Planning and Environmental Consultants

# Environmental Impact Assessment Report

## Derrybrien Wind Farm Development Decommissioning Project – Prospective Development

## Volume 1: Non-Technical Summary & Main Report

Planning and Environmental Consultants

Energy for generations

# Environmental Impact Assessment Report

## Derrybrien Wind Farm Development Decommissioning Project – Prospective Development

## Volume 1

## Non-Technical Summary and Main Report



# DOCUMENT DETAILS

| | |
|---|---|
| Client: | **Gort Windfarms Ltd.** |
| Project Title: | **Derrybrien Wind Farm Development Decommissioning Project – Prospective Development** |
| Project Number: | **220437** |
| Document Title: | **Volume 1 - Non-Technical Summary and Main Report** |
| Document File Name: | **EIAR F – 2025.04.25 – 220437** |
| Prepared By: | **MKO**<br>**Tuam Road**<br>**Galway**<br>**Ireland**<br>**H91 VW84** |

Planning and Environmental Consultants

| Rev | Status | Date | Author(s) | Approved By |
|---|---|---|---|---|
| 01 | Final | 25.04.2025 | TB | MW |
| | | | | |
| | | | | |
| | | | | |

# Table of Contents

TABLE OF CONTENTS.....i

TABLE OF TABLES.....xii

TABLE OF FIGURES.....xvii

TABLE OF PLATES.....xxi

TABLE OF APPENDICES.....xxiii

NON-TECHNICAL SUMMARY.....xxv

1. INTRODUCTION..... 1-1

1.1 Introduction..... 1-1
1.2 The Applicant..... 1-1
1.3 Brief Description of the Prospective Development..... 1-1
1.4 Project Need..... 1-2
1.5 Legislative Context..... 1-3
1.5.1 Requirement for EIA..... 1-3
1.5.2 Environmental Impact Assessment..... 1-3
1.5.3 EIAR Guidance..... 1-4
1.6 Purpose and Scope of the EIAR..... 1-4
1.7 Structure and Content of the EIAR..... 1-5
1.7.1 General Structure..... 1-5
1.7.2 Content of the EIAR / Environmental Baseline..... 1-6
1.7.3 Description of Likely Significant Effects and Impacts..... 1-6
1.8 Project Team..... 1-8
1.8.1 Project Team Responsibilities..... 1-8
1.8.2 Project Team Members..... 1-10
1.9 Difficulties Encountered..... 1-16
1.10 Viewing and Purchasing of the EIAR..... 1-16

2. SCOPING AND CONSULTATION..... 2-1

2.1 Introduction..... 2-1
2.2 Informal Scoping..... 2-1
2.3 Pre-Planning Consultation and the Community Engagement Process..... 2-5
2.3.1 Pre-Planning Application Consultation..... 2-5
2.3.2 Public Consultation..... 2-6

3. ASSESSMENT OF REASONABLE ALTERNATIVES..... 3-1

3.1 Introduction..... 3-1
3.1.1 Chapter Scope..... 3-1
3.1.2 Statement of Authority..... 3-2
3.1.3 Relevant Legislation and Guidance..... 3-2
3.2 Methodology..... 3-2
3.3 Receiving Environment..... 3-4

3.3.1 Derrybrien Wind Farm (including the Derrybrien 110kV Substation) 3-4
3.3.2 Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation 3-11
3.3.3 Offsite ancillary works associated with peat slide (2003) 3-14
3.4 Evaluation of Decommissioning Alternatives 3-17
3.4.1 Work Area A: Derrybrien Wind Farm (including the Derrybrien 110kV Substation) 3-17
3.4.2 Work Area B: Derrybrien to Agannygal 110 kV OHL including Agannygal 110kV Substation 3-35
3.4.3 Work Area C: Offsite ancillary works associated with peat slide (2003) 3-49
3.5 Conclusions 3-64

4. DESCRIPTION OF THE PROSPECTIVE DEVELOPMENT 4-1

4.1 Introduction 4-1
4.2 Existing Derrybrien Wind Farm Project 4-3
4.2.1 Existing Derrybrien Wind Farm 4-5
4.2.2 Existing Derrybrien to Agannygal 110 kV OHL 4-8
4.2.3 Existing Agannygal 110kV Substation 4-8
4.2.4 Offsite features constructed in response to the peat slide (2003) 4-8
4.3 Derrybrien Wind Farm Development Decommissioning Project 4-13
4.4 Prospective Development Components 4-13
4.4.1 Enabling Works 4-13
4.4.2 Decommissioning Derrybrien Wind Farm (including the Derrybrien 110kV Substation) 4-14
4.4.3 Decommissioning Derrybrien Wind Farm Grid Connection 4-16
4.5 Decommissioning Programme 4-17
4.6 Environmental Protection Measures 4-17
4.6.1 Environmental Management Plan 4-17
4.6.2 Resource and Waste Management Plan 4-18
4.6.3 Traffic Management Plan 4-18
4.7 Cumulative Impact Assessment 4-18
4.7.1 Projects Considered in Cumulative Assessment 4-19
4.7.2 Adjacent Land Uses 4-20

5. POPULATION AND HUMAN HEALTH 1

5.1 Introduction 1
5.1.1 Chapter Scope 1
5.1.2 Statement of Authority 1
5.1.3 Relevant Legislation 1
5.1.4 Relevant Guidance 2
5.2 Methodology 2
5.2.1 Population and Human Health Study Area 2
5.2.2 Consultation 3
5.2.3 Impact Assessment Methodology 3
5.2.3.1 Population 4
5.2.3.2 Human Health 4
5.2.4 Limitations /Difficulties Encountered 6
5.3 Receiving Environment 6
5.3.1 Population 7
5.3.1.1 Population Trends 7
5.3.1.2 Household Statistics 10
5.3.1.3 Study Area Age Structure 10
5.3.2 Employment and Economic Activity 11
5.3.2.1 Economic Status of the Study Area 11
5.3.2.2 Employment by Socio-Economic Group 12
5.3.3 Land-Use 13
5.3.4 Services 14
5.3.5 Education 14

5.3.6 Access and Public Transport ..... 14
5.3.7 Amenities and Community Facilities ..... 14
5.3.8 Tourism ..... 15
5.3.8.1 Tourism Numbers and Revenue ..... 15
5.3.8.2 Tourist Attractions ..... 16
5.4 Assessment of Effects on Human Health ..... 17
5.5 Vulnerability of the Prospective Development to Natural Disasters and Major Accidents ..... 17
5.6 Residential Amenity ..... 18
5.7 Likely Significant Impacts and Mitigation Measures Implemented ..... 18
5.7.1 "Do-Nothing" Scenario ..... 19
5.7.2 Impacts of Prospective Development ..... 19
5.7.2.1 Population Levels ..... 19
5.7.2.2 Employment and Investment ..... 19
5.7.2.3 Land-use ..... 19
5.7.2.4 Tourism ..... 19
5.7.2.5 Health ..... 20
5.7.3 Cumulative and In-Combination Effects ..... 25
5.7.3.1 Employment and Economic Activity ..... 26
5.7.3.2 Tourism and Amenity ..... 26
5.7.3.3 Air (Dust) ..... 26
5.7.3.4 Health and Safety ..... 26
5.7.3.5 Residential Amenity ..... 26
5.8 Conclusion ..... 27

6. **BIODIVERSITY (TERRESTRIAL AND AVIAN ECOLOGY) ..... 6-1**

6.1 Introduction ..... 6-1
6.1.1 Chapter Scope ..... 6-1
6.1.2 Statement of Authority ..... 6-1
6.1.3 Relevant Legislation ..... 6-3
6.1.4 Relevant Guidance ..... 6-3
6.2 Methodology ..... 6-4
6.2.1 Overview ..... 6-4
6.2.2 Desk Study ..... 6-5
6.2.3 Zone of Influence ..... 6-6
6.2.4 Field Surveys ..... 6-9
6.2.4.1 Terrestrial habitats ..... 6-9
6.2.4.2 Birds ..... 6-10
6.2.4.3 Bats ..... 6-16
6.2.4.4 Mammals (other than bats) ..... 6-18
6.2.4.5 Other fauna ..... 6-18
6.2.5 Scoping and Consultation ..... 6-19
6.2.6 Assessment Methodology ..... 6-19
6.2.6.1 Important Ecological Features ..... 6-19
6.2.6.2 Evaluation: Determining Importance ..... 6-19
6.2.6.3 Characterising and Qualifying Impacts and Assessing the Significance of Effects ..... 6-20
6.2.7 Article 12 of the Habitats Directive ..... 6-20
6.2.8 Limitations/Difficulties Encountered ..... 6-22
6.3 Receiving Environment ..... 6-22
6.3.1 Designated Nature Conservation Sites ..... 6-23
6.3.1.1 European sites ..... 6-23
6.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas ..... 6-29
6.3.1.3 Nature Reserves ..... 6-33
6.3.2 Protected and/or Rare Species ..... 6-33
6.3.3 Terrestrial Habitats ..... 6-33
6.3.3.1 Terrestrial Habitats within Prospective Development Area ..... 6-33
6.3.4 Invasive species ..... 6-41
6.3.5 Birds ..... 6-42
6.3.5.1 Review of status of birds in study area, 1998-2018 ..... 6-42
6.3.5.2 Review of hen harrier population in Slieve Aughty Mountains SPA ..... 6-47
6.3.5.3 Status of birds in study area in 2022 and 2024 ..... 6-49
6.3.6 Bats ..... 6-52
6.3.6.1 Desk Study ..... 6-52
6.3.6.2 Evaluation of vulnerability of baseline bat assemblage ..... 6-55

6.3.6.3 Summary Evaluation of Bat Resources ..... 6-62
6.3.7 Mammals (other than bats) ..... 6-63
6.3.7.1 European otter ..... 6-63
6.3.7.2 Other mammals ..... 6-64
6.3.8 Other Fauna ..... 6-64
6.4 Likely, Significant Impacts and Mitigation Measures Implemented ..... 6-65
6.4.1 Do-Nothing Scenario ..... 6-65
6.4.2 Impacts of the Prospective Development ..... 6-66
6.4.2.1 Designated Nature Conservation Sites ..... 6-66
6.4.2.2 Protected and/or Rare Species ..... 6-70
6.4.2.3 Terrestrial Habitats ..... 6-70
6.4.2.4 Birds ..... 6-76
6.4.2.5 Bats ..... 6-86
6.4.2.6 Mammals (other than bats) ..... 6-88
6.4.2.7 Other Fauna ..... 6-93
6.4.3 Potential Cumulative Impacts ..... 6-96
6.4.3.1 Designated Nature Conservation Sites ..... 6-96
6.4.3.2 Terrestrial Habitats ..... 6-97
6.4.3.3 Birds ..... 6-97
6.4.3.4 Bats ..... 6-98
6.4.3.5 Mammals (other than bats) ..... 6-99
6.4.3.6 Other Fauna ..... 6-100
6.5 Residual Effects ..... 6-100
6.5.1 Designated Nature Conservation Sites ..... 6-100
6.5.1.1 European sites ..... 6-100
6.5.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas ..... 6-100
6.5.1.3 Nature Reserves ..... 6-100
6.5.2 Protected and/or Rare Species ..... 6-101
6.5.3 Terrestrial Habitats ..... 6-101
6.5.3.1 Terrestrial Habitats within Prospective Development Area ..... 6-101
6.5.4 Birds ..... 6-101
6.5.5 Bats ..... 6-101
6.5.6 Mammals (other than bats) ..... 6-102
6.5.6.1 European otter ..... 6-102
6.5.6.2 Other mammals ..... 6-102
6.5.7 Other Fauna ..... 6-102

7. BIODIVERSITY (AQUATIC ECOLOGY AND FISHERIES INCLUDING WATER QUALITY) ..... 7-1

7.1 Introduction ..... 7-1
7.1.1 Background and Objectives ..... 7-1
7.1.2 Statement of Authority ..... 7-2
7.1.3 Relevant Legislation ..... 7-2
7.1.4 Relevant Guidance ..... 7-3
7.2 Methodology ..... 7-3
7.2.1 Overview of Methods for the Aquatic Study ..... 7-3
7.2.2 Desk Study ..... 7-3
7.2.3 Field Surveys ..... 7-4
7.2.3.1 Macroinvertebrate Q-value Surveys ..... 7-7
7.2.3.2 Water Chemistry ..... 7-8
7.2.3.3 Electrofishing Surveys ..... 7-9
7.2.4 Impact Assessment Methodology ..... 7-10
7.2.5 Ecological Valuation of Watercourses ..... 7-10
7.2.6 Impact Assessment Criteria ..... 7-11
7.2.7 Limitations/Difficulties Encountered ..... 7-12
7.2.8 Scoping and Consultation ..... 7-12
7.3 Receiving Environment ..... 7-12
7.3.1 River Catchments - Overview ..... 7-12
7.3.2 Wind Farm On-Site Drainage ..... 7-12
7.3.3 Drainage from the Wind Farm ..... 7-13
7.3.4 Drainage of the Overhead Line (OHL) Corridor ..... 7-16
7.3.5 Wider Drainage Area and connectivity to European Sites ..... 7-16
7.3.6 Biological Water Quality ..... 7-17
7.3.6.1 EPA Monitoring ..... 7-17

7.3.6.2 Q-Value Surveys for this Assessment ..... 7-18
7.3.7 Habitat Description ..... 7-20
7.3.8 Water Chemistry ..... 7-26
7.3.8.1 EPA Data ..... 7-26
7.3.8.2 Water Chemistry ..... 7-26
7.3.8.3 Overview ..... 7-26
7.3.8.4 pH, conductivity, alkalinity and calcium ..... 7-27
7.3.8.5 Colour and DOC ..... 7-27
7.3.8.6 BOD, ammonia and SRP ..... 7-27
7.3.8.7 Iron ..... 7-27
7.3.8.8 Aluminium ..... 7-28
7.3.8.9 Suspended Solids ..... 7-28
7.3.9 Fisheries ..... 7-31
7.3.9.1 Overview ..... 7-31
7.3.9.2 Findings of Fisheries Surveys ..... 7-31
7.3.10 Ecological and Freshwater Value ..... 7-37
7.3.10.1 Approach ..... 7-37
7.3.10.2 Overview of the Evaluation ..... 7-37
7.4 Likely Significant Impacts and Mitigation Measures Implemented ..... 7-40
7.4.1 Do-Nothing Scenario ..... 7-40
7.4.2 Impacts of the Prospective Development ..... 7-40
7.4.2.1 Relevant Characteristics of the Proposal ..... 7-40
7.4.2.2 Initial Considerations ..... 7-41
7.4.2.3 Windfarm Decommissioning ..... 7-41
7.4.2.4 Decommissioning of the OHL Line and Agannygal Substation ..... 7-53
7.4.3 Water Framework Directive Implications ..... 7-65
7.4.4 Cumulative and In-Combination Effects ..... 7-65
7.4.4.1 Overview ..... 7-65
7.4.4.2 Cumulative Effects with Retained Development ..... 7-65
7.4.4.3 Cumulative Effects of Prospective Development with Turbary and Clear-felling ..... 7-65
7.4.5 Designated Nature Conservation Sites ..... 7-67
7.5 Conclusion ..... 7-67

8. LAND, SOILS AND GEOLOGY ..... 8-1

8.1 Introduction ..... 8-1
8.1.1 Scope of Chapter ..... 8-1
8.1.2 Statement of Authority ..... 8-1
8.1.3 Relevant Legislation ..... 8-2
8.1.4 Relevant Guidance ..... 8-2
8.2 Methodology ..... 8-3
8.2.1 Desk Study ..... 8-3
8.2.2 Walkover Surveys and Site Inspections ..... 8-3
8.2.3 Scoping and Consultation ..... 8-4
8.2.4 Impact Assessment Methodology ..... 8-5
8.2.4.1 Baseline Condition ..... 8-5
8.2.4.2 Terminology ..... 8-5
8.2.4.3 Direct Impacts ..... 8-5
8.2.4.4 Stability Impacts ..... 8-5
8.2.4.5 Sensitivity of the Receiving Environment for Direct & Stability Impacts ..... 8-9
8.2.4.6 Significance of Effects for Direct & Stability Impacts ..... 8-10
8.2.4.7 Cumulative Impacts ..... 8-11
8.2.4.8 Remedial (Mitigation) Measures and Monitoring ..... 8-11
8.2.4.9 Residual Impacts ..... 8-11
8.2.5 Limitations/Difficulties Encountered ..... 8-11
8.3 Receiving Environment ..... 8-12
8.3.1 Introduction ..... 8-12
8.3.2 Geotechnical Investigations ..... 8-13
8.3.2.1 Introduction ..... 8-13
8.3.2.2 Pre-Construction Ground Investigation - IGSL Site Investigation (2002) ..... 8-13
8.3.2.3 AGL/BAM Supplemental Site Investigations – Construction Stage (Post-Slide – 2004/2005) ..... 8-14
8.3.2.4 AGEC Ground Investigation (2003) ..... 8-14
8.3.2.5 ESBIE Ground Investigation (2004) ..... 8-15
8.3.2.6 AGEC Ground Investigation (2018) ..... 8-15

8.3.3 Land Use and Topography ..... 8-17
8.3.4 Soils and Geology ..... 8-22
8.3.4.1 Quaternary Geology Map – Geological Survey of Ireland ..... 8-22
8.3.4.2 Peat (Upland Blanket Bog) ..... 8-22
8.3.4.3 Mineral Subsoil and Glacial Till ..... 8-30
8.3.4.4 Bedrock Geology ..... 8-30
8.3.5 Geological Heritage and Designated Sites ..... 8-33
8.3.6 Economic Geology ..... 8-33
8.3.7 Soil Contamination ..... 8-33
8.3.8 Groundwater ..... 8-34
8.3.9 Surface Water, Watercourses and Surface Drainage ..... 8-35
8.3.10 Baseline Sensitivity of the Receiving Environment (Soils, Geology & Land Use) ..... 8-38
8.3.11 Landslide Susceptibility Mapping ..... 8-40
8.3.12 Peat Stability Risk Assessment (PSRA) ..... 8-43
8.3.12.1 PSRA for Wind farm Site – Initial Conditions Prior to Construction ..... 8-44
8.3.12.2 Changes in the Likelihood of a Peat Slide over the Project Life Cycle and Baseline Conditions for Decommissioning – Wind Farm Site ..... 8-46
8.3.12.3 Summary of full-scale proof testing carried out on all of the floating roads in 2018 ..... 8-47
8.3.12.4 PSRA for PS-1 to PS-4 of the 110kV OHL between Derrybrien and Agannygal ..... 8-54
8.3.12.5 PSRA for Grid Connection: 110kV OHL (PS-5 to EW-41) & Agannygal Substation ..... 8-57
8.4 Likely, Significant Impacts and Mitigation Measures Implemented ..... 8-59
8.4.1 Do-Nothing Scenario ..... 8-59
8.4.2 Prospective Development (Wind Farm & Polesets PS-1a to PS-4 of the 110kV OHL) ..... 8-60
8.4.2.1 Site Activities – Decommissioning of Wind Farm & Polesets PS-1a to PS-4 of the 110kV OHL ..... 8-60
8.4.2.2 Assessment of Direct Impacts During Decommissioning ..... 8-66
8.4.2.3 Assessment of Stability Impacts During Decommissioning ..... 8-66
8.4.3 Prospective Development Impacts (OHL) ..... 8-73
8.4.3.1 Site Activities - Decommissioning of Overhead Line and Agannygal Substation ..... 8-73
8.4.3.2 Assessment of Direct Impacts During Decommissioning ..... 8-73
8.4.3.3 Assessment of Stability Impacts During Decommissioning ..... 8-75
8.4.4 Geotechnical Monitoring and Mitigation of Site Activities during Decommissioning ..... 8-79
8.4.5 Potential Cumulative Impacts ..... 8-82
8.4.5.1 Introduction ..... 8-82
8.4.5.2 Cumulative Impacts with Retained Development ..... 8-82
8.4.5.3 Cumulative Impacts from Adjacent Coniferous Forestry Plantations (Not Part of Prospective Development) ..... 8-82
8.4.5.4 Cumulative Impacts from Peat Extraction outside the Prospective Development Site ..... 8-83
8.4.5.5 Cumulative Impacts from Mechanical Peat Harvesting in Turbary Plots Within and Immediately Adjacent to the Wind Farm Site ..... 8-83
8.4.6 Residual Impacts ..... 8-109
8.4.6.1 Residual Direct Impacts ..... 8-109
8.4.6.2 Residual Stability Impacts ..... 8-112
8.5 Conclusions ..... 8-116
8.5.1 Wind Farm & Polesets PS-1a to PS-4 of 110kV OHL ..... 8-116
8.5.2 Grid Connection: 110kV OHL & Annygal Substation ..... 8-119

9. **HYDROLOGY AND HYDROGEOLOGY ..... 9-1**

9.1 Introduction ..... 9-1
9.1.1 Chapter Scope ..... 9-1
9.1.2 Statement of Authority ..... 9-1
9.1.3 Relevant Legislation ..... 9-1
9.1.4 Relevant Guidance ..... 9-2
9.2 Methodology ..... 9-3
9.2.1 Impact Assessment Methodology ..... 9-3

9.2.2 Flood Risk Assessment Methodology ..... 9-3
9.2.3 Zone of Influence ..... 9-4
9.2.4 Baseline Data Gathering ..... 9-7
9.2.5 Site Walkover ..... 9-7
9.2.6 Scoping and Consultation ..... 9-8
9.2.7 Limitations/Difficulties Encountered ..... 9-8
9.3 Receiving Environment ..... 9-8
9.3.1 Existing Environment ..... 9-8
9.3.2 Water Balance ..... 9-14
9.3.3 Regional & Local Hydrology ..... 9-16
9.3.4 Hydrogeology ..... 9-18
9.3.5 Flood Risk Identification ..... 9-25
9.3.6 Groundwater Quality ..... 9-26
9.3.7 Surface Water Quality ..... 9-26
9.4 Likely, Significant Impacts and Mitigation Measures Implemented ..... 9-27
9.4.1 Do-Nothing Scenario ..... 9-27
9.4.2 Impacts of the Prospective Development ..... 9-27
9.4.3 Cumulative and In-Combination Effects ..... 9-35
9.5 Conclusion ..... 9-38
9.6 References ..... 9-39
9.7 Glossary of Terms ..... 9-40

10. **AIR AND CLIMATE ..... 10-1**

10.1 Introduction ..... 10-1
10.1.1 Chapter Scope ..... 10-1
10.1.2 Statement of Authority ..... 10-1
10.1.3 Relevant Guidance ..... 10-1
10.1.4 Limitations /Difficulties Encountered ..... 10-2
10.2 Air Quality ..... 10-2
10.2.1 Methodology ..... 10-2
10.2.1.1 Assessment of Significance ..... 10-2
10.2.1.2 Relevant Legislation ..... 10-2
10.2.1.3 Air Quality Standards ..... 10-3
10.2.1.4 Air Quality and Health ..... 10-6
10.2.2 Receiving Environment ..... 10-7
10.2.2.1 Air Quality Zones ..... 10-7
10.2.2.2 Existing Air Quality ..... 10-7
10.2.3 Likely and Significant Impacts and Mitigation Measures Implemented ..... 10-10
10.2.3.1 'Do-Nothing' Scenario ..... 10-10
10.2.3.2 Impacts of Prospective Development ..... 10-11
10.2.3.3 Cumulative and In-Combination Effects ..... 10-14
10.2.4 Conclusion ..... 10-15
10.3 Climate ..... 10-16
10.3.1 Relevant Guidance ..... 10-16
10.3.2 Methodology ..... 10-16
10.3.2.1 Assessment of Significance ..... 10-16
10.3.3 Climate Change and Greenhouse Gases ..... 10-16
10.3.3.1 International Greenhouse Gas Emission and Climate Targets ..... 10-16
10.3.3.2 National Greenhouse Gas Emission and Climate Targets ..... 10-25
10.3.3.3 Local Greenhouse Gas Emission and Climate Targets ..... 10-32
10.3.3.3.1 *Galway Local Authority Climate Action Plan 2024-2029* ..... 10-32
10.3.3.4 Contribution of the Prospective Development to Meeting Greenhouse Gas Emission Targets ..... 10-32
10.3.4 Receiving Environment: Climate and Weather in the Existing Environment ..... 10-32
10.3.4.1 Wind 10-33
10.3.4.2 Rainfall ..... 10-33
10.3.5 Likely Significant Effects and Mitigation Measures Implemented ..... 10-37
10.3.5.1 'Do-Nothing' Scenario ..... 10-37
10.3.5.2 Impacts of Prospective Development ..... 10-37
10.3.5.3 Cumulative and In-Combination Effects ..... 10-39
10.3.6 Conclusion ..... 10-39

11. NOISE AND VIBRATION ..... 11-1

11.1 Introduction ..... 11-1
11.1.1 Chapter Scope ..... 11-1
11.1.2 Statement of Authority ..... 11-1
11.1.3 Relevant Legislation ..... 11-2
11.1.4 Relevant Guidance ..... 11-2
11.2 Methodology ..... 11-4
11.2.1 Zone of Influence ..... 11-4
11.2.2 Document review ..... 11-4
11.2.3 Scoping and Consultation ..... 11-4
11.2.4 Impact Assessment Methodology ..... 11-4
11.2.5 Limitations/Difficulties Encountered ..... 11-5
11.3 Receiving Environment ..... 11-5
11.3.1 Receptors ..... 11-5
11.3.2 Noise levels (2018 and 2019) ..... 11-11
11.4 Likely Significant Impacts and Mitigation Measures Implements ..... 11-13
11.4.1 Do-Nothing Scenario ..... 11-13
11.4.2 Impacts of Prospective Development ..... 11-14
11.4.3 Cumulative and In-Combination Effects ..... 11-22
11.5 Summary Of Effects ..... 11-22
11.6 Conclusion ..... 11-23
11.7 Glossary ..... 11-24

12. CULTURAL HERITAGE ..... 12-1

12.1 Introduction ..... 12-1
12.1.1 Chapter Scope ..... 12-1
12.1.2 Statement of Authority ..... 12-1
12.1.3 Relevant Legislation ..... 12-1
12.1.4 Relevant Guidance ..... 12-4
12.2 Methodology ..... 12-4
12.2.1 Zone of Influence ..... 12-4
12.2.2 Desktop Study ..... 12-4
12.2.3 Site Walkover ..... 12-5
12.2.4 Scoping and Consultation ..... 12-5
12.2.5 Impact Assessment Methodology ..... 12-6
12.2.6 Limitations/Difficulties Encountered ..... 12-10
12.3 Receiving Environment ..... 12-10
12.3.1 Archaeological and Historical Context ..... 12-10
12.3.2 Cartographic Sources ..... 12-19
12.3.3 Designated Architectural Heritage ..... 12-21
12.3.4 Undesignated and Intangible Cultural Heritage ..... 12-22
12.3.5 Site Inspections ..... 12-23
12.3.6 Summary of Baseline Information ..... 12-26
12.4 Likely, Significant Impacts and Mitigation Measures Implemented ..... 12-27
12.4.1 Do-Nothing Scenario ..... 12-27
12.4.2 Impacts of the Prospective Development ..... 12-27
12.4.3 Cumulative and In-Combination Effects ..... 12-28
12.5 Conclusion ..... 12-29

13. LANDSCAPE AND VISUAL ..... 13-1

13.1 Introduction ..... 13-1
13.1.1 Chapter Scope ..... 13-1
13.1.2 Statement of Authority ..... 13-1
13.2 Methodology ..... 13-1
13.2.1 Key Guidance Documents ..... 13-1

13.2.2 Other Guidance ..... 13-2
13.2.3 Key Principles of GLVIA ..... 13-3
13.3 Assessment Methodology- overall process ..... 13-3
13.3.2 Sensitivity of the Landscape Resource ..... 13-4
13.3.3 Magnitude of Landscape Change ..... 13-5
Significance of Effects ..... 13-6
13.3.4 Sensitivity of the Visual Receptor ..... 13-7
13.3.5 Magnitude of Change to the View ..... 13-8
13.3.6 Quality and Timescale of Effects ..... 13-11
13.3.7 Study Area ..... 13-11
13.3.8 Limitations/Difficulties Encountered ..... 13-12
13.4 Receiving Environment ..... 13-12
13.4.1 Landscape Character ..... 13-12
13.4.2 Landscape Policy ..... 13-21
13.4.3 Visual Receptors ..... 13-26
13.5 Likely, Significant Impacts and Mitigation Measures ..... 13-34
13.5.1 Do-Nothing Scenario ..... 13-34
13.5.2 Effects of the Prospective Development ..... 13-35
13.5.3 Cumulative and In-Combination Impacts ..... 13-51
13.6 Mitigation Measures ..... 13-54
13.7 Conclusion ..... 13-54

14. **MATERIAL ASSETS ..... 14-1**

14.1 Traffic and Transport ..... 14-1
14.1.1 Introduction ..... 14-1
14.1.2 Methodology ..... 14-2
14.1.3 Receiving Environment ..... 14-3
14.1.4 Traffic Assessment ..... 14-17
14.1.5 Likely Significant Effects and Mitigation Measures Implements ..... 14-23
14.1.6 Conclusion ..... 14-24
14.2 Telecommunications, Aviation, and Other Material Assets ..... 14-26
14.2.1 Introduction ..... 14-26
14.2.2 Methodology ..... 14-26
14.2.3 Receiving Environment ..... 14-27
14.2.4 Likely Significant Effects and Mitigation Measures Implemented ..... 14-29
14.2.5 Cumulative and In-Combination Effects ..... 14-31
14.2.6 Conclusion ..... 14-31

15. **VULNERABILITY OF THE PROJECT TO MAJOR ACCIDENTS AND/OR NATURAL DISASTERS ..... 15-1**

15.1 Introduction ..... 15-1
15.1.1 Scope of Chapter ..... 15-1
15.1.2 Statement of Authority ..... 15-1
15.1.3 Relevant Legislation ..... 15-2
15.1.3.1 Relevant Guidance Documents ..... 15-2
15.2 Assessment Methodology ..... 15-3
15.2.1 Categorisation of the Baseline Environment ..... 15-3
15.2.2 Impact Assessment Methodology ..... 15-3
15.2.2.1 Introduction ..... 15-3
15.2.2.2 Site-Specific Risk Assessment Methodology ..... 15-4
15.3 Project Hazard Analysis ..... 15-7
15.3.2 Meteorological ..... 15-10
15.3.3 Hydrological ..... 15-11
15.3.4 Peat Stability ..... 15-11
15.3.5 Transportation ..... 15-13
15.3.6 Industrial Accident ..... 15-13
15.3.7 Loss of Critical Infrastructure ..... 15-13

15.3.8 Contamination ..... 15-14
15.3.9 Health and Safety ..... 15-14
15.4 Risk Assessment ..... 15-14
15.4.1.1 Likely Significant Effects ..... 15-15
15.4.2 Mitigation Measures ..... 15-22
15.4.3 Residual Effects ..... 15-23
15.4.4 Assessment of Cumulative Effects ..... 15-23
15.4.4.1 Cumulative Impacts with the Retained Development ..... 15-23
15.4.4.2 Cumulative Impacts from Adjacent Coniferous Forestry Plantations (Not Part of Project) ..... 15-25
15.4.4.3 Turbary Activities ..... 15-25
15.5 Conclusion ..... 15-26

16. RESOURCE AND WASTE MANAGEMENT ..... 16-1

16.1 Introduction ..... 16-1
16.1.1 Chapter Scope ..... 16-1
16.1.2 Statement of Authority ..... 16-1
16.1.3 Relevant Legislation ..... 16-1
16.1.4 Waste Management Policy Context ..... 16-2
16.1.4.1 National Level ..... 16-2
16.1.4.2 Regional Level - Connacht-Ulster Waste Management Plan 2015 – 2021 ..... 16-3
16.1.5 Relevant Guidance ..... 16-5
16.2 Methodology ..... 16-6
16.2.1 Introduction ..... 16-6
16.2.2 Assessment Methodology ..... 16-8
16.2.2.1 Step 1 - Assessing Sensitivity ..... 16-9
16.2.2.2 Step 2 - Assessing Magnitude of Impacts ..... 16-9
16.2.2.3 Step 3 - Determining the Significance of Effect ..... 16-10
16.2.3 Scoping and Consultation ..... 16-11
16.2.4 Limitations/Difficulties Encountered ..... 16-11
16.3 Receiving Environment ..... 16-11
16.3.1 Waste Management Facilities ..... 16-12
16.3.2 National Landfill Capacity ..... 16-12
16.3.3 Hazardous waste treatment in Ireland ..... 16-13
16.4 Characteristics of the Prospective Development ..... 16-13
16.4.1 Waste Generation ..... 16-13
16.4.1.1 Wind Turbines ..... 16-13
16.4.1.2 Underground Cables ..... 16-15
16.4.1.3 Anemometer Masts ..... 16-15
16.4.1.4 Derrybrien 110kV Grid Connection OHL ..... 16-15
16.4.1.5 Substation Electrical Equipment ..... 16-16
16.4.1.6 Substation Demolition Waste ..... 16-18
16.4.1.7 General Domestic Waste ..... 16-19
16.4.1.8 Summary of Waste Generation ..... 16-19
16.5 Likely Significant Impacts and Associated Mitigation Measures ..... 16-20
16.5.1 "Do-Nothing" Scenario ..... 16-20
16.5.2 Impacts of Prospective Development ..... 16-20
16.5.2.1 Waste Generation ..... 16-20
16.5.3 Cumulative and In-Combination Effects ..... 16-24
16.6 Conclusion ..... 16-25

17. INTERACTION OF THE FOREGOING ..... 17-1

17.1 Introduction ..... 17-1
17.1.1 Chapter Scope ..... 17-1
17.1.2 Statement of Authority ..... 17-3
17.1.3 Relevant Legislation ..... 17-3
17.1.4 Relevant Guidance ..... 17-3
17.2 Methodology ..... 17-3
17.2.1 Limitations/Difficulties Encountered ..... 17-3
17.3 Receiving Environment ..... 17-4
17.3.1 Impact Interactions of Prospective Development ..... 17-4
17.4 Conclusion ..... 17-8

18. SCHEDULE OF MITIGATION MEASURES AND CONCLUSION ..... 18-1

18.1 Introduction ..... 18-1
18.1.1 Chapter Scope ..... 18-1
18.2 Mitigation Measures ..... 18-1
18.3 Conclusion ..... 18-1

GLOSSARY

BIBLIOGRAPHY

## TABLE OF TABLES

*Table 1-1 Impact Classification Terminology (EPA, 2022)* ..... 1-7
*Table 1-2 Project Team* ..... 1-9
*Table 2-1 Scoping Responses* ..... 2-2
*Table 2-2 Review of Scoping Responses.* ..... 2-3
*Table 3-1 Description of Environmental Effects Scores (adapted from EPA Guidance 2022)* ..... 3-3
*Table 3-2 Summary of Predicted Effects of Alternative 1 (Work Area A).* ..... 3-18
*Table 3-3 Alternative 2 - Estimated tonnages of material to be removed from Work Area A during decommissioning.* ..... 3-22
*Table 3-4 Summary of Predicted Effects of Alternative 2 (Work Area A).* ..... 3-22
*Table 3-5 Alternative 4 - Estimated tonnages of material to be removed from Work Area A during decommissioning.* ..... 3-28
*Table 3-6 Summary of Predicted Effects of Alternative 4 (Work Area A).* ..... 3-29
*Table 3-7 Comparison of Alternatives Considered (Work Area A)* ..... 3-34
*Table 3-8 Estimated tonnages of material to be removed from Work Area A during decommissioning (Alternative 1-4)* ..... 3-35
*Table 3-9 Summary of Predicted Effects of Alternative 1 (Work Area B).* ..... 3-36
*Table 3-10 Alternative 2 - Estimated tonnages of material to be removed from Work Area B during decommissioning* ..... 3-38
*Table 3-11 Summary of Predicted Effect of Alternative 2 (Work Area B).* ..... 3-40
*Table 3-12 Alternative 4 - Estimated tonnages of material to be removed from Work Area B during decommissioning.* ..... 3-44
*Table 3-13 Summary of Predicted effects of Alternative 4 (Work Area B).* ..... 3-45
*Table 3-14 Comparison of Alternatives Considered (Work Area B)* ..... 3-48
*Table 3-15 Estimated tonnages of material to be removed from Work Area B during decommissioning (Alternative 1-4)* ..... 3-49
*Table 3-16 Summary of Predicted Effects of Alternative 1 (Work Area C).* ..... 3-50
*Table 3-17 Alternative 2 - Estimated tonnages of material to be removed from Work Area C during decommissioning.* ..... 3-53
*Table 3-18 Summary of Predicted Effects of Alternative 2 (Work Area C)* ..... 3-53
*Table 3-19 Summary of Predicted effects of Alternative 3 (Work Area C).* ..... 3-56
*Table 3-20 Alternative 4 - Estimated tonnages of material to be removed from Work Area C during decommissioning.* ..... 3-59
*Table 3-21 Summary of Predicted effects of Alternative 4 (Work Area C)* ..... 3-59
*Table 3-22 Comparison of Alternatives Considered (Work Area C)* ..... 3-63
*Table 3-23 Estimated tonnages of material to be removed from Work Area C during decommissioning (Alternative 1-4)* ..... 3-64
*Table 3-24 Summary of Assessment of Alternative Findings for each Work Area* ..... 3-65
*Table 5-2 Population Density in 2016 and 2022 (Source: CSO)* ..... 5-7
*Table 5-3 Number of Household and Average Household Size 2016 – 2022 (Source: CSO)* ..... 5-10
*Table 5-4 Population per Age Category in 2022 (Source: CSO)* ..... 5-10
*Table 5-5 Economic Status of the Total Population Aged 15+ in 2022 (Source: CSO)* ..... 5-11
*Table 5-6 Farm Size and Classification within the Study Area in 2020 (Source: CSO)* ..... 5-13

*Table 5-7 Overseas Tourists Revenue and Numbers 2019 (Source: Fáilte Ireland)* ..... 5-15

*Table 5-8 Overseas Tourism to West Region during 2017 (Source: Fáilte Ireland)* ..... 5-16

*Table 5-9 Domestic Tourism Revenue by Region 2022* ..... 5-16

*Table 6-1 Details of vantage points within wind farm used for surveys.* ..... 6-11

*Table 6-2 SACs and SPAs within 15km of the Prospective Development (Slieve Aughty Mountains SPA, Lough Cutra SAC and Lough Cutra SPA, highlighted in blue, are within the ZoI of the Prospective Development)* ..... 6-23

*Table 6-3 NHAs and pNHAs within 15km of the Prospective Development (Slieve Aughty Bog NHA and Lough Cutra pNHA, highlighted in blue, are within the ZoI of the Prospective Development)* ..... 6-29

*Table 6-4 Overview of terrestrial habitats present within or adjacent to the Prospective Development area.* ..... 6-41

*Table 6-5 Summary of the number of territories occupied in various years since 2004 within a 5 km radius of the wind farm.* ..... 6-44

*Table 6-6 Status of birds recorded at Derrybrien Wind Farm during various summer surveys, 2006-2018. Breeding status given as possible, probable, confirmed or non-breeding after Breeding Atlas (Balmer et al. 2012). Conservation status after Gilbert et al. (2021).* ..... 6-45

*Table 6-7 Comparative population data from the national hen harrier surveys in 1998-2000, 2005, 2010, 2015 and 2022 for the Slieve Aughty Mountains, and for 2020 and 2021. Figures are total estimated pairs.* ..... 6-47

*Table 6-8 Potential impacts on terrestrial habitats associated with the decommissioning of Derrybrien Wind Farm (including its substation)* ..... 6-71

*Table 6-9 Potential impacts on terrestrial habitats associated with the decommissioning of the Agannygal Substation* ..... 6-73

*Table 6-6-10 Potential impacts on terrestrial habitats associated with the decommissioning of the Derrybrien - Agannygal 110kV OHL and reinstatement of the Ennis-Shannonbridge 110 kV OHL.* ..... 6-73

*Table 7 -2 Q-value relationship to water quality and WFD status* ..... 7-7

*Table 7-3 Water chemistry methods used for this study* ..... 7-8

*Table 7-4 Ecological evaluation criteria (Adapted from NRA, 2003, 2009)* ..... 7-10

*Table 7-5 Ecological Impact Significance Criteria (from EPA, 2022)* ..... 7-11

*Table 8 1 Truck/Crane Type used in Proof Load Test including pressure on floating road* ..... 8-47

*Table 8 2 Floating road performance criteria for full-scale serviceability load tests.* ..... 8-48

*Table 8 3 Summary of Likelihood of Peat Slide* ..... 8-57

*Table 8 4 Assessment of Stability Impacts for Decommissioning* ..... 8-71

*Table 8 5 Activities and Related Impacts* ..... 8-73

*Table 8 6 Impact Assessment on Soils, Geology and Land Use (Decommissioning)* ..... 8-76

*Table 8 7 Assessment of Stability Impacts – Prospective Development* ..... 8-77

*Table 8 8 Total Hazard Rating and Likelihood (L) of a Peat Slide for Turbary Plots on Derrybrien Wind Farm site* ..... 8-90

*Table 9-1 Monthly Rainfall (mm) at Gort Derrybrien II Met Station* ..... 9-14

*Table 9-2 Rainstorm Depth (mm) Duration Return Period Table for wind farm site from FSU Web Portal* ..... 9-15

*Table 9-3 Potential Evapotranspiration (mm) at Athenry Synoptic Station* ..... 9-15

*Table 9-4 Summary of rivers draining from Derrybrien wind farm* ..... 9-16

*Table 9-5 Summary of river subcatchments draining from Derrybrien wind farm* ..... 9-17

*Table 9-6 Receptor Sensitivity Criteria (adapted from www.sepa.org.uk)* ..... 9-19

*Table 9-7 Groundwater Vulnerability Categories (GSI)* ..... 9-22

*Table 9-8 Summary information of piezometers installed on site between 2005 and 2011* ..... 9-23

*Table 10-1 Limit values of the CAFE Directive 2008/50.EC, Source: https://airquality.ie/information/air-quality-standards)* ..... 10-3

*Table 10-2 Assessment Thresholds from CAFE Directive 2008/50/EC* ..... 10-5

*Table 10-3 Thresholds Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)* ..... 10-6

*Table 10-4 Target values for Ozone Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)* ..... 10-6

*Table 10-5 Average Sulphur Dioxide Data for Zone D Sites in 2023* ..... 10-7

*Table 10-6 Average Particulate Matter ($PM_{10}$) Data for Zone D Sites in 2023* ..... 10-8

*Table 10-7 Average Nitrogen Dioxide Data for Zone D Sites in 2023* ..... 10-9

*Table 10-8 Carbon Monoxide Data for Birr - Zone D Site in 2023* ..... 10-9

*Table 10-9 Ozone Data for Zone D Sites in 2023* ..... 10-10

*Table 10-10 Sustainable Development Goals Report 2023, Relevant SDGs to the Prospective Development and Implementation into Irish National Plans* ..... 10-21

*Table 10-11 Proposed Carbon Budgets of the Climate Change Advisory Council* ..... 10-26

*Table 10-12 Sectoral Emission Ceilings 2022* ..... 10-27

*Table 10-13 Data from Met Éireann Weather Station at Shannon Airport, 1990-2020: Monthly and Annual Mean and Extreme Values* ..... 10-34

*Table 10-14 Data from Met Éireann Weather Station at Gort (Derrybrien II) 1990-2020: Rainfall mean and extreme values* ..... 10-36

*Table 11-1 EPA EIAR impact assessment criteria.* ..... 11-5

*Table 11-2 2018 Noise Survey $L_{AF90\ 10\ min}$ (dB) levels measured at R21 and R35 (with turbine noise removed).* ..... 11-12

*Table 11-3 2019 Noise Survey levels (dB) measured at NML1-NML5.* ..... 11-12

*Table 11-4 Impacts associated with wind farm compound set up.* ..... 11-14

*Table 11-5 Impacts associated with wind farm compound use.* ..... 11-14

*Table 11-6 Impacts associated with Agannygal compound set up.* ..... 11-15

*Table 11-7 Impacts associated with Agannygal compound use.* ..... 11-15

*Table 11-8 Impacts associated with clearance works.* ..... 11-15

*Table 11-9 Impacts associated with access road works.* ..... 11-16

*Table 11-10 Impacts associated with turbine removal.* ..... 11-16

*Table 11-11 Impacts associated with wind farm substation works.* ..... 11-17

*Table 11-12 Impacts associated with wind farm substation works.* ..... 11-17

*Table 11-13 Impacts associated with Agannygal Substation works.* ..... 11-17

*Table 11-14 Impacts associated with Agannygal Substation works.* ..... 11-18

*Table 11-15 Impacts associated with overhead line removal.* ..... 11-18

*Table 11-16 Impacts associated with line reinstatement.* ..... 11-19

*Table 11-17 Impacts associated with onsite works traffic.* ..... 11-19

*Table 12-1. Criteria for Assessment of Magnitude of Impact (PER ICOMOS 2011)* ..... 12-7

*Table 12-2. Guidance Criteria for Assessment of Values of Cultural Heritage Assets* ..... 12-8

*Table 12-3. Description of Impact Significance (PER EPA 2022)* ..... 12-9

*Table 12-4. Significance of Impacts Matrix (PER EPA 2022)* ..... 12-10

*Table 12-5. Recorded Archaeological Sites with 3km of Wind Farm Site* ..... 12-11

*Table 12-6. Recorded Archaeological Artifacts Discovered in Study Area* ..... 12-14
*Table 12-7. Database of Irish Excavation Reports Entries* ..... 12-19
*Table 12-8. Designated Architectural Heritage Structures with 3km Study Area* ..... 12-22
Table 12-9. Translations of Townland Names ..... 12-23
*Table 13-1 Categories of Landscape Sensitivity* ..... 13-5
*Table 13-2 Magnitude of Landscape Change* ..... 13-5
*Table 13-3 Guide to Classification of Significance of Effects* ..... 13-6
*Table 13-4 Categories of Visual Receptor Sensitivity* ..... 13-8
*Table 13-5 Magnitude of Visual Change* ..... 13-8
*Table 13-6.Quality of Effects.* ..... 13-11
*Table 13-7: Timescale of Effects* ..... 13-11
*Table 13-8 Viewpoint Locations* ..... 13-34
*Table 13-9 Summary of Visual Effects at Decommissioning* ..... 13-49
*Table 14-1. Link-Based Growth Rates: County Annual Growth Rates (excluding Metropolitan Area)* ..... 14-8
*Table 14-2. Type and number of LV vehicles during decommissioning for Derrybrien Wind Farm Development site* ..... 14-8
*Table 14-3. Type and number of HGV vehicles during decommissioning for Derrybrien Wind Farm Development site* ..... 14-8
*Table 14-4. Type and number of LV vehicles during decommissioning for Derrybrien Substation* ..... 14-9
*Table 14-5. Type and number of HGV vehicles during decommissioning for Derrybrien Substation* ..... 14-9
*Table 14-6. Type and number of LV vehicles during decommissioning for OHL Decommissioning* ..... 14-10
*Table 14-7. Type and number of HGV vehicles during decommissioning for OHL Decommissioning* ..... 14-10
*Table 14-8. Type and number of LV vehicles during decommissioning for Agannygal Substation* ..... 14-11
*Table 14-9. Type and number of HGV vehicles during decommissioning for Agannygal Substation* ..... 14-11
*Table 14-10. AM & PM Peak Vehicles (LV & HGV) passing through R353 at Black Road Junction* ..... 14-11
*Table 14-11. Existing Bridges/Culverts location (Source: GCC)* ..... 14-16
*Table 14-12.Picady Summary: Junction R353 @ Black Road* ..... 14-22
*Table 14-13.Decommissioning Traffic – EPA Criteria Effect* ..... 14-23
*Table 15-1 Classification of Likelihood (Source: Department of Environment, Heritage and Local Government, 2010)* ..... 15-4
*Table 15-2 Classification of Impact (Source: DoEHLG, 2010)* ..... 15-5
*Table 15-3 Classification of Impact (Source: DoEHLG, 2010)* ..... 15-7
*Table 15-4 HSE Emergency Plan hazard types (HSE Area 2 Crisis Management Team Major Emergency Plan May 2022)* ..... 15-7
*Table 15-5 Risk Register – Prospective Development* ..... 15-15
*Table 15-6 Risk Assessment* ..... 15-17
*Table 15-7 Risk Scores* ..... 15-21
*Table 15-8 Risk Matrix* ..... 15-21
*Table 16-1 Waste Management Policy Objectives from Galway County Development Plan 2022 – 2028* ..... 16-3

*Table 16-2 Landfill Capacity Sensitivity Criteria* ..... 16-9
*Table 16-3 Magnitude of Impacts – Non-Hazardous Waste* ..... 16-9
*Table 16-4 Magnitude of Impacts – Hazardous Waste* ..... 16-10
*Table 16-5 Criteria for determining significance of effect, based on (EPA, 2022) guidelines.* ..... 16-10
*Table 16-6 Significance Matrix* ..... 16-11
*Table 16-7 Operational Municipal Landfills in Ireland (EPA 2020)* ..... 16-12
*Table 16-8 Estimated Expected Composition of Vestas V52 Turbines.* ..... 16-14
*Table 16-9 Derrybrien Substation Electrical Equipment* ..... 16-16
*Table 16-10 Agannygal Substation Electrical Equipment* ..... 16-17
*Table 16-11 Waste Generated from Demolition of Derrybrien and Agannygal Substations* ..... 16-19
*Table 16-12 Estimated tonnages of material to be removed from Prospective Development during decommissioning.* ..... 16-20
*Table 16-13 Significance Matrix for Waste Generated by the Project – Non-Hazardous Waste* ..... 16-23
*Table 16-14 Significance Matrix for Waste Generated by the Prospective Development- Hazardous* ..... 16-24
*Table 17-1 Interaction Matrix* ..... 17-2
*Table 18-1 Mitigation Measures* ..... 18-1

## TABLE OF FIGURES

*Figure 3-1 Features within the Derrybrien Wind Farm Site* ..... 3-10

*Figure 3-2 Derrybrien - Agannygal 110kV Overhead Line Route (Sheet 1 of 2)* ..... 3-12

*Figure 3-3 Derrybrien - Agannygal 110kV Overhead Line Route (Sheet 2 of 2)* ..... 3-13

*Figure 3-4 Emergency works carried out as part of the peat slide (2003)* ..... 3-16

*Figure 3-5 Summary chart of Predicted Effects of Alternative 1 (Work Area A)* ..... 3-19

*Figure 3-6 Summary chart of Predicted Effects of Alternative 2 (Work Area A) when compared to the Do-Nothing scenario.* ..... 3-26

*Figure 3-7 Summary chart of Predicted Effects of Alternative 3 (Work Area A) when compared to the Do-Nothing scenario.* ..... 3-27

*Figure 3-8 Summary chart of Predicted effects of Alternative 4 (Work Area A) when compared to the Do-Nothing scenario.* ..... 3-33

*Figure 3-9 Summary chart of Predicted Effects of Alternative 1 (Work Area B)* ..... 3-37

*Figure 3-10 Summary chart of Predicted Effects of Alternative 2 (Work Area B) when compared to the Do-Nothing scenario.* ..... 3-42

*Figure 3-11 Summary chart of Predicted Effects of Alternative 3 (Work Area B) when compared to the Do-Nothing scenario.* ..... 3-43

*Figure 3-12 Summary chart of Predicted Effects of Alternative 4 (Work Area B) when compared to the Do-Nothing scenario.* ..... 3-47

*Figure 3-13 Summary chart of Predicted Effects of Alternative 1 (Work Area C)* ..... 3-51

*Figure 3-14 Summary chart of Predicted effects of Alternative 4 (Work Area B) when compared to the Do-Nothing scenario* ..... 3-56

*Figure 3-15 Summary chart of Predicted effects of Alternative 3 (Work Area C) when compared to the Do-Nothing scenario* ..... 3-58

*Figure 3-16 Summary chart of Predicted Impacts of Alternative 4 (Work Area C) when compared to the Do-Nothing scenario* ..... 3-62

*Figure 4-1 EIAR Study Area* ..... 4-2

*Figure 4-2 Existing Derrybrien Wind Farm Development* ..... 4-4

*Figure 4-3 Location of and the Extent of Peat Slide and Main Peat Slide Run Out Area.* ..... 4-12

*Figure 4-5 Location of Turbary within and immediately adjacent to wind farm* ..... 4-22

*Figure 4-6 Location of Projects/Activities considered* ..... 4-23

*Figure 5-1 Population Study Area* ..... 5-8

*Figure 5-2 Dwellings within 500m of Prospective Development Site* ..... 5-9

*Figure 5-3 Population per Age Category in 2022 (Source: CSO)* ..... 5-11

*Figure 5-4 Employment by Socio-Economic Group in 2022 (Source: CSO)* ..... 5-12

*Figure 6-1 Survey transects used on Derrybrien Wind Farm Development site, 2022 and 2024* ..... 6-13

*Figure 6-2 Survey transects used along overhead line grid connection between Derrybrien Wind Farm and Agannygal Substation, 2022 and 2024* ..... 6-14

*Figure 6-3 SACs and SPAs within 15km of the Prospective Development* ..... 6-28

*Figure 6-4 NHAs and pNHAs within 15km of the Prospective Development* ..... 6-32

*Figure 6-5 Habitat map of wind farm site.* ..... 6-34

*Figure 6-6 Annotated aerial photograph indicating the habitats that occur along the Derrybrien to Agannygal OHL line route and at Agannygal Substation.* ..... 6-35

*Figure 7-1 Location of survey sites for current study, including selected EPA and IFI survey sites* ..... 7-6

*Figure 7-2 Map of windfarm showing pre-construction and construction related drainage ..... 7-14*

*Figure 7-3 Map showing sub-catchment extent of the streams draining the windfarm site ..... 7-15*

*Figure 7-4 Aerial photo showing detour off the Agannygal haul route ..... 7-64*

*Figure 8-1 Flow chart for assessment of direct impacts and stability impacts on soils, geology and land ..... 8-8*

*Figure 8-2 Matrix used to assess the significance of effects for impacts on soils, geology and land ..... 8-9*

*Figure 8-3 Consolidation site investigation location plan (Ref: AGEC Drawing No. 003 – Ground Investigation Location Plan for Wind Farm & Failure Scar, Rev.0, 25th July, 2018) ..... 8-15*

*Figure 8-4 Aerial Photograph (Google Earth, 2020) ..... 8-18*

*Figure 8-5 LiDAR Topographical Survey ..... 8-19*

*Figure 8-6 Topography from LiDAR Survey – Slope Angles ..... 8-20*

*Figure 8-7 Quaternary Geology Map of the Project Area (GSI online Spatial Resources Mapping, 2023) ..... 8-23*

*Figure 8-8 Peat depth from peat probes across the site ..... 8-24*

*Figure 8-9 Peat depth along OHL between Polesets 1a and 7 ..... 8-25*

*Figure 8-10 Typical water content of peat ..... 8-26*

*Figure 8-11 Organic content of the peat by Mass Loss on Ignition ..... 8-26*

*Figure 8-12 Bulk Density of Peat ..... 8-27*

*Figure 8-13 Profiles of undrained shear strength ($c_u$) with depth recorded in the peat across the site with the Geonor H-10 vane ..... 8-27*

*Figure 8-14 Profiles of undrained shear strength ($c_u$) with depth recorded in the peat along the OHL with a hand vane ..... 8-28*

*Figure 8-15 Undrained shear strengths recorded on undisturbed samples of peat by hand vane, triaxial tests and direct simple shear tests ..... 8-28*

*Figure 8-16 1:100,000 Bedrock Geology Map of the project area (GSI online Spatial Resources Mapping – www.gsi.ie, 2023) ..... 8-31*

*Figure 8-17 Existing and as-constructed drainage, natural watercourses and location of electronic vibrating wire piezometers (Pz-01 to Pz-12) (Ref. ESB Drawing No. QS-00192-01-D451-016) ..... 8-35*

*Figure 8-18 Change in groundwater level readings from electronic piezometers at Turbines T2, T18 & T34 ..... 8-36*

*Figure 8-19 Landslide Susceptibility Map (GSI online Spatial Resources Mapping, www.gsi.ie, 2023) ..... 8-41*

*Figure 8-20 PSRA Likelihood of a peat slide prior to construction in 2003 prior to implementation of effective design/construction risk mitigation measures ..... 8-49*

*Figure 8-21 PSRA Reduced likelihood of a peat slide during second phase of construction in 2004/2005 after implementation of effective design/construction risk mitigation measures ..... 8-50*

*Figure 8-22 PSRA – Existing Baseline Condition–Likelihood of a peat slide during decommissioning after implementation of effective design/construction risk mitigation measures ..... 8-51*

*Figure 8-23 Results of the full-scale proof load tests carried out on the upgraded floating roads in 2018 ..... 8-52*

*Figure 8-24 Location of Polesets PS-1a to PS-4 along the 110kV Derrybrien-Agannygal Overhead Line (OHL) ..... 8-53*

*Figure 8-25 Interpreted Likelihood of a peat slide along OHL between PS-1a and PS-4 for existing baseline conditions prior to implementation of mitigation measures ..... 8-54*

*Figure 8-26 Likelihood (L) of a peat slide along OHL between PS-1a and PS-4 for decommissioning the OHL and polesets using appropriate methodologies to minimise the impact on peat stability ..... 8-55*

*Figure 8-27 Load of Transformer and Low-Loader Transporter ..... 8-61*

*Figure 8-28 Typical temporary road widening detail. ..... 8-62*

*Figure 8-29 Proposed minor road widening works at Turbine T68 for decommissioning.* ..... *8-63*

*Figure 8-30 Proposed minor road widening works at Turbine T14 for decommissioning.* ..... *8-63*

*Figure 8-31 Proposed minor road widening works at Turbine T4 for decommissioning.* ..... *8-64*

*Figure 8-32 Proposed minor road widening works at Turbine T1 for decommissioning.* ..... *8-64*

*Figure 8-33 Turbary plots at east end of wind farm site (ESBI Drawing No. QS-000280-01-0460-011-020-000)* ..... *8-86*

*Figure 8-34 Turbary plots where mechanical peat harvesting has been carried out by a local contractor since 2012...* ..... *8-87*

*Figure 8-35 2020 Aerial photo of turbary plots illustrating recent peat extraction activity & areas of local peat instability* ..... *8-88*

*Figure 8-36 Likelihood of a peat failure due to mechanical peat harvesting in the turbary plots prior to mitigation.....* ..... *8-92*

*Figure 8-37 Drainage works carried out in early August 2020 to relieve water pressures in zone of peat failure in Turbary Plot 161* ..... *8-99*

*Figure 8-38 Survey monitoring points on the surface of the peat in and around the zone of peat failure in Turbary Plot 161* ..... *8-100*

*Figure 8-39 Surveyed movement of monitoring points in zone of peat failure in Turbary Plot 161 in 2020/2021 (Day 0 = 21/5/2020)* ..... *8-101*

*Figure 8-40 Likelihood of a peat failure due to mechanical peat harvsting in the turbary plots after mitigation measures have ben implemented.* ..... *8-104*

*Figure 9-1 Catchments in relation to Derrybrien Wind Farm Development* ..... *9-6*

*Figure 9-2 Ground surface slope angles based on post construction LIDAR survey* ..... *9-6*

*Figure 9-3 Wind Farm Development - Pre-existing Drainage Only* ..... *9-12*

*Figure 9-4 Location of Works* ..... *9-13*

*Figure 9-5 Sub catchments draining from Derrybrien Wind Farm Development site to major rivers* ..... *9-20*

*Figure 9-6 Karst features in relation to Derrybrien Wind Farm Development* ..... *9-21*

*Figure 9-7 Approximate Locations of Piezometers on site 2005-2011* ..... *9-24*

*Figure 9-8 Piezometer Data (2005 - 2011)* ..... *9-25*

*Figure 9-9 Derrybrien Wind Farm Development - Pre-existing and construction drainage* ..... *9-34*

*Figure 11-1 Dwellings within 500 m of the proposed works* ..... *11-7*

*Figure 11-2 Dwelling D1* ..... *11-8*

*Figure 11-3 Dwelling D2, with 110 kV line to be removed shown yellow.* ..... *11-8*

*Figure 11-4 Dwellings D3 to D5, with 110 kV line to be removed shown yellow. D4 appears to be derelict.* ..... *11-9*

*Figure 11-5 Dwellings D6 to DR8, with 110 kV line to be removed shown yellow. The eastern and western extents of the Ennis-Shannonbridge 110 kV line reinstatement works are marked red.* ..... *11-9*

*Figure 11-6 Dwelling D9* ..... *11-10*

*Figure 11-7 Dwellings D10 and D11* ..... *11-10*

*Figure 11-8 Noise stations used for 2020 substitute consent rEIAR at R21 and R35.* ..... *11-11*

*Figure 11-9 Baseline stations NML1-NML5 used for Derrybrien Wind Farm remedial EIAR.* ..... *11-13*

*Figure 13-1 LVIA Study Area* ..... *13-12*

*Figure 13-2 Topographical context of Derrybrien site and immediate vicinity* ..... *13-14*

*Figure 13-3 EPA CORINE Landcover Map (2018) of study area* ..... *13-15*

*Figure 13-4 CORINE Landcover map of immediate vicinity* ..... *13-16*

*Figure 13-5 Slieve Aughty Landscape Character Type Character Assessment 2022* Source: Galway County Landscape ..... 13-22

*Figure 13-6 Extract from LCA showing site and landscape units* ..... 13-23

*Figure 13-7 Landscape Sensitivity of LCAs with Site Character Assessment 2022* Source: Galway County Landscape ..... 13-24

*Figure 13-8 Landscape and Visual designations in Co. Galway and Co. Clare* ..... 13-25

*Figure 13-9 ZTV Map of existing Derrybrien turbines* ..... 13-26

*Figure 13-10 Viewpoint Map with landscape and visual designations* ..... 13-39

*Figure 14-1 SPA Gort turn blade (Source ESB)* ..... 14-4

*Figure 14-2 SPA Gort turn tower (Source ESB)* ..... 14-4

*Figure 14-3 SPA Site exit blade (Source ESB)* ..... 14-5

*Figure 14-4 SPA Site exit tower (Source ESB)* ..... 14-5

*Figure 14-5 Traffic Count Locations (Source: https://trafficdata.tii.ie/)* ..... 14-6

*Figure 14-6 Traffic Count Locations (Source: https://trafficdata.tii.ie/)* ..... 14-6

*Figure 14-7 Traffic Count Locations (Source: https://trafficdata.tii.ie/)* ..... 14-7

*Figure 14-8 Haul route from M18 (Source: ESB)* ..... 14-12

*Figure 14-9 Wind Farm & Substation HGV Haul Route (Source: ESB)* ..... 14-15

*Figure 14-10 Overhead Line HGV Haul Route (Source: ESB)* ..... 14-15

*Figure 14-11 Existing Bridges/Culverts along access route (Source: GCC)* ..... 14-16

*Figure 14-12 Junction R353 Regional Road at Black Road Schematic with arm designation* ..... 14-19

*Figure 14-13 Base year 2023 AM peak hour traffic volumes* ..... 14-19

*Figure 14-14 Opening year 2023 AM peak hour traffic volumes without Prospective Development* ..... 14-20

*Figure 14-15 Opening year 2023 AM peak hour traffic volumes with Prospective Development* ..... 14-20

*Figure 14-16 Base year 2023 PM peak hour traffic volumes* ..... 14-20

*Figure 14-17 Opening year 2025 PM peak hour traffic volumes without Prospective Development* ..... 14-21

*Figure 14-18 Opening year 2025 PM peak hour traffic volumes with Prospective Development* ..... 14-21

*Figure 16-1 Simplified Model of the Circular Economy (Source: European Environment Agency)* ..... 16-7

*Figure 16-2 Waste Hierarchy (Source: European Commission)* ..... 16-8

## TABLE OF PLATES

*Plate 6-1 Survey transect No. 1 through bog in eastern sector of site, May 2022.....6-15*

*Plate 6-2 Survey transect No. 3 through regenerating bog in western sector of site, May 2022.....6-15*

*Plate 6-3 Survey transect No. 5 along the overhead line corridor, May 2022.....6-16*

*Plate 6-4 Regeneration of peatland vegetation across felled woodland areas in southern part of wind farm site....6-37*

*Plate 6-5 Cutover bog in the eastern parts of the site.....6-38*

*Plate 6-6 Upland blanket bog within the wind farm site.....6-39*

*Plate 6-7 Dystrophic lake located within wind farm site.....6-40*

*Plate 6-8 Blanket bog to northwest of wind farm which supports Red Grouse. Looking northwards towards Sonnagh Old Wind Farm, April 2022.....6-50*

*Plate 8 1 – Difco Bogmiser Peat Hopper extruding rows of peat sods.....8-85*

*Plate 8 2 – Typical saw cutting attachment for extracting peat.....8-86*

*Plate 8 3 – Peat Failure in Turbary Plot #161 (Site Photo May 2020).....8-96*

*Plate 8 4 – Peat Movement in Turbary Plot #30 c2015-2018 (OSI Geohive Portal, 2020).....8-97*

*Plate 8 5–Re-vegetated surface of peat repository site opposite Turbine T50 in January 2024.....8-115*

*Plate 9-1 Typical site land at Derrybrien Wind Farm.....9-10*

*Plate 9-2 Interceptor Drainage channel at Derrybrien wind farm near Turbine T35.....9-10*

*Plate 9-3 Typical drainage channels flowing across Derrybrien wind farm.....9-34*

*Plate 9-4 Typical culverts installed under roadways and turbine hardstanding areas.....9-36*

*Plate 13-1 Slieve Aughty mountains viewed from the north: A lower rounded profile is visible.....13-13*

*Plate 13-2 Slieve Aughty mountains and Derrybrien wind farm from R458 north of Gort.....13-14*

*Plate 13-3 View towards coniferous forestry from R353 southwest of Derrybrien.....13-16*

*Plate 13-4 Views of coniferous forestry from the R353 near of the Flaggy Bridge south of the Derrybrien turbines.....13-17*

*Plate 13-5 View from Black Road where blocks of plantations screen views.....13-18*

*Plate 13-6 Mosaic of Bogland, forestry and wind turbines from the Black Road.....13-18*

*Plate 13-7 Derrybrien-Agannygal overhead line crossing the Black Road and Loughatorick North.....13-19*

*Plate 13-8 Ennis-Shannonbridge overhead line crosses the local road at Loughatorick North.....13-19*

*Plate 13-9 View of Agannygal Substation and overhead line at Loughatorick North.....13-20*

*Plate 13-10 Dense coniferous forestry along R353 west of Derrybrien.....13-28*

*Plate 13-11 The R353 (scenic route) east of Derrybrien.....13-28*

*Plate 13-12 Flaggy Bridge on the R353 east of Derrybrien.....13-29*

*Plate 13-13 Agannygal Substation (visible from the local road to the west) is located in an area which was forested.....13-30*

*Plate 13-14 View from Black Road Bridge towards location of the peat repository.....13-31*

*Plate 13-15 Enclosure by forestry along Black Road* *Plate 13-16 Open bogland along Black Road.....13-31*

*Plate 13-17 View from Thoor Ballylee battlements –views to Slieve Aughty hills and distant Derrybrien turbines.....13-33*

*Plate 14-1 Exit from M18 (Source: ESB).....14-12*

*Plate 14-2 Exit from R458 (Source: ESB).....14-13*

*Plate 14-3 Left turn to R380 (Source: ESB).....14-13*

*Plate 14-4 Right turn to R353 (Source: ESB)* ..... *14-13*
*Plate 14-5 Left turn to Black Road (Source: ESB)* ..... *14-14*
*Plate 14-6 Status of site entrance (Source: ESB)* ..... *14-14*

## TABLE OF APPENDICES

*Appendix 2-1 EIA Scoping Responses*

*Appendix 2-2 Community Report*

*Appendix 3-1 Assessment of Decommissioning Alternatives Report*

*Appendix 4-1 Drawings associated with Derrybrien Wind Farm (vestas/met mast etc)*

*Appendix 4-2 Decommissioning Management Plan*

*Appendix 4-3 Outline Construction Environmental Management Plan*

*Appendix 6-1 National Biodiversity Ireland Database Records for Protected Flora and Fauna species within 10 squares M50, M60 and R69 occupied by the Prospective Development.*

*Appendix 6-2 Vantage Point Watches - March - June 2022.*

*Appendix 6-3 Derrybrien Wind Farm Transect Surveys 2022 & 2024*

*Appendix 6-4 Bat Mitigation Report of The Bat Derogation Licence*

*Appendix 7-1 - 2022 Macroinvertebrate Results*

*Appendix 7-2 – WFD Assessment*

*Appendix 8-1 - AGEC 2004 Reports on 2003 Landside and Post Landslide Appraisal*

*Appendix 8-2 - Geotechnical Stability Report - Wind Farm Site*

*Appendix 8-3 – Peat Stability Risk Assessment (PSRA) for Polesets PS-1 to PS-4 Along 110kV Overhead Line Route*

*Appendix 8-4 – Peat Stability Risk Assessmnet (PSRA) for Turbary Plots on the Wind Farm Site*

*Appendix 8-5 Geotechnical & Peat Stability Report (Janaury 2023)*

*Appendix 8-6 Geotechnical Stability Report (July 2020)*

*Appendix 8-7 – Derrybrien Wind Farm Overhead line Decommissioning Figures*

*Appendix 9-1 - Flood Risk Assessment*

*Appendix 9-2 - Flood Review of Gort Lowlands*

*Appendix 12-1 Archeological Survey of Ireland Records*

*Appendix 12-2 Site Photographs*

*Appendix 13-1 Study Area Map (A3)*

*Appendix 13-2 Topographic Map (A3)*

*Appendix 13-3 EPA Corine Landcover Map - Study Area*

*Appendix 13-4 EPA Corine Landcover Map – Detailed*

*Appendix 13-5 Landscape Character Area Map*

*Appendix 13-6 Landscape and Visual Designations*

*Appendix 13-7 Existing ZTV Map (A1)*

*Appendix 13-8 Viewpoint Map*

*Appendix 13-9 Photomontage Booklet*

*Appendix 13-10 Cumulative ZTV*

*Appendix 14-1 Traffic Survey Data (Blacks Road)*

*Appendix 14-2 Picady 10 Analysis Report for R353 (Blacks Road)*

*Appendix 14-3 Traffic Management Plan*

*Appendix 16-1 Turbine Recyclability Report*

*Appendix 16-2 Outline Resource and Waste Management Plan*

# NON-TECHNICAL SUMMARY

# 1. INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of Gort Windfarms Ltd. (Gort WFL) and assesses the potential environmental impacts arising from the "Derrybrien Wind Farm Development Decommissioning Project."

The proposed 'Derrybrien Wind Farm Development Decommissioning Project' comprises two elements:

- The carrying out of physical works to decommission specific features of the existing development (the "**Prospective Development**").
- Proposed 'retention' in situ of other specific features of the existing development (the "**Retained Development**").'

This Environmental Impact Assessment Report (EIAR) accompanies the application made to An Bord Pleanála (ABP), under section 37L of the Planning and Development Act 2000, as amended ("the 2000 Act") for permission to decommission the Derrybrien Wind Farm development ('the Prospective Development').

This Environmental Impact Assessment Report (EIAR) accompanies the application made to An Bord Pleanála, under section 37L of the Planning and Development Act 2000, as amended ("the 2000 Act") for permission to decommission the Derrybrien Wind Farm development ('the Prospective Development'). In addition, the Derrybrien Windfarm Development Decommissioning Project also comprises the retention in situ of specific features of the existing development ("the Retained Development") and an application has been made simultaneously, under section 177E of the 2000 Act, for substitute consent (which application is accompanied by, *inter alia*, a remedial Environmental Impact Assessment Report [rEIAR]).

As stated above, this EIAR accompanies the application for the Prospective Development; substitute consent for the Retained Development will be applied for separately under section 177E of the 2000 Act. However, the potential significant effects of the Retained Development have been assessed cumulatively with those of the Prospective Development as part of this EIAR. The Prospective Development is described in detail in Chapter 4.

## 1.1 The Applicant

The application for substitute consent is being made by **Gort Windfarms Limited** which is a wholly owned subsidiary of the Electricity Supply Board (ESB).

## 1.2 Brief Description of the Proposed Development

The existing Derrybrien Wind Farm Project (Project) is located in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna, County Galway. A detailed overview of the planning history of the site is set out in the accompanying Planning Report.

For the purposes of the application for prospective development consent under section 37R, and the Board's consideration of this EIAR (and the Natura Impact Statement [NIS] also submitted with that application), the Prospective Development comprises the following:

- Enabling works to facilitate the decommissioning of the Derrybrien Windfarm.
- Decommissioning and removal of the Derrybrien Wind Farm and associated ancillary components. The decommissioning works include the removal of the above-ground structures only leaving certain features in situ.
- Decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line. Reinstatement of the Ennis-Shannonbridge 110kV Line.

The area of the Prospective Development for which permission is sought under section 37L is defined by the "red line" application boundary as illustrated on the section 37L application drawings.

The application for permission in respect of the Prospective Development for the decommissioning of the existing Derrybrien Wind Farm Development. All elements of the Prospective Development have been assessed as part of this EIAR. The Prospective Development is described in Chapter 4 of this EIAR and the Decommissioning Management Plan included as **Appendix 4-1**.

For the purposes of this EIAR, the key terms are:

- The "**Project**" - referring to all existing elements of the Derrybrien Windfarm Development.
- The "**Prospective Development**" - referring to all elements for which permission under section 37L is sought.
- The "**Retained Development**" - referring to all elements for which substitute consent is sought under section 177E.

## 1.3 Project Need

The overall need for the Derrybrien Wind Farm Development Decommissioning Project, as proposed arises because of the need to:

- Comply with enforcement notice EN23/235 issued by Galway County Council which requires the removal of the unauthorised windfarm and associated ancillary structures, subject to the applicable consent(s) / permissions(s) from the appropriate authority or authorities;
- To regularise the planning status of the development; and
- To safely complete decommissioning of this unauthorised development.

If the decommissioning works do not proceed, then the Project – particularly the structures associated with the windfarm, substations and overhead line, would deteriorate over time, rendering the site unsafe and posing serious risks over the long term – both to human health and to the local environment. As such it would not be possible for Gort Windfarms Ltd to comply with the stated requirements of Galway County Council as set out in the enforcement notice EN23/235 – namely to decommission and, where appropriate in terms of possible environmental impacts on the environment at this location, remove the unauthorised windfarm and associated ancillary structures, subject to the applicable consent(s) / permissions(s) from the appropriate authority or authorities.

## 1.4 Legislative Context

### 1.4.1 Requirement for EIA

The 'EIA Directive' (Directive 2011/92/EU as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment, requires Member States to ensure that, in the context of an application for development consent, a competent authority carries out an

assessment of the likely significant effects of certain types of project, prior to development consent being given for the project.

Article 5 of the EIA Directive states that where an Environmental Impact Assessment (EIA) is required, the developer shall prepare and submit an Environmental Impact Assessment Report (EIAR).

It is considered that the preparation of an EIAR is required in respect of the entire Derrybrien Wind Farm Development Decommissioning Project, in circumstances where, *inter alia*, substitute consent is sought for Retained Development and all applications for substitute consent must be accompanied by a remedial Environmental Impact Assessment Report (rEIAR).

The Prospective Development falls within Class 13 of Part 2 of Schedule 5, "*Any change or extension of development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, which would result in the demolition of structures, the demolition of which had not previously been authorised, and where such demolition would be likely to have significant effects on the environment, having regard to the criteria set out under Schedule 7*".

The relevant criteria in Schedule 7 which apply to the Prospective Development are: the risk of accidents, the potential significant effects of the proposed development and the magnitude and complexity of the impact and the environmental sensitivity of geographical areas likely to be affected by proposed development. Hence, this EIAR has been prepared and submitted with the application for permission under section 37L of the 2000 Act.

### 1.4.2 Environmental Impact Assessment

The obligations under EIA Directive have been transposed into Irish planning legislation by the relevant provisions of Part X of the 2000 Act and Part 10 of the 2001 Regulations.

The Environmental Impact Assessment (EIA) of the Prospective Development will be undertaken by An Bord Pleanála, as the competent authority under section 37L of the 2000 Act. Article 5 of the EIA Directive provides that, where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR). The information to be provided by the developer shall include at least:

a) *A description of the project comprising information on the site, design, size and other relevant features of the project;*
b) *a description of the likely significant effects of the project on the environment;*
c) *a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
d) *a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment; and,*
e) *a non-technical summary of the information referred to in points (a) to (d); and (f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

In addition, Schedule 6 to the Planning and Development Act 2000 as amended sets out the information to be contained in an EIAR, with which this EIAR complies.

The EIAR provides information on the receiving environment and assesses the likely significant effects of the proposed project on it and proposes mitigation measures to avoid or reduce these effects. The

function of the EIAR is to provide information to allow the competent authority to conduct the EIA of the proposed project.

### 1.4.3 EIAR Guidance

The Environmental Protection Agency (EPA) published its 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, May 2022), which is intended to guide practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

In preparing this EIAR, regard has also been taken of the provisions of the 'Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment', published by the Department of Housing, Planning and Local Government (DHPLG) in August 2018 to the extent these guidelines are relevant having regard to the enactment of the revised EIA Directive.

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects including 'Guidance on Screening', 'Guidance on Scoping' and 'Guidance on the preparation of the Environmental Impact Assessment Report'. MKO has prepared the EIAR with regard to these guidelines and earlier European Commission Guidance: Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013) which is relevant to the Biodiversity and Climate chapters of the EIAR.

## 1.5 Purpose and Scope of the EIAR

The main purpose of this EIAR is to identify, describe and present an assessment of the likely significant effects of the Prospective Development on the environment. This EIAR will inform An Bord Pleanála's (ABP) assessment process, its decision on whether to grant consent for the Prospective Development and, if granting consent, the nature and extend of any conditions required. The EIAR focuses on: (a) effects that are both likely and significant; and (b) description of effects that are accurate and credible.

The EIA to be carried out by ABP , as competent authority, is a process consisting of –

(i) the preparation of an EIAR;
(ii) the carrying out of consultations
(iii) the examination by ABP of–
  (I) the information contained in the EIAR,
  (II) any supplementary information provided, where necessary, by the applicant,
  (III) any relevant information received through the consultations carried out,
  (IV) the reasoned conclusion by the Board on the significant effects on the environment of the Prospective Development, taking into account the results of the examination carried out) and, where appropriate, its own supplementary examination, and
  (V) the integration of the reasoned conclusion of the Board into the decision on the Prospective Development.

The EIA conducted by ABP must include–

(i) an examination, analysis and evaluation, carried out by ABP, that identifies, describes and assesses in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11 of the EIA Directive , the direct and indirect effects of the Prospective Development on the following:

a) population and human health

b) biodiversity, with particular attention to species and habitats protected under the Habitats Directive (Directive 92/43/EEC) and the Birds Directive (Directive 2009/147/EC)
c) land, soil, water, air and climate
d) material assets, cultural heritage and the landscape
e) the interaction between the factors referred to in points (a) to (d)

Moreover, pursuant to the 2000 Act, an EIA shall include, as regards the factors mentioned in (a) to (e) above, such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the Prospective Development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development.

The EIAR which will be submitted by the applicant/developer provides the prescribed and relevant environmental information to enable the EIA to be carried out by the competent authority and complies with the relevant provisions of the EIA Directive and Irish implementing legislation.

## 1.6 Structure and Content of the EIAR

### 1.6.1 General Structure

This EIAR uses the grouped structure method to describe the existing environment, the potential impacts of the Prospective Development thereon and the proposed mitigation measures. Background information relating to the Prospective Development, scoping and consultation undertaken and a description of the Prospective Development are presented in separate sections. The grouped format sections describe the impacts of the Prospective Development in terms of population and human health, biodiversity, ornithology, soils and geology, hydrology and hydrogeology, air and climate, noise and vibration, landscape and visual, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing.

The chapters of this EIAR are as follows:

1. *Introduction*
2. *Scoping and Consultation*
3. *Consideration of Reasonable Alternatives*
4. *Description of the Prospective Development*
5. *Population and Human Health*
6. *Biodiversity (Terrestrial and Avian Ecology)*
7. *Biodiversity (Aquatic Ecology and Fisheries)*
8. *Land, Soils and Geology*
9. *Water (Hydrology and Hydrogeology)*
10. *Air and Climate*
11. *Noise and Vibration*
12. *Cultural Heritage*
13. *Landscape and Visual*
14. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
15. *Risk of Major Accidents and Natural Disasters*
16. *Resource and Waste Management*
17. *Interactions of the Foregoing*
18. *Schedule of Mitigation Measures*

The EIAR also includes a non-technical summary, which is a condensed and easily comprehensible version of the EIAR document. The non-technical summary is laid out in a similar format to the main EIAR document and comprises a description of the Prospective Development followed by the existing environment, impacts and mitigation measures presented in the grouped format.

## 1.6.2 Content of the EIAR / Environmental Baseline

For the sake of completeness, and in order to enable an assessment of all aspects of the Derrybrien Wind Farm Decommissioning Project this EIAR describes all elements of the overall Project, including the Prospective Development and Retained Development. This EIAR assesses the impacts on the environment resulting from the Prospective Development, including the decommissioning and removal of wind farm structures, grid connection, substations, and ancillary components, as described in Chapter 4. The impacts on the environment resulting from the Prospective Development are assessed cumulatively with the effects of the Retained Development, should it be consented

For the purposes of this assessment, the baseline environment against which likely significant effects and impacts have been assessed has been taken as 2024. The baseline environment is an non-operational wind farm development that ceased commercial electricity generation in February 2022.

## 1.6.3 Description of Likely Significant Effects and Impacts

As stated in the *Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)*, an assessment of the likely impacts of the Prospective Development is a requirement of the EIA process. The criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable) of the impact.

The classification of impacts in this EIAR follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Advice Notes for Preparing Environmental Impact Statements – Draft September 2015 (EPA, 2015).Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

Table 1-1 presents the EPA Description of Effects as published in the 2022 EPA guidance document. Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with the Prospective Development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the Prospective Development on the receiving environment. In the case of biodiversity, significant effects will be qualified with reference to an appropriate geographical scale, in accordance with best practice guidance (CIEEM, updated 2022).

*Table 1-1 EPA Description of Effects (EPA, 2022)*

| Effect Characteristic | Term | Description |
|---|---|---|
| **Quality** | Positive Effects | A change which improves the quality of the environment |
| | Neutral Effects | No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. |
| | Negative / Adverse Effects | A change which reduces the quality of the environment |
| | | |
| **Significance** | Imperceptible | An effect capable of measurement but without significant consequences |
| | Not significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Effect Characteristic | Term | Description |
|---|---|---|
| | Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| | Moderate | An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| | Significant | An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment |
| | Very significant | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment |
| | Profound | An effect which obliterates sensitive characteristics |
| | | |
| **Extent & Context** | Extent | Describe the size of the area, number of sites and the proportion of a population affected by an effect |
| | Context | Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions |
| | | |
| **Probability** | Likely | Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented |
| | Unlikely | Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented |
| | | |
| **Duration and Frequency** | Momentary | Effects lasting from seconds to minutes |
| | Brief | Effects lasting less than a day |
| | Temporary | Effects lasting less than a year |
| | Short-term | Effects lasting one to seven years |
| | Medium-term | Effects lasting seven to fifteen years |
| | Long-term | Effects lasting fifteen to sixty years |
| | Permanent | Effect lasting over sixty years |
| | Reversible | Effects that can be undone, for example through remediation or restoration |
| | Frequency | Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually) |
| | | |
| **Type** | Indirect | Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway |
| | Cumulative | The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. |
| | 'Do Nothing' | The environment as it would be in the future should the subject project not be carried out |
| | Worst Case' | The effects arising from a project in the case where mitigation measures substantially fail |
| | Indeterminable | When the full consequences of a change in the environment cannot be described |
| | Irreversible | When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost |
| | Residual | Degree of environmental change that will occur after the proposed mitigation measures have taken effect |
| | Synergistic | Where the resultant effect is of greater significance than the sum of its constituents |

Each effect is described in terms of its quality, significance, extent, duration and frequency, and type where possible. A 'Do-Nothing' impact is also predicted in respect of each environmental theme in the EIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed and any interactions between the impacts are assessed. The remaining impact types are presented as required or applicable throughout the EIAR.

## 1.7 Difficulties Encountered

There were no technical difficulties encountered during the preparation of this EIAR.

# 2. SCOPING AND CONSULTATION

Chapter 2 of the EIAR details scoping and consultation undertaken as part of the EIA Process, as well as setting out the nature of the cumulative impact assessment process undertaken.

A scoping report, in line with the Environmental Protection Agency's (EPA) "Guidelines on the information to be contained in Environmental Impact Assessment Reports", providing details of the Derrybrien Wind Farm Development Decommissioning Project, was prepared by MKO and circulated to prescribed statutory bodies in September 2024. The scoping document provided details of the Derrybrien Wind Farm Development Decommissioning Project and set out the scope of work for the EIAR. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey techniques and potential impacts that should be considered as part of the assessment process and in the preparation of the EIAR.

The consultees to whom the scoping document were sent and the responses received from those are set out in Section 2.2 of Chapter 2 of this EIAR.

In accordance with provisions of section 37L(9) of the 2000 Act, in October 2024, the Applicant wrote to ABP seeking to initiate pre-application consultation in respect of this application (ABP Ref ABP-321156-24). The request for a pre-application meeting was acknowledged and on 21 November 2024, the Board confirmed that this request had been processed and a decision made to facilitate pre-application consultation – noting that this process would only deal with procedural matters. As of late December 2024, with no confirmed date for a pre-application meeting, and the Board facilitating engagement on procedural aspects of the application via email, this application pack has been finalised for submission.

It is noted that the Applicant did not seek to engage in formal pre-application consultation with Galway County Council's Planning Department – but that scoping correspondence issued to the Planning, Roads and Transportation, Environment and Heritage Departments of the County Council.

The Applicant set in place a consultation process that began once the decision to refuse consent issued (February 2022). A press statement confirmed the cessation of generation activity and that the Project would be decommissioned. The dedicated project website – www.derrybrienwindfarm.ie, was maintained and period updates posted.

Furthermore, a public information event was held. In advance of the public information event, advertisements were posted in the local press, and details provided to local newspapers. A leaflet drop in the wider area was also carried out. At the event, information boards were provided describing the proposed development and setting out the next steps in the planning process; and 10 representatives from the technical team – including those engaged in planning, environmental impact assessment, civil engineering, geotechnical assessment, and hydrology / flood risk assessment; attended.

The event was attended by c. between 55 and 60 people - principally members of the local community, with a small number of public representatives. Specific to the proposed decommissioning works almost all attendees would be considered detractors of the project – insofar that that they were largely opposed to the decommissioning of the windfarm. The key issues raised are discussed further in Chapter 2 of this EIAR.

# 3. CONSIDERATION OF REASONABLE ALTERNATIVES

The EIA Directive requires an EIAR to contain "*a description of the reasonable alternatives studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*".

This chapter of the EIAR examines the 'decommissioning alternatives' that have been considered pursuant to the decision of An Bord Pleanála (ABP) to refuse permission for Substitute Consent for the continued operation of the Derrybrien Wind Farm (ABP Ref. ABP-308019-20).

Alternatives are different ways of carrying out the Project in order to meet the agreed objective(s). In relation to the Derrybrien Wind Farm Development Decommissioning Project the overarching project objective is:

> *"To undertake the decommissioning of the Derrybrien wind farm development by carrying out those works that enable the removal of structures from the site and, in so far as is practicable, its restoration, in a manner that ensures that all potential risks to key environmental factors are minimised or avoided where possible."*

This chapter of the EIAR sets out various options for decommissioning and describes them having regard to land ownership, engineering feasibility and environmental impact. This chapter describes the evolution process for the Derrybrien Wind Farm Development Decommissioning Project and evaluates each approach on the basis of EIA topics. The assessment of alternatives and the evolution process for the Derrybrien Wind Farm Development Decommissioning Project was undertaken on the basis of EIA topics. The key environmental factors considered are Population & Human Health; Biodiversity; Land, Soils & Geology; Hydrology & Hydrogeology; Air Quality; Noise & Vibration; Cultural Heritage; Material Assets and Waste & Resource Management.

In the case of Derrybrien Wind Farm Development, the wind farm has ceased to operate, and will not resume, commercial operation in the future, therefore the potential option of future operation or repowering has not been considered in this EIAR.

## 3.1 Assessment Process

The purpose of this process is to predict and evaluate, insofar as possible, the environmental effects of the proposed alternatives, highlighting any significant environmental problems and / or benefits that are likely to arise from their implementation.

Where possible, the environmental assessment is quantitative with a graphical output to aid in the appreciation and understanding of the implications of each decommissioning alternative. This method involves the assessment of the decommissioning alternatives for each of the following EIA topics:

- Population and Human Health
- Biodiversity
- Land, Soils and Geology
- Hydrology and Hydrogeology
- Air Quality
- Noise & Vibration
- Cultural Heritage
- Landscape and Visual

- Material Assets
- Waste

All potential positive and negative impacts are presented individually, with a text description, and then in a summary graphic (where appropriate). Each alternative is assessed against predefined sub-objectives and scores assigned to impacts range from +3 to -3 that have been adapted from the EPA guidelines (2022), as shown in ***Table 3-1***.

The purpose of adding numerical scores is to assist in the ranking of the alternatives. Like the assessment, the scores demonstrate both the positives and the negatives, and are not conveyed in terms of net benefit or net loss, which can be misleading.

*Table 3-1 Description of Environmental Impact Scores*

| Score | Description |
|---|---|
| +3 | Very Significant / Profound (Positive) |
| +2 | Significant (Positive) |
| +1 | Slight / Moderate (Positive) |
| 0 | Neutral / Imperceptible |
| -1 | Slight / Moderate (Negative) |
| -2 | Significant (Negative) |
| -3 | Very Significant / Profound (Negative) |

For the purposes of the alternatives assessment, the Derrybrien Wind Farm Development has been separated into three distinct "work areas", they are:

- Work Area A: Derrybrien Wind Farm including Derrybrien Substation.
- Work Area B: The Derrybrien to Agannygal OHL including Agannygal Substation.
- Work Area C: Offsite ancillary works associated with the 2003 peat slide.

The assessment of decommissioning alternatives for each "work area" was conducted in comparison to a "do-nothing" scenario. For the purposes of this assessment, the do-nothing scenario is Derrybrien Wind Farm Development remaining *in situ* in its current state – i.e., an unauthorised windfarm development that ceased commercial electricity generation in February 2022.

The environmental impacts of each decommissioning alternatives were assessed in terms of their potential positive and negative impacts, and the significance of these impacts on the environment against the project objectives. The decommissioning alternatives considered for the Derrybrien Wind Farm Development Decommissioning Project can be summarised as:

- Alternative 1 - 'Do Nothing' i.e. the Derrybrien Wind Farm Development will remain in *situ* in its current state (2024) an unauthorised windfarm development that ceased commercial electricity generation in February 2022.
- Alternative 2 – Remove all development which has taken place since 2003 including those offsite emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding those offsite emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration' i.e. remove and alter existing structures on the site and, restore the site in so far as is practicable, while minimising risks to safety and the environment.

For the assessment of decommissioning alternatives, it is assumed that standard best practice guidance on pollution prevention will be followed at all times to avoid or reduce as far as reasonably practicable the potential for adverse effects on the environment.

## 3.2 Conclusion

Alternatives are different ways of carrying out the Project in order to meet the agreed objective(s). In relation to the Derrybrien Wind Farm Development (pursuant to the ABP decision, ABP-308019-20), electricity generation has ceased and will not resume. Therefore, the alternatives considered relate only to its decommissioning.

The overarching project objective for the Derrybrien Wind Farm Development Decommissioning Project is as follows: To undertake the decommissioning of the Derrybrien wind farm development by carrying out those works that enable the removal of structures from the site and, in so far as is practicable, its restoration, in a manner that ensures that all potential risks to key environmental factors are minimised or avoided where possible.

This chapter of the EIAR examined the various options for decommissioning of the Derrybrien Wind Farm Development and describes them having regard to engineering feasibility, environmental impact, and land ownership.

This chapter describes the evolution process for the Derrybrien Wind Farm Development Decommissioning Project and evaluates each approach based on following EIA topics: Population & Human Health; Biodiversity; Land, Soils & Geology; Hydrology & Hydrogeology; Air Quality; Noise & Vibration; Cultural Heritage; Material Assets and Waste & Resource Management.

The assessment of alternatives and the evolution process for the Derrybrien Wind Farm Development Decommissioning Project was undertaken on the basis of EIA topics for three separate work areas:

- Work Area A: Derrybrien Wind Farm including Derrybrien Substation
- Work Area B: The Derrybrien to Agannygal OHL including Agannygal Substation
- Work Area C: Offsite ancillary works associated with the 2003 peat slide.

The assessment was undertaken using a pre-defined sub-objective to determine the potential impacts of the following alternatives:

- Alternative 1- "Do-Nothing" - All features associated with the existing Derrybrien Wind Farm Development would remain *in situ* in its current state – i.e., an unauthorised windfarm development that ceased commercial electricity generation in February 2022.
- Alternative 2 – Remove all development which has taken place since 2003 including those offsite emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding those offsite emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration'

A summary of the alternatives considered within each works is presented in Table 3-2 below.

*Table 3-2 Summary of Assessment of Alternative Findings for each Work Area*

| Work Area A | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| Allows for the removal of structures from the site. i.e. The Derrybrien Wind Farm including Derrybrien 110kV Substation. | No | Yes | Yes | Yes |

| Work Area A | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| Ensures that all potential risks to key environmental factors are minimised or avoided. | Yes | No | No | Yes |
| **Considered to be a Practicable Alternative.** | **No** | **No** | **No** | **Yes** |
| **Work Area B** | **Alternative 1** | **Alternative 2** | **Alternative 3** | **Alternative 4** |
| Allows for the removal of structures from the site. i.e. The Derrybrien to Agannygal OHL and Agannygal Substation. | No | Yes | Yes | Yes |
| Ensures that all potential risks to key environmental factors are minimised or avoided. | Yes | No | No | Yes |
| **Considered to be a Practicable Alternative.** | **No** | **No** | **No** | **Yes** |
| **Work Area C** | **Alternative 1** | **Alternative 2** | **Alternative 3** | **Alternative 4** |
| Allows for the removal of structures from the site. i.e. offsite features associated with the peat slide. | No | Yes | No | No |
| Ensures that all potential risks to key environmental factors are minimised or avoided. | Yes | No | Yes | No |
| **Considered to be a Practicable Alternative.** | **Yes** | **No** | **Yes** | **No** |

**Summary of Consideration of Alternative Options**

The alternative selected by the developer in respect of each works are and the reason for the chosen option is summarised below:

Work Area A: Derrybrien Wind Farm (including the Derrybrien 110kV substation)
Alternative 4 'practicable restoration' was selected as it facilitates the decommissioning of the Derrybrien Wind Farm (including the Derrybrien Substation) and ensures the potential risks to the environment, peat stability and human health is minimised.

Alternative 4 includes the removal of the above ground structures only, leaving the wind turbine foundations, underground cables, meteorological mast foundations and substation foundations in situ. Any protruding foundations or structures will be cut to below ground level and infilled and levelled to match adjoining areas. Works can be confined to areas within the control of Gort Windfarms Ltd.

When compared to other decommissioning alternatives, Alternative 4 aims to minimise ground and civil works across the site and by default reduces the potential environmental impacts. By leaving the roads, hardstands, bases, cables etc in situ there is a 98% reduction in waste and traffic generation thus reducing the effects from very significant /profound (Alternative 2&3) to slight to moderate. The potential for significant effects on soils and geology and the increased risk of further peat instability at the wind farm site is also reduced to slight to moderate.

Work Area B: Derrybrien to Agannygal 110 kV Overhead Line (OHL) and Agannygal 110kV Substation.
Alternative 4 - 'Practicable Restoration' was also selected as it facilitates the decommissioning of the Derrybrien to Agannygal 110kV OHL (including the Agannygal Substation) and ensures potential risk to the environment, peat stability and human health is minimised.

Alternative 4 aims to remove the existing above ground structures on the site, leaving all other features in situ in perpetuity. The reduction in civil works reduces the potential environmental impact. For example, the potential for Significant negative effects to peat stability and Aquatic Ecology and Fisheries have been reduced to Slight to Moderate through leaving certain at or below ground features in situ.

Work Area C: Offsite ancillary works associated with peat slide (2003)
Alternative 1 'Do-Nothing' was selected by Gort Wind Farms Ltd as it ensures the potential risk to the environment are eliminated. As no works would be undertaken, there would be no requirement for vegetation clearance or the construction of temporary compounds and haul routes to access works areas. There would requirement for instream works or disturbance of any kind to environment. Furthermore, there would be no impacts to privately owned infrastructure – the coillte tracks at Barrage 1 and 2 and the rebuilt unnamed bridge C would not be impacted. Since their installation in 2003, the instream features have not resulted in any environmental impacts, and this will likely remain the case into the future.

# 4. DESCRIPTION OF THE PROPOSED PROJECT

This section of the Environmental Impact Assessment Report (EIAR) describes the project and the component parts of the Project which are the subject of the application made to An Bord Pleanála, under section 37L of the Planning and Development Act 2000, as amended ("the 2000 Act") for permission to decommission the Derrybrien Wind Farm development ('the Prospective Development'). In addition, the Project also comprises the retention in situ of at-ground and below-ground structures such as turbine and other foundations; development associated with historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits/quarries etc ('the Retained Development') and an application has been made simultaneously, under section 177E of the 2000 Act, for substitute consent (which application is accompanied by, inter alia, a remedial Environmental Impact Assessment Report [rEIAR].

For the sake of completeness, and in order to enable an assessment of all aspects of the Project, whether or not the individual components of that project are the subject of an application under section 37L or 177E, this chapter describes all elements of the overall Derrybrien Wind Farm Decommissioning Project, including the Prospective Development and Retained Development.

For the purposes of the application for prospective development consent under section 37L, and the Board's consideration of this EIAR (and the Natura Impact Statement [NIS] also submitted with that application), the Prospective Development comprises the following:

- Enabling works to facilitate the decommissioning of the Derrybrien Windfarm.
- Decommissioning and removal of the Derrybrien Wind Farm and associated ancillary components. The decommissioning works include the removal of the above-ground structures only leaving certain features in situ.
- Decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line. Reinstatement of the Ennis-Shannonbridge 110kV Line.

The area of the Prospective Development for which permission is sought under section 37R is defined by the "red line" application boundary as illustrated on the section 37L application drawings and Figure 4-1 below. The primary EIAR Study Area is shown in green in Figure 4-2.

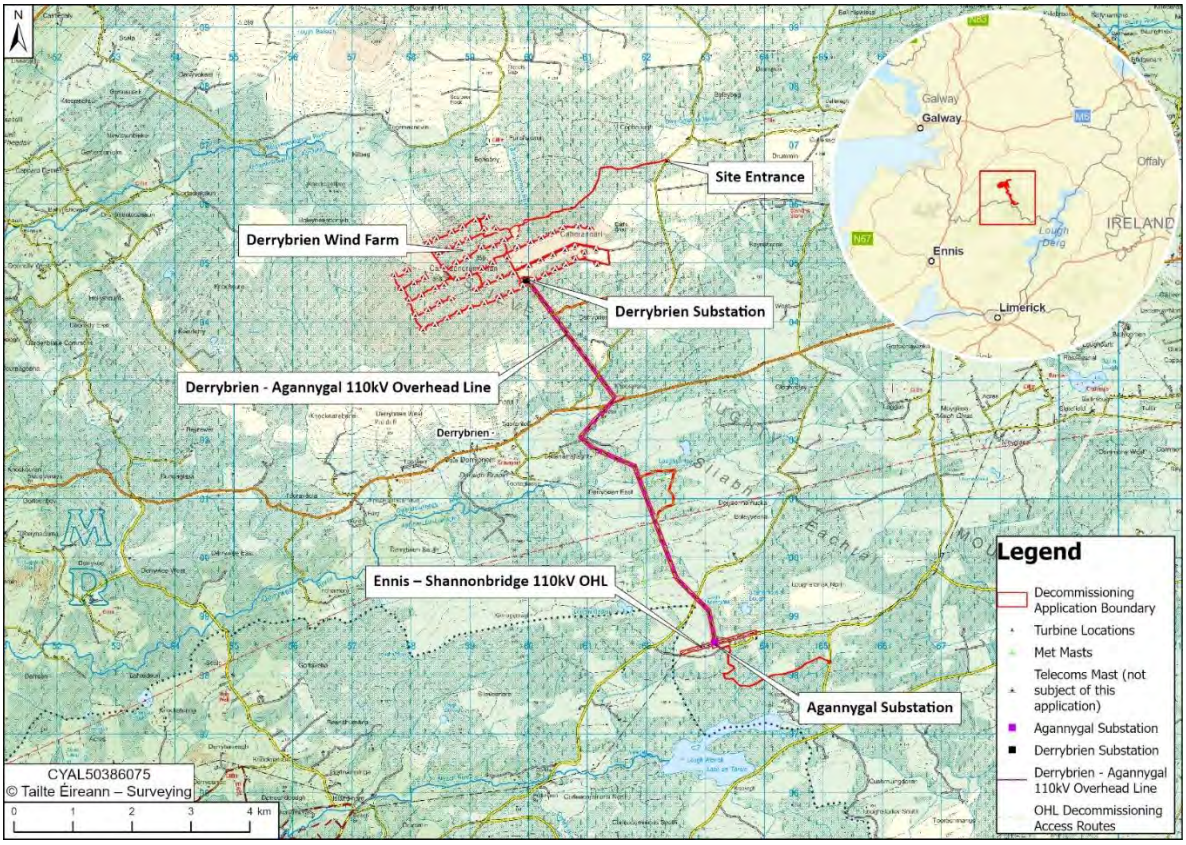



*Figure 4-1 Derrybrien Wind Farm Decommissioning Project – Prospective Development Planning Application Boundary*

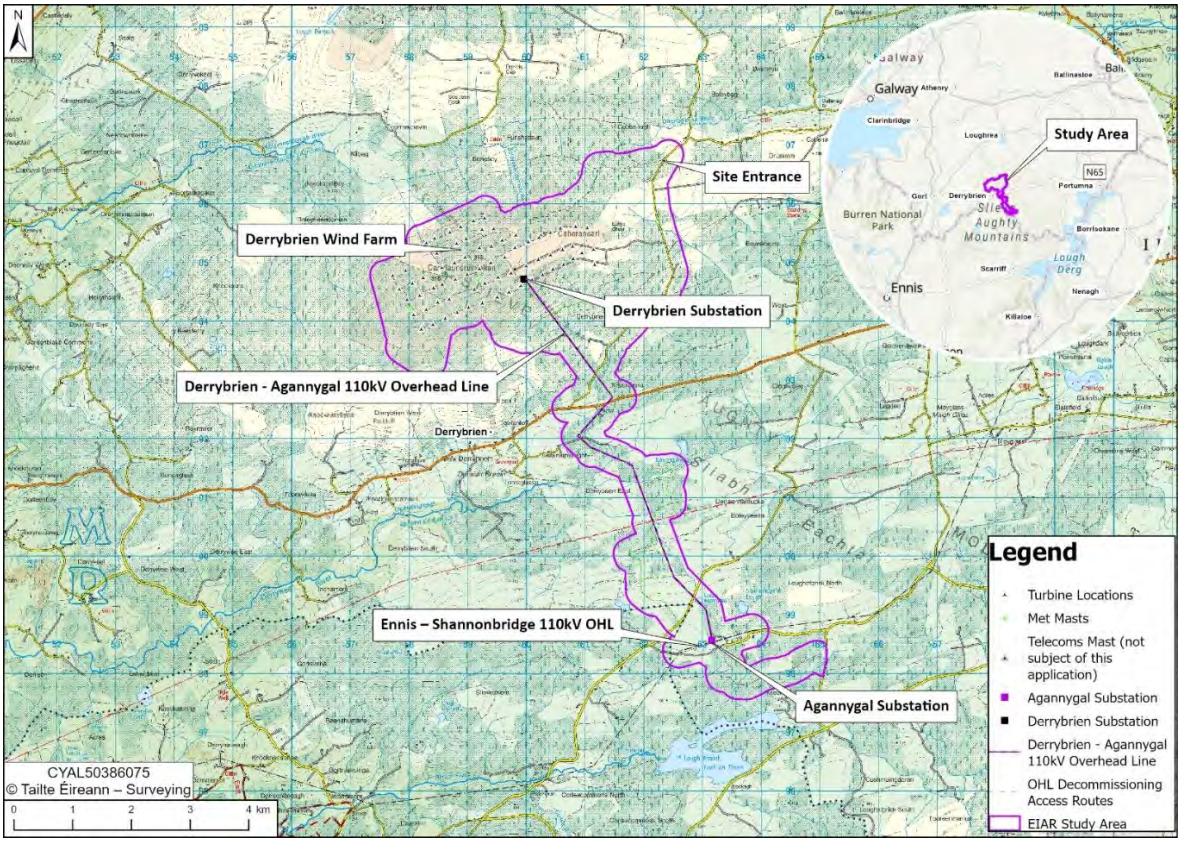



*Figure 4-2 EIAR Study Area*

# 4.1 Existing Derrybrien Wind Farm

Derrybrien Wind Farm Development is owned and operated by Gort Windfarms Ltd, a wholly owned subsidiary company of ESB.

Derrybrien Wind Farm is in County Galway in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast.

The wind farm site is located within the townlands of Boyaboy, Bolenyneendorrish, Coppanagh, Derreennamucka, Derrybrien East, Derrybrien North, Derrybrien West, Funshadaun, Kilbeg, Loughatorick North, Loughstorick South and Toormacnevin. . The postal address is Derrybrien North, Kylebrack, Loughrea, County Galway, Eircode H62 PE08. The approximate centre of the wind farm site is at Irish Transverse Mercator (ITM) co-ordinates 559572E, 705010N

The closest settlement to the wind farm site is the village of Derrybrien some 2 km to the south. The village of Peterswell is approximately 7.5 km west of the site. The nearest occupied houses are located approximately 2 km from the wind farm site.

As illustrated in ***Figure 4-1***, the overall Derrybrien Wind Farm project has three distinct elements:

- The development on the Derrybrien Wind Farm Site (including the Derrybrien 110kV Substation).
- The Derrybrien to Agannygal 110 kV Overhead Line (OHL).
- The Agannygal 110kV Substation, which connects the windfarm to the National Grid.

## 4.1.1 The Existing Development at the Derrybrien Wind Farm

The overall area of the wind farm site is approximately 344.5 ha, but the wind farm infrastructure occupies only a small proportion of this area (31.1 ha – approximately 9% of site). The wind farm site is accessed from a Coillte access road via a minor public road known as the Black Road (approximately 3.1 km from the wind farm to the Black Road/Coillte junction). The Black Road generally runs in a north south direction between the R353 at its southern end and Killeenadeema village (south of Loughrea) at its northern end. Access to the Black Road is via the R353 Regional Road, which originates near Portumna, passes over Flaggy Bridge before passing through the village of Derrybrien to join the N66 Loughrea – Gort National Secondary Road near Gort. From Gort the Black Road is accessed via the N66 for a distance of 1.7 km and the R353 for a distance of 14 km. Alternatively, the Black Road /Coillte access road can be accessed via minor public roads from Loughrea a distance of approximately 10 km.

The main wind farm infrastructure comprises turbines, crane hard standings, 17.5 km of access tracks within the site (including 14.6km of floating access tracks), drainage channels, borrow pits/quarries, on site material storage, the Derrybrien110 kV substation, direct buried electric cables and anemometer masts. These infrastructure elements are described below:

**Wind Turbines:** There are seventy (70) Vestas V52-850 kW turbines on site. The wind turbines have a rotor diameter of 52m, a hub height of 49m and overall height of up to 75m and associated ancillary development typical of a wind farm of this size and scale. A number of turbines foundations were constructed deeper below ground level to give a reduced hub height. It is noted that these turbines are

small compared to modern turbines. Each turbine is supported by a turbine foundation and comprises a vertical tower (consisting of two cylindrical sections), a nacelle – housing the machinery, connected at the hub to three rotating blades. The wind turbines are painted light grey with a matt finish.

The approximate spacing between turbines is between 150m to 260m in a west/southwest direction.

The main turbine components comprise:

- 2 no. cylindrical towers sections.
- 1 no. nacelle, which encapsulated the mechanical machinery of the wind turbine and was placed on top of the tower sections.
- 3 no. blades connecting to the hub of the nacelle.

The turbine towers are of tubular steel tapering from about 3.3m diameter at the base to 2.1m diameter at the top where the nacelle is mounted. Access to the tower is via a staircase located outside on the hardstand and a secure hinged door into the tower. The nacelle is accessed from the tower using an internal ladder with landing/rest positions. The tower and nacelle incorporate internal and emergency lighting.

The nacelle contains the generator and control unit, which is designed for computer-controlled monitoring of all major functions of the turbine. The glass-fibre reinforced nacelle cover protects all the components inside the nacelle against the elements.

A three-blade rotor is attached to the nacelle. The blades are made of fiberglass reinforced epoxy material with each blade consisting of two blade shells, bonded to a supporting beam. The wind turbines are geared to ensure the blades rotate in the same direction. Transformers are located internally within the turbine tower. The equipment is protected from lightning strike by deep earthing and from corrosion by multiple coatings. The turbine tower and nacelle are equipped with optical smoke sensors. Aviation lights are provided on nine turbines, specifically T1, T18, T26, T44, T46, T47, T52, T61 and T65.

The basis of wind turbine operation is as follows:

- Sensors are used to monitor wind direction and a yaw mechanism turns the turbines to keep the blades facing into the wind.
- The blades of the turbine, which are bolted onto a hub rotate at a rate of once every 3 – 5 seconds (s), depending on wind conditions.
- Inside the nacelle (housing) located at the turbine hub, the rotor drives a large shaft into a gearbox, which steps up the revolutions per minute to a speed suitable for the electrical generator. The rotor speed range is 14.0 - 31.4 revs per minute (rpm). A separate transformer is located internally within each wind turbine to uprate the generation voltage of the turbines from 380 – 660 V to a higher voltage for connection via underground cables to the Derrybrien Substation. The hermetically sealed wind turbine transformers can be considered as leak free and largely maintenance free. They are dispatched from the factory leak free and can primarily only be damaged during transport or installation. Once in service, they remain closed for their lifetime.

The electricity generated at each turbine is fed via underground cables to electrical transformers in Derrybrien Substation where it is transformed to a higher voltage for supply to the national electricity network. The cables are direct buried in the peat, at some locations like access track crossings, the cables are in ducts.

The windfarm ceased generating electricity in February 2022. Since that time, the turbines have been maintained by the turbine supplier while in a prolonged non-operational state.

**Derrybrien 110kV Substation:** Underground cables from across the site converge at Derrybrien 110kV Substation where the electricity is transformed from 20kV to 110kV and exported to the national grid. The substation comprises a c.1585m$^2$ fenced stoned compound containing outdoor electrical equipment and a c.202m$^2$ single storey Control Building accommodating a control room, MV switchgear room, relay room (protection relays) battery room, welfare facilities, workshop and office area. Other features of the Derrybrien 110kV Substation include: monitoring and communications equipment to enable remote monitoring; electrical plant; a standby generator and associated bunded diesel tank; external lighting poles; a lightning mast; a wastewater treatment system and palisade fencing.

The station is accessed via a 4m wide hardcore surfaced access track with links to the on-site road network. Non-potable water is sourced from a well on-site.

**Anemometer masts:** There are two anemometer lattice masts (meteorological masts or met masts) with a height (49m) corresponding to that of the turbines on the site which monitor wind speeds and validate the performance of the wind turbines. Each leg of the mast sits on a concrete plinth of plan dimension 1m x 1m x 1.5m (depth to top of foundation). The base of the masts is triangular in plan 2m x 2m x 2m. The mast is supported on reinforced concrete foundations. The masts are lattice masts, comprising a free-standing galvanised lattice type meteorological tower, being approximately 2m wide at its base x 0.6m wide at its top. Equipment on each mast comprises anemometers, wind direction vanes, a barometric pressure sensor and a data logger. Anti-climb screening (3m high) is provided to masts. A mobile phone network operator has a cell on the wind farm anemometer mast beside turbine T68 to assist with improved phone signal at the site.

**Third Party Mast:** There is also an existing telecoms mast in the east of the site (beside turbine T25) which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter. This mast is unrelated to the Derrybrien Wind Farm and pre-dates the presence of the wind farm by a significant period. The mast is currently supplied electricity through the metered Derrybrien wind farm electricity network.

**Access roads:** Access to the wind farm site was facilitated by the upgrading of an existing Coillte forestry road which connected to the Black Road to the east of the site. This c.3.1 km road was widened (typically to 4m with 4.5m width at bends), strengthened and re-surfaced to facilitate the development. Lay-bys and drainage were provided and the bell mouth entrance at the junction with the Black Road was widened. There is a network of wind farm access tracks across the site. These comprise sections of pre-existing forestry tracks, and access tracks specifically developed during the construction of the wind farm. These facilitate on-going access to the wind turbines and anemometer masts for operation and maintenance.

**Borrow pits / quarries:** Three borrow pits / quarries were excavated on the site – with the extracted material used for the construction of access tracks and hard standing areas. Borrow Pit 1 (BP1) was a source of c. 40,000m$^3$ of material, primarily rock. Borrow Pit 2 (BP2) was a source of c. 12,000m$^3$ of material, primarily clay. These pits are estimated to be up to 10m deep. Borrow Pit 3 (BP3) adjacent to Turbine T65 is located at the entrance to the wind farm site. This was the main source of rock fill for the works, with c. 180,000cu.m. of material extracted. Some peat was stored in the vicinity of each of the borrow pits / quarries. The borrow pits have been closed since the end of the construction phase. BP3 is flooded to the natural water table level. Both BP2 and BP3 are fenced off as a safety measure.

**Peat excavation and storage:** To facilitate the development of the wind farm, peat was excavated from locations including the turbine foundations, hardstanding areas and the footprint of the substation. This material is stored in a number of peat repositories located across the site. Recent surveys (2019 / 2020) show the majority of these areas have naturally re-vegetated with blanket bog vegetation. In many locations these features are difficult to discern.

**On-site storage/Drainage and Signage:** Spare turbine parts are stored in a number of modular storage containers located on the wind farm site.

Across the site there is a network of drainage channels. These comprise a mixture of pre-existing and constructed channels and they facilitate the discharge of surface waters to watercourses. There are information and directional signs on the site – including panel signs at the wind farm entrance indicating the presence of the wind farm; signage on each turbine indicating the turbine number, potential hazards and an emergency contact telephone number; and operational signage as required e.g. buried HV cable, warning signs. etc.

### 4.1.2 The Existing Derrybrien to Agannygal 110 kV OHL

The Derrybrien to Agannygal 110 kV Overhead OHL is the grid connection constructed for exporting the electricity generated at the wind farm to the national grid. It begins at the Derrybrien Substation (located within the Derrybrien wind farm site, ITM 559916E, 704736N) and ends at the Agannygal Substation (located to the south-east of the windfarm site, ITM 563118E, 698593N).

The grid connection comprises of c. 7.8 km 110 kV conductor, 34 no. double wood pole structures, 2 no. end masts, 5no. angle masts and 1 no. intermediate mast. The OHL connects into the Ennis – Shannonbridge line at the Agannygal 110kV Substation. The Agannygal 110kV substation splits this line into two circuits: Agannygal - Shannonbridge (Galway West) and Agannygal - Ennis (Galway West).

Periodic access to the overhead line structures for inspection is from nearby roads and Coillte forestry tracks.

### 4.1.3 The Existing Agannygal 110kV Substation

The Agannygal 110kV substation is located within the townland of Loughatorick and the approximate centre point of Agannygal Substation is at ITM co-ordinates 563118E, 698593N. The site is owned by Gort Windfarms Ltd and under the control of ESB Networks.

The nearest villages to Agannygal 110kV substation are the following: Derrybrien – 5 km to the northwest of the site, Ballynakill – 8.7 km to the northeast, Woodford – 10 km to the east and Flagmount – 8.4 km to the southwest.

Access to the Agannygal 110kV substation and overhead line structures is from nearby roads and forestry tracks. The substation site is located within the townland of Loughatorick North

The Agannygal 110kV substation consists of a palisade fenced compound (approximately 63m x 47.5m) containing outdoor electrical equipment and a Control Building. The foundations for the control building and the electrical equipment steelwork within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstanding is capped with hardcore surfacing. Other features include external cable trenching, standby generator (bunded) and diesel tank, external lighting poles, lightning mast and a well supplying nondrinking water. There is a wide hardcore surfaced access track around the external perimeter of the substation.

### 4.1.4 Off-site Features constructed in response to the peat slide (2003)

Construction of the wind farm commenced in June 2003 and continued to 2006. A peat slide occurred during project construction on the 16th October 2003. The peat slide occurred during excavation works

for the foundation of Turbine 68 (T68) close to the southern boundary of the windfarm. The peat slide resulted in the disturbance and partial displacement of peat and forest debris mainly onto land downslope of the peat slide area to Black Road Bridge (Figure 4-2).

The peat slide area extended approximately 1.65 km downslope from turbine T68 and displaced peat and forestry over an area of approximately 25ha. The majority of the peat slide was contained within Coillte coniferous forests to the south of the wind farm site.

From the peat slide area, debris passed down a stream valley and into an area of open flatter ground where it lost momentum and was deposited upstream of a minor road bridge (the Black Road Bridge). From the peat slide area, debris from the slide entered the valley of the stream located in the Derrybrien North sub-catchment into an area of flatter ground down to the Black Road Bridge approximately 1.0 km downslope from the slide area. This was the primary run-out zone for the slide. Some peat was transported further down the Owendalulleegh River with some peat being deposited along the riverbanks. The location of the peat slide and run-out zone is also shown in Figure 4-3.

In the days and weeks after the peat slide, following subsequent rainfall events, water entered the upper reaches of the stream and caused the peat slide debris to move downstream.

The estimated volume of peat in the peat slide area, based on the extent of the peat slide area was 450,000m$^3$. Estimates suggest that possibly 50 to 70% of the failed debris left the peat slide area. The remaining material within the peat slide area comprised typically isolated detached rafts of peat, peat debris and a thin covering of intact basal peat. The balance of the debris remains within the site of the peat slide.

The peat slide occurred in the Owendalulleegh Catchment with the bulk of the debris settling out in the 4 km$^2$ lake area of Lough Cutra. The finer buoyant material is likely to have over time been carried through Lough Cutra in the Beagh/Gort River and eventually discharged into Galway Bay at Kinvarra.

A site walkover by geotechnical specialists in 2019 (downslope of Black Road Bridge) showed little/no visual evidence of any remaining peat debris deposited along the banks of the streams/rivers. Over time, any material deposited along the riverbanks has been eroded/degraded.

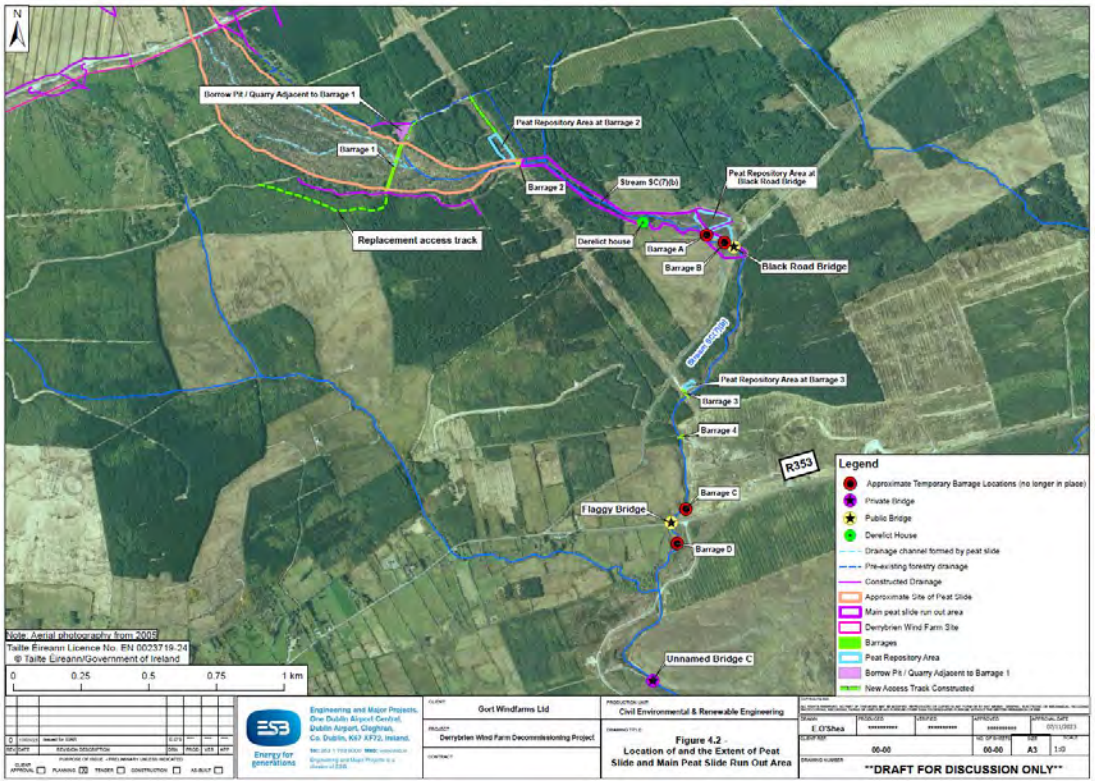



*Figure 4-3 Location of and the Extent of Peat Slide and Main Peat Slide Run Out Area.*

A number of specific emergency response measures were undertaken in the immediate aftermath of the peat slide by Gort Wind Farms Ltd, and other bodies such as GCC. Measures undertaken included the rebuilding of short sections of road within the wind farm site and the installation of eight barrages (three temporary earthen barrages, one temporary rockfill barrage and four extant boulder barrages) along and downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge.

These barrages were constructed along and downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge. After the landslide four temporary earthen barrages (Barrages A, B, C and D) were removed and four remain in-situ (Barrages 1,2, 3 and 4). Peat and soil from the peat slide which had accumulated on adjacent lands, together with material excavated for the construction of barrages and had accumulated behind the barrages was placed in three peat repository areas (Figure 4-2) – Details of each and their current condition is provided below.

**Barrage 1 and Coillte Access Track:** Barrage 1 is located approximately 1,100m downslope of the head at the peat slide. The closest turbine (T71) is approximately 770m from Barrage 1. This barrage reinstated forestry access across the peat slide area. The barrage was constructed of coarse fill founded on mineral soil sometime after the peat slide event. A minor borrow pit/quarry was opened up adjacent to Barrage 1 as a source of rock for the barrages built in response to the peat slide (approximate area 2314m$^2$). The dimensions of the sandstone/conglomerate boulders used in the construction of the containment barrage vary from 0.6 to 1.3m. The size of the boulders used in the parapet wall on the containment barrage was up to about 2m. The containment barrage footprint is approximately 94m long and 8m wide. A localised sump approximately 3m deep has been excavated on the upslope side of the barrage for drainage purposes. An access track 830m in length was constructed from an existing Coillte forest track in order to access the location of barrage 1 and replace the Coillte access track removed by the slide. The access track comprised a western and eastern section. The access track to the west of barrage 1 was constructed as a floating track on peat.

ESB undertook peat probing in 2020 in the area of the floated road section. The floating access track is estimated to be placed on peat about 0 to 1.4 m depth. Based on recent visual inspections, the

containment barrage appears stable. The lack of recent accumulation of debris on the upslope face of the barrage indicates that the debris in the upslope peat slide source area is no longer mobile.

**Barrage 2 and Repository Area:** This containment barrage is located within the gorge beyond the downslope end of the source area approximately 468m from Barrage 1. This barrage was constructed as part of the emergency works shortly after the peat slide event. The barrage comprised boulders placed within a section of an incised stream. The dimensions of the boulders used in the construction of the containment barrage range from 1.0 to 1.2m. The containment barrage is approximately 17m long and 20m wide at the surface.

The lack of recent accumulation of silt/sand debris on the upslope face of the barrage indicates that the debris in the source area is no longer mobile. Based on a visual inspection, the containment barrage appears stable. The repository area adjacent to containment barrage 2 comprises 2 no. separate storage areas which are referred to as the northern and southern repository areas. The northern repository has no bund whilst the southern repository has a bund comprising soil and rock around the stored arisings. The total plan area of the repositories is approximately 3,700m$^2$. The repository areas contain peat, silt and sand which were removed from behind the barrage in the years following the peat slide.

As part of the construction of the barrage, a floated access track was constructed from the existing Coillte forestry track to the site of barrage 2. This track is 3m in width and was constructed using crushed rock imported from local quarries. The track is still present but is currently overgrown. The floating access track is 300m in length and was constructed on peat. The floating access track is estimated to be placed on peat up to about 1.5m depth based on nearest available data. The repository areas have become re-vegetated and recent visual inspections in 2020 shows that they are stable and have no signs of instability.

**Barrage 3 and Repository Area:** This containment barrage is located over 1 km downstream of the source area. This barrage was constructed as part of the emergency works shortly after the peat slide event. The barrage comprised boulders placed within a section of an incised stream. The maximum dimension of the boulders used in the construction of the containment barrage range from 0.9 to 2.5m. The containment barrage is approximately 41m long and 9m wide at the surface. The barrage was heavily vegetated at the time of inspection.

Based on an inspection of an exposure along the watercourse bank in the area of barrage 3 and results of the Mackintosh probes (AGEC, 2018), the founding conditions for the barrage are likely to be bedrock. The aforementioned founding conditions would be deemed a competent stratum for the containment barrage. Based on a visual inspection, the containment barrage appears stable.

The repository area adjacent to barrage 3 has a plan area of approximately 600m$^2$. The repository is partially cut into a slope adjacent to the barrage with a bund placed at the lower slope and partially along the upper slope. The repository area contains silt and sand which were removed from the area following the peat slide. The repository area has become re-vegetated and a recent visual inspection shows that it is stable and has no signs of instability.

**Barrage 4:** This containment barrage is located approximately 300m downstream of containment barrage 3. This barrage was constructed as part of the emergency works shortly after the peat slide event. The barrage comprised competent boulders placed within a section of an incised stream. The maximum dimension of the boulders used in the construction of the containment barrage range from 1.0 to 2.1m. The containment barrage is approximately 25m long and 10m wide at the surface.

Based on an inspection of an exposure along the watercourse bank in the area of barrage 4 and results of the Mackintosh probes (AGEC, 2018), the founding conditions for the barrage are likely to be bedrock. The aforementioned founding conditions would be deemed a competent stratum for the containment barrage. Based on a visual inspection, the containment barrage appears stable. The lack of

recent accumulation of peat debris on the upslope face of the barrage indicates that the debris in the source area is no longer mobile.

**Repository Area at the Black Road Bridge:** The repository areas at the Black Road Bridge essentially contain stored peat, together with some soil/rock debris from the peat slide and were placed up to about 2m high with a flat upper surface. The repository areas comprise 2 separate storage areas. Both storage areas are located on relatively flat ground and are heavily vegetated and are partially bunded. The total plan area of the repositories is approximately 11,900m$^2$. The repository areas contain peat and possibly some non-peat debris. The repository areas have become re-vegetated and recent site visits indicated the stored peat/debris was firm underfoot. Inspection of the stored peat/debris showed that they are stable.

**Drainage diversion works:** As part of the works to stabilise the peat debris contained within the site of the peat slide, a series of drains were constructed to allow excess water to effectively drain away. In addition, since the peat slide occurred, a number of natural flow paths have formed within the site of the peat slide as a result of the development of preferential flow paths following rainfall events.

**Repairs to bridges:** The peat slide resulted in damage to a number of bridges downstream of the wind farm. Repairs were carried out to address structural stability and capacity concerns. These individual structures are identified below in order from upstream to downstream.

- Black Road Bridge: At Black Road Bridge structural repairs consisted of replacing the parapets of the bridge.
- Flaggy Bridge: At Flaggy Bridge on the R353, damaged parapets were repaired and replaced after the peat slide.
- Unnamed Bridge C: Damage to Unnamed Bridge C (privately owned) by the peat slide necessitated removal of the existing structure and re-construction of the entire bridge span.

## 4.2 Derrybrien Wind Farm Development - Decommissioning Project

The Derrybrien Wind Farm Decommissioning Project has been informed by an Assessment of Decommissioning Options (Chapter 3 to this EIAR) which sets out a rationale for the proposed decommissioning approach.

The proposed 'Derrybrien Wind Farm Development Decommissioning Project' comprises two types of "development" for which separate Prospective Development Consent and Substitute Consent is sought from An Bord Pleanála:

- "Prospective Development" - the carrying out of decommissioning works to remove the majority of above-ground features from the site – including all turbines, masts, electrical plant, overhead lines etc; and enable the final decommissioning of the site (the "prospective development" and "prospective works"); and
- "Retained Development" - the 'retention' *in situ* and in perpetuity of part of the existing development – including at-ground and below-ground structures such as turbine and other foundations; and development associated with historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits / quarries etc.

## 4.3 Prospective Development Components

This section of the EIAR describes the "prospective works" associated with the Derrybrien Wind Farm Decommissioning Project that are the subject of this EIAR. A detailed Decommissioning Management Plan has been prepared as part of this project **(Appendix 4-1**). Detailed method statement for decommissioning works is provided within the Decommissioning Management Plan. The duration of the decommissioning phase is expected to be approximately 24 months. The prospective works proposed as part of the Derrybrien Wind Farm Decommissioning Project are summarised as follows:

- enabling works to facilitate the decommissioning of the Derrybrien Windfarm.
- decommissioning and removal of the Derrybrien Wind Farm and their associated ancillary components.
- decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line. Reinstatement of the Ennis-Shannonbridge 110kV Line.

### 4.3.1 Enabling Works

Enabling works will be undertaken at the Derrybrien Wind Farm site to facilitate the decommissioning, dismantling and removal of the Derrybrien Wind Farm. The enabling works will include the following:

- establishment of temporary compounds – 3 no. temporary site compounds and hardstand areas will be re-established at the Derrybrien Wind Farm site and the Agannygal Substation.
- minimal vegetation/scrub clearance and minor levelling works at the existing hardstand areas and access tracks. Waste arising from these enabling works is expected to comprise of vegetation, rubble and gravel. Any clean material that cannot be reused on site will be removed by licensed waste carriers for disposal at appropriately licensed facilities.
- improvements to existing access roads and forestry tracks. The existing access road and forestry tracks typically comprise a 3m wide running track constructed of crushed rock which has been founded on the mineral soil underlying the peat and floating road construction. Minor permanent upgrades to some sections of the access roads may be required to facilitate heavy plant accessing the wind farm. It is envisaged that the improvement works would include filling potholes and localised widening where necessary. Temporary widening of the turbary road and certain sections of turning heads may also be required to provide safe access to the mobile crane that will be used to dismantle the turbines. 1 No. 10m long turning area at Turbine No.4 is required to facilitate access and it is proposed to remain in place post decommissioning.

### 4.3.2 Decommissioning Derrybrien Wind Farm (including the Derrybrien 110kV substation)

The decommissioning works will include the the removal of the above ground structures only, leaving the access tracks, hard stands, wind turbine foundations, underground LV cables, meteorological mast foundations and substation foundations in situ. Any protruding foundations or structures would be cut to below ground level and infilled and levelled to match adjoining areas. These proposed decommissioning works are confined to areas within the control of Gort Windfarms Ltd. (as illustrated on the site layout plans) and are considered typical of the industry norm in respect of windfarm decommissioning.

No bog rehabilitation or active drain blocking would occur and the existing drainage network would be left to naturally rehabilitate. No replanting of forest would occur although some natural regeneration would be likely. The decommissioning works associated will include the following:

- De-energising of the site, which will involve initial disconnection of turbines, low voltage (LV) components followed by disconnection of high voltage (HV) elements.
- Temporary widening of the Turbary Road and certain sections of turning heads.
- Controlled dismantling of 70 no. turbines (blades, nacelle, and tower) and 2no. anemometer lattice masts.
- Controlled removal of electrical equipment from Derrybrien substation and demolition of substation building.

#### 4.3.2.1 Access to wind farm:

It is proposed that the wind farm site will be accessed from a Coillte access road in the townlands of Bohaboy, Funshadaun and Coppanagh, via the BlackRoad (approximately 3.1 km from wind farm to the Black Road/Coillte junction). Black Road generally runs in a north south direction between the R353 at its southernend and Killeenadeema village (south of Loughrea) at its northern end. Access to theBlack Road is via the R353 Regional Road, which originates near Portumna, passes over Flaggy Bridge before passing through the village of Derrybrien to join the N66 Loughrea - Gort National Secondary Road near Gort. From Gort the Black Road is accessed via the N66 for a distance of 1.7 km and the R353 for a distance of 14km.Alternatively, the Black Road /Coillte access road can be accessed via minor public roads from Loughrea a distance of approximately 10km.

#### 4.3.2.2 Controlled dismantling of 70 no. turbines and 2 no. anemometer lattice masts:

The 70 no. turbines and 2 no anemometer masts will be dismantled by mobile cranes operating on the adjacent granular hardstand areas,which are designed to support the crane loads on the glacial till or rock below the peat.

It is not proposed to carry out any remedial works on any of the elements of the wind farm that will be left in place after decommissioning. However, it may be necessary to carry out temporary road widening works along the narrow (approx. 3 metres) turbary road between Turbines T31 and T45 to provide safe access for the mobile crane that will be used to dismantle the turbines. If this is required, then the roads will be widened temporarily using a combination of steel plates, timber bog mats and aggregates, as necessaryto provide adequate edge support to the wheels of the crane without significantly increasing the loads on the peat.

Specialist trucks and low-loader transporters will be required to remove the heavy and oversize components of the turbines from the site. The mass and length of the main turbine components are as follows for the Vestas V52/850 turbine: Nacelle (22 tonnes), 26m Rotor Blades (1.9 tonnes), Tower sections (base tower 29.9 tonnes, top tower 20.5 tonnes)) and 49m Mast (55 tonnes).

The 2 no. anemometer lattice masts will be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland. Wind turbines and components will be reused or recycled where possible.

#### 4.3.2.3 Controlled removal of electrical equipment from Derrybrien substation and demolition of substation building

The Derrybrien substation and control building will be dismantled. Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist. There will be no blastingon the site. The 80-tonne step-up transformer will be removed from site on a specialised 28.5 m long multi-axle articulated truck and low-loader transporter. All demolition waste will be removed from the site. Sulphur hexafluoride ($SF_6$) switchgear from the substation and any oil-containing equipment will be carefully removed in compliance with applicable legislation. All waste generated will be managed in accordance with applicable legislative requirements.

On completion of the works, all above-ground structures will have been removed from the windfarm site. All sub-surface infrastructure, hardstand areas and the internal road network would remain *in situ* but would not be visible in the context of the surrounding landscape. Locations of works will be levelled and reinstated to match adjoining areas of ground. It is not proposed to replant the wind farm site with trees although natural regrowth of previously felled areas is likely .

Subject to a separate assessment and any grant of substitute consent by the Board, the features of the wind farm that will be left in-situ after decommissioning works are completed are listed below:

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approximately 17.5km of access tracks and 70no. hardstand areas.
- Direct buried underground electrical and communications cabling.
- 3no. Borrow Pits / Quarries.
- Naturalised Peat Repository areas.
- Onsite Drainage Infrastructure.
- The third-party mast will remain in situ but the electricity supply to the site will be disconnected.

### 4.3.3 Decommissioning Derrybrien Wind Farm Grid Connection

The decommissioning works will include:

- Destringing of the overhead Line conductor.
- Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts).
- Controlled removal of Agannygal substation and demolition of control building.
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast.
- Removal of palisade fencing surrounding the Agannygal substation.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

#### 4.3.3.1 Destringing of Overhead Line Conductor

Access routes for decommissioning the OHL have been identified in the Decommissioning Management Plan subject to detailed design. The Decommissioning Management Plan has been included in Appendix 4.1. All-terrain vehicles including low ground pressure excavators will be used to access the Overhead

Line (OHL) locations. Conductor destringing will be carried out and all-terrain vehicles will be used to pull lines to allow the conductor to be pulled from mast to mast. Where the OHL crossed public roads, temporary goalpost or H frameswill be used to support the conductor etc. over the road so that safe access can be maintained on the public roads.

#### 4.3.3.2 Removal of Overhead Line infrastructure

The overhead line (OHL) will be decommissioned and will entail the removal of the OHL infrastructure between the Derrybrien substation and Agannygal substation. During the removal of the overhead line, all polesets and masts will be cut at base. The OHL poles and mast elements will be removed from site for reuse and if necessary, disposal in accordance with the relevant legislation. On completion of the works, all above-ground structures will have been removed from the route of the overhead line and the Agannygal substation site. Any disturbed areas shall be reinstated and the below-ground features will be imperceptible.

#### 4.3.3.3 Decommissioning of Agannygal Substation

The decommissioning of Agannygal Substation will involve the removal of the aboveground elements of the substation. These works will entail the de-energising of the electrical equipment and the removal of sub-station from site. The substation equipment will be reused or recycled where possible. All waste will be managed in accordance with applicable legislation. On completion of the works, all structures will be removed from the Agannygal substation site. The palisade fencing surrounding the substation will be dismantled and removed from site. The reinforced concrete base for the substation will be left *in situ* as will the access road to the site.

#### 4.3.3.4 Reinstatement of the Ennis-Shannonbridge 110 kV Line

Following the decommissioning of the wind farm grid connection the Ennis-Shannonbridge 110kV Overhead Line will be reinstated. These works will involve the re-conductoring of the OHL span at Agannygal Substation. The full section of line between angle masts will be wheeled and re-tensioned (approximate length 1.3km). Stringing equipment will comprise 4x4 vehicles, puller – tensioners, teleporters, stringing wheels, conductor drums, compressor & head, transit vans, chains and other small tools, drum stands and drum carriers. It is estimated that thework would take less than 6 weeks to undertake.

On completion of the works, all above-ground structures will have been removed from the route of the overhead line and the Agannygal substation site. Any disturbed areas shall be reinstated and below ground features rendered imperceptible. The OHL poles and mast elements will be removed from site in accordance with the relevant legislation. The reinforced concrete bases will remain in situ. Tree replanting is not proposed although natural regrowth of previously felled areas is likely.

Subject to a separate assessment and any grant of substitute consent, the features of the overhead line and Agannygal substations that will be left *in situ* after decommissioning works are completed are listed below:

- Concrete foundations for 34no. double wooden pole sets.
- Reinforced concrete foundations for 2no. end masts.
- Reinforced concrete foundations for 5no. angle masts.
- Reinforced concrete foundations for 1no. intermediate mast.
- Reinforced concrete foundations of structures within the Agannygal Substation compound.

## 4.4 Decommissioning Programme

The proposed project programme and phasing plan is presented in Section 2.0 of the Decommissioning Management Plan (Appendix 4-1). The duration of the decommissioning phase is expected to be approximately 24 months, which may need to be extended appropriately e.g. seasonal, garda escort availability for abnormal loads etc.

The decommissioning of the project is expected to take place in stages, described below. The stages are expected to run concurrently unless, they are prevented from being doing so, due to for example, the seasonality of the works such as the presence of breeding birds or hedge trimming etc, weather conditions, ground conditions or availability of an outage of the grid for the reinstatement of the Ennis-Shannonbridge line etc.

## 4.5 Project Considerations

### 4.5.1 Adjacent Land Uses

**Forestry:** The adjacent land use at the Derrybrien Wind Farm is used for forestry. The State-owned company Coillte owns most of the forestry in the area, non Coillte private forestry represents less than 10% of forestry in the area. In 1998, prior to project construction, approximately 76% of the site (263ha) was used for commercial forestry, with most of the remainder used for turbary. Based on Coillte data much of the wind farm site had been planted in 1963-1973, a smaller proportion in 1980-1988 and a section to the southwest of the site in 1994. The development of the wind farm entailed the felling of approximately 222ha of forestry within the wind farm site. The remaining forestry on site was not felled. Most of the resulting timber was taken off site, some used for the construction of floating roads on site and some was left on site.

No commercial forestry activities have taken place on the wind farm site since the development of the wind farm. Due to the age profile of the trees in the surrounding areas much of the forestry estate will over the next decade, require felling and replanting as part of the normal lifecycle of such commercial plantations.

**Turf Cutting:** The area is also used by local people for turf cutting who hold turbary rights to a large proportion of the area. There are 136 turbary plots within or immediately adjacent to the wind farm site. Individual plot sites range in area between approximately 0.55ha and 1.10ha. Turbary rights simply means the right to cut and carry away turf from a specific plot of bogland and, includes the right of preparing and storing on the bogland any turf that is cut from it. Turf cutting on turbary lands is referred to hereinafter in this EIAR as “turbary”.

**Environmental Designations:** There are a number of European Sites designated as Special Protection Areas (SPAs) or Special Areas of Conservation (SACs) which has connectivity with the Derrybrien Wind Farm Site. The Derrybrien Wind Farm site is located within the Slieve Aughty Mountains Special Protection Area and mast AM24 is located within the Slieve Aughty Bog Natural Heritage Area (NHA). The spatial configuration of these designated nature conservation sites and relationship with the proposed development is presented and assessed in Chapter 6 of this EIAR and, in the case of European sites, in the Appropriate Assessment Screening and Natura Impact Statement submitted with the application for permission.

There are no protected archaeological or industrial heritage features designated within the application area. There are eleven recorded archaeological sites located within the 3km study area. An assessment of these amenity sites and relationship with the proposed development is presented and assessed in Chapter 12 of this EIAR.

### 4.5.2 Environmental Protection Measures

A series of construction environmental protection measures for the Derrybrien Wind Farm Development Decommissioning Project - Prospective Development were developed through the preparation of this EIAR whose primary objective is to identify the baseline environmental context of the proposed development, predict potential beneficial and/or adverse cumulative effects of the development and propose appropriate mitigation measures where necessary. The preparation of the environmental appraisals was guided by the requirements of EU Directives and Irish law regarding Environmental Impact Assessment.

#### 4.5.2.1 Environmental Management Plan

The Derrybrien Wind Farm Decommission Project will be undertaken in compliance with a Construction Environmental Management Plan (CEMP) which will include all measures which have been brought forward from the environmental assessments undertaken during the preparation of this EIAR as well as any additional measures required pursuant to conditions of development consent. An Outline CEMP (oCEMP) has been prepared and submitted with the application for permission, so as to enable a comprehensive assessment of the decommissioning works. The mitigation measure included in the CEMP set out the minimum requirements which will be adhered to during the decommissioning of the Derrybrien Windfarm.

#### 4.5.2.2 Resource and Waste Management Plan

All waste generated on site during the decommissioning will be dealt with in accordance with the applicable provisions of the Waste Management Act 1996, as amended, and regulations made thereunder.

A Resource & Waste Management Plan (RWMP) has been prepared to enable a comprehensive assessment of the prospective decommissioning works and forms part of the application for permission. The mitigation measure included in the RWMP will be adhered to during the decommissioning of the Derrybrien Windfarm.

#### 4.5.2.3 Traffic Management Plan

A Traffic Management Plan has been prepared to enable assessment to be carried out prior to granting development consent in respect of the decommissioning traffic impacts. The Traffic Management Plan has been submitted with the application for prospective development consent and will be finalised, consequent on any grant of permission, in conjunction with the planning authority. The TMP include details of route of decommissioning traffic, temporary road closures, diversions, temporary signal strategy; programme of vehicular arrivals; onsite parking for vehicles and workers; road cleaning and other traffic management requirements. A Traffic Management Plan has been prepared and forms part of the application for permission (**Appendix 14-3**).

# 5. POPULATION AND HUMAN HEALTH

## 5.1 The baseline

Chapter 5 of the EIAR identifies, describes, and assesses the potential impacts and effects of the Prospective Development on human beings, population and human health and has been completed in accordance with the EIA guidance and legislation set out in Chapter 1: Introduction.

One of the principal concerns in the development process is that individuals or communities, should experience no significant diminution in their quality of life from the direct or indirect effects arising from the decommissioning of a development. Ultimately, all the impacts of a development impinge on human health, directly and indirectly, positively and negatively. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, noise and health and safety

The Project is in County Galway in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast. The wind farm site is leased from a private landowner. The overall area of the wind farm site is approximately 344.5 ha, but the wind farm infrastructure occupies only a small proportion of this area (31.1 ha - approximately 9% of site).

There are 11 no. private residential dwellings within 500m of the Prospective Development. The closest third-party property (inhabitable dwelling) to the proposed works is located approximately 25m from the southern section of the site boundary.

The Derrybrien Wind Farm Development is currently a non-operating wind farm and has been since February 2022. The site is situated on a mixture of commercial forestry, and areas of blanket bog currently used for turf cutting. The existing grid connection route is located in areas of commercial forestry plantation. Other land-uses in the surrounding area include agriculture and low-density rural residential areas. The main wind farm infrastructure comprises turbines, crane hard standings, access tracks, drainage channels, quarries, on site material storage, 110 kV substation, direct buried electric cables and anemometer masts. The predominant surrounding land use within the Population Study Area is agricultural, with a predominant use for pasture. No additional changes are to be made to the land uses of the areas surrounding the Prospective Development site.

The Derrybrien Wind Farm is located on a site mainly consisting of commercial forestry and partially cutover blanket bog. As such, the amount of people accessing the site relates mainly to those cutting peat, recreating, and engaged in agricultural activities. There are no dwellings within the Prospective Development site.

## 5.2 Impacts of the Development

Residential amenity relates to the human experience of one's home, derived from the general environment and atmosphere associated with the residence. The quality of residential amenity is influenced by a combination of factors, including site setting and local character, land-use activities in the area and the relative degree of peace and tranquillity experienced in the residence.

When considering the amenity of residents in the context of a Prospective Development, there are two main potential impacts of relevance: 1) Noise, and 2) Visual Amenity. Noise is a quantifiable aspect of residential amenity while visual amenity is more subjective. Potential noise impact is assessed in Chapter 11 of this EIAR. A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 13 of this EIAR.

Impacts on human beings arising from the Prospective Development is assessed in relation to each of these key issues and other environmental factors such as noise, traffic and dust; see Impacts in Section 5.6 of Chapter 5 of the EIAR. The impact on residential amenity is then derived from an overall judgement of the combination of impacts due to changes to land-use and visual amenity, noise, traffic, dust and general disturbance.

## 5.3 Conclusion

Following consideration of the residual effects (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Human Beings in the area surrounding the Prospective Development.

Provided that the Prospective Development is decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant effects on population and human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values and health and safety are not anticipated at international, national, or county scale.

# 6. BIODIVERSITY (TERRESTRIAL AND AVIAN ECOLOGY)

## 6.1 The baseline

The Biodiversity (Terrestrial and Avian Ecology) Chapter was completed in accordance with all relevant legislation, policies and guidance.

A desktop study was carried out to establish the Zone of Influence of the Prospective Development and to identity any ecological receptors that may potentially be affected by the Prospective Development. Sources of information included databases, websites and reports.

Ecological surveys were undertaken between 2022 and 2024, in line with best practice guidance, to establish the baseline ecological conditions for the site and to inform the assessment. These included terrestrial habitat surveys, vantage point and transect bird surveys, building inspections and activity surveys for bats and otter surveys. The results of ecological surveys undertaken at the site prior to and during its construction as well as its operation also informed the assessment, in particular for terrestrial habitats, birds and bats.

The Prospective Development is located entirely within the Slieve Aughty Mountains Special Protection Area (SPA) and partially within the Slieve Aughty Bog Natural Heritage Area (NHA). No rare or protected plant species were recorded during the surveys. Similarly, no problematic invasive plant species were recorded. The following habitats were identified within and/or adjacent to the Prospective Development area (as per Fossitt, 2000): conifer plantation (WD4), recently felled woodland (WS5), cutover bog (PB4), upland blanket bog (PB2), dystrophic lake (FL1), heath bog mosaic (HH/PB), artificial lakes and ponds (FL5), buildings and artificial surfaces (BL3) and drainage ditches (FW4). These habitats have been valued either at county importance, local importance (higher value), local importance (lower value) or low ecological value.

According to historic and recent bird data (from 1998 to 2024), no breeding hen harrier territories have been recorded within the wind farm site. For the period of 1998 to 2018 there were two regular breeding territories recorded within 1-2 km of the wind farm site. Based on the results of the 2022 and 2024 Vantage Point (VP) surveys, there is no evidence of a breeding hen harrier territory within at least 2 km of the Prospective Development area. No winter hen harrier roosts were recorded during the winter roost surveys (2011/12 and 2019/20). There have been no sightings of merlin within the wind farm site during various bird surveys carried out between 2006 and 2018. Similarly, there were no sightings of merlin within the wind farm site or hinterland during the 2022 or 2024 VP surveys.

A range of bird species characteristic of bog, heath, scrub and forest habitats have been recorded on site over the years. These include 6 Red-listed species: kestrel, golden plover, snipe, red grouse,

meadow pipit and grey wagtail. Bird species recorded during the 2022 VP included: hen harrier (an adult male, approximately 4 km from the wind farm site), kestrel, teal, red grouse, snipe, lesser black-backed gull and sparrowhawk. Bird species recorded during the 2024 VP survey included: hen harrier (a female and a ringtail, recorded on separate occasions approximately 500 m and 2 km from the wind farm, respectively), kestrel, snipe and sparrowhawk. During the 2022 and 2024 transect surveys, meadow pipit and skylark were recorded as widespread. Kestrel was recorded hunting along the overhead line corridor. Willow warbler was recorded as widespread in scrub and woodland edges, while goldcrest was recorded in conifer stands. Mallard was also present in the bog drains and ponds.

Annex I bird species have been valued as being of international importance, while Red-listed species have been valued as being of national importance. Amber-listed species have been valued as being of county importance. Green-listed species have been valued as being of local importance.

There are records of the following bat species within 10 km of the Prospective Development: common pipistrelle, soprano pipistrelle, Nathusius's pipistrelle, lesser horseshoe bat, Leisler's bat, brown long-eared bat, Daubenton's bat, whiskered bat and Natterer's bat. Bat activity surveys (driven transects and static bat detectors) carried out during the operation of the wind farm recorded common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, *Myotis* species and brown long-eared bat. Building inspections and bat activity surveys carried out at the two control buildings at Derrybrien and Agannygal substations confirmed the presence of roosts opportunistically used by a small number of bats (common pipistrelle bat at Derrybrien and Agannygal substations as well as soprano pipistrelle and brown long-eared bat at Agannygal substation). No evidence of bats was recorded during the bridge inspections. All bridges are considered to be of limited roosting suitability for bats. No trees were identified as having potential for roosting bats. All bat species have been valued as either of local importance or site value importance.

Signs of otter have been recorded in the area over the years, including spraint at the Flaggy Bridge tributary, downstream of the confluence with the Owendalulleegh, the Owendalulleegh main channel and Boleyneendorrish River. Otter is likely to use the main river channels and their tributaries within the Zone of Influence of the Prospective Development (Owendalulleegh, Boleyneendorrish and Duniry) for breeding, foraging and commuting. Otter have been valued as being of local importance (higher value).

There are records of the following species within 10 km grid squares that are occupied by the Prospective Development: badger, hedgehog, pine marten, pygmy shrew, red squirrel, common frog, smooth newt and common lizard. Pine marten have been previously recorded within the wind farm site. Pine marten and badger are considered likely to occasionally forage on site, however they are unlikely to breed. Pygmy shrew is likely to breed and forage on site. Red squirrel or hedgehog are unlikely to be present. Common frog, smooth newt and common lizard are all likely to be present on site. All these species are valued as being of local importance (higher value).

## 6.2 Impacts of the Development

In absence of mitigation, the Prospective Development may result in potential impacts on the Slieve Aughty Mountains SPA as a result of loss and fragmentation of suitable hen harrier and merlin habitat, degradation of suitable hen harrier and merlin foraging habitat, and increased levels of disturbance to hen harrier and merlin. The Prospective Development may also result in a positive impact on hen harrier arising from the removal of collision risk and displacement as a potential impact as a result of the decommissioning of turbines and overhead lines. The Prospective Development may also result in potential impacts on Slieve Aughty Bog NHA as a result of habitat loss, fragmentation and degradation.

With regards to terrestrial habitats, in absence of mitigation, potential impacts may arise as a result of habitat loss associated with the temporary widening of the turbary road and creation of turning heads and habitat degradation associated with ground disturbance. In absence of mitigation, the Prospective

Development may result in potential impacts on the birds as a result of permanent and temporary loss of suitable habitat as well as disturbance to habitats and disturbance to birds from decommissioning works. It may also result in positive impacts arising from the removal of collision risk and displacement as a potential impact as a result of the decommissioning of turbines and overhead lines and hardcore surfaces revegetating naturally, overtime providing habitat for passerine bird species which will in turn benefit birds of prey.

With regards to bats, the demolition of the control buildings at Derrybrien and Agannygal substations will result in a loss of a roosting resources for common pipistrelle, soprano pipistrelle and brown long-eared bat at a local level. There is also potential for disturbance to bats resulting in localised displacement of foraging and commuting bats if works take place at night and require lighting. The Prospective Development will also result in the potential loss or degradation of foraging and commuting habitat; however, this will be very temporary and localised in nature. With regards to otter, in absence of mitigation, the Prospective Development may result in loss of breeding, foraging and/or commuting habitat, habitat degradation and a reduction in the abundance and quality of prey species due to a reduction in water quality, habitat severance and barrier effect arising from instream works and temporary increased levels of disturbance. These potential impacts will not result in a significant effect on the conservation status of otter at any geographic scale – with the only exception of a reduction in water quality.

Mitigation measures are included to ensure that all potential impacts are appropriately avoided and minimised.

Following the implementation of all proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects at any geographic scale.

In fact, the Prospective Development will result in a long-term positive effect on terrestrial ecology due to the continued establishment of bog and heath habitat across the felled woodland.

## 6.3 Conclusion

Following the implementation of all proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects at any geographic scale on biodiversity. In fact, the Prospective Development will result in a long-term positive effect on terrestrial ecology due to the continued establishment of bog and heath habitat across the felled woodland.

# 7. AQUATIC ECOLOGY AND FISHERIES

This chapter contains the environmental impact assessment for the Prospective Development as relates to aquatic ecology and fisheries.

### 7.1.1 The Baseline

The baseline for the Prospective Development is 2024, i.e., the current condition of aquatic ecological receptors following 18 years of operation and 2 years of ceased operation. A range of data has been used to define baseline conditions for the Prospective Development. These include EPA biological water quality monitoring (Q-values) and Water Framework Directive (WFD) ecological status reporting; IFI fisheries data for the Owendalulleegh River, plus project-specific field surveys (conducted 2011-2024) including electrofishing, macroinvertebrate sampling (Q-value rating) and water chemistry sampling and interpretation. Whilst EPA and IFI data relates solely to larger, main stem rivers, project-specific field data extended the coverage (and hence the baseline knowledge base) to include all the smaller tributary streams that drain the wind farm, substations and OHL corridor.

## River Catchment Overview

The Derrybrien Wind Farm site drains into three river catchments: 33.4% (115.2ha) to the Boleyneendorrish River, 66.2% (228ha) to the Owendalulleegh River, and 0.6% (1.28ha) to the headwaters of Duniry River. The Duniry River flows to Lough Derg, while the Boleyneendorrish and Owendalulleegh flow westward, with the latter reaching Lough Cutra and the former joining a nexus of tributaries and dropping underground into the karst geology just northeast of Gort. The Beagh River, outflowing from Lough Cutra, re-emerges as the Canahowna River before sinking again just southwest of Gort. All these underground watercourses discharge to the sea at Kinvarra Bay. The wind farm site drainage is conveyed in nine sub-catchments (referred to in the rEIAR as SC1 to SC9, with SC7 (Derrybrien North tributary of the Owendalulleegh) being notable for the occurrence of the 2003 peat slide.

The 110kV OHL corridor also drains primarily to the Owendalulleegh catchment. The Agannygal substation and the small southernmost portion of the OHL drain southwards via forestry drains towards a small unnamed stream that eventually enters Lough Atorick, which outflows as the Bleach River towards Lough Graney and eventually Lough Derg in the Shannon catchment.

## Biological Water Quality Baseline (2024)

The EPA monitor Q-values on main channel sites of the three principal receiving river systems with data reported most recently in 2021 (Owendalulleegh, Boleyneendorrish) and 2023 (Duniry). Collectively, the Owendalulleegh and Boleyneendorrish drain 99% of the wind farm site itself and the OHL route also drains primarily to the Owendallulleegh. An EPA station on the smaller Knocknarebana tributary of the Owendalulleegh in proximity to the wind farm site provides useful data to understand baseline conditions of the many small headwater tributaries that drain the wind farm but are not monitored by the EPA.

Downstream of the Prospective Development, as of 2024, all EPA monitored main channel sites on the major receiving rivers (Owendalulleegh, Boleyneendorrish) are at high status (Q4-5 or Q5) based on sampling in 2021/2022, i.e., “unpolluted”, virtually pristine biological water quality conditions. These data were backed up by recent project-specific macroinvertebrate sampling Q-value sampling carried out in 2024, also recording high status (Q5) on the main channel sites of these catchments. High status is the norm on these major river channels since 1996, with just one notable period of short-term decline in water quality on the Owendalulleegh linked to the effect of the 2003 peat slide during the wind farm construction. Immediately after the 2003 peat slide, the quality at the Owendalulleegh River main channel sites dropped from high status to good (Q4), moderate (Q3-4) and bad (Q2) status, the latter nearest the confluence of the Derrybrien North tributary affected by the peat slide. All the Owendalulleegh main channel sites had returned to High Status (Q4-5) within three years apart from that latter site which returned and have remained at high status since 2006 -2009. The Boleyneendorrish and Duniry rivers were not impacted by the 2003 peat slide.

The EPA monitors one tributary site of the Owendalulleegh (Knocknarebana). It returned high status results in each survey from 1997 to 2012 with the exception of 2003 when the status was good (Q4). SC9 sub catchment was not affected by the 2003 peat slide. This site oscillated between moderate (Q3-4) and good status (Q4) from 2015 to 2021 which is believed to be owing to clearfelling upstream in SC9 outside of the wind farm. Meanwhile the main channel sites downstream maintained high status. This result shows that smaller watercourses tend to have less buffering against environmental change as compared to main channel sites.

EPA sampling on the Duniry most recently (2023) recorded moderate status (Q3-4) at a location >5km from the wind farm site. This was a decline from good status (Q4) recorded between 2006 and 2017, noting that overall river waterbody status is currently ‘good’ (2016-2021 EPA data). Given the very small proportion (~0.6%) of wind farm drainage flowing to this catchment and its dominant (non-project related) forestry land use, it is extremely unlikely that wind farm drainage was responsible for the more

recent decline. Project specific Q-value survey in the Duniry catchment also showed a decline between 2011 and 2022, from high to good/moderate status.

Compared to the main channel sites, which invariably were at high status, results from repeated project-specific sampling (2011 - 2024) for the many smaller tributaries in the upper regions of the study catchments showed variable results over different sampling rounds, ranging from high status down to moderate/poor (the latter at only one location). At several of these sites, repeat surveys tended to indicate that occasional drops in the record (to generally only as low as moderate status) were linked to forestry activity in the upstream catchment areas, either in the same year, or 1-2 years prior to the Q-rating in question. However, other factors were also identified as potentially at play regarding Q-value, including natural water level variability and to a lesser extent site- specific factors such as turbary on the eastern portion of the wind farm and the presence of iron bacterial biofilm (possibly in combination with peat silt) also affecting sites on tributaries draining the eastern portion of the wind farm. Recent (2022, 2024) project-specific round of Q-value survey showed that smaller tributaries (i.e., not monitored by the EPA) were either good or moderate status, with occasional high status in slightly larger more stable channels. The Derrybrien North tributary of the Owendalulleegh (SC7), which was previously heavily impacted by the 2003 peat slide, was high status (Q5) in 2024.

Project-specific water chemistry sampling conducted at numerous sites, some repeatedly between 2011 and 2022, broadly agreed with Q-value results, with sites generally showing low nutrient levels (conducive to high status) with occasional drops to moderate status, linked apparently to, for example, antecedent disturbance upstream. In general, the upper tributary sites tended to be high or good status, with some localised departures depending on the extent of forestry and potentially turbary activity (i.e., the latter unrelated and the former largely unrelated to the wind farm) either during or 1-2 years prior to the sampling round.

Agannygal Substation and the southern end of the OHL corridor drain via a network of forestry drains towards channels termed ‘eastern stream’ and ‘western stream’, both within the Bleach_010 river water body and flowing into Lough Atorick (Shannon catchment). The EPA don’t monitor these, but project specific data showed water quality in both streams was good status (Q4) on the eastern stream (in 2022) and high status (Q4-5) on the lower reaches of the western stream (in 2019).

## Fisheries Baseline (2024)

Despite excellent salmonid habitat and high-status waters in the Owendalulleegh, underground (karst) flows form a barrier to migratory fish species. Hence, there are no salmon in the system and recorded lampreys are almost certainly the non-migratory brook lamprey. Eels manage to reach Lough Cutra and the Owendalulleegh River from the sea. Similarly, the Boleyneendorrish system has an underground connectivity to the sea and thus barriers to migration. While the Duniry and Lough Atorick / Bleah systems are not affected in the same way, they discharge to Lough Derg which is upstream of the Ardnacrusha hydropower station (a significant barrier on the Shannon system) and for this reason likely to have very few, if any, salmon.

Inland Fisheries Ireland (IFI) data is available for the lower Owendalulleegh from 2009, 2013 and 2016. The following species were recorded: brown trout (dominant), eel, lamprey, perch, gudgeon, stone loach, 3-spined stickleback, minnow, and pike. Extensive and repeated project-specific electrofishing (2011-2022) at main channel and tributary small sites showed brown trout and stone loach as dominant species. Where sites were fished on more than one occasion in different years the trout densities were generally found to be within a similar order of magnitude, which suggests fish populations in these streams are relatively stable. The actual trout densities encountered tended to be highest in the larger, open channels of the main channel of the Owendalulleegh. The small tributaries tended to have very low densities and there was evidence in the Derrybrien North tributary of the Owendalulleegh (SC7), i.e., the sub catchment affected by the 2003 peat slide, that a combination of natural and artificial fish passage barriers is preventing upstream fish migration.

IFI do not monitor fish on the Boleyneendoorish or Duniry River. Neither catchment was affected by the 2003 peat slide. Project specific electrofishing between 2011 and 2022 showed that in Boleyneendorrish tributaries, brown trout were the only species present in any year with one minnow at one site in 2011. While it's not possible to rule out other species, e.g., eel, stickleback and lamprey, the fact that none were encountered despite surveys at several sites, some on more than one occasion, suggests that (if present) these species are only likely to be at very low densities. The high-status water quality and very good salmonid habitats of the Boleyneendoorish thus support a brown trout dominated fish community, but at low density, indicative of low nutrient and naturally low productivity.

Electrofishing in the Duniry showed moderate juvenile trout density in 2022 about 4-5km downstream of the wind farm, but only minnow nearest to the wind farm in 2011 (2.4km downstream). The latter result aligns with habitat observations in the upper Duniry, where there are extensive bedrock substrates, which would tend to preclude salmonid spawning. Thus, the 2024 baseline condition for the potentially affected Duniry headwaters does not signify highly sensitive fisheries habitat, but there is a gradual downstream increase in sensitivity as gradient and substrates become more conducive to trout recruitment.

Electrofishing surveys were not undertaken on either the 'eastern stream' or 'western stream' draining the Agannygal substation and southern end of the OHL corridor, but both are unlikely to have trout in the upper reaches closest to the Agannygal substation due to the very small size and unsuitable substrates of the channels. Some potential trout habitat is present on the eastern stream, which may be crossed by a new haul route for the decommission, but densities are likely to be low as the habitat is sub-optimal. Given recorded good status on the eastern stream and high-status waters on the lower reaches of the western stream, trout are likely to be present in the lower reaches of both, i.e., upstream of their inflow to Lough Atorick, where habitat is more suitable.

### Baseline Ecological Valuation Summary

The main channel of the Boleyneendorrish and Owendalulleegh Rivers are both large 4$^{th}$ order channels in their mid to lower reaches. Both rivers have high status waters, excellent salmonid habitats and documented confirmed populations of trout and other fish species, as evidenced by IFI data and project-specific electrofishing between 2011 and 2022. This combination of a healthy trout population, excellent salmonid habitat and a natural hydromorphology, combined with consistently high status (Q4-5/Q5) water quality has accorded the main channels of the Boleyneendorrish and Owendalulleegh a rating of National Importance for the 2024 baseline condition. Reaches of the upper Owendalulleegh, because they tended to return good (Q4) rather than high status water quality results as part of project-specific sampling in 2019 and 2022 were assigned County level value. All the other streams draining the wind farm, Agannygal Substation and the OHL corridor are much smaller, have variable water quality and variable or low fisheries value and these were assigned values from County level to Local level (low) ecological values depending on their individual hydromorphology and their most recent (i.e., 2019-2024) monitored Q-value, water chemistry and electrofishing results.

## 7.1.2 Impacts of the Development

It is important to note that the decommissioning proposal, as prescribed in the EIAR, with only the above ground elements of the Project being removed, carries inherently and substantially less risk of likely significant effects on water quality, aquatic habitats and fisheries compared to the theoretical removal of all below ground elements as well. This avoids extensive excavation, earth movement, soil redistribution and reinstatement that could otherwise occur, were the below ground elements also removed, which could potentially give rise to likely significant negative effects in relation to wash out of peat soils or, at worst, another peat slide. Therefore, likely significant effects are largely and inherently avoided by the Prospective Development design with regards to water quality, macroinvertebrate and fish populations and overall waterbody status in receiving waters of the primary receiving water

catchments: Owendalulleegh and Bolyneedoorish (which collectively receive about 99% of the wind farm site drainage) as well as the Duniry River and Lough Atorick tributary stream.

At the outset, it is important to note that, in the main the access tracks and haul routes required to conduct the decommissioning are already in-situ as part of the existing project infrastructure, requiring only relatively minor upgrades and no significant earth movement. Potential effects on the aquatic environment during decommissioning are mainly related to washout of suspended solids because of ground disturbance, and/or hydrocarbons (fuels and oils) arising from the substations or vehicles and machinery. If such pollutants did reach drains and watercourses, they could have negative effects on water quality and downstream aquatic receptors but primarily confined to the 1st and 2nd order tributaries and without likely significant effects aquatic sensitivities of the main stem receiving channels (i.e., fisheries and Q-values of the Owendalulleegh and Boleyneendoorish rivers). The likelihood of such pollutants reaching drains and watercourses will be reduced through the prescribed mitigation measures.

Key to the mitigations are the proposed methods / water quality protection measures relating to access routes for the decommissioning of the OHL, particularly: (1) the route termed 'Alternative 1' where the SC7(b) and SC7(c) tributaries will be subject to temporary clear span bridge structures between polesets 16 and 17; and also: (2) the access route involving fording of the Owendalulleegh from the south to reach polesets 23 and 25 and angle mast 24. Adherence to all mitigations will be overseen by an appointed Ecological Clerk of Works (ECoW) throughout the decommissioning to ensure their implementation of continued efficacy.

In addition, upgrade of the Agannygal Substation decommissioning haul route at the southern end of the project requires relatively minor works to upgrade an existing (collapsed) forestry culvert and potentially install an additional new culvert at the haul route entry point from the local road. With best construction practise employed and prescribed mitigation at these locations, mainly in the area of prevention of sediment wash out, likely significant effects will be prevented and avoided in relation to water quality and minor fisheries habitat of the 'eastern' and 'western' Lough Atorick tributary streams.

The extensive water quality and fisheries dataset gathered over many years from streams and rivers draining the project area have shown that the ongoing operation period (2006-2022) followed by the ceased operation phase (2022 to present) of the wind farm, including the OHL and Agannygal Substation, has had no significant negative impacts on surface receiving waters. Any impacts that have been recorded were slightly negative, temporary, not significant and confined if/where they did occur to the upper reaches of small tributaries, potentially in relation to small amounts of site maintenance and turbulence felling but also affected by other catchment land use (forestry, turbary). Furthermore, throughout the operation and ceased operation phases, there has been a long-term neutral effect on biological water quality of the principal receiving rivers: Owendalulleegh and Boleyneendoorish, with high status (Q5/Q4-5) maintained on both channels throughout these phases, providing evidence of the benign nature of the presence of the project between 2006 and 2024 in terms of ecological status of waterbodies.

### 7.1.3 Conclusion

The Prospective Development as described, involving the removal of above ground elements, with all recommended mitigation measures implemented, is predicted to have localised and at worst, **imperceptible to slight negative, temporary reversible** residual impact on biological water quality and fisheries confined mainly to upper reaches of small tributaries nearer the work sites. There will be a **neutral** impact on current high ecological status of the main receiving rivers: Owendalulleegh and Boleyneendoorish which collectively receive 99% of drainage from the wind farm site. Furthermore, with their very small drainage proportion and considering the nature of the works required and mitigations prescribed, there will be **temporary imperceptible negative to neutral** effects on the Duniry and Lough Atorick / Bleach catchment streams.

# 8. LANDS, SOILS AND GEOLOGY

## 8.1.1 The baseline

The available desktop information and the numerous geotechnical site investigations undertaken on the Project site have been used to inform the baseline Soils, Geology and Land conditions and to undertake the assessment of the impacts for the Project.

From the wind farm site, the overhead line (OHL) is routed in a southernly direction where the topography is steep over the initial 1.5km and then crosses the more gently sloping terrain of the Owendalluleagh River valley to the Agannygal substation where the site has been cut and filled locally to provide a level platform at about 190m AOD.

The quaternary geology underlying the Grid Connection route comprises blanket bog (peat). The walkover survey and ground investigation undertaken previously by Applied Ground Engineering Consultants (AGEC, 2018) and FT (2019) indicates that the upper 1m of peat is generally very fibrous and locally desiccated becoming less fibrous with depth.

Peat depth probing carried out by ESB, AGEC and FT was used to establish peat depth contours along the OHL route. The depth of peat recorded along the OHL route ranged from 0.2m to 5.6m bgl with an average depth of 1.35m bgl.

Based on the available data, varying thicknesses of glacial soils are present beneath the peat along the OHL route corridor. The publicly available GSI (2022) mapping shows glacial till in the vicinity of the OHL to be derived from Devonian sandstones. Exposures of glacial till noted during the walkover surveys showed a reddish brown or whiteish brown well-graded material consisting of sandy slightly gravelly Clay/Silt with occasional sub-angular to rounded cobbles and boulders of sandstone.

The bedrock geology along the OHL route corridor (from GSI mapping) comprises the Ayle River Formation, the Derryfadda Formation, the Scalpnagown Formation, and Undifferentiated Visean Limestone.

The Ayle River Formation consists of red siltstones, mudstones with carbonate concretions, sandstones, conglomerates and mud-flake breccia. The Derryfadda Formation consists of greywackes, siltstones, and mudstones, and the Scalpnagown Formation consists of conglomerate, sandstone & siltstone. The Undifferentiated Visean Limestones are impure Dinantian limestones.

## 8.1.2 Impacts of the Development

For this project, activities that have negative stability impacts on the receiving soils, geology and land typically involve temporary or permanent loading on the surface of the blanket bog that covers the site.

The probability of a peat failure occurring is a function of the characteristics of the site as well as the stability impacts of the site activities on the peat. Therefore, a Peat Stability Risk Assessment (PSRA) has been carried out for the project in accordance with current best practice guidelines to interpret the risk of a peat slide across the site. This is based on factors that are relevant to peat stability such as topography, peat depth, peat strength, hydrology, and groundwater conditions.

For the grid connection the predominant stability impacts during decommissioning will be the live loadings on the peat due to removal of the OHL structures. Insofar as possible the construction stage access routes will be reused to access the structure locations, the effect of which is assessed as **Not Significant** except in a single location at AM38 which is assessed as **Slight** due to the presence of deeper peat.

Residual impacts with respect to the Grid Connection are not considered to be significant.

No significant cumulative impacts have been identified with other projects activities with respect to the decommissioning of the OHL.

### 8.1.3 Conclusion

For the decommissioning phase of the project the direct impacts on soils land and geology of significance will be restricted to the tracking of plant across the deeper peat slopes for the OHL. These have been assessed as of slight significance. No significant impacts on land, soil and geological environmental are anticipated during the decommissioning phases of the OHL.

# 9. HYDROLOGY AND HYDROGEOLOGY

## 9.1 The baseline

A desk study was carried out to collate the available information on the surface water and groundwater environments of the study area.

Substantial field work in the form of geotechnical investigations from prior to construction of the Project onward have informed the establishment of baseline data for this chapter. Field work carried out between 2018 and 2024 for the purpose of assessing the current state of the Project site specifically involved a series of walkover surveys of the wind farm site, the peat slide area, the overhead line (OHL) route and two electrical substations that comprised the Project. These were carried out in tandem with topographical and drone surveys. Detailed surveys were carried out on the wind farm site of the drainage channels and on the in-stream structures.

The 344 ha wind farm site partially extends over the catchments of three rivers – Boleyneendorrish and Owendalulleegh in the Galway Bay South East WFD Catchment and Duniry in the Lower Shannon WFD Catchment. The Owendalulleegh River System drains approximately two-thirds (66%) of the wind farm site through a number of small hill slope stream tributaries. The Boleyneendorrish River drains approximately 33% of the wind farm site. The Duniry River drains a very small section of the overall site (0.6%) to the northeast. Several watercourses exist within the footprint of the OHL route, the largest being the Owendalulleegh River, approximately 6.0 m wide, which passes beneath the OHL halfway between pole sets 25 and 26, approximately 150 m from both. The land on which Agannygal substation is located (0.5 ha in the Bleach River Catchment) is elevated with respect to the surrounding area to the north, west and south. There is no record of drainage on or in the vicinity of the site prior to construction.

The Ayle River Formation, comprising mudstones, siltstones and conglomerates, underlie most of the wind farm site. This bedrock formation is predominantly classified by the GSI as a poor bedrock aquifer, having bedrock that is generally unproductive except for local zones. This bedrock is a muddy impermeable bedrock that is not very conducive to transmitting and storing groundwater flow or karstification due to its higher clay composition. Groundwater at the wind farm site can be classed as Not Sensitive to pollution. The closest karst features to the Project area according to GSI mapping are several limestone springs and depressional features near Ballynakill, approximately 5 km to the southeast of the wind farm site at its closest point. Groundwater within the wind farm site boundary would be expected to flow downslope through a network of natural open pipes within the peat as well as possibly through an open joint network in the underlying bedrock. The relatively low permeability of the bedrock means that contaminants in the overburden will not be very mobile and any contaminant that may reach the bedrock would not disperse and would remain localised to the source or would be diluted and removed as part of runoff during wet periods.

## 9.2 Impacts of the Development

During the post-construction phase of the wind farm from 2006 to the present day, the drainage network has experienced a variety of large storm events ranging from intense short-duration events to long-duration winter floods which saturated the wider area. The drainage network has to date demonstrated sufficient capacity to convey floodwaters without causing excessive flooding of access tracks and turbine bases and not requiring any significant drainage maintenance works.

Decommissioning is not anticipated to give rise to any significant impacts related to flood risk locally or downstream of the site.

Water quality impacts potentially arising during the decommissioning phase of the wind farm development are likely to be limited to minor siltation or pollution incidents as a result of small-scale maintenance and decommissioning works. Such local incidents will not give rise to significant impacts on water quality in downstream receiving streams and rivers. Appropriate precautions will be taken to ensure the protection of watercourses from silting during any maintenance activities.

There are no significant cumulative impacts on drainage and flooding arising from the wind farm decommissioning works when considered cumulatively and in-combination with the Retained Development and any other projects in the locality.

Due to the nature of the prospective development, which are "near surface" construction activities, the impacts on groundwater are generally minor and surface water is generally the main sensitive receptor. The decommissioning will not give rise to any significant hydrogeological impacts.

## 9.3 Conclusion

The Prospective Development is not anticipated to give rise to any significant impacts related to the drainage flow regime and flood risk classification or result in any unacceptable hydrological or hydrogeological impacts both on-site or off-site.

# 10. AIR AND CLIMATE

Chapter 10 of the EIAR identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the Prospective Development.

## 10.1 Air Quality

### 10.1.1 The baseline

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and Environs
- Zone B: Cork City and Environs
- Zone C: 16 urban areas within population greater than 15,000
- Zone D: remainder of the country

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the CAFE Directive. The Wind Farm Site lies within Zone D, which represents rural areas located away from large population centres.

The air quality in the vicinity of the Wind Farm Site and Grid Connection site is typical of that of rural areas in the west of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, *'Air Quality in Ireland 2022'* was published by the EPA in September 2023[1]. The EPA reports provide $SO_2$, $PM_{10}$, $NO_2$ and $O_3$ concentrations for areas in Zone D. These are detailed in Section 10.2.2 of Chapter 10 of this EIAR.

Due to the non-industrial nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. Based on professional judgement it is considered that that air quality in the existing environment is reflective of the EPA Air Quality Zone D, due to the remote location of the site and since there are no major sources of air pollution (e.g., heavy industry) in the vicinity of the site.

### 10.1.2 Impacts of the Development

Exhaust emissions associated with the operation of vehicles and plant will arise as a result of the construction and decommissioning activities. This potential effect will not be significant and will be restricted to the duration of the Prospective Development and localised to works locations. Furthermore, the Prospective Development works will give rise to dust emissions. This potential effect will not be significant and will be restricted to the duration of the Prospective Development.

A CEMP will be implemented throughout the Prospective Development (see Appendix 4-3 of this EIAR), which includes dust suppression measures. In addition, turbines and construction materials will be transported away the site on specified haul routes only. The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.

### 10.1.3 Conclusion

Chapter 10 of the EIAR followed relevant guidance and best practice to provide an assessment of potential effects from the Prospective Development on air quality, either alone or cumulatively considered with other relevant activities in the vicinity of the site. It is concluded that effects on air quality from this Prospective Development will be, at worst, short-term, imperceptible and negative.

## 10.2 Climate

### 10.2.1 The baseline

Chapter 10 of the EIAR also identifies, describes and assesses the potential significant direct and indirect effects on climate arising from the Prospective Development.

Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are linked to increased frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

[1] *https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2022.php*

In June 2023, the Environmental Protection Agency (EPA) released '*Ireland's Greenhouse Gas Emissions Projections 2022-2040*'. The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario assumes that no additional policies and measures, beyond those already in place by the end of 2020. This is the cut off point for which the latest national greenhouse gas emission inventory data is available, known as the 'base year' for projections. The WEM scenario has a higher level of ambition and includes government policies and measures to reduce emissions such as those in Ireland's Climate Action Plan 2024 (CAP 2024).

The projections show that implemented policies and measures in the WEM scenario can deliver an 11% reduction in greenhouse gas emissions by 2030 compared to the 2018 level. The WAM scenario, including policies and measures from CAP 2024, is projected to deliver a 29% emissions reduction over the same period. This is well short of the legally binding commitment to achieving a 51% reduction in GHG emissions from 2021 to 2030, and to achieving net-zero emissions no later than 2050. Ireland's new 2030 target under the EU's Effort Sharing Regulation (ESR) is to limit its greenhouse gas emissions by at least 42% by 2030. This target was set in April 2023 upon amendment of the Emissions Sharing Regulation. For Ireland to achieve its national and international climate targets, it will require a full and rapid implementation of CAP 2024 measures and further measures to be implemented.

The Prospective Development will not contribute to meeting any of Ireland's greenhouse gas emission targets. However, since the Derrybrien Wind Farm has been determined to be unauthorised development by An Bord Pleanála and following receipt of an enforcement notice from Galway County Council, Gort WFL is obligated to decommission the wind farm and associated grid connection.

### 10.2.2 Impacts of the Development

Emissions from the Prospective Development will be restricted to the duration of the decommissioning works, and as such will give rise to emission over a short-term duration. However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from decommissioning activities will have a permanent imperceptible negative effect on Climate. It is concluded that effects on climate from this Prospective Development will be, at worst, short-term, imperceptible and negative.

### 10.2.3 Conclusion

This Chapter of the EIAR followed relevant guidance and best practice to provide an assessment of potential effects from the Prospective Development on climate, either alone or cumulatively. It is concluded that effects on climate from this Prospective Development will be, at worst, short-term, imperceptible and negative.

# 11. NOISE AND VIBRATION

### 11.1.1 The baseline

Damian Brosnan has been commissioned to conduct an assessment into the likely environmental noise and vibration impacts of the Prospective Development.

Baseline noise levels across the local area were documented in the 2020 remedial EIAR. This data was used to determine noise criteria relevant to the decommissioning project, following guidance set out in British Standard BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (2014). Plant likely to be required during the Prospective Development were identified, and their noise emissions data used to determine the likely audibility

radius of each works zone. Levels expected at surrounding receptors were assessed in the context of identified criteria, and mitigation measures identified where required.

Noise impacts were assessed with reference to the assessment methodology described in Guidelines on the Information to Be Contained in Environmental Impact Assessment Reports (EPA, 2022). Each of the impact types listed in Chapter 11 of the EIAR is defined in the EPA document. The EPA guidance document also sets out advice in relation to the assessment of potential indirect effects, cumulative effects, and other categories. These are assessed in Chapter 11 where relevant.

### 11.1.2 Impacts of the Development

There are no receptors in immediate proximity to the wind farm. The nearest receptors to the wind farm lie along the R353 at Derrybrien, where several dwellings are located approximately 2100-2200 m from the nearest turbines. There are no occupied dwellings to the east, west or north within 3 km, apart from scattered dwellings to the northeast. Here, the closest dwelling lies 2260 m from the nearest turbine.

There are 11 dwellings inside the 500 m offset of the proposed works. All 11 consist of residential dwellings. There are no vulnerable receptors such as hospitals or care homes within the 500 m contour, or indeed in the wider surrounding area. The nearest non-residential receptors are a school and church at Derrybrien, approximately 2,200 m from the nearest turbines. These and other receptors outside the 500 m contour are expected to be well outside audible range of the proposed works.

Overall, the Prospective Development will result in minimal impacts, confined to a short period. None of the residual effects are considered to be significant

### 11.1.3 Conclusion

Overall, the Prospective Development will result in minimal impacts, confined to a short period. None of the residual effects are considered to be significant. No cumulative or indirect effects have been identified. Provided that the Project is decommissioned in accordance with the design, best practice and mitigation that is described within Chapter 11 of this EIAR, significant effects from Noise are not anticipated.

# 12. ARCHAEOLOGY AND CULTURAL HERITAGE

## 12.1 The baseline

The sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record and the Record of Monuments and Places for County Galway. The current County Galway Record of Protected Structures and the National Inventory of Architectural Heritage were consulted in order to identify the locations of designated elements of the architectural heritage resource. The assessment also included reviews of other sources, including but not limited to, archaeological and architectural heritage inventory descriptions, previous archaeological assessment reports, the Database of Irish Excavation Reports and historical cartographical sources. In addition, a number of field-walking inspections of the lands within the planning boundary were carried out.

There are no extant archaeological sites or architectural heritage structures located within the wind farm site, in the environs of the overhead line or the locations of the peat slide and remedial measures. The Archaeological Survey of Ireland records that a potential cashel site (GA124-001—) formerly located in the northwest corner of the wind farm was likely destroyed by the commercial forestry plantation prior

to the commencement of the wind farm development. The recorded location of this site was inspected as part of the assessment and no surface traces of any potential archaeological features were noted at the location.

In addition, a programme of archaeological monitoring of ground works during the construction of the wind farm was carried out and nothing of archaeological significance was identified.

There are no other recorded archaeological sites within 350m of the planning boundary and there are no National Monuments or archaeological sites subject to Preservation Orders located within a 3km study area. There are also no monuments with potential visual alignment attributes, such as megalithic tombs or stone circles, located within the 3km study area.

There are no designated architectural heritage structures located within the planning boundary or within 1.58km of its boundary. There were also no undesignated architectural heritage structures identified within the planning boundary during the assessment.

## 12.2 Impacts of the Development

The demolition phase activities associated with the proposed decommissioning project will be limited to the removal of above ground elements of the Derrybrien wind farm and will not require ground excavation works within areas of undisturbed ground that have the potential to contain unrecorded, subsurface archaeological remains.

Given the baseline cultural heritage environment described above, it is concluded that the decommissioning works will result in a neutral effect on the cultural heritage resource and that no mitigation measures for this resource are required. Residual and cumulative impacts on the cultural heritage resource with respect to the proposed decommissioning project will also be neutral.

## 12.3 Conclusion

No significant impacts on the cultural heritage resource are predicted to occur as a result of the proposed decommissioning project.

# 13. LANDSCAPE AND VISUAL

## 13.1 The baseline

The Derrybrien Wind Farm Development is located on the northern part of the Slieve Aughty Mountains in Co. Galway. The Slieve Aughty uplands compris Cashlaundrumlahan and a parallel unnamed ridge in the townland of Sonnagh Old, is an upland landscape of relatively small scale and undramatic landform compared to other mountain ranges in Co. Galway and across Ireland. The uplands are visible from a very wide area of the surrounding plains. They generally feature as a broad, low, round-topped landform on the horizon, with limited visual presence.

Aerial photography shows areas of coniferous plantation, in geometric forms, and areas of bog on the site and immediate surrounds. The Derrybrien Wind Farm Development turbines are in a grid pattern. The immediate surrounds of the site are covered by a mosaic of coniferous forestry and open bogland. The nearest areas of agricultural lands with small scale field patterns, appear to be to the south and southeast near Derrybrien village. The area has a remote character.

The route of the overhead line which connects to the Agannygal substation, lies to the south of the existing wind farm. The land cover along the route of the overhead line is similar to that of the windfarm site, with a contrast between the mosaic of open bogland and large areas of coniferous

plantation. Consequently, views vary between a high degree of enclosure and open areas with views of the wider landscape.

Visibility of the Derrybrien Wind Farm Development turbines, which are considered low in height by today's standards, varies throughout the landscape. There are relatively few locations where open and close-up views of the wind turbines are available, with two main locations along the Black Road providing open views in close proximity. The turbines are visible from the wider landscape as a large cluster of low turbines and are a landmark in the wider area.

Though the nature of decommissioning involves the removal rather than the insertion of elements into the landscape, a selection of viewpoints and the preparation of some photomontages to illustrate the visual effects of Prospective Development. 17 no. viewpoints were chosen, with six photomontages produced, showing the visual effects of decommissioning of the turbines and the Agannygal substation.

A selection of viewpoints represents the following viewers, including viewpoints at various elevations, distances and contexts in the landscape of the study area. These include:

- *Viewers in the local Derrybrien community and on local roads.*
- *Viewers in the wider Slieve Aughty and Burren Lowlands landscape.*
- *Viewers on Scenic Routes and at Protected Views.*
- *Viewers at amenity and recreational locations.*
- *Viewers in local towns and villages.*
- *Viewers on Regional and National Roads.*

## 13.2 Impacts of the Development

The effects on the landscape during the process of enabling and decommissioning works are considered to be Temporary to Short term and Slight, in the vicinity of the site and Imperceptible in the wider landscape. The quality of the effects is likely to be adverse.

Following decommissioning the landscape effect will vary depending on the location – landscape effects will range from Not Significant to Moderate. The effects are considered to be neutral to beneficial.

The removal of the turbines and associated buildings and elements on the site of the wind farm is considered to result in a Slight- Moderate landscape effect on the fabric of the site, as the above-ground elements only are to be removed with access roads and hardstands remaining on site. Underground cabling will also remain. The quality of the effect is considered to be neutral where natural regrowth occurs. This is considered to be Short term in duration. The removal of the wind farm from the landscape will result in a Slight to Moderate change to the character of the wider landscape also, depending on the views. Overall, it is considered that the quality of the effect is neutral.

The removal of the overhead line would be considered Not Significant to Slight, beneficial landscape effect, and the removal of the Agannygal sub-station a Slight, neutral to beneficial landscape effect.

Visual effects range from Imperceptible to Moderate, depending on the location. The quality of the visual effects are range from neutral to adverse during the process of decommissioning, with visual effects once the above ground elements have been removed, considered neutral to beneficial.

## 13.3 Conclusion

The Prospective Development will result in some landscape and visual effects, ranging from Imperceptible to Moderate. Temporary to short term, adverse effects are likely during the process of decommissioning and will be more pronounced in locations close to the turbines, the overhead line

and the Agannygal substation. Once works are completed the quality of the landscape and visual effects are considered neutral to beneficial in quality.

# 14. MATERIAL ASSETS

This chapter of the EIAR addresses the likely significant effects of the Prospective Development on transportation infrastructure (Section 14.1 Traffic and Transport), and Other Material Assets (Utilities, Telecommunications and Aviation) (Section 14.2), which are economic material assets of human origin.

## 14.1 Traffic and Transportation

### 14.1.1 The baseline

This section of the Environmental Impact Assessment Report (EIAR) has been prepared by TOBIN, as part of the EIA process to assess the transportation impacts of the Prospective works of the Derrybrien Wind Farm Development Decommissioning Project on the surrounding road network. The decommissioning phase Traffic Impact Assessment considers the combined effect of the traffic likely to be generated by the proposed and cumulative development of the Derrybrien area.

The performance of R353 regional road at Black Road junction was modelled.

The existing (year 2023) and the decommissioning (year 2025) generated traffic were assessed for R353 and Black Road junction.

### 14.1.2 Impacts of the Development

The traffic impact assessment results have shown that the increase in traffic volumes, that will be generated by the Prospective Development will have no significant impact on the performance of the junctions assessed.

### 14.1.3 Conclusion

The number of vehicle movements generated by the Prospective Development is significantly low. The assessment indicates that there will be negligible queues and minimal delays during both peak hours. The impact of transporting the turbine components from site via proposed road network is negligible due to the proven history of transportation during construction phase.

## 14.2 Telecommunications and Aviation and Other Material Assets

### 14.2.1 The baseline

The Prospective Development is not within any of the zones for which guidelines are laid down by the Irish Aviation Authority (IAA). The airports in closest proximity to the Prospective Development are Galway, approximately 31 km away, and Shannon, approximately 45 km away. However, the Prospective Development location is outside both the aviation exclusion zone for Galway Airport and other airfields in the County. The Prospective Development does not affect the safe operation of these airport / airfield facilities.

There are no known water supplies within the Prospective Development site and no existing water services in the vicinity of the Prospective Development will be altered, reinforced, or relocated as a result of the Prospective Development. No groundwater abstraction will take place as a result of the Prospective Development. There is no anticipated effect on water supply as a result of the Prospective Development.

There are no known main drainage or sewerage schemes within the Prospective Development site. No existing schemes in the vicinity of the Prospective Development will be altered, reinforced or relocated as a result of the Prospective Development. There is no anticipated effect on sewerage schemes and wastewater infrastructure as a result of the Prospective Development.

The following electricity distribution/ transmission lines are within the Prospective Development area.

- The existing 110kV Ennis – Shannonbridge OHL which runs in an east-west direction, located to the south of the wind farm in line with the Agannygal Substation. As described by Chapter 4 this line will be restored following the decommissioning of the Agannygal Substation.
- The existing 400kV Moneypoint – Woodlands OHL which is located to the south of the Prospective Development. The Derrybrien Wind Farm grid connection crosses beneath this OHL.

In addition to the above there are existing Low Voltage (LV) power supplies in the surrounding area, primarily serving residential properties. No existing LV power supply connections in the vicinity of the Prospective Development will be altered, reinforced or relocated as a result of the Prospective Development.

The Prospective Development area does encompass any other significant energy infrastructure aside from the above. The closest gas pipeline to the Prospective Development is approximately 5.9 km north-east of the site at Loughrea.

There are 2 meteorological masts (anemometer) belonging to ESB in the western part of the site. Vodafone placed a cell at the central mast to assist with improved phone signal for personnel working at the site. The mast was installed in 2005 with the cell added at a later date to boost signal.

There is also an existing telecoms mast in the east of the site which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter.

The Maghera transmission site is located approximately 14.1 km southwest of the Derrybrien site in County Clare at a site elevation of approximately 400 m high. It is one of RTE Transmission Networks Ltd (2RN) network of radio and television transmitters. There are also existing telecommunications services in the surrounding area, primarily serving residential properties. Tourism & Recreational Infrastructure

The Prospective Development is located in a remote area and not in an area of significant tourism importance, near any of the region's major tourism attractions or in an area with existing recreational infrastructure in its own right. There are no designated walking routes within or in the immediate vicinity of the Prospective Development.

There are no EPA-licensed or local authority-authorised waste facilities or activities located within the EIAR Site Boundary. The closest, authorised municipal waste facility (City Bin Co.) is located approximately 28.6km to the northwest of the Proposed works.

### 14.2.2 Impacts of the Development

Following consideration of the residual effects (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Material Assets within the Prospective Development site or in the surrounding area. More details regarding the impacts of the Prospective Development are included in Section 14.2.4 of Chapter 14 of the EIAR.

### 14.2.3 Conclusion

Following consideration of the residual effects (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Material Assets within the Prospective Development site or in the surrounding area.

Provided that the Prospective Development is decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant effects on Material Assets, including aviation, telecommunications, energy infrastructure, or water supplies are not anticipated.

# 15. VULNERABILITY OF THE PROJECT TO MAJOR ACCIDENTS AND NATURAL DISASTERS

## 15.1 The baseline

Chapter 15 of the EIAR describes the likely significant adverse effects on the environment arising from the vulnerability of the Proposed Development as detailed in Chapter 4 to risks of major accidents and/or natural disasters, as well as the potential of the Prospective Development itself to cause potential major accidents and/or natural disasters.

Major accidents and natural disasters are hazards which have the potential to affect the Project and consequently have potential impacts on the environment. These include accidents during construction caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e., population and human health, biodiversity, land, soil (peat stability), water, air and climate and material assets, cultural heritage and the landscape.

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

Further detail on the baseline environment is provided in Section 15.3 of Chapter 15 of this EIAR.

## 15.2 Impacts of the Development

This assessment is focused on an understanding that the Derrybrien Windfarm Development will be decommissioned in line with the methodologies and measures prescribed in this EIAR. Therefore, the overall vulnerability of the Project to risks of major accidents and natural disasters is considered low.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events and peat instability. These are described in detail in the relevant EIAR assessment chapters (Refer to Chapters 8 to 9 for further detail).

The risk of a major accident and/or disaster during the construction of the Project is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010).

It is considered that when the mitigation and monitoring measures outlined in the CEMP are implemented and adhered to there will not be significant residual effect(s) associated with the construction and decommissioning of the Project.

## 15.3 Conclusion

Based on the assessment set out in this chapter the Prospective Development is considered to be at low risk of either causing or being impacted by a major accident or natural disaster. Furthermore, given the nature of the works proposed for the Prospective Development there will likely be no significant cumulative impacts with other projects or land use activities in the vicinity of the Project.

# 16. RESOURCE AND WASTE MANAGEMENT

## 16.1 The baseline

Chapter 16 of the EIAR identifies, describes, and assesses the likely significant effects of the Prospective Development as part of the Derrybrien Wind Farm Development Decommissioning Project (as described in Chapter 4) on Resource and Waste Management.

Resource and waste management takes place in a policy and legislative framework. A review of relevant legislation, policy and best practice guidance was undertaken to inform the impact assessment and recommended mitigation.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the Waste Management Act 1996, as amended and subsequent Irish legislation, is the principle of "Duty of Care". This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of "Polluter Pays" whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

## 16.2 Impacts of the Development

The majority of the electrical equipment, wind turbines, and grid connection cabling will either be recycled or reused. Table 16.1 below summarises the anticipated waste generated during the Prospective Development that is likely to be disposed of in landfill. This summary assumes that, as a

worst-case scenario, the 70 no. turbines at the site cannot be reused and have to be scrapped. In such a scenario, 88% (by mass) of the turbines would be recycled with the residual being disposed of in landfill.

*Table 16.2-1Waste Generation Summary*

| Description | Estimated Volume (Tonne) |
|---|---|
| **Non-Hazardous Waste** | |
| Concrete Bricks | 300.7 |
| Tiles and Ceramics | 7.4 |
| Wood | 22.97 |
| Plastics (Blades) | 700 |
| Plastics | 9.00 |
| Iron and Steel | 5,731.2 |
| Cables | 128 |
| **Total Non-Hazardous** | **6,899.27** |
| **Hazardous Waste** | |
| Creosote Treated Poles | 40.8 |
| Waste Oil | 25.93 |
| **Total Hazardous** | **66.73** |

As set out in Chapter 16 of this EIAR, following consideration of the residual impacts (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Resource and Waste Management either locally, regionally, or nationally.

## 16.3 Conclusion

The mitigation measures outlined in Chapter 16 of this EIAR will ensure that the waste arising from the Prospective Development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the Connacht-Ulster Waste Management Plan (2015 - 2021). They will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources Provided that the decommissioning works are undertaken in accordance with the best practice and mitigation that is described within Chapter 16, significant effects on Resources or Waste Management, are not anticipated at any scale.

# 17. INTERACTIONS OF THE FOREGOING

The preceding Chapters 5 to 16 of this Environmental Impact Assessment Report (EIAR) identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna) Fisheries and Aquatic Ecology, Land, Soils and Geology, Hydrology and Hydrogeology, Air, Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage

(Archaeological, Architectural and Cultural Heritage), Material Assets (Roads and Traffic, Telecommunications and Aviation), Resource and Waste Management, and Vulnerability to/from Major Accidents and Natural Disasters, as a result of the Prospective Development as described in Chapter 4 of this EIAR. All of the potential significant effects of the Prospective Development and the measures proposed to mitigate them have been outlined in the preceding chapters of this EIAR. Mitigation measures and best practice measures for the Prospective Development are detailed in the accompanying Construction and Environmental Management Plan (CEMP). However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

A matrix is presented in Chapter 17 of the EIAR to identify interactions between the various aspects of the environment already discussed in the EIAR. The matrix highlights the potential for the occurrence of positive, neutral or negative effects arising from the Prospective Development. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections (Chapters 5–16) of the EIAR.

# 18. SCHEDULE OF MITIGATIONS

All mitigation measures relating to the Prospective Development are set out in the relevant chapters of the EIAR and associated documents submitted as part of this planning application.

All mitigation measures proposed for the Prospective Development are outlined in Table 18-1 of Chapter 18 of this EIAR. The mitigation measures have been grouped together according to their environmental field/topic and are presented under the following headings:

- Construction Management.
- Drainage and Water Quality.
- Peat, Subsoils.
- Biodiversity.
- Air Quality and Dust Control.
- Noise and Vibration.
- Cultural Heritage.
- Traffic.

The mitigation proposals table provides an easy to audit list that can be reviewed and reported on during the future phases of the Prospective Development. The proposal for site inspections and environmental audits are set out in the outline Construction and Environmental Management Plan (oCEMP) which is included as Appendix 4-3 of this EIAR. The tabular format in which the information below is presented, can be further expanded upon during the course of the project to provide a reporting template for site compliance audits.

It is intended that the oCEMP will be updated where required prior to the commencement of construction to include all mitigations and monitoring measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and would be submitted to the Planning Authority for written approval.

# 1. INTRODUCTION

## 1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of Gort Windfarms Ltd (Gort WFL) and assesses the potential environmental impacts arising from the "Derrybrien Wind Farm Development Decommissioning Project."

The proposed 'Derrybrien Wind Farm Development Decommissioning Project' comprises two elements:

- The carrying out of physical works to decommission specific features of the existing development (the "**Prospective Development**"); and the
- Proposed 'retention' in situ of other specific features of the existing development (the "**Retained Development**").'

This Environmental Impact Assessment Report (EIAR) accompanies the application made to An Bord Pleanála, under section 37L of the Planning and Development Act 2000, as amended ("the 2000 Act") for permission to decommission the Derrybrien Wind Farm development ('the Prospective Development'). In addition, the Derrybrien Windfarm Development Decommissioning Project also comprises the retention in situ of specific features of the existing development ("the Retained Development") and an application has been made simultaneously, under section 177E of the 2000 Act, for substitute consent (which application is accompanied by, *inter alia*, a remedial Environmental Impact Assessment Report [rEIAR]).

As stated above, this EIAR accompanies the application for the Prospective Development; substitute consent for the Retained Development will be applied for separately under section 177E of the 2000 Act. However, the potential significant effects of the Retained Development have been assessed cumulatively with those of the Prospective Development as part of this EIAR. The Prospective Development is described in detail in Chapter 4

## 1.2 The Applicant

The application for substitute consent is being made by **Gort Windfarms Ltd** which is a wholly owned subsidiary of the Electricity Supply Board (ESB).

## 1.3 Brief Description of the Prospective Development

The existing Derrybrien Wind Farm Development is located in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna, County Galway. A detailed overview of the planning history of the site is set out in the accompanying Planning Report.

For the purposes of the application for Prospective Development consent under section 37L, and the Board's consideration of this EIAR (and the Natura Impact Statement [NIS] also submitted with that application), the Prospective Development comprises the following:

- Enabling works to facilitate the decommissioning of the Derrybrien Windfarm.

- Decommissioning and removal of the Derrybrien Wind Farm and associated ancillary components. The decommissioning works include the removal of the above-ground structures only leaving certain features in situ.
- Decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line. Reinstatement of the Ennis-Shannonbridge 110kV Line.

The area of the Prospective Development for which permission is sought under section 37L is defined by the "red line" application boundary as illustrated on the drawings accompanying the section 37L application.

The application for permission in respect of the Prospective Development seeks a five-year permission for the decommissioning of the existing Derrybrien Wind Farm. All elements of the Prospective Development have been assessed as part of this EIAR. The Prospective Development is described in Chapter 4 of this EIAR and the Decommissioning Management Plan (**Appendix 4-2**).

For the purposes of this EIAR, the key terms are:

- The "**Project**" - referring to all existing elements of the Derrybrien Windfarm Development;
- The "**Prospective Development**" - referring to all elements for which permission under section 37L is sought; and
- The "**Retained Development**" - referring to all elements for which substitute consent is sought under section 177E.

## 1.4 Project Need

The overall need for the Derrybrien Wind Farm Development Decommissioning Project, as proposed arises because of the need to:

- Comply with enforcement notice EN23/235 issued by Galway County Council which requires the removal of the unauthorised windfarm and associated ancillary structures, subject to the applicable consent(s) / permissions(s) from the appropriate authority or authorities;
- To regularise the planning status of the development; and
- To safely complete decommissioning of this unauthorised development.

If the decommissioning works do not proceed, then the Project – particularly the structures associated with the windfarm, substations and overhead line, would deteriorate over time, rendering the site unsafe and posing serious risks over the long term – both to human health and to the local environment. As such it would not be possible for Gort Windfarms Ltd to comply with the stated requirements of Galway County Council as set out in the enforcement notice EN23/235 – namely to decommission and, where appropriate in terms of possible environmental impacts on the environment at this location, remove the unauthorised windfarm and associated ancillary structures, subject to the applicable consent(s) / permissions(s) from the appropriate authority or authorities.

# 1.5 Legislative Context

## 1.5.1 Requirement for EIA

The 'EIA Directive' (Directive 2011/92/EU as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment, requires Member States to ensure that, in the context of an application for development consent, a competent authority carries out an assessment of the likely significant effects of certain types of project, prior to development consent being given for the project.

Article 5 of the EIA Directive states that where an Environmental Impact Assessment (EIA) is required, the developer shall prepare and submit an Environmental Impact Assessment Report (EIAR).

It is considered that the preparation of an EIAR is required in respect of the entire Derrybrien Wind Farm Development Decommissioning Project, in circumstances where, *inter alia*, substitute consent is sought for Retained Development and all applications for substitute consent must be accompanied by a remedial Environmental Impact Assessment Report (rEIAR).

The Prospective Development falls within Class 13 of Part 2 of Schedule 5, "*Any change or extension of development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, which would result in the demolition of structures, the demolition of which had not previously been authorised, and where such demolition would be likely to have significant effects on the environment, having regard to the criteria set out under Schedule 7*".

The relevant criteria in Schedule 7 which apply to the Prospective Development are: the risk of accidents, the potential significant effects of the proposed development and the magnitude and complexity of the impact and the environmental sensitivity of geographical areas likely to be affected by proposed development. Hence, this EIAR has been prepared and submitted with the application for permission under section 37L of the 2000 Act.

## 1.5.2 Environmental Impact Assessment

The obligations under EIA Directive have been transposed into Irish planning legislation by the relevant provisions of Part X of the 2000 Act and Part 10 of the Planning and Development Regulations (PDR) 2001 (as amended).

The Environmental Impact Assessment (EIA) of the Prospective Development will be undertaken by An Bord Pleanála, as the competent authority under section 37L of the 2000 Act. Article 5 of the EIA Directive provides that, where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR). The information to be provided by the developer shall include at least:

a) *A description of the project comprising information on the site, design, size and other relevant features of the project;*
b) *a description of the likely significant effects of the project on the environment;*
c) *a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
d) *a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment; and,*

e) *a non-technical summary of the information referred to in points (a) to (d); and (f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

In addition, Schedule 6 to the 2000 Act sets out the information to be contained in an EIAR, with which this EIAR complies.

The EIAR provides information on the receiving environment and assesses the likely significant effects of the proposed project on it and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the EIA of the proposed project.

### 1.5.3 EIAR Guidance

The Environmental Protection Agency (EPA) published its 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, May 2022), which is intended to guide practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

In preparing this EIAR, regard has also been taken of the provisions of the 'Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment', published by the Department of Housing, Planning and Local Government (DHPLG) in August 2018 to the extent these guidelines are relevant having regard to the enactment of the revised EIA Directive.

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects including 'Guidance on Screening', 'Guidance on Scoping' and 'Guidance on the preparation of the Environmental Impact Assessment Report'. MKO has prepared the EIAR with regard to these guidelines and earlier European Commission Guidance: Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013) which is relevant to the Biodiversity and Climate chapters of the EIAR.

## 1.6 Purpose and Scope of the EIAR

The main purpose of this EIAR is to identify, describe and present an assessment of the likely significant effects of the Prospective Development on the environment. This EIAR will inform An Bord Pleanála's (ABP) assessment process, its decision on whether to grant consent for the Prospective Development and, if granting consent, the nature and extend of any conditions required. The EIAR focuses on: (a) effects that are both likely and significant; and (b) description of effects that are accurate and credible.

The EIA to be carried out by ABP , as competent authority, is a process consisting of –

(i) the preparation of an EIAR;
(ii) the carrying out of consultations
(iii) the examination by ABP of–
  (I) the information contained in the EIAR,
  (II) any supplementary information provided, where necessary, by the applicant,
  (III) any relevant information received through the consultations carried out,
  (IV) the reasoned conclusion by the Board on the significant effects on the environment of the Prospective Development, taking into account the results of the examination carried out) and, where appropriate, its own supplementary examination, and

(V) the integration of the reasoned conclusion of the Board into the decision on the Prospective Development.

The EIA conducted by ABP must include–

(i) an examination, analysis and evaluation, carried out by ABP, that identifies, describes and assesses in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11 of the EIA Directive , the direct and indirect effects of the Prospective Development on the following:

a) population and human health
b) biodiversity, with particular attention to species and habitats protected under the Habitats Directive (Directive 92/43/EEC) and the Birds Directive (Directive 2009/147/EC)
c) land, soil, water, air and climate
d) material assets, cultural heritage and the landscape
e) the interaction between the factors referred to in points (a) to (d)

Moreover, pursuant to the 2000 Act, an EIA shall include, as regards the factors mentioned in (a) to (e) above, such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the Prospective Development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development.

The EIAR which will be submitted by the applicant/developer provides the prescribed and relevant environmental information to enable the EIA to be carried out by the competent authority and complies with the relevant provisions of the EIA Directive and Irish implementing legislation.

## 1.7 Structure and Content of the EIAR

### 1.7.1 General Structure

This EIAR uses the grouped structure method to describe the existing environment, the potential effect of the Prospective Development thereon and the proposed mitigation measures. Background information relating to the Prospective Development, scoping and consultation undertaken and a description of the Prospective Development are presented in separate sections. The grouped format sections describe the impacts of the Prospective Development in terms of population and human health, biodiversity, ornithology, soils and geology, hydrology and hydrogeology, air and climate, noise and vibration, landscape and visual, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing.

The chapters of this EIAR are as follows:

1. Introduction
2. Scoping and Consultation
3. Consideration of Reasonable Alternatives
4. Description of the Prospective Development
5. Population and Human Health
6. Biodiversity (Terrestrial and Avian Ecology)
7. Biodiversity (Aquatic Ecology and Fisheries)
8. Land, Soils and Geology
9. Water (Hydrology and Hydrogeology)
10. Air and Climate
11. Noise and Vibration
12. Cultural Heritage

13. Landscape and Visual
14. Material Assets (including Traffic and Transport, Telecommunications and Aviation)
15. Risk of Major Accidents and Natural Disasters
16. Resource and Waste Management
17. Interactions of the Foregoing
18. Schedule of Mitigation Measures

The EIAR also includes a non-technical summary, which is a condensed and easily comprehensible version of the EIAR document. The non-technical summary is laid out in a similar format to the main EIAR document and comprises a description of the Prospective Development followed by the existing environment, impacts and mitigation measures presented in the grouped format.

### 1.7.2 Content of the EIAR / Environmental Baseline

For the sake of completeness, and in order to enable an assessment of all aspects of the Derrybrien Wind Farm Development Decommissioning Project, this EIAR describes all elements of the overall Project, including the Prospective Development and Retained Development. This EIAR assesses the impacts on the environment resulting from the Prospective Development, including the decommissioning and removal of wind farm structures, grid connection, substations, and ancillary components, as described in Chapter 4. The impacts on the environment resulting from the Prospective Development are assessed cumulatively with the effects of the Retained Development, should it be consented

For the purposes of this assessment, the baseline environment against which likely significant effects and impacts have been assessed has been taken as 2024. The baseline environment is a non-operational wind farm development that ceased commercial electricity generation in February 2022.

### 1.7.3 Description of Likely Significant Effects and Impacts

As stated in the *Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)*, an assessment of the likely impacts of the Prospective Development is a requirement of the EIA process. The criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable) of the impact.

The classification of impacts in this EIAR follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Advice Notes for Preparing Environmental Impact Statements – Draft September 2015 (EPA, 2015).Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

Table 1-1 presents the EPA Description of Effects as published in the 2022 EPA guidance document. Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with the Prospective Development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the Prospective Development on the receiving environment. In the case of biodiversity,

significant effects will be qualified with reference to an appropriate geographical scale, in accordance with best practice guidance (CIEEM, updated 2022).

*Table 1-1 EPA Description of Effects (EPA, 2022)*

| Effect Characteristic | Term | Description |
|---|---|---|
| **Quality** | Positive Effects | A change which improves the quality of the environment |
| | Neutral Effects | No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. |
| | Negative / Adverse Effects | A change which reduces the quality of the environment |
| | | |
| **Significance** | Imperceptible | An effect capable of measurement but without significant consequences |
| | Not significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| | Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| | Moderate | An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| | Significant | An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment |
| | Very significant | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment |
| | Profound | An effect which obliterates sensitive characteristics |
| | | |
| **Extent & Context** | Extent | Describe the size of the area, number of sites and the proportion of a population affected by an effect |
| | Context | Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions |
| | | |
| **Probability** | Likely | Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented |
| | Unlikely | Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented |
| | | |
| **Duration and Frequency** | Momentary | Effects lasting from seconds to minutes |
| | Brief | Effects lasting less than a day |
| | Temporary | Effects lasting less than a year |
| | Short-term | Effects lasting one to seven years |
| | Medium-term | Effects lasting seven to fifteen years |
| | Long-term | Effects lasting fifteen to sixty years |
| | Permanent | Effect lasting over sixty years |
| | Reversible | Effects that can be undone, for example through remediation or restoration |
| | Frequency | Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually) |
| | | |
| **Type** | Indirect | Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway |
| | Cumulative | The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. |
| | 'Do Nothing' | The environment as it would be in the future should the subject project not be carried out |
| | Worst Case' | The effects arising from a project in the case where mitigation measures substantially fail |
| | Indeterminable | When the full consequences of a change in the environment cannot be described |

| Effect Characteristic | Term | Description |
|---|---|---|
| | Irreversible | When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost |
| | Residual | Degree of environmental change that will occur after the proposed mitigation measures have taken effect |
| | Synergistic | Where the resultant effect is of greater significance than the sum of its constituents |

Each effect is described in terms of its quality, significance, extent, duration and frequency, and type where possible. A 'Do-Nothing' impact is also predicted in respect of each environmental theme in the EIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed and any interactions between the impacts are assessed. The remaining impact types are presented as required or applicable throughout the EIAR.

# 1.8 Project Team

## 1.8.1 Project Team Responsibilities

The EIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. The qualifications and experience of the principal staff from each company involved in the preparation of this EIAR are summarised in Section 1.8.2 below. Each chapter of this EIAR has been prepared by a competent expert in the subject matter. Further details on project team expertise are provided in the Statement of Authority at the beginning of each impact assessment chapter.

The companies and their competent technical experts listed in Table 1-2 were responsible for completion of this EIAR. Further details regarding project team members are provided in Section 1.8.2 below.

*Table 1-2 Project Team*

| Consultants | Principal Staff Involved in Project | EIAR Input |
|---|---|---|
| **McCarthy Keville O' Sullivan Ltd. (MKO)** | Michael Watson<br>Thomas Blackwell<br>Edward Ryan<br>Morgan Valvik | Project Management, Scoping and Consultation, Preparation of the following Report Sections:<br>1. *Introduction*<br>2. *Scoping and Consultation*<br>5. *Population & Human Health*<br>10. *Air & Climate*<br>11. *Noise and Vibration*<br>14. *Material Assets*<br>15. *Vulnerability to Natural Disaster and Major Accidents*<br>16. *Resource and Waste Management*<br>17. *Interaction of the Foregoing*<br>15. *Schedule of Mitigation* |
| **ESB (Engineering & Major Projects)** | Daniel Hogan<br>Helen O'Keeffe | Preparation of the following Report Sections:<br>3. *Consideration of Reasonable Alternatives*<br>4. *Description of the Prospective Development* |
| **Wetland Surveys Ireland**<br>**BSG Ecology**<br>**Biosphere Environmental Services**<br>**ESB (Engineering & Major Projects)** | Patrick Crushell<br>Owain Gabb<br>Rachel Taylor<br>Brian Madden<br>Kate-Marie O'Connor | Baseline Habitat and Bird Survey, Preparation of Natura Impact Statement (NIS) and EIAR Section:<br>6. *Biodiversity (Terrestrial)* |
| **Lauren Williams**<br>**Ger Morgan**<br>**(Previously Aquatic Services Unit (UCC))** | Lauren Williams<br>Ger Morgan | Aquatic surveys. Preparation of the following EIAR Section:<br>7. *Aquatic Ecology and Fisheries* |
| **Fehily Timoney** | Ian Higgins | Preparation of the following Report Section:<br>8. *Land, Soils & Geology (Overhead Line)* |
| **AGL** | Conor O'Donnell | Geotechnical site investigations; Peat Stability Assessment and Peat Management Plan. Preparation of the following Report Sections:<br>8. *Land, Soils & Geology (Derrybrien Windfarm)* |
| **ESB (Engineering & Major Projects)**<br>**Hydro Environmental** | Harry Griffin<br>Anthony Cawley | Preparation of the following Report Sections:<br>9. Water (Hydrology and Hydrogeology) |
| **John Cronin and Associates** | Tony Cummins | Preparation of EIAR Section:<br>12. Archaeological, Architectural and Cultural Heritage |
| **Cunnane, Stratton, Reynolds** | Evelyn Sikora | Preparation of the following Report Section:<br>13. *Landscape & Visual* |
| **Tobin Consulting Engineers** | John O'Flaherty<br>Viswas Kutty | Preparation of the following Report Section:<br>14. *Material Assets (Traffic)* |

## 1.8.2 Project Team Members

### 1.8.2.1 MKO

#### Michael Watson MA MIEMA CEnv PGeo

Michael Watson is Project Director and head of the Environment Team in MKO. Michael has over 18 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michaels key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

#### Thomas Blackwell M.Sc. BA PWS

Thomas is a Senior Environmentalist with MKO with over 15 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Prior to taking up his position with MKO in August 2019, Thomas worked as a Senior Environmental Scientist with HDR, Inc. in the United States and held previous posts with private consulting firms in both the USA and Ireland. Thomas is a registered Professional Wetland Scientist with the Society of Wetland Scientists with specialist knowledge in wetland assessment and delineation, mitigation planning and design, stream geomorphic assessment, and stream and wetland restoration design. Thomas' professional experience includes managing Environmental Impact Assessments, environmental permitting, environmental due diligence and compliance, and general environmental assessment on behalf of clients in the solar farm, mining, solid waste management, residential and commercial development, and public sectors. Thomas' key strengths and areas of expertise are in project management and strategy development, environmental permitting and assessment for renewable energy projects, fluvial geomorphology and stream restoration design. Since joining MKO, Thomas has been involved as an Environmental Consultant on a range of energy infrastructure, and residential projects.

#### Edward Ryan BSc (Hons) MSc

Edward is an Environmental Scientist with a B.Sc. (Hons) in Environmental Science from the University of Limerick and a M.Sc. (hons) in Environmental Systems from Atlantic Technological University (ATU) (previously known as GMIT). Edward is an Environmental Scientist with over 3 years of consultancy experience has over three years' experience in the environmental sector. Edward's key strengths and expertise are Environmental Protection and Management, Environmental Impact Statements and GIS mapping.

### Morgan Valvik M.Sc

Morgan is an Environmental Scientist at MKO having joined the company in September 2023. Morgan holds an MSc in Environmental Science from Trinity College Dublin, where she completed a thesis on the comparison of the regeneration and spreading patterns of Rhododendron ponticum in different habitats. Prior to joining MKO, she worked as a Graduate Environmental Scientist for AKRF Inc. where she conducted site assessments and remedial oversight related to brownfield sites and landfills in the United States. Morgan's key strengths and areas of expertise are in report writing, environmental remediation, and natural areas restoration. Since joining MKO, Morgan has been involved in the preparation of Environmental Impact Assessment Screening Reports, Construction and Environmental Management Plans, and Environmental Reports for a wide range of projects. Morgan is a graduate member of the Chartered Institution of Water and Environmental Management.

## 1.8.2.2 ESB Engineering and Major Projects

### Daniel Hogan

Daniel Hogan (BSc, MSc, CSci, C.WEM, M.CIWEM) is the Senior Consenting Specialist for ESB (Electricity Supply Board) based in Dublin. Daniel is a graduate of Atlantic Technical University (formerly Institute of Technology Sligo) with an honours Bachelor's Degree in Environmental Science and Technology and a Masters in Science in Environmental Engineering from Queens University Belfast. Daniel has over fourteen years' experience as a professional Environmental Scientist in the Engineering and Environmental Consultancy industry. He has a significant portfolio of experience in a range of water environment and strategic planning projects of various scales including major port developments, cross country pipelines and energy generation and storage projects in Ireland and Northern Ireland. Daniel is a past Chairman of the Chartered Institution of Water and Environmental Management (CIWEM) Northern Ireland (2020-21) and holds Chartered Scientist (CSci), Chartered Water and Environment Manager (C.WEM) and Chartered Member of the Chartered Institutions of Water and Environmental Management (M.CIWEM) status.

### Helen O'Keeffe

Helen O'Keeffe is Planning Strategy Manager in Generation projects in ESB. Helen is a Graduate of UCD with a Bachelor's Degree in Civil Engineering and Masters Degrees in Regional and Urban Planning (MRUP) and Urban Design (MSc). Helen has over 24 years of experience in project consenting and strategic planning. Helen has worked in ESB since 2016, leading planning applications for a diverse range of projects for both ESB Networks and ESB Generation and Trading on technologies including solar, wind, thermal generation, batteries and grid services. Helen is a Corporate Member of both Engineers Ireland and the Irish Planning Institute.

### Kate-Marie O'Connor

Kate-Marie O'Connor (BA MSc, MCIEEM) is a Senior Ecologist with ESB and has over 11 years' professional experience in ecological assessment. She holds an honours degree in Natural Sciences from Trinity College Dublin, specialising in Botany, and obtained a distinction in her Masters in Environmental Modelling, Monitoring and Reconstruction from the University of Manchester. She also holds an advanced diploma in Planning and Environmental Law from The Honourable Society of King's Inn. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Kate-Marie provides ecological support and advice on a range of electricity infrastructure projects through all project stages, including pre-planning, construction and operation. Her experience primarily includes the preparation and review of Ecological Impact Assessments, Biodiversity Chapters of Environmental impact Assessment (EIA) reports, Appropriate Assessment (AA) Screening reports and Natura Impact Statements (NIS) for a range of public and private projects across Ireland. Kate-

Marie has extensive experience undertaking ecological surveys to inform various assessments, including surveys for habitats, bats, badger, otter, breeding and wintering birds and newts.

#### Harry Griffin

Harry Griffin is a chartered engineer with 9 years of post-qualification experience in hydrological/hydrogeological assessment, flood risk analysis and drainage design. Harry graduated from Trinity College Dublin with a first-class honours BA BAI in Civil, Structural and Environmental Engineering and also graduated from Newcastle University with a first-class honours MEng in Hydrology and Climate Change. He has worked on flood risk assessments associated with Grousemount and Crockahenny Wind Farms and, drainage design for Cappawhite, Castlepook and Crockdun Wind Farms and a large number of hydrological and hydrogeological assessments for electrical substations, power stations and other ESB developments across Ireland. Harry has thorough knowledge and expertise in civil and environmental engineering and provides expert advice to key stakeholders across ESB business units on a wide range of projects, most recently in drainage design and flood risk assessments for a number of new open-cycle gas turbine plants, battery energy storage facilities and synchronous condenser compounds.

### 1.8.2.3 Biosphere Environmental Services

#### Brian Madden

Dr. Brian Madden (BA Mod, PhD, MCIEEM) qualified in Natural Sciences at the University of Dublin in 1984 and earned a doctorate degree in 1990 from the National University of Ireland for research in peatland ecosystem processes. Since 1994, Brian has worked as an independent environmental consultant. Brian is an expert ornithologist and has carried out various surveys for the National Parks and Wildlife Service, including survey of breeding birds of western machair systems and co-ordination of the National Peregrine Survey in 2002. Brian has extensive experience in the assessment of electricity infrastructure projects including high voltage transmission lines, substations, underground cables and wind energy projects. For many of the projects, Brian has been involved from pre-planning impact assessment stage through to the implementation and monitoring of mitigation measures during the operational stage. Brian has been involved in the Derrybrien Wind Farm project since 2004.

### 1.8.2.4 Hydro Environmental

#### Anthony Cawley

Anthony Cawley qualified with an honours degree in Civil Engineering from NUI Galway in 1987 and a post graduate master's degree in Engineering Hydrology from NUI Galway in 1990. He is a Chartered Civil Engineer with Specialist education and over 30 years professional consulting experience in the water engineering field in a wide variety of activities relating to hydrology, hydrogeology and flooding, and hydrodynamic and hydraulic assessment of fluvial and tidal processes.

Mr. Cawley has carried out well over 200 flood risk assessment studies on rivers, estuaries and coastal areas throughout Ireland. These studies ranged from scoping type assessments to detailed flood risk assessments involving hydrometric measurements river channel survey, hydraulic modelling and flood inundation mapping. Involved in flood relief and flood management studies for OPW and local Authorities having provided hydrology and hydraulic modelling inputs to various flood relief schemes including Lucan, Ennis, Mullingar, Claregalway, Arklow, Carrick-on-Shannon, Ballinasloe, Galway City and the Gort Lowlands.

### 1.8.2.5 Wetland Surveys Ireland, Ltd.

#### Patrick Crushell

Dr. Patrick Crushell (BSc Applied Ecology; MSc Environmental Resource Management, PhD Environmental Sciences, C. Ecol, MCIEEM) received an honors degree in Applied Ecology from University College Cork, a Masters degree in Environmental Resource Management from University College Dublin and defended his PhD at Wageningen University, the Netherlands. He is a Chartered Ecologist of the Chartered Institute of Ecology and Environmental Management. Dr Crushell has been working in the area of nature conservation and ecological impact assessment for the past 23 years and has particular expertise in peatland habitats. Projects that he has been involved in include wetland inventory surveys; evaluation of proposed designated sites; restoration and management of peatland habitats; baseline ecological surveys and impact assessments of various development proposals including road, quarries, wind-farms, waste facilities, arterial drainage schemes, and residential developments; during and post-construction ecological monitoring. He has been working on the Derrybrien Wind farm Project since 2003.

### 1.8.2.6 BSG Ecology

#### Owain Gabb

Owain Gabb CIEEM, CEnv is a Director of BSG Ecology. He has almost 25 years of experience as a professional ecologist, of which 20 have been in consultancy. He has worked on wind and other renewables projects in Ireland and throughout the UK since 2003. His inputs include planning and co-ordinating ornithological, protected species and habitat survey work, co-ordinating consultation with nature conservation agencies and planning authorities, writing and reviewing technical reports and assessments, assisting in discharging conditions, acting as an expert witness at hearings and designing and implementing post construction monitoring.

#### Rachel Taylor

Rachel Taylor, ACIEEM is a Principal Ecologist at BSG Ecology, and joined the company in 2013. Her role involves the design and co-ordination of ecological survey work and undertaking ecological impact assessments in relation to planning applications. Rachel has undertaken bat surveys in connection with numerous wind farm sites across Ireland, Wales and Scotland. She has deployed static detectors in upland, lowland and coastal locations, co-ordinated, stored and analysed the resulting data, and monitored bat fatalities at Welsh and Irish wind farms using search dogs.

### 1.8.2.7 Aquatic Services Unit (UCC)

#### Gerard Morgan

Gerard Morgan is a graduate of University College Cork with an honours BSc in Zoology and MSc. in freshwater ecology. Ger has managed the Aquatic Services Unit, a UCC-based environmental consultancy specialising in aquatic systems, since 1986. He has over 30 years' experience in ecological consultancy, specialising in water quality impacts of a wide range of infrastructural projects including roads, bridge, pipelines, windfarms, power transmission and port & harbour facilities. He also specialises in protected species surveys, including for fish and pearl mussels. He is a specialist in algal surveys and identifications in rivers and lakes and is recognised by the EPA as a practitioner of the Q-value biotic index system. His clients include the EPA, Teagasc, Cork County Council, Port Authorities and several large environmental and engineering consultancies and industry. Recent

projects include water quality monitoring of the construction phase of the Grousemount windfarm in Co. Kerry, the 2020 rEIAR for Derrybrien Wind Farm, aquatic ecological chapters for EIARs for a solar farm in Kanturk (2022) expansions to Dublin Port, (2016-2023) Ringaskiddy Port and Foynes Port, numerous Q-value and SSRS surveys, electrofishing surveys and pearl mussel surveys, nationwide macro-algal surveys in rivers for the EPA and phytoplankton identification of lake and reservoir samples for local authorities.

#### Lauren Williams

Lauren Williams BSc PGDip MCIEEM, a senior freshwater ecologist with 24 years professional consultancy experience. Lauren holds a BSc in Zoology, a Certificate in Environmental Law and a Post Graduate Diploma in Environmental Monitoring Assessment and Engineering with Distinction from Trinity College Dublin. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). For 21 years Lauren worked as joint Principal Freshwater Ecologist in the Aquatic Services Unit (ASU), University College Cork (UCC) where she worked with Gerard Morgan (ASU Manager) who prepared the 2020 rEIAR for the Derrybrien Wind Farm Project and the 2024 EIAR for the Derrybrien Wind farm Development Decommissioning Project. Lauren assisted with those projects providing analysis and review of ASU biological water quality data between 2011 and 2020 and carrying out field studies and data analysis in 2022 as part of the 2024 EIAR Derrybrien Wind farm Development Decommissioning Project.

Lauren specialises in water quality assessment, fisheries and protected aquatic species and habitat surveys, monitoring, aquatic ecological impact assessment (EcIA), regularly undertaking baseline studies and preparation of EcIA reports, EIAR chapters and Appropriate Assessment (AA) reporting in relation to a wide range of large infrastructural developments throughout Ireland. She has carried out aquatic sampling, monitoring, and reporting as part of EPA national river monitoring programmes. She is a recognized practitioner of the Q-value biotic index system and is a trainer for the EPA's Small Streams Risk Assessment (SSRS) method. Lauren is a recognized professional in aquatic protected species survey (freshwater pearl mussel and white-clawed crayfish, on behalf of NPWS), and an accredited River Habitat Survey (RHS) and River Hydromophology Assessment Technique (RHAT) practitioner.

### 1.8.2.8 Fehily Timoney & Associates

#### Ian Higgins

Ian Higgins (BSc Engineering Geology, MSc Geotechnical Engineering, FGS, MIEI) is a Geotechnical Engineer with over 20 years consultancy experience in Ireland. Ian has completed numerous peat stability assessment and geological impact assessment for wind farms. In addition, he has significant experience in the geotechnical design of wind energy projects at construction stage.

### 1.8.2.9 AGL

#### Conor O'Donnell

Conor O'Donnell, BA, BAI, MS, FGS, CEng, MIEI, FConsEI: The assessment of the impacts related to the Derrybrien Wind Farm elements of the project was carried out by Mr. Conor O'Donnell, Managing Director at AGL Consulting. Mr. O'Donnell is a Chartered Engineer with over 25 years' experience as a geotechnical engineer in Ireland and the United States. He has an Honours Bachelor's Degree in Civil, Structural and Environmental Engineering from Trinity College Dublin, and a Master's

Degree in Geotechnical Engineering and Structural Mechanics from Cornell University, Ithaca, New York.

Mr. O'Donnell has extensive experience with civil and earthworks design for wind farms in Ireland and the UK, and has developed a particular area of expertise in assessing and managing the risk of peat instability for wind farms on upland blanket bogs at planning, detailed design and construction stage. He has worked as a geotechnical consultant on the design and construction of over 20 windfarms in Ireland and the UK with a scope ranging from design of turbine foundations and site infrastructure, to peat stability risk assessment, spoil managmeent and site inspections. He was the lead project geotechnical engineer responsible for managing the risk of peat instability for the completion of the civil works on the Derrybrien Wind Farm site after the peat slide in October 2003 and he prepared the chapter on Soils, Geology and Land in the 2020 remedial Environmental Impact Assessment Report for the Derrybrien Windfarm.

Mr. O'Donnell was the geotechnical advisor to An Bord Pleanála on peat stability and ground movement for the Oral Hearing into the 2009 application for the Corrib Onshore Gas Pipeline. He was geotechnical consultant to Sligo County Council on spoil management for excess peat and mineral soil for the EIS and 2014 Oral Hearing for the N4 Collooney to Castlebaldwin Road Improvement Scheme. Mr. O'Donnell has also provided expert opinion to the Health and Safety Authority and to insurance companies in relation to peat slides that occurred on wind farm sites in Ireland.

#### 1.8.2.10 Cunnane, Stratton, Reynolds

##### Evelyn Sikora (BA MPlan, MILI)

Evelyn has eight years' experience in preparing Landscape and Visual Assessment Reports (LVIA) as part of Environmental Impact Assessment Reports (EIAR) for various types of development including wind energy, solar, flood relief works, quarries, roads, greenway projects and other infrastructure, as well as residential, commercial and recreational developments, in both rural and urban contexts. Oversight of the chapter was provided by Declan O' Leary, CMLI, MILI, Managing Director of Cunnane Stratton Reynolds.

#### 1.8.2.11 John Cronin and Associates

##### Tony Cummins

Tony is a Senior Archaeologist with John Cronin & Associates and has been with this consultancy since 2009. Tony holds B.A. and M.A. degrees in archaeology (University College Cork (UCC), 1992/1994) and he was appointed as a supervisor on the Department of Archaeology, UCC annual training excavation course between 1994 and 2002 where he was responsible for teaching undergraduate students various excavation and surveying techniques. He has accumulated 28 years continuous experience as an archaeological consultant in Ireland and was certified as a licence-eligible archaeologist in 1998. Since that time Tony has directed numerous excavations for various Irish archaeological consultancies and these included a range of site investigations carried out as part of residential and commercial developments, road schemes and energy supply projects. Tony has extensive experience in the preparation of cultural heritage EIA/EIS assessments for renewable energy planning applications and this has included inputs such as desktop research, field surveys and liaising with multi-discipline project teams.

### 1.8.2.12 Tobin Consulting Engineers

#### John O'Flaherty

John is a Chartered Engineer with over 26 years' post graduate experience in Civil Engineering. He holds the position as Associate Director in the Roads & Transportation Division of TOBIN with autonomy for the management of that team and its projects. John has worked on National and Non-National road projects at all stages of development from feasibility to hand over. He was also been responsible for all Active Travel Schemes, PARR, Minor realignments and Safety schemes on National and Non-National Roads in County Sligo from 2006 to 2019. He has a particular interest in Sustainable Transport and submitted a thesis on Sustainable Urban Mobility Plans (SUMP) as part of his Masters in Roads & Transport Engineering and at the ITRN conference in 2019.

Since joining TOBIN Consulting Engineers, he has been responsible for project management of the development numerous windfarm projects including Derryadd, Owiniinny, Lisnagroargh, Broemountain windfarms.

#### Viswas Kutty

Viswas is a Project Engineer with over 16 years of experience in Civil Engineering with primary focus on Transportation Engineering (Traffic Engineering, Transportation Planning, and Intelligent Transportation Systems(ITS)). Working within TOBIN Roads and Transportation Division, he is a Lead Traffic Engineer responsible for preparing the Preliminary and Detailed design reports, TTA reports, Traffic chapters for EIAR (Wind Farms, Solar Farms & Quarries), TTM plans, Construction Traffic Management Plans, and providing expert guidance to TOBIN E&P team on large scale energy development projects. He is responsible for the preparation of Tender documents, Specifications, Tender assessments, and award for National roads PARR schemes. He is responsible for preparing toposurvey drawings, specifications, pricing document, traffic survey tender documents and options assessment for Active Travel Schemes. He is responsible for liaising with local authorities, TII, clients and other key stakeholders to obtain required approvals.

Prior to joining TOBIN, He worked in the USA and Middle East on Traffic Studies, Mobility Studies, Traffic Signal Designs, Signing and Pavement Marking plans, Transportation Master Plans, Resolving Road Safety audit comments, ITS design and ATMS design schemes, site supervision services for ITS works for both private and public sector clients.

## 1.9 Difficulties Encountered

There were no technical difficulties encountered during the preparation of this EIAR.

## 1.10 Viewing and Purchasing of the EIAR

The EIAR will also be available to view online via the Department of Planning, Housing and Local Government's EIA Portal, which will provide a link to the planning authority's website on which the application details are contained. This EIA Portal was recently set up by the Department as an electronic notification to the public of requests for development consent which are accompanied by an EIAR (https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal).

# 2. SCOPING AND CONSULTATION

## 2.1 Introduction

This section includes details of scoping and consultation undertaken as part of the Environmental Impact Assessment (EIA) Process.

## 2.2 Informal Scoping

As set out in the Environmental Protection Agency's (EPA) "Guidelines on the information to be contained in Environmental Impact Assessment Reports 2022":

> '*Scoping' is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is defined in the European Commission guidance*[1] *as: 'The process of identifying the content and extent of the information to be submitted to the Competent Authority under the EIA process.'*
>
> *Scoping is best carried out by personnel having appropriate expertise and relevant prior experience. Knowledge of the characteristics of the project type and of the sensitivities likely to be present in the receiving environment are particularly useful for scoping. The legislation provides for developers to formally request the opinion of the Competent Authority (CA) on the scope of an EIAR*[2]*. This can be availed of for any project requiring an EIAR. The provision of sufficient detail at the scoping stage is the best way to facilitate useful and specific responses from consultees. Scoping is carried out on a case-by-case basis because the significant issues for different projects are unlikely to ever be identical. However, there are standard issues that a developer should consider for each project to establish whether they apply in specific cases. The Advice Notes contain guidance on relevant environmental factors for principal project types. The potential for likely significant effects throughout different phases of the proposed project are considered as far as possible at scoping stage – whether they would individually require consent or not. These include, as relevant, site investigations, construction, commissioning and operation to eventual decommissioning. Scoping also considers the range of alternatives to be considered in an EIAR.*"

A scoping report, providing details of the Derrybrien Wind Farm Development Decommissioning Project, was prepared by MKO and circulated to prescribed statutory bodies in September 2024. The scoping document provided details of the Derrybrien Wind Farm Development Decommissioning Project and set out the scope of work for the EIAR. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey techniques and potential impacts that should be considered as part of the assessment process and in the preparation of the EIAR. Scoping Responses

Table 2-1 lists the consultees to whom the scoping document were sent and the responses received from those. Copies of all scoping responses received are included in **Appendix 2-1** of this EIAR. If further responses are received, the comments of the consultees will be considered in the Derrybrien Wind Farm Development Decommissioning Project in the event of planning permissions being granted. The recommendations of the consultees have informed the scope of the assessments undertaken and the

[1] *European Commission (2001). Guidance on EIA Scoping. Available at: https://wayback.archive-it.org/12090/20151221014910/http://ec.europa.eu/environment/archives/eia/eia-guidelines/g-scoping-full-text.pdf.*
[2]. *European Union (2020). Article 5(2) of European Union (Environmental Impact Assessment) (Environmental Protection Agency Act 1992) (Amendment) Regulations 2020 and transposing legislation (Section 1.3 Legislation). Available at: https://circabc.europa.eu/ui/group/3b48eff1-b955-423f-9086-0d85ad1c5879/library/94b9394e-cc9e-4859-94ca-95ccecb43422?p=1&n=-1&sort=name_ASC*

contents of the EIAR. Table 2-2 further below presents the key points from the scoping responses and identifies where such points have been addressed in this EIAR.

*Table 2-1 Scoping Responses*

| No. | Consultee | Date of Response |
|---|---|---|
| 1 | An Taisce | No response received |
| 2 | Aviation Navigation Ireland | No response received |
| 3 | Bat Conservation Ireland | No response received |
| 4 | BirdWatch Ireland | No response received |
| 5 | Commission for Regulation of Utilities | No response received |
| 6 | Department of Agriculture, Food and the Marine | 04.11.2024 |
| 7 | Department of the Environment, Climate and Communications | No response received |
| 8 | Department of Defence | No response received |
| 9 | Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media | No response received |
| 10 | Department of Transport | 24.10.2024 |
| 11 | Department of Housing, Local Government and Heritage | 06.11.2024 |
| 12 | Environmental Protection Agency | No response received |
| 13 | Eirgrid | No response received |
| 14 | Fáilte Ireland | 15.10.2024 |
| 15 | Forest Service | No response received |
| 16 | Galway Airport | No response received |
| 17 | Galway County Council – Planning Department | No response received |
| 18 | Galway County Council – Roads and Transportation Department | No response received |
| 19 | Galway County Council – Environment Department | No response received |
| 20 | Galway County Council – Heritage Officer | No response received |
| 21 | Geological Survey of Ireland | 11.10.2024 |
| 22 | Health Service Executive | 14.10.2024 |
| 23 | Iarnród Éireann | 25.09.2024 |
| 24 | Inland Fisheries Ireland | No response received |
| 25 | Irish Aviation Authority | 04.10.2024 |
| 26 | Irish Peatland Conservation Council | No response received |
| 27 | Irish Raptor Study Group | No response received |
| 28 | Irish Red Grouse Association | No response received |
| 29 | Irish Wildlife Trust | 01.10.2024 |

| No. | Consultee | Date of Response |
|---|---|---|
| 30 | Office of Public Works | No response received |
| 31 | Sport Ireland | No response received |
| 32 | Sustainable Energy Authority of Ireland | No response received |
| 33 | The Heritage Council | No response received |
| 34 | Transport Infrastructure Ireland | No response received |
| 35 | Uisce Éireann | 26.09.2024 |
| 36 | Waterways Ireland | 27.09.2024 |

*Table 2-2 Review of Scoping Responses*

| Consultee | Response Received | Response Summary |
|---|---|---|
| Department of Agriculture, Food and the Marine | 04.11.2024 | Response outlined that if the proposed development will involve the felling or removal of any trees, the developer must obtain a Felling License from this Department before trees are felled or removed. Provided guidance related to applying for a felling licence and noted that the developer should take note of the contents of Felling and Reforestation Policy document which provide a consolidated source of information on the legal and regulatory framework relating to tree felling. Stated that as this development is within forest lands, particular attention should be paid to deforestation, turbulence felling and the requirement to afforest alternative lands. |
| Department of Housing, Local Government and Heritage | 06.11.2024 | Noted that the information provided was not sufficiently detailed to allow for a full assessment of the archaeological implications of this proposal, however the Department notes that an Archaeological Impact Assessment (AIA) is scoped into the proposed Environmental Impact Assessment (EIA) process as part of the overall Cultural Heritage Impact Assessment of the proposed development and will be carried out by John Cronin & Associates. The supplied methodology indicates that this will incorporate a detailed desktop study and field inspection. In this regard, this Department awaits the results of the Cultural Heritage Impact Assessment (CHIA) and full Environmental Impact Assessment Report (EIAR) for the scheme before commenting further.<br><br>The Department also attached general biodiversity and heritage guidelines for the completion of the EIAR. |

| Consultee | Response Received | Response Summary |
|---|---|---|
| Department of Transport | 24.10.2024 | The Department stated that they consider it important that the examination of the proposal should include consideration of the following:<br>› When considering Waste and Turbine Removal, all abnormal loads associated with the project should be kept to minimal dimensions and weights to minimise the impact on the public road network. |
| Fáilte Ireland | 15.10.2024 | Attached a copy of Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA. Outlined that the purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an EIAR, or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines. |
| Geological Survey of Ireland (GSI) | 11.10.2024 | Recommended using GSI's various data sets when conducting the EIAR, Strategic Environmental Assessments (SEA), planning and scoping processes for developments, plans and policies. |
| Health Service Executive | 14.10.2024 | A representative for the Health Service Executive (HSE) reviewed the submitted scoping documents for decommissioning and stated that they have nothing further to add.<br><br>National Environmental Health Service (NEHS) will assess the EIAR when it comes in in accordance to the protection of public health. |
| Iarnród Éireann | 25.09.2024 | Stated that the windfarm is remote from the railway so the proposals have no effect on the railway. Should there be any movement of abnormal loads in the vicinity of the railway during the decommissioning please make contact again. |
| Irish Aviation Authority | 04.10.2024 | Stated that the Authority has no specific requirements for incorporation into the scoping.<br><br>When the formal planning application is submitted to ABP, the Authority will provide the general observations in relation to notification with at least 30 days of any proposed cranes for the decommissioning of the wind farm.<br><br>When the process of decommissioning is complete, Irish Aviation Authority would request |

| Consultee | Response Received | Response Summary |
|---|---|---|
| | | that the developer advise the Authority which will allow for the steps to be taken to remove the decommissioned wind farm from the aeronautical datasets and charts in due course. |
| Irish Wildlife Trust | 01.10.2024 | Stated that Irish Wildlife Trust do not have the staff capacity to respond to this consultation at the moment, but we will endeavour to respond if possible. |
| Uisce Éireann | 26.09.2024 | Uisce Éireann have no water and sewer data in the requested area.<br><br>Noted that as Uisce Éireann receive data from the Local Authority, they may have information that Uisce Éireann have not received. Advised to contact directly for more information. |
| Waterways Ireland | 27.09.2024 | Stated that this project is not within any Zone of Influence of waterways so they will not be commenting. |

## 2.3 Pre-Planning Consultation and the Community Engagement Process

### 2.3.1 Pre-Planning Application Consultation

In accordance with provisions of section 37L(9) of the 2000 Act, in October 2024, the Applicant (Gort Windfarms Ltd) wrote to ABP seeking to initiate pre-application consultation in respect of this application (ABP Ref ABP-321156-24). At this time, Gort Windfarms Ltd confirmed that it did not propose to seek a formal scoping opinion in relation to the assessment document, but indicated the purpose of consultation was, in accordance with statutory provisions, to enable:

- Gort Windfarms Ltd to provide the ABP with sufficient information to enable it to provide procedural advice in relation to the application.
- ABP to set out those considerations, relating to proper planning and sustainable development or the effects on the environment, which may have a bearing on its decision in relation to the application.
- ABP to identify any other information which may be submitted as part of the application pack, that would assist the Board in making a decision in relation to this application.
- ABP to an indicate the bodies/persons which the prospective applicant should consult with prior to lodging an application and completion of a remedial EIAR.

Gort Windfarms Ltd confirmed at that time that the preparation of this planning application was at an advanced stage and noted that they were co-operating with Galway County Council in relation to enforcement proceedings which require that these works are completed within a specified timeframe. Furthermore, it was confirmed that, as part of the pre-application process, the EIA and Planning Team acting for Gort Windfarms Ltd had held a public information event where the scope of work proposed was explained and where attending members of the public were advised of our intention to submit this application by the end of 2024. Finally, it was noted that the ABPs facilitation of a meeting at the earliest opportunity would be greatly appreciated.

The request for a pre-application meeting was acknowledged and on 21 November 2024, ABP confirmed that this request had been processed and a decision made to facilitate pre-application consultation – noting that this process would only deal with procedural matters. A pre-application meeting was held online with ABP on 7th February 2025, where procedural matters in relation to the submission of the application being discussed (Ref: ABP-321862-25).

As part of the environmental assessment process, a scoping report, providing details of the Derrybrien Wind Farm Development Decommissioning Project, was prepared by MKO and circulated to prescribed statutory bodies in September 2024. The scoping document provided details of the Derrybrien Wind Farm Development Decommissioning Project and set out the scope of work for the EIAR. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey techniques and potential impacts that should be considered as part of the assessment process and in the preparation of the EIAR. Section 2.2 sets out in detail the list of 36 consultees to whom the scoping document were sent; the 11 responses received from those; the key points from the scoping responses and identifies where such points have been addressed in the EIAR.

It is noted that Gort Windfarms Ltd did not seek to engage in formal pre-application consultation with Galway County Council's Planning Department – but that scoping correspondence issued to the Planning, Roads and Transportation, Environment and Heritage Departments of the County Council.

### 2.3.2 Public Consultation

National and local media periodically feature articles in relation to the Derrybrien Wind Farm Development. There has consistently been a high level of public awareness of the development and the requirement for the developer to decommission the Development consequent upon the refusal of substitute consent.

Gort Windfarms Ltd set in place a consultation process that began once the decision to refuse consent issued (February 2022). A press statement was issued on the 16th of March 2022 to confirm the cessation of generation activity and that the Project would be decommissioned. The dedicated project website – www.derrybrienwindfarm.ie, was maintained and period updates posted.

In advance of submitting this application, Gort Windfarms Ltd sought to increase public awareness of the imminent application and to highlight the opportunities that this particular process gives for third parties to get involved. Though the proposal relates to a decommissioning project – as opposed to a wind farm development project, it was deemed appropriate that sectoral guidance was reviewed, considered and applied as appropriate, particularly:

- The 2006 Wind Energy Development Guidelines [specifically Para. 4.4 Public Consultation with the Local Community and Appendix 2 – Advice for Developers on Best Practice in the Pre-application Consultation Process].
- The Good Practice for Wind Energy Development Guidelines, Department of Communications, Climate Action and Environment (December 2016).
- The Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement, Department of Communications, Climate Action and Environment (2016).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Section 3.1 Consultations on the EIA Report). EU Commission, 2017

Mindful of, inter alia; the need to engage in meaningful consultation but with a limited range of alternatives open to Gort Windfarms Ltd ; the planning history of the development, and the associated sensitivity of these issues with the local community; a number of steps were taken, namely:

- An independent Community Liaison Office (CLO) was retained – having been previously involved in engagement with third parties during the original substitute

consent process. Contact details (email and phone number) for the CLO were provided in the information sheet and members of the public were invited to contact the CLO as appropriate. The information sheet was distributed within a consultation catchment of 10 km from the outer edge of the Wind Farm site. The leaflet was distributed within the locality on behalf of Gort Windfarms Ltd (Appendix 2-2). Landowners who are affected by the project, including Coillte were consulted with directly.

- A dedicated Project website (www.Derrybrienwindfarm.ie) was created, going live in July 2020. This website provided updates on public information events, the status of the application and also – once this application is submitted, hosts the application documentation. The public notices were included to ensure that people had access to information directing them to how they could engage with the statutory decision-making process.
- A public information event was hosted at Gort Community Centre, Ennis Road, Lavally, Gort, Co. Galway, H91 K7YA on Monday the 16th of September 2024.

**Public Information Event – 16 September 2024**

In advance of the public information event, advertisements were posted in the local press, and details provided to local newspapers. A leaflet drop in the wider area was also carried out. At the event, information boards were provided describing the proposed development and setting out the next steps in the planning process; and 10 representatives from the technical team – including those engaged in planning, environmental impact assessment, civil engineering, geotechnical assessment, and hydrology / flood risk assessment; attended.

The event was attended by c. between 55 and 60 people - principally members of the local community, with a small number of public representatives. Specific to the proposed decommissioning works almost all attendees would be considered detractors of the project – insofar that that they were largely opposed to the decommissioning of the windfarm. The key issues raised were:

- Dissatisfaction with the proposal to decommission the Wind Farm, particularly in light of the need for additional renewable electricity generation capacity and the perception of it as an important asset.
- Community gain and a desire that there should be a contribution to the local community via a prolonged community fund, or other measure linked to the long-term management of the site.
- Concern about how the Project could interact with on-going turbary activity on the site.
- Flooding and assessment of flood risk – with positive engagement on how the risk would be assessed and mitigated.
- Engagement and communications – with some participants seeking to issues specific to the planning and legal history of the development, which were beyond the scope of the discussion.

Following the event, digital version of the information boards was posted on the project website **(Appendix 2-3)**. The information boards described the 'Derrybrien Wind Farm Development Decommissioning Project' and explained the planning permission process, setting out the opportunities people would have to view the application documentation and also to comment on it.

In advance of submission of this application to ABP, the Planning Department of Galway County Council was advised of the timeframe for its submission.

# 3. ASSESSMENT OF REASONABLE ALTERNATIVES

## 3.1 Introduction

The EIA Directive requires an EIAR to contain "*a description of the reasonable alternatives studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*".

In relation to the Derrybrien Wind Farm Development, An Bord Pleanála (ABP) have refused an application for substitute consent which would have authorised the continued operation of the windfarm and ancillary development (ABP-308019-20). The development is now unauthorised and is the subject of an enforcement notice that requires the decommissioning and removal of the unauthorised wind farm and ancillary structures. Therefore, the reasonable alternatives considered can relate only to its decommissioning.

As the Derrybrien Wind Farm Development has ceased to operate and will not resume commercial operation, future repowering has not been considered further in this EIAR.

### 3.1.1 Chapter Scope

Alternatives are different ways of carrying out the Project to meet the agreed objective(s). In relation to the Derrybrien Wind Farm Development Decommissioning Project, the objective is to comply with the enforcement notice and to undertake the decommissioning of the Derrybrien Wind Farm Development by carrying out those works that enable the removal of structures and buildings from the site and, in so far as is practicable, its restoration, in a manner that ensures that all potential risks to key environmental factors are minimised or avoided where possible.

This chapter of the EIAR sets out the reasonable alternative options for decommissioning of the Derrybrien Wind Farm Development and describes them having regard to engineering feasibility, environmental impact, and land ownership.

This chapter sets out the evolution process of the Derrybrien Wind Farm Development Decommissioning Project. This chapter assesses four alternatives decommissioning options and evaluates them based on following EIA topics: Population & Human Health; Biodiversity; Land, Soils & Geology; Hydrology & Hydrogeology; Air Quality; Noise & Vibration; Cultural Heritage; Material Assets and Waste & Resource Management. The alternative options considered are:

- Alternative 1 - 'Do Nothing' i.e. the Derrybrien Wind Farm Development will remain in *situ* in its current state (2024) as an unauthorised windfarm development that ceased commercial electricity generation in February 2022.
- Alternative 2 – Remove all development which has taken place since 2003 including those offsite emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding those offsite emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration' i.e. remove and alter existing structures on the site and, restore the site in so far as is practicable, while minimising risks to safety and the environment.

### 3.1.2 Statement of Authority

This chapter of the EIAR has been prepared by Daniel Hogan informed by expert input. Daniel Hogan is the Senior Consenting Specialist for ESB, Engineering and Major Projects. Daniel is a graduate of Atlantic Technological University (formally Institute of Technology Sligo) with an BSc in Environmental Science and Technology and also a graduate of Queens University Belfast (QUB) with a MSc in Environmental Engineering.

Daniel has over fourteen years' experience as a professional Environmental Scientist working in the Engineering and Environmental Consultancy industry. He has a significant portfolio of experience in a range of water environment and strategic planning projects of various scales including major port developments, cross country pipelines and energy generation and storage projects in Ireland and Northern Ireland. Daniel holds Chartered Scientist (CSci), Chartered Water and Environment Manager (C.WEM) and Chartered Member of the Chartered Institutions of Water and Environmental Management (MCIWEM) status and is the past Chairman of the Chartered Institution of Water and Environmental Management (CIWEM) Northern Ireland Branch (2020-21).

### 3.1.3 Relevant Legislation and Guidance

The assessment of decommissioning alternatives for the Derrybrien Wind Farm Development Decommissioning Project has been undertaken in accordance with the following guidance documents that have been reviewed, considered and applied by the author:

- The EU Commission's Environmental Impact Assessment of Projects Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014 /52/EU), 2017.
- The EU Commission's Guidance on the implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, 2022.
- The Department of Housing, Planning and Local Government (DHPLG) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018.
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency (EPA), 2022.

The DHPLG Guidelines (2018) state that the EIA Directive requires that an EIAR includes,

> *"A description of the reasonable alternatives studied... which are relevant to the project and its specific characteristics." This "must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment... The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment ... It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. A 'mini-EIA' is not required for each alternative studied."*

## 3.2 Methodology

The purpose of this process is to predict and evaluate, insofar as possible, the environmental effects of the proposed alternatives, highlighting any significant environmental risks and / or benefits that are likely to arise from their implementation.

Where possible, the environmental assessment is quantitative with a graphical output to aid in the appreciation and understanding of the implications of each decommissioning alternative. This method involves the assessment of the decommissioning alternatives for each of the following EIA topics:

- Population and Human Health.
- Biodiversity.
- Land, Soils and Geology.
- Hydrology and Hydrogeology.
- Air Quality.
- Noise & Vibration.
- Cultural Heritage.
- Landscape and Visual.
- Material Assets.
- Waste.

All potential positive and negative effects are presented individually, with a text description, and then in a summary graphic (where appropriate). Each alternative is assessed against predefined sub-objectives (included in **Appendix 3-1**) and scores assigned to effects range from +3 to -3 that have been adapted from the EPA guidelines (2022), as shown in *Table 3-1*.

The purpose of adding numerical scores is to assist in the ranking of the alternatives. Like the assessment, the scores demonstrate both the positives and the negatives and are not conveyed in terms of net benefit or net loss, which can often be misleading.

*Table 3-1 Description of Environmental Effects Scores (adapted from EPA Guidance 2022)*

| Score | Description |
|---|---|
| +3 | Very Significant / Profound (Positive) |
| +2 | Significant (Positive) |
| +1 | Slight / Moderate (Positive) |
| 0 | Neutral / Imperceptible |
| -1 | Slight / Moderate (Negative / Adverse) |
| -2 | Significant (Negative / Adverse) |
| -3 | Very Significant / Profound (Negative / Adverse) |

For the purposes of the assessment of decommissioning alternatives, the Derrybrien Wind Farm Development has been separated into three distinct "work areas", they are:

- Work Area A: Derrybrien Wind Farm including Derrybrien Substation.
- Work Area B: The Derrybrien to Agannygal Overhead Line (OHL)including Agannygal Substation.
- Work Area C: Offsite ancillary works associated with the 2003 peat slide.

The assessment of decommissioning alternatives for each "work area" was conducted in comparison to a "do-nothing" scenario. For the purposes of this assessment, the do-nothing scenario is Derrybrien Wind Farm Development remaining *in situ* in its current state – i.e., as an unauthorised windfarm development that ceased commercial electricity generation in February 2022.

The decommissioning alternatives considered for the Derrybrien Wind Farm Development Decommissioning Project can be summarised as:

- Alternative 1 - 'Do Nothing' i.e. the Derrybrien Wind Farm Development will remain in *situ* in its current state (2024) as an unauthorised windfarm development that ceased commercial electricity generation in February 2022.
- Alternative 2 – Remove all development which has taken place since 2003 including those offsite emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding those offsite emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration' i.e. remove and alter existing structures on the site and, restore the site in so far as is practicable, while minimising risks to safety and the environment.

For the assessment of decommissioning alternatives, it is assumed that standard best practice guidance on pollution prevention will be followed at all times to avoid or reduce as far as reasonably practicable the potential for adverse effects on the environment. Examples of best practice is provided below:

- Controls and contingency measures to manage runoff from construction areas and to manage sediment.
- Oils, fuels, lubricants or other chemicals will be stored in an appropriate secure container in a suitable storage area, with spill kits provided. No storage of any oils, fuels, lubricants in close proximity to an aquatic feature.
- Refuelling will be carried out in a designated area which is bunded and has an impermeable base.
- Temporary soil storage would be located at least 10m from any aquatic feature.
- All plant used on the site will be regularly maintained, paying particular attention to the integrity of silencers and acoustic enclosures.
- Construction machinery and plant in intermittent use will be shut down in the intervening periods between work or throttled down to a minimum.
- Compliance with normal construction working hours.

## 3.3 Receiving Environment

A description of the receiving baseline environment is included in each of the technical chapters of the EIAR as listed below:

- Population and Human Health (Chapter 5).
- Biodiversity / Aquatic Ecology and Fisheries (Chapter 6 / Chapter 7).
- Land, Soils and Geology (Chapter 8).
- Hydrology and Hydrogeology (Chapter 9).
- Air Quality (Chapter 10).
- Noise & Vibration (Chapter 11).
- Cultural Heritage (Chapter 12).
- Landscape and Visual (Chapter 13).
- Material Assets (Chapter 14).
- Waste (Chapter 15).

A summary of the features associated with the Derrybrien Wind Farm Development within each work area are included in sub sections 3.3.1 – 3.3.3 below.

### 3.3.1 Derrybrien Wind Farm (including the Derrybrien 110kV Substation)

The main wind farm infrastructure comprises c.17.5km of access tracks, 70no. turbines and adjacent crane hard standings, drainage channels, borrow pits/quarries, on site peat repositories, Derrybrien

110kV substation, c.25km of direct buried electric and communication cables and 2no. anemometer masts.

All elements within the Derrybrien Wind Farm are described in subsections 3.3.1.1 - 3.3.1.9 below. The wind farm layout is presented in Figure 3-1 below:

### 3.3.1.1 Wind Farm Access Tracks

The access tracks are utilised for on-going access to the wind turbines and anemometer masts for operation and maintenance of the windfarm. The total length of access tracks within the site boundary is 17.5 km. These comprise:

- Approximately 2.0km of pre-existing floating roads that were upgraded through the turbary plots on the east side of the site.
- Approximately 14.6 km of new floating roads.
- Approximately 0.9 km of new non-floating roads.

The floating turbary roads which had been in place prior to the construction of the wind farm on the east side of the site were upgraded with a capping layer of crushed rock granular fill reinforced with a layer of geogrid on the surface of the existing road. The width of these roads was not increased so they are narrower than the other site access tracks/roads at 3-4 m wide.

The floating roads built for the project are typically 4.5 m wide and comprise 600-1000 mm of crushed rock granular fill reinforced with 1-2 layers of geogrids, as necessary, over a regulating layer of granular fill on a layer of logs, branches and brash from trees that were felled on the site.

The non-floating roads were constructed of granular rockfill on the glacial till below the peat.

### 3.3.1.2 Wind Turbines

There are seventy (70) Vestas V52-850 kW turbines on site. The wind turbines have a rotor diameter of 52m and a hub height of 49m. It is noted that these turbines are small compared to modern turbines. There are two prevailing wind directions-to the west and southwest. The approximate spacing between turbines is between 150m to 260m in a west/southwest direction.

A hardstanding area is located adjacent to each wind turbine. The hardstand are provided support to mobile cranes used to erect the turbines during construction and to facilitate maintenance activity involving the use of cranes and machinery that arose over the lifetime of the wind farm. The hardstands were constructed of crushed rock granular fill supported on the glacial till below the peat. The individual hardstanding's typically cover an area of approximately 47m x 18m.

The turbine foundations are reinforced concrete pad design that are founded onto stratum with suitable bearing capacity, predominantly rock. The dimensions of the foundations used were either 9.8m x 9.8m (type-1) or 11m x 11m (type-2) in plan, with the main section of the foundation being 1m in depth. There are 64 bases of type-1 dimensions and 6 bases of type-2 dimensions. The majority of the foundations comprised foundation type 1, however, 6 No. of the 70 foundations were foundation type 2, they are: T11, T60-T62, T66, T67.

The main turbine components comprise:

- 2 x cylindrical towers sections.
- 1 x nacelle, which encapsulated the mechanical machinery of the wind turbine and was placed on top of the tower sections.
- 3 x blades connecting to the hub of the nacelle.

The turbine towers are of tubular steel tapering from about 3.3 m diameter at the base to 2.1 m diameter at the top where the nacelle is mounted. Access to the tower is via a staircase located outside on the hardstand and a secure hinged door into the tower. The nacelle is accessed from the tower using an internal ladder with landing/rest positions. The tower and nacelle incorporate internal and emergency lighting.

The nacelle contains the generator and control unit, which is designed for computer-controlled monitoring of all major functions of the turbine. The glass-fibre reinforced nacelle cover protects all the components inside the nacelle against the elements.

A three-blade rotor is attached to the nacelle. The blades are made of fibreglass-reinforced epoxy material with each blade consisting of two blade shells, bonded to a supporting beam.

The wind turbines are painted light grey with a matt finish. The equipment is protected from lightning strike by deep earthing and from corrosion by multiple coatings. The turbine tower and nacelle are equipped with optical smoke sensors. Aviation lights are provided on nine turbines, specifically T1, T18, T26, T44, T46, T47, T52, T61 and T65.

The wind turbines are geared to ensure the blades rotate in the same direction. Transformers are located internally within the turbine tower. A separate transformer is located internally within each wind turbine to uprate the generation voltage of the turbines from 380 – 660 V to a higher voltage for connection via underground cables to the Derrybrien Substation. The hermetically sealed wind turbine transformers can be considered as leak free and largely maintenance free. They are dispatched from the factory leak free and can primarily only be damaged during transport or installation. Once in service, they remain closed for their lifetime.

#### 3.3.1.3 Anemometer Masts

There are two anemometer lattice masts with a height (49m) corresponding to that of the turbines on the site which monitor wind speeds and validate the performance of the wind turbines. Each leg of the mast sits on a concrete plinth of plan dimension 1m x 1m x 1.5m (depth to top of foundation). The base of the mast is triangular in plan 2m x 2m x 2m. The mast is supported on reinforced concrete foundations.

The masts are lattice masts, comprising a free-standing galvanised lattice type meteorological tower, being approximately 2 m wide at its base x 0.6 m wide at its top. Equipment on each mast comprises anemometers, wind direction vanes, a barometric pressure sensor and a data logger. Anti-climb screening (3m high) is provided to masts.

A mobile phone network operator has a cell on the wind farm anemometer mast beside turbine T68 to facilitate phone coverage at the Derrybrien site. There is a broadband service from a 70m high third-party service provider mast (beside turbine T25) which has been present on the site since the 1980s.

#### 3.3.1.4 LV and communication cables

Throughout the site there is an installed buried cable network of LV electrical cables and SCADA communication cables. The LV cables connect each wind turbine to the sub-station on the south side of the site between Turbines T26 and T29. They feed the electrical output from each turbine generator to the sub-station at a rating of 20kV, for export onto the electrical transmission network. The cables are buried within a trench to an approximate depth of 1.1m.

In September 2017, as part of an upgrade to the turbine control systems, approximately 7.6km of new 12 core single-mode fibre-optic cable was installed on the site which was run in 2.6km of ducts to improve the response of communication signals between the turbine controllers and the central control system.

### 3.3.1.5 Derrybrien Substation

The purpose of Derrybrien Substation which is located within the wind farm site is to transform the 20 kV output from the wind turbine generators to 110kV for export out to the national grid at 110 kV.

**Compound Size and Construction**: The 110kV/20kV Substation consists of a compound (approximately 58.5m x 27.1m) containing outdoor electrical equipment and a Control Building.

The foundations for the control building, the electrical equipment steelwork and transformer within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstanding is capped with hardcore surfacing.

Other features include a reinforced concrete transformer bund support, external cable trenching, standby generator and bunded diesel tank, external lighting poles, lightning mast, palisade fencing and a well supplying nondrinking water. There is a 4m wide hardcore surfaced access track around the external perimeter of the substation.

**Control Building:** The Control Building is a single storey building (22.86m x 8.83m) with pitched roof, double leaf cavity blockwork walls, pre-cast concrete ceiling slabs with wooden roof trusses overlain with felt and slates. The internal floor is a reinforced concrete slab, cast in-situ.

Equipment contained in the control building includes a Supervisory Control and Data Acquisition (SCADA) system, which allows for off-site monitoring via a telephone connection. The following is located with the control building-control room, MV switchgear room, relay room (protection relays) battery room, toilet, workshop and office area.

**Substation Drainage:** The substation site is finished on 50 mm single size clean compound stone. The permeable compound stone provides a means of attenuation of runoff and allows rainwater to infiltrate to ground. Rainwater from the roof of the control building connects via downpipes away from the compound into the wind farm drainage system. There is a proprietary pump that directs drainage to an oil separator ((Butler Manufacturing Services) Ltd. PIF Class 1 Full Retention Oil Separator) when oil is detected before discharge to the site drainage network. The concrete access road within the compound is cambered to drain to the permeable compound stone.

The welfare facilities in the control building of Derrybrien Substation consists of one toilet and two sinks. An Envirocare P6 sewage treatment plant unit caters for the wastewater generated in these facilities. It is regularly serviced under a maintenance contract with a private service company.

The grid transformer is located within an impermeable bund capable of oil retention of 110% of oil volume in the event of a leakage from the transformer.

**Electrical Equipment**: The station contains outdoor and indoor electrical equipment.

The outdoor electrical equipment within the substation compound comprises:

- 1 70 MVA Transformer 110 kV/MV.
- Cable chair.
- 3 surge arresters.
- 1 NER (Neutral Earth Resistor).
- 1 Busbar Disconnect.
- 1 Circuit Breaker.
- 3 Current Transformers.
- 3 Voltage Transformers.
- 1 Line/Earth Disconnector.
- 2 capacitor banks.

- 6 Post Insulators.
- 1 End Mast.
- 1 house transformer.

The indoor electrical equipment within the substation control room comprises:

- Control and protection panels.
- Batteries.
- MV metal enclosed switchgear.

**Electrical insulating material:** SF6 is used as insulating material in the substation switchgear -specifically the outdoor Siemens 110 kV circuit breaker (8.10kg SF6), the two capacitor bank units (2 x0.34kg SF6) and in the ten 20 kV radial circuit breakers within the control building. The equipment containing SF6 is labelled and sealed. There is an alarm system in the switch room to alert operator to any loss of SF6.

### 3.3.1.6 Drainage

Prior to construction of the wind farm, the site had already been subjected to a programme of drainage to facilitate forestry (in the 1960s and 1970s) and turbary. The majority (27 km out of 39 km) of drainage channels on site were in place prior to the wind farm development. During construction of the wind farm many of the pre-existing channels were left unchanged except where there was a conflict with new infrastructure. In areas of high concentrations of flow upstream of access tracks and / or close to turbine foundations, sections of drainage were re-aligned or deepened to reduce the risk of localised surface ponding and flooding and some minor cleaning out and maintenance work took place as required".

The remaining 12 km of drainage channels were newly constructed for the wind farm project. These drain the site access tracks and connect the turbine foundation drainage to the drainage network. The constructed channels are narrow open drains, typically 0.5 to 1.5 m deep, with culverts under the site access tracks.

Culverts of either 450mm or 600 mm in diameter have been inserted at various wind farm access road crossings as necessary to maintain the conveyance path of the existing drains crossed.

The on-site drainage network connects to the natural regional network of streams and rivers downslope from the site.

### 3.3.1.7 Wind Farm Peat Repositories

It is estimated that approximately 160,000m$^3$ of peat was excavated for the wind farm infrastructure (turbine foundations and crane hard standings, borrow pits, site compound, substation and anemometers). Prior to the peat slide, spoil which arose from construction excavations was side cast. Following the peat slide, the spoil was placed up to a height of 1.0m in designated locations in areas of flat or gently sloping ground (<3°) across the site.

As of 2020, blanket bog vegetation has re-established on the surface of almost all the repository/storage areas, in some cases making them difficult to distinguish from the surrounding ground.

### 3.3.1.8 Borrow Pits/Quarries

There are 3 borrow pits/quarries on site. These were used during construction as a source of bedrock to be processed into crushed rock granular fill for use in the construction of the access tracks and hard standing areas. Some clay was also extracted. Borrow Pit/Quarry No. 3 adjacent to Turbine T65 at the site entrance, was the main source of rock fill for the works. The borrow pits have been closed since the

end of the construction phase in 2006. The three borrow pits/quarries have also been partially rehabilitated by backfilling with excavated peat.

**Borrow Pit/Quarry 1:** Borrow Pit/Quarry1 is within an area of shallow peat adjacent to Turbine T24. Peat was removed from the site and the underlying glacial till and weathered rock was excavated for re-use as backfill material over the turbine foundations. The borrow pit/quarry was rehabilitated by backfilling with excess excavated peat/soil prior to completion of the works on site and blanket bog vegetation and some small trees have become established at the surface.

**Borrow Pit/Quarry 2:** Borrow Pit/Quarry 2 is within an area of shallow and outcropping rock on the west side of the site between Turbines T9 and T10. Shallow peat was initially removed from the site and mineral soil and rock were extracted for use as backfill material for the turbines and for road construction. The borrow pit/quarry was rehabilitated by backfilling with excess excavated peat/soil from the excavations for the turbine foundations and crane hard standings prior to completion of the works on site. Bunds of mineral soil were constructed around the perimeter of the borrow pit so that the remoulded peat was fully contained within the pit. The borrow pit/quarry area is fenced off as a safety measure.

**Borrow Pit/Quarry 3:** Borrow/Quarry 3 located near the site entrance on the north side of Turbine T65 was the main source of rock on the site for the construction of the site access tracks and hardstanding areas. Borrow Pit/Quarry 3 has been partially rehabilitated by backfilling sections of the borrow pit which are fully contained within rock fill and mineral soil bunds. The borrow pit/quarry is flooded to the natural water table level 1.0-1.5 m below the level of site access road at the entrance to the borrow pit/quarry. There is a drain along the edge of the road to divert any rising water from the borrow pit to the offsite drainage network. The area is fenced off with timber fencing to restrict access as a safety measure.

#### 3.3.1.9 Onsite site works associated with the peat slide 2003

After the peat slide in 2003, the following sections of access track within the wind farm site had to be rebuilt and remain in place today are:

- Wind Farm Access Track at T68: The original access track at T68 within the wind farm site is within the vicinity of the head of the peat slide. The track was rendered effectively unusable following the peat slide in 2003 and was reinstated along its original route by removing all peat below the track and re-constructing the track on mineral soil using coarse fill. The reconstructed access track varies in width due to the hardstand at turbine T68.The reconstructed access track acted as a containment measure following the peat slide.
- Wind Farm Access Track T23-T70: Following the 2003 peat slide, part of the access track between T23-T70 was reinstated along its original route by removing all peat below the track and re-constructing the track on mineral soil using coarse fill. As with the access track at T68, the access track acted as a containment measure following the peat slide. The width of the access track varies from 3.5 to 5m wide at its surface. A small berm approximately 300mm high carrying services buried in concrete is located on the upslope side of the access track.

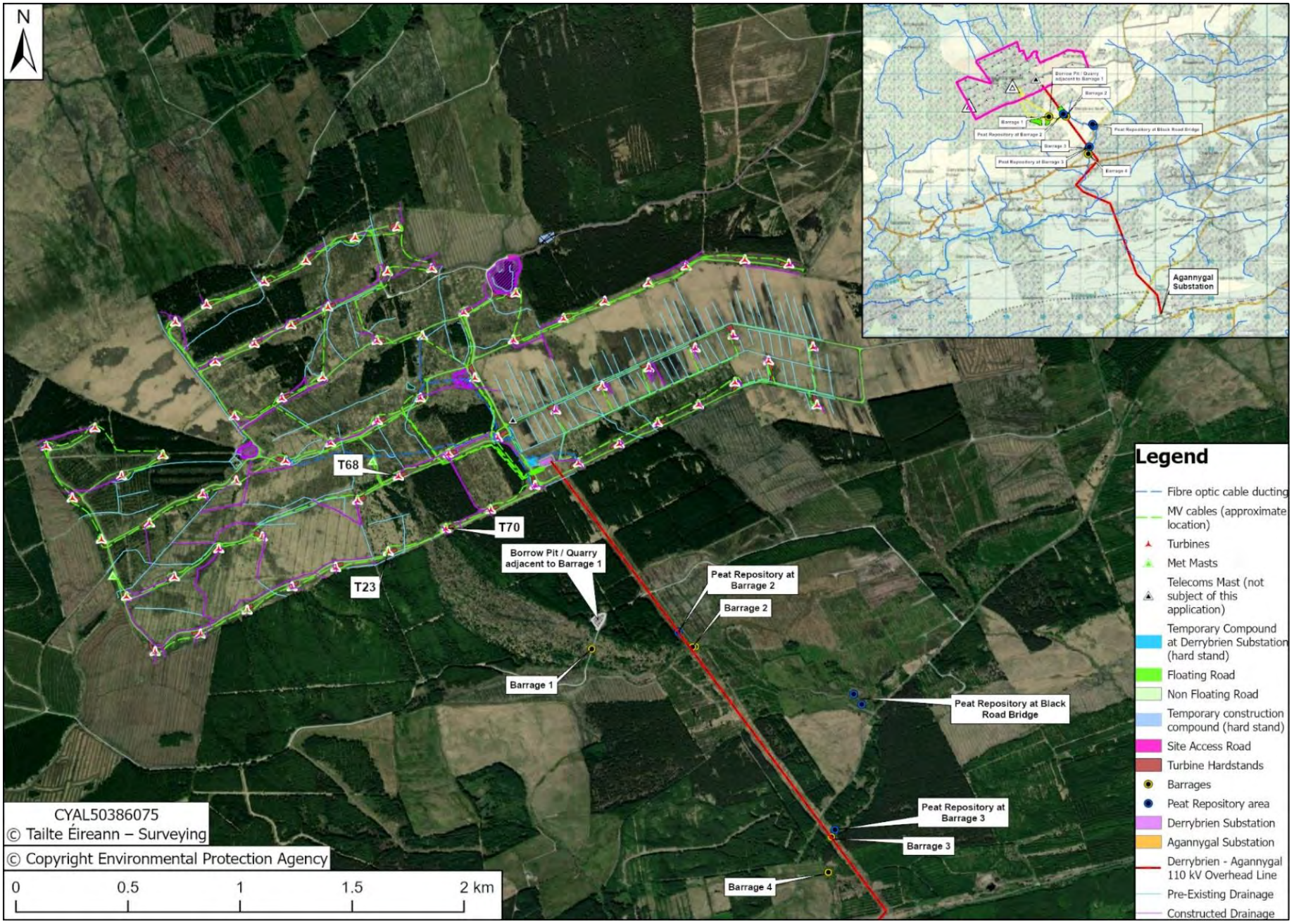



*Figure 3-1 Features within the Derrybrien Wind Farm Site*

### 3.3.2 Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation

The electricity generated at Derrybrien Wind Farm is transmitted from the 20kV/110kV Derrybrien Substation via a 7.8km overhead line to the national grid at Agannygal 110kV Substation on the Ennis-Shannonbridge 110kV Line. The 7.8km Derrybrien –Agannygal 110kV overhead line (with earth wires) is supported on double pole sets and mast structures, 43 structures in total. Of these 34 are double wood pole sets, 2 are end masts (EM) (1 end mast within Derrybrien Substation and 1 at Agannygal Substation), 6 angle masts (AM) and 1 intermediate mast (IM) (Figure 3-2 and Figure 3-3).

The Agannygal 110kV Substation consists of a compound (approximately 63m x 47.5m) containing outdoor electrical equipment and a Control Building. The foundations for the control building, the electrical equipment steelwork and transformer within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstanding is capped with hardcore surfacing.

Other features include external cable trenching, standby generator (bunded) and diesel tank, external lighting poles, lightning mast, palisade fencing and a well supplying non drinking water. There is a wide hardcore surfaced access track around the external perimeter of the substation.

The Control Building is a single storey building (14.5m x 8.9m) with pitched roof, double leaf cavity blockwork walls, pre-cast concrete ceiling slabs and wooden roof trusses overlain with felt and slates. The internal floor is a cast in-situ reinforced concrete slab. The control building comprises the control room, battery room, store room and toilet.

Clean surface water drainage from the control building roof is collected by guttering and downpipes and directed to the substation drainage system. Land drains surrounding the substation compound collect surface water runoff which drains downhill offsite along the edge of the access road constructed to the substation. The wastewater from the control room is treated by a Biocycle wastewater treatment system.

The station contains outdoor and indoor electrical equipment. The outdoor electrical equipment within the substation compound comprises: 3 end masts (note that one is denoted as a line bay gantry on the drawing), 4-line traps (Telecoms Equipment), 1 busbar, 5 post insulators, 3 line/earth disconnects, 9 current transformers, 9 voltage transformers, 3 circuit breaker and 5 busbar disconnectors.

The indoor electrical equipment within the substation control room comprises Control and protection panels and Batteries.

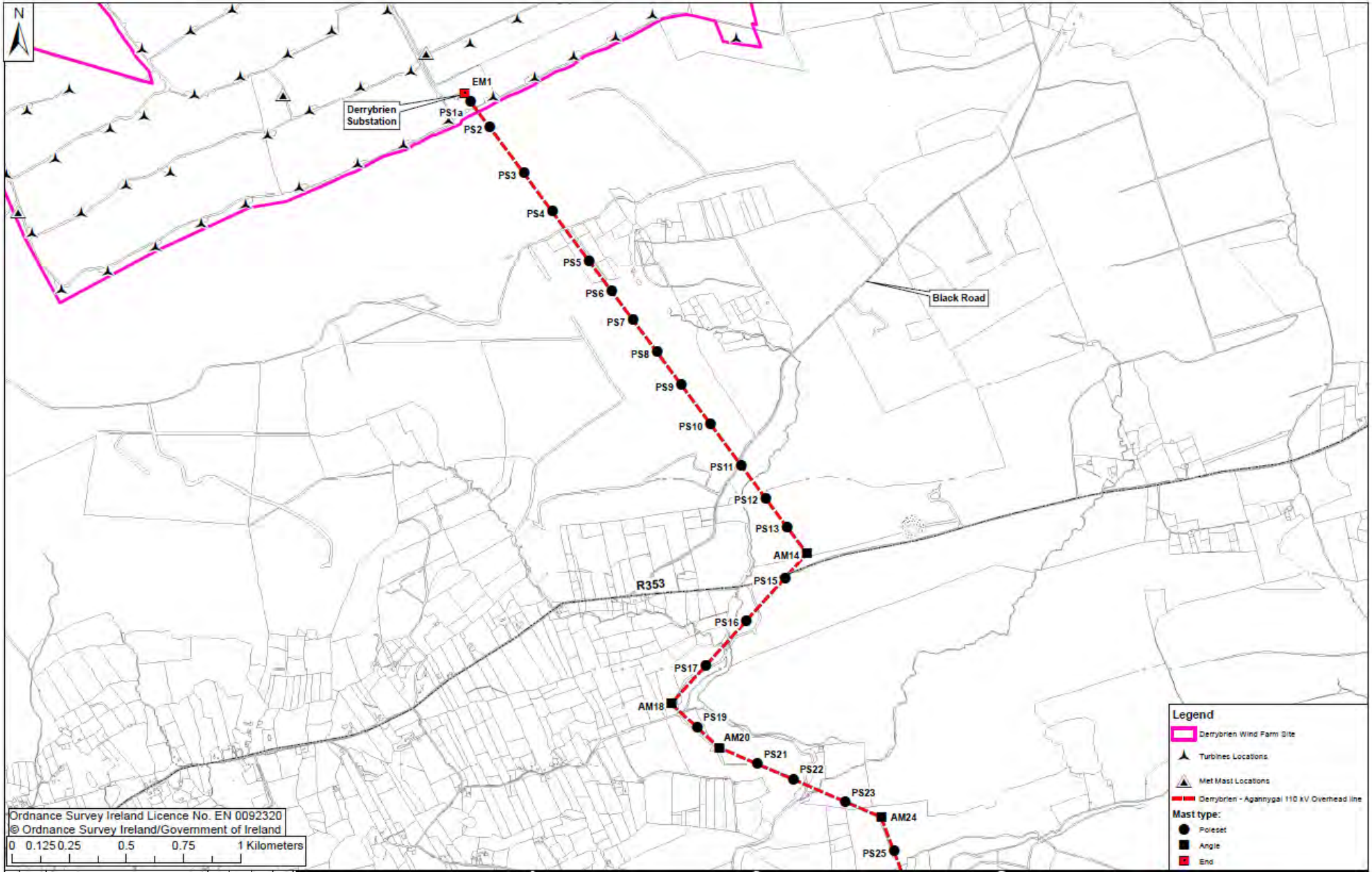



*Figure 3-2 Derrybrien - Agannygal 110kV Overhead Line Route (Sheet 1 of 2)*

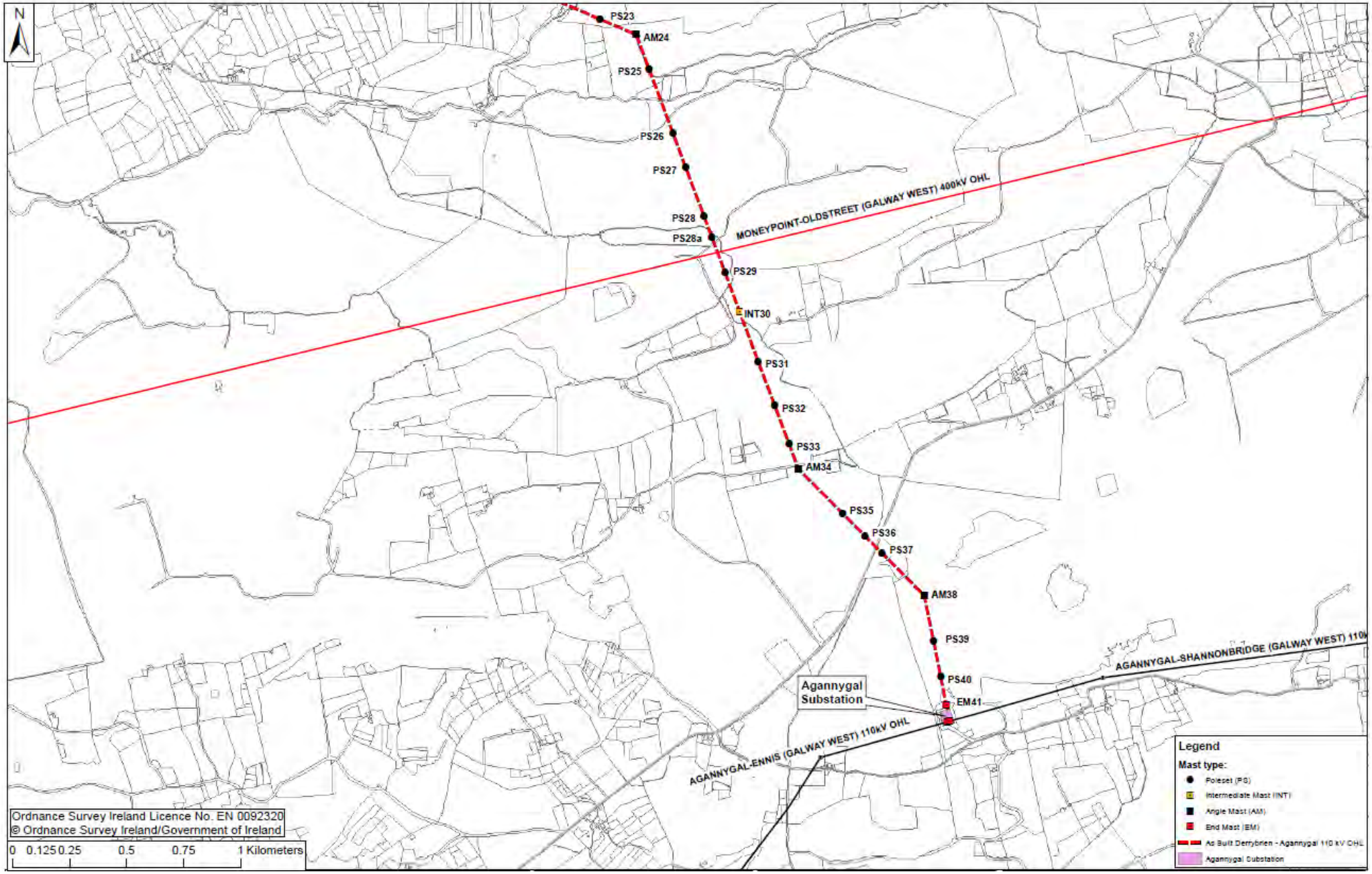



*Figure 3-3 Derrybrien - Agannygal 110kV Overhead Line Route (Sheet 2 of 2)*

## 3.3.3 Offsite ancillary works associated with peat slide (2003)

In the response to the peat slide, works were undertaken offsite to minimise effects on lands and receiving watercourses.

The offsite features associated with the peat slide that remain in place today are illustrated in Figure 3-4 and described in sections 3.3.3.1 – section 3.3.3.8, they are:

- Borrow Pit adjacent to Barrage 1 (Section 3.3.3.1).
- Barrage 1 (Section 3.3.3.2).
- Barrage 2, access track and repository area (Section 3.3.3.3).
- Barrage 3 and associated repository area (Section 3.3.3.4).
- Barrage 4 (Section 3.3.3.5).
- Repository area at the Black Road Bridge (Section 3.3.3.6).
- Drainage diversion works (Section 3.3.3.7).
- Repairs to bridges (Section 3.3.3.8).

Note: Temporary Barrages A-D were also constructed using locally sourced earthen material immediately after the peat slide (October 2003). Temporary Barrages A, C and D were removed in December 2003 and Temporary Barrage B was removed in September 2005. For completion their location has been illustrated in Figure 3-4 below.

### 3.3.3.1 Borrow Pit/Quarry adjacent to Barrage 1

The borrow pit/quarry located adjacent to Barrage 1 existed prior to the construction of the Derrybrien Wind Farm Development. In 2003 The borrow pit was reopened as a source of rock for the barrages built in response to the peat slide (approximate area 2314m$^2$). Borrow pit adjacent to Barrage 1 is illustrated previously in Figure 3-1.

### 3.3.3.2 Barrage 1

Barrage 1 was constructed on Stream SC7(B) as a containment measure shortly after the peat slide occurred. The barrage was built in the vicinity of the pre-existing Coillte track located upstream of the main gorge. A Coillte access track was rebuilt over the barrage. This is a low embankment constructed using boulders and crushed rock. The barrage is a porous structure constructed of rock boulders. A sump on the upslope side of the barrage is provided for drainage purposes. The barrage functioned as a containment/stability measure for several years after the peat slide. Barrage 1 is no longer required as a containment/stability measure however it forms part of the Coillte forestry access track network.

### 3.3.3.3 Barrage 2, Access Track and Repository Area

Barrage 2 was constructed on Stream SC7(B) as a containment measure shortly after the peat slide occurred. An 300m floating access track approximately 3 metres in width was constructed from an existing Coillte access track to access this location. Barrage 2 is no longer required as a containment/stability measure however it forms part of the Coillte forestry access track network.

The repository area associated with Barrage 2 is approximated 3,498m$^2$ in area and contains peat, silt and sand which was removed during construction of the barrage from behind the barrage in the years following the peat slide. Probing indicates that the placed arisings depth ranges from 0.6 to 1.9m with an average of about 1.6m. The repository area has become re-vegetated and partially fenced with post and wire fencing.

#### 3.3.3.4 Barrage 3 and Repository Area

Barrage 3 was constructed on Stream SC7(B) as a containment measure shortly after the peat slide. The barrage is a porous structure comprised of boulders within a section of an incised stream which forms a tributary of the Owendalulleegh River and is located over 1km downstream of the site of the peat slide. As of 2020, the barrage is covered by heavy vegetation.

The repository area adjacent to Barrage 3 is approximately 8,220m$^2$ in area and contains silt, sand and peat which were removed from the area following the peat slide. Probing indicates the placed arisings depth ranges from 1.0 to 1.6m. The repository area has become re-vegetated. The repository area adjacent to Barrage 3 is fenced with post and wire fencing.

#### 3.3.3.5 Barrage 4

Barrage 4 was constructed on Stream SC7(B) as a containment measure shortly after the peat slide. The barrage is a porous structure comprised of boulders placed within a section of stream which forms a tributary of the Owendalulleegh River. The containment barrage is approximately 20m long and 3m wide at the surface.

#### 3.3.3.6 Repository Area at Black Road Bridge

The repository area at Black Road Bridge comprises two separate sections with a total area of 8,220m$^2$. The repository area at Black Road Bridge contains stored peat (up to 2m high), together with some soil/rock debris from the site of the peat slide. Both sections are heavily vegetated and are bunded. The repository area is fenced with post and wire fencing.

#### 3.3.3.7 Drainage diversion works.

As part of the works to stabilise the peat debris contained within the site of the peat slide a series of drains were constructed to allow excess water to effectively drain away. In addition, since the peat slide occurred, several natural flow paths have formed within the site of the peat slide because of the development of preferential flow paths following rainfall events.

#### 3.3.3.8 Repairs to bridges

The peat slide resulted in damage to three bridges downstream of the wind farm. Repairs were carried out to address structural stability and capacity concerns. The individual structures are identified below in order from upstream to downstream.

- **Black Road Bridge:** At Black Road Bridge structural repairs consisted of replacing the parapets of the bridge.
- **Flaggy Bridge:** At Flaggy Bridge on the R353, damaged parapets were repaired and replaced after the peat slide.
- **Unnamed Bridge C:** Damage to Unnamed Bridge C (privately owned) by the peat slide necessitated removal of the existing structure and re-construction of the entire bridge span.
- **Crooked Bridge:** Localised road widening was undertaken at Crooked Bridge on the R353, for a distance of approximately 30m on either side of the bridge (See Figure 4-1 – Chapter 4).

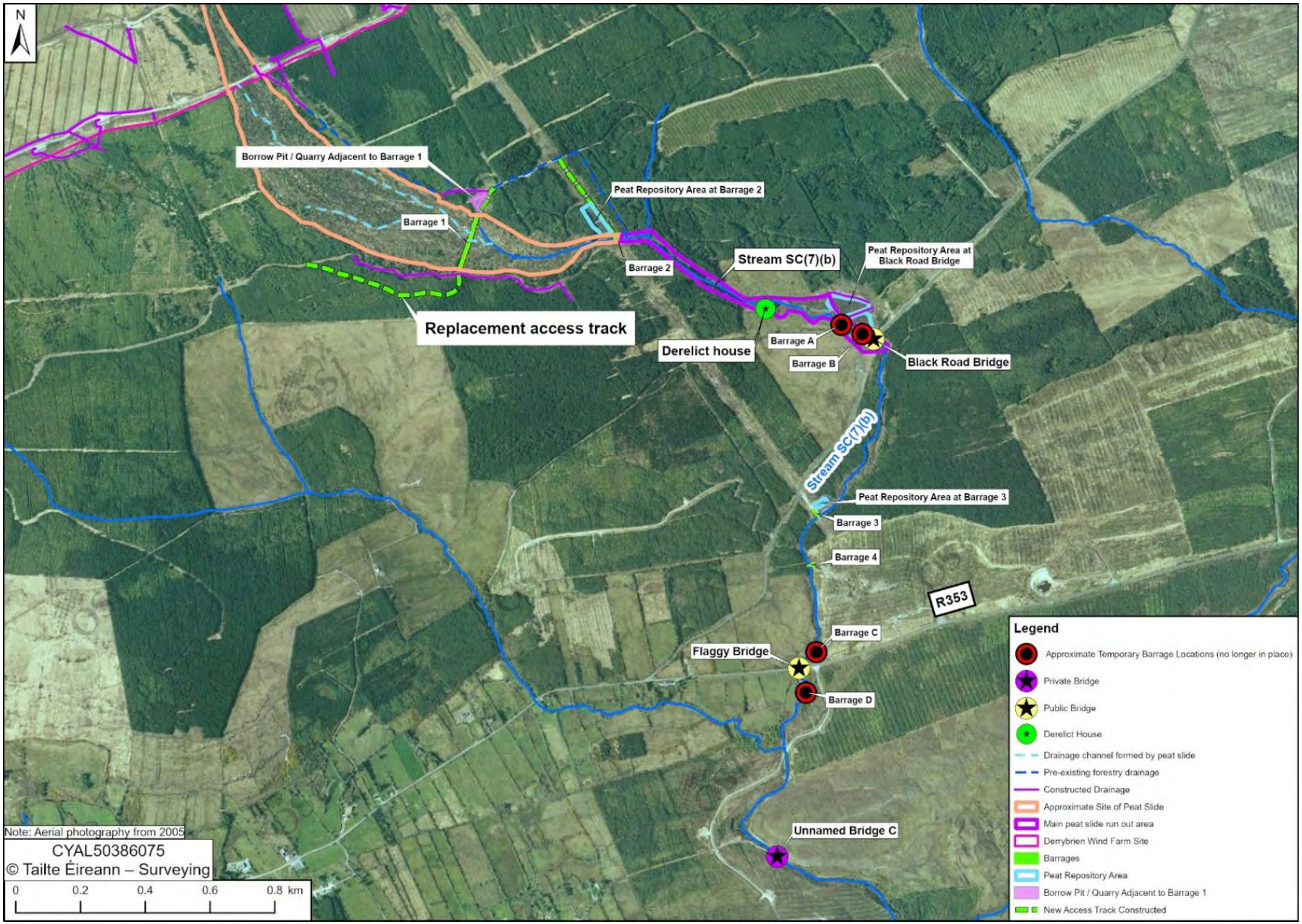



*Figure 3-4 Emergency works carried out as part of the peat slide (2003)*

# 3.4 Evaluation of Decommissioning Alternatives

The assessment of decommissioning alternatives for each "work area" was conducted in comparison to a "do-nothing" scenario. For the purposes of this assessment, the do-nothing scenario is Derrybrien Wind Farm Development remaining *in situ* in its current state – i.e., as an unauthorised windfarm development that ceased commercial electricity generation in February 2022.

Note: As an unauthorized development it is appropriate that the wind farm structures (Turbines) are decommissioned. For the purposes of this assessment, the loss of Derrybrien Wind Farm as a Material Asset that contributes clean renewable energy to the national grid has not been included in this assessment.

## 3.4.1 Work Area A: Derrybrien Wind Farm (including the Derrybrien 110kV Substation)

As described in detail in Section 3.3.1 – the infrastructure within Work Area A comprises c.17.5km of access tracks, 70no. turbines and adjacent crane hard standings, drainage channels, borrow pits/quarries, on site peat repositories, Derrybrien 110kV substation, c.25km of direct buried electric and communication cables and 2no. anemometer masts. The affected features within Work Area A are within private lands under the control of Gort Windfarms Ltd.

The four decommissioning alternatives considered for Work Area A are:

- Alternative 1 – Do Nothing.
- Alternative 2 - Remove all development which has taken place since 2003 including any emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding any emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration.'

Details of each alternative is provided in the sections below.

### 3.4.1.1 Alternative 1 - Do Nothing.

No decommissioning works would be undertaken as part of Alternative 1. The Derrybrien Wind Farm Development would not operate and there would be no commercial electricity generation at the site. All features within Work Area A would remain *in-situ* in their current condition. The infrastructure would continue to degrade over time.

A summary of the predicted effects of Alternative 1 when compared against the predefined sub-objectives are included in Table 3-2 and illustrated in Figure 3-5.

*Table 3-2 Summary of Predicted Effects of Alternative 1 (Work Area A).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | 0 | No change in employment opportunities for the local community. No effect to population and human health (employment) are anticipated (0). |
| Human Health (1B) | -2 | No change in the human health and risks to life in the local community is anticipated in the short term. Overtime the features within Work Area A would likely deteriorate, rendering the structures and buildings within the Derrybrien Wind Farm Development unsafe posing a significant adverse effects to human health for turbary plot holders in vicinity of the wind turbines (-2). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | -1 / +1 | Over time small areas of open heathland within Area A will gradually become more enclosed with self-sown conifers creating the potential for a slight to moderate negative impact on suitable foraging habitats for the hen harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) across the Derrybrien Wind Farm Development site (-1).<br><br>Overtime parts of the Derrybrien Wind Farm Development site may transition from open upland habitats to more enclosed habitats re-colonised by self-sown conifer trees. It is possible that this long-term re-vegetation of the site and the associated impedance of drainage over time may result in a slight to moderate positive effects on terrestrial habitats and some faunal species in the medium to long term (+1). |
| Aquatic Ecology & Fisheries (2B) | 0 | No effect to surface water quality/fish populations in nearby watercourse are envisaged (0). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing land use or site conditions envisaged (0). |
| Soils and Geology (3B) | 0 | The do-nothing alternative preserves the existing stable ground and groundwater conditions. No effect to Soils and Geology are envisaged (0). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | No interaction with current Hydrological regime therefore no effect to flood risk envisaged (0). |
| Groundwater (4B) | 0 | No interaction with hydrogeology therefore no effect to groundwater quality envisaged (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | 0 | No effect to air quality in the area envisaged (0). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | 0 | No effect to existing noise and vibration levelin the area envisaged (0). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | No disturbance to topsoil or peat therefore no effect to known heritage features envisaged (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | 0 | No change to current landscape therefore no effect on the landscape quality and visual amenity envisaged (0). |
| **Material Assets** | | |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| Material Assets (9A) | 0 | No change to existing material assets therefore no effect to existing material assets and infrastructure envisaged (0). |
| Traffic (9B) | 0 | No change to current traffic movement therefore no effect to Traffic in the area envisaged (0). |
| **Waste & Resource Management** | | |
| Waste (10A) | -1 | In the long term, the Derrybrien Wind Farm would continue to degrade overtime and significantly reduce the potential to reuse or recycle the wind turbine units/components elsewhere. As such, the Do-nothing alternative has the potential to have a moderate adverse effects through the creation of large quantities of waste that can only be managed using methods lower down the Waste Hierarchy (most likely disposal) (-1). |

Assessment was conducted in comparison to the Do-Nothing Scenario: +3 Very Significant / Profound positive effects , +2 Significant positive effects, +1 Slight to Moderate positive effects, 0 Neutral/ Imperceptible, -1 Slight to Moderate adverse effects, -2 Significant adverse effects , -3 Very Significant / Profound adverse effects.

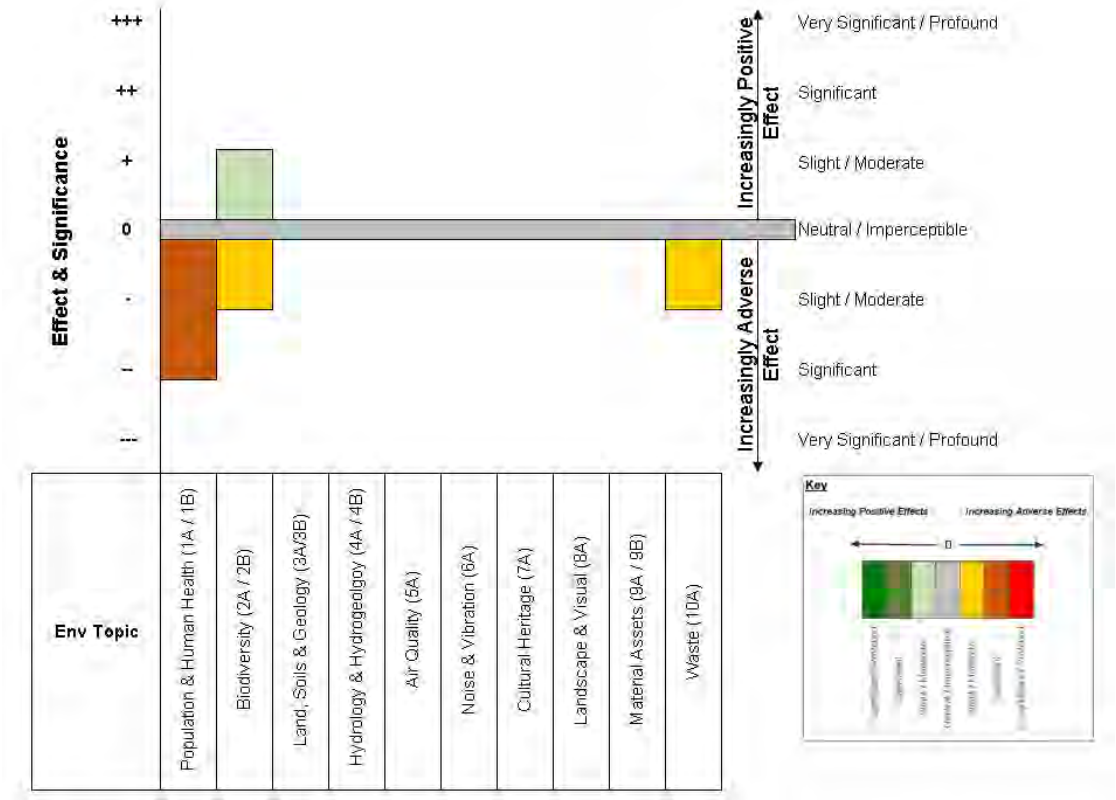



*Figure 3-5 Summary chart of Predicted Effects of Alternative 1 (Work Area A)*

Alternative 1 would not have an effect on the environment in the short term as no decommissioning works or would occur. However, in the long term there is potential to have a significant negative / adverse effect on Human Health and a slight to moderate negative / adverse effect on Biodiversity and Waste.

Alternative 1 does not facilitate the decommissioning of the Derrybrien Wind Farm and therefore is not considered to be a practicable alternative and is presented solely to provide context for the "do-something" alternatives which can deliver the project's required objectives.

### 3.4.1.2 Alternative 2 - Remove all development which has taken place since 2003 including any emergency works installed during the peat slide.

Alternative 2 includes the removal of all development at the Derrybrien Wind Farm which has taken place since 2003 including any emergency works installed during the peat slide. As illustrated in Figure 3-4 above, the emergency works installed during the peat slide include the reconstruction of the access tracks that were rendered unusable during the peat slide. The tracks are located within the windfarm site at Turbine 68 and between Turbine 23 and Turbine 70.

Works associated with Alternative 2 (Work Area A) is summarised below:

- Controlled dismantling and removal of 70no. wind turbines (blades, nacelle, and tower) including their reinforced concrete foundations. Backfilling of the open excavations with suitable source of glacial till and peat to blend the area into the surrounding blanket bog.
- Controlled dismantling and removal of Derrybrien 110kV Substation including any reinforced concrete foundations within the substation compound. Backfilling of the open excavations with suitable source of glacial till and peat to blend the area into the surrounding blanket bog.
- Controlled dismantling and removal of 2no. anemometer masts including their reinforced concrete foundations and backfilling of the open excavations with suitable source of glacial till and peat to blend the area into the surrounding blanket bog.
- Removal of de-energised underground Electrical and communication cables. *Note:* It is physically possible to remove the underground cables by excavating open trenches along the cable routes using low ground bearing pressure tracked excavators working directly on the peat. However, this is considered a high-risk activity with regards to peat stability.
- Excavation and removal of c.17.5km access tracks network within the Derrybrien Wind Farm Site including those reconstructed after the peat slide (T68 and between T23-T70). Subsequent regrading to to match adjoining areas.
- Excavation and removal of 70no. hardstand areas and re-profiling of the adjacent areas and covering with 0.5 -1.0m of vegetated peat to blend into the surrounding blanket bog.
- Removal of naturalised peat repositories area.
- Reinstatement of the 3no. Borrow Pits / queries through infilling with material from removed access tracks and hardstands.
- Site restoration works, subsequent landscaping and bog rehabilitation measures through active drain blocking (where feasible) is also included.

This alternative would involve significant civil engineering works to remove all development from the site. It is likely that demolition and removal of the concrete foundations and surface buildings would likely be carried out mechanically using hydraulic excavators, rock breakers and earthmoving transport vehicles similar to the equipment that was used during the project construction phase.

Removing the turbine foundations would involve open excavations to the underside of the large reinforced concrete pad foundations, typically 2.5 to 3.0m below existing ground level over an area of approximately 10m x 10m. The peat and glacial till around the perimeter of the excavation would have to be battered back to a stable temporary slope. In areas of deep very weak peat, temporary support in the form of rockfill berms may be required to support the peat. Hydraulic rock breakers would be required to break up the reinforced concrete foundations, which would generate steel and crushed concrete waste material that would need to be hauled off site along the existing access roads for recycling or disposal. The resulting open excavations for each turbine base would need to be backfilled with natural subsoil and peat in a manner that restored the site to its original condition,

insofar as was reasonably practicable, so that the turbine areas blended into the surrounding landscape and did not pose a risk to the stability of the existing peat on the site.

The hardstand areas were constructed using inert crushed rock granular fill that was processed from the bedrock in the borrow pits on the site or imported from nearby quarries. Therefore, removal of the hardstanding's would involve trimming the surface down, reprofiling it to the existing slope and covering it with 0.5-1.0m of vegetated acrotelm peat over an area of approximately 25x50m to match the profile of the surrounding ground.

A suitable source of glacial till subsoil and peat would need to be identified on site or in the general area to obtain sufficient material to backfill the large open excavations for the turbine foundations and to cover the adjacent re-profiled hardstanding areas with peat. This would result in heavy construction traffic loading on the floating access tracks on the site and on the site access roads up to the site. It would also have an impact on soils and geology at the source for the fill materials. The sourcing of peat from elsewhere to place over excavations at turbine foundations and hardstands would also create an area of de-graded natural bogland elsewhere (i.e at the source location of where it was taken from).Removing the existing floating access tracks on the site would involve the staged excavation of the crushed rockfill, plastic geogrid reinforcement and basal reinforcing layers of timber brash and trees using hydraulic excavators and large earthmoving vehicles. The vehicles and construction plant will need to operate on the floating access tracks during decommissioning. Therefore, the removal of tracks will need to be carried out in a staged progressive manner after the rest of the decommissioning works have been completed because it will restrict access across the site. The excavated inert engineered rockfill materials which were originally processed from the bedrock in the borrow pits on the site or imported from nearby quarries would be used to backfill the borrow pits. The timber (where possible to remove), plastic geogrids and excess inert engineered rockfill would have to be taken offsite along the existing access tracks to a suitable location for recycling or disposal.

Removal of the floating access tracks will result in a net unloading of the surcharge loads on the peat. However, the tracks have settled by up to 0.75-1.5m into the peat under the weight of the rockfill. Therefore, they will leave behind a strip of lower ground across the slopes which will be liable to flooding or accumulation of surface runoff.

The original peat repositories that were used for the controlled deposition and storage of the surplus peat that was excavated from the site of the turbines, crane hardstanding areas and substation site have also settled into the surface of the blanket bog on the site. The surface of the excavated peat has dried out and re-vegetated so that they blend into the surrounding bog. Therefore, removal of the 0.5-1.0m of peat in the repository areas will involve excavation of the vegetated surface and underlying remoulded peat with low ground bearing pressure (LGBP) and long-reach excavators and transporting this material along the site access tracks to a suitable deposition area. The excavation will leave an area of stripped vegetation and lowered ground over a wide area at each repository site which will be liable to flooding or accumulation of surface runoff. The excavated material could be used to reinstate the backfilled turbine base excavations and re-profiled adjacent crane hardstanding areas.

Reinstating the drains that were constructed for the windfarm will involve blocking and infilling the drains, where possible, which will result in a gradual rise in the groundwater level on the upper slopes of the mountain. This could lead to periodic flooding in low-lying areas on flat ground within the wind farm site, which will increase groundwater pressures on the network of natural drainage pipes in the peat.

Approximately 25km of electric and fibre-optic cables were direct laid in trenches across the site with ducts at road crossings and at the turbine foundations. These would have to be removed by winching from the crane hardstand's and by excavating trenches in the peat along the line of the cables between the turbines using low ground bearing pressure (LGBP) wide-tracked excavators. The excavated cables would be transported to a suitable facility offsite for recycling or disposal.

A breakdown of materials and estimated tonnages to be removed from site under Alternative 2 is provided in Table 3-3 below. It is estimated that a total of 356,528 tonnes of material would have to be removed from site to be managed in accordance with the applicable provisions of the Waste Management Act 1996 and associated regulations. This would result in the addition of approximately 35,653 truck movements to the local road network during decommissioning.

*Table 3-3 Alternative 2 - Estimated tonnages of material to be removed from Work Area A during decommissioning.*

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Waste Oil (Turbine Gearboxes) | Ton | 25.5 | <1% |
| Concrete | Ton | 13,395 | 4% |
| Concrete Bricks | Ton | 232.0 | <1% |
| Tiles and Ceramics | Ton | 6.0 | <1% |
| Wood | Ton | 6.7 | <1% |
| Plastics (Blades) | Ton | 700 | <1% |
| Plastics | Ton | 7.0 | <1% |
| Iron and Steel | Ton | 5,618.7 | 2% |
| Cables | Ton | 447 | <1% |
| Stone | Ton | 262,750 | 74% |
| Peat from repository areas | Ton | 73,340 | 21% |
| **Total** | **Ton** | **356,528** | |
| **Truck Movements** | **No** | **35653 (20 Tonne Trucks x 2)** | |

On completion all tracks and structures would be removed. The hardstand areas would be regraded with existing available material where possible. It is not proposed to replant the wind farm site with trees although natural regrowth of previously felled areas will likely continue. A summary of the predicted effects of Alternative 2 is provided in Table 3-4 and illustrated in Figure 3-6.

*Table 3-4 Summary of Predicted Effects of Alternative 2 (Work Area A).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | +1 | Alternative 2 would likely have a slight to moderate positive effect on the local economy through the creation of temporary employment for the duration of the decommissioning works (+1). |
| Human Health (1B) | -2 / +1 | Alternative 2 would likely have a significant adverse effect on human health as a result of short to medium term disturbance and nuisance impacts brought about by high volumes of traffic movements, traffic congestion, emissions to air and noise for the duration of the decommissioning works (-2).<br><br>The following turbines are located along the turbary access road: T28, T31, T34, T37 and T40. During decommissioning there will likely be a need for temporary restrictions to users of the turbary area. These precautionary restrictions would likely have a short-term temporary adverse effects to turbary users but will result in slight to moderate improvements to human health by minimising risk (+1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | -1 /+1 | Alternative 2 has the potential to have a slight to moderate adverse effect on terrestrial ecology through temporary loss and/or |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | degradation of habitat and disturbance and displacement of terrestrial fauna for the duration of the works) (-1).<br><br>Alternative 2 will likely result in temporary slight to moderate negative / adverse effects during decommissioning on roosting bats through disturbance and loss of a roost of local significance located in the Derrybrien Substation. The installation of pole-mounted bat boxes would be installed to mitigate this loss and allow the species to reestablish in the short term (-1).<br><br>The peat rehabilitation works proposed have the potential to result in slight to moderate positive effects on the terrestrial ecology through habitat creation/improvement from active drain blocking and reprofiling (+1). However, over time some areas of open heathland within the wind farm site will gradually become more enclosed with self-sown conifers creating the potential for a slight to moderate adverse effects on suitable foraging habitats for the hen harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) (-1). |
| Aquatic Ecology & Fisheries (2B) | -2 | The significant amount of civil works proposed have the potential to cause the displacement of large amounts of soil and fine sediments. Under wet conditions disturbed sediment could be mobilised (bypassing installed mitigation measures) and accidentally release into a nearby water course causing temporary significant adverse effects to water quality, aquatic and fisheries (-2). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | -2 | Alternative 2 would likely have a significant adverse effects on the local land uses practices within the wind farm site. The active drain blocking would increase the saturation levels within the blanket bog encouraging suitable hydrological conditions for the development of fens and bog habitats changing the land use from drained blanket peatland to a wetland habitat restricting the turbary activities onsite (-2).<br>Removal of the site access tracks within the wind farm would also restrict vehicular access to parts of the site used for turbary activity, which will likely have a significant adverse effect within the wind farm area (-2). |
| Soils and Geology (3B) | +1/-3 | Removal of the peat repository sites and floating access tracks on the peat would have a slight to moderate positive effect on peat stability insofar as it will reduce existing surcharge loads on the peat slopes (+1).<br><br>It is considered that removal of all of the above-ground elements of the windfarm infrastructure will involve a negligible to slight effects on peat stability. The turbines will be dismantled using mobile cranes operating on the adjacent hardstand areas, which are constructed on the glacial till below the peat and designed for the crane loads. The floating access tracks will also be used by the cranes moving between turbines and by trucks and low-loaders to transport the heavy components from the turbines and substation along designated routes where the capacity and performance of the tracks has been proven by proof load testing. In general, the works will involve a significantly lower level of heavy plant and machinery movements across the site. There will be no excavations in peat, and minimal work directly on the surface of the peat (-1). |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | However, when considering in combination, the works to remove at and below ground element have the potential to have very significant/profound adverse effects on soils and peat stability for the following reasons (-3):<br>› Removal of the site access tracks will involve intensive earthworks operations, excavations and movements of fully laden heavy earthmoving trucks across the floating access tracks of a similar level to the original construction.<br>› The floating access tracks and peat repository sites have settled into the existing ground as the peat compressed under the applied surcharge loads. Therefore, removal of the tracks will leave open trenches about 5.0m wide and 0.5-1.5m deep across the peat slopes, and removal of the excavated peat from the repository areas will leave an open pit 0.5-1.0m deep over a wide area. These open areas will be prone to flooding from groundwater and ponded surface water, which could have a significant negative / adverse effect on peat stability.<br>› The vegetation that has regenerated on the surface of the peat repository areas will be stripped over a wide area if the deposited peat is removed, which will have a slight to moderate negative / adverse effect on the degraded blanket bog.<br>› Removal of the peat deposited in the repository areas will involve intensive operations from wide tracked excavators and long-reach excavators operating directly on the peat and adjacent floating access tracks. Disposal of peat will involve double handling the excavated peat across the bog with temporary surcharge loading on the peat.<br>› Removal of the below ground elements of the turbine foundations and reinstating the crane hardstand areas will have a very significant negative / adverse effect on soils and peat stability because it will involve large deep excavations in the peat and glacial subsoils as well as intensive earthworks, hydraulic breaking of reinforced concrete, and frequent movements of fully laden heavy earthmoving trucks across the floating access tracks of a similar level to the original construction. There would also be a slight to moderate impact on the peat at the source of the peat and glacial subsoil that will be required to backfill and reinstate the turbine foundation excavations and adjacent re-profiled hardstand areas.<br>› Removal of the approximately 25km of below-ground LV aluminium electrical cables and fibre-optic control cables by opening trenches across the blanket bog with wide tracked excavators will likely have a very significant negative / adverse effect on peat stability as it will involve surcharge loading on the peat and temporary side casting of the excavated materials from shallow excavations. It would also reduce the integrity of the regenerated surface vegetated peat along the line of the trenches.<br>› Blocking and infilling of the drains that were constructed for the windfarm could have a moderate to significant negative / adverse effect on peat stability if it results in localised flooding and ponding of surface runoff in areas where there is an elevated risk of peat instability due to natural conditions on the site such as zones of deep peat at convex breaks in slope directly upslope from natural watercourses where there is evidence of concentrated subsurface drainage. |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | -1 | Intact bogland has the capacity to store vast amounts of water. Under certain conditions bog rehabilitation measures and active drain blocking/reprofiling has the potential to have a slight to moderate positive effect to hydrology in the long term through the natural retention of water in upstream catchments. In the case of Derrybrien, poor drainage is a contributory risk factor for peat instability. The removal of the drainage network and active drain blocking would likely alter the current regime which has the potential to have a slight to moderate increase flood risk resulting in localised flooding within the wind farm site (-1). |
| Groundwater (4B) | 0 | No interaction with hydrogeology therefore no effect to groundwater quality is anticipated (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | -2 | Considering the volume of civil works, it is likely that there will be significant and temporary adverse effect to air quality in the local area during decommissioning through increase increased emissions to air (dust/vehicle emissions) from extensive decommissioning activities, demolition of reinforce concrete bases, removal of soil and increased traffic movements to and from the Derrybrien wind farm site (-2). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | -2 | Alternative 2 has the potential to result in significant and temporary adverse effects to the local community through increases in noise and vibration levels resulting in infrequent exceedances to relevant construction noise and vibration thresholds (-2). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | +1/-1 | Due to the level of ground disturbance, there is potential for slight to moderate adverse effects and positive effects through loss or damage/ discovery of undiscovered archaeology of significance (+1/-1). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | -1 | Alternative 2 has the potential to have slight to moderate short term temporary adverse effects on local views and local landscape. Landscape effects are anticipated due to site works i.e. vegetation clearance, earthworks, removal of site elements and movement of machinery to and from the site and environs. Visual effects of the decommissioning would be related primarily to movement of machinery and visibility of structures being dismantled from public roads (-1). |
| **Material Assets** | | |
| Material Assets (9A) | -2 | Alternative 2 reinstatement works and bog rehabilitation measures have the potential to have a significant adverse effects on the local blanket bog areas through potential alterations to the current hydrologic regime and peat stability. The change to the hydrology has the potential to result in a permanent loss to blanket bog areas that are used for turbary (-2).<br><br>The removal and of all internal tracks within the Derrybrien Wind Farm also have the potential to result in a significant adverse effects on persons using the site for turbary or recreational activities (walking etc) (-2).<br><br>The decommissioning works will have a temporary slight to moderate adverse effects on Telecoms through the removal of the power |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | supply to the third-party mast located within the Derrybrien Wind Farm (-1).<br><br>The significant increase in traffic movements would likely result in a significant adverse effect to the local and regional road networks (-2). |
| Traffic (9B) | -3 | The decommissioning and removal of all features on the wind farm will likely result in a very significant adverse effect on traffic for the duration of the works. In addition to plant and personal commuting to and from site, the traffic volumes to remove all features and C&D material would require an estimated total of 35,653 truck movements causing frequent delays to traffic movements within the local community. |
| **Waste & Resource Management** | | |
| Waste (10A) | -3 | Alternative 2 would likely have a very significant adverse effect on waste as the majority of material removed from site would be disposed of using methods lower down the waste hierarchy.<br><br>It is likely that 94% of material (Stone and Peat) would be removed from site and sent to landfill. |

Assessment was conducted in comparison to the Do-Nothing Scenario: +3 Very Significant / Profound positive effects , +2 Significant positive effects, +1 Slight to Moderate positive effects, 0 Neutral/ Imperceptible, -1 Slight to Moderate adverse effects, -2 Significant adverse effects , -3 Very Significant / Profound adverse effects.

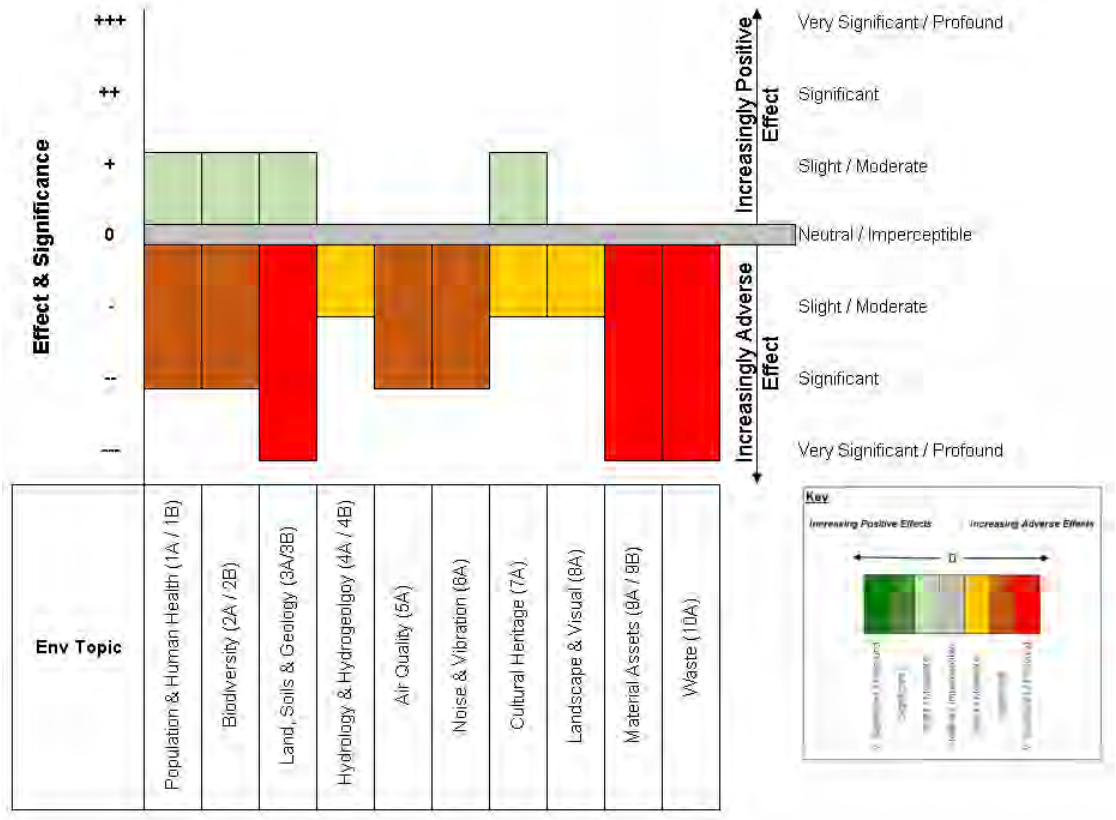



*Figure 3-6 Summary chart of Predicted Effects of Alternative 2 (Work Area A) when compared to the Do-Nothing scenario.*

Alternative 2 would achieve the removal of all features and structures within work Area A and also facilitates a high level of restoration on the site – although the ability to restore it to pre-development conditions is highly implausible. Given the high level of ground disturbance required and the potential

to give rise to very significant / profound adverse effects to the environment, this alternative carries significant environmental risks. This alternative does not minimise or avoid all potential significant engineering and environmental risks impacting key environmental factors including site stability and potential for peat slides. As such Alternative 2 is not considered to be a practicable alternative.

### 3.4.1.3 Alternative 3 - Remove all development which has taken place since 2003 excluding any emergency works installed during the peat slide.

Alternative 3 includes the removal of all development at the Derrybrien Wind Farm which has taken place since 2003, excluding any emergency works installed during the peat slide. As outlined in Section 3.3.1.9 there was a requirement to rebuild two access tracks within the wind farm at T68 and T23-77. As illustrated in Figure 3-7, the predicted effects associated with Alternative 3 is expected to be the same as Alternative 2.

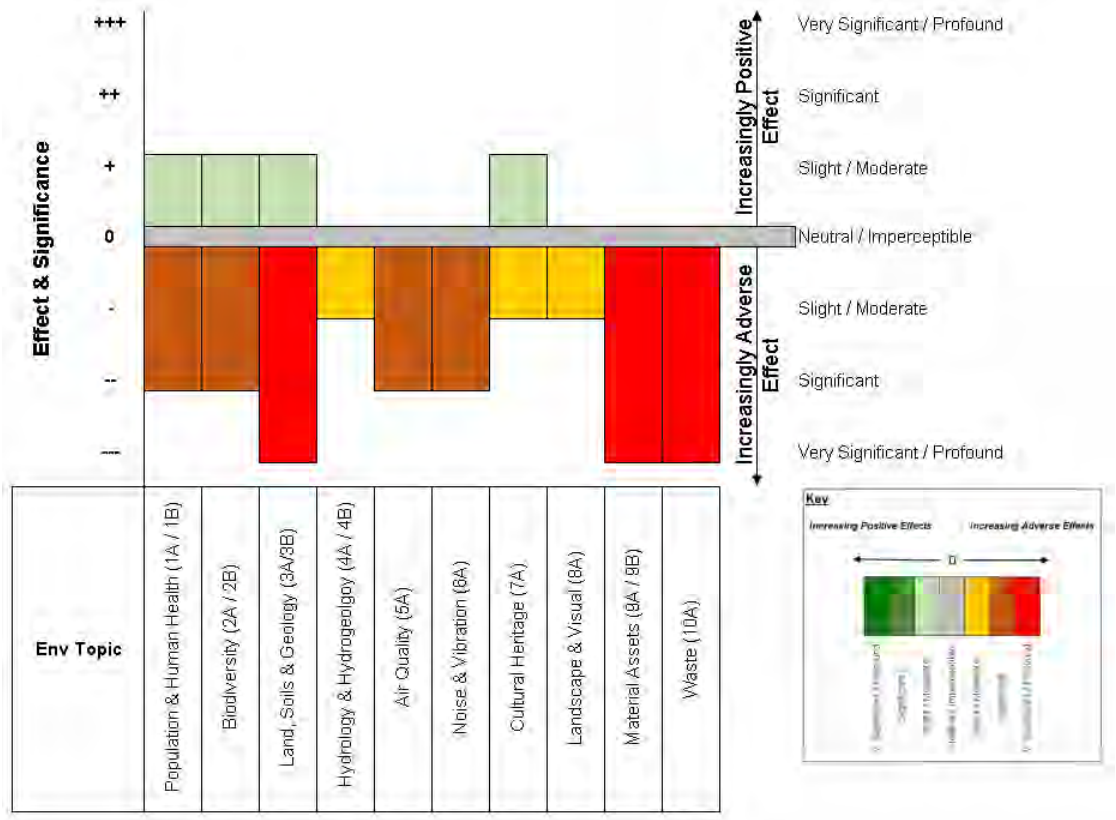



*Figure 3-7 Summary chart of Predicted Effects of Alternative 3 (Work Area A) when compared to the Do-Nothing scenario.*

Per Alternative 2, this alternative would achieve the removal of structures and a high level of restoration on the site, although the ability to restore the site to pre-development conditions is highly implausible. Given the high level of ground disturbance required and the potential to give rise to very significant / profound adverse effects to the environment. This alternative does not minimise or avoid all potential significant engineering and environmental risks impacting key environmental factors including site stability and potential for peat slides. As such Alternative 3 is not considered a practicable alternative.

### 3.4.1.4 Alternative 4 - Practicable Restoration.

Alternative 4 'practicable restoration' includes the removal of the above ground structures and buildings only, leaving the wind turbine foundations, underground cables, meteorological mast

foundations and substation foundations in situ. Any protruding foundations or structures will be cut to below ground level and infilled and regraded to match adjoining areas. Works can be confined to areas within the control of Gort Windfarms Ltd.

The decommissioning works associated with this alternative is considered typical of the industry norm in respect of windfarm decommissioning and includes the following works:

- Construction of temporary works compound.
- Vegetation/scrub clearance and minor levelling works at existing hardstand areas and access tracks to create a safe working environment for the decommissioning works.
- Minor Improvements and upgrades to existing forestry access roads.
- De-energising of the site which will involve the disconnection of the turbines. Low Voltage (LV) followed by disconnection of high voltage elements.
- Controlled dismantling and removal of 70 No. turbines (blades, nacelle, and tower) and 2 No. anemometer lattice masts.
- Controlled removal of Derrybrien Substation and demolition of substation building.

Due to the significant risks associated with peat stability, no bog rehabilitation measures, or active drain blocking would occur and the existing drainage network would be left to naturally rehabilitate over time. Access tracks, borrow pits, onsite peat repositories and hardstands would be left in place. No replanting of forest would occur although some natural revegetation would be likely.

A breakdown of materials and estimated tonnages of material to be removed from site under Alternative 4 is provided in Table 3-5 below. It is estimated that a total of 6,596 tonnes of material would have to be removed from site to be managed in accordance with the applicable provisions of the Waste Management Act 1996. This would result in the addition of approximately 660 truck movements to the local road network.

*Table 3-5 Alternative 4 - Estimated tonnages of material to be removed from Work Area A during decommissioning.*

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Waste Oil (Turbine Gearboxes) | Ton | 25.48 | <1% |
| Concrete | Ton | 0 | 0 |
| Concrete Bricks | Ton | 232 | 4% |
| Tiles and Ceramics | Ton | 6 | <1% |
| Wood | Ton | 6.97 | <1% |
| Plastics (Blades) | Ton | 700 | 11% |
| Plastics | Ton | 7.00 | <1% |
| Iron and Steel | Ton | 5,618.7 | 85% |
| Cables | Ton | 0 | 0 |
| Stone | Ton | 0 | 0 |
| Peat from repository areas | Ton | 0 | 0 |
| **Total** | **Ton** | **6,596** | |
| **Truck Movements** | **No** | **660** ***(20 Tonne Trucks x 2)*** | |

On completion of the works, the Work Area A would be free of all above ground structures and buildings and electrical installations. The following at and below ground features would remain in situ in perpetuity:

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundation of structures and buildings within the Derrybrien Substation compound.

- Reinforced concrete foundations of 2no. Anemometer masts.
- Approx. 17.5km of access tracks and hardstand areas.
- Underground Electrical and communications cabling.
- 3no. Borrow Pits / Quarries.
- Naturalised Peat Repository areas.
- Onsite Drainage Infrastructure.

A summary of the predicted effects associated with Alternative 4 is provided in Table 3-6 and illustrated in Figure 3-8 below.

*Table 3-6 Summary of Predicted Effects of Alternative 4 (Work Area A).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | +1 | Alternative 4 would likely have a slight to moderate positive effect on the local economy through the creation of temporary employment for the duration of the decommissioning works (+1). |
| Human Health (1B) | -1 / +1 | Alternative 4 would likely have a slight to moderate adverse effect on Human Health as a result of very temporary disturbance and nuisance impacts to the local community from temporary traffic congestion, emissions to air and noise (-1).<br><br>The following turbines are located along the Turbary access road: T28, T31, T34, T37 and T40. During decommissioning there will likely be a need for precautionary and temporary restrictions to users of the turbary road for the purposes of Health & Safety. This precautionary restriction would likely have a slight short-term temporary adverse effect to turbary users (-1) but will result in slight to moderate positive improvements to human health by minimising potential risks (+1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | -1 / +1 | Alternative 4 has the potential to have a slight to moderate adverse effect on terrestrial ecology through temporary loss and/or degradation of habitat and disturbance and displacement of terrestrial fauna for the duration of the works (-1).<br><br>Alternative 4 will likely result in temporary slight to moderate adverse effect during decommissioning on roosting bats through disturbance and loss of a roost of local significance (in the Derrybrien Substation). The installation of pole-mounted bat boxes would be installed to mitigate this loss and allow the species to reestablish in the short term (-1).<br><br>Over time, the retained hardstands and tracks will become sparsely vegetated providing useful habitat for small birds and insects, which in turn may attract hunting hen harrier and kestrels. Hen harrier often like to hunt along linear features such as the edge of roads. The retained tracks will have a slight positive effect through the creation of this this feature on site. In addition, red grouse often use dry road surfaces to pick up grit, which aids their digestion, and also dust bathe. The retained tracks may also provide useful habitat for red grouse in the locality (+1).<br><br>Over time some areas of open heathland may gradually become more enclosed with self-sown conifers creating the potential for a slight to moderate adverse effect on suitable foraging habitats for the for-hen harrier (a special conservation bird species of the Slieve Aughty |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | Mountains SPA) across parts of the Derrybrien Wind Farm Development site (-1). |
| Aquatic Ecology & Fisheries (2B) | -1 | Alternative 4 minimises the level of ground disturbance and therefore reduces the potential to cause the displacement of large volumes of soil which under wet conditions could be accidentally released into a nearby watercourse. However, the potential for slight to moderate adverse effects to water quality aquatic and fisheries as a result of mobilised (bypassing installed mitigation measures) and accidentally release into a nearby water course causing temporary effects to water quality, aquatic and fisheries still exists (-1). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to current land use therefore no effect to Local Land Practices are anticipated (0). |
| Soils and Geology (3B) | -1 | It is considered that removal of only the above-ground elements of the windfarm infrastructure and associated buildings will have a a negligible to slight adverse effect on peat stability (-1).<br><br>The turbines will be dismantled using mobile cranes operating on the adjacent hardstand areas, which are constructed on the glacial till below the peat and designed for the crane loads. The floating access tracks will also be used by the cranes moving between turbines and by trucks and low-loaders to transport the heavy components from the turbines and substation along designated routes where the capacity and performance of the tracks has been proven by proof load testing. In general, the works will involve a low level of heavy plant and machinery movements across the site. There will be no excavations in peat, and minimal work directly on the surface of the peat.<br><br>The reinforced concrete turbine foundations are supported on rock or on lean mix and rock structural fill down to rock below the peat and glacial till so that they do not apply any load on the peat. After the turbines are removed there will be no loading on the foundations. Therefore, if they are left in place below ground there will be a negligible negative residual impact on soils, geology or peat stability.<br><br>The hardstand areas adjacent to the turbines and at the substation site are constructed of crushed rock granular rockfill supported on the glacial till or rock below the peat. They do not apply any load on the peat and the residual negative impact on the stability of the underlying glacial till or rock will also be negligible.<br><br>After decommissioning the crane hardstands and reinforced concrete turbine pad foundations will act as a shear key preventing shear failure in the peat directly upslope from them, which is a slight positive impact with respect to site stability.<br><br>All of the existing floating access tracks sites will be left in place on the slopes, which will provide continued access across the site. The peat under the tracks has compressed and increased in strength since they were constructed, and all of the tracks have been proof tested to the design crane load to verify their capacity. Therefore, there will be a negligible residual negative impact on peat stability if they are left in place after decommissioning.<br><br>All of the peat repository sites are located on flat to gently sloping ground where there was a low risk of peat instability. Geotechnical |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | investigations and stability analyses were carried out during construction to confirm that there was an acceptable margin of safety against shear failure in the peat under the applied surcharge loads. The highest risk with respect to peat instability was during construction when the excavated material was placed on the slopes. The risk has since reduced as the peat has settled and gained in strength under the applied surcharge loads so that there will be a negligible residual negative impact on peat stability if the repository sites are left in place after decommissioning.<br><br>If all of the windfarm drains are left in place after decommissioning it will preserve the capacity of the existing drainage system, which will have a negligible impact on peat stability. Over time the capacity and efficiency of the system could reduce if the drains start to become clogged with vegetation. No significant work has been required to maintain the drainage system over the last number of years. Therefore, any changes to the system are expected to occur slowly over time, which will give the peat habitat the opportunity to adapt to any gradual changes to the hydrological and hydrogeological conditions on the site. This will have a slight adverse effect on peat stability relative to the current baseline condition However, the long-term likelihood of a peat slide due to the potential reduction in the efficiency and capacity of the drainage system would still be very low. |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | The existing network of open drains and culverts across the site will remain in service until the windfarm is decommissioned and then they will be left in place at the end of decommissioning. Alternative 4 would not involve any disturbance or alteration to local water courses or instream works of any kind. No effect to Hydrology and Flood Risk is anticipated (0). |
| Groundwater (4B) | 0 | No interaction with with hydrogeology therefore no effect to groundwater is anticipated (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | -1 | There is potential for slight temporary adverse effects to air quality in the local area during decommissioning through increase increased emissions to air (dust/vehicle emissions) from decommissioning activities and increased traffic movements to and from the Derrybrien Wind Farm Development site (-1). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | -1 | There is potential for slight temporary adverse effects to baseline noise and vibration levels as a result of the decommissioning works but its is unlikely to impact on the local community (-1). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | Alternative 4 will require no disturbance of intact peatland of any kind and therefore there is no potential to adversely affect any undiscovered features of cultural heritage significance. No effect to Cultural Heritage is anticipated (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | -1 | Alternative 4 has the potential to have slight short term temporary adverse effect on local views and local landscape. Temporary landscape effects are anticipated due to site works such as vegetation clearance, removal of site elements and movement of machinery to |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | and from the site and environs. Alternative 4 poses minimal ground disturbance. Visual effects of the decommissioning would be related primarily to movement of machinery and visibility of structures being dismantled from public roads (-1). |
| **Material Assets** | | |
| Material Assets (9A) | -1 | The decommissioning works will have a temporary slight to moderate adverse effect on the Telecoms through the removal of the power supply to the third-party mast located within the Derrybrien Wind Farm (-1).<br><br>The temporary increase in traffic movements would likely result in a slight to moderate adverse effects to the local and regional road networks (-1). |
| Traffic (9B) | -1 | Alternative 4 has the potential to result in a slight adverse effect on traffic for the duration of the works. In addition to plant and personal commuting to and from site, the traffic volumes to remove all above ground features and C&D material would require an estimated total of 660 truck movements which is unlikely to impact on traffic movements within the local community. |
| **Waste & Resource Management** | | |
| Waste (10A) | +1 | Alternative 4 would likely have a very slight to moderate positive negative impact on waste. It is estimated a total of 6,596 tonnes of material would be removed from site. Under Alternative 4, It is thought that the majority of material (96%) generated on site could be reused or recycled. |

Assessment was conducted in comparison to the Do-Nothing Scenario: +3 Very Significant / Profound positive effects , +2 Significant positive effects, +1 Slight to Moderate positive effects, 0 Neutral/ Imperceptible, -1 Slight to Moderate adverse effects, -2 Significant adverse effects , -3 Very Significant / Profound adverse effects.

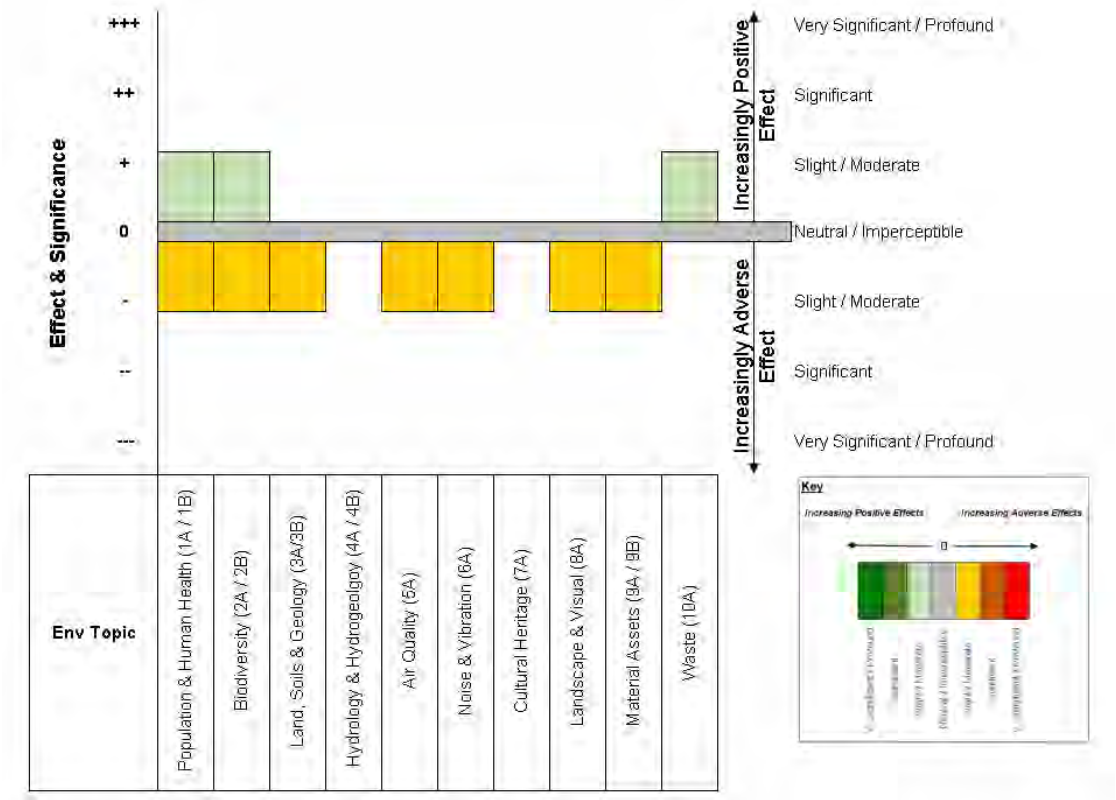



*Figure 3-8 Summary chart of Predicted effects of Alternative 4 (Work Area A) when compared to the Do-Nothing scenario.*

Alternative 4 facilitates the decommissioning, dismantling and removal of all above ground structures and buildings within the Derrybrien Wind Farm Development. Any disturbed ground would be regraded to match adjacent areas. Thereby achieving a level of restoration across the site.

This alternative reduces the level of ground disturbance as a means of lowering the geotechnical risk. This alternative minimises the duration of decommissioning activities which in turn minimises the potential effects on the environment in general. However, there are still potential for adverse effects impacts when compared to the Do-nothing scenario including:

- Slight temporary positive effect to Population and Human Health, Biodiversity and Waste.
- Slight temporary adverse effect to Population and Human Health, Land Soils and Geology, Air Quality, Noise and Vibration, Landscape and Visual and Material Assets.
- Slight long-term adverse effect on the Biodiversity.

This alternative is practicable from engineering point of view and minimises or avoids all potential risks to key environmental receptors. All works can be confined to land under the control of Gort Wind Farms Ltd. Alternative 4 represents a reduction in the potential effects to the environment when compared to Alternative 2 and 3. As such it is considered that Alternative 4 is most favourable compared to the other alternatives.

### 3.4.1.5 Assessment of Alternatives (Work Area A)

A comparison of the alternatives considered for Work Area A: Derrybrien Wind Farm including the Derrybrien 110kV Substation is provided in Table 3-7 below.

The Do-Nothing Scenario (Alternative 1) would not result in any adverse effects on the environment in the short term. However, in the medium to long term, Alternative 1 has the potential to have slight to

moderate adverse effects on Biodiversity through the naturalisation of the site resulting in a slight reduction in suitable habitat for Hen Harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) and; a significant adverse effect on Human Health through the deterioration of onsite infrastructure rendering the Derrybrien Wind Farm Development unsafe and posing risk to human health for turbary plot holders in vicinity of the turbines. Alternative 1 does not facilitate the decommissioning of the Derrybrien Wind Farm Development and therefore is not considered to be a practicable alternative and is presented to provide context for "do-something" alternatives which can deliver the project's required objective.

Alternatives 2, 3 and 4 facilitates the decommissioning of the Derrybrien Wind Farm Development and eliminates the risk to human health caused by deteriorating infrastructure over time. However, the degree or extent in which the features within Work Area A are removed has the potential to result in Slight to Very Significant / Profound Negative effects.

Alternative 2 and 3 were found to have similar levels of potential adverse effects. In addition to the very significant/profound adverse effects to ground stability, Alternatives 2&3 would likely give rise to very significant adverse effects to waste and traffic as a result of removing large volumes of site material for disposal at landfill – a comparison of material to be removed and estimated traffic volumes is provided in Table 3-8.

Alternatives 2 & 3 also have the potential to have significant adverse effects on Biodiversity, Local Land Practices, Air Quality, Noise and Vibration as a result of extensive ground and civil works site restoration and subsequent landscaping and bog rehabilitation measures through active drain blocking. When compared to the project sub-objectives Alternatives 2 & 3 carries significant environmental risks. Although these alternatives facilitate the decommissioning of the wind farm features, they do not avoid or minimise environmental effects and therefore are not considered to be practicable.

Taking account of the significant adverse effects associated with Alternatives 1-3, Alternative 4 aims to minimise ground and civil works across the site and thus ensures a reduction in the potential environmental effects. For example, by leaving the roads, hardstands, bases, cables etc in situ there is a 98% reduction in waste and traffic generation (Table 3-8) thus reducing the effects from very significant /profound adverse effects(Alternative 2&3) to slight to moderate (Alternative 4). The potential for significant adverse effects on soils and geology and the increased risk of further peat instability at the wind farm site is also reduced to slight to moderate.

Given the reduction in environmental effects, the preferred option for Work Area A is Alternative 4 – Practical Restoration. This alternative is unlikely to give rise to significant adverse effects on the environment.

*Table 3-7 Comparison of Alternatives Considered (Work Area A)*

| Environmental Topic (Sub-objective) | | Degree of Potential Effects and Significance | | | |
|---|---|---|---|---|---|
| | | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Population & Human Health** | Employment (1A) | 0 | +1 | +1 | +1 |
| | Human Health (1B) | -2 | -2 / +1 | -2 / +1 | -1 / +1 |
| **Biodiversity** | Terrestrial Ecology (2A) | -1 / +1 | -1 / +1 | -1 / +1 | -1 / +1 |
| | Aquatic Ecology & Fisheries (2B) | 0 | -2 | -2 | -1 |
| **Land, Soils & Geology** | Local Land Practices (3A) | 0 | -2 | -2 | 0 |
| | Soils and Geology (3B) | 0 | -3 / +1 | -3 / +1 | -1 |
| | Flood Risk Management (4A) | 0 | -1 | -1 | 0 |

| Environmental Topic (Sub-objective) | | Degree of Potential Effects and Significance | | | |
|---|---|---|---|---|---|
| | | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Hydrology & Hydrogeology** | Groundwater (4B) | 0 | 0 | 0 | 0 |
| **Air Quality** | Air Quality (5A) | 0 | -2 | -2 | -1 |
| **Noise & Vibration** | Noise & Vibration (6A) | 0 | -2 | -2 | -1 |
| **Cultural Heritage** | Cultural Heritage (7A) | 0 | -1 +1 | -1 +1 | 0 |
| **Landscape & Visual** | Landscape & Visual (8A) | 0 | -1 | -1 | -1 |
| **Material Assets** | Material Assets (9A) | 0 | -2 | -2 | -1 |
| | Traffic (9B) | 0 | -3 | -3 | -1 |
| **Waste & Resource Management** | Waste (10A) | -1 | -3 | -3 | +1 |

*Table 3-8 Estimated tonnages of material to be removed from Work Area A during decommissioning (Alternative 1-4)*

| Description | Unit | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|---|
| Waste Oil | Ton | 0 | 25.48 | 25.48 | 25.48 |
| Concrete | Ton | 0 | 13,395 | 13,395 | 0 |
| Concrete Bricks | Ton | 0 | 232 | 232 | 232 |
| Tiles and Ceramics | Ton | 0 | 6 | 6 | 6 |
| Wood | Ton | 0 | 6.97 | 6.97 | 6.97 |
| Plastics (Blades) | Ton | 0 | 700 | 700 | 700 |
| Plastics | Ton | 0 | 7 | 7 | 7 |
| Creosote Treated Poles | Ton | 0 | 0 | 0 | 0 |
| Iron and Steel | Ton | 0 | 5,618.70 | 5,618.70 | 5,618.70 |
| Cables | Ton | 0 | 447 | 447 | 0 |
| Stone | Ton | 0 | 262,750 | 262,750 | 0 |
| Peat from repository areas | Ton | 0 | 73,340 | 73,340 | 0 |
| **Total Volume** | **Ton** | **0** | **356,528** | **356,528** | **6,596** |
| **Vehicle Movement (2 way)** | **No.** | **0** | **35,653** | **35,653** | **660** |

### 3.4.2 Work Area B: Derrybrien to Agannygal 110 kV OHL including Agannygal 110kV Substation.

As described in detail in Section 3.3.2 – the infrastructure within Work Area B comprises: c. 7.8 km 110 kV conductor, 34 no. double wood pole structures, 2 no. end masts, 6 no. angle masts and 1 no. intermediate mast and the Agannygal 110kV substation and all associated auxiliary components. There are no features associated with the emergency works installed during the peat slide. The affected features within Work Area B are within private lands under the control of Gort Windfarms Ltd. The four decommissioning alternatives considered for Work Area B are:

- Alternative 1 – Do Nothing.
- Alternative 2 - Remove all development which has taken place since 2003 including any emergency works installed during the peat slide.

- Alternative 3 - Remove all development which has taken place since 2003 excluding any emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration.'

Details of each alternative is provided in the sections below.

#### 3.4.2.1 Alternative 1 – Do Nothing.

No decommissioning works would be undertaken as part of Alternative 1. The features within Works Area B (Derrybrien Wind Farm Grid Connection and Agannygal Substation) would remain *in-situ* in their current condition. The infrastructure would continue to degrade over time.

A summary of the predicted effects of Alternative 1 when compared against the predefined sub-objectives are included in

Table 3-9 and illustrated in Figure 3-9.

*Table 3-9 Summary of Predicted Effects of Alternative 1 (Work Area B).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | 0 | No change to current employment opportunities for the local community therefore no effect to Population and Human Health (0). |
| Human Health (1B) | -1 | No change in the human health and risks to life in the local community. In the long term, the OHL would likely deteriorate in the medium to long term creating the potential for slight to moderate adverse effects to human health for landowners in the vicinity of the overhead line infrastructure (-1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | -1 | Over time some areas of the OHL may gradually become more enclosed with self-sown conifers creating the potential for a slight to moderate negative impact on suitable foraging habitats for the hen harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) across parts of the Derrybrien Wind Farm Development site (-1). |
| Aquatic Ecology & Fisheries (2B) | 0 | No effects to surface water quality/fish populations in nearby watercourse envisaged (0). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing land use or site conditions envisaged therefore no effects to local land practices envisaged (0). |
| Soils and Geology (3B) | 0 | Alternative preserves the existing stable ground and groundwater conditions thereforeno effects to Soils and Geology are anticipated (0). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | No change in existing Hydrological regime therefore no effects to flood risk envisaged (0). |
| Groundwater (4B) | 0 | No interaction with hydrogeology therefore no effects groundwater quality envisaged (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | 0 | No changes to air quality in the area envisaged (0). |
| **Noise & Vibration** | | |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| Noise & Vibration (6A) | 0 | No change to existing noise and vibration therefore no effects to Noise and Vibration is envisaged (0). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | No disturbance of intact soil or peatland of any kind and therefore there is no potential to adversely affect any undiscovered features of cultural heritage significance. No effect to Cultural Heritage is anticipated (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | 0 | No change to existing landscape therefore no effects on the landscape quality and visual amenity envisaged (0). |
| **Material Assets** | | |
| Material Assets (9A) | 0 | No change to existing infrastructure therefore no effects to existing material assets envisaged (0). |
| Traffic (9B) | 0 | No change in existing traffic movements in the area therefore no effects to traffic envisaged (0). |
| **Waste & Resource Management** | | |
| Waste (10A) | -1 | In the long term the OHL would continue to degrade over time decreasing its potential to reuse units elsewhere. In the long term, the Do Nothing alternative has the potential to have a slight to moderate adverse effect through the creation of waste material that can only be managed using methods that are lower down the Waste Hierarchy i.e. Disposal (-1). |

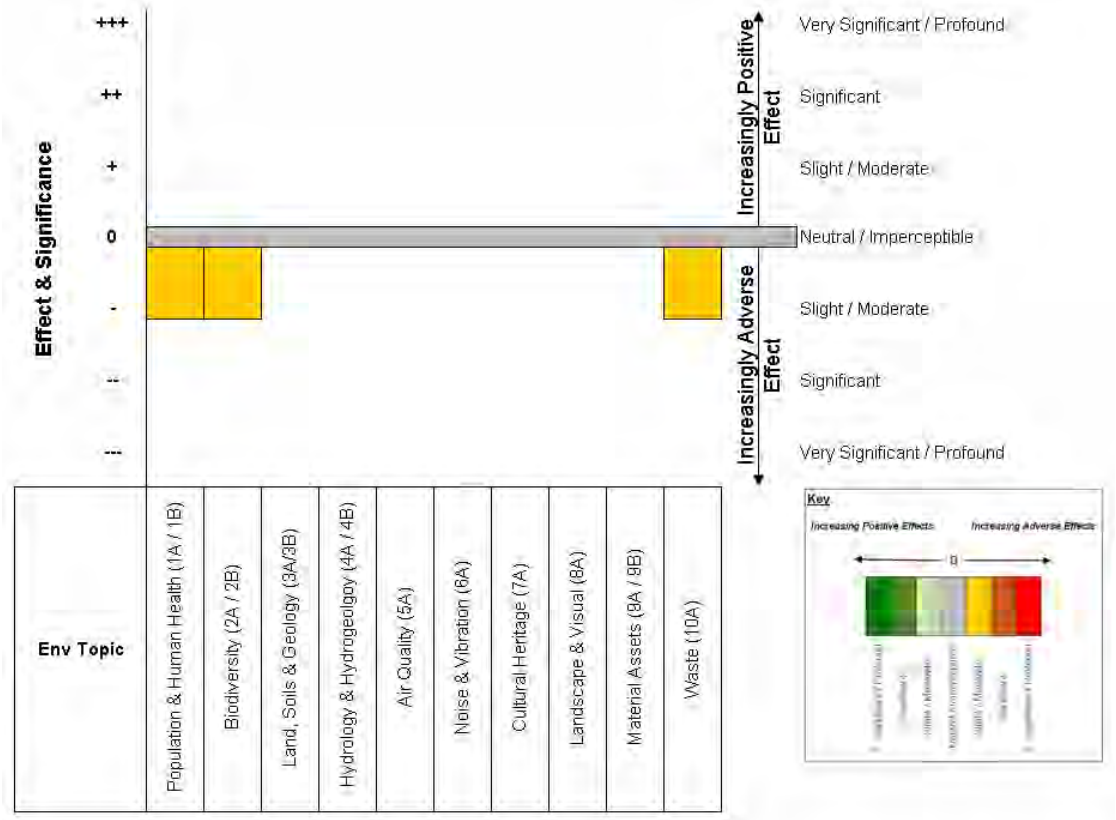



*Figure 3-9 Summary chart of Predicted Effects of Alternative 1 (Work Area B)*

Alternative 1 does not impact on the environment in the short term as no decommissioning works or ongoing site maintenance to the overhead line or substation would occur. However, in the long term there is potential to have a slight to moderate adverse effect on Human Health, Biodiversity and Waste.

While this is a viable alternative in terms engineering feasibility in the short term, this alternative is not considered practicable as it does not address the medium- and long-term deterioration of the structures, facilitate the safe decommissioning of the unauthorised development, the removal of structures, and restoration of the route of the overhead line and Agannygal Substation. As such, Alternative 1 is not considered practicable.

#### 3.4.2.2 Alternative 2 - Remove all development which has taken place since 2003 including any emergency works installed during the peat slide.

Alternative 2 includes the removal all development at the Derrybrien to Agannygal 110kV OHL and the Agannygal Substation which has taken place since 2003 including any emergency works installed during the peat slide. There are no emergency works located within Works Area B.

The works associated with Alternative 2 include the following:

- Destringing of the overhead line conductor.
- Removal of the overhead line infrastructure
- Controlled removal of Agannygal Substation and demolition of control building.
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast.
- Removal of palisade fencing.
- Removal and reinstatement of the reinforced concrete foundations for the control building and compound hardstand areas.
- Removal and reinstatement at the location of hardcore surfaced access track.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

A breakdown of the list of material to be removed from site and estimated tonnages for Work Area B is provided in Table 3-10. It is estimated that a total of 2,686 tonnes of material would have to be removed from site to be managed in accordance with the applicable provisions of the Waste Management Act 1996. This would result in the addition of approximately 269 truck movements to the local road network.

*Table 3-10 Alternative 2 - Estimated tonnages of material to be removed from Work Area B during decommissioning*

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Waste Oil | Ton | 0.445 | <1% |
| Concrete | Ton | 624.7 | 23% |
| Concrete Bricks | Ton | 68.7 | 3% |
| Tiles and Ceramics | Ton | 1.4 | <1% |
| Wood | Ton | 16 | 1% |
| Plastics (Blades) | Ton | 0 | 0% |
| Plastics | Ton | 2 | <1% |
| Creosote Treated Poles | Ton | 40.8 | 2% |
| Iron and Steel | Ton | 112.5 | 4% |
| Cables | Ton | 128 | 5% |
| Stone | Ton | 1691 | 63% |
| Peat | Ton | 0 | 0% |

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Total | Ton | 2,686 | |
| Truck Movements | No | 269 *(20 Tonne Trucks x 2)* | |

On completion of the works, all overhead line structures and the substation building within Work Area B would be removed and regraded using existing available material to match adjoining areas. The OHL poles and mast elements would be removed from site. The reinforced concrete bases for angle masts would be demolished using mechanical breakers and excavators and removed from site as waste using transport vehicles. Tree replanting along the route of the OHL is not proposed, although natural regrowth of previously felled areas would likely continue.

All above and below ground structures at the Agannygal Substation site would be removed. The palisade fenced compound and reinforced concrete bases would be demolished using mechanical breakers and excavators. All waste generated would be removed from site using transport vehicles (i.e. 20 Tonne Trucks). The hardstand area would be regraded to match adjoining areas of ground where possible.

Once the Derrybrien-Agannygal 110 kV infrastructure is removed, the Ennis-Shannonbridge 110kV Overhead Line would be reinstated. These works would involve the reinstatement of the OHL span at Agannygal 110kV substation. The full section of line between angle masts would be wheeled and re-tensioned. A summary of the predicted effects of Alternative 2 for the Derrybrien to Agannygal OHL work area is provided in Table 3-11 and illustrated in Figure 3-10.

*Table 3-11 Summary of Predicted Effect of Alternative 2 (Work Area B).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | +1 | Alternative 2 would likely have a slight to moderate positive effect on the local economy through the creation of temporary employment for the duration of the decommissioning works (+1). |
| Human Health (1B) | -1 | Alternative 2 would likely have a slight to moderate adverse effect on Human Health as a result of very temporary disturbance and nuisance impacts to the local community from temporary traffic congestion, emissions to air and noise (-1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | -1 | Alternative 2 has the potential to have a slight to moderate adverse effect on terrestrial ecology through temporary loss and/or degradation of habitat and disturbance and displacement of terrestrial fauna (i.e. birds, bats) for the duration of the works) (-1).<br><br>Alternative 2 will likely result in temporary slight to moderate adverse effects during decommissioning on roosting bats through disturbance and loss of a roost of local significance (in the Derrybrien Substation). The installation of pole-mounted bat boxes would be installed to mitigate this loss and allow the species to reestablish in the short term (-1).<br><br>Over time some areas of the OHL may gradually become more enclosed with self-sown conifers creating the potential for a slight to moderate adverse effect on suitable foraging habitats for the for-hen harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) across parts of the Derrybrien Wind Farm Development site (-1). |
| Aquatic Ecology & Fisheries (2B) | -2 | The decommissioning works, including a number of proposed variants of this alternative, will give rise to ground disturbance which has the potential to cause the displacement of soil which under wet conditions could be mobilised and accidentally released into a nearby water course causing significant adverse effects to water quality and fisheries (-2). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing local land practices are anticipated therefore no potential to cause an effect. (0). |
| Soils and Geology (3B) | -2 | Depending on the characteristics of the peat at each pole set (which is higher risk at the upper slopes), this alternative has the potential to have significant adverse effects on peat stability through the movement of wide-tracked excavators, forwarders and winching equipment through the site and works required to take down overhead cables, removal of the pole sets, digging out foundations and minor ground levelling works (-2) |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | No change to current hydrological regime therefore no effect to flood risk is anticipated (0). |
| Groundwater (4B) | 0 | No interaction with hydrogeology therefore no effect to groundwater quality is anticipated (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | -1 | There is potential for slight temporary adverse effects to air quality in the local area during decommissioning through increase increased |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | emissions to air (dust/vehicle emissions) from decommissioning activities and increased traffic movements to and from the Derrybrien wind farm site (-1). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | -1 | There is potential for slight temporary adverse effects through increases in noise and vibration levels resulting in infrequent breaches to relevant construction noise and vibration thresholds but unlikely to impact on the local community (-1). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | -1 / +1 | Any development activity has the potential to result in effect (positive and adverse) on heritage features and their setting. Alternative 2 has the potential to result in slight to moderate adverse and positive effects to the historic environment through; the discovery or permanent loss of unidentified heritage features due to the clearance and demolition that are necessary to decommission the overhead line and Agannygal Substation. |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | -1 | Alternative 2 will result in some slight temporary landscape and visual effects during the works due to construction traffic and activities, as well as disturbance to the landscape on a local level. Temporary visual effects will occur as works – particularly removal of poles and substation will be visible from the public roads. |
| **Material Assets** | | |
| Material Assets (9A) | -2 | The decommissioning works will have a significant adverse effect on Material Assets through the permanent loss of the Agannygal Substation which represents a node on the National Grid. The Agannygal Substation could be utilised for future projects that aim to add energy onto the grid (-2).<br><br>The temporary increase in traffic movements would likely result in a slight to moderate adverse effect to the local and regional road networks.(-1). |
| Traffic (9B) | -1 | Alternative 2 has the potential to result in a slight negative adverse effect on traffic for the duration of the works. In addition to plant and personal commuting to and from site, the traffic volumes to remove all above OHL and Agannygal Substation would require an estimated total of 269 truck movements which is unlikely to impact on traffic movements within the local community. |
| **Waste & Resource Management** | | |
| Waste (10A) | -1 | Alternative 2 would likely have a very slight to moderate adverse effect on waste as the majority of material removed from site would be disposed of using methods lower down the waste hierarchy.<br><br>It is estimated a total of 2,686 tonnes of material would be removed from site. The Creosote Poles, Cables and Iron & Steel (11%) could feasibly be reused or recycled elsewhere. However, the majority of stone and concrete (86%) of would be removed from site and most likely used for landfilling. |

Assessment was conducted in comparison to the Do-Nothing Scenario: +3 Very Significant / Profound positive effects, +2 Significant positive effects, +1 Slight to Moderate positive effects, 0 Neutral/ Imperceptible, -1 Slight to Moderate adverse effects, -2 Significant adverse effects, -3 Very Significant / Profound adverse effects.

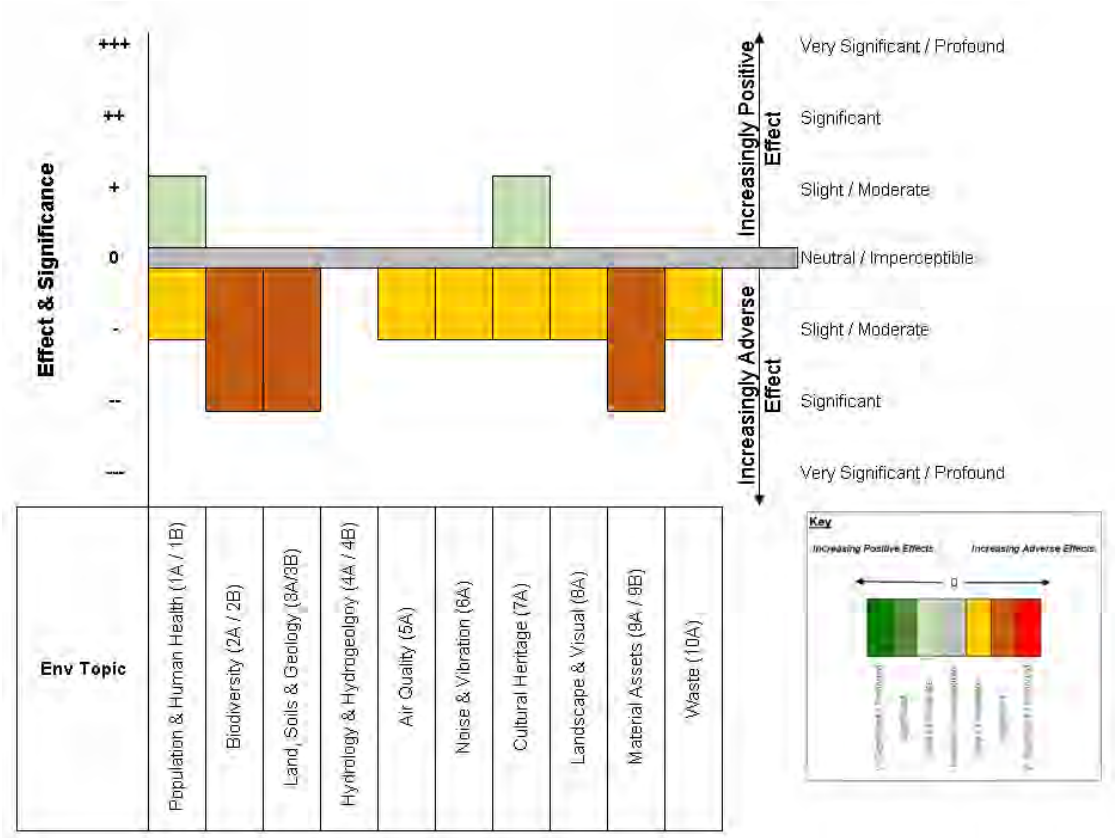



*Figure 3-10 Summary chart of Predicted Effects of Alternative 2 (Work Area B) when compared to the Do-Nothing scenario.*

Alternative 2 facilitates the decommissioning, dismantling and removal of all overhead line features and the Agannygal substation within Work Area B (above and below ground). This alternative has potential to result in the following effects when compared again the Do-Nothing Scenario:

- Short term slight to moderate positive effects to Population and Human Health, Biodiversity and Cultural Heritage.
- Short term temporary slight to moderate adverse effects to Population and Human Health, Biodiversity, Air Quality, Noise and Vibration, Cultural Heritage, Landscape and Visual and Waste
- Short term significant adverse effects on Land Soils and Geology and Material Assets.

This alternative would achieve the removal of structures and a high level of restoration on the site although the ability to restore to the OHL and Agannygal Substation to pre-development conditions would be highly implausible as it is not possible to determine the original ground levels. Given the level of ground disturbance required and the potential to give rise to adverse effects ranging from slight/moderate to significant.

Although practicable in terms of engineering feasibility, this alternative cannot be considered to minimise or avoid all potential risks to key environmental factors and is likely to result in the significant adverse effects. As such, Alternative 2 is not considered a practicable alternative.

### 3.4.2.3 Alternative 3 - Remove all development which has taken place since 2003 excluding any emergency works installed during the peat slide.

Alternative 3 includes the removal of all development at the Derrybrien Wind Farm Development which has taken place since 2003 excluding any emergency works installed during the peat slide. There

are no emergency works located within Works Area B. Therefore, the predicted effects are the same as Alternative 2 (Figure 3-11).

Per Alternative 2, this alternative would achieve the removal of structures and a high level of restoration on the site – although the ability to restore it to pre-development conditions is highly implausible. Works can be confined to areas within the control of Gort Windfarms Ltd. Given the level of ground disturbance required and the potential to give rise to significant adverse effects to the environment, this alternative carries risks of significant environmental impact. Therefore, although practicable in terms of landownership, this alternative does not minimise or avoid all potential significant engineering and environmental risks impacting key environmental factors including site stability and potential for peat slides. As such, this alternative is not considered practicable.

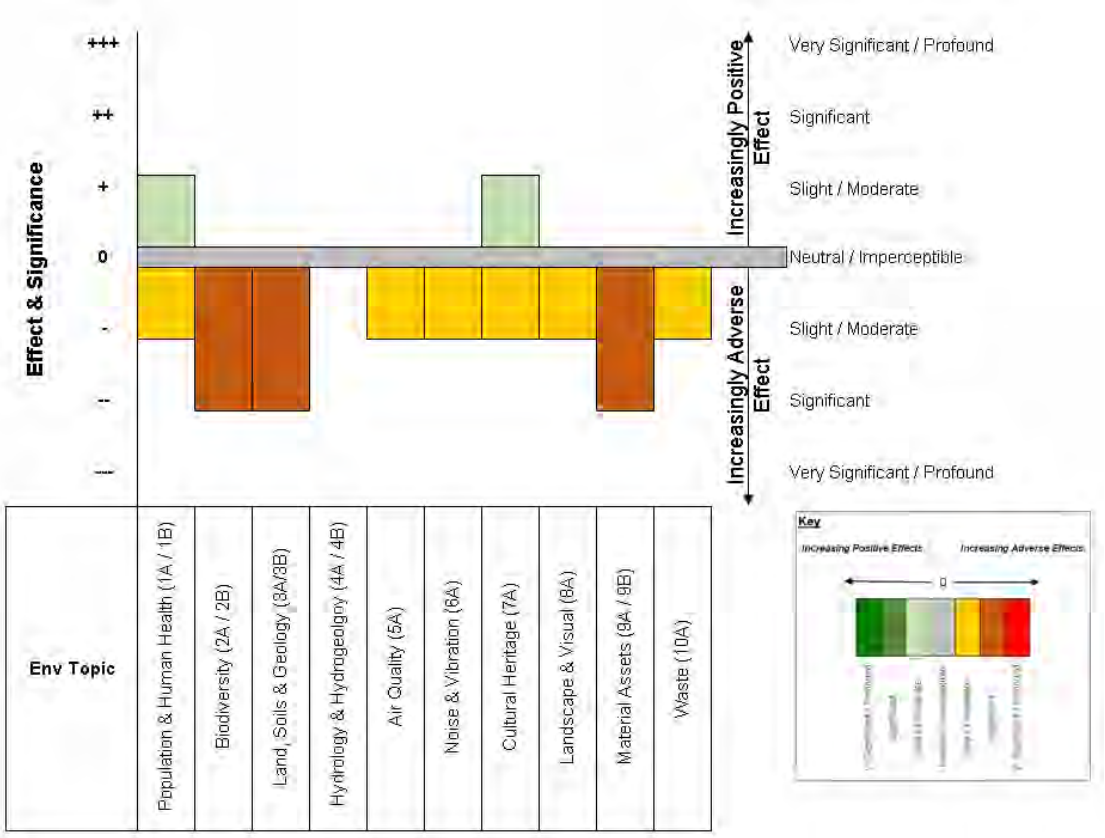



*Figure 3-11 Summary chart of Predicted Effects of Alternative 3 (Work Area B) when compared to the Do-Nothing scenario.*

### 3.4.2.4 Alternative 4 – Practicable Restoration.

In respect of the features within Work Area B, Alternative 4 'practicable restoration' would involve the removal of the above ground structures associated with the Overhead line (OHL) and Agannygal 110kV substation. The decommissioning works associated with Alternative 4 includes the following:

- Destringing of the overhead line conductor.
- Removal of the above ground overhead line infrastructure.
- Controlled removal of Agannygal 110kV substation and demolition of control building.
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast.
- Removal of palisade fencing.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

On completion of the works, the route of the OHL and the Agannygal 110kV substation site would be free of all above ground structures. Any disturbed areas would be reinstated and below ground features imperceptible.

The OHL poles and mast elements will be removed from site in accordance with the relevant legislation. During the removal of the overhead line all pole sets and masts will be cut at c.300mm below ground level. The reinforced concrete bases for angle masts would be left in situ. Tree replanting is not proposed although natural regrowth of previously felled areas will likely continue. All structures would be removed from the Agannygal Substation site. The palisade fencing surrounding the substation would be dismantled and removed from site. The reinforced concrete base for the substation would be left in-situ.

A breakdown of the list of material to be removed from site and estimated tonnages for Work Area B is provided in Table 3-12. It is estimated that a total of 370 tonnes of material would be removed from site adding approximately 37 truck movements to the local road network.

*Table 3-12 Alternative 4 - Estimated tonnages of material to be removed from Work Area B during decommissioning.*

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Waste Oil | Ton | 0.445 | <1% |
| Concrete | Ton | 0 | 0% |
| Concrete Bricks | Ton | 68.7 | 19% |
| Tiles and Ceramics | Ton | 1.4 | <1% |
| Wood | Ton | 16 | 4% |
| Plastics (Blades) | Ton | 0 | 0% |
| Plastics | Ton | 2 | 1% |
| Creosote Treated Poles | Ton | 40.8 | 11% |
| Iron and Steel | Ton | 112.5 | 30% |
| Cables | Ton | 128 | 35% |
| Stone | Ton | 0 | 0% |
| Peat | Ton | 0 | 0% |
| **Total** | **Ton** | **370** | |
| **Truck Movements** | **No** | **37 (20 Tonne Truck x 2)** | |

Once the Derrybrien-Agannygal 110 kV OHL is removed, the Ennis-Shannonbridge 110kV OHL would be reinstated. These works would involve the reinstatement of the OHL span at Agannygal Substation. The full section of line between angle masts would be wheeled and re-tensioned. A summary of the predicted effects of Alternative 4 is provided in Table 3-13 and illustrated in Figure 3-12.

*Table 3-13 Summary of Predicted effects of Alternative 4 (Work Area B).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | +1 | Alternative 4 would likely have a slight to moderate positive effect on the local economy through the creation of temporary employment for the duration of the decommissioning works (+1). |
| Human Health (1B) | -1 | Alternative 4 would likely have a slight adverse effect on Human Health as a result of very temporary disturbance and nuisance impacts to the local community from temporary traffic congestion, emissions to air and noise (-1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | -1 | Alternative 4 has the potential to have a slight to moderate adverse effectss on terrestrial ecology through temporary loss and/or degradation of habitat and disturbance and displacement of terrestrial fauna for the duration of the works) (-1).<br><br>Alternative 4 will likely result in temporary slight to moderate adverse effects during decommissioning on roosting bats through disturbance and loss of a roost of local significance (in the Agannygal Substation). The installation of pole-mounted bat boxes would be installed to mitigate this loss and allow the species to reestablish in the short term (-1).<br><br>Over time some areas of the OHL may gradually become more enclosed with self-sown conifers creating the potential for a slight to moderate adverse effects on suitable foraging habitats for the for-hen harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) across parts of the Derrybrien Wind Farm Development site (-1). |
| Aquatic Ecology & Fisheries (2B) | -1 | Alternative 4 proposes minimal disturbance to soils and no instream works is proposed. No impacts to water quality and/or fisheries are anticipated. Nevertheless, a number of proposed variants of this alternative have the potential to give rise to slight to moderate adverse effects both for water quality and fisheries, depending on how they are mitigated (0). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing Local Land Practices therefore no effects are are anticipated (0). |
| Soils and Geology (3B) | -1 | Alternative 4 proposes to leave the embedded portion of the pole set foundation in place. Depending on the characteristics of the peat at each pole set (which is higher risk at the upper slopes), this alternative has the potential to have slight adverse effect on peat stability through the movement of wide-tracked excavators, forwarders and winching equipment through the site and works required to take down overhead cables and the removal of the above ground element of pole sets (-1). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | No change to current hydrological regime therefore no effect to flood risk is anticipated (0). |
| Groundwater (4B) | 0 | No interaction with hydrogeology therefore no effects to groundwater quality is anticipated (0). |
| **Air Quality & Climate** | | |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| Air Quality (5A) | -1 | There is potential for slight temporary adverse effects to air quality in the local area during decommissioning through increase increased emissions to air (dust/vehicle emissions) from decommissioning activities and increased traffic movements to and from the Derrybrien wind farm site (-1). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | -1 | There is potential for slight temporary adverse effects through increases in noise and vibration levels resulting in infrequent breaches to relevant construction noise and vibration thresholds but unlikely to impact on the local community (-1). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | Alternative 4 considers minimal disturbance to soils. The decommissioning works will not include disturbance of ground of any kind and therefore no effect to Cultural Heritage is anticipated. |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | -1 | Alternative 2 will result in some slight temporary landscape and visual effects during the works due to construction traffic and activities, as well as disturbance to the landscape on a local level. Temporary visual effects will occur as works – particularly removal of poles and Agannygal Substation which may be visible from the public roads. |
| **Material Assets** | | |
| Material Assets (9A) | -2 | The decommissioning works will have a significant adverse effects on Material Assets through the permanent loss of the Agannygal Substation which represents a node on the National Grid. The Agannygal Substation could be utilised for future project that aim to add energy onto the grid. |
| Traffic (9B) | -1 | The decommissioning works have the potential to have a slight adverse effect on traffic as a result of plant/personnel movements and also the movements associated with the removal of 7.8km of overhead line, the Agannygal Substation and any waste generated from site. All traffic will be managed in accordance with a robust Traffic Management Plan to minimise any disruption. |
| **Waste & Resource Management** | | |
| Waste (10A) | +1 | Alternative 4 would likely have a very slight to moderate positive effects on waste. It is estimated a total of 370 tonnes of material would be removed from site. Under Alternative 4, it is thought that the majority of material (76%) on site would be reused or recycled. |

Assessment was conducted in comparison to the Do-Nothing Scenario: +3 Very Significant / Profound positive impacts, +2 Significant positive impacts, +1 Slight to Moderate positive impacts, 0 Neutral/ Imperceptible, -1 Slight to Moderate negative impacts, -2 Significant negative impacts, -3 Very Significant / Profound negative impacts.

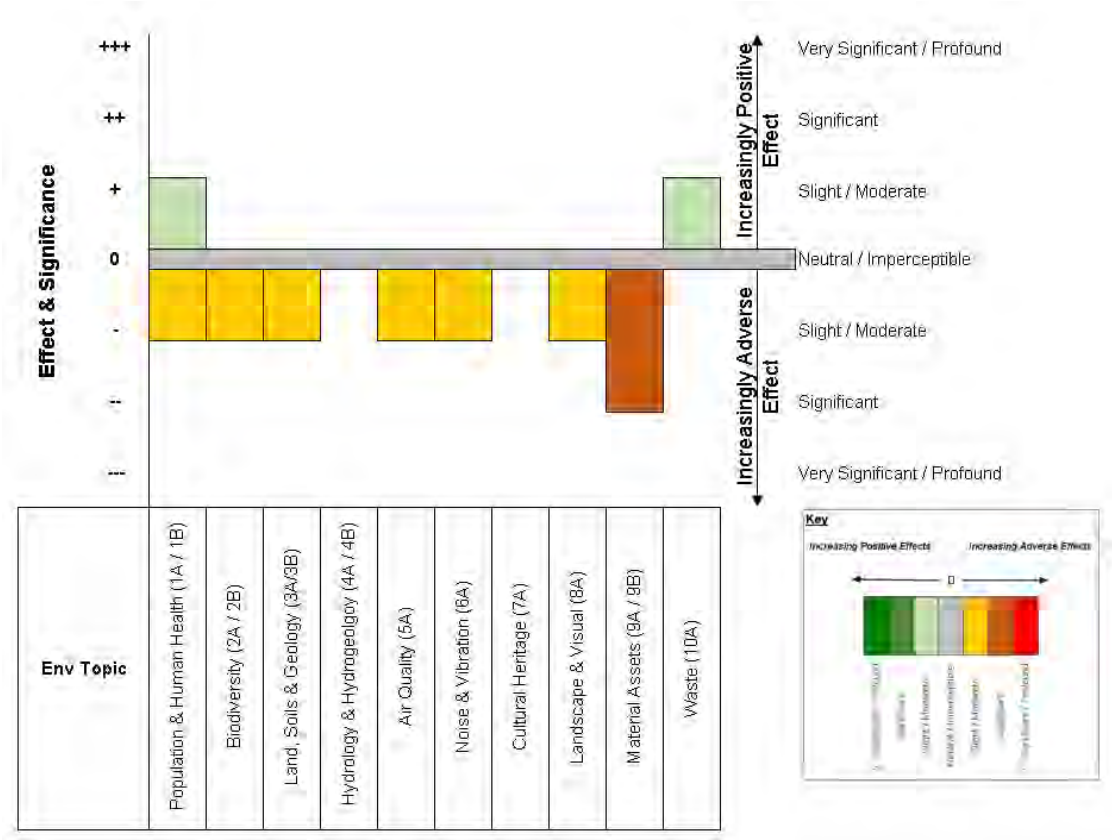



*Figure 3-12 Summary chart of Predicted Effects of Alternative 4 (Work Area B) when compared to the Do-Nothing scenario.*

Alternative 4 facilitates the decommissioning, dismantling and removal of all features within Work Area B (the above ground) and any disturbed areas would be regraded to match adjacent areas. In so far as possible this alternative reduces the level of ground disturbance as a means of minimising the potential impacts on the terrestrial habitats and other local receptors along the route of the overhead line. However, potential effects arising from this alternative still exists when compared against the Do-Nothing Alternative.

Alternative 4 is practicable from a landownership and engineering point of view and minimises and/or avoids all potential risks to key environmental factors, Alternative 4 represents a reduction in the potential effects to the environment when compared to Alternatives 2 and 3. As such it is considered that this alternative is considered to be the most favourable.

### 3.4.2.5 Assessment of Alternatives (Work Area B)

A comparison of the alternatives considered for Work Area B: Derrybrien to Agannygal 110kV OHL including Agannygal 110 kV substation is provided in Table 3-14 below.

The Do-Nothing Alternative (Alternative 1) would not result in any effects in the short term. However, in the medium to long term there is potential to have a slight to moderate adverse effects on Human Health through the deterioration of onsite OHL which over time would present a risk to local landowners. In addition, Alternative 1 has the potential for slight to moderate adverse effects impacts through small areas of the OHL may gradually become more enclosed with self-sown conifers potentially impacting on suitable foraging habitats for the for-hen harrier (a special conservation bird species of the Slieve Aughty Mountains SPA) across parts of the Derrybrien Wind Farm Development site. Alternative 1 does not facilitate the decommissioning of the Derrybrien Wind Farm Development and therefore is not considered to be a practicable alternative and is presented to provide context for "do-something" alternatives which can deliver the overarching project objective i.e. decommissioning the Derrybrien Wind Farm Development.

Alternatives 2, 3 and 4 facilitates the decommissioning of the Derrybrien Wind Farm OHL and Agannygal Substation and eliminates the risk to human health caused by deteriorating infrastructure overtime. The removal of the Agannygal Substation will have an unavoidable significant negative impact on Material Assets as it eliminates the prospect of any future developments exporting electricity through the Agannygal node on the national grid. As tabulated in Table 3-14, the degree or extent in which the features within Work Area B are removed has the potential to result in impacts ranging from Significant adverse to to Slight to Moderate positive.

Alternative 2 and 3 were found to have similar levels of potential adverse effects. In addition to the significant adverse effects to ground stability, Alternatives 2&3 would like give rise to significant adverse effects on aquatic ecology and fisheries through the potential to cause the displacement of soil which under wet conditions could be mobilised and accidentally released into a nearby water course. Furthermore, Alternative 2 & 3 would likely have very slight to moderate adverse effect on waste and traffic generation for the duration of the works. It is estimated a total of 2,686 tonnes of material would be removed from site adding 269 traffic movements to the local road network (Table 3-15). Although these alternatives facilitate the decommissioning of the windfarm features within Area B, they do not avoid or minimise environmental effects and therefore are not considered to be practicable.

Alternative 4 reduces the level of potential effects to the environment by minimising the level of ground disturbance. Alternative 4 aims to remove the existing above ground OHL structures and the Agannygal substation, leaving all below ground foundations in situ in perpetuity.

The reduction in civil works reduces the potential for environmental effects. For example, the potential for Significant adverse effects to peat stability and Aquatic Ecology and Fisheries have been reduced to Slight to Moderate adverse through leaving certain at or below ground features in situ. In addition, through minimisation of ground disturbance there is an 86% reduction in waste volumes and traffic generation (Table 3-15).

Given the significant reduction in environmental effects, the preferred option for Work Area B is Alternative 4 – Practical Restoration. This alternative is unlikely to give rise to significant adverse effects on the environment during the removal of the OHL and Agannygal substation.

*Table 3-14 Comparison of Alternatives Considered (Work Area B)*

| Environmental Topic (Sub-objective) | | Degree of Potential Effect and Significance | | | |
|---|---|---|---|---|---|
| | | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Population & Human Health** | Employment (1A) | 0 | +1 | +1 | +1 |
| | Human Health (1B) | -1 | -1 | -1 | -1 |
| **Biodiversity** | Terrestrial Ecology (2A) | -1 | -1 | -1 | -1 |
| | Aquatic Ecology & Fisheries (2B) | 0 | -2 | -2 | -1 |
| **Land, Soils & Geology** | Local Land Practices (3A) | 0 | 0 | 0 | 0 |
| | Soils and Geology (3B) | 0 | -2 | -2 | -1 |
| **Hydrology & Hydrogeology** | Flood Risk Management (4A) | 0 | 0 | 0 | 0 |
| | Groundwater Impacts (4B) | 0 | 0 | 0 | 0 |
| **Air Quality** | Air Quality (5A) | 0 | -1 | -1 | -1 |
| **Noise & Vibration** | Noise & Vibration (6A) | 0 | -1 | -1 | -1 |
| **Cultural Heritage** | Cultural Heritage (7A) | 0 | -1 / +1 | -1 / +1 | 0 |

| Environmental Topic (Sub-objective) | | Degree of Potential Effect and Significance | | | |
|---|---|---|---|---|---|
| | | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Landscape & Visual** | Landscape & Visual (8A) | 0 | -1 | -1 | -1 |
| **Material Assets** | Material Assets (9A) | 0 | -2 | -2 | -2 |
| | Traffic (9B) | 0 | -1 | -1 | -1 |
| **Waste & Resource Management** | Waste (10A) | -1 | -1 | -1 | +1 |

*Table 3-15 Estimated tonnages of material to be removed from Work Area B during decommissioning (Alternative 1-4)*

| Description | Unit | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|---|
| Waste Oil | Ton | 0 | 0.4 | 0.4 | 0.4 |
| Concrete | Ton | 0 | 624.7 | 624.7 | 0.0 |
| Concrete Bricks | Ton | 0 | 68.7 | 68.7 | 68.7 |
| Tiles and Ceramics | Ton | 0 | 1.4 | 1.4 | 1.4 |
| Wood | Ton | 0 | 16.0 | 16.0 | 16.0 |
| Plastics (Blades) | Ton | 0 | 0.0 | 0.0 | 0.0 |
| Plastics | Ton | 0 | 2.0 | 2.0 | 2.0 |
| Creosote Treated Poles | Ton | 0 | 40.8 | 40.8 | 40.8 |
| Iron and Steel | Ton | 0 | 112.5 | 112.5 | 112.5 |
| Cables | Ton | 0 | 128.0 | 128.0 | 128.0 |
| Stone | Ton | 0 | 1691.0 | 1691.0 | 0.0 |
| Peat from repository areas | Ton | 0 | 0.0 | 0.0 | 0.0 |
| **Total Volume** | **Ton** | **0** | **2,686** | **2,686** | **370** |
| **Vehicle Movement (2 way)** | **No.** | **0** | **269** | **269** | **37** |

### 3.4.3 Work Area C: Offsite ancillary works associated with peat slide (2003)

As described in detail in Section 3.3.3 – the permanent offsite features within Work Area C that are associated with the engineering works required to stop and stabilise the peat slide that remain on-site today are listed below. These features are not located on land in the ownership or control of Gort Windfarms Ltd.

- Barrage 1.
- Barrage 2 , access track and repository area.
- Barrage 3 and repository area.
- Barrage 4.
- Repository area at the Black Road Bridge.
- Minor borrow pit adjacent to Barrage 1 that was used to source material.
- Drainage Diversion Works.
- Repaired Bridges (Black Road Bridge , Flaggy Bridge and Unnamed Bridge C, Crooked Bridge).

The location of all permanent features is illustrated in Figure 3-4 above. In general, all features associated with the peat slide have naturalised and, in some instances, become heavily vegetated over the past 20 years and are virtually imperceptible today. The four decommissioning alternatives considered for Work Area C are:

- Alternative 1 – Do Nothing.
- Alternative 2 - Remove all development which has taken place since 2003 including any emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding any offsite emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration.'

Details of each alternative is provided in the sections below.

#### 3.4.3.1 Alternative 1 – Do Nothing

Alternative 1 proposes that no development works are carried out to decommission these offsite ancillary works associated with the peat slide in 2003. All features will remain in situ. There will be no requirement for vegetation clearance or the construction of temporary compounds and haul routes to access works areas. There would also be no requirement for instream works to remove any items – specifically the four instream barrages located in Stream SC7(B), a tributary of the Owendalulleegh River.

A summary of the predicted effects of Alternative 1 when compared against the predefined sub-objectives are included in Table 3-16 and illustrated in Figure 3-13.

*Table 3-16 Summary of Predicted Effects of Alternative 1 (Work Area C).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | 0 | No change in employment opportunities for the local community therefore no effects are anticipated (0). |
| Human Health (1B) | 0 | No change in the human health and risks to life in the local community are anticipated(0). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | 0 | No effects on any natural fauna, flora or habitats at any geographical scale of importance is anticipated (0). |
| Aquatic Ecology & Fisheries (2B) | 0 | No effects to surface water quality or fish populations in nearby watercourses is anticipated (0). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing land use or site conditions envisaged therefore no effects anticipated (0) |
| Soils and Geology (3B) | 0 | Alternative preserves the existing stable ground and groundwater conditions therefore no effect to soils and geology is anticipated (0). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | No change in existing hydrological regieme therefore no effect to flood risk envisaged (0). It is considered that the 4 Barrages are not impeding the flow of water along Stream SC7(B) to a level that creates a risk of flooding. |
| Groundwater (4B) | 0 | No interaction with hydrogeological features therefore no effects to to groundwater quality envisaged (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | 0 | No change in air quality in the area envisaged (0). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | 0 | No change in noise and vibration effects in the area envisaged (0). |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | No disturbance of soil therefore no potential for loss or damage to known heritage features are envisaged (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | 0 | No effect on the existing landscape quality and visual amenity envisaged (0). |
| **Material Assets** | | |
| Material Assets (9A) | 0 | No effects to to existing material assets and infrastructure envisaged (0). |
| Traffic (9B) | 0 | No change in existing Traffic movements in the area envisaged therefore no effects anticipated(0). |
| **Waste & Resource Management** | | |
| Waste (10A) | 0 | No effect to Waste envisaged (0). |

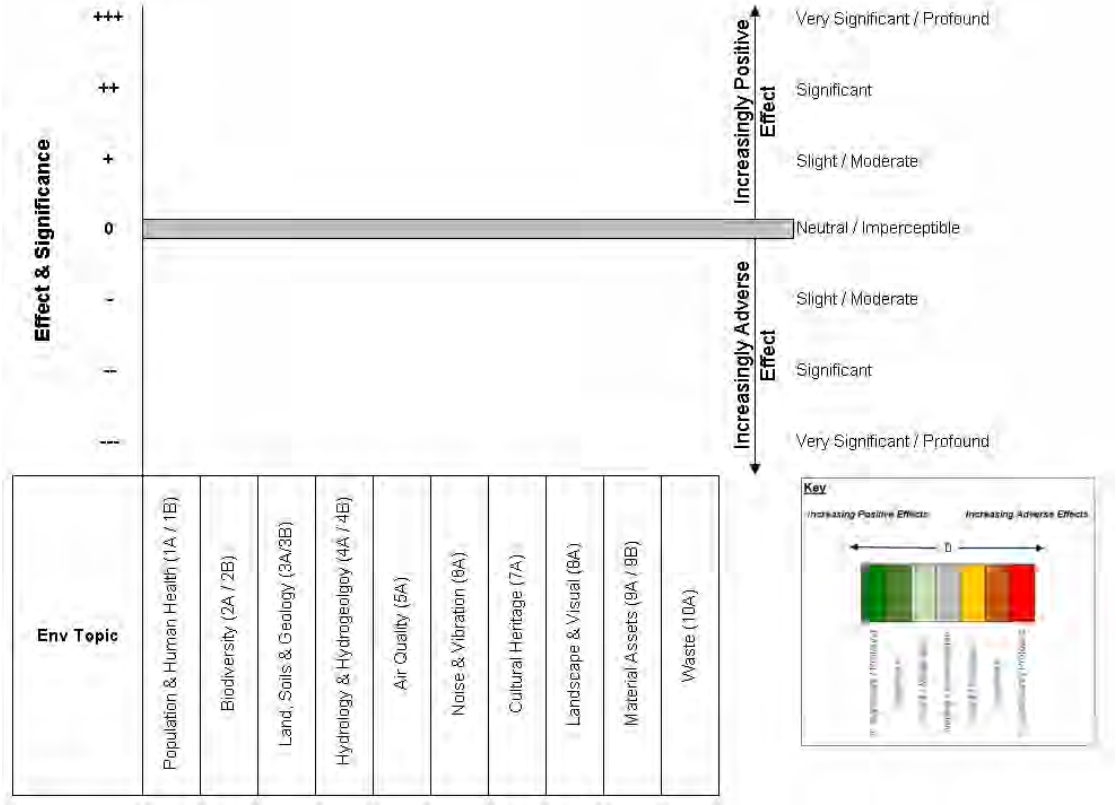



*Figure 3-13 Summary chart of Predicted Effects of Alternative 1 (Work Area C)*

In terms of environmental effects, the offsite features were installed 2003 following the peat slide. Since installation these features have not resulted in any environmental effects.

With regards to the potential effect to fisheries - the instream barrages have the potential to cause potential obstruction to fish passage within Stream SC(7)B, a tributary of the Owendalulleegh River. However, repeated fish surveys in Stream SC(7)B strongly suggest that natural and artificial barriers downstream of Flaggy Bridge (not associated with the Derrybrien Wind Farm Development) are preventing fish passage upstream as far as the barrages. As such effects are thought to be negligible.

This alternative would not achieve the removal of the naturalised features from the site. However, it is considered to be practicable for the following reasons:

- Since installation the instream features have not resulted in any environmental effects and are unlikely to have an effect in the future.
- Private owned infrastructure will not be impacted (i.e. Coillte infrastructure at Barrage 3 & 4, landowner at unnamed bridge C).

#### 3.4.3.2 Alternative 2 - Remove all development which has taken place since 2003 including any emergency works installed during the peat slide.

Alternative 2 includes the removal all any emergency works installed during the peat slide including:

- Borrow Pit adjacent to Barrage 1.
- Barrage 1.
- Barrage 2, access track and repository area.
- Barrage 3 and repository area.
- Barrage 4.
- Repository area at the Black Road Bridge.
- Drainage diversion works.
- Repairs made to bridges (Black Road Bridge, Flaggy Bridge and Unnamed Bridge C).

The decommissioning works associated with alternative 2 would include the following:

- Extensive vegetation clearance and the construction of new haul routes to enable access to each offsite feature. Construction of temporary compound for the duration of the works.
- In-stream works to remove Barrage No.1 and Coillte forestry access track followed by riverbank reinstatement works.
- Infilling of minor borrow pit adjacent to Barrage No. 1 through using material removed from Barrage No.1 and other imported material if required.
- In-stream works to remove Barrage No.2 and Coillte forestry access track followed by riverbank reinstatement works.
- Removal of naturalised peat repository area adjacent to Barrage No. 2 and offsite disposal of material.
- In-stream works to remove Barrage No. 3 followed by riverbank reinstatement works.
- Removal of naturalised peat repository area adjacent to Barrage No. 3 and offsite disposal of material.
- In-stream works to remove Barrage No. 4 followed by riverbank reinstatement works.
- Removal of naturalised peat repository area at the Black Road Bridge adjacent to Barrage No. 3 and offsite disposal of material.
- Removal of naturalised drainage diversion works.
- Removal of repairs made to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C.
- Removal of temporary haul routes and temporary compounds followed by ground reinstatement.

A breakdown of materials and estimated tonnages to be removed from site under Alternative 2 is provided in Table 3-17 below. It is estimated that a total of 15,426 tonnes of material would have to be removed from site resulting in the addition of approximately 1543 truck movements to the local road network. It is thought the vast majority of material on site would need to be removed from site and disposed of in accordance with regulatory requirements.

*Table 3-17 Alternative 2 - Estimated tonnages of material to be removed from Work Area C during decommissioning.*

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Stone (Barrage No. 1 / Coillte Track) | Ton | 2160 | 14% |
| Stone (Barrage No. 2 / Coillte Track) | Ton | 2820 | 18% |
| Peat (Repository Area at Barrage No.2) | Ton | 1399 | 9% |
| Stone (Barrage No. 3) | Ton | 840 | 5% |
| Peat (Repository Area at Barrage No.3) | Ton | 238.4 | 2% |
| Stone (Barrage No. 4) | Ton | 840 | 5% |
| Peat (Repository Area at Black Road Bridge | Ton | 2128.8 | 14% |
| Stone for the creation of access roads | Ton | 5000 | 32% |
| **Total** | **Ton** | **15,426.2** | |
| **Truck Movements** | **No** | **1543 (20 Tonne Truck x 2)** | |

On completion of the works, all features installed as part of the emergency works will be removed from site and the river bank and reinstated in so far as possible. A summary of the predicted effects associated with Alternative 2 is provided in Table 3-18 and illustrated in Figure 3-14 below.

*Table 3-18 Summary of Predicted Effects of Alternative 2 (Work Area C)*

| Environmental Topic (Sub-objective) | Degree of Potential Effects | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | +1 | Alternative 2 would likely have a slight to moderate positive effects on the local economy through the creation of temporary employment for the duration of the decommissioning works (+1). |
| Human Health (1B) | -1 | Alternative 2 would likely have a slight adverse effect on Human Health as a result of very temporary disturbance and nuisance impacts to the local community from temporary traffic congestion, emissions to air and noise (-1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | +1 / -2 | Alternative 2 involves significant vegetation clearance for the creation of haul routes to access the Barrages, Peat Repositories and Minor Borrow Pit at Barrage 1. The clearance works coupled with the movement of personnel and machinery on-site would like result in slight to moderate disturbance effect to Avian and Terrestrial Ecology for the duration of the work (-1).<br><br>The works would involve the removal of supporting habitat for bats, including the loss of valuable foraging and commuting habitat for bats adjacent to the watercourse at barrage 4. As such alternative 2 has the potential to result in temporary adverse effects on roosting bats (barrages would need additional investigation) through habitat loss, disturbance and loss of a roost (if present in barrages). Short term adverse effects on foraging / commuting bats during removal due to habitat loss caused by removal of infrastructure, short-term as the assumption is that habitats would regenerate after decommissioning (-2).<br><br>Decommissioning works would remove the in-stream barriers increasing the potential movement of species upstream and downstream of the barrages - e.g. otter. As such alternative 2 has the |

| Environmental Topic (Sub-objective) | Degree of Potential Effects | Description |
|---|---|---|
| | | potential to have slight positive effect on terrestrial ecology by provide access to aquatic habitat upstream of the barrages (+1). |
| Aquatic Ecology & Fisheries (2B) | +1 / -2 | Alternative 2 removes in-stream barriers. This has the potential to increase movement of species upstream and downstream of the barriers - e.g. fish species. However, repeated fish surveys in the tributary on which the barrages are present strongly suggest that natural and artificial barriers downstream of Flaggy Bridge are preventing fish travelling upstream as far as the barrages so that even if they were removed, there's no guarantee that fish would be able to migrate upstream to where they are currently in place or beyond. It also has the potential to have a slight positive effect through restoring the riverbed and channel to a more natural hydromorphology, possibly improving the quality of aquatic habitat present, which in turn may benefit aquatic species (+1).<br><br>In a worst-case scenario, Alternative 2 has the potential to have a temporary significant adverse effects on downstream water quality, fisheries and riparian habitat. The instream works required to remove the instream barriers will likely result in the disturbance or damage to bankside habitat. The instream works have the potential to result in the accidental release of large quantities of trapped sediment as well as pollutants into the watercourse i.e., silts, oils, greases. This would result in a reduction in water quality and an increased risk of mortality of fish and predator species (e.g. otter, bird species).The removal of all barriers has the potential to result in further changes to the watercourse morphology and hydrology (-2).<br><br>The ground disturbance associated with this alternative, e.g. associated with gaining access to the barrage locations for work vehicles, the removal of the peat repositories and importation of material to infill Borrow pit has the potential to cause the displacement of soil which under wet conditions could be mobilised and accidentally released into the nearby water course, also causing temporary but significant adverse effect to water quality and fisheries (-2). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing Land Practices therefore no effects are anticipated (0). |
| Soils and Geology (3B) | 0 | No effect to Soil and Geology is anticipated. No residual risk of slippage or movement of soils is envisaged once the barrages are removed (0). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | -1 | The removal of all four barriers from the river has the potential to return it to its 'natural' / pre-development hydrological regime. However, the removal of barriers after 20 years has the potential to increase instream flow which has the potential to have a slight adverse effects further downstream during large flood events (-1). |
| Groundwater (4B) | 0 | No alteration with hydrogeological features therefore no effect to groundwater quality anticipated (0). |

| Environmental Topic (Sub-objective) | Degree of Potential Effects | Description |
|---|---|---|
| **Air Quality & Climate** | | |
| Air Quality (5A) | -1 | There is potential for slight temporary adverse effect to air quality in the local area during decommissioning through increased emissions to air (dust/vehicle emissions) from decommissioning activities and increased traffic movements to and from the site (-1). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | -1 | There is potential for slight temporary adverse effects through increases in noise and vibration levels resulting in infrequent breaches to relevant construction noise and vibration thresholds but unlikely to impact on the local community (-1). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | No disturbance to therefore no effects to cultural heritage is anticipated (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | -1 | Alternative 2 will result in some landscape and visual effects, both on the character of the landscape and the physical landscape. Slight adverse visual effects are likely as some of these works (Barrages 3&4 and Peat Repository at Barrage 3) would be visible from the public road (-1). |
| **Material Assets** | | |
| Material Assets (9A) | -1 | A new section of unpaved, hardcore surfaced track was constructed on top of Barrage 1 & 2 to re-establish pre-existing Coillte access tracks. Alternative 2 has the potential to have a slight to moderate effects on existing Coillte infrastructure through the permanent loss of tracks currently used for commercial forestry (-1).<br><br>The removal of repairs made to bridges would also result in have a slight to moderate effect to the landowner of Unnamed Bridge C through the loss of access (-1). |
| Traffic (9B) | -1 | The decommissioning works have the potential to have a slight adverse effect on traffic. The effects to traffic will be a result of plant/personnel movement and also the 1543 movements that are associated with the creation of access tracks, the removal the offsite features associated with the peat slide and the removal and reinstatement of the access tracks. All traffic will be managed in accordance with a robust Traffic Management Plan to minimise any disruption. |
| **Waste & Resource Management** | | |
| Waste (10A) | -1 | Alternative 2 would likely have a very slight to moderate adverse effect on waste as the majority of material removed from site would be disposed of using methods lower down the waste hierarchy.<br>It is estimated a total of 15,426 tonnes of material would be removed from site. The majority of stone and peat would be removed from site and most likely used for landfilling (-1). |

Assessment was conducted in comparison to the Do-Nothing Scenario: +3 Very Significant / Profound positive effect, +2 Significant positive effect, +1 Slight to Moderate positive effects, 0 Neutral/ Imperceptible, -1 Slight to Moderate adverse effect, -2 Significant adverse effect, -3 Very Significant / Profound adverse effect.

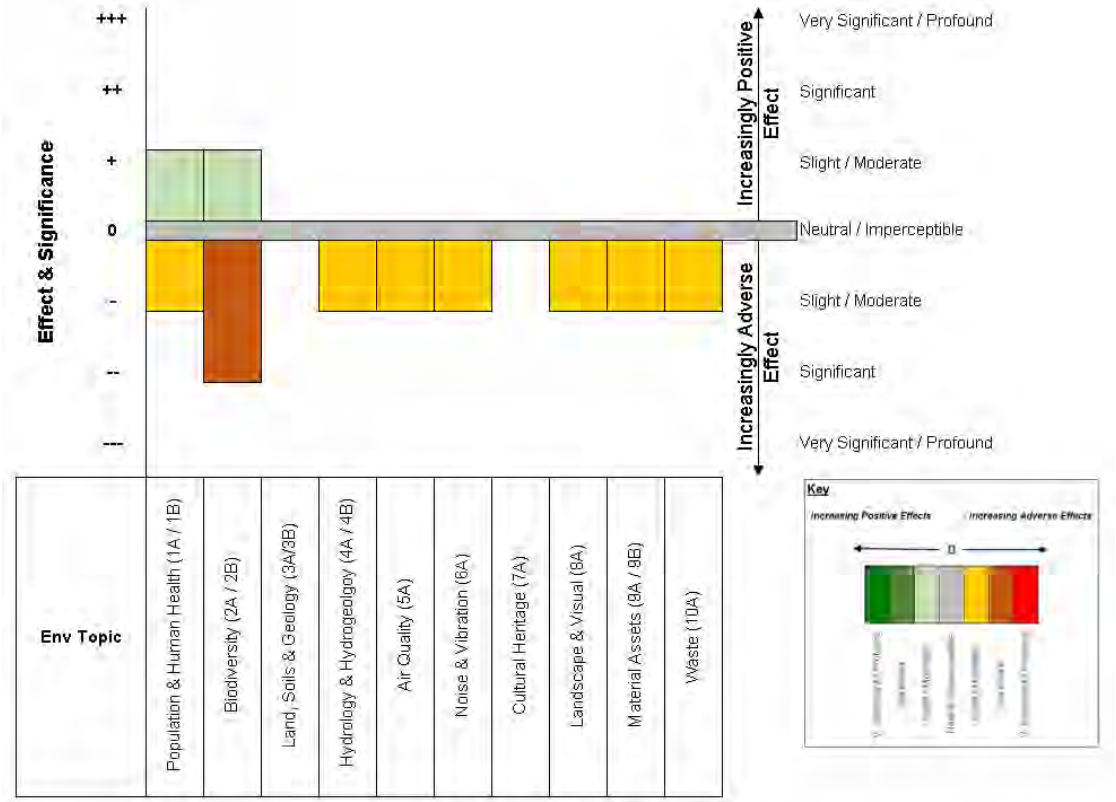



*Figure 3-14 Summary chart of Predicted effects of Alternative 4 (Work Area B) when compared to the Do-Nothing scenario*

This alternative would achieve the removal of the features from the site however it would necessitate significant disturbance of naturalised areas to create temporary haul routes. Works to remove the four in-stream barriers would involve extensive instream works to remove the boulders from the river and to undertake riverbank reinstatement. This alternative would also achieve some reinstatement of the minor borrow pit (although given its previous condition, the ability to restore it to pre-development conditions is impossible).

Although this alternative is practicable in terms of engineering feasibility, it is not in respect of environmental impact given the level of ground disturbance required. As such alternative 2 does not align with the overarching project objective.

### 3.4.3.3 Alternative 3 - Remove all development which has taken place since 2003 excluding any emergency works installed during the peat slide.

Similar to Alternative 1, Alternative 3 proposed that no development works are carried out to decommission these offsite ancillary works associated with the peat slide in 2003. All features will remain in situ.

There will be no requirement for vegetation clearance or the construction of temporary compounds and haul routes to access works areas. There would also be no requirement for instream works to remove any items – specifically instream barrages. No material would have to be removed from site for disposal. A summary of the predicted impacts of Alternative 3 when compared against the predefined sub-objectives are included in Table 3-19 and illustrated in Figure 3-15.

*Table 3-19 Summary of Predicted effects of Alternative 3 (Work Area C).*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | 0 | No change in employment opportunities for the local community therefore no effect anticipated (0). |
| Human Health (1B) | 0 | No change in the human health and risks to life in the local community therefore no effect anticipated(0). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | 0 | No disturbance to natural fauna, flora or habitats at any geographical scale of importance therefore no effects anticipated(0). |
| Aquatic Ecology & Fisheries (2B) | 0 | No effects to surface water quality or fish populations in nearby watercourses anticipated (0). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to existing land use or site conditions envisaged therefore no effect envisaged (0) |
| Soils and Geology (3B) | 0 | Alternative preserves the existing stable ground and groundwater conditions (0). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | 0 | No change to existing hydrological regime therefor no effects to flood risk envisaged (0). |
| Groundwater Impacts (4B) | 0 | No interaction with hydrogeological features therefore no effects to groundwater quality envisaged (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | 0 | No change in air quality in the area envisaged (0). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | 0 | No change in existing noise and vibration levels in the area therefore no effects envisaged (0). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | No disturbance of any kind therefore no potential loss or damage to known heritage features envisaged (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | 0 | No effect to the existing landscape quality and visual amenity envisaged (0). |
| **Material Assets** | | |
| Material Assets (9A) | 0 | No effect to existing material assets and infrastructure envisaged (0). |
| Traffic (9B) | 0 | No change in Traffic movements in the area envisaged (0). |
| **Waste & Resource Management** | | |
| Waste (10A) | 0 | No effects to Waste anticipated (0). |

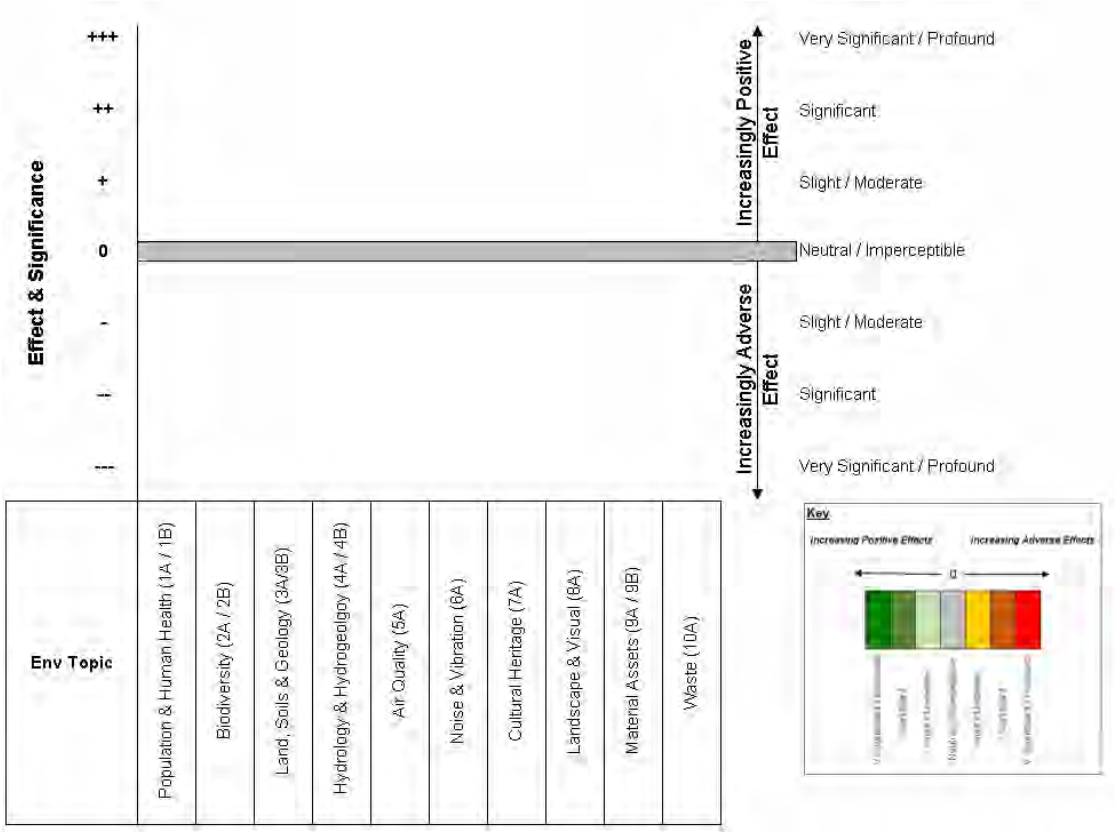



*Figure 3-15 Summary chart of Predicted effects of Alternative 3 (Work Area C) when compared to the Do-Nothing scenario*

Alternative 3 proposes that no development works are carried out to decommission these offsite ancillary works associated with the peat slide in 2003. All offsite features associated with the peat slide will remain in situ. There will be no requirement for vegetation clearance or the construction of temporary compounds and haul routes to access works areas. There would also be no requirement for instream works to remove any items – specifically instream barrages.

With regards to the potential effects to fisheries - the instream barrages have the potential to cause potential obstruction to fish passage within Stream SC(7)B, a tributary of the Owendalulleegh River. However, repeated fish surveys in Stream SC(7)B strongly suggests that natural and artificial barriers downstream of Flaggy Bridge (not associated with the Derrybrien Wind Farm Development) are preventing fish passage upstream as far as the barrages. As such impacts are thought to be negligible.

Per Alternative 1, this alternative would not achieve the removal of the naturalised features from the site. However, it is considered to be practicable for the following reasons:

- Since installation the instream features have not resulted in any environmental impact and are unlikely to have an impact in the future.
- Private owned infrastructure will not be impacted (i.e. Coillte infrastructure at Barrage 3 & 4, landowner at unnamed bridge C).

### 3.4.3.4 Alternative 4 – Practicable Restoration.

Alternative 4 'practicable restoration' would involve the removal of barrages 3 & 4 only while other ancillary areas – principally the peat repository areas and borrow pit at Barrage 1 and 2, remain in situ. This ensures that the forest roads used by Coillte to facilitate their on-going activities in the area, are unaffected. The naturalised drainage diversion works and repairs works to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C would also remain in-situ. The decommissioning works associated with alternative 4 would include the following:

- Extensive vegetation clearance and the construction of new haul routes to enable access to each offsite feature. Construction of temporary compound for the duration of the works.
- In-stream works to remove Barrage No. 3 followed by riverbank reinstatement works.
- In-stream works to remove Barrage No. 4 followed by riverbank reinstatement works.
- Removal of temporary haul routes and temporary compounds followed by ground reinstatement.

A breakdown of materials and estimated tonnages to be removed from site under Alternative 2 is provided in Table 3-20. It is estimated that a total of 6680 tonnes of material would have to be removed from site resulting in the addition of approximately 668 truck movements to the local road network. It is thought the vast majority of material on site would need to be removed from site and disposed of in accordance with regulatory requirements.

On completion of the works, Barrages 3 and 4 would be partially removed from the river. Barrages 1 and 2 and all other features associated with the peat slide would remain in-situ. A summary of the predicted effects associated with alternative 4 is provided in Table 3-21 and illustrated in Figure 3-16 below.

*Table 3-20 Alternative 4 - Estimated tonnages of material to be removed from Work Area C during decommissioning.*

| Description | Unit | Estimated Volume | % of Total |
|---|---|---|---|
| Stone (Barrage No. 3) | Ton | 840 | 33% |
| Stone (Barrage No. 4) | Ton | 840 | 33% |
| Stone for the creation of access roads | Ton | 5000 | 33% |
| **Total** | **Ton** | **6680** | |
| **Truck Movements** | **No** | **668 (20 Tonne Truck x 2)** | |

*Table 3-21 Summary of Predicted effects of Alternative 4 (Work Area C)*

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| **Population & Human Health** | | |
| Employment (1A) | +1 | Alternative 4 would likely have a slight to moderate positive effect on the local economy through the creation of temporary employment for the duration of the decommissioning works (+1). |
| Human Health (1B) | -1 | Alternative 4 would likely have a slight adverse effect on Human Health as a result of very temporary disturbance and nuisance impacts to the local community from temporary traffic congestion, emissions to air and noise (-1). |
| **Biodiversity** | | |
| Terrestrial Ecology (2A) | +1 / -2 | Alternative 4 involves significant vegetation clearance for the creation of haul routes to access the Barrages 3&4. The clearance works coupled with the movement of personnel and machinery on-site would likely result in slight to moderate adverse disturbance effects to Avian and Terrestrial Ecology for the duration of the work (-1).<br><br>The works would involve the removal of supporting habitat for bats, including the loss of valuable foraging and commuting habitat for bats adjacent to the watercourse at barrage 4. As such alternative 4 has the potential to result in temporary adverse effects on roosting bats (barrages would need additional investigation) through habitat |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | loss, disturbance and loss of a roost (if present in barrages). Short term adverse effects on foraging / commuting bats during removal due to habitat loss caused by removal of infrastructure, short-term as the assumption is that habitats would regenerate after decommissioning (-2).<br><br>Decommissioning works would remove the in-stream barriers increasing the potential movement of species upstream and downstream of the barrages - e.g. otter. As such alternative 4 has the potential to have slight positive effects on terrestrial ecology by provide access to aquatic habitat upstream of the barrages (+1). |
| Aquatic Ecology & Fisheries (2B) | +1 / -2 | Alternative 4 removes two barrages within Stream SC(7)B. This has the potential to increase movement of species upstream and downstream of the barriers - e.g. fish species. However, repeated fish surveys in the tributary on which the barrages are present strongly suggest that natural and artificial barriers downstream of Flaggy Bridge are preventing fish travelling upstream as far as the barrages so that even if they were removed, there's no guarantee that fish would be able to migrate upstream to where they are currently in place or beyond. It also has the potential to have a slight positive effect through restoring the riverbed and channel to a more natural hydromorphology, possibly improving the quality of aquatic habitat present, which in turn may benefit aquatic species (+1).<br><br>In a worst-case scenario, Alternative 4 has the potential to have a significant adverse effect on downstream water quality, fisheries and riparian habitat. The instream works required to remove the instream barriers will likely result in the disturbance or damage to bankside habitat. The instream works have the potential to result in the accidental release of large quantities of trapped sediment as well as pollutants into the watercourse i.e., silts, oils, greases. This would result in a reduction in water quality and an increased risk of mortality of fish and predator species (e.g. otter, bird species). The removal of all barriers has the potential to result in further changes to the watercourse morphology and hydrology (-2).<br><br>The ground disturbance associated with this alternative, e.g. associated with gaining access to the barrage locations for work vehicles, the removal of the peat repositories and importation of material to infill Borrow pit has the potential to cause the displacement of soil which under wet conditions could be mobilised and accidentally released into the nearby water course, also causing temporary but significant adverse effects to water quality and fisheries (-2). |
| **Land, Soils and Geology** | | |
| Local Land Practices (3A) | 0 | No change to Local Land Practices therefore no effects are anticipated (0). |
| Soils and Geology (3B) | 0 | No impact to Soil and Geology is anticipated. No residual risk of slippage or movement of soils is envisaged once the barrages are removed (0). |
| **Hydrology and Hydrogeology** | | |
| Flood Risk Management (4A) | -1 | The removal of all two barrages from the river has the potential to partially return it to its 'natural' / pre-development hydrological regime. However, the removal of barriers after 20 years has the |

| Environmental Topic (Sub-objective) | Degree of Potential Effect | Description |
|---|---|---|
| | | potential to increase instream flow which has the potential to have a slight adverse effect further downstream during large flood events (0). |
| Groundwater (4B) | 0 | No interaction with hydrogrological features therefore no effect to groundwater quality is anticipated (0). |
| **Air Quality & Climate** | | |
| Air Quality (5A) | -1 | There is potential for slight temporary adverse effects to air quality in the local area during decommissioning through increased emissions to air (dust/vehicle emissions) from decommissioning activities and increased traffic movements to and from the site (-1). |
| **Noise & Vibration** | | |
| Noise & Vibration (6A) | -1 | There is potential for slight temporary adverse effects through increases in noise and vibration levels resulting in potential infrequent breaches to relevant construction noise and vibration thresholds but unlikely to impact on the local community (-1). |
| **Cultural Heritage** | | |
| Cultural Heritage (7A) | 0 | No disturbance to soil therefore no potential effects to cultural heritage is anticipated (0). |
| **Landscape & Visual** | | |
| Landscape & Visual (8A) | -1 | Alternative 4 will result in some landscape and visual effects, both on the character of the landscape and the physical landscape. Slight adverse visual effects are likely as some of these works (Barrages 3&4 and Peat Repository at Barrage 3) would be visible from the public road (-1). |
| **Material Assets** | | |
| Material Assets (9A) | 0 | No disturbance to existing assets therefore no effects are anticipated (0). |
| Traffic (9B) | -1 | The decommissioning works have the potential to have a slight adverse effect on traffic. The effect to traffic will be a result of plant/personnel movement and movements that are associated with the creation of access tracks and the removal the Barrages 3 and 4. |
| **Waste & Resource Management** | | |
| Waste (10A) | -1 | Alternative 4 would likely have a very slight adverse effect on waste as the majority of material removed from site would be disposed of using methods lower down the waste hierarchy.<br><br>It is estimated a total of 5680 tonnes of material would be removed from site. The majority of stone and peat would be removed from site and most likely used for landfilling. |

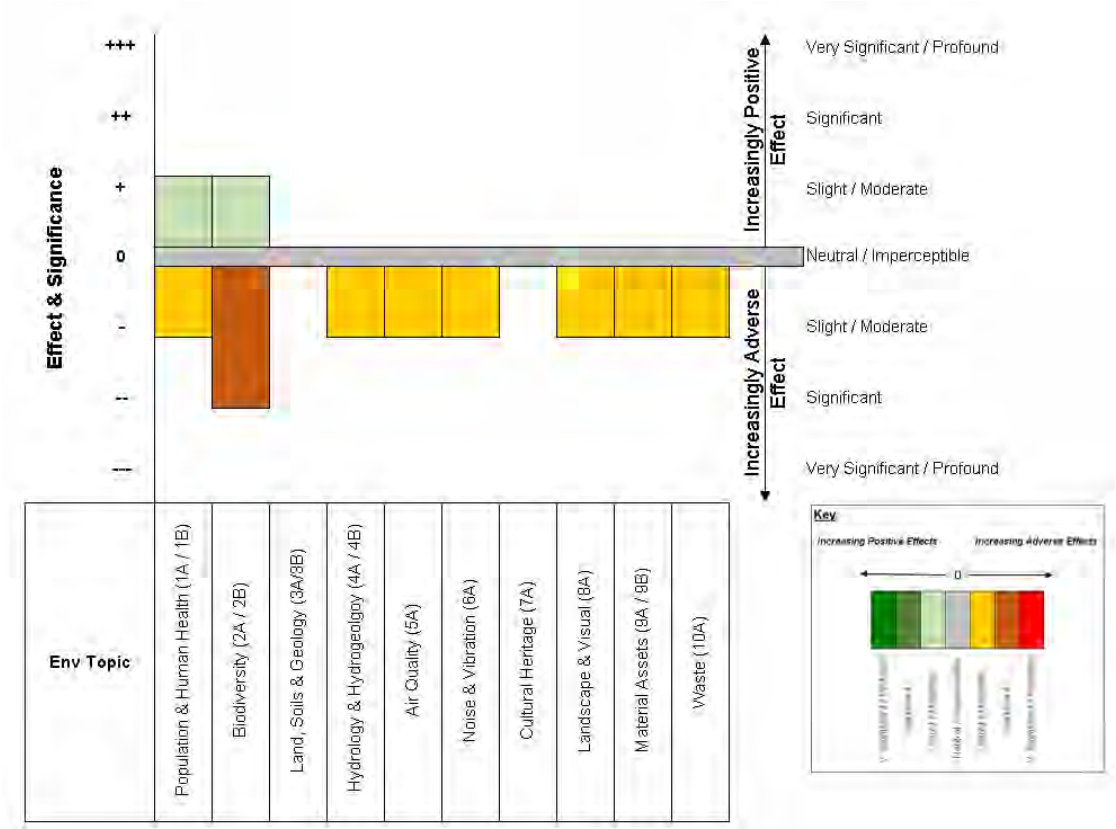



*Figure 3-16 Summary chart of Predicted Impacts of Alternative 4 (Work Area C) when compared to the Do-Nothing scenario*

Alternative 4 ensures that the Coillte forestry track at Barrages 1 & 2 will remain in situ. It also achieves the partial removal of instream barriers that have the potential to improve fish migration to upstream catchments (assuming fish can migrate past other natural and artificial barriers located downstream of Flaggy Bridge). Similar to Alternative 2, the works to remove the two of the four in-stream barriers would involve extensive instream works to remove the boulders from the river and to undertake riverbank reinstatement. Given the level of ground disturbance required and the potential to give rise to slight/moderate and significant negative effect to the environment, this alternative carries risks of environmental impact.

Although this alternative is practicable in terms of engineering feasibility, it is not in respect of environmental impact when compared to other alternatives.

### 3.4.3.5 Assessment of Alternatives (Work Area C)

A comparison of the decommissioning alternatives considered for Work Area C: Offsite ancillary works associate with the peat slide 2003 is provided in Table 3-22 below.

Alternative 1 and Alternative 3 proposed that no works are carried out to decommission the offsite features associated with the peat slide in 2003. There will be no requirement for vegetation clearance or the construction of temporary compounds and haul routes to access works areas. There would also be no requirement for instream works to remove any items – specifically instream barrages, peat repositories or repaired bridges. Although Alternative 1 and 3 would not achieve the removal of the naturalised features from the site, they are considered to be practicable alternatives. No disturbance to environment or instream works will be required to facilitate their removal and the privately owned infrastructure such as the coillte tracks at Barrage 1 and 2 and the unnamed bridge C will not be impacted. Also, since their installation in 2003, the instream features have not resulted in any environmental effects and this will likely remain the case into the future.

Alternative 2 includes the full removal of the offsite features associated with the peat slide. In addition to removing access roads used by Coillte, it was found that the effects of significant vegetation clearance and the construction of new temporary haul routes to access the offsite features (Barrages, Peat Repositories and Minor Borrow Pit at Barrage 1, bridge repairs and drainage works) has the potential to result in significant adverse effects to biodiversity in the short and medium term. The instream works required to remove the instream barriers will likely result in; disturbance or damage to valuable bankside habitat used by bats and other species, accidental release of large quantities of trapped sediment and/or pollutants, a reduction in water quality and an increased risk of mortality of fish and predator species. Furthermore, the removal of all barriers has the potential to result in further changes to the watercourse morphology and hydrology. This alternative would achieve the removal of structures and a high level of restoration on the site. The ability to restore the watercourse to pre-development conditions would be highly implausible as it is not possible to determine what the original ground levels were. Given the level of ground disturbance required and the potential to give rise to slight/moderate to significant adverse effects to the environment, this alternative carries risks of significant environmental impact. As such, Alternative 2 is not considered a practicable alternative.

Alternative 4 includes the partial removal of Barrages 3 and 4, while the Coillte Access track at Barrages 1 and 2, the bridge repairs and drainage diversion work remain in-situ. It was found that while Alternative 4 is a decrease in works, the impacts are identical to that of Alternative 2. The impacts to the environment are a result of the vegetation clearance, construction of new temporary haul routes, instream works required to remove the barriers and reinstatement. Per alternative 2, Alternative 4 is not considered a practicable alternative.

Given the significant environmental effects associated with Alternative 2 and 4, and for reasons outlined above the preferred option for Work Area C is Alternative 1 – Do Nothing. This alternative is unlikely to give rise to significant adverse effects on the environment.

*Table 3-22 Comparison of Alternatives Considered (Work Area C)*

| Environmental Topic (Sub-objective) | | Degree of Potential Effects and Significance | | | |
|---|---|---|---|---|---|
| | | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Population & Human Health** | Employment (1A) | 0 | +1 | 0 | +1 |
| | Human Health (1B) | 0 | -1 | 0 | -1 |
| **Biodiversity** | Terrestrial Ecology (2A) | 0 | -2 +1 | 0 | -2 +1 |
| | Aquatic Ecology & Fisheries (2B) | 0 | -2 +1 | 0 | -2 +1 |
| **Land, Soils & Geology** | Local Land Practices (3A) | 0 | 0 | 0 | 0 |
| | Soils and Geology (3B) | 0 | 0 | 0 | 0 |
| **Hydrology & Hydrogeology** | Flood Risk Management (4A) | 0 | -1 | 0 | -1 |
| | Groundwater Impacts (4B) | 0 | 0 | 0 | 0 |
| **Air Quality** | Air Quality (5A) | 0 | -1 | 0 | -1 |
| **Noise & Vibration** | Noise & Vibration (6A) | 0 | -1 | 0 | -1 |
| **Cultural Heritage** | Cultural Heritage (7A) | 0 | 0 | 0 | 0 |
| **Landscape & Visual** | Landscape & Visual (8A) | 0 | -1 | 0 | -1 |
| **Material Assets** | Material Assets (9A) | 0 | -1 | 0 | -1 |
| | Traffic (9B) | 0 | -1 | 0 | -1 |

| Environmental Topic (Sub-objective) | | Degree of Potential Effects and Significance | | | |
|---|---|---|---|---|---|
| | | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
| **Waste & Resource Management** | Waste (10A) | 0 | -1 | 0 | -1 |

*Table 3-23 Estimated tonnages of material to be removed from Work Area C during decommissioning (Alternative 1-4)*

| Description | Unit | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|---|
| Stone (Barrage No. 1 / Coillte Track) | Ton | 0 | 2160 | 0 | 0 |
| Stone (Barrage No. 2 / Coillte Track) | Ton | 0 | 2820 | 0 | 0 |
| Peat (Repository Area at Barrage No.2) | Ton | 0 | 1399 | 0 | 0 |
| Stone (Barrage No. 3) | Ton | 0 | 840 | 0 | 840 |
| Peat (Repository Area at Barrage No.3) | Ton | 0 | 238 | 0 | 0 |
| Stone (Barrage No. 4) | Ton | 0 | 840 | 0 | 840 |
| Peat (Repository Area at Black Road Bridge | Ton | 0 | 2128 | 0 | 0 |
| Stone for access tracks | Ton | 0 | 5000 | 0 | 5000 |
| **Total Volume** | **Ton** | **0** | **15426** | **0** | **6680** |
| **Vehicle Movements (2 way)** | **No.** | **0** | **1543** | **0** | **668** |

## 3.5 Conclusions

Alternatives are different ways of carrying out the Project in order to meet the agreed objective(s). In relation to the Derrybrien Wind Farm Development (pursuant to the ABP decision, ABP-308019-20), electricity generation has ceased and will not resume. Therefore, the alternatives considered relate only to its decommissioning.

The overarching project objective for the Derrybrien Wind Farm Development Decommissioning Project is as follows: To undertake the decommissioning of the Derrybrien Wind Farm Development by carrying out those works that enable the removal of structures from the site and, in so far as is practicable, its restoration, in a manner that ensures that all potential risks to key environmental factors are minimised or avoided where possible.

This chapter of the EIAR examined the various options for decommissioning of the Derrybrien Wind Farm Development and describes them having regard to engineering feasibility, environmental impact, and land ownership.

This chapter describes the evolution process for the Derrybrien Wind Farm Development Decommissioning Project and evaluates each approach based on following EIA topics: Population & Human Health; Biodiversity; Land, Soils & Geology; Hydrology & Hydrogeology; Air Quality; Noise & Vibration; Cultural Heritage; Material Assets and Waste & Resource Management.

The assessment of alternatives and the evolution process for the Derrybrien Wind Farm Development Decommissioning Project was undertaken on the basis of EIA topics for three separate work areas:

- Work Area A: Derrybrien Wind Farm including Derrybrien Substation
- Work Area B: The Derrybrien to Agannygal OHL including Agannygal Substation

- Work Area C: Offsite ancillary works associated with the 2003 peat slide.

The assessment was undertaken using a pre-defined sub-objective to determine the potential impacts of the following alternatives:

- Alternative 1- "Do-Nothing" - All features associated with the existing Derrybrien Wind Farm Development would remain in situ in its current state – i.e., an unauthorised windfarm development that ceased commercial electricity generation in February 2022.
- Alternative 2 – Remove all development which has taken place since 2003 including those offsite emergency works installed during the peat slide.
- Alternative 3 - Remove all development which has taken place since 2003 excluding those offsite emergency works installed during the peat slide.
- Alternative 4 – 'Practicable Restoration'.

A summary of the alternatives considered within each works is presented in Table 3-24 below.

*Table 3-24 Summary of Assessment of Alternative Findings for each Work Area*

| Work Area A | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|
| Allows for the removal of structures from the site. i.e. The Derrybrien Wind Farm including Derrybrien 110kV Substation. | No | Yes | Yes | Yes |
| Ensures that all potential risks to key environmental factors are minimised or avoided. | Yes | No | No | Yes |
| **Considered to be a Practicable Alternative.** | **No** | **No** | **No** | **Yes** |
| **Work Area B** | **Alternative 1** | **Alternative 2** | **Alternative 3** | **Alternative 4** |
| Allows for the removal of structures from the site. i.e. The Derrybrien to Agannygal OHL and Agannygal Substation. | No | Yes | Yes | Yes |
| Ensures that all potential risks to key environmental factors are minimised or avoided. | Yes | No | No | Yes |
| **Considered to be a Practicable Alternative.** | **No** | **No** | **No** | **Yes** |
| **Work Area C** | **Alternative 1** | **Alternative 2** | **Alternative 3** | **Alternative 4** |
| Allows for the removal of structures from the site. i.e. offsite features associated with the peat slide. | No | Yes | No | No |
| Ensures that all potential risks to key environmental factors are minimised or avoided. | Yes | No | Yes | No |
| **Considered to be a Practicable Alternative.** | **Yes** | **No** | **Yes** | **No** |

**Summary of Consideration of Alternative Options**

The alternative selected by the developer in respect of each works are and the reason for the chosen option is summarised below:

Work Area A: Derrybrien Wind Farm (including the Derrybrien 110kV substation)

Alternative 4 'practicable restoration' was selected as it facilitates the decommissioning of the Derrybrien Wind Farm (including the Derrybrien Substation) and ensures the potential risks to the environment, peat stability and human health is minimised.

Alternative 4 includes the removal of the above ground structures only, leaving the wind turbine foundations, underground cables, meteorological mast foundations and substation foundations in situ. Any protruding foundations or structures will be cut to below ground level and infilled and regraded with existing available materialto match adjoining areas. Works can be confined to areas within the control of Gort Windfarms Ltd.

When compared to other decommissioning alternatives, Alternative 4 aims to minimise ground and civil works across the site and by default reduces the potential environmental impacts. By leaving the roads, hardstands, bases, cables etc in situ there is a 98% reduction in waste and traffic generation thus reducing the effects from very significant /profound (Alternative 2&3) to slight to moderate. The potential for significant effects on soils and geology and the increased risk of further peat instability at the wind farm site is also reduced to slight to moderate.

Work Area B: Derrybrien to Agannygal 110 kV Overhead Line (OHL) and Agannygal 110kV Substation.

Alternative 4 - 'Practicable Restoration' was also selected as it facilitates the decommissioning of the Derrybrien to Agannygal 110kV OHL (including the Agannygal Substation) and ensures potential risk to the environment, peat stability and human health is minimised.

Alternative 4 aims to remove the existing above ground structures on the site, leaving all other features in situ in perpetuity. The reduction in civil works reduces the potential environmental effects. For example, the potential for Significant adverse effects to peat stability and Aquatic Ecology and Fisheries have been reduced to Slight to Moderate through leaving certain at or below ground features in situ.

Work Area C: Offsite ancillary works associated with peat slide (2003)

Alternative 1 'Do-Nothing' was selected by Gort Windfarms Ltd as it ensures the potential risk to the environment are eliminated. As no works would be undertaken, there would be no requirement for vegetation clearance or the construction of temporary compounds and haul routes to access works areas. There would no requirement for instream works or disturbance of any kind to environment. Furthermore, there would be no effects to privately owned infrastructure – the Coillte tracks at Barrage 1 and 2 and the rebuilt unnamed bridge C would not be impacted. Since their installation in 2003, the instream features have not resulted in any environmental effects, and this will likely remain the case into the future.

# 4. DESCRIPTION OF THE PROSPECTIVE DEVELOPMENT

## 4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the project and the component parts of the Project which are the subject of the application made to An Bord Pleanála (ABP), under section 37L of the Planning and Development Act 2000, as amended ("the 2000 Act") for permission to Decommission the Derrybrien Wind Farm Development ('the Prospective Development'). In addition, the Project also comprises the retention in situ of at-ground and below-ground structures such as turbine and other foundations; development associated with the historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits/quarries etc ('the Retained Development') and an application has been made simultaneously, under section 177E of the 2000 Act, for substitute consent ( the application for substitute consent is accompanied by, inter alia, a remedial Environmental Impact Assessment Report [rEIAR].

For the sake of completeness, and in order to enable an assessment of all aspects of the Project, whether or not the individual components of that project are the subject of an application under section 37L or 177E, this chapter describes all elements of the Derrybrien Wind Farm Development Decommissioning Project, including the Prospective Development and Retained Development.

For the purposes of the application for Prospective Development consent under section 37L, and the Board's consideration of this EIAR (and the Natura Impact Statement [NIS] also submitted with that application), the Prospective Development comprises the following:

- Enabling works to facilitate the decommissioning of the Derrybrien Wind Farm Development.
- Decommissioning and removal of the Derrybrien Wind Farm Development and associated ancillary components. The decommissioning works include the removal of the above-ground structures only leaving certain features in situ.
- Decommissioning and removal of the Derrybrien Wind Farm Development Grid Connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line (OHL). Reinstatement of the Ennis-Shannonbridge 110kV Line.

The area of the Prospective Development for which permission is sought under section 37L is defined by the "red line" application boundary as illustrated on the section 37L application drawings. The primary EIAR Study Area is shown in purple in Figure 4-1.

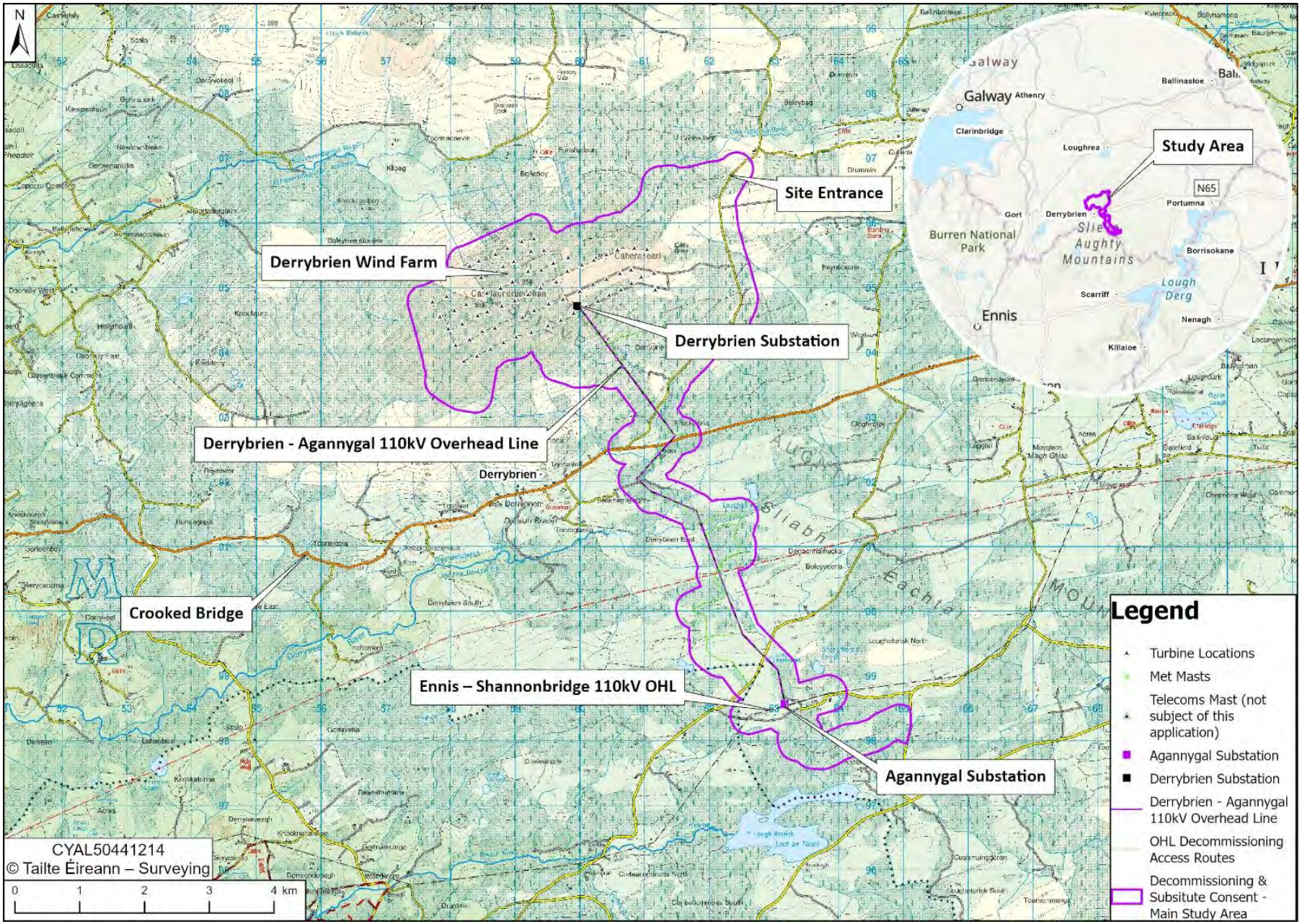



*Figure 4-1 EIAR Study Area*

## 4.2 Existing Derrybrien Wind Farm Project

The Derrybrien Wind Farm Development is owned and operated by Gort Windfarms Ltd, a wholly owned subsidiary company of ESB.

Derrybrien Wind Farm Development is located in County Galway in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast.

The Derrybrien Wind Farm Development site is located within the townlands of Boyaboy, Bolenyneendorrish, Coppanagh, Derreennamucka, Derrybrien East, Derrybrien North, Derrybrien West, Funshadaun, Kilbeg, Loughatorick North, Loughstorick South and Toormacnevin. The postal address is Derrybrien North, Kylebrack, Loughrea, County Galway, Eircode H62 PE08. The approximate centre of the wind farm site is at Irish Transverse Mercator (ITM) co-ordinates 559572E, 705010N.

The closest settlement to the wind farm site is the village of Derrybrien some 2 km to the south. The village of Peterswell is approximately 7.5 km west of the site. The nearest occupied houses are located approximately 2 km from the wind farm site.

The main components associated with the existing Derrybrien Wind Farm Development are described in the sections below, and include:

- Existing Derrybrien Wind Farm Development (Section 4.2.1).
- Existing Derrybrien-Agannygal 110kV Overhead Line (Section 4.2.2).
- Existing Agannygal Substation connecting into the Ennis-Shannonbridge 110kV Overhead Line and associated ancillary works (Section 4.2.3).
- Works undertaken in response to peat slide which occurred during construction of wind farm and associated ancillary works (Section 4.2.4).

For the purposes of assessment, a description of each component is provided in Sections 4.2.1 – 4.2.3 below. All components of the existing Derrybrien Wind Farm Development are shown in Figure 4-2.

Separately, a detailed description of those off-site features that were constructed in response to the peat slide that occurred in 2003 during the construction of the wind farm is also provided in Section 4.2.4. It should be noted that these elements of the Project are the subject of remedial environmental impact assessment by ABP as part of a separate substitute consent application under section 177E.

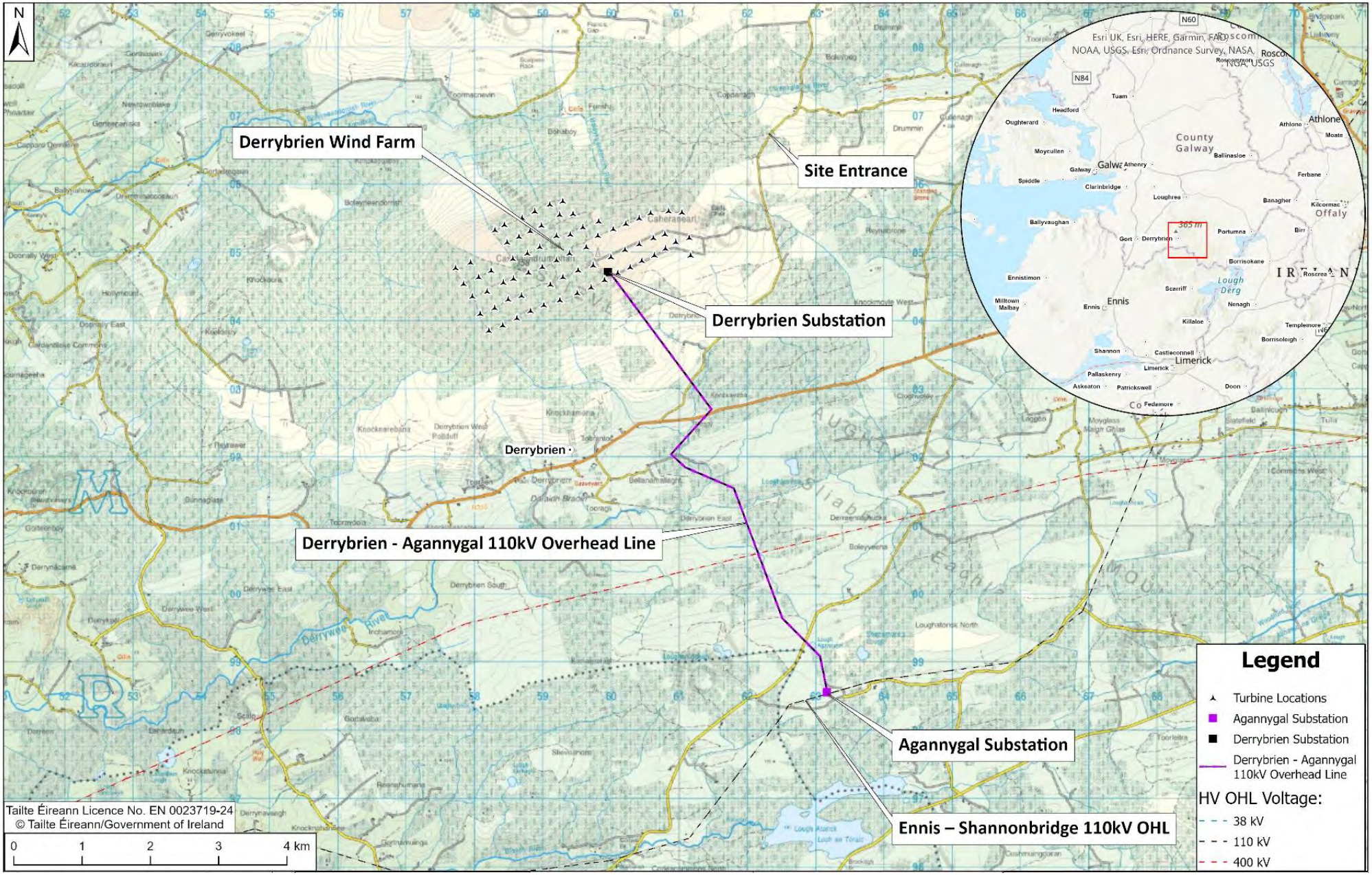



*Figure 4-2 Existing Derrybrien Wind Farm Development*

### 4.2.1 Existing Derrybrien Wind Farm

The overall area of the Derrybrien Wind Farm Development site is approximately 344.5 ha, but the wind farm infrastructure occupies only a small proportion of this area (31.1 ha – approximately 9% of site). The wind farm site is accessed from a Coillte access road via a minor public road known as the Black Road L-4214 (approximately 3.1 km from the wind farm to the Black Road/Coillte junction). The Black Road generally runs in a north south direction between the R353 at its southern end and Killeenadeema village (south of Loughrea) at its northern end. Access to the Black Road is via the R353 Regional Road, which originates near Portumna, passes over Flaggy Bridge before passing through the village of Derrybrien to join the N66 Loughrea – Gort National Secondary Road near Gort. From Gort the Black Road is accessed via the N66 for a distance of 1.7 km and the R353 for a distance of 14 km. Alternatively, the Black Road /Coillte access road can be accessed via minor public roads from Loughrea a distance of approximately 10 km.

The main wind farm infrastructure comprises 70 no. turbines and adjacent crane hard standings, 17.5 km of access tracks within the site (including 14.6km of floating access tracks), drainage channels, borrow pits/quarries, onsite material storage, the Derrybrien110 kV Substation, direct buried electric cables and 2 no. anemometer masts. These infrastructure elements are described below:

#### 4.2.1.1 Wind Turbines

There are seventy (70 no.) Vestas V52-850 kW turbines on site. The wind turbines have a rotor diameter of 52m, a hub height of 49m and overall height of up to 75m and associated ancillary development typical of a wind farm of this size and scale. A number of turbines foundations were constructed deeper below ground level to give a reduced hub height. It is noted that these turbines are small compared to modern turbines. Each turbine is supported by a turbine foundation and comprises a vertical tower (consisting of two cylindrical sections), a nacelle – housing the machinery, connected at the hub to three rotating blades. The wind turbines are painted light grey with a matt finish. The approximate spacing between turbines is between 150m to 260m in a west/southwest direction. A drawing of the Vestas V52-850kW turbine is provided in **Appendix 4-1.**

The main turbine components comprise:

- 2 no. cylindrical towers sections.
- 1 no. nacelle, which encapsulated the mechanical machinery of the wind turbine and was placed on top of the tower sections.
- 3 no. blades connecting to the hub of the nacelle.

The turbine towers are of tubular steel tapering from about 3.3m diameter at the base to 2.1m diameter at the top where the nacelle is mounted. Access to the tower is via a staircase located outside on the hardstand and a secure hinged door into the tower. The nacelle is accessed from the tower using an internal ladder with landing/rest positions. The tower and nacelle incorporate internal and emergency lighting.

The nacelle contains the generator and control unit, which is designed for computer-controlled monitoring of all major functions of the turbine. The glass-fibre reinforced nacelle cover protects all the components inside the nacelle against the elements.

A three-blade rotor is attached to the nacelle. The blades are made of fiberglass reinforced epoxy material with each blade consisting of two blade shells, bonded to a supporting beam. The wind turbines are geared to ensure the blades rotate in the same direction. Transformers are located internally within the turbine tower. The equipment is protected from lightning strike by deep earthing and from corrosion by multiple coatings. The turbine tower and nacelle are equipped with optical

smoke sensors. Aviation lights are provided on nine turbines, specifically T1, T18, T26, T44, T46, T47, T52, T61 and T65.

The basis of wind turbine operation is as follows:

- sensors are used to monitor wind direction and a yaw mechanism turns the turbines to keep the blades facing into the wind.
- the blades of the turbine, which are bolted onto a hub rotate at a rate of once every 3 – 5 seconds (s), depending on wind conditions.
- Inside the nacelle (housing) located at the turbine hub, the rotor drives a large shaft into a gearbox, which steps up the revolutions per minute to a speed suitable for the electrical generator. The rotor speed range is 14.0 – 31.4 revs per minute (rpm). A separate transformer is located internally within each wind turbine to uprate the generation voltage of the turbines from 380 – 660 V to a higher voltage for connection via underground cables to the Derrybrien Substation. The hermetically sealed wind turbine transformers can be considered as leak free and largely maintenance free. They are dispatched from the factory leak free and can primarily only be damaged during transport or installation. Once in service, they remain closed for their lifetime.

The electricity generated at each turbine is fed via underground cables to electrical transformers in Derrybrien Substation where it is transformed to a higher voltage for supply to the national electricity network. The cables are direct buried in the peat, at some locations like access track crossings, the cables are in ducts.

The windfarm ceased generating electricity in February 2022. Since that time, the turbines have been maintained by the turbine supplier while in a prolonged non-operational state.

#### 4.2.1.2 Derrybrien 110kV Substation

Underground cables from across the site converge at Derrybrien 110kV Substation where the electricity is transformed from 20kV to 110kV and exported to the national grid. The substation comprises a c.1585m$^2$ fenced stoned compound containing outdoor electrical equipment and a c.202m$^2$ single storey Control Building accommodating a control room, MV switchgear room, relay room (protection relays) battery room, welfare facilities, workshop and office area. Other features of the Derrybrien 110kV Substation include: monitoring and communications equipment to enable remote monitoring; electrical plant; a standby generator and associated bunded diesel tank; external lighting poles; a lightning mast; a wastewater treatment system and palisade fencing.

The station is accessed via a 4m wide hardcore surfaced access track with links to the on-site road network. Non-potable water is sourced from a well on-site.

#### 4.2.1.3 Anemometer masts

There are two anemometer lattice masts (meteorological masts or met masts) with a height (49m) corresponding to that of the turbines on the site which monitor wind speeds and validate the performance of the wind turbines. Each leg of the mast sits on a concrete plinth of plan dimension 1m x 1m x 1.5m (depth to top of foundation). The base of the masts is triangular in plan 2m x 2m x 2m. The mast is supported on reinforced concrete foundations. The masts are lattice masts, comprising a free-standing galvanised lattice type meteorological tower, being approximately 2m wide at its base x 0.6m wide at its top. Equipment on each mast comprises anemometers, wind direction vanes, a barometric pressure sensor and a data logger. Anti-climb screening (3m high) is provided to masts. A mobile phone network operator has a cell on the wind farm anemometer mast beside turbine T68 to assist with

improved phone signal at the site. A drawing of the 2 no. anemometer lattice masts is provided in **Appendix 4-1**.

#### 4.2.1.4 Third Party Mast:

There is also an existing telecoms mast in the east of the site (beside turbine T25) which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter. This mast is unrelated to the Derrybrien Wind Farm Development and pre-dates the presence of the wind farm by a significant period. The mast is currently supplied electricity through the metered Derrybrien Wind Farm Development electricity network.

#### 4.2.1.5 Access tracks:

Access to the wind farm site was facilitated by the upgrading of an existing Coillte forestry road which connected to the Black Road to the east of the site. This c.3.1 km road was widened (typically to 4m with 4.5m width at bends), strengthened and re-surfaced to facilitate the development. Lay-bys and drainage were provided and the bell mouth entrance at the junction with the Black Road was widened. There is a network of wind farm access tracks across the site. These comprise sections of pre-existing forestry tracks, and access tracks specifically developed during the construction of the wind farm. These facilitate on-going access to the wind turbines and anemometer masts for operation and maintenance.

#### 4.2.1.6 Borrow pits / quarries:

Three borrow pits / quarries were excavated on the site – with the extracted material used for the construction of access tracks and hard standing areas. Borrow Pit 1 (BP1) was a source of c. 40,000m$^3$ of material, primarily rock. Borrow Pit 2 (BP2) was a source of c. 12,000m$^3$ of material, primarily clay. These pits are estimated to be up to 10m deep. Borrow Pit 3 (BP3) adjacent to Turbine T65 is located at the entrance to the wind farm site. This was the main source of rock fill for the works, with c. 180,000cu.m. of material extracted. Some peat was stored in the vicinity of each of the borrow pits / quarries. The borrow pits have been closed since the end of the construction phase. BP3 is flooded to the natural water table level. Both BP2 and BP3 are fenced off as a safety measure.

#### 4.2.1.7 Peat excavation and storage:

To facilitate the development of the wind farm, peat was excavated from locations including the turbine foundations, hardstanding areas and the footprint of the substation. This material is stored in a number of peat repositories located across the site. Recent surveys (2019 / 2020) show the majority of these areas have naturally re-vegetated with blanket bog vegetation. In many locations these features are difficult to discern.

#### 4.2.1.8 On-site storage/Drainage and Signage:

Spare turbine parts are stored in a number of modular storage containers located on the wind farm site.

Across the site there is a network of drainage channels. These comprise a mixture of pre-existing and constructed channels and they facilitate the discharge of surface waters to watercourses. There are information and directional signs on the site – including panel signs at the wind farm entrance indicating the presence of the wind farm; signage on each turbine indicating the turbine number, potential hazards and an emergency contact telephone number; and operational signage as required e.g. buried HV cable, warning signs, etc.

### 4.2.2 Existing Derrybrien to Agannygal 110 kV OHL

The Derrybrien to Agannygal 110 kV Overhead OHL is the grid connection constructed for exporting the electricity generated at the wind farm to the national grid. It begins at the Derrybrien Substation (located within the Derrybrien wind farm site, ITM 559916E, 704736N) and ends at the Agannygal Substation (located to the south-east of the windfarm site, ITM 563118E, 698593N).

The grid connection comprises of c. 7.8 km 110 kV conductor, 34 no. double wood pole structures, 2 no. end masts, 5no. angle masts and 1 no. intermediate mast. The OHL connects into the Ennis – Shannonbridge line at the Agannygal 110kV Substation. The Agannygal 110kV Substation splits this line into two circuits: Agannygal – Shannonbridge (Galway West) and Agannygal – Ennis (Galway West).

Periodic access to the overhead line structures for inspection is from nearby roads and Coillte forestry tracks.

### 4.2.3 Existing Agannygal 110kV Substation

The Agannygal 110kV Substation is located within the townland of Loughatorick and the approximate centre point of Agannygal Substation is at ITM co-ordinates 563118E, 698593N. The site is owned by Gort Windfarms Ltd and under the control of ESB Networks.

The nearest villages to Agannygal 110kV Substation are the following: Derrybrien – 5 km to the northwest of the site, Ballynakill – 8.7 km to the northeast, Woodford – 10 km to the east and Flagmount – 8.4 km to the southwest.

Access to the Agannygal 110kV Substation and overhead line structures is from nearby roads and forestry tracks. The substation site is located within the townland of Loughatorick North

The Agannygal 110kV Substation consists of a palisade fenced compound (approximately 63m x 47.5m) containing outdoor electrical equipment and a Control Building. The foundations for the control building and the electrical equipment steelwork within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstanding is capped with hardcore surfacing. Other features include external cable trenching, standby generator (bunded) and diesel tank, external lighting poles, lightning mast and a well supplying nondrinking water. There is a wide hardcore surfaced access track around the external perimeter of the substation.

### 4.2.4 Offsite features constructed in response to the peat slide (2003)

Construction of the wind farm commenced in June 2003 and continued to 2006. A peat slide occurred during project construction on 16th October 2003. The peat slide occurred during excavation works for the foundation of Turbine 68 (T68) close to the southern boundary of the windfarm. The peat slide resulted in the disturbance and partial displacement of peat and forest debris mainly onto land downslope of the peat slide area to Black Road Bridge (Figure 4-4).

The peat slide area extended approximately 1.65 km downslope from turbine T68 and displaced peat and forestry over an area of approximately 25ha. The majority of the peat slide was contained within Coillte coniferous forests to the south of the wind farm site.

From the peat slide area, debris passed down a stream valley and into an area of open flatter ground where it lost momentum and was deposited upstream of a minor road bridge (the Black Road Bridge).

From the peat slide area, debris from the slide entered the valley of the stream located in the Derrybrien North sub-catchment into an area of flatter ground down to the Black Road Bridge approximately 1.0 km downslope from the slide area. This was the primary run-out zone for the slide. Some peat was transported further down the Owendalulleegh River with some peat being deposited along the riverbanks. The location of the peat slide and run-out zone is also shown in Figure 4-4.

In the days and weeks after the peat slide, following subsequent rainfall events, water entered the upper reaches of the stream and caused the peat slide debris to move downstream.

The estimated volume of peat in the peat slide area, based on the extent of the peat slide area was 450,000m$^3$. Estimates suggest that possibly 50 to 70% of the failed debris left the peat slide area. The remaining material within the peat slide area comprised typically isolated detached rafts of peat, peat debris and a thin covering of intact basal peat. The balance of the debris remains within the site of the peat slide.

The peat slide occurred in the Owendalulleegh Catchment with the bulk of the debris settling out in the 4 km$^2$ lake area of Lough Cutra. The finer buoyant material is likely to have over time been carried through Lough Cutra in the Beagh/Gort River and eventually discharged into Galway Bay at Kinvarra. A site walkover by geotechnical specialists in 2019 (downslope of Black Road Bridge) showed little/no visual evidence of any remaining peat debris deposited along the banks of the streams/rivers. Over time, any material deposited along the riverbanks has been eroded/degraded.

#### 4.2.4.1 Emergency Response Measures

A number of specific emergency response measures were undertaken in the immediate aftermath of the peat slide by Gort Wind Farms Ltd, and other bodies such as Galway County Council. Measures undertaken included the rebuilding of short sections of road within the wind farm site and the installation of eight (8 no.) barrages (three temporary earthen barrages, one temporary rockfill barrage and four extant boulder barrages) along and downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge.

These barrages were constructed along and downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge. After the landslide, four (4 no.) temporary earthen barrages (Barrages A, B, C and D) were removed and four (4 no.) remain in-situ (Barrages 1,2, 3 and 4). Peat and soil from the peat slide which had accumulated on adjacent lands, together with material excavated for the construction of barrages and had accumulated behind the barrages was placed in three (3 no.) peat repository areas (Figure 4-4) – Details of each and their current condition is provided below.

#### 4.2.4.2 Barrage 1 and Coillte Access Track

Barrage 1 is located approximately 1,100m downslope of the head at the peat slide. The closest turbine (T71) is approximately 770m from Barrage 1. This barrage reinstated forestry access across the peat slide area. The barrage was constructed of coarse fill founded on mineral soil shortly after the peat slide event. A minor borrow pit/quarry was opened up adjacent to Barrage 1 as a source of rock for the barrages built in response to the peat slide (approximate area 2314m$^2$). The dimensions of the sandstone/conglomerate boulders used in the construction of the containment barrage vary from 0.6 to 1.3m. The size of the boulders used in the parapet wall on the containment barrage was up to about 2m. The containment barrage footprint is approximately 94m long and 8m wide. A localised sump approximately 3m deep has been excavated on the upslope side of the barrage for drainage purposes. An access track 830m in length was constructed from an existing Coillte forest track in order to access the location of Barrage 1 and replace the Coillte access track removed by the slide. The access track comprised a western and eastern section. The access track to the west of Barrage 1 was constructed as a floating track on peat.

ESB undertook peat probing in 2020 in the area of the floated road section. The floating access track is estimated to be placed on peat about 0 to 1.4 m depth. Based on recent visual inspections, the containment barrage appears stable. The lack of recent accumulation of debris on the upslope face of the barrage indicates that the debris in the upslope peat slide source area is no longer mobile.

#### 4.2.4.3 Barrage 2, Access Track and Repository Area

This containment barrage is located within the gorge beyond the downslope end of the source area approximately 468m from Barrage 1. This barrage was constructed as part of the emergency works shortly after the peat slide event. The barrage comprised boulders placed within a section of an incised stream. The dimensions of the boulders used in the construction of the containment barrage range from 1.0 to 1.2m. The containment barrage is approximately 17m long and 20m wide at the surface.

The lack of recent accumulation of silt/sand debris on the upslope face of the barrage again indicates that the debris in the source area is no longer mobile. Based on a visual inspection, the containment barrage appears stable. The repository area adjacent to containment Barrage 2 comprises 2 no. separate storage areas which are referred to as the northern and southern repository areas. The northern repository has no bund whilst the southern repository has a bund comprising soil and rock around the stored arisings. The total plan area of the repositories is approximately 3,700m$^2$. The repository areas contain peat, silt and sand which were removed from behind the barrage in the years following the peat slide.

As part of the construction of the barrage, a 300m floated access track approximately 3metres wide was constructed from the existing Coillte forestry track to the site of Barrage 2. This track is 3m in width and was constructed using crushed rock imported from local quarries. The track is still present but is currently overgrown. The floating access track is 300m in length and was constructed on peat. The floating access track is estimated to be placed on peat up to about 1.5m depth based on nearest available data. The repository areas have become re-vegetated and recent visual inspections in 2020 shows that they are stable and have no signs of instability.

#### 4.2.4.4 Barrage 3 and Repository Area

This containment barrage is located over 1 km downstream of the source area. This barrage was constructed as part of the emergency works shortly after the peat slide event. The barrage comprised boulders placed within a section of an incised stream. The maximum dimension of the boulders used in the construction of the containment barrage range from 0.9 to 2.5m. The containment barrage is approximately 41m long and 9m wide at the surface. The barrage was heavily vegetated at the time of inspection.

Based on an inspection of an exposure along the watercourse bank in the area of barrage 3 and results of the Mackintosh probes (AGEC, 2018), the founding conditions for the barrage are likely to be bedrock. The aforementioned founding conditions would be deemed a competent stratum for the containment barrage. Based on a visual inspection, the containment barrage appears stable.

The repository area adjacent to Barrage 3 has a plan area of approximately 600m$^2$. The repository is partially cut into a slope adjacent to the barrage with a bund placed at the lower slope and partially along the upper slope. The repository area contains silt and sand which were removed from the area following the peat slide. The repository area has become re-vegetated, and a recent visual inspection shows that it is stable and has no signs of instability.

#### 4.2.4.5 Barrage 4

This containment barrage is located approximately 300m downstream of containment barrage 3. This barrage was constructed as part of the emergency works shortly after the peat slide event. The barrage

comprised competent boulders placed within a section of an incised stream. The maximum dimension of the boulders used in the construction of the containment barrage range from 1.0 to 2.1m. The containment barrage is approximately 25m long and 10m wide at the surface.

Based on an inspection of an exposure along the watercourse bank in the area of Barrage 4 and results of the Mackintosh probes (AGEC, 2018), the founding conditions for the barrage are likely to be bedrock. The aforementioned founding conditions would be deemed a competent stratum for the containment barrage. Based on a visual inspection, the containment barrage appears stable. The lack of recent accumulation of peat debris on the upslope face of the barrage indicates that the debris in the source area is no longer mobile.

#### 4.2.4.6 Repository Area at the Black Road Bridge

The repository areas at the Black Road Bridge essentially contain stored peat, together with some soil/rock debris from the peat slide and were placed up to about 2m high with a flat upper surface. The repository areas comprise 2 no. separate storage areas. Both storage areas are located on relatively flat ground and are heavily vegetated and are partially bunded. The total plan area of the repositories is approximately 11,900m$^2$. The repository areas contain peat and possibly some non-peat debris. The repository areas have become re-vegetated and recent site visits indicated the stored peat/debris was firm underfoot. Inspection of the stored peat/debris showed that they are stable.

#### 4.2.4.7 Drainage diversion works

As part of the works to stabilise the peat debris contained within the site of the peat slide, a series of drains were constructed to allow excess water to effectively drain away. In addition, since the peat slide occurred, a number of natural flow paths have formed within the site of the peat slide as a result of the development of preferential flow paths following rainfall events.

#### 4.2.4.8 Repairs to bridges

The peat slide resulted in damage to a number of bridges downstream of the wind farm. Repairs were carried out to address structural stability and capacity concerns. These individual structures are identified below in order from upstream to downstream.

- Black Road Bridge: At Black Road Bridge structural repairs consisted of replacing the parapets of the bridge.
- Flaggy Bridge: At Flaggy Bridge on the R353, damaged parapets were repaired and replaced after the peat slide.
- Unnamed Bridge C: Damage to Unnamed Bridge C (privately owned) by the peat slide necessitated removal of the existing structure and re-construction of the entire bridge span. Stepping Stones across Owendalulleegh: Replacement of stepping stones across Owendalulleegh River.
- Localised road widening was undertaken at Crooked Bridge on the R353, for a distance of approximately 30m on either side of the bridge.

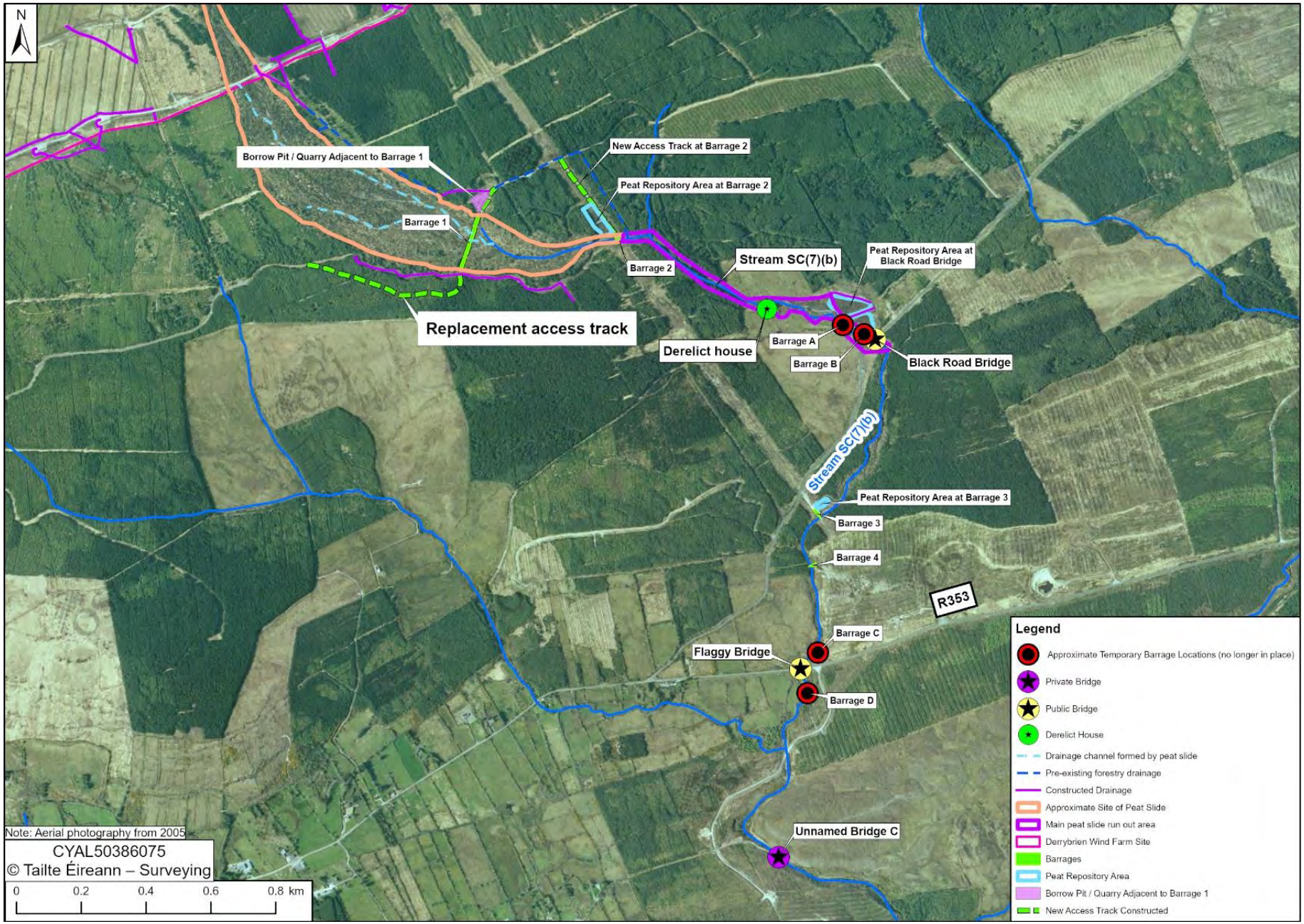



*Figure 4-3 Location of and the Extent of Peat Slide and Main Peat Slide Run Out Area.*

# 4.3 Derrybrien Wind Farm Development Decommissioning Project

The Derrybrien Wind Farm Development Decommissioning Project has been informed by an Assessment of Decommissioning Options (Chapter 3 to this EIAR) which sets out a rationale for the proposed decommissioning approach.

The proposed 'Derrybrien Wind Farm Development Decommissioning Project' comprises two types of "development" for which separate Prospective Development Consent and Substitute Consent is sought from An Bord Pleanála:

- "Prospective Development" - the carrying out of decommissioning works to remove the majority of above-ground features from the site – including all turbines, masts, electrical plant, overhead lines etc; and enable the final decommissioning of the site (the "prospective development" and "prospective works"); and
- "Retained Development" - the 'retention' in situ and in perpetuity of part of the existing development – including at-ground and below-ground structures such as turbine and other foundations; and development associated with historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits / quarries etc.

# 4.4 Prospective Development Components

This section of the EIAR describes the "prospective works" associated with the Derrybrien Wind Farm Development Decommissioning Project that are the subject of this EIAR. A detailed Decommissioning Management Plan has been prepared as part of this project **(Appendix 4-2)**. Detailed method statement for decommissioning works is provided within the Decommissioning Management Plan. The duration of the decommissioning phase is expected to be approximately 24 months. The prospective works proposed as part of the Derrybrien Wind Farm Development Decommissioning Project are summarised as follows:

- Enabling works to facilitate the decommissioning of the Derrybrien Wind Farm **(Section 4.4.1)**.
- Decommissioning and removal of the Derrybrien Wind Farm and their associated ancillary components **(Section 4.4.2)**.
- Decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line. Reinstatement of the Ennis-Shannonbridge 110kV Line **(Section 4.4.3)**.

## 4.4.1 Enabling Works

Enabling works will be undertaken at the Derrybrien Wind Farm site to facilitate the decommissioning, dismantling and removal of the Derrybrien Wind Farm. The enabling works will include the following:

- Establishment of temporary compounds – 3 no. temporary site compounds and hardstand areas will be re-established at the Derrybrien Wind Farm site and the Agannygal Substation.
- Minimal vegetation/scrub clearance and minor levelling works at the existing hardstand areas and access tracks. Waste arising from these enabling works is expected to comprise of vegetation, rubble and gravel. Any clean material that

cannot be reused on site will be removed by licensed waste carriers for disposal at appropriately licensed facilities.

- Improvements to existing access roads and forestry tracks. The existing access road and forestry tracks typically comprise a 3m wide running track constructed of crushed rock which has been founded on the mineral soil underlying the peat and floating road construction. Minor permanent upgrades to some sections of the access roads may be required to facilitate heavy plant accessing the wind farm. It is envisaged that the improvement works would include filling potholes and localised widening where necessary. Temporary widening of the turbary road and certain sections of turning heads may also be required to provide safe access to the mobile crane that will be used to dismantle the turbines. 1 No. 10m long turning area at Turbine No.4 is required to facilitate access and it is proposed to remain in place post decommissioning.

### 4.4.2 Decommissioning Derrybrien Wind Farm (including the Derrybrien 110kV Substation)

The decommissioning works will include the removal of the above ground structures and buildings only, leaving the access tracks, hard stands, wind turbine foundations, underground LV cables, meteorological mast foundations and substation foundations in situ. Any protruding foundations or structures would be cut to below ground level and infilled and reprofiled to match adjoining areas. The proposed decommissioning works are confined to areas within the control of Gort Windfarms Ltd (as illustrated on the site layout plans) and are considered typical of the industry norm in respect of windfarm decommissioning.

No bog rehabilitation or active drain blocking would occur, and the existing drainage network would be left to naturally rehabilitate. No replanting of forest would occur although some natural regeneration would be likely. The decommissioning works associated will include the following:

- De-energising of the site, which will involve initial disconnection of turbines, low voltage (LV) components followed by disconnection of high voltage (HV) elements;
- Temporary widening of the Turbary Road and certain sections of turning heads;
- Controlled dismantling of 70 no. turbines (blades, nacelle, and tower) and 2no. anemometer lattice masts;
- Controlled removal of electrical equipment from Derrybrien Substation and demolition of substation building.

#### 4.4.2.1 Access to wind farm:

It is proposed that the wind farm site will be accessed from a Coillte access road in the townlands of Bohaboy, Funshadaun and Coppanagh, via the BlackRoad (approximately 3.1 km from wind farm to the Black Road/Coillte junction). Black Road generally runs in a north south direction between the R353 at its southernend and Killeenadeema village (south of Loughrea) at its northern end. Access to theBlack Road is via the R353 Regional Road, which originates near Portumna, passes over Flaggy Bridge before passing through the village of Derrybrien to join the N66 Loughrea - Gort National Secondary Road near Gort. From Gort the Black Road is accessed via the N66 for a distance of 1.7 km and the R353 for a distance of 14km.Alternatively, the Black Road /Coillte access road can be accessed via minor public roads from Loughrea a distance of approximately 10km.

### 4.4.2.2 Controlled dismantling of 70 no. turbines and 2 no. anemometer lattice masts:

The 70 no. turbines and 2 no anemometer masts will be dismantled by mobile cranes operating on the adjacent granular hardstand areas,which are designed to support the crane loads on the glacial till or rock below the peat.

It is not proposed to carry out any remedial works on any of the elements of the wind farm that will be left in place after decommissioning. However, it may be necessary to carry out temporary road widening works along the narrow (approx. 3 metres) turbary road between Turbines T31 and T45 to provide safe access for the mobile crane that will be used to dismantle the turbines. If this is required, then the roads will be widened temporarily using a combination of steel plates, timber bog mats and aggregates, as necessaryto provide adequate edge support to the wheels of the crane without significantly increasing the loads on the peat.

Specialist trucks and low-loader transporters will be required to remove the heavy and oversize components of the turbines from the site. The mass and length of the main turbine components are as follows for the Vestas V52/850 turbine: Nacelle (22 tonnes), 26m Rotor Blades (1.9 tonnes), Tower sections (base tower 29.9 tonnes, top tower 20.5 tonnes)) and 49m Mast (55 tonnes).

The 2 no. anemometer lattice masts will be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland. Wind turbines and components will be reused or recycled where possible.

### 4.4.2.3 Controlled removal of electrical equipment from Derrybrien Substation and demolition of substation building

The Derrybrien Substation and control building will be dismantled. Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist. There will be no blasting on the site. The 80-tonne step-up transformer will be removed from site on a specialised multi-axle articulated truck and low-loader transporter. All demolition waste will be removed from the site. Sulphur hexafluoride ($SF_6$) switchgear from the substation and any oil-containing equipment will be carefully removed in compliance with applicable legislation. All waste generated will be managed in accordance with applicable legislative requirements.

On completion of the works, all above-ground structures will have been removed from the windfarm site. All sub-surface infrastructure, hardstand areas and the internal road network would remain *in situ* but would not be visible in the context of the surrounding landscape. Locations of works will be levelled and reinstated to match adjoining areas of ground. It is not proposed to replant the wind farm site with trees although natural regrowth of previously felled areas is likely.

Subject to a separate assessment and any grant of substitute consent by ABP, the features of the wind farm that will be left in-situ after decommissioning works are completed are listed below:

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approximately 17.5km of access tracks and 70no. hardstand areas.
- Direct buried underground electrical and communications cabling.
- 3no. Borrow Pits / Quarries.

- Naturalised Peat Repository areas.
- Onsite Drainage Infrastructure.
- The third-party mast will remain in situ but the electricity supply from the Derrybrien Wind Farm Development will be disconnected.

### 4.4.3 Decommissioning Derrybrien Wind Farm Grid Connection

The decommissioning works will include:

- Destringing of the overhead Line conductor.
- Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts).
- Controlled removal of Agannygal Substation and demolition of control building.
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast.
- Removal of palisade fencing surrounding the Agannygal Substation.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

#### 4.4.3.1 Destringing of Overhead Line Conductor

Access routes for decommissioning the OHL have been identified in the Decommissioning Management Plan subject to detailed design. The Decommissioning Management Plan has been included in **Appendix 4-2**. All-terrain vehicles including low ground pressure excavators will be used to access the Overhead Line (OHL) locations. Conductor destringing will be carried out and all-terrain vehicles will be used to pull lines to allow the conductor to be pulled from mast to mast. Where the OHL crossed public roads, temporary goalpost or H frameswill be used to support the conductor etc. over the road so that safe access can be maintained on the public roads.

#### 4.4.3.2 Removal of Overhead Line infrastructure

Access routes for decommissioning the OHL have been identified (Figure 14-10 included in Chapter 14). The overhead line (OHL) will be decommissioned and will entail the removal of the OHL infrastructure between the Derrybrien Substation and Agannygal Substation. During the removal of the overhead line, all polesets and masts will be cut at base. The OHL poles and mast elements will be removed from site for reuse and if necessary, disposal in accordance with the relevant legislation. On completion of the works, all above-ground structures will have been removed from the route of the overhead line and the Agannygal Substation site. Any disturbed areas shall be reinstated, and the below-ground features will be imperceptible.

#### 4.4.3.3 Decommissioning of Agannygal Substation

The decommissioning of Agannygal Substation will involve the removal of the aboveground elements of the substation. These works will entail the de-energising of the electrical equipment and the removal of sub-station from site. The substation equipment will be reused or recycled where possible. All waste will be managed in accordance with applicable legislation. On completion of the works, all structures will be removed from the Agannygal Substation site. The palisade fencing surrounding the substation will be dismantled and removed from site. The reinforced concrete base for the substation will be left *in situ* as will the access road to the site.

#### 4.4.3.4 Reinstatement of the Ennis-Shannonbridge 110 kV Line

Following the decommissioning of the Derrybrien Wind Farm Development grid connection the Ennis-Shannonbridge 110kV Overhead Line will be reinstated, involving mid span joints and re-conductoring of the OHL span at Agannygal 110kvV Substation. Stringing equipment will comprise 4x4 vehicles, puller – tensioners, teleporters, stringing wheels, conductor drums, compressor & head, transit vans, chains and other small tools, drum stands and drum carriers. It is estimated that thework would take less than 6 weeks to undertake.

On completion of the works, all above-ground structures will have been removed from the route of the overhead line and the Agannygal Substation site. Any disturbed areas shall be reinstated and below ground features rendered imperceptible. The OHL poles and mast elements will be removed from site in accordance with the relevant legislation. The reinforced concrete bases will remain in situ. Tree replanting is not proposed although natural regrowth of previously felled areas is likely.

Subject to a separate assessment and any grant of substitute consent, the features of the overhead line and Agannygal Substation that will be left *in situ* after decommissioning works are completed are listed below:

- Below ground elements of 34no. double wooden pole sets.
- Reinforced concrete foundations for 2no. end masts.
- Reinforced concrete foundations for 5no. angle masts.
- Reinforced concrete foundations for 1no. intermediate mast.
- Reinforced concrete foundations of structures within the Agannygal Substation compound.

## 4.5 Decommissioning Programme

The proposed project programme and phasing plan is presented in Section 2.0 of the Decommissioning Management Plan (**Appendix 4-2**). The duration of the decommissioning phase is expected to be approximately 24 months, which may need to be extended appropriately e.g. seasonal, garda escort availability for abnormal loads etc.

The decommissioning of the project is expected to take place in stages, described below. The stages are expected to run concurrently unless, they are prevented from being doing so, due to for example, the seasonality of the works such as the presence of breeding birds or hedge trimming etc, weather conditions, ground conditions or availability of an outage of the grid for the reinstatement of the Ennis-Shannonbridge line etc.

## 4.6 Environmental Protection Measures

A series of construction environmental protection measures for the Derrybrien Wind Farm Development Decommissioning Project were developed through the preparation of this EIAR whose primary objective is to identify the baseline environmental context of the Prospective Development, predict potential beneficial and/or adverse cumulative effects of the development and propose appropriate mitigation measures where necessary. The preparation of the environmental appraisals was guided by the requirements of EU Directives and Irish law regarding Environmental Impact Assessment.

### 4.6.1 Environmental Management Plan

The Derrybrien Wind Farm Development Decommissioning Project will be undertaken in compliance with a Construction Environmental Management Plan (CEMP) which will include all measures which

have been brought forward from the environmental assessments undertaken during the preparation of this EIAR as well as any additional measures required pursuant to conditions of development consent An Outline CEMP (oCEMP) has been prepared and submitted with the application for permission, so as to enable a comprehensive assessment of the decommissioning works. The oCEMP has been included in **Appendix 4-3**. The mitigation measures included in the CEMP set out the minimum requirements which will be adhered to during the decommissioning of the Derrybrien Wind Farm.

### 4.6.2 Resource and Waste Management Plan

All waste generated on site during the decommissioning will be dealt with in accordance with the applicable provisions of the Waste Management Act 1996, as amended, and regulations made thereunder. Measures to minimise waste generation during the decommissioning of the Derrybrien Wind Farm and effectively manage those wastes which arise are set out below.

A Resource & Waste Management Plan (RWMP) has been prepared to enable a comprehensive assessment of the prospective decommissioning works and forms part of the application for permission (**Appendix 16-2**). The mitigation measure included in the RWMP will be adhered to during the decommissioning of the Derrybrien Wind Farm Development.

### 4.6.3 Traffic Management Plan

A Traffic Management Plan has been prepared to enable assessment to be carried out prior to granting development consent in respect of the decommissioning traffic impacts. The Traffic Management Plan has been submitted with the application for prospective development consent and will be finalised, consequent on any grant of permission, in conjunction with the planning authority. The TMP include details of route of decommissioning traffic, temporary road closures, diversions, temporary signal strategy; programme of vehicular arrivals; onsite parking for vehicles and workers; road cleaning and other traffic management requirements. A Traffic Management Plan has been prepared and forms part of the application for permission (**Appendix 14-4**).

## 4.7 Cumulative Impact Assessment

The EPA's EIAR Guidance (2022) states as follows in relation to cumulative effects:

> *"The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.*
>
> *While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or insignificant), result in a cumulative impact that is collectively significant. For example, effects on traffic due to an individual industrial project may be acceptable; however, it may be necessary to assess the cumulative effects taking account of traffic generated by other permitted or planned projects. It can also be prudent to have regard to the likely future environmental loadings arising from the development of zoned lands in the immediate environs of the proposed project."*

The EIA Directive and associated guidance documents state that as well as considering any indirect, secondary, transboundary, short-, medium-, and long-term, permanent and temporary, positive and negative effects of the project (all of which are considered in the various chapters of this EIAR), the description of likely significant effects should include an assessment of cumulative impacts that may arise. The factors to be considered in relation to cumulative effects include population and human health, biodiversity, land, soil, water, air, climate, material assets, landscape, and cultural heritage as well as the interactions between these factors.

To gather a comprehensive view of cumulative impacts on these environmental considerations and to inform the EIAR process being undertaken by the consenting authority, each relevant chapter within this EIAR includes a cumulative impact assessment where appropriate. The potential cumulative impact of the proposed and other relevant developments has been carried out with the purpose of identifying what likely significant effect the Prospective Development will have on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed, and constructed projects in the vicinity of the Prospective Development.

The cumulative impact assessment of projects has three principle aims:

- To establish the range and nature of existing projects within the cumulative impact study area of the proposed development.
- To summarise the relevant projects which have a potential to create cumulative impacts.
- To identify the projects that hold the potential for cumulative interaction within the context of the proposed development and discard projects that will neither directly or indirectly contribute to cumulative impacts.

Assessment material for this cumulative impact assessment was compiled on the relevant developments within the vicinity of the Prospective Development. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIAR (or historical EIS) documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts.

## 4.7.1 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts arising during all phases of the Prospective Development and for which all relevant data was reviewed include those listed below.

### 4.7.1.1 Derrybrien Wind Farm Development Decommissioning Project (Retained Development)

The proposed **'Derrybrien Wind Farm Development Decommissioning Project'** comprises two elements:

- The carrying out of decommissioning works to remove the majority of above-ground features from the site – including all turbines, masts, electrical plant, overhead lines etc; and enable the final decommissioning of the site (the "Prospective Development"); and
- The structures to be retained in situ and in perpetuity of part of the existing development – including at- and below-ground structures such as turbine and other foundations; and development associated with historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits / quarries etc. ("the Retained Development").

This Environmental Impact Assessment Report (EIAR) accompanies the application made to An Bord Pleanála, under section 37L of the Planning and Development Act 2000, as amended ("the 2000 Act") for permission for the Prospective Development. In addition, an application has been made simultaneously, under section 177E of the 2000 Act, for substitute consent in respect of the Retained Development (which application is accompanied by, *inter alia*, a remedial Environmental Impact Assessment Report [rEIAR]).

Thus, this EIAR assesses the potential cumulative effects associated with the Retained Development (which forms the subject-matter of the substitute consent application).

#### 4.7.1.2 Applications within the Vicinity of the Wind Farm

A review was undertaken of the Galway County Council planning register documents in respect of the relevant general development planning applications in the vicinity of the existing wind farm.

Furthermore, the cumulative impact assessments carried out in each of the subsequent chapters of this EIAR consider all potential significant cumulative effects arising from all land uses in the vicinity of the Prospective Development.

Additional detail in relation to the potential significant cumulative effects arising and, where appropriate, the specific suite of relevant mitigation measures proposed are set out within each of the relevant chapters of this EIAR.

Following a desktop review of the Galway County Council online planning portal there have been no new development consent applications within c. 2km of the existing turbine infrastructure lodged in the last 5 years.

- Pl Ref. 18/1462: for the construction of a forest access road and entrance with all ancillary site works. (**Withdrawn** – 19/03/2019).
- Pl Ref. 17/152: Chun teach chonaithe garaiste, coras searachais agus seirbhis laithreain a thogail. Gross floor space of proposed works: House 151sqm, Garage 60sqm (**Withdrawn** – 09/06/2017).
- Pl Ref. 17/994: Chun teach chonaithe garaiste, coras searachais agus seirbhis laithreain a thogail. Gross floor space of proposed works: House 151sqm, Garage 60sqm (**Withdrawn** – 24/10/2017).

The study area is located in a rural setting with low density residential development in the surrounding area. As indicated above, there have not been any new development permitted within the general vicinity of the study in the last 5 years and there are no dwellings within 2 km of the subject site. The closest occupied residential dwelling is c. 2.5km south of the subject site.

#### 4.7.1.3 Proposed Gort Lowlands Flood Relief Scheme

The proposed Gort Lowlands Flood Relief Scheme is examining options of providing flood overflow pathways from anumber of turloughs (Lough Coole to Caherglassaun to Cahermore and an overland spill to the Galway Bay at Dungory Castle at Kinvarra). Design process is currently underway.

### 4.7.2 Adjacent Land Uses

#### 4.7.2.1 Forestry and Turf Cutting

The adjacent land at the Derrybrien Wind Farm is used for forestry. The State-owned company Coillte owns most of the forestry in the area, with non-Coillte private forestry represents less than 10% of forestry in the area. In 1998, prior to project construction, approximately 76% of the site (263ha) was used for commercial forestry, with most of the remainder used for turbary. Based on Coillte data, much of the wind farm site had been planted in 1963-1973, a smaller proportion in 1980-1988 and a section to the southwest of the site in 1994.

The development of the wind farm entailed the felling of approximately 222ha of forestry within the wind farm site. The remaining forestry on site was not felled. Most of the resulting timber was taken off site, some used for the construction of floating roads on site, and some was left on site.

No commercial forestry activities have taken place on the wind farm site since the development of the wind farm. Due to the age profile of the trees in the surrounding areas much of the forestry estate will,

over the next decade, require felling and replanting as part of the normal lifecycle of such commercial plantations.

**Turf Cutting:** The area is also used by local people for turf cutting who hold turbary rights to a large proportion of the area. There are 136 turbary plots within or immediately adjacent to the wind farm site. Individual plot sites range in area between approximately 0.55ha and 1.10ha. Turbary rights simply means the right to cut and carry away turf from a specific plot of bogland and, includes the right of preparing and storing on the bogland any turf that is cut from it. Turf cutting on turbary lands is referred to hereinafter in this EIAR as "turbary". The location and extent of turbary plots is shown in Figure 4-5.

Turf cutting activities outside project site

No peat extraction activities subject to a development consent have been identified in the vicinity of the Project. An inspection of EPA licences and planning files in the area has not found any peat extraction projects in the area. Despite no licensed or permitted projects being identified, turbary turf cutting is likely to be practiced in the wider area as at the Derrybrien site.

Property based data is not readily available regarding the extent of turbary lands in the area. In the absence of such data, the extent of turbary in the vicinity of the project has been assumed to equate to the habitat category "cutover bog" obtained from the National Parks and Wildlife Service (NPWS) Hen Harrier mapping project for the Slieve Aughty Mountains SPA. In the report (Moran and Wilson, 2015) accompanying the digital mapping the habitat category Cutover Bog has been defined as – "This category should be used in situations where part of the original mass of peat has been removed through turf cutting or other forms of peat extraction." The primary data-source utilised for identifying non-forestry habitats was the Digital Globe Satellite Imagery. There are limitations as to accuracy of this data, in particular, the categorisation of habitats based on the interpretation of aerial images has an inherent limitation in that it is dependent on the ecologist interpreting the image. The categorisation of many of the habitat types is subjective, and different ecologists may assign different habitat categories. Figure 4-6 shows considerable areas of cutover bog but a considerable distance from the project and largely separated from the site by forestry.

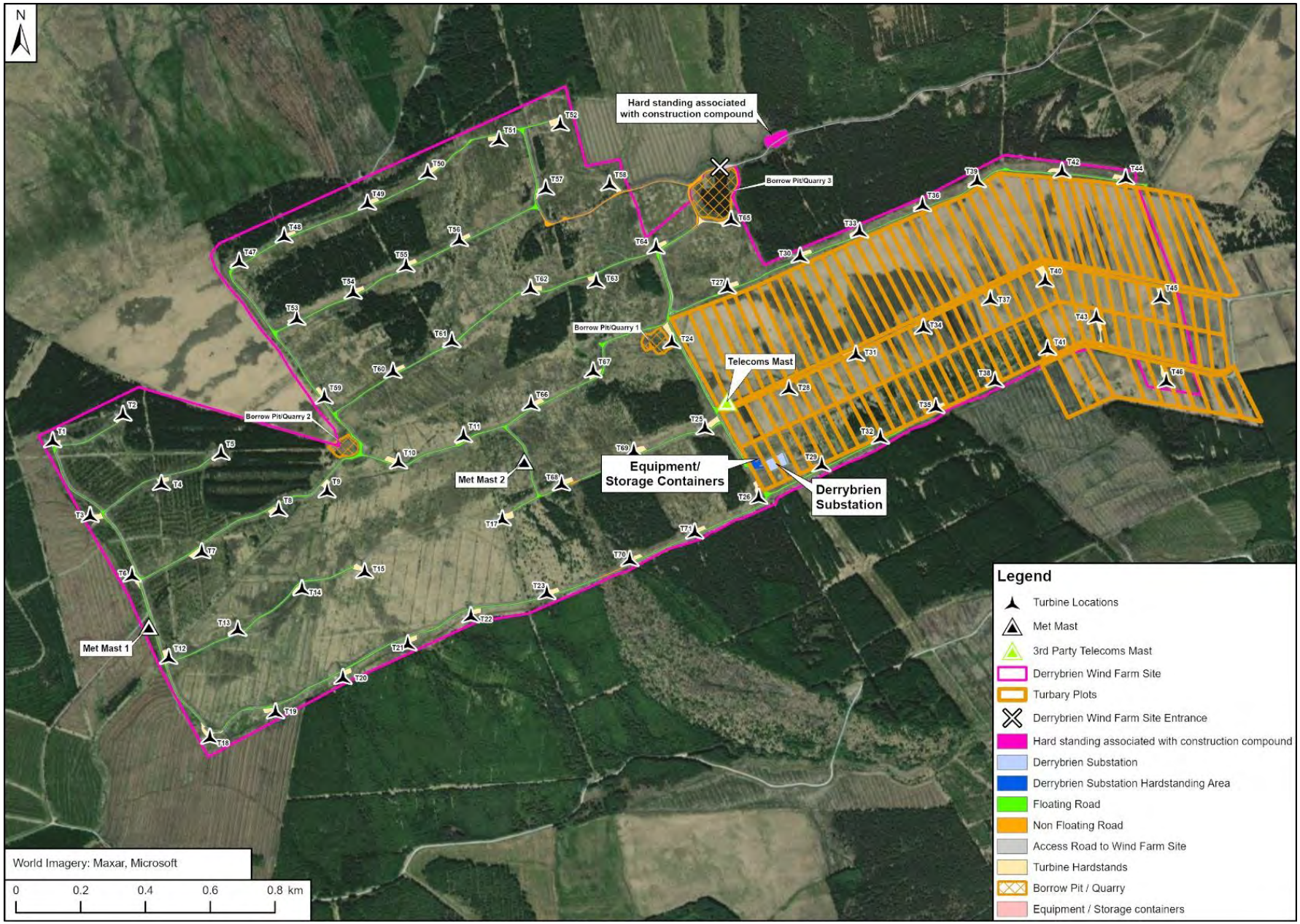



*Figure 4-4 Location of Turbary within and immediately adjacent to wind farm*

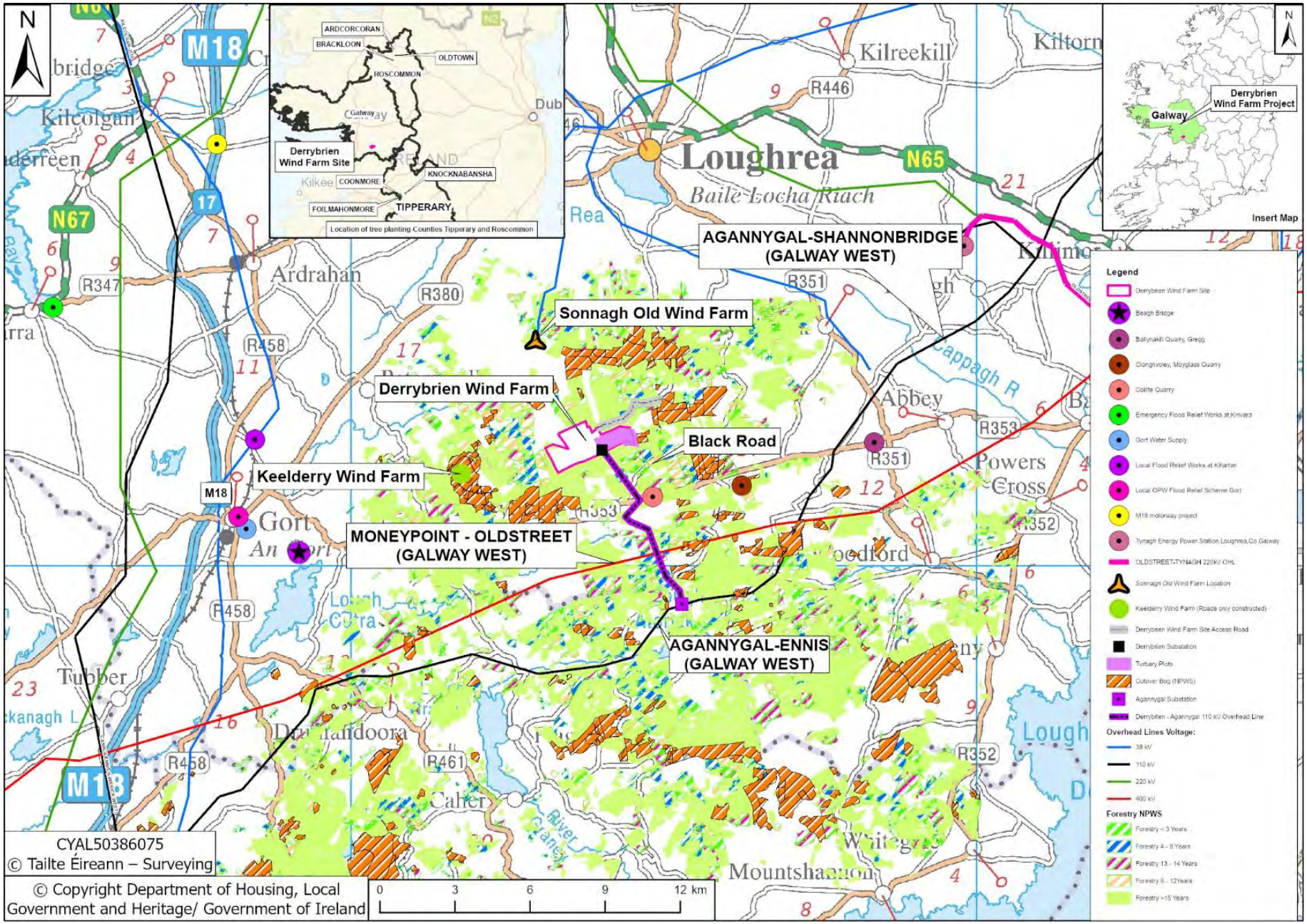



*Figure 4-5 Location of Projects/Activities considered*

#### 4.7.2.2 Environmental Designations

There are a number of European Sites designated as Special Protection Areas (SPAs) or Special Areas of Conservation (SACs) in the vicinity of the Derrybrien Wind Farm site. The Derrybrien Wind Farm site is located within the Slieve Aughty Mountains Special Protection Area and mast AM24 is located within the Slieve Aughty Bog Natural Heritage Area (NHA). The spatial configuration of these designated nature conservation sites and relationship with the Prospective Development is presented and assessed in Chapter 6 of this EIAR and, in the case of European sites, in the Appropriate Assessment Screening Report (AASR) and Natura Impact Statement submitted with the application for permission under section 37L.

There are no protected archaeological or industrial heritage features designated within the application area. There are eleven (11 no.) recorded archaeological sites located within the 3km study area. An assessment of these amenity sites and relationship with the Prospective Development is presented and assessed in Chapter 12 of this EIAR.

# 5. POPULATION AND HUMAN HEALTH

## 5.1 Introduction

### 5.1.1 Chapter Scope

This section of the Environmental Impact Assessment Report (EIAR) identifies, describes, and assesses the potential impacts and effects of the Prospective Development on human beings, population and human health and has been completed in accordance with the EIA guidance and legislation set out in Chapter 1: Introduction. The full description of the Prospective Development is provided in Chapter 4 of this EIAR.

One of the principal concerns in the development process is that individuals or communities should experience no significant diminution in their quality of life from the direct or indirect effects arising from the decommissioning of a development. Ultimately, all the impacts of a development impinge on human health, directly and indirectly, positively and negatively. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, noise, health and safety.

### 5.1.2 Statement of Authority

This section of the EIAR has been prepared by Thomas Blackwell and reviewed by Michael Watson, of MKO. Thomas is a Senior Environmental Consultant with MKO with over 17 years' of progressive experience in environmental consulting and in the assessment of environmental documents for renewable energy developments. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin.

Michael Watson is a Project Director with MKO; with over 20 years' experience in the environmental consulting sector. Michael's project experience includes the management and delivery of Environmental Impact Statements / EIARs, with a particular focus on the renewable energy (wind) sector.

### 5.1.3 Relevant Legislation

The population and human health section of this EIAR is carried out in accordance with legislation and guidance referred to in Chapter 1 of this EIAR. The Prospective Development is will be carried out in compliance with the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (General Application) Regulations 2007 and also by S.I. 291 the Safety, Health and Welfare at Work (Construction)(Amendment) Regulations, 2019.

The Department of Environment, Community and Local Government set out an appropriate approach to reflect the requirements of the 'EIA Directive' (Directive 2011/92/EU as amended by 2014/52/EU) in relation to Population and Human Health in their Key Issues Consultation Paper.

> *"It is intended that the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters, and not requiring a wider consideration of human health effects which do not relate to the factors identified in the Directive"*

### 5.1.4 Relevant Guidance

This chapter of this EIAR is carried out in accordance with the 'EIA Directive' and has been prepared in accordance with guidance referred to in Chapter 1 of this EIAR.

In addition to the guidelines set out in the Environmental Protection Agency (EPA) Guidelines on the information to be contained in the Environmental Impact Assessment Report (2022) and the EIA Directive, the following guidelines, plans and reports have been reviewed, considered, and applied in the preparation of this chapter:

- Department of Health – Health in Ireland: Key Trends 2022.
- Department of Housing, Planning and Local Government (DoHPLG), Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018).
- European Commission (EC), Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- Department of the Environment, Heritage and Local Government Wind Energy Development Guidelines (2006).
- Department of the Environment, Heritage and Local Government Draft Wind Energy Development Guidelines (2019).
- Environmental Impact Assessment of National Road Schemes- A practical Guide, National Roads Authority/ Transport Infrastructure Ireland, Revision 1, November 2008.
- Fáilte Ireland EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects, July 2023.
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2022).
- Health Impact Assessment Resource and Tool Compilation, United States Environmental Protection Agency 2016.
- Health Impact Assessment Guidance, Institute of Public Health Ireland. 2009.
- Framework for Human Health Risk Assessment to Inform Decision Making developed by the United States Environmental Protection Agency (US EPA) 2014.
- Institute for Environmental Management and Assessment (2017) Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment.
- Institute for Environmental Management and Assessment (2022) Determining Significance for Human Health in Environmental Impact Assessment.
- Central Statistics Office (CSO): Census of Ireland 2016; Census of Ireland 2022; Census of Agriculture 2020.
- The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region (WHO, 2022 Update) https://www.who.int/.

## 5.2 Methodology

### 5.2.1 Population and Human Health Study Area

In order to assess the population in the vicinity of the Prospective Development, the Study Area for the Population section of this EIAR was defined in terms of the Electoral Divisions (EDs) where the site is located, and where relevant, nearby EDs which may be affected by the Prospective Development. The Prospective Development lies predominantly within Derrylaur and Aille EDs, while also lying partly in the adjacent EDs of Kilthomas, Castleboy, Mountain and Marblehill (in the 2022 census combined with the EDs of Loughatorick and Coos). These EDs therefore comprise the Study Area. The Study Area for the Population and Human Health chapter of this EIAR is shown in Figure 5-1.

## 5.2.2 Consultation

Chapter 2 Section 2.2 of this EIAR describes the scoping and consultation exercise undertaken for the Prospective Development. Scoping responses pertinent to this chapter are discussed below.

### Health Service Executive

A scoping response was received from the Health Service Executive (HSE) on 14th October 2024. The response stated that a representative from HSE has reviewed the submitted scoping documents and has nothing further to add. Additionally, the response stated that the National Environmental Health Service (NEHS) will assess the EIAR in accordance with the protection of public health.

### Uisce Éireann

A scoping response was received from Uisce Éireann on the 21st of October 2024, which provided information on the water distribution and sewer networks at the site. The response stated that there are no underground water or sewerage networks within the footprint of the site.

### Fáilte Ireland

A scoping response was received from Fáilte Ireland on the 15th of October 2024 and provided the 'Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA', to inform the preparation of the Environmental Impact Assessment Report (EIAR) for the Prospective Development. The report provides guidance for those conducting Environmental Impact Assessment and compiling an EIAR, or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2 of the 'Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA', including some of the key requirements for an EIAR under the current guidance:

- Project description.
- Assessment of alternatives considered.
- Baseline assessment.
- Assessment of effects.
- Cumulative impacts.
- Interaction of impacts.
- Mitigation & monitoring.
- Residual impacts.

## 5.2.3 Impact Assessment Methodology

The EPA guidelines have been used to describe effects and impacts where they occur.

The EPA guidelines set out seven generalised degrees of effect significance that are commonly used in EIA: Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant and Profound. While generalised descriptions of these degrees of significance are provided in guidance, no specific thresholds are established, and it is a matter of best professional judgement to determine the degree of significance for a given effect. This socio-economic study of the receiving environment includes an examination of the population and employment characteristics of the area. Information regarding population and general socio-economic data were sourced from the Central Statistics Office (CSO), the Galway County Development Plan 2022– 2028, Fáilte Ireland and any other literature pertinent to the area.

The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2022, the Census of Ireland 2016, the Census of Agriculture 2010, and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town and Electoral Division (ED) level.

### 5.2.3.1 Population

A desk-based assessment using sources and guidelines referenced in Section 5.1.4 above was undertaken to examine relevant information pertaining to the population impact assessment. Information on population statistics, employment and social data for the relevant EDs were obtained from the CSO for census years 2022. 'Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA' was also considered in this assessment. See section 5.3 below

### 5.2.3.2 Human Health

The human health analysis section was assessed using guidelines set out in section 5.1.4 above.

The WHO defines health as: "*A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*".[1]

#### National Guidance

In Section 3.3.6 of the EPA 2022 EIAR Guidelines, it states that "*in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g., under the environmental factors of air, water, soil etc.*" Environmental Impacts from the Prospective Development which may also have an impact on population and human health are discussed in this chapter but addressed in more detail in the following chapters: Chapter 8 Land Soil and Geology, Chapter 9 Hydrology and Hydrogeology, Chapter 10 Air Quality and Climate, Chapter 11 Noise and Vibration, Chapter 13 Landscape and Visual, Chapter 14 Material Assets (including Traffic and Transport).

As referenced in the European Commission's Environmental Impact Assessment of Projects: *Guidance on the Preparation of the Environmental Impact Assessment Report* (2017), human health is, "*a very broad factor that would be highly project dependent.*" The report continues:

> *'*The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population.'*

The EPA 2022 EIAR Guidelines state that,

> *"while no specific guidance on the meaning of the term Human Health has been issued in the context of Directive 2014/52/EU, the same term was used in 3.3.6 the SEA Directive (2001/42/EC). The Commission's SEA Implementation Guidance states 'The notion of human health should be considered in the context of the other issues mentioned in paragraph (f)'" of the Directive, where paragraph f lists*

[1] *World Health Organisation Constitution Available at: https://www.who.int/about/governance/constitution*

*environmental factors such as soils, water, landscape, air etc. The Guidelines state that this approach is 'consistent with the approach set out in the 2002 EPA Guidelines where health was considered through assessment of the environmental pathways through which it could be affected, such as air, water or soil'. The Guidelines note that the above approach follows the 2002 EPA guidelines already in place which details the following:*

*'The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment'.*

## IEMA Guidance 2017

The Institute for Environmental Management and Assessment (IEMA) published *'Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment'* in 2017 examining what a proportionate assessment of the impacts on health should be in Environmental Impact Assessments. The document states that Health Impact Assessment (HIA) and EIA are separate processes.

*'HIA is defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project on both the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects... [...] ... HIA can inform EIA practice in relation to population and human health but conducting a HIA will not necessarily meet the EIA population and human health requirement. By the same token, conducting an EIA will not automatically meet the requirements of a HIA.'*

The IEMA report acknowledges that 'disproportionate burdens maybe placed on developers if HIA is applied as a proxy for the consideration of population and human health in every future UK EIA'. The focus of EIA should be on predicting health and wellbeing outcomes, rather than focusing on changes in determinants of health e.g., expected changes in noise levels. Determining the significance of impacts on population and human health should include a professional judgement, scientific literature; consultation responses; comparison with baseline conditions; local health priorities; and national/international regulatory standards and guidelines. The IEMA report refers to the WHO 2014 report which provides and overview of health in different types of assessment:

"*The health sector, by crafting and promoting HIA, can be regarded as contributing to fragmentation among impact assessments. Health issues can, and need to, be included [in impact assessment] irrespective of levels of integration. At the same time, from a civic society perspective, it would be unacceptable for HIA to weaken other impact assessments. A prudent attitude suggests optimizing the coverage of health along all three avenues:*

- *Better consideration of health in existing impact assessments other than HIA;*
- *Dedicated HIA; and*
- *Integrated forms of impact assessment."*

As such, the WHO does not support a stand-alone HIA unless it could be demonstrated to be of advantage over an EIA Therefore, given that this human health assessment is part of the EIAR; there is no stand-alone HIA.

### EIA Significance Matrix for Human Health, IEMA Guidance 2022

The IEMA Working Group 2022 published *Determining Significance for Human Health In Environmental Impact Assessment* in response to gaps and inconsistencies across existing guidance documents as to how health is assessed in EIA, particularly with regard to significance. The aim of this report is to assist and streamline discussions for consultants producing the assessments and for the decision makers who are reviewing the assessments. The report states that an EIA must identify, describe and assess the direct and indirect significant effects in an appropriate manner of a proposed development on human health. It must include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects, taking into account current knowledge and methods of assessment.

## 5.2.4 Limitations /Difficulties Encountered

No significant difficulties were encountered in the preparation of the Population and Human Health chapter of this EIAR.

# 5.3 Receiving Environment

This socio-economic study of the receiving environment included an examination of the population and employment characteristics of the area. Information regarding population and general socio-economic data were sourced from the Central Statistics Office (CSO), the Galway County Development Plan 2022 – 2028, Fáilte Ireland and any other literature pertinent to the area. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2022, which is the most recent census for which a complete dataset is available, also the Census of Ireland 2016, the Census of Agriculture 2020 and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town and Electoral Division (ED) level.

The Derrybrien Windfarm Development Decommissioning Project (Prospective Development) is in County Galway in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast. The overall area of the wind farm site is approximately 344.5 ha, but the wind farm infrastructure occupies only a small proportion of this area (31.1 ha - approximately 9% of site). The existing Derrybrien Wind Farm Development is located within the townlands of Boyaboy, Bolenyneendorrish, Coppanagh, Derreennamucka, Derrybrien East, Derrybrien North, Derrybrien West, Funshadaun, Kilbeg, Loughatorick North, Loughstorick South and Toormacnevin. Please refer to Figure 4-1 of Chapter 4: Project Description for the site location.

In order to assess the population in the vicinity of the Prospective Development, the Population Study Area for the Population section of this EIAR was defined in terms of the EDs where the Prospective Development is located, and where relevant, nearby EDs which may be affected by the Prospective Development. The Prospective Development lies predominantly within Derrylaur and Aille EDs, while also lying partly in the adjacent EDs of Kilthomas, Castleboy, Mountain and Loughatorick/Coos/Marblehill. In the 2022 census, the EDs of Marblehill and Coos were combined under the name of Loughatorick/Coos/Marblehill. To allow for comparison of the Study Area between 2016 and 2022, the then separate EDs of Marblehill and Coos Eds will be considered together in the 2016 Study Area. These six EDs therefore comprise the Study Area for the Population section of this EIAR. The Study Area has a population of 2,008 persons, as of 2022 and comprises a total land area of 232km$^2$ (Source: CSO Census of the Population 2022).

There are 11 no. private residential dwellings within 500m of the Prospective Development (Figure 5-2), The closest third-party property (inhabitable dwelling) to the proposed works is located approximately 25m from the southern section of the site boundary. Potential noise related impacts at these dwellings are detailed in Chapter 11 of this EIAR.

## 5.3.1 Population

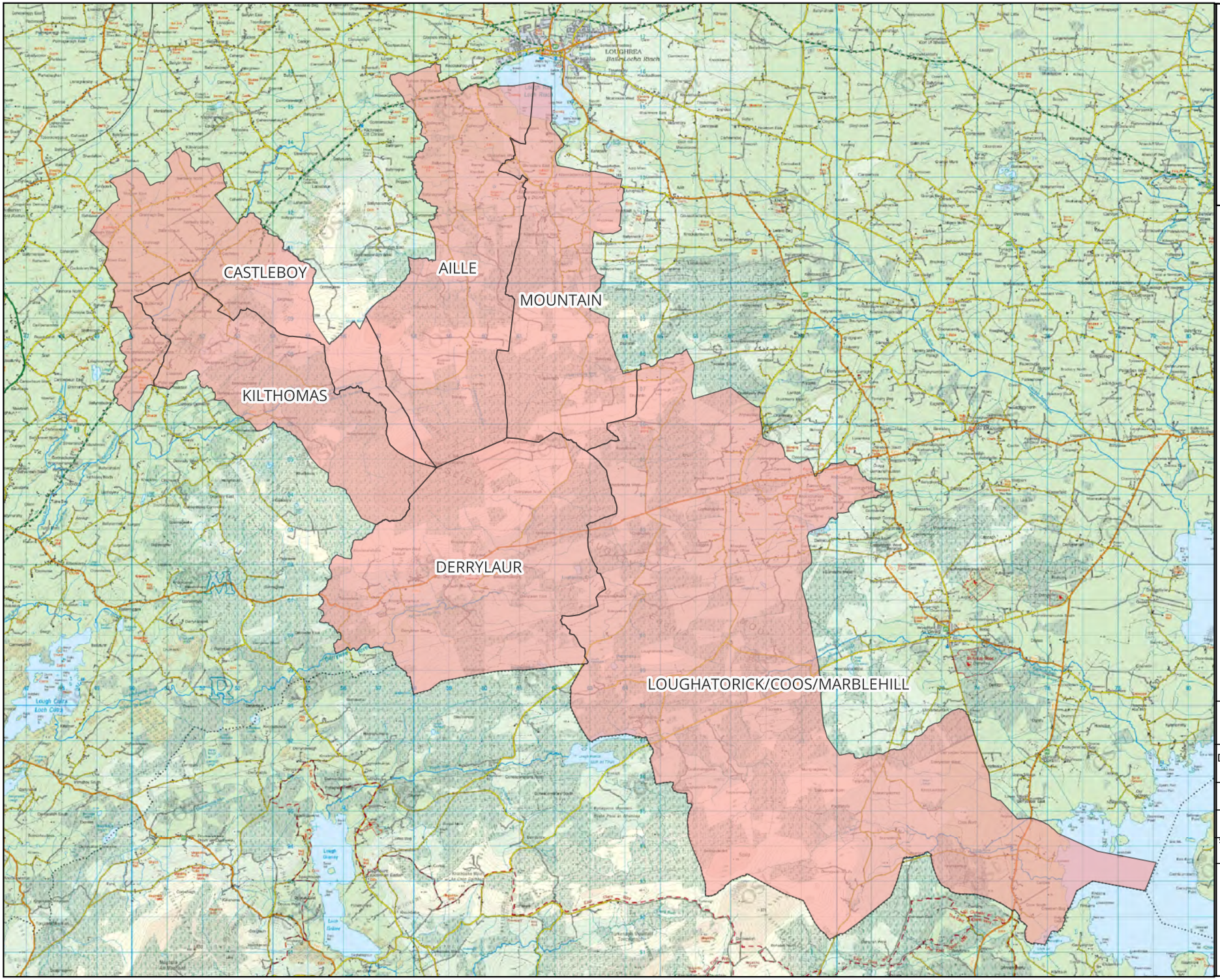
### 5.3.1.1 Population Trends

In the period between the 2016 and 2022 Census, the population of Ireland increased by 8%. During this time, the population of County Galway grew by 7.8% to 193,323 persons. Other population statistics for the State, County Galway and the Study Area have been obtained from the Central Statistics Office (CSO) and are presented in Table 5-1.

*Table 5-1 Population 2016 – 2022 (Source: CSO)*

| Area | Population Change | | % Population Change |
|---|---|---|---|
| | 2016 | 2022 | 2016-2022 |
| State | 4,761,865 | 5,149,139 | 8.1% |
| Co. Galway | 179,390 | 193,323 | 7.8% |
| Study Area | 1,866 | 2,008 | 7.6% |

The data in Table 5-1 shows that the population of the Study Area grew in the period between the 2016 Census and the 2022 Census by 7.6% from 1,866 to 2,008 people. The rate of population growth increased in this period, which is in line with the growing population of both the State and County.




## Map Legend

Electroral Divisions

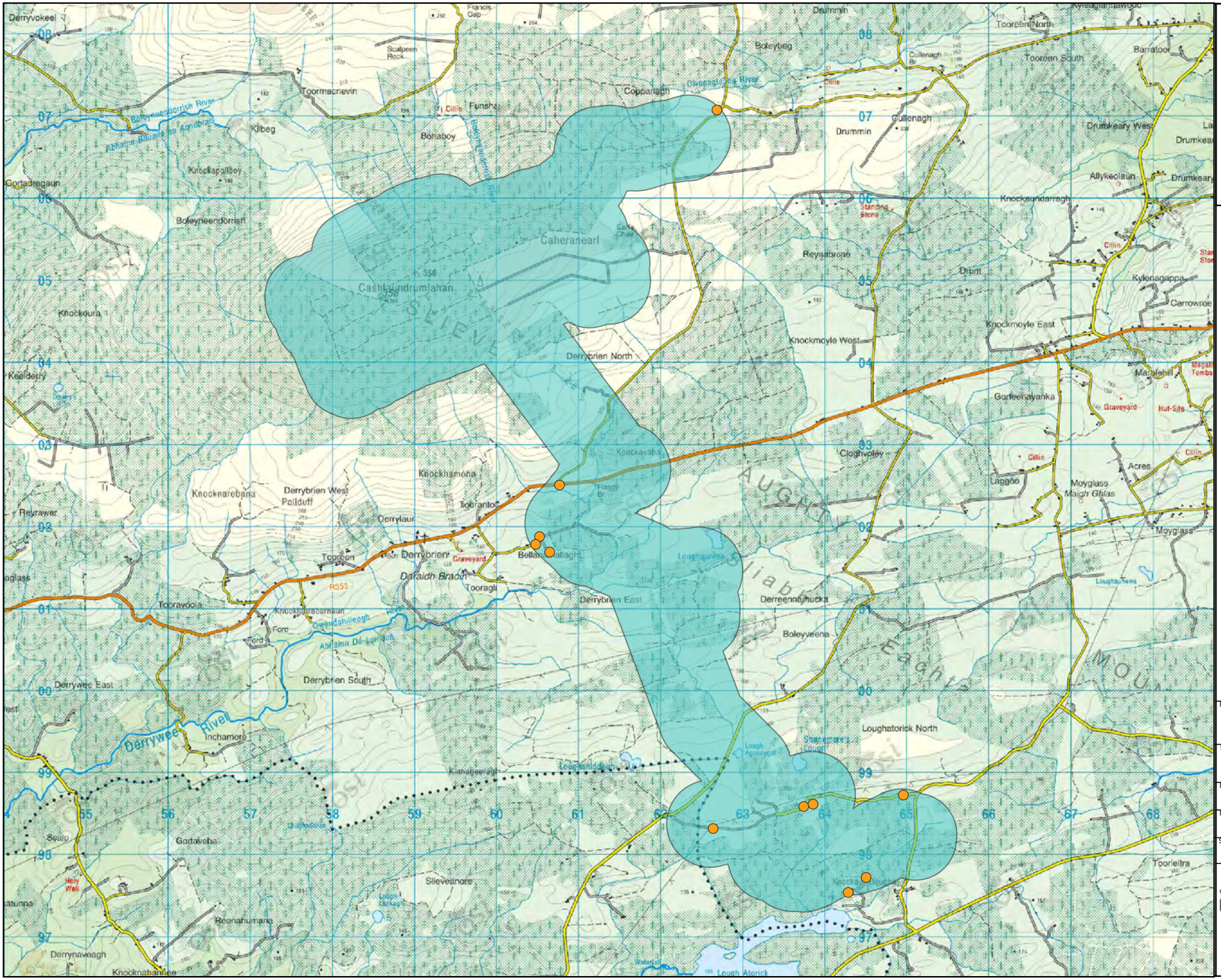
Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

Drawing Title
Population and Human Health Study Area

Project Title
Derrybrien Wind Farm Decommissioning Project

| Drawn By | Checked By |
|---|---|
| MV | TB |
| Project No. | Drawing No. |
| 220437 | Figure 5-1 |
| Scale | Date |
| 1:140,000 | 10/03/2025 |

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie




## Map Legend

- Noise Sensitive Receptors (Dwellings within 500m of Site)
- Derrybrien 500m Buffer

Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

Drawing Title
**Existing Noise Sensitive Locations**

Project Title
Derrybrien Wind Farm Decommissioning Project

| Drawn By | Checked By |
|---|---|
| MV | TB |
| Project No. | Drawing No. |
| 220437 | Figure 5-2 |
| Scale | Date |
| 1:60,000 | 10/03/2025 |

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

### 5.3.1.2 Population Density

The population densities recorded within the State, County Galway and the Study Area during the 2016 and 2022 Census are shown in Table 5-2.

*Table 5-2 Population Density in 2016 and 2022 (Source: CSO)*

| Area | Population Density (Persons per square kilometre) | |
|---|---|---|
| | 2016 | 2022 |
| State | 67.8 | 73.3 |
| Co Galway | 29.4 | 31.7 |
| Study Area | 8.0 | 8.6 |

The population density of the Study Area recorded during the 2016 Census was 8.0 persons per $km^2$. This figure is significantly lower than the national population density of 67.8 persons per $km^2$ and the county population density of 29.4 persons per $km^2$. These findings confirm that the site of the Prospective Development is located within a very sparsely populated area.

The population densities recorded during 2022 around the Prospective Development site is varied across the six EDs. Derrylaur had the lowest population density at 2.43 persons/$km^2$ and Kilthomas and Loughatorick/Coos/Marblehill EDs had lower recorded population densities at 4.7 and 4.6 persons per $km^2$ respectively, while Castleboy ED had the highest of the six population densities at 23.04 persons per $km^2$.

### 5.3.1.3 Household Statistics

The number of households and average household size recorded within the State, County Galway and the Study Area during the 2016 and 2022 Censuses are shown in Table 5-3.

*Table 5-3 Number of Household and Average Household Size 2016 – 2022 (Source: CSO)*

| Area | 2016 | | 2022 | |
|---|---|---|---|---|
| | No. of Households | Avg. Size (persons) | No. of Households | Avg. Size (persons) |
| State | 1,697,665 | 2.8 | 1,841,152 | 2.7 |
| County Galway | 63,040 | 2.8 | 68,021 | 2.8 |
| Study Area | 683 | 2.7 | 746 | 2.7 |

The figures in Table 5-3 show that the number of households on a State, County and Study Area level, the number of households increased in the period between 2016 and 2022. The average number of persons per household remained virtually unchanged for the Study Area. This aligns with the figures presented for the State and County Galway.

A closer look at this data also show that Derrylaur has the lowest average household size at 2.3 persons/ household and Aille the highest at 2.9 persons per household. Kilthomas and

Loughatorick/Coos/Marblehill have an average household size of 2.5 persons per household; meanwhile, Mountain and Castleboy have an average household size of 2.8, which is in accordance with the average Study Area, County and State household size.

#### 5.3.1.4 Study Area Age Structure

Table 5-4 presents the population percentages of the State, County Galway and Study Area within different age groups as defined by the Central Statistics Office during the 2022 Census. This data is also displayed in Figure 5-3.

*Table 5-4 Population per Age Category in 2022 (Source: CSO)*

| Area | Age Category | | | | |
|---|---|---|---|---|---|
| | 0 - 14 | 15 – 24 | 25 - 44 | 45 - 64 | 65 + |
| State | 19.7% | 12.5% | 27.6% | 25.1% | 15.1% |
| County Galway | 21.0% | 11.6% | 24.1% | 26.7% | 16.6% |
| Study Area | 24.0% | 15.3% | 29.4% | 40.4% | 24.9% |

The proportion of persons in the 65+ category in the Study Area population is higher than that recorded at a State-level. This highlights an ageing population in the Study Area. For the Study Area, the highest population percentage occurs within the 45-64 age category followed by the 25-44 age category, while the two least represented age categories are 0-14 and 65+.

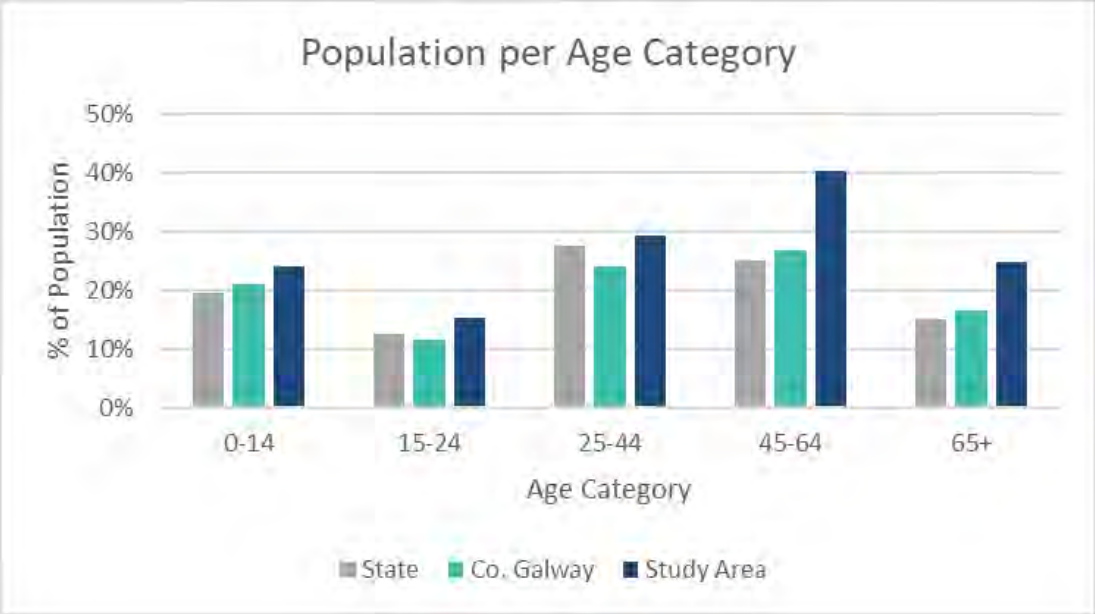



*Figure 5-3 Population per Age Category in 2022 (Source: CSO)*

## 5.3.2 Employment and Economic Activity

### 5.3.2.1 Economic Status of the Study Area

In 2022, there were 2,531,099 persons in the labour force in the State. Table 5-5 shows the percentage of the total population aged 15+ who were in the labour force in the State during the 2022 Census. This

figure is further broken down into the percentages that were at work or unemployed. It also shows the percentage of the total population aged 15+ who were not in the labour force, i.e., those who were students, retired, unable to work, or performing home duties. In Census 2022, for the first time, two categories of unemployment detail were included, Long-term Unemployment and Short-term Unemployment, for the purpose of this assessment, both categories have been grouped into one Unemployment group.

*Table 5-5 Economic Status of the Total Population Aged 15+ in 2022 (Source: CSO)*

| Status | | State | County Galway | Population Study Area |
|---|---|---|---|---|
| % of population aged 15+ who are in the labour force | | 61.2% | 60.6% | 59.7% |
| % of which are: | At work | 91.7% | 92.8% | 95.0% |
| | First time job seeker | 1.4% | 1.1% | 0.7% |
| | Unemployed | 7.0% | 6.2% | 4.3% |
| % of population aged 15+ who are not in the labour force | | 38.8% | 39.4% | 40.3% |
| % of which are: | Student | 28.6% | 27.7% | 25.8% |
| | Home duties | 17.0% | 16.8% | 19.7% |
| | Retired | 41.0% | 43.0% | 43.8% |
| | Unable to work | 11.8% | 10.8% | 9.5% |
| | Other | 1.7% | 1.7% | 1.2% |

Overall, the principal economic status of those living within the Study Area is broadly similar to that recorded at both State and County Level. During the 2022 Census, the percentage of people over the age of 15 who were in the labour force were similar at a State, County level and slightly lower at Study Area level. Of those who were not in the labour force during the 2022 Census, the highest percentage of the Study Area population were 'Retired' individuals, which correlates with both the State and County figures.

### 5.3.2.2 Employment by Socio-Economic Group

Socio-economic grouping divides the population into categories depending on the level of skill or educational attainment required. The 'Higher Professional' category includes scientists, engineers, solicitors, town planners and psychologists. The 'Lower Professional' category includes teachers, lab technicians, nurses, journalists, actors and driving instructors. Skilled occupations are divided into manual skilled such as bricklayers and building contractors; semi-skilled such as roofers and gardeners; and unskilled, which includes construction labourers, refuse collectors and window cleaners. Figure 5-4 shows the percentages of those employed in each socio-economic group in the State, County Galway and the Study Area during 2022.

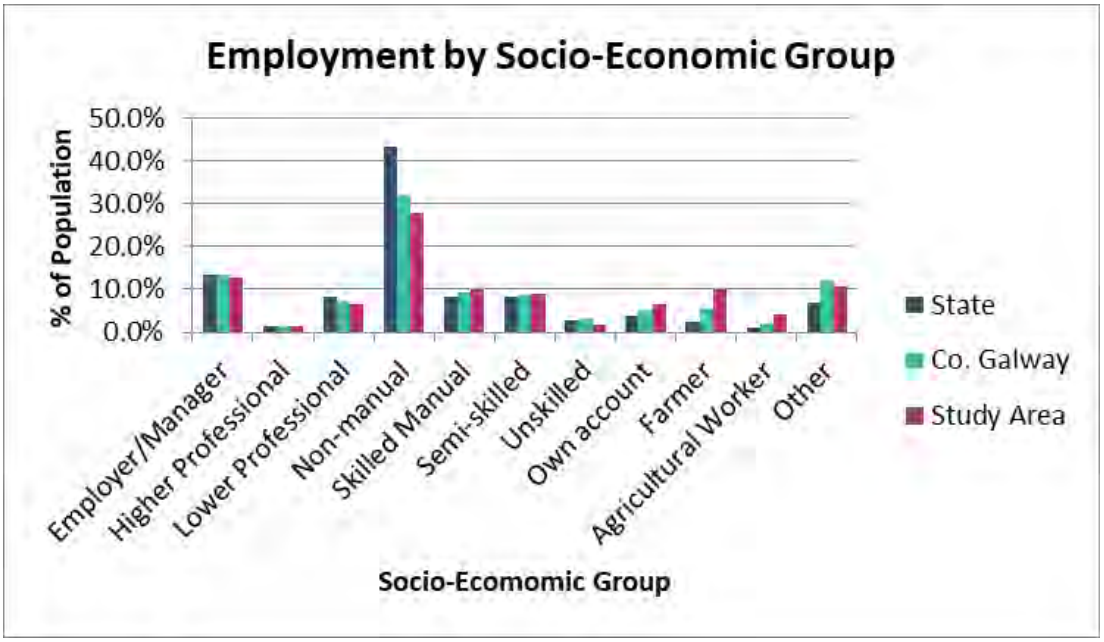



*Figure 5-4 Employment by Socio-Economic Group in 2022 (Source: CSO)*

The CSO employment figures grouped by socio-economic status includes only the population 'at work'. The highest level of employment within the Study Area was recorded in the non-manual category which was still lower than the percentages recorded on State and County level. Most categories in the Study Area were largely the same as that recorded at a State and County level, with the exception of Non manual and unskilled categories being lower and the categories of farmer and agricultural worker being higher than on State and County level. Across the categories, the Study Area is more similar in categories to the County than the State level, with the County often representing the average between the Study Area and the State level.

### 5.3.3 Land-Use

As previously noted, the Derrybrien Wind Farm Development is currently a non-operating wind farm and has been since February 2022. The Prospective Development site includes a mixture of commercial forestry, and areas of blanket bog currently used for turf cutting. The existing grid connection route is located in areas of commercial forestry plantation. Prior to the development of the wind farm, the entire site was dominated by conifer plantation of different aged stands. The majority of this conifer plantation was felled to facilitate the wind farm and these lands were not subsequently replanted. The habitat in these locations corresponds with the habitat recently felled woodland. Other land-uses in the surrounding area include agriculture and low-density rural residential areas. The main wind farm infrastructure comprises turbines, crane hard standings, access tracks, drainage channels, quarries, on site material storage, 110 kV substation, direct buried electric cables and anemometer masts. The predominant surrounding land use within the Population Study Area is agricultural, with the data contained in Table 5-6 below indicating a predominant use for pasture. No additional changes are to be made to the land uses of the areas surrounding the Prospective Development site.

The total area of farmland within the six EDs that comprise the Population and Human Health Study Area (Derrylaur, Aille, Kilthomas, Castleboy, Loughatorick/Coos/Marblehilland Mountain) measures approximately 7,202.7 hectares, comprising approximately 31% of the Study Area (23,200hectares) according to the CSO Census of Agriculture 2020. There are 266 farms within the Study Area, with an average farm size of 27.1 hectares. This is slightly larger than the 26.5-hectare average farm size for Co. Galway.

The average age of farm owners within the Study Area, is approximately 59 years old. Table 5-6 shows the breakdown of farmed lands within the Study Area. Farmland within the Study Area is entirely

grassland for livestock grazing, with no land recorded for cereals or tillage. Livestock within the Study Area is predominantly cattle with a smaller sheep herd also recorded within the Study Area. There were 433 dairy cows recorded during the CSO Census of Agriculture 2020 within the Study Area.

*Table 5-6 Farm Size and Classification within the Study Area in 2020 (Source: CSO)*

| Characteristic | Value |
|---|---|
| Size of Study Area | 23,200 hectares |
| Total Area Farmed within Study Area | 7,202.7 hectares |
| Farmland as % of Study Area | 31% |
| **Breakdown of Farmed Land** | **Value** |
| Total Grassland | 7,069.9ha |
| Total Cereals | 0 ha |
| Total Cattle Herd (Beef) | 9,777 |
| Total Dairy Cows | 433 |
| Total Sheep | 3,808 |

### 5.3.4 Services

The Prospective Development is located approximately 2.2 km north of the village of Derrybrien and approximately 12.7 km east of the town of Gort in Co. Galway. The main services for the Study Area are located within the town of Gort. Additionally, the town of Loughrea lies approximately 10.2 km north of the Prospective Development where larger scale retail and services are available.

### 5.3.5 Education

The nearest school to the Perspective Development site is Drim National School, located approximately 6.4 km west of the EIAR Study Area Boundary. St Thomas' National School is located approximately 8.0 km northwest of the EIAR Study Area Boundary.

The closest secondary school is Gort Community School which is located approximately 12.7 km west of the Prospective Development.

The closest Third-Level Institution to the site is ATU Galway which is located approximately 32.7 km northwest of the Prospective Development.

### 5.3.6 Access and Public Transport

The Prospective Development site is accessed via local roads off the R353 Regional Road, which travels in an east-west direction south of the site and the L4214 Local Road which runs in a south-north direction to the east of the site. The current entrance to the Derrybrien Wind Farm Development from a Coillte access road via the Black Road L-4214 will remain the primary entrance, utilising the existing access roads and infrastructure.

The site of the Prospective Development is not served by public transport. The nearest train station to the Prospective Development site is at Gort, located approximately 12.7km west of the site.

From the town of Gort, approximately 12.7 km west of the Prospective Development, there are Bus Eireann connections to Galway Town, from which a significant number of destinations may be reached. Galway city is located approximately 34.4 km north-west of the Prospective Development.

## 5.3.7 Amenities and Community Facilities

The majority of amenities and community facilities, including the Gaelic Athletic Association (GAA) and other sports clubs, youth clubs and recreational areas available in the area are located in the centres of settlement throughout the wider area. Retail and personal services within the vicinity are provided in the larger settlements in the wider area such as Gort, Galway Town, and Loughrea. The County Council also has a branch library in Galway town.

The varied natural environment of this area of County Galway provides opportunities for walking, cycling and horse riding, however, there are no designated walking trails within the site of the current proposal.

## 5.3.8 Tourism

### 5.3.8.1 Tourism Numbers and Revenue

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. *Key Tourism Facts 2019*, pertaining to domestic and international tourism volumes for Ireland, was published by Failte Ireland in 2021 for the year 2019. *Key Tourism Facts 2019* states that during 2019, overseas tourists to Ireland grew by 0.7% to 9.7 million. In 2019, out-of-state (Overseas and Northern Ireland) tourist expenditure amounted to €5.6 billion. With a further €1.8 billion spent by overseas visitors on fares to Irish carriers, foreign exchange earnings were €7.4 billion. Domestic tourism expenditure amounted to €2.1 billion, making tourism a €9.5 billion industry. The Central Statistics Office's official count of direct employment in 'Accommodation and food service activities', a category which includes hotels, restaurants, bars, canteens and catering, was 177,700 in Q3 2019 (7.6% of total employment) and rises to 260,000 when including seasonal and casual employment in the industry.

*Key Tourism Facts 2022*, published in October 2023 does not provide the same level of detail in terms of tourist numbers and expenditure as the 2019 version of the same report, however it does note that

> *"While traditional tourism statistics focus primarily on 'flows' (i.e., the number of visitors, the number of overnight stays, etc.), Gross Value Added (GVA) measures the overall contribution of a particular sector to national income. Tourism activity in Ireland is associated with over 4% of direct GVA."*

*Key Tourism Facts 2022* goes on to state that through an alternative method of estimating employment using PAYE tax data, the CSO estimates the number of people employed in 'Tourism Industries' to be 220,000 in Q3 2022.

Ireland is divided into seven tourism regions. Table 5-7 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2019 ('*Tourism Facts 2019*, Fáilte Ireland, March 2021).

*Table 5-7 Overseas Tourists Revenue and Numbers 2019 (Source: Fáilte Ireland)*

| Region | Total Revenue (€m) | Total Number of Overseas Tourists (000s) |
|---|---|---|
| Dublin | €2,210m | 6,644 |
| Mid-East/Midlands | € 348m | 954 |
| South-East | €261m | 945 |
| South-West | €970m | 2,335 |
| Mid-West | €472 m | 1,432 |
| West | €653m | 1,943 |
| Border | €259m | 768 |
| **Total** | **€5,174 m** | **15,021** |

The Prospective Development is located within the West Region. According to '*Regional Tourism Performance in 2019'* (Fáilte Ireland, March 2021), the West Region, which comprises the counties Galway, Mayo and Roscommon, benefitted from approximately 12.9% of the overseas visitors who came to Ireland in 2019 and approximately 12.6% of the associated tourism income generated in Ireland in 2019.

Although the data from 2019 is not available, Table 5-8 presents the most recent breakdown of overseas tourist numbers and revenue to the West Region during 2017 ('*2017 Topline Tourism Performance by Region,* Fáilte Ireland, August 2018). As can be observed in Table 5-8, Co. Galway hosted 1,673,000 no. tourists in 2017, which was the largest share of those who visited the West Region and had tourism revenue of €589 million.

*Table 5-8 Overseas Tourism to West Region during 2017 (Source: Fáilte Ireland)*

| Region | Total Revenue (€m) | Total Number of Overseas Tourists (000s) |
|---|---|---|
| Galway | €589m | 1,673 |
| Mayo | €78m | 324 |
| **Roscommon** | **€27m** | **54** |

In October 2023, Failte Ireland released their *Key Tourism Facts 2022* in which details of domestic tourism in 2022 were included. The report states that, in 2022, holidays accounted for 50% of all domestic trips with a per diem spend of €100. The report detailed the performance of each region on the revenue collected from domestic tourists. The results of this are detailed below in Table 5-9.

*Table 5-9 Domestic Tourism Revenue by Region 2022*

| Region | Estimated Expenditure (€m) |
|---|---|
| Mid East/ Midlands | 395 |
| Dublin | 419 |

| Region | Estimated Expenditure (€m) |
|---|---|
| South East | 381 |
| South West | 665 |
| Mid West | 261 |
| **West** | **459** |
| Border | 350 |

The West region received an estimated €459 million from domestic tourism in 2022, which was the second highest earning region in this period. Tourism is one of Ireland's, and the West region's most important industries, contributing to the economic and social fabric of the island. It is a leading creator of jobs and revenue, and one of the few sectors that has the potential to significantly benefit remote rural areas.

#### 5.3.8.2 Tourist Attractions

There are no key identified tourist attractions pertaining specifically to the Prospective Development site itself. The varied natural landscape and scenic amenity of this area provide many opportunities for general outdoor recreation within the wider area including walking, cycling and horse-riding. The EIAR Study Area is not within any of the strategic tourism areas identified in the Galway County Development Plan (2022-2028).

## 5.4 Assessment of Effects on Human Health

As set out in the Department of Housing, Planning, Community and Local Government '*Key Issues Consultation Paper on the Transposition of the EIA Directive 2017*' and the guidance listed in Section 1.5.3 of Chapter 1: Introduction, the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters. Consideration has also been given to 'Determining Significance for Human Health in Environmental Impact Assessment (IEMA, November 2022) in determining the significance of potential effects on Human Health resulting from the Prospective Development.

Chapter 8: Land, Soils and Geology, Chapter 9: Water, Chapter 10: Air and Climate, Chapter 11: Noise and Vibration and Chapter 14: Material Assets (Traffic and Transport) provide an assessment of the effects of the Prospective Development on these areas of consideration. There is the potential for negative effects on human health from the Prospective Development related to potential emissions to air of dust (Section 5.7.2.5.3), potential emissions to land and water of hydrocarbons, release of potentially silt-laden runoff into watercourses, and noise emissions (Section 5.7.2.5.2). The potential for negative health effects associated with the Prospective Development during all phases is considered in Section 5.7.2.5 below.

The proposed site design and mitigation measures outlined in Chapter 8 and Chapter 9 ensures that the potential for impacts on the water environment are not significant. No impacts on local water supplies are anticipated.

As set out in Chapter 9, potential health effects are associated with negative impacts on public and private water supplies and potential flooding. There are no mapped public or group groundwater scheme protection zones in the area of the Prospective Development. The preliminary Flood Risk

Assessment also concludes that the Prospective Development is not anticipated to give rise to any significant impacts related to flood risk within or downstream of the Prospective Development areas.

## 5.5 Vulnerability of the Prospective Development to Natural Disasters and Major Accidents

As outlined in Section 5.4 above, the Prospective Development is not a recognised source of pollution. Should a major accident or natural disaster occur, the potential sources of pollution on-site from the Prospective Development, are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health, such as bulk storage of hydrocarbons or chemicals, storage of wastes etc., will be limited on the Prospective Development site. Furthermore, the risk of pollution has been minimised through the careful development of the decommissioning plan for the Prospective Development and will be further limited through the implementation of the best practice construction control measures, which are proposed in the various chapters of this EIAR and set out in the outline CEMP.

There is limited potential for significant natural disasters to occur at the Prospective Development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to flooding and fire. Flooding is addressed in Chapter 9: Hydrology and Hydrogeology. There is a potential risk of fire/explosion at the Prospective Development site. However, as outlined in Section 15.4.1.1 of Chapter 15 of this EIAR, the Prospective Development has been designed in line with current best practice. Furthermore, in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 (as amended), the Prospective Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site. Therefore, it is considered, based on professional judgment, that the risk of significant fire occurring, affecting the Prospective Development and causing the Prospective Development to have significant environmental effects is limited and therefore a significant effect on human health is similarly limited.

As described earlier, there are no significant sources of pollution in the wind farm with the potential to cause environmental or health effects.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Prospective Development site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e., SEVESO sites and so there are no potential effects from this source. There are two SEVESO sites in County Galway which includes the Chemoran facility at Deerpark Industrial Estate in Oranmore and the Tynagh Energy Ltd. The Chemoran facility at Deerpark Industrial Estate is the closest SEVESO site to the Prospective Development site – it is located approximately 31km northwest of the Prospective Development site.

A detailed discussion of the vulnerability of the Prospective Development to natural disasters and major accidents is provided in Chapter 15 of this EIAR.

## 5.6 Residential Amenity

Residential amenity relates to the human experience of one's home, derived from the general environment and atmosphere associated with the residence. The quality of residential amenity is influenced by a combination of factors, including site setting and local character, land-use activities in the area and the relative degree of peace and tranquillity experienced in the residence.

The Derrybrien Wind Farm is located on a site mainly consisting of commercial forestry, recently felled woodland, and partially cutover blanket bog. As such, the amount of people accessing the site relates mainly to those cutting peat, recreating, and engaged in agricultural activities. There are no dwellings within the Prospective Development site.

When considering the amenity of residents in the context of a Prospective Development, there are two main potential impacts of relevance: 1) Noise, and 2) Visual Amenity. Noise is a quantifiable aspect of residential amenity while visual amenity is more subjective. Potential noise impact is assessed in Chapter 11 of this EIAR. A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 13 of this EIAR. Impacts on human beings arising from the Prospective Development is assessed in relation to each of these key issues and other environmental factors such as noise, traffic and dust; see Impacts in Section 5.7 below. The impact on residential amenity is then derived from an overall judgement of the combination of impacts due to changes to land-use and visual amenity, noise, traffic, dust and general disturbance.

## 5.7 Likely Significant Impacts and Mitigation Measures Implemented

The below assessment evaluates the impact (where there is the potential for an impact to occur) on health and safety, employment and economic activity, population, land-use, tourism, noise, dust, traffic, and residential amenity as a result of the Prospective Development.

### 5.7.1 "Do-Nothing" Scenario

Under the do-nothing scenario, the decommissioning works would not be undertaken and the Derrybrien Wind Farm, grid connections, and substations would remain in-situ in their current condition. The wind farm would not operate and there would be no electricity generation at the site.

Since there would be no change from current conditions, there would be no effect on population, employment and economic activity, land use or tourism in the "do nothing" scenario. Likewise, there would be no effects in terms of noise, air quality, traffic, or residential amenity.

### 5.7.2 Impacts of Prospective Development

#### 5.7.2.1 Population Levels

It is anticipated that those working on the Prospective Development will travel daily to the site from the wider area. The Prospective Development will have no effect on the population of the area in terms of changes to population trends or density, household size or age structure.

#### 5.7.2.2 Employment and Investment

The decommissioning of the wind farm will provide employment for technical consultants, contractors, and maintenance staff. Approximately, 25-50 jobs could be created as a result of the Prospective Development. The decommissioning of the Derrybrien Wind Farm Development will last approximately 24 months.

The injection of money in the form of salaries and wages to those employed at the Prospective Development has the potential to result in an increase in household spending and demand for goods and services in the local area. This would result in local retailers and businesses experiencing a short-term positive impact on their cash flow. Based on the timeframe of the Prospective Development and

the relatively small number of staff involved, this is considered to be an indirect, short-term, slight, positive effect.

Therefore, there will be no significant negative effect on employment and investment due to the Prospective Development.

#### 5.7.2.3 Land-use

The existing land-uses of agriculture, commercial forestry, roads, and turbary will continue on the site. The decommissioning of the windfarm, grid connection, and substations will have no impact on existing land-uses on the site. The existing road networks on the site and in the surrounding area will remain unchanged. There will be no effect on land-uses in the wider area as a result of the Prospective Development.

#### 5.7.2.4 Tourism

##### Pre-Mitigation Impacts

Given that there are currently no tourism attractions specifically pertaining to the Prospective Development site, there are no impacts on tourism associated with the Prospective Development.

With regard to tourist attractions and amenity use surrounding the Prospective Development site, potential impacts on tourism during the Prospective Development could arise primarily due to traffic. As set out in Chapter 14 Material Assets, the volume of traffic associated with the Prospective Development is significantly less than the construction stage, as the turbine foundation, internal access roads and substation will be retained. The large volume of stone aggregate and concrete brought to site during the construction of the Project will not be required for decommissioning.

Therefore, based on the timeframe of the Prospective Development and low anticipated volumes of traffic, the potential effects of the Prospective Development on traffic will be short term, slight negative effect.

Traffic management measures will be in place, where required. Please see below for traffic impact mitigation measures (also set out in Chapter 14 Material Assets).

##### Proposed Mitigation Measures

The decommissioning of the Wind Farm will be as per the Traffic Management Plan (TMP) prepared for this project (Appendix 14-3).

The TMP is a live document drafted during the planning stage and will be upgraded as the Prospective Development progresses, taking into account of any road improvements and changes to the network.

When the turbine blades are decommissioned, it is envisaged they will be removed intact.

The large volume of aggregate material and concrete that was imported to site during construction will remain onsite. The principal expected volumes of traffic will be primarily associated with the transportation off-site of turbine components and significantly reduced volume of materials only (i.e. haul routes maintained, turbine foundations retained, substation retained, car parking hardstanding areas retained).

### Residual Impact

As the expected volumes of traffic arising from the Prospective Development will be low and primarily associated with the transportation off-situ of turbine components and materials only, the residual impact on traffic is considered to be not significant. Based on the above it is concluded that there would be a short term, indirect, negative imperceptible effect on tourism in the wider landscape during the decommissioning works associated with the Prospective Development.

### Significance of Effects

The effect on tourism in the wider landscape due to the Prospective Development is not significant.

## 5.7.2.5 Health

### 5.7.2.5.1 *Health and Safety*

### Pre-Mitigation Impacts

Decommissioning of the Derrybrien Wind Farm will necessitate the presence of a construction site. Construction workplaces by their nature present many health and safety hazards, such as moving heavy equipment, delivery loads, electricity supply, uneven ground, working at heights, confined spaces, working with caustic materials (concrete) and others. Incidents can occur which can result in impacts on the health and wellbeing of the workforce and people accessing the construction site. These effects would be limited to the duration of the Prospective Development works. Construction workplaces must be operated in accordance with Irish Legislation relating to Health Safety and Welfare at Work. If site rules are not properly implemented there is potential for a short-term, significant, direct, negative effect on health and safety associated with the construction site.

### Proposed Mitigation Measures

The Prospective Development will be decommissioned in accordance with all relevant Health and Safety Legislation, including:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005).
- Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended.
- Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended.
- Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

During the decommissioning works proposed as part of the Prospective Development, all staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'. This will encompass the use of all necessary Personal Protective Equipment, Risk Assessment and Method Statements and adherence to the site Health and Safety Plan.

Where necessary, fencing will be erected in areas of the Prospective Development site where uncontrolled access is not permitted. Appropriate health and safety signage will also be erected on this fencing and at locations around the Site.

The Prospective Development comprises the decommissioning of the Derrybrien grid connection and Agannygal substation as well as reconnection of the 110kV Shannonbridge -Ennis transmission line.

Health and safety guidelines for working within and around electrical substations and overhead lines will be adhered to on site.

#### Residual Impact

The implementation of the mitigation measures discussed above will reduce the likelihood of a serious accident occurring on the site during the Prospective Development. Due to the inherently hazardous nature of construction sites, with the implementation of the above, there will be a short-term, direct, slight, negative residual effect on health and safety due to the Prospective Development.

#### Significance of Effects

Based on the assessment above, there will be no significant direct or indirect effects.

### 5.7.2.5.2 *Noise*

#### Pre-Mitigation Impacts

There will be an increase in noise levels in the vicinity of the Prospective Development site as a result of heavy machinery and decommissioning works. These effects will be short-term in duration, as they will be restricted to the duration of the Prospective Development works. The noisiest activities associated with wind farm decommissioning will be the demolition of the substations.

The potential noise effects that will occur during the Prospective Development are further described in Chapter 11 of this EIAR. In residential settings, the World Health Organisation currently recommends a daytime/evening $L_{Aeq\ 16\ h}$ level of 55 dB to protect health. As set out in Chapter 11, noise levels associated with the Prospective Development will be considerably lower than the Guidelines on Community Noise (World Health Organisation, 1999) criterion at all receptors, apart from a single dwelling to the west of Agannygal Substation where levels may temporarily exceed this level over several days. However, given the short duration of these works, it is considered that there will be no negative noise impact on the local population or on human health.

#### Proposed Best Practice Measures

Apart from one potential exception, $L_{Aeq\ 1\ h}$ levels at offsite receptors during Prospective Development will not exceed the identified 65 dB criterion and will be markedly lower than this criterion throughout the project. However, best practice measures for noise control will be adhered to onsite during the Prospective Development works. The measures include:

- The hours of activity will be limited to avoid unsociable hours where possible. Operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 14:00hrs on Saturdays.
- Drivers of plant and vehicles will be instructed to avoid hooting at all times unless necessary.
- Plant used onsite during the decommissioning works will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.
- Queuing of trucks near offsite receptors will be prohibited.
- Machinery not in active use will be shut down.
- A site representative will be appointed as a liaison officer with the local community.

- Complaints of noise received during the Prospective Development will be logged in a register and investigated immediately. Details of follow-up action will be included in the register.
- Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance.
- Guidance set out in British Standard BS 5228-1:2009+A1:2014 Code Of Practice For Noise And Vibration Control On Construction And Open Sites – Part 1: Noise (2014) with respect to noise control will be applied throughout the Prospective Development.
- The residents of the dwelling to the west of Agannygal Substation, where there may be noise level exceedances over several days, will be contacted by the site representative in advance of these works in order to identify suitable working times so as to minimise disruption to the residents.

#### Residual Impact

Following the implementation of the above best practice measures, it is considered that there will be no negative noise impact on the local population or on human health.

#### Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects.

### 5.7.2.5.3 *Air Quality*

#### Pre-Mitigation Impacts

Potential dust and exhaust emission sources from the Prospective Development during the decommissioning works include the use of heavy machinery, travel on existing access tracks, removal of above ground element of turbine and meteorological mast foundations, regrading of hardstands, demolition works on the substations, and temporary construction compound.

An increase in dust and exhaust emissions has the potential to cause a nuisance to sensitive receptors in the immediate vicinity of the Prospective Development site. The entry and exit of construction vehicles from the Prospective Development site may result in the transfer of mud to the public road, particularly if the weather is wet. This may cause nuisance to residents and other road users. However, these effects will be limited, as abnormal load vehicles will only travel along the proposed route shown on Figure 14-8 in Chapter 14 of this EIAR and will be limited to the duration of the decommissioning works. Therefore, these impacts will have a short-term, slight, direct, negative impact on air quality. The potential dust impacts that may occur during the Prospective Development are further described in Chapter 10 of this EIAR.

#### Proposed Mitigation Measures

Truck wheels will be washed to remove mud and dirt before leaving the wind farm site. All plant and materials vehicles shall be stored in the compound area or other dedicated areas. Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. Traffic will be restricted to defined routes and a speed limit will be implemented.

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from the site's drainage system, and will be pumped into a bowser or water spreader to dampen down haul roads and the temporary site compound to prevent the generation of dust. Silty or oily water will not be used for dust suppression,

because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.

#### Residual Effects

With the implementation of the mitigation measures discussed above, the residual effects will be short-term, direct, imperceptible, and negative.

#### Significance of Effects

Based on the assessment above there will be no significant direct and indirect effects.

### 5.7.2.5.4 *Traffic*

#### Pre-Mitigation Impacts

It is intended that the existing turbines will be dismantled on-site and then transported off site for resale or recycling. Vehicles transporting large turbine components and other abnormal loads will travel southbound on the M18, then exit at Junction 16, Loughrea & Gort, drive down exit ramp to roundabout, and take the second exit onto Crowe Street (R458). The vehicles will continue for approximately 1.3 km to left turn for Loughrea road (R380), turn left onto Loughrea road, and continue on R380 for approximately 1.8 km to crossroads with R353. The vehicles will then turn right onto R353, turn right and drive for 16 km to junction with Black Road, take left turn onto the Black Road before entering the site entrance. The proposed route is shown on Figure 14-8 in Chapter 14 of this EIAR. It is also envisaged that some general construction traffic (including materials and staff) will travel to the site via the local road network to the east and south of the site. The vehicles will follow the same route leaving the site.

A complete Traffic and Transportation Assessment (TTA) of the Prospective Development has been carried out by TOBIN Consulting Engineers. The full results of the TTA are presented in Section 14.1 of this EIAR.

The types of vehicles that will be required to negotiate the local network, carrying turbine components, represent abnormal size loads and a detailed assessment of the geometry of the proposed route was therefore undertaken.

As set out in Chapter 14 of this EIAR, the volume of traffic associated with the Prospective Development is significantly less than the construction stage as the turbine foundation, internal access roads and substation will be retained. The large volume of stone aggregate and concrete brought to site during the construction stage will not be required for decommissioning.

Based on the timeframe of the Prospective Development and low anticipated volumes of traffic, the potential effects of the Prospective Development on population and human health will be short term, indirect, slight negative effect.

#### Proposed Mitigation Measures

The assessment of potential impacts indicates that the Prospective Development will not have a significant effect. To reduce the impact on the environment further the following mitigation measures will be undertaken.

- The decommissioning of the Derrybrien Wind Farm Development will be as per the Traffic Management Plan (TMP) prepared for this Prospective Development (Appendix 14-3).
- The TMP is a live document drafted during the planning stage and will be upgraded as the project progresses taking into account of any road improvements and changes to the network.
- When the turbine blades are decommissioned, it is envisaged they will be removed intact.

#### Residual Impact

As the expected volumes of traffic are low and primarily associated with the transportation off-situ of turbine components and materials only, the residual impact on population and human health is considered to be not significant, indirect, negative and temporary in duration.

#### Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects.

### 5.7.2.5.5 *Telecommunications*

#### Pre-Mitigation Impacts

There are 2 meteorological masts (anemometer) belonging to ESB in the western part of the site. Vodafone placed a cell at the central mast to assist with improved phone signal at the site. The mast was installed in 2005 with the cell added at a later date to boost signal at the Derrybrien Windfarm. This cell will be removed as part of the decommissioning of the wind farm, however, since this cell was only placed on the site to provide improved phone signal for site operatives working at the wind farm and does not affect areas beyond the wind farm there will be no effect on telecommunications as a result of the decommissioning of this cell.

There is also an existing telecoms mast in the east of the site which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter. This mast is unrelated to the Prospective Development and pre-dates the presence of the wind farm by a significant period. This mast currently receives power from the Derrybrien Substation. Prior to the presence of the wind farm, a diesel generator was used to provide power to this mast. Following the decommissioning works, the mast will need to revert to using a diesel generator or another independent power source.

As there will be a need for the mast to revert to using a diesel generator or another independent power source, there may be disruption to broadband and radio services as a result of the Prospective Development which has the potential to cause inconvenience local residents. These effects will be limited to the decommissioning works. Since the Prospective Development involves the removal of the existing wind turbines, and other structures within the Prospective Development site there is no potential for interference occurring to telecommunications in the vicinity of the Prospective Development. Therefore, indirect or direct there is potential for a short term, slight, negative impact.

#### Proposed Mitigation Measures

The owner of the communications mast will be informed in advance of the Prospective Development in order to allow an alternative power source to be provided for the existing mast.

### Residual Impact

With the implementation of the mitigation measures above, and due to the nature of the Prospective Development there will be no residual effect.

### Significance of Effects

There will be no significant effects on from the Prospective Development.

## 5.7.3 Cumulative and In-Combination Effects

For the assessment of cumulative impacts, any other existing, permitted or proposed projects (wind energy or otherwise) have been considered. The factors to be considered in relation to cumulative effects include population and human health, biodiversity, land, soil, water, air, climate, material assets, landscape, and cultural heritage as well as the interactions between these factors.

The potential cumulative impact of the Prospective Development and other relevant developments has been carried out with the purpose of identifying what influence the Prospective Development will have on the surrounding environment when considered cumulatively and in combination with relevant approved, and existing projects in the vicinity of the proposed site.

Further information on projects considered as part of the cumulative assessment are given in Chapter 4. The impacts with the potential to have cumulative effects on human beings are discussed below and in more detail in the relevant chapters: noise (Chapter 11), visual impacts (Chapter 13) and traffic (Chapter 14).

### 5.7.3.1 Employment and Economic Activity

The commercial forestry activities on the site provides between 3-6 months of employment, either for harvesting or replanting per year. These activities can continue while the wind farm decommissioning is ongoing, resulting in a long-term slight positive cumulative effect.

The injection of money in the form of salaries and wages to those employed at the Prospective Development has the potential to result in an increase in household spending and demand for goods and services in the local area. This would result in local retailers and businesses experiencing a short-term positive impact on their cash flow.

### 5.7.3.2 Tourism and Amenity

There are no key identified tourist attractions pertaining specifically to the Prospective Development site itself.

Notwithstanding this, there will be no cumulative effects on tourism between the Prospective Development and other projects in the area once the mitigation measures in Section 5.7.2.4 above are implemented. Therefore, it is not considered that the Prospective Development together with other projects in the area will cumulatively affect any tourism in the wider area.

### 5.7.3.3 Air (Dust)

There will be minor emissions from plant and machinery and potential dust emissions associated with the decommissioning activities of the Prospective Development, when considered cumulatively with other permitted or proposed projects and plans in the area as set out in Section 4.7 in Chapter 4 of this EIAR, that are yet to be constructed. However, once the mitigation proposals, as outlined in Section

5.7.2.5.3 are implemented during the Prospective Development, and considering the distance from other proposed projects, there will be no cumulative negative effect on air quality.

There will be no significant cumulative effects on air resulting from the Prospective Development in-combination with the Retained Development.

### 5.7.3.4 Health and Safety

Any potential cumulative effects between the Prospective Development and the other cumulative projects in terms of health and safety will be mitigated by the requirement for all projects to adhere to Health & Safety legislation. Therefore, the Prospective Development will have no cumulative impacts in terms of health and safety.

### 5.7.3.5 Residential Amenity

#### Pre-Mitigation Impacts

In the unlikely event of permitted and proposed projects as described in the cumulative assessment in Chapter 4 being constructed at the same time as the Prospective Development at Derrybrien, there is the potential for a resulting short, slight, cumulative, negative effect to occur on residential amenity, in relation to noise and vibration, dust, traffic, and telecommunications.

#### Proposed Mitigation Measures

All mitigation as outlined under noise and vibration, dust, traffic, and telecommunications in this EIAR will be implemented in order to reduce insofar as possible impacts on residential amenity at properties located in the vicinity of the Prospective Development, including along the proposed turbine haul route. It is assumed also that all mitigation measures in relation to the other cumulative projects will also be implemented.

#### Residual Impact

Taking into consideration the mitigation measures described in this EIAR, the Prospective Development will have at worst, a short-term, imperceptible, cumulative, negative effect on residential amenity, in combination with other projects.

#### Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects.

## 5.8 Conclusion

Following consideration of the residual effects (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Human Beings in the area surrounding the Prospective Development.

Provided that the Prospective Development is decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant effects on population and human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values and health and safety are not anticipated at international, national, or county scale.

# 6. BIODIVERSITY (TERRESTRIAL AND AVIAN ECOLOGY)

## 6.1 Introduction

### 6.1.1 Chapter Scope

This chapter identifies, describes and assesses the likely significant effects on terrestrial biodiversity associated with the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development as described in Chapter 4, and its accompanying appendices, including **Appendix 4.2**

The baseline for the receiving terrestrial biodiversity has been established based on the results of a desk study and ecological surveys. Potential impacts on terrestrial biodiversity that may arise as a result of the Prospective Development have been assessed. Mitigation measures and monitoring have been identified, where required. Residual impacts have also been assessed, along with cumulative impacts arising in conjunction with other projects and activities in the area. The likely significant effects of the Prospective Development on aquatic biodiversity are addressed in Chapter 7 Biodiversity (Aquatic Ecology and Fisheries).

A standalone Natura Impact Statement (NIS) has been produced, in accordance with the requirements of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as the 'Habitats Directive', which is transposed into Irish legislation as the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)) and the Planning and Development Acts 2000 - 2024 (and associated Regulations), which consider the potential impacts of the Prospective Development on European sites (sites designated as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) within the Zone of Influence of the Prospective Development and should be read in conjunction with this chapter.

### 6.1.2 Statement of Authority

This Chapter of the report has been prepared by Kate-Marie O'Connor (Senior Ecologist ESB), Dr. Patrick Crushell (Wetland Surveys Ireland), Dr. Brian Madden (Biosphere Environmental Services), Rachel Potter (BSG Ecology) and Owain Gabb (BSG Ecology).

**Kate-Marie O'Connor (BA MSc, MCIEEM)** is a Senior Ecologist with ESB and has over 12 years' professional experience in ecological assessment. She holds an honours degree in Natural Sciences from Trinity College Dublin, specialising in Botany, and obtained a distinction in her Masters in Environmental Modelling, Monitoring and Reconstruction from the University of Manchester. She also holds an advanced diploma in Planning and Environmental Law from The Honourable Society of King's Inn. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Kate-Marie provides ecological support and advice on a range of electricity infrastructure projects through all project stages, including pre-planning, construction and operation. Her experience primarily includes the preparation and review of Ecological Impact Assessments, Biodiversity Chapters of Environmental impact Assessment (EIA) reports, Appropriate Assessment (AA) Screening reports and Natura Impact Statements (NIS) for a range of public and private projects across Ireland. Kate-Marie has extensive experience undertaking ecological surveys to inform various assessments, including surveys for habitats, bats, badger, otter, breeding and wintering birds and newts.

**Dr. Patrick Crushell (BSc Applied Ecology; MSc Environmental Resource Management, PhD Environmental Sciences, C. Ecol, MCIEEM)** received an honors degree in Applied Ecology from University College Cork, a Masters degree in Environmental Resource Management from University

College Dublin and defended his PhD at Wageningen University, the Netherlands. He is a Chartered Ecologist of the Chartered Institute of Ecology and Environmental Management. Dr Crushell has been working in the area of nature conservation and ecological impact assessment for the past 23 years and has particular expertise in peatland habitats. Projects that he has been involved in include wetland inventory surveys; evaluation of proposed designated sites; restoration and management of peatland habitats; baseline ecological surveys and impact assessments of various development proposals including road, quarries, wind-farms, waste facilities, arterial drainage schemes, and residential developments; during and post-construction ecological monitoring. He has been working on the Derrybrien Wind Farm Project since 2003.

**Dr. Brian Madden (BA Mod, PhD, MCIEEM)** qualified in Natural Sciences at the University of Dublin in 1984 and earned a doctorate degree in 1990 from the National University of Ireland for research in peatland ecosystem processes. Since 1994, Brian has worked as an independent environmental consultant. Brian is an expert ornithologist and has carried out various surveys for the National Parks and Wildlife Service, including survey of breeding birds of western machair systems and co-ordination of the National Peregrine Survey in 2002. Brian has extensive experience in the assessment of electricity infrastructure projects including high voltage transmission lines, substations, underground cables and wind energy projects. For many of the projects, Brian has been involved from pre-planning impact assessment stage through to the implementation and monitoring of mitigation measures during the operational stage. Brian has been involved in the Derrybrien Wind Farm project since 2004.

**Rachel Potter (Principal Ecologist at BSG Ecology; BSc MSc ACIEEM)** has co-ordinated bat surveys at the Derrybrien wind farm since 2016 during which time she has designed and adapted approaches to reflect changing industry guidance, and been responsible for the bat assessment as part of the remedial EIA for the Site. Her current and recent work has also included co-ordinating ecological and ornithological inputs, including scoping and consultation for several wind farm projects in Wales. Other recent experience includes the production of ecological reports (Habitat Management and Monitoring Plans, licencing documentation and baseline monitoring reports) to facilitate the sign off of ecological conditions in relation to Garreg Lwyd Hill wind farm, Powys, and the management of post-construction monitoring work relating to hedgerow and stream corridor habitats, dormouse, great crested newt, and breeding waders for that site. Rachel also helped to complete pre-construction surveys for otter and bats, and identify key reptile habitat at RWE Renewables's Brechfa Forest West Wind Farm (Carmarthenshire), and designed and implemented bat work to address monitoring conditions for both that site and Vattenfall's Pen-y-Cymoedd wind farm (Neath Port Talbot / Rhondda Cynon Taf). Qualifications include: BSc (Hons), Zoology; MSc, Environmental Biology: Conservation and Resource Management; Associate Member Chartered Institute of Ecology and Environmental Management; and, holds bat and great crested newt licences for England and Wales.

**Owain Gabb (Director at BSG Ecology; BSc MSc MCIEEM CEnv)** has overseen the bat survey work at Derrybrien since 2016, reviewing all approaches and baseline reports and providing review comment and written input to this chapter. He has worked on onshore wind projects since 2003 and has led the ornithological and / or ecological input to numerous schemes throughout the UK and Ireland. His experience includes planning and co-ordinating ornithological, protected species and habitat survey work, co-ordinating consultation with statutory conservation agencies and LPAs, writing and reviewing technical reports, helping discharge conditions, and acting as expert witness at public hearings. He has also led monitoring work including: radio tracking of nightjar to determine proximity of nesting birds to operational turbines; dog-searches to assess levels of bird and bat fatality; and, flight line and distribution studies to assess evidence for flight avoidance of turbine blades and displacement of birds from wind farms. Owain provided expert ornithological support to RES with regard to the Upper Ogmore wind farm, Bridgend. This was the first wind farm to be determined through the DNS process, and Owain's involvement included representing RES at the hearing. Owain has had recent involvement in many other wind farm projects, including ornithological monitoring at Pen y Cymoedd (Rhondda / Neath Port Talbot), condition discharge and ecological monitoring at Brechfa Forest West (Carmarthenshire), baseline survey, consultation and scoping for Alwen Forest (Conwy), and review of the Ornithological Impact Assessment and Ecological Impact Assessment for the Clachindarroch

extension wind farm (Aberdeenshire). He has also planned and co-ordinated extensive bird survey work on behalf of EirGrid in the Irish Midlands and southern counties, and in relation to the Carrownaweelaun wind farm (County Clare). Qualifications include: BSc (Hons) Countryside Management; MSc Environmental Biology; Full Member Chartered Institute of Ecology and Environmental Management; and Chartered Environmentalist (CEnv).

### 6.1.3 Relevant Legislation

The following legislation and policy documents have been considered in preparing this chapter, where relevant:

- European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 of 2011 (as amended).
- The EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.
- European Union (EU) (Environmental Impact Assessment and Habitats) (No. 2) Regulations 2015. [S.I. No. 320/2015].
- Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage.
- The Habitats Directive (92/43/EEC) (as amended).
- The Birds Directive (2009/147/EC) (as amended).
- The EU Water Framework Directive (2000/60/EC).
- The Wildlife Act, 1976 (as amended).
- The Flora (Protection) Order 2015 [S.I. 356/2015].
- Planning and Development Acts 2000 - 2024 (and associated Regulations).
- County Development Plan 2022 -2028 (Galway County Council, 2022).
- Strategic Environmental Assessment (SEA) Environmental Report for the Galway County Development Plan 2022-2028 (Galway County Council, 2022).
- Natura Impact Report In Support of the Appropriate Assessment for the Galway County Development Plan 2022- 2028 (Galway County Council, 2022).
- Galway County Heritage and Biodiversity Plan 2017-2022.
- Clare County Development Plan 2023-2029 (Clare County Council, 2023).
- Clare County Development Plan 2023-2029 Volume 10a Appropriate Assessment Natura Impact Report (Clare County Council, 2023).
- Ireland's 4th National Biodiversity Action Plan 2023-2030. Department of Housing, Local Government and Heritage.

### 6.1.4 Relevant Guidance

The assessment was carried out with regard to the following Environmental and Ecological Impact Assessment guidance and tailored accordingly based on professional judgement:

- Chartered Institute of Ecology and Environmental Management (2018 (Version 1.2, April 2022)) Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine.
- Department of Environment, Heritage and Local Government (2009 (Rev 1 2010)) Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities.
- Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- Environmental Protection Agency (2015) Advice notes on current practice (in the preparation of Environmental Impact Statements) Draft September 2015.
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.

- European Commission: Directorate-General for Environment, McGuinn, J., Lukacova, Z., McNeill, A. and Lantieri, A., *Environmental impact assessment of projects – Guidance on the preparation of the environmental impact assessment report (Directive 2011/92/EU as amended by 2014/52/EU)*, Publications Office, 2017, https://data.europa.eu/doi/10.2779/41362.
- Bat Conservation Ireland (2012) Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8, December 2012.
- Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition).
- Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition).
- Hundt L (2012) Bat Surveys: Good Practice Guidelines, 2nd edition, Chapter 10: Surveying proposed onshore wind turbine developments, 2nd Edition. Bat Conservation Trust, London.
- Natural England Technical Information Note TIN051 (2014). Bats and onshore wind turbines Interim guidance. (3rd Edition).
- NatureScot *et al.* (2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.
- Rodrigues *et al.* (2015) Guidelines for consideration of bats in wind farm projects Revision 2014.
- Scottish Natural Heritage *et al.* (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.
- National Roads Authority (2006a) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes.
- National Roads Authority (2008) Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes.
- National Roads Authority (2006b) Guidelines for the Treatment of Bats during the Construction of National Roads Schemes.
- National Roads Authority (2009a) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (Transport Infrastructure Ireland (formerly the National Roads Authority).
- National Roads Authority (2009b) Guidelines for Assessment of Ecological Impacts of National Road Schemes.
- Transport Infrastructure Ireland (2020) The Management of Invasive Alien Plant Species on National Roads – Technical Guidance.
- National Parks and Wildlife Service (2003) Recommended Methodology for Assessment of Impacts of Proposed Windfarms on Breeding Hen Harrier within the Known Range of the Species in Ireland.
- Scottish Natural Heritage (2016b) Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds.
- Scottish Natural Heritage (March 2017) Recommended bird survey methods to inform impacts assessment of onshore wind farms.
- Smith *et al.* (2011) Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council Church Lane, Kilkenny, Ireland.
- Fossitt, J. A. (2000) A Guide to Habitats in Ireland. Heritage Council, Kilkenny.

## 6.2 Methodology

### 6.2.1 Overview

The baseline date for the assessment of environmental effects in the Environmental Impact Assessment Report (EIAR) is the present day. Following the refusal by An Bord Pleanála to grant Substitute Consent in relation to the Derrybrien Wind Farm Project (ABP planning reference no. ABP-308019-20),

commercial wind generation immediately ceased.. Since wind generation ceased, the turbines have been maintained by the turbine supplier while in a prolonged non-operational state.

Baseline data to inform the assessment of potential impacts was collected from a desktop review of existing datasets, including the results from the suite of ecological surveys carried out during the construction and operation of the wind farm from 2004 to 2022.

The following sections describe the methodologies followed in the compilation of this chapter. Recognised guidelines have been followed in relation to every aspect of the scoping, surveys and assessment.

## 6.2.2 Desk Study

A desk study was conducted to establish the Zone of Influence (see Section 6.2.3) of the Prospective Development and to identify any ecological receptors within this area which may have the potential to be affected as a result of the Prospective Development.

The National Parks and Wildlife Service (NPWS) website database was examined in relation to designated nature conservation areas and relevant reports. GIS data was accessed using the NPWS MapViewer (accessed date October 2024).

Information on the distribution of hen harrier breeding territories in the hinterland of the wind farm site (up to approximately 5 km distance from the site boundary) was provided by NPWS.

The desk study included a review of historic and current mapping including aerial photographs, historic and current reports and data relating to the wind farm site and adjoining areas.

The following databases, websites and reports have been consulted:

- The National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht (DCHG) (www.npws.ie).
- The National Biodiversity Data Centre (NDBC) (www.biodiversityireland.ie).
- Bat Conservation Ireland (www.batconservationireland.org).
- Aerial photography (past and present) and photographs taken at the site.
- Ordnance survey data (past and present) www.osi.ie.
- Information on water quality in the area available from www.epa.ie.
- Information on local watercourse catchments from www.catchments.ie.
- Information on soils, geology and hydrogeology in the area available from www.gsi.ie.
- Information on the status of EU protected habitats and species in Ireland (NPWS, 2019a, 2019b and 2019c).
- Review of specially requested records from the NPWS Rare and Protected Species Database for the hectads which overlap with the study area.
- Annual reports from the Hen Harrier Project (www.henharrierproject.ie), which includes the Slieve Aughty Mountains SPA, were reviewed for period 2017-2021.
- Monitoring data for the Lesser Horseshoe Roost at Lough Cutra Castle (provided by National Parks and Wildlife Service).
- Galway County Council Planning Website http://www.eplanning.ie/GalwayCC/searchexact to search for planning applications.

The following documents associated with Derrybrien Wind Farm Project Substitute Consent application have been reviewed in relation to data collected as part of previous ecological surveys undertaken on site:

- ESB (2020) Derrybrien Wind Farm Project Remedial Environmental Impact Assessment Report – Chapter 7 Biodiversity (Terrestrial Ecology).

- Wilson (2012) Derrybrien Wind Farm Bat Assessment (Draft report) – Faith Wilson Ecological Consultant (2012).

### 6.2.3 Zone of Influence

The 'zone of influence' (ZoI) for a project is the area over which ecological features may be subject to significant effects as a result of the project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. It may therefore be appropriate to identify different ZoIs for different features. The features affected could include habitats, species, ecosystems and the processes on which they depend (CIEEM, 2018 (Version 1.2, April 2022)).

Departmental guidance in relation to Appropriate Assessment states that,

> *'A distance of 15 km is currently recommended in the case of plans and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15 km and, in some cases, less than 100 m, but this must be evaluated on a case-by-case basis....'* (DoEHLG, 2009 (Rev 1 2010)).

The first step in determining the ZoI is to analyse the characteristics of the Prospective Development and identify the range of ZoI using the source-pathway-receptor conceptual model. Impacts associated with the Prospective Development, both known and potential, have been used to establish the potential zone(s) of influence.

The mechanism for defining the ZoI is summarised as follows:

- The nature, size and location of the Prospective Development have been considered.
- The sensitivities of the relevant ecological receptors have been considered.
- The known and potential impact sources and pathways have been identified.

The Derrybrien Wind Farm site drains to three river catchments. The Owenaglanna flows east becoming the Duniry River eventually discharging into Lough Derg, whereas the Boleyneendorrish and the Owendalulleegh Rivers flow westward, the latter discharging to Lough Cutra and the former joining a nexus of tributaries and dropping underground into the karst geology just north-east of Gort. The outflow from Lough Cutra, the Beagh River drops underground in the Punch Bowl and emerges again as the Cannahowna River which then flows north to Gort. Thereafter, known as the Gort River, it flows north before dropping underground at Pollatoophil at Castletown and emerges west north-west near Kiltartan where it is joined by the combined flows of the Boleyneendorrish and Kilchreest Rivers which drain the northern slopes of the Slieve Aughty Mountains. These combined flows then continue west underground emerging into the Coole River which flows due south to the Coole-Garryland wetland complex. Flows from here continue entirely underground until they emerge west north west in Galway Bay at Kinvarra. All these underground watercourses discharge to the sea at Kinvarra Bay. A small section of the grid connection and Agannygal Substation drain to Lough Atorick which is within one of the subbasins of the Bleach River. The Bleach River flows from Lough Atorick on into Lough Graney which in turn flows into the lower portion of Lough Derg at Scarriff Co. Clare, part of the River Shannon catchment.

The Prospective Development is hydrologically connected to 10 European sites (including Slieve Aughty Mountains SPA), however 9 of these are located at a significant instream distance from the site boundary (approximately 14.2 km or greater, see Section 6.3.1.1 for full details). Sonnagh Bog SAC is located north of the Boleyneendorrish River, approximately 2.2 km downstream of the Prospective Development. However, the SAC and river are separated by a terrestrial land buffer of approximately 14 m at its closest point, comprising a public road and conifer plantation/scrub habitat. In addition, the

SAC is located on elevated ground above the river. Therefore, no potential hydrological impact pathway exists between the Sonnagh Bog SAC and the Prospective Development.

As described in Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) and Chapter 9 Hydrology and Hydrogeology of the EIAR, the Prospective Development will interact with a number of watercourses and drainage ditches within the wind farm site and along the OHL corridor (including its access routes). There will be a requirement to cross a number of watercourses (including the Owendalulleegh River and its tributaries) to facilitate access to the OHL as part of the decommissioning works. In addition, there will be a requirement to replace a culvert along the decommissioning haul route to Agannygal Substation. Any potential hydrological impacts associated with the Prospective Development (in absence of mitigation) are only likely to have an effect on the local sub-catchments. As such there is no potential for impacts on European sites hydrologically connected to the Prospective Development but at a substantial instream distance (approximately 14.2 km or greater) and therefore these sites are considered to be beyond the ZoI of the Prospective Development.

The only exception to this (albeit it very unlikely) is in relation to the potential for a peat slide to occur as a result of peat instability arising from the Prospective Development, in particular when considered in-combination with the existing turbary activities on the wind farm site. Such a peat slide would only potentially affect SC7(a) and SC7(d) catchments, extending down the Owendalulleegh River to Lough Cutra. Whilst the likelihood of a peat slide occurring is deemed to be very low to low (as outlined in Chapter 8 Land, Soils and Geology of the EIAR), a precautionary approach has been applied and as such Lough Cutra SAC and Lough Cutra SPA, which are located approximately 22 km downstream of the site, have been identified as potentially being within the ZoI of the Prospective Development.

The Prospective Development is hydrologically connected to 5 pNHAs and one NHA (Slieve Aughty Bog NHA), however four of these nationally designated sites are located at a significant instream distance from the site boundary (approximately 22 km or greater, see Section 6.3.1.2 for full details). The Prospective Development is also hydrologically connected to one nature reserve: Coole-Garyland Nature Reserve, which is located over 30 km downstream of the wind farm site (see Section 6.3.1.3 for full details).

Considering the scale and nature of the Prospective Development as well as the substantial instream distances between the Prospective Development and these European and nationally designated sites, which would allow for significant mixing and dilution of any potential contaminants arising from the Prospective Development, they are not considered to be within the ZoI of the Prospective Development. The only exceptions to this are the following sites:

- Slieve Aughty Mountains SPA (004168), which the entire Prospective Development site boundary is located within.
- Slieve Aughty Bog NHA (001229), which the Prospective Development site boundary is partially located within.
- Lough Cutra SAC (000299).
- Lough Cutra SPA (004056).
- Lough Cutra pNHA (000299).

No other potential impact pathway exists between the Prospective Development and any other European or nationally designated sites or nature reserves. As there is no potential for impacts to occur, no other designated sites are considered to be within the ZoI of the Project.

The ZoI for birds will vary with species and type of impact: relevant factors include conservation status, sensitivity to disturbance and species core foraging distances, as described in the Scottish Natural Heritage Guidelines (SNH, 2016a). Target bird species occurring within the study area were identified during the desk review and core foraging ranges were established for these species. For hen harrier, the core foraging range from nest sites during the breeding season is 2 km, with a maximum range of 10 km. With regards to merlin, the core foraging range from nest sites during the breeding season will vary

depending on habitats present. Cramp and Simmons (1980) note that male merlins may fly several kilometres to hunt, while in a study in Sweden it was found that the hunting range could be twice the pair's territory, the latter averaging about 2km$^2$ (cited in Sale 2016).

Based on the bird species which have been identified as target species for the purpose of this assessment, the ZoI for birds is primarily up to 2 km from the wind farm project area. The Prospective Development is located entirely within the Slieve Aughty Mountains SPA and therefore this SPA is within its ZoI. The nearest SPA/pNHA after that is Lough Rea SPA/pNHA, located approximately 8.9 km north of wind farm site. Lough Rea SPA is designated for SCI species shoveler and coot as well as wetland and waterbirds. The wind farm site and OHL corridor do not contain habitats suitable for these wetland bird species, neither have been recorded near the wind farm site. The Prospective Development and Lough Rea SPA are located within different river catchments and therefore there is no potential hydrological impact pathways between the two sites.

After Lough Rea SPA/pNHA, the next nearest SPA is Lough Cutra SPA/pNHA, which is located approximately 10 km south-west of the wind farm site and approximately 22 km downstream of the site via the Owendalulleegh River catchment. Lough Cutra SPA is designated for SCI species cormorant, which has never been recorded within the wind farm site. As noted above, a precautionary approach has been applied and Lough Cutra SPA has been identified within the ZoI of the Prospective Development with regards to the potential for a peat slide to occur as a result of peat instability arising from the Prospective Development, in particular when considered in-combination with the existing turbary activities on the wind farm site. All other SPAs are considered to be beyond the ZoI of the Prospective Development.

Bats are highly mobile species, and capable of travelling large distances to forage and during migration. Of particular importance is the area around a bat roost in which habitat availability and quality will have an influence on the resilience and conservation status of that roost (the core sustenance zone (CSZ)). For Irish bat species the core sustenance zone ranges from approximately 1 to 4 km (Collins, 2023), although individual flights can be longer. Shiels *et al.* (1999) found that the maximum (mean) flight distance recorded for individuals from two Leisler's bat maternity roosts ranged from approximately 4.5 km to 7.5 km throughout the year. There is no species guidance on the ZoI for the decommissioning of wind farms. Industry guidance suggests a 10 km zone of influence is considered when assessing impacts of new wind farm proposals on bats; 'Bats and onshore wind turbines: survey, assessment and mitigation' (SNH *et al.,* 2021)) and EUROBATS Guidelines for consideration of bats in windfarm projects (Rodrigues *et al.,* 2015). However, the zone of influence for the decommissioning of a non-operational wind farm is likely to be very localised with regard to bats.

The nearest SAC/pNHA designated for the Annex II species lesser horseshoe bat is Lough Cutra SAC/pNHA, which is located approximately 10 km south-west of wind farm site – significantly beyond lesser horseshoe bat's CSZ of 2 km (Collins, 2023). As noted above, a precautionary approach has been applied and Lough Cutra SAC/pNHA has been identified within the ZoI of the Prospective Development with regards to the potential for a peat slide to occur as a result of peat instability arising from the Prospective Development, in particular when considered in-combination with the existing turbary activities on the wind farm site. All other SACs/pNHAs designated for this species are considered to be beyond the ZoI of the Project.

The ZoI for terrestrial habitats is considered to be within the red line boundary of the Prospective Development and immediately adjoining the site boundary. This has been determined based on the fact that direct impacts to habitats would be confined to the footprint of the Prospective Development within the site boundary and any associated works. Habitats immediately adjoining the site boundary were assessed in relation to indirect impacts. Surface water dependent habitats are addressed in Chapter 7 Biodiversity (Aquatic Ecology and Fisheries).

Otter likely use the main river channels of the three river catchments within the ZoI of the Prospective Development (Owendalulleegh, Boleyneendorrish and Duniry) and their tributaries as well as the

unnamed stream crossed by the proposed access route to Agannygal substation that flows into Lough Atorick for breeding, foraging and commuting. In accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2008), the ZoI of the Prospective Development on the local otter population is likely to be 150 m from the site boundary. The local otter population are not connected to any SAC designated for otter. Galway Bay Complex SAC (000268) is the nearest SAC designated for otter, which is hydrologically connected to the Prospective Development. This SAC is located approximately 45 km downstream of the Prospective Development, significantly beyond the normal territorial range of otter in Ireland, which is approximately 7.5 km ±1.5 km for female otter and approximately 13.2 km ±5.3 km for male otter (Ó'Néill et al., 2008).

In accordance with Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA, 2006a), the ZoI of the Prospective Development on badger is likely to be similar to otter, 150 m from the site boundary. The ZoI of the Prospective Development on smaller mammals (such as pine marten, pygmy shrew and red squirrel) and other fauna species (such as common frog, smooth newt and common lizard) is likely to be suitable habitat within and immediately adjacent to the footprint of the Prospective Development, or in the case of amphibian species suitable habitat within the immediate downstream aquatic environment.

## 6.2.4 Field Surveys

### 6.2.4.1 Terrestrial habitats

The following field surveys have informed the assessment presented in this report:

- Ecological assessment of peat slide. Surveys included a walkover habitat survey of peat slide area from the wind farm downstream as far as Flaggy Bridge. A Phase 1 habitat survey of the wind farm site itself was also undertaken focusing mainly on peatland areas (February 2004).
- Monitoring of habitat recovery within peat slide area (July 2004).
- Monitoring of habitat recovery within peat slide area (February 2005).
- Monitoring of habitat recovery within peat slide area (October 2005).
- Habitat assessment of wind farm and peat slide area (September 2011).
- Habitat survey of wind farm site to inform assessment of road upgrades (June 2013).
- Habitat survey of wind farm site and peat slide area (July 2015).
- Habitat survey of wind farm site, peat slide area, and the Derrybrien-Agannygal 110kV OHL corridor (July 2018).
- Habitat survey of wind farm site, peat slide area, and the Derrybrien-Agannygal 110kV OHL corridor (August 2022, February, and May 2023).

The most recent surveys of the site (2011 to 2023) followed methodology outlined in Smith *et al.* (2011). Detailed botanical and habitat descriptions were prepared for areas of ecological interest within the Prospective Development area. The most recent ecological surveys of the wind farm site (undertaken in 2022 and 2023) inform the receiving environment conditions against which the potential impacts associated with the decommissioning of the wind farm are assessed.

During the course of the survey, habitats present were classified according to Fossitt (2000) and where relevant according to Annex I of the EU Habitats Directive. Guidance in determining whether or not a habitat type may correspond to an EU Annex I type was sought from a variety of sources including European Commission (2013), and Fossitt (2000).

During the field survey, attention was paid to the possible occurrence of plant species which are considered to be rare in both a national and local context (Scannell and Synnott 1987) with particular emphasis on plant species listed in the Irish Red Data Book for vascular plants (Jackson et al., 2016), the Flora Protection Order (2015), and Annex II of the E.U. Habitats Directive.

Plant species nomenclature in this report follows Parnell & Curtis (2012) for vascular plants, Atherton (2010) for mosses and liverworts, and Whelan (2011) for lichens.

#### 6.2.4.2 Birds

Field surveys were undertaken in 2022, 2024 and 2025 to establish baseline conditions on site since the turbines were switched off.

The survey methods employed were appropriate for the purpose of monitoring target bird species to enable the prediction of impacts during the Prospective Development.

Surveys were carried out during the 2022 and 2024 breeding seasons, and in the 2024/2025 winter season.

##### 6.2.4.2.1 *Previous monitoring surveys at Derrybrien*

A programme for monitoring of hen harrier distribution within the Derrybrien Wind Farm had commenced in March 2004. The monitoring was in compliance with Condition 9 of Galway County Council Planning Ref. 02/3560. Hen harrier *Circus cyaneus* and merlin *Falco columbarius* were identified as target species given the designation of the Slieve Aughty Mountains SPA for both species. All other bird species observed or heard were recorded during the vantage point surveys and general time spent within the wind farm site and the surrounding areas. The section of the Derrybrien to Agannygal overhead line grid connection within a 5 km radius of the wind farm was included as part of the regular monitoring study zone. The objectives of the monitoring programme, which had been undertaken in the years 2004, 2006, 2007, 2009, 2011, 2015 and 2018, were as follows:

- To determine if hen harriers and merlins that may nest in the vicinity (up to c. 5 km from wind farm site) use any part of the wind farm site for nesting and/or foraging purposes.
- To determine what distance foraging birds will approach wind turbines.
- To determine if birds habituate to the presence of turbines.

The survey methodology used was that recommended for monitoring hen harriers at wind farm projects in upland areas by the NPWS (NPWS Hen Harrier Survey Methodology, Draft 12/03/03). At the time (2004), this was based on survey techniques established by Madders (2002) and these were later developed by Scottish Natural Heritage (SNH) as standard methods for survey of birds at onshore wind farm sites (SNH, 2014 & 2017). Methodology for the winter 2019/20 hen harrier winter roost survey followed O'Donoghue (2019).

##### 6.2.4.2.2 *Baseline surveys 2022 and 2024*

###### Hen harrier and merlin

For the 2022 and 2024 baseline survey, the objective of the survey was to determine the locations of breeding species of conservation importance that could be disturbed by the decommissioning works. Focus was on hen harrier and merlin, with methodology following Ruddock *et al.* (2016). Four rounds of site visits were carried out within the site area in the period of late-March to late-June, while three rounds of site visits were carried out in the period of early April to late-June 2024. Focus was on the early period, late-March to mid-May, when territorial birds are most active. Observations within the wind farm site were made using the vantage points used in the previous monitoring surveys (see Table 6-1 below). At each of these locations, watches up to 6 hours duration (split into several sessions) were made in each of the three survey periods.

Outside of the wind farm site at Derrybrien, watches of shorter duration (minimum 1 hour) were made over areas which had suitable breeding habitat, or which had supported hen harrier territories in the past. All observations were within an approximate 2 km distance of the wind farm infrastructure,

including the route corridor of the overhead line (breeding birds beyond that would be unlikely to be affected by decommissioning works).

*Table 6-1 Details of vantage points within wind farm used for surveys.*

| Vantage Point (VP) | |
|---|---|
| **VP A: M 60560 05219** | On track out on open bog with views back west into centre of site and views east over Caheranearl to Earl's Chair. |
| **VP B: M 58704 04749** | Looking over clearfell, open bog and forest edge at northwest corner of site from track c. 300 m north of '365 m' high point on Cashlaundrumlahan. |

The 2022 surveys were carried out over the following periods:

- 29th – 31st March.
- 28th – 30th April.
- 24th – 26th May.
- 28th – 30th June.

The 2024 surveys were carried out over the following periods:

- 9th – 10th April 2024.
- 5th – 11th May 2024.
- 18th – 19th June 2024.

### Other breeding birds

Surveys by transects were carried out for all breeding birds within the wind farm site and along the overhead line corridor. The survey was in accordance with the Countryside Bird Survey methodology (BirdWatch Ireland / NPWS), which is based on Bibby *et al.* (2000).

Sampling locations were selected along sections of wind farm roads to represent the main habitats present, as follows (and see Figure 6-1):

- No. 1: T28 to T37 – through cutover blanket bog (see Plate 6-1).
- No. 2: T23 to T70 – through peat slide section.
- No. 3: T12 to T15 – through regenerating bog area (see Plate 6-2).
- No. 4: T47 to T50 – through standing conifer plantation.

For the overhead line corridor, routes were selected partly due to ease of access, as follows (see Figure 6-2):

- No. 5: PS1 (substation) to PS4 – tall conifers to both sides (see Plate 6-3).
- No. 6: PS10 to PS12 (both sides of Black Road) - tall conifers to both sides.
- No. 7: Local road to PS36 to AM34 – clear felled area to both sides, with bog and wet grassland vegetation.

The transects were surveyed on two occasions within the following periods:

- 24th – 26th May 2022.
- 28th – 30th June 2022.
- 9th – 11th May 2024.
- 18th – 20th June 2024.

The transects were walked at a slow pace, with a 5-minute stop near each turbine or poleset location. Birds were recorded at distances of up to 300 m either side of the transect, both by sight and sound.

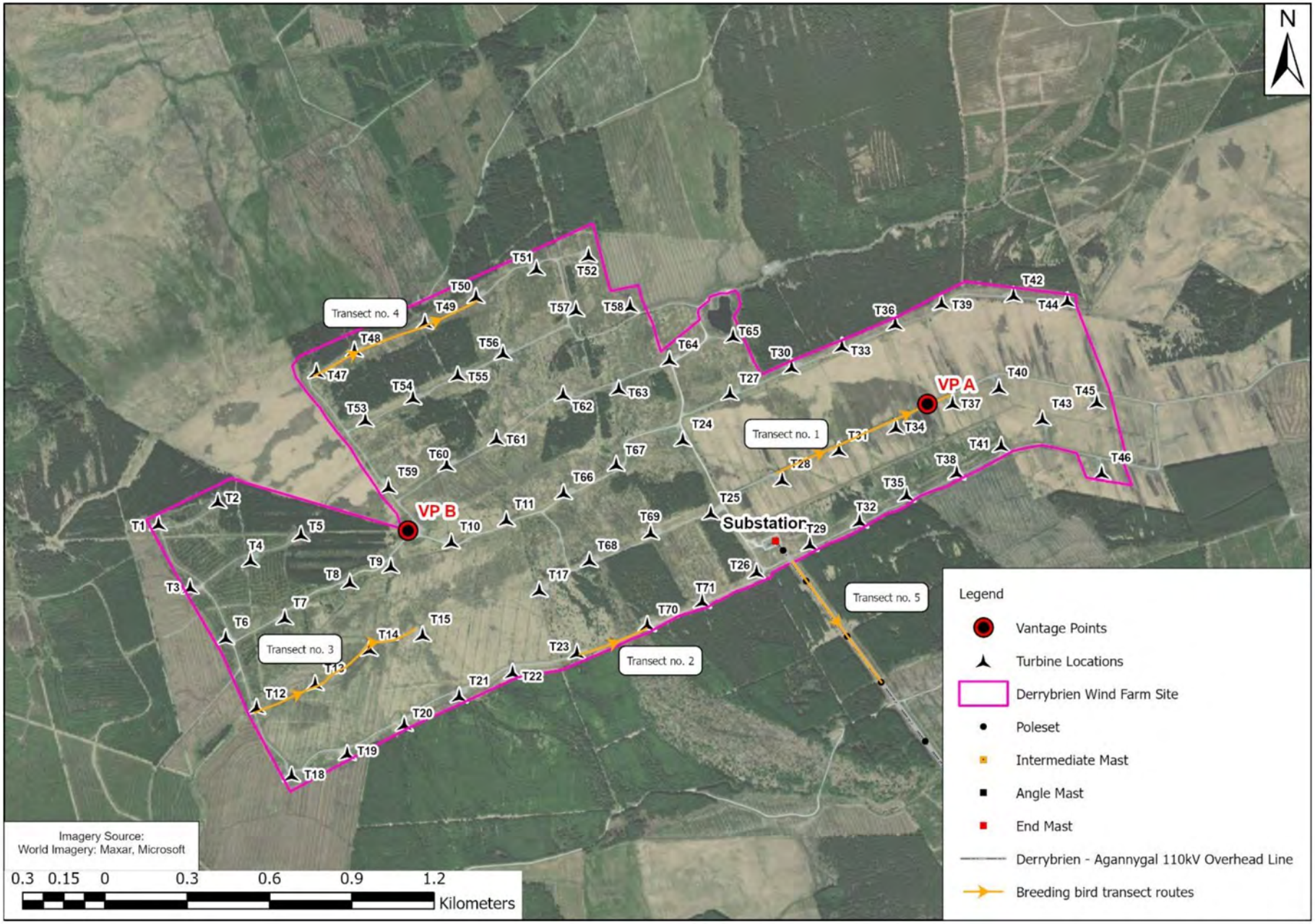



*Figure 6-1 Survey transects used on Derrybrien Wind Farm Development site, 2022 and 2024*

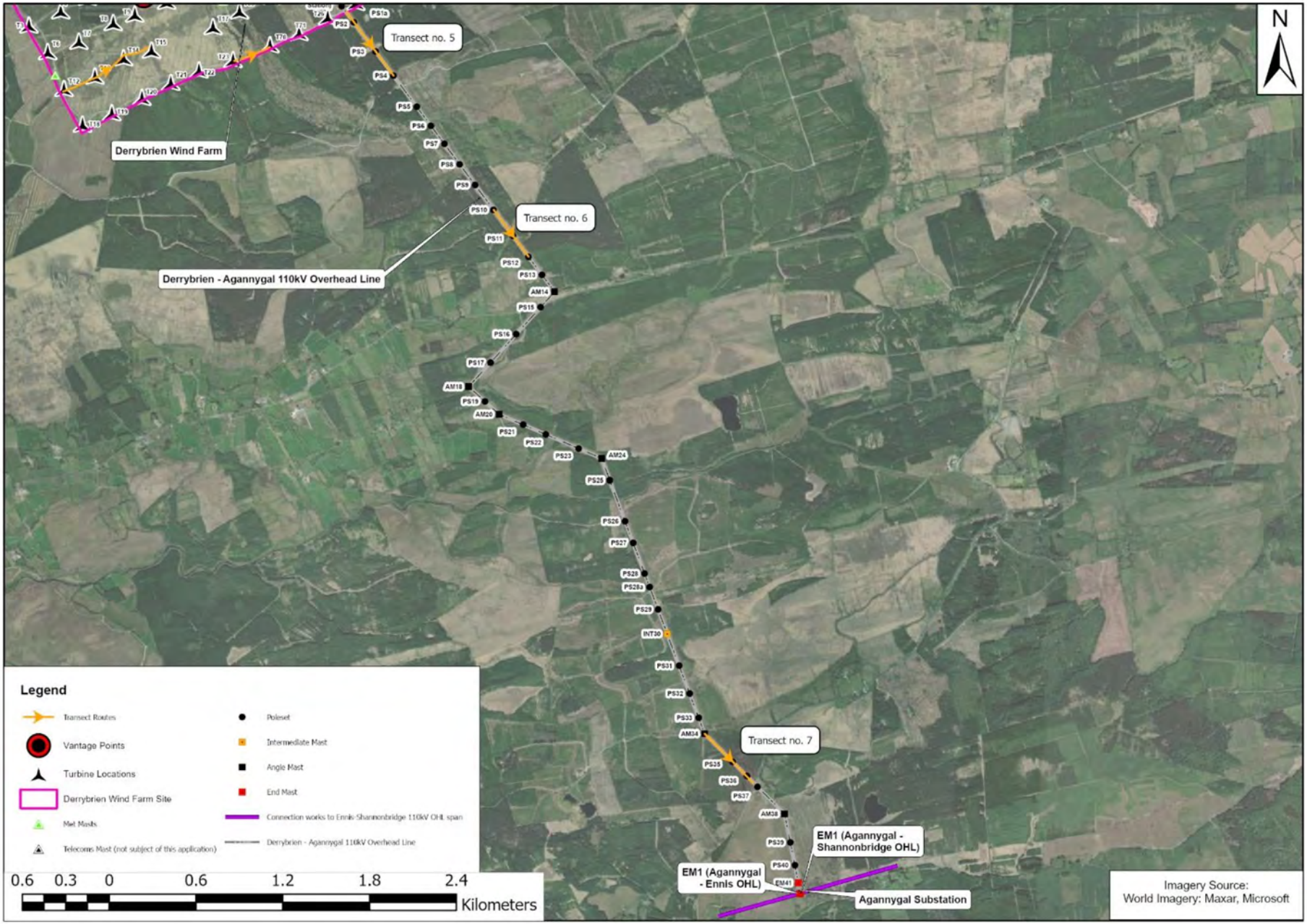



*Figure 6-2 Survey transects used along overhead line grid connection between Derrybrien Wind Farm and Agannygal Substation, 2022 and 2024*



*Plate 6-1 Survey transect No. 1 through bog in eastern sector of site, May 2022*



*Plate 6-2 Survey transect No. 3 through regenerating bog in western sector of site, May 2022.*



*Plate 6-3 Survey transect No. 5 along the overhead line corridor, May 2022.*

### 6.2.4.3 Bats

Bat activity surveys were undertaken between 2011 and 2023 on behalf of Gort Windfarms Ltd. All work completed during and after 2016 has been completed by BSG Ecology.

The purpose of gathering data over multiple years was to establish the species composition, spatial occurrence and activity levels of the local bat population as part of work to understand the impacts of the operational wind farm site, and subsequently to inform the remedial EIAR, which was submitted to An Bord Pleanála as part of the substitute consent application for the Derrybrien Wind Farm Project. The most recent work has included inspections of buildings and trees on site to specifically inform the EIAR of the Derrybrien Wind Farm Development Decommissioning Project. Initial building and tree inspections were completed in 2022, with the building inspections repeated in summer 2023.

The following field surveys have informed the assessment presented in this report, with the most recent data collection being relied on more heavily than the more historical survey data in characterising the baseline bat community. This greater reliance on the more recent data reflects its greater relevance to the EIAR (due to the scope of work completed) and the fact that being more contemporary it was collected at a time when conditions most closely resembled those currently on site.

#### 6.2.4.3.1 *Bat survey 2022 and 2023*

BSG Ecology completed field surveys to inform the decommissioning of the wind farm with reference to best practice survey methodologies set out by Bat Conservation Trust (Collins 2023; Collins 2016). These were as follows:

- Assessment of the potential use of Derrybrien Substation by bats including internal and external building inspections for bats and/or evidence of their presence, and post-dusk emergence and/or pre-dawn entry bat activity surveys (2023 and 2022). In 2022 work was

undertaken on 15 August (building inspection followed by a dusk emergence survey[1]), 09 September (re-entry survey) and 26 September (emergence survey). All internal areas were inspected, external features were viewed using binoculars. A follow up survey was completed on 20 July (re-entry survey) 2023. Details of all surveys are included in the bat mitigation report of the bat derogation licence included in **Appendix 6-4**.

- Assessment of the potential use of Agannygal substation by bats including internal and external building inspections for bats and/or evidence of their presence, and post-dusk emergence and/or pre- dawn entry bat activity surveys (2022 and 2023). In 2022 the survey work was completed on 16 August (building inspection followed by dusk emergence) and 08 September (when a Songmeter 4 detector was left at the northern gable end to determine activity through the night and at dawn following the completion of a dusk emergence survey). All internal areas were inspected, external features were viewed using binoculars. A follow up survey was completed on 19 July (emergence survey) 2023. Details of all surveys are included in the bat mitigation report of the bat derogation licence included in **Appendix 6-4**.
- Assessment of the potential use by bats of three bridges along the Black Road (ITM grid co-ordinate references: E 561836, N 704082; E 561367, N 703601; and, E 562242, N 705630), where structural works are proposed, including inspection for bats and/or evidence of bats (completed on 16th of August 2022). Features suitable for use by bats were inspected using an endoscope.
- Assessment of trees to be removed for bats – including trees at set down areas adjacent to the turbine locations and around the construction compound (completed on 15th of August 2022).

eDNA analysis of bat droppings collected during the surveys was completed by a specialist laboratory.

#### 6.2.4.3.2 Bat survey 2020 and 2021

Bat survey methods in 2020 were derived with reference to guidance for onshore wind farms produced by SNH *et al.* (2019[2]). Survey work comprised:

- Static bat detector survey. SNH et al. (2019) guidance was applied. This indicated that for a wind farm of 70 turbines a total of 32 locations should be sampled for a total of ten consecutive nights in each of spring, summer and autumn using static detectors. Data for summer and autumn were collected in 2020. Spring, summer and autumn data were collected in 2021. Bat fatalities were searched for during each of the periods in which static detectors were deployed[3].

#### 6.2.4.3.3 Bat survey 2019

Bat survey methods in 2019 were derived with reference to guidance documents produced by Bat Conservation Ireland (BCI) (2012), and multi-agency guidance published by Scottish Natural Heritage (SNH *et al.*, 2019)[4]. Survey work comprised:

[1] *Both emergence surveys involved two surveyors standing on different aspects of the building.*
[2] *This has since been superseded, and is now attributable to NatureScot et al (2021). The changes between the 2019 and 2021 guidance are minor.*
[3] *These were completed using specialist search dogs. A total of 32 turbines were searched at a rate of 8 turbines per day for 10 consecutive days in each of spring, summer and autumn 2021 and in summer and autumn 2020. Fatality surveys were also completed, at a far more limited scale, during late summer and autumn 2016. The work was undertaken to inform the remedial EIA, and is not of particular relevance to the decommissioning. The work in 2020 and 2021 followed a curtailment regime being implemented. No dead bats were recorded. It is not commented on further in this document.*
[4] *The SNH guidance supersedes previous guidance by Natural England (2014) and the Bat Conservation Trust (BCT) (Hundt, 2012). While this guidance is not specifically aimed at Ireland, it is broadly compatible with Bat Conservation Ireland's equivalent guidance (BCI, 2012), more prescriptive in some areas and more applicable to a wind farm of the scale of Derrybrien.*

- Static bat detector survey. Sampling was completed during the autumn (29 August to 8 October 2019) at each of 32 turbine locations using static detectors (11 detectors were rotated between the 32 locations). Ten consecutive nights of data were collected at each location.

#### 6.2.4.3.4 Bat Survey 2016

Survey methods were derived with reference to guidance produced by Bat Conservation Ireland (BCI) (2012), Natural England (2014) and the Bat Conservation Trust (Hundt [Ed], 2012).

Field surveys to inform the assessment for the site comprised:

- Driven transect survey with stopping points.
- Static bat detector survey at 32 turbine locations (these were selected to representatively sample the habitats present). The same locations were used as in 2019.

#### 6.2.4.3.5 Bat survey 2011

The first bat survey work at the Site was in 2011; a bat activity survey was undertaken on 5 November 2011 (Wilson, 2012). Each turbine was visited during the survey and a bat detector used to record activity along tracks whilst driving between turbines. Surveys were completed using a Heterodyne Bat Detector (Pettersson D100), a Time Expansion Bat Detector (Pettersson D240) and a Frequency Division Bat Detector (Bat Box Duet).

### 6.2.4.4 Mammals (other than bats)

#### 6.2.4.4.1 European Otter

A dedicated otter (*Lutra lutra*) survey of the Derrybrien North stream (a tributary of the Owendalulleegh River) between Black Road Bridge and Flaggy Bridge (approximately 1 km in length) was carried out on the 22nd August 2022 and 2nd December 2022.

In addition to the recent surveys, a dedicated otter survey of the wind farm site was undertaken on the 20th July 2018, which included a thorough search of the drains within the site. Otter signs were also recorded during aquatic habitat surveys on the Owendalulleegh River on the 25th August 2018 and on the Boleyneendorrish River while undertaking Q-value assessments on the 10th October 2018.

#### 6.2.4.4.2 Other mammals

Based on an assessment of current habitat suitability for other large mammals within the wind farm site and along the grid connection corridor (see Section 6.3.7 for full details), no other dedicated mammal surveys were undertaken.

### 6.2.4.5 Other fauna

Habitats within the wind farm site are not considered suitable for marsh fritillary butterfly (*Eurodryas aurinia*); this species is protected under Annex II of the Habitats Directive and is listed under the Wildlife Acts 1976 (as amended). This is based on an assessment of the percentage cover of Purple-moor grass (*Molinia caerulea*) and Devil's-bit scabious (*Succisa pratensis*), scrub cover, sward height and presence of tussocks (NRA, 2009a). Devil's-bit scabious, which is the foodplant of marsh fritillary, was not recorded during the 2022 or 2023 habitat surveys. Marsh fritillary has been scoped out of further assessment.

## 6.2.5 Scoping and Consultation

As detailed in Chapter 2, EIA scoping was undertaken in September 2024. No responses relating to terrestrial or avian biodiversity were received.

## 6.2.6 Assessment Methodology

The evaluation and assessment within this Chapter has been undertaken with reference to relevant parts of the 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine' developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018 (Version 1.2, April 2022)). Although these guidelines are recognised as the industry standard for ecological assessment in Ireland, they are not prescriptive; rather, they aim to "provide guidance to practitioners for refining their own methodologies". The impact assessment has also had regard to advice set out in the EPA's Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR) published in 2022 and NRA guidance Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009b).

### 6.2.6.1 Important Ecological Features

A first step in Ecological Impact Assessment (EcIA) is determination of which ecological features (habitats, species, ecosystems and their functions/processes) are important. Important features should then be subject to detailed assessment if they are likely to be affected by the Prospective Development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to effects of the Prospective Development, such that there is no risk to their viability.

Ecological features can be important for a variety of reasons and the rationale used to identify these is explained below. Importance may relate, for example, to the quality or extent of designated sites or habitats, to habitat/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline.

### 6.2.6.2 Evaluation: Determining Importance

The importance of an ecological feature (located within the ZoI of the Prospective Development) was evaluated in accordance with Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018 (Version 1.2, April 2022)) and Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009b) and by professional judgement.

The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case:

- International and European.
- National (Ireland).
- County (County Galway).
- Vice County (South Galway).
- Local (Slieve Aughty Mountains - defined by SPA boundary).
- Site (study area).

In certain circumstances particular receptors may be valued below the Site level. In these instances, they are described as being of negligible importance. CIEEM guidance indicates that features of less than Local importance are generally considered unlikely to trigger a mitigation or policy response in EcIA terms.

The approach to evaluating terrestrial habitats included two categories in the local context, higher value and lower value. In this case, those habitats of lower value do not trigger a mitigation response.

#### 6.2.6.3 Characterising and Qualifying Impacts and Assessing the Significance of Effects

The terms impact and effect are defined by CIEEM (2018 (Version 1.2, April 2022)) as:

- Impact - Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.
- Effect - Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.

CIEEM (2018 (Version 1.2, April 2022)) guidelines state that when describing ecological impacts and effects, reference should be made to the following characteristics as required: positive or negative; extent; magnitude; duration; frequency and timing and reversibility.

Following the characterisation of impacts, an assessment of the ecological significance of their effects is made. The guidelines promote a transparent approach in which a positive or negative effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued. The decision about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation and / or policy (CIEEM, 2018 (Version 1.2, April 2022)).

Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of this assessment, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'. A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. The EcIA guidelines (CIEEM, 2018 (Version 1.2, April 2022)) state that "*A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process*". The assessment of significance is based on professional judgement.

The Environmental Protection Agency (EPA) provides defined terms for the description of effects (see Table 1-2 in Chapter 1 Introduction of this EIAR). Where relevant significant effects have been described using these terms.

### 6.2.7 Article 12 of the Habitats Directive

This assessment has been undertaken in consideration of the requirements of Article 12 of the Habitats Directive with specific reference to bat species and otter (no other Annex IV species are considered likely to be affected by the Prospective Development). The Habitats Directive sets out measures the objective of which is the preservation, protection and improvement of the quality of the environment, including the conservation of natural habitats and of wild fauna and flora. Article 12 of the Habitats Directive sets out the strict protection that is afforded to certain species and directs Member States to implement the necessary measures to achieve this strict protection.

Article 12 states the following:

*1. Member States shall take the requisite measures to establish a system of strict protection for the animal species listed in Annex IV (a) in their natural range, prohibiting:*

*(a) all forms of deliberate capture or killing of specimens of these species in the wild;*

*(b) deliberate disturbance of these species, particularly during the period of breeding, rearing, hibernation and migration;*

*(c) deliberate destruction or taking of eggs from the wild;*

*(d) deterioration or destruction of breeding sites or resting places.*

*2. For these species, Member States shall prohibit the keeping, transport and sale or exchange, and offering for sale or exchange, of specimens taken from the wild, except for those taken legally before this Directive is implemented.*

*3. The prohibition referred to in paragraph 1 (a) and (b) and paragraph 2 shall apply to all stages of life of the animals to which this Article applies.*

*4.Member States shall establish a system to monitor the incidental capture and killing of the animal species listed in Annex IV (a). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.*

The European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) is the enacting legislation in Ireland for the Habitats Directive. The provisions of Article 12 of the Habitats Directive are set out in Regulation 51, which states:

*51. (1) The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule.*

*(2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54, a person who in respect of the species referred to in Part 1 of the First Schedule—*

*(a) deliberately captures or kills any specimen of these species in the wild,*

*(b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*

*(c) deliberately takes or destroys eggs of those species from the wild,*

*(d) damages or destroys a breeding site or resting place of such an animal, or*

*(e) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive,*

*shall be guilty of an offence.*

*(3) The prohibitions referred to in paragraph (2) shall apply to all stages of life of the biological cycle of fauna to which this Regulation applies.*

*(4) The Minister shall establish a system to monitor the incidental capture and killing of fauna consisting of the animal species referred to in Part 1 of the First Schedule and, having regard to the information gathered, he or she shall conduct further research or take such conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.*

The elements of Article 12 that are considered relevant to the Prospective Development are Article 12(1)(a) deliberate capture or killing of specimens (bats), Article 12(1)(b) deliberate disturbance (bats and otter) and Article 12(1)(d) deterioration or destruction of breeding sites or resting places (bat roosts). No issues are considered to arise under any of the other sub-paragraphs of Article 12. These elements have been considered as part of this assessment, as presented in the following sections of this report: 6.3.6, 6.3.7.1, 6.4.2.5, 6.4.2.6.1, 6.4.3.4, 6.4.3.5, 6.5.5 and 6.5.6. With respect to bats, a bat mitigation report is presented in Appendix 6-4. The work with regards to the substations (where bat roosts are located) will be completed under a bat derogation licence obtained from the Wildlife Licencing Unit at NPWS, in accordance with the requirements of Article 16 of the Habitats Directive and Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

### 6.2.8 Limitations/Difficulties Encountered

In general, no significant difficulties were encountered in carrying out the assessment of the impact of the Prospective Development on biodiversity.

Desktop records of rare and/or protected species sourced from the National Biodiversity Data Centre (NBDC) and NPWS are generally submitted on an ad-hoc basis and therefore these records can only provide an indication of what species may be present within the study area and cannot be relied upon to confirm the absence of a species. Despite this, no significant limitations on the assessment are predicted given that dedicated surveys for the key ecological groups (i.e. habitats (including the aquatic environment), birds and bats) and habitat suitability assessments have been carried out to inform the assessment.

Dedicated surveys were not carried out for some mammal (i.e. badger, pine marten or pygmy shrew), amphibian or reptile species (see Sections 6.2.4.4, 6.2.4.5, 6.3.7 and 6.3.8 for full details) and not all watercourses within the ZoI of the Prospective Development were surveyed for otter. Despite this, no significant limitations on the assessment are predicted considering the relatively widespread distributions of these species across Ireland and that habitat suitability assessments have been carried out to inform the assessment.

No significant limitations or difficulties were encountered during the assessment relevant to terrestrial habitats. The terrestrial ecologist who is a co-author of this chapter has been involved with the project since first visiting the site in the days following the peat slide event in late 2003.

Bat surveys commenced in mid-August 2022 which is towards the end of the bat active season, when maternity roosts may have started to disperse. It was therefore not possible to completely discount the presence of a small maternity roost in the substation buildings during 2022. However, the roof spaces of both buildings were fully inspected, and there was no evidence that a large maternity roost was present (or had been previously from the limited accumulated droppings present). Survey work was completed in July 2023 to address this limitation and confirm the nature of the roosts beyond doubt.

## 6.3 Receiving Environment

This section sets out the findings of the desk study and baseline ecological survey work. It then goes on to evaluate the importance of the identified ecological features.

## 6.3.1 Designated Nature Conservation Sites

### 6.3.1.1 European sites

The Habitats Directive 92/43/EEC provides legal protection for habitats and species of European importance through the establishment of a network of European designated conservation sites. These sites are known as Special Areas of Conservation (SAC) under the Habitats Directive and Special Protection Areas (SPA) designated under the EU Birds Directive 79/209/EEC.

The potential for the Prospective Development to impact on European sites within the ZoI was considered as part of this assessment. The ZoI is described in Section 6.2.3 and considers all aspects of the Prospective Development, including the wind farm site, grid connection (comprising the overhead line and Agannygal substation) and all associated ancillary works. The Prospective Development is entirely within the Slieve Aughty Mountains SPA (site code 004168). In addition to the Slieve Aughty Mountains SPA, 23 other European sites have been identified within a 15 km radius of the Prospective Development (4 SPAs and 19 SACs). A total of 10 of these sites are hydrologically connected to the Project site boundary. 9 of these 10 sites are located at an instream distance of between approximately 14.2 km to 30 km downstream of the Prospective Development. The only exception to this is the Slieve Aughty Mountains SPA, which has been identified as being within the ZoI of the Prospective Development (i.e. having the potential to be impacted by the Prospective Development) along with Lough Cutra SAC and Lough Cutra SPA for the reasons outlined in Section 6.2.3.

These sites were identified using GIS data downloaded from www.npws.ie (accessed October 2024). Refer to Table 6-2 and Figure 6-3 for details and locations of these sites.

These European sites are valued as being of International Importance.

*Table 6-2 SACs and SPAs within 15km of the Prospective Development (Slieve Aughty Mountains SPA, Lough Cutra SAC and Lough Cutra SPA, highlighted in blue, are within the ZoI of the Prospective Development)*

| European Sites (Natura 2000) | Distance from the Prospective Development (Approximate) | Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site Specific Conservation Objectives) |
|---|---|---|
| Slieve Aughty Mountains SPA (004168) | The entire Prospective Development is within the boundary of the SPA. | › Hen Harrier (*Circus cyaneus*) [A082]<br>› Merlin (*Falco columbarius*) [A098]<br><br>NPWS (2022a) |
| Sonnagh Bog SAC (001913) | 1.5 km north-west of wind farm site<br>2.8 km north-west of grid connection<br>No potential hydrological impact pathway. The Boleyneendorrish River (which is connected to the Prospective Development) is located in close proximity to the SAC, however they are separated by a terrestrial land buffer of approximately 14 m at its closest point, comprising a public road and conifer plantation/scrub habitat | › Blanket bogs (* if active bog) [7130]<br><br>NPWS (2019d) |
| Drummin Wood SAC (002181) | 7.4 km south-west of wind farm site<br>9.3 km west of grid connection | › Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] |

| European Sites (Natura 2000) | Distance from the Prospective Development (Approximate) | Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site Specific Conservation Objectives) |
|---|---|---|
| | No potential hydrological impact pathway as it is located upstream of the Prospective Development via the Owendalulleegh River system | NPWS (2021a) |
| Peterswell Turlough SAC (000318) | 7.7 km north-west of wind farm site<br>9.8 km north-west of grid connection<br>No potential hydrological impact pathway as it is located upstream of the Prospective Development via the Kilchreest River, a tributary of the Boleyneendorrish River | › Turloughs [3180]<br>› Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270]<br><br>NPWS (2021b) |
| Lough Rea SPA (004134) | 8.9 km north of wind farm site<br>9.7 km north of grid connection<br>No hydrological connection | › Shoveler (*Anas clypeata*) [A056]<br>› Coot (*Fulica atra*) [A125]<br>› Wetland and Waterbirds [A999]<br><br>NPWS (2025) |
| Lough Rea SAC (000304) | 8.9 km north of wind farm site<br>9.7 km north of grid connection<br>No hydrological connection | › Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140]<br><br>NPWS (2019e) |
| Lough Coy SAC (002117) | 9 km north-west of wind farm site<br>11 km north-west of grid connection<br>No hydrological connection | › Turloughs [3180]<br><br>NPWS (2021c) |
| Pollagoona Bog SAC (002126) | 9 km south-east of wind farm site<br>2 km south of grid connection<br>No hydrological connection | › Blanket bogs (* if active bog) [7130]<br><br>NPWS (2017) |
| Gortacarnaun Wood SAC (002180) | 9 km south-west of wind farm site<br>11 km west of grid connection<br>14.2 km downstream of the grid connection via the Owendalulleegh River system | › Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br><br>NPWS (2021d) |
| Carrowbaun, Newhall and Ballylee Turloughs SAC (002293) | 9.6 km west of wind farm site<br>11.9 km west of grid connection<br>15 km downstream of the wind farm site via the Boleyneendorrish River system | › Turloughs [3180]<br><br>NPWS (2021e) |
| Lough Cutra SPA (004056) | 10 km south-west of wind farm site<br>12 km west of grid connection<br>22 km downstream of the wind farm site via the Owendalulleegh River system | › Cormorant (*Phalacrocorax carbo*) [A017]<br><br>NPWS (2025) |
| Lough Cutra SAC (000299) | 10 km south-west of wind farm site<br>12 km west of grid connection<br>22 km downstream of the wind farm site via the Owendalulleegh River system | › *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]<br><br>NPWS (2018a) |

| European Sites (Natura 2000) | Distance from the Prospective Development (Approximate) | Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site Specific Conservation Objectives) |
|---|---|---|
| Ballinduff Turlough SAC (002295) | 11.7 km north-west of wind farm site<br>13.7 km north-west of grid connection<br>No hydrological connection | › Turloughs [3180]<br><br>NPWS (2021f) |
| Pollnaknockaun Wood Natura Reserve SAC (000319) | 12.6 km south-east of wind farm site<br>10.9 km east of grid connection<br>No hydrological connection | › Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br><br>NPWS (2018b) |
| Loughatorick South Bog SAC (000308) | 12.8 km south-east of wind farm site<br>6 km south-east of grid connection<br>No hydrological connection | › Blanket bogs (* if active bog) [7130]<br><br>NPWS (2019f) |
| Kiltartan Cave (Coole) SAC (000286) | 12.7 km west of wind farm site<br>15 km west of grid connection<br>No hydrological connection | › Caves not open to the public [8310]<br>› *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]<br><br>NPWS (2018c) |
| Derrycrag Wood Nature Reserve SAC (000261) | 13 km south-east of wind farm site<br>10 km east of grid connection<br>No hydrological connection | › Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br><br>NPWS (2018d) |
| Coole-Garryland Complex SAC (000252) | 13.4 km west of wind farm site<br>15.5 km west of grid connection<br>30 km downstream of the wind farm via the Boleyneendorrish River system | › Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation [3150]<br>› Turloughs [3180]<br>› Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270]<br>› Juniperus communis formations on heaths or calcareous grasslands [5130]<br>› Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]<br>› Limestone pavements [8240]<br>› *Taxus baccata* woods of the British Isles [91J0]<br><br>NPWS (2024) |
| Coole-Garryland SPA (004107) | 13.8 km west of wind farm site<br>16 km west of grid connection<br>30 km downstream of the wind farm via the Boleyneendorrish River system | › Whooper Swan (*Cygnus cygnus*) [A038]<br><br>NPWS (2025) |

| European Sites (Natura 2000) | Distance from the Prospective Development (Approximate) | Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site Specific Conservation Objectives) |
|---|---|---|
| Ardrahan Grassland SAC (002244) | 14.6 km north-west of wind farm site<br>16 km north-west of grid connection<br>No hydrological connection | › Alpine and Boreal heaths [4060]<br>› *Juniperus communis* formations on heaths or calcareous grasslands [5130]<br>› Limestone pavements [8240]<br><br>NPWS (2024) |
| Rosturra Wood SAC (001313) | 15.5 km east of wind farm site<br>13.7 km east of grid connection<br>No hydrological connection | › Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]<br><br>NPWS (2018e) |
| Cloonmoylan Bog SAC (000248) | 15.9 km east of wind farm site<br>13.7 km east of grid connection<br>No hydrological connection | › Active raised bogs [7110]<br>› Degraded raised bogs still capable of natural regeneration [7120]<br>Depressions on peat substrates of the *Rhynchosporion* [7150]<br>› Bog woodland [91D0]<br><br>NPWS (2016) |
| Glendree Bog SAC (001912) | 16 km south-west of wind farm site<br>15 km south-west of grid connection<br>No hydrological connection | › Blanket bogs (* if active bog) [7130]<br><br>NPWS (2019h) |
| Barroughter Bog SAC (000231) | 18 km east of wind farm<br>14.3 km east of grid connection<br>22 km downstream of the wind farm site via the Duniry River system | › Active raised bogs [7110]<br>› Degraded raised bogs still capable of natural regeneration [7120]<br>Depressions on peat substrates of the *Rhynchosporion* [7150]<br><br>NPWS (2015b) |
| Lough Derg (Shannon) SPA (004058) | 18 km south-east of wind farm site<br>13 km east of grid connection<br>23 km downstream of the wind farm site via the Duniry River system | › Cormorant (*Phalacrocorax carbo*) [A017]<br>› Tufted Duck (*Aythya fuligula*) [A061]<br>› Goldeneye (*Bucephala clangula*) [A067]<br>› Common Tern (*Sterna hirundo*) [A193]<br>› Wetland and Waterbirds [A999]<br><br>NPWS (2024) |
| Lough Derg, North-east Shore SAC (002241) | 18 km east of wind farm<br>14.7 km east of grid connection<br>23 km downstream of the wind farm site via the Duniry River system | › *Juniperus communis* formations on heaths or calcareous grasslands [5130] |

| European Sites (Natura 2000) | Distance from the Prospective Development (Approximate) | Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site Specific Conservation Objectives) |
|---|---|---|
| | | › Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]<br>› Alkaline fens [7230]<br>› Limestone pavements [8240]<br>› Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]<br>› *Taxus baccata* woods of the British Isles [91J0]<br><br>NPWS (2019i) |

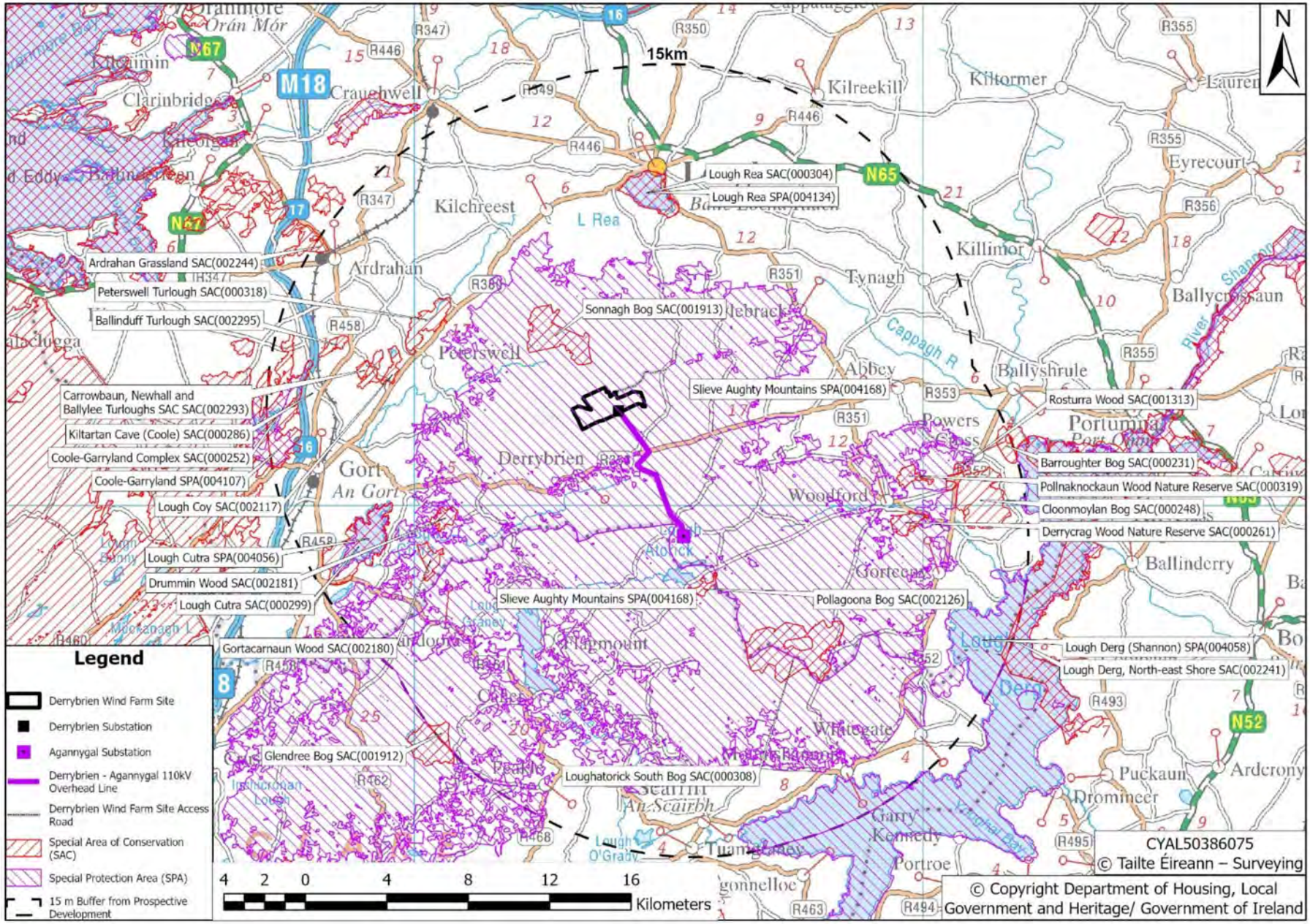



*Figure 6-3 SACs and SPAs within 15km of the Prospective Development*

### 6.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

Natural Heritage Areas (NHAs) are sites that are designated for the protection of flora, fauna, habitats and geological sites of national importance. Management of NHAs is guided by planning policy and the Wildlife Acts, 1976-2012. Proposed NHAs (pNHAs) were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats.

Angle mast AM24 along the grid connection is located within the Slieve Aughty Bog NHA site boundary. In addition, the following minor sections of the site boundary partially overlap with this NHA: grid connection corridor adjacent to AM24, the proposed access route to AM25 located north of the Owendalulleegh River and the Ennis-Shannonbridge 110 kV OHL reinstatement.

In addition to the Slieve Aughty Bog NHA, 3 other NHAs and 18 pNHAs have been identified within the 15 km radius of the site boundary; 13 of which are also designated as European sites (SAC or SPA). A total of 5 of these sites are hydrologically connected to the site boundary. 4 of these 5 sites are located at an instream distance of between approximately 14.2 km to 30 km downstream of the Prospective Development. The only exception to this is the Slieve Aughty Bog NHA, which has been identified as being within the ZoI of the Prospective Development (i.e. having the potential to be impacted by the Project) along with Lough Cutra pNHA for the reasons outlined in Section 6.2.3.

These sites were identified using GIS data downloaded from www.npws.ie (accessed October 2024). Refer to Table 6-3 and Figure 6-4 for details and locations of these sites.

These nationally designated sites are valued as being of National Importance.

*Table 6-3 NHAs and pNHAs within 15km of the Prospective Development (Slieve Aughty Bog NHA and Lough Cutra pNHA, highlighted in blue, are within the ZoI of the Prospective Development)*

| Name of site | Distance from the Prospective Development (Approximate) | Reason(s) for Designation |
|---|---|---|
| Slieve Aughty Bog NHA (001229) | 1.6 km east of wind farm site<br>Angle mast AM24 is entirely within this NHA's site boundary, while the following sections of the site boundary partially overlap with this NHA: grid connection corridor adjacent to AM24, the proposed access route to AM25 located north of the Owendalulleegh River and the Ennis-Shannonbridge 110 kV OHL reinstatement<br>Immediately downstream of the grid connection (at polesets 16 and 17) via the Owendalulleegh River system | › Peatlands |
| Sonnagh Bog pNHA/SAC (001913) | 1.5 km north-west of wind farm site<br>2.8 km north-west of grid connection<br>No potential hydrological impact pathway. The Boleyneendorrish River (which is connected to the Prospective Development) is located in close proximity to the pNHA, however they are separated | For reasons outlined above in Table 6-2 under Sonnagh Bog SAC |

| Name of site | Distance from the Prospective Development (Approximate) | Reason(s) for Designation |
|---|---|---|
| | by a terrestrial land buffer of approximately 14 m at its closest point, comprising a public road and conifer plantation/scrub habitat | |
| Lough Atorick District Bogs NHA (002377) | 6 km south of wind farm site<br>460 m south of grid connection<br>No hydrological connection | › Peatlands |
| Peterswell Turlough pNHA/SAC (000318) | 7.8 km north-west of wind farm site<br>9.8 km north-west of grid connection<br>No potential hydrological impact pathway as it is located upstream of the Prospective Development via the Kilchreest River, a tributary of the Boleyneendorrish River | For reasons outlined above in Table 6-2 under Peterswell Turlough SAC |
| Lough Rea pNHA/SAC/SPA (000304) | 8.9 km north of wind farm site<br>9.8 km north of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Lough Rea SAC and SPA |
| Cahermurphy Wood pNHA (000022) | 9.1 km south-west of wind farm site<br>6.7 km south-west of grid connection<br>No hydrological connection | › Oak woodland (NPWS, 2009a) |
| Lough Cutra pNHA/SAC/SPA (000299) | 10 km south-west of wind farm site<br>12 km west of grid connection<br>22 km downstream of the wind farm site via the Owendalulleegh River system | For reasons outlined above in Table 6-2 under Lough Cutra SAC and SPA |
| Lough Graney Woods pNHA (001714) | 12.1 km south-west of wind farm site<br>9 km south-west of grid connection<br>No hydrological connection | › Acid woodland (NPWS, 2009b) |
| Pollnaknockaun Wood Nature Reserve pNHA/SAC (000319) | 12.6 km south-east of wind farm site<br>10.1 km east of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Pollnaknockaun Wood Nature Reserve SAC |
| Kiltartan Cave (Coole) pNHA/SAC (000286) | 12.7 km west of wind farm site<br>15 km west of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Kiltartan Cave (Coole) SAC |
| Pollduagh Cave, Gort pNHA (000320) | 14 km west of wind farm site<br>16.5 km west of grid connection<br>No hydrological connection | › Daubenton's bat nursey colony roost (approximately 100 bats) (NPWS, 2009c) |
| Loughatorick South Bog pNHA/SAC (000308) | 12.8 km south-east of wind farm site<br>6 km south-east of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Loughatorick South Bog SAC |
| Derrycrag Wood Nature Reserve pNHA/SAC (000261) | 13 km south-east of wind farm site<br>9.1 km east of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Derrycrag Wood Nature Reserve SAC |
| Rosturra Wood pNHA/SAC (001313) | 15.5 km east of wind farm site<br>12.3 km east of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Rosturra Wood SAC |
| Derryoober Bogs NHA (002379) | 13 km south-east of wind farm site<br>7.8 km south-east of grid connection | › Peatlands |

| Name of site | Distance from the Prospective Development (Approximate) | Reason(s) for Designation |
|---|---|---|
| | No hydrological connection | |
| Coole Garryland Complex pNHA/SAC (000252) | 13.4 km west of wind farm site<br>15.5 km west of grid connection<br>30 km downstream of the wind farm via the Boleyneendorrish River system | For reasons outlined above in Table 6-2 under Coole-Garryland Complex SAC and SPA |
| Maghera Mountains Bogs NHA (002442) | 13.5 km south-west of wind farm site<br>12.8 km south-west of grid connection<br>No hydrological connection | › Peatlands |
| Glendree Bog pNHA/SAC (001912) | 16 km south-west of wind farm site<br>15 km south-west of grid connection<br>No hydrological connection | For reasons outlined above in Table 6-2 under Glendree Bog SAC |
| Barroughter Bog pNHA/SAC (000231) | 18 km east of wind farm<br>14.3 km east of grid connection<br>22 km downstream of the wind farm site via the Duniry River system | For reasons outlined above in Table 6-2 under Barroughter Bog SAC |
| Cloonamirran Wood pNHA (001686) | 21 km south-east<br>14.3 km south-east of grid connection<br>No hydrological connection | › Raised bog site naturally recolonised with woodland species.<br>(NPWS, 2009d) |
| Lough O'Grady pNHA (001019) | 20 km south of wind farm<br>14.2 south of grid connection<br>No hydrological connection | › Waterfowl species, especially Greenland white-fronted geese<br>› Variety of habitats – open water to wet grassland/marsh, wet woodland and scrub<br>(NPWS, 2009e) |
| Lough Derg pNHA/SAC/SPA (000011) | 22 km east of wind farm site<br>13.6 km east of grid connection<br>23 km downstream of the wind farm site via the Duniry River system | For reasons outlined above in Table 6-2 under Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA |

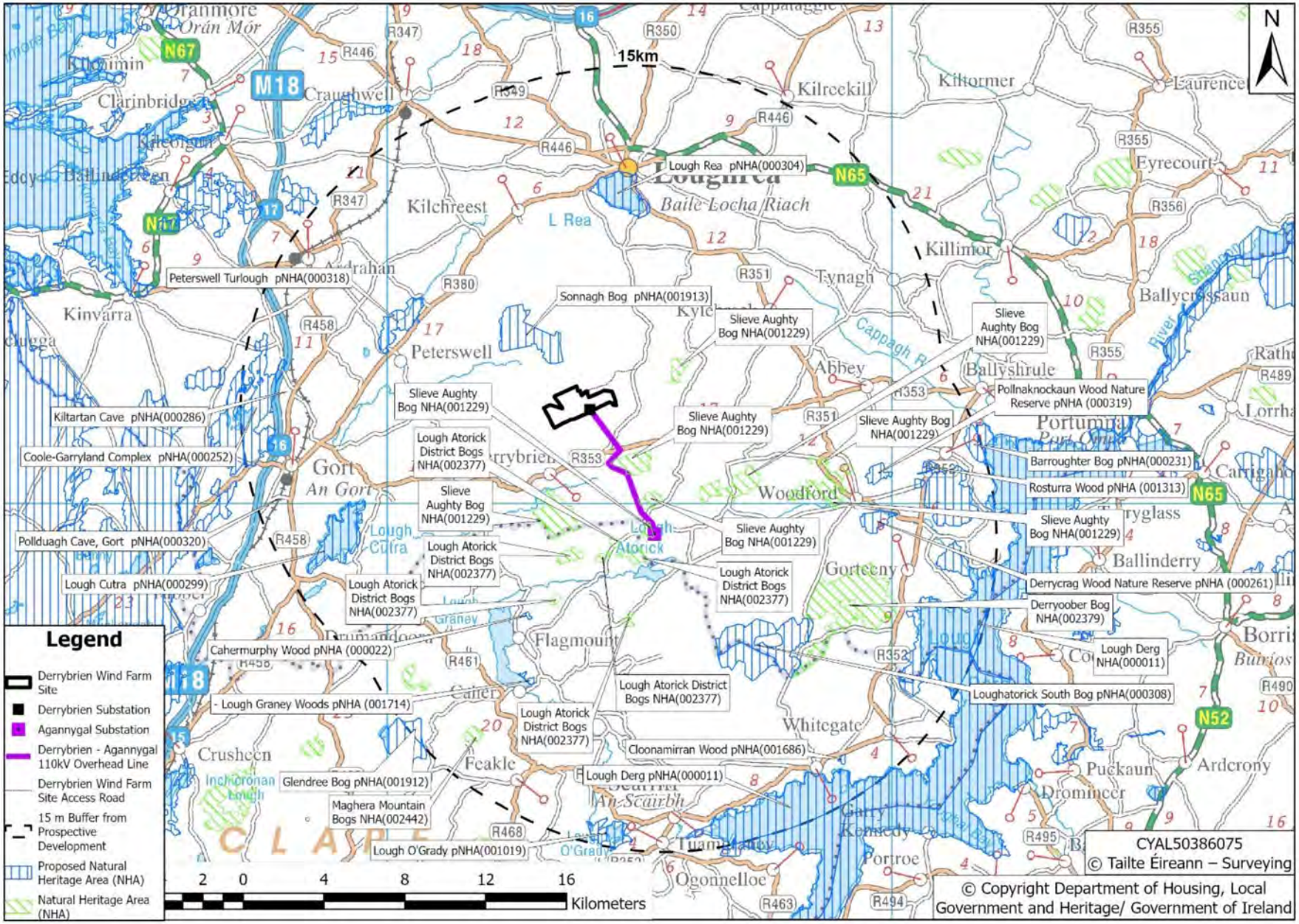



*Figure 6-4 NHAs and pNHAs within 15km of the Prospective Development*

#### 6.3.1.3 Nature Reserves

A Nature Reserve is an area of importance to wildlife, which is protected under Ministerial order. Most are owned by the State. However, some are owned by organisations or private landowners, and persons interested in acquiring statutory protection for their lands can seek advice on this matter from the DCHG. The following Nature Reserves occur within 15 km of the Prospective Development:

- Coole-Garyland Nature Reserve is approximately 13.4 km west from the Prospective Development and over 30 km downstream of the wind farm site.
- Caher (Murphy) Nature Reserve is approximately 6.7 km west of the Prospective Development.
- Pollnaknockaun Wood Nature Reserve is approximately 10.1 km east of the Prospective Development.
- Rosturra Wood Nature Reserve is approximately 12.3 km east of the Prospective Development.
- Derrycrag Nature Reserve is approximately 10 km east of the Prospective Development.

Four of these five Nature Reserves (Coole-Garyland, Pollnaknockaun Wood, Rosturra Wood and Derrycrag) are also designated as European sites and the assessment of impacts to these sites is addressed in Section 6.4.2.1.1 of this chapter and in the NIS. Caher (Murphy) Natura Reserve is also designated as a pNHA and the assessment of impacts to this site are addressed in Section 6.4.2.1.2.

These nature reserves are valued as being of International to National Importance as they are also designated as European and nationally designated sites.

### 6.3.2 Protected and/or Rare Species

A review of the National Biodiversity Ireland Database (NBDC) showed a number of records for protected flora and fauna species within the 10 km squares M50, M60 and R69 occupied by the Prospective Development (Refer to **Appendix 6-1**).

No rare or protected plant species were recorded during the site surveys. It is considered, based on the type and condition of habitats present, that rare and protected plant species are highly unlikely to occur within the project area.

### 6.3.3 Terrestrial Habitats

#### 6.3.3.1 Terrestrial Habitats within Prospective Development Area

A map illustrating the distribution of habitats within the Prospective Development area is presented in Figure 6-5 (wind farm site) and Figure 6-6 (overhead line and Agannygal substation).

Terrestrial habitats recorded within the Prospective Development area are described in the following paragraphs and summarised in Table 6-4. Habitat names and codes correspond with the Fossitt (2000) classification system which is a three-tier hierarchical approach.

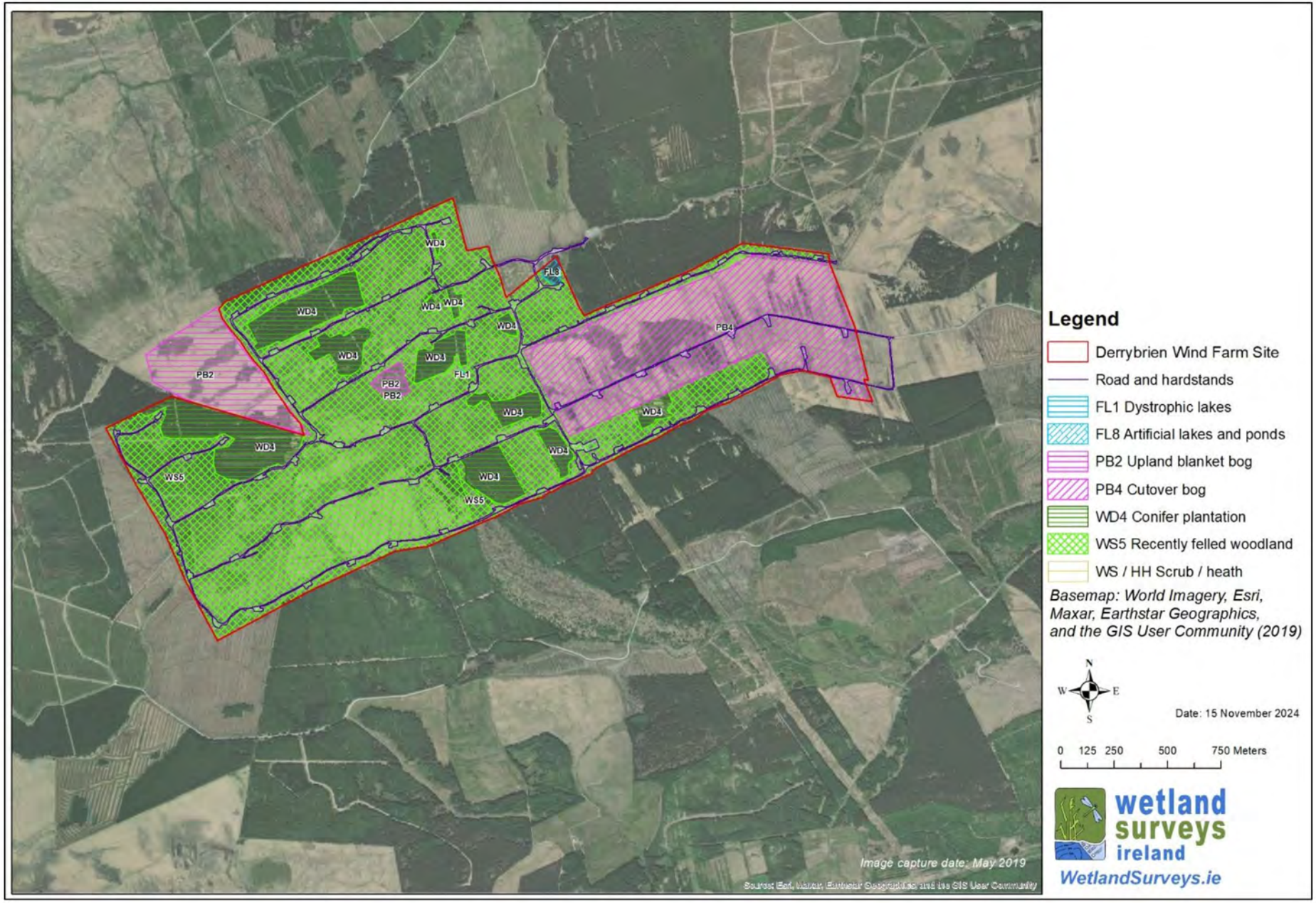



*Figure 6-5 Habitat map of wind farm site.*

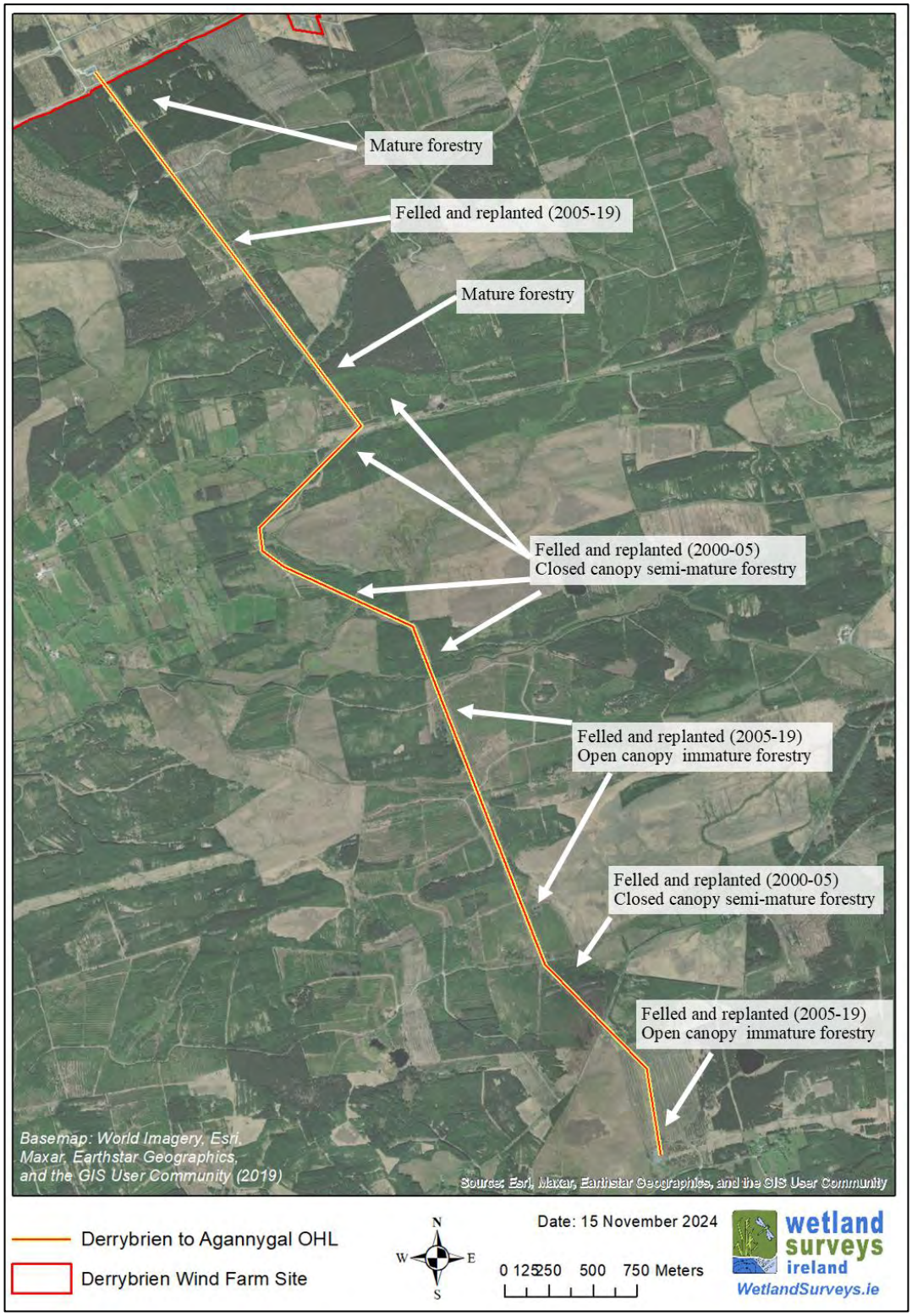



*Figure 6-6 Annotated aerial photograph indicating the habitats that occur along the Derrybrien to Agannygal OHL line route and at Agannygal Substation.*

### 6.3.3.1.1 Conifer plantation (WD4)

There are a small number of mature conifer stands remaining within the wind farm site. These areas are mostly dominated by Lodge Pole Pine (*Pinus contorta*) although Sitka Spruce (*Picea sitchensis*)

stands also occur. There is an abundance of moss growing on the woodland floor of these mature plantations mostly comprising *Thuidium tamariscinum*.

Prior to the development of the wind farm, the entire site was dominated by conifer plantation of different aged stands. The majority of this conifer plantation was felled to facilitate the wind farm and these lands were not subsequently replanted. The habitat in these locations corresponds with the habitat "Recently felled woodland (WS5)" as described below.

Conifer plantation also occurs either side of the overhead line corridor, the plantation ages and maturity varies from mature closed canopy forestry to open immature forestry which continues to support a ground flora representative of the pre-existing heath and bog. A map showing the distribution of habitats along the route of the OHL and at the Agannygal Substation site is presented in Figure 6-6 above.

*Evaluation*

Conifer plantation is a species poor habitat of low ecological value being managed for commercial timber production. These highly modified areas that were managed as commercial timber plantations are of low ecological value with poor species diversity, altered hydrological conditions, and dominance of non-native tree species.

Local importance, lower value.

#### 6.3.3.1.2 Recently felled woodland (WS5)

Prior to the development of the wind farm, most of the site was afforested with conifer plantation. However, this has largely been felled and replanting has not been undertaken. The current habitat of these felled areas varies considerably depending on a number of factors including the age of the plantation at the time of felling and the prevailing topographic and ground conditions.

In those areas of young conifers where an open canopy persisted up until the time of felling, the habitat has rapidly regenerated with vegetation typical of upland blanket bog. Vegetation in these areas is dominated by Purple-moor grass (*Molinia caerulea*) with a frequent occurrence of Ling Heather (*Calluna vulgaris*) and Hare's-tail Cotton-grass (*Eriophorum vaginatum*). Bog Rosemary (*Andromeda polifolia*), Tormentil (*Potentilla erecta*) and Bilberry (*Vaccinium myrtillus*) are also present. The mosses present include *Sphagnum papillosum*, *Eurhynchium praelongum* and *Sphagnum subnitens*. Moss cover is high (typically over 80%) with an abundance of *Sphagnum* species and feather mosses (see Plate 6-4). Locally there is abundant natural regeneration of Lodge-pole Pine (*Pinus contorta*) and Sitka Spruce (*Picea sitchensis*) with scattered individual immature trees present. In places low willow scrub has started to become established.

In those areas where a closed canopy mature plantation was felled, vegetation associated with disturbed conditions has become established being typically dominated by Soft Rush (*Juncus effusus*) with an abundance of Bramble (*Rubus fruticosus*), Willowherb (*Epilobium angustifolium*), Foxglove (*Digitalis purpurea*) and Bracken (*Pteridium aquilinum*).

This habitat also occurs along the entire route of the overhead line from Derrybrien Substation to Agannygal Substation. The habitat is similar in character along the overhead line although the topography is more undulating. As within the wind farm site, the habitat varies according to the age and stage of maturity of the pre-existing forestry. Felling of the OHL corridor was undertaken in advance of the OHL construction. The regeneration of trees within the OHL corridor has been subject to occasional cutting in the period since the line was commissioned to ensure clearance requirements are met. No further cutting has occurred along the OHL corridor since An Bord Pleanala's decision to not grant substitute consent in relation to the Derrybrien Wind Farm Project (ABP planning reference no. ABP-308019-20), *i.e.* from the 7th of February 2022 to the present day.

*Evaluation*

Those areas with regenerating bog communities are likely to restore to active peat forming systems in a relatively short period and are deemed to be of local importance, higher value. This variant of the habitat is best developed in the south-western part of the wind farm site.



*Plate 6-4 Regeneration of peatland vegetation across felled woodland areas in southern part of wind farm site.*

#### 6.3.3.1.3 Cutover bog (PB4)

The eastern portion of the wind farm site remains un-planted and has been and continues to be used for turbary being classified as cutover bog. Much of the area comprises turf banks encroaching into the remaining high bog in the area (see Plate 6-5). These peat cuttings (caused by people carrying out the turf cutting) have had an adverse effect on the bog by causing drying out and alteration of the bog surface. Within the old bog cuttings where conditions have remained wet the vegetation is dominated by Common Cotton-grass (*Eriophorum angustifolium*). It is likely that burning has also occurred in the area. The bog surface on the remaining high bog in the area is firm with low cover of *Sphagnum* mosses. The vegetation is largely dominated by Purple Moor-grass (*Molinia caerulea*) with an abundance of Deergrass (*Trichophorum cespitosum*), Cross-leaved heath (*Erica tetralix*), Bog Asphodel (*Narthecium ossifragum*), Carnation Sedge (*Carex panacea*), and Common Cotton-grass (*Eriophorum angustifolium*). *Sphagnum* species that were recorded in the area include *Sphagnum magelanicum*, *S. papillosum*, S. *cuspidatum* and *Sphagnum capillifolium* with total Sphagnum cover rarely exceeding 10%. Ling Heather (*Calluna vulgaris*) occurs frequently as does the lichen *Cladonia portentosa*.

*Evaluation*

Despite the degradation of this habitat, it represents a semi-natural habitat that, due to very extensive forestry planting, is relatively rare in the wider upland area.

Local importance, higher value



*Plate 6-5 Cutover bog in the eastern parts of the site.*

#### 6.3.3.1.4 Upland blanket bog (PB2)

There is a single area of intact blanket bog remaining in the Prospective Development area in the central part of the wind farm site. It is an area of unplanted blanket bog with a pool and hummock complex that was once surrounded by mature conifer plantation (see Plate 6-6). This area has vegetation typical of upland blanket bog. It is possible that the area was considered too wet for forestry in the past. Species in this area include the bog mosses *Sphagnum cuspidatum* occupying the wetter areas with *Sphagnum capillifolium*, *Sphagnum magellanicum* and *Sphagnum auriculatum* also present. The large hummocks are principally dominated by the moss *Racomitrium lanuginosum*, as is typical of upland bog. In between these hummocks are large pools that appear to be orientated in an east – west direction. Bogland plants such as Cross-leaved Heath (*Erica tetralix*), Ling Heather (*Calluna vulgaris*), Bog Asphodel (*Narthecium ossifragum*), Crowberry (*Empetrum nigrum*), Deer-grass (*Trichophorum caespitosum*), Hare's-tail Cotton-grass (*Eriophorum vaginatum*) and Common Cotton-grass (*Eriophorum angustifolium*) are all present.

Of note is the presence of Bog Rosemary (*Andromeda polifolia*) and Cranberry (*Vaccinium oxycoccos*) as both these species are deemed more typical of raised bogs. Cranberry is also reported from the nearby Sonnagh Bog (NHA/SAC) while Bog Rosemary is recorded in the nearby Pollagoona Bog (SAC). Both species are also present on the nearby Slieve Aughty Bog NHA.

*Evaluation*

The blanket bog within the wind farm site boundary is characterised by a pool and hummock complex surrounded by mature conifer plantation. Various *Sphagnum* mosses and other heathland bryophytes were frequent. The habitat corresponds with the priority Annex I habitat Active Blanket Bog [habitat code 7130] and is deemed to be of county importance.



*Plate 6-6 Upland blanket bog within the wind farm site.*

#### 6.3.3.1.5 Dystrophic lake (FL1)

There is a small natural peat floored lake present within the study area as shown on Figure 6-5. The lake is base poor and acidic. The lake is dominated by a cover of the aquatic bog moss, *Sphagnum cuspidatum*. The southern margin of the lake has a narrow band of Soft Rush (*Juncus effusus*) dominated flush vegetation surrounding it. The lake appears to be in a relatively natural state despite the planted forestry in the adjacent area and the development of the wind farm infrastructure close-by (see Plate 6-7).

*Evaluation*



*Plate 6-7 Dystrophic lake located within wind farm site.*

#### 6.3.3.1.6 Mosaic of Heath and scrub (HH / WS)

The area in the footprint of the former peat slide is mapped as a mosaic of heath and scrub. There is a well-developed herb and shrub layer with Purple Moor-grass (*Molinia caerulea*) and Ling Heather (*Calluna vulgaris*) dominating. Other peatland species that are abundant include Common Cottongrass (*Eriophorum angustifolium*), Carnation Sedge (*Carex panacea*), and Deergrass (*Trichophiorum cespitosum*). In places Soft Rush (*Juncus effusus*) is common particularly where mineral soil predominates. Mosses have become established throughout much of the ground layer with species typical of heathland and bog such as *Sphagnum capillifolium*, *Racometrium luginosum*, *Polytrichum commune*, *Aulacomnium palustre*, and *Hypnum jutlandicum*. The non-native *Campylopus introflexus* occurs in areas of bare peat together with Bulbous Rush (*Juncus bulbosus*). The tree layer continues to support scattered pine and spruce of varying ages, many of which are less than 4 m tall and appear to be self-sown since the peat slide occurred. The low growing eared willow, (*Salix aurita*), is also common throughout.

*Evaluation*

The area has stabilised and improved in quality in the period since the peat slide occurred and is now deemed to be of local value, higher importance. The habitat is likely to be of value to common bird species and may provide suitable foraging habitat to hen harrier.

#### 6.3.3.1.7 Artificial Lakes and Ponds (FL5)

This habitat occurs in the footprint of a borrow pit used during the construction of the wind farm. The lake comprises deep water and lacks any aquatic or marginal vegetation being surrounded by steep exposed rock outcrops.

*Evaluation*

This habitat is of low ecological value.

#### 6.3.3.1.8 Other habitats

Buildings and artificial surfaces (BL3) include the network of access roads, hard stands, turbine bases, site office and electrical sub-stations. This habitat occurs throughout the Agannygal 110 kV Substation site.

Drainage ditches (FW4) are common throughout the Prospective Development area. These include old forestry drains that are well vegetated and only part functional while larger functional free-flowing drains occur in proximity to the site infrastructure and in the turbary cutover bog area.

*Evaluation*

These habitats are of low ecological value.

*Table 6-4 Overview of terrestrial habitats present within or adjacent to the Prospective Development area.*

| Habitat type | Occurrence | Evaluation |
|---|---|---|
| Conifer plantation (WD4) | Dominant habitat throughout the wind farm site, the OHL corridor, and surrounding the Agannygal Substation. | Local importance, lower value |
| Recently felled woodland (WS5) | Occurs throughout much of the site where forestry has been felled and upland bog vegetation is re-establishing. | Local importance, higher value |
| Cutover bog (PB4) | Eastern extent of wind farm site. | Local importance, higher value |
| Upland blanket bog (PB2) | Two discrete areas of intact bog, one in central part of wind farm site and another directly to the north-west of wind farm site. | County importance |
| Dystrophic lake (FL1) | Single pond in central part of wind farm site. | County importance |
| Heath bog mosaic (HH / PB) | Occurs in footprint of the former peat slide. | Local importance, higher value |
| Artificial lakes and ponds (FL5) | Occurs within a single borrow pit at main entrance to the wind farm site. | Low ecological value |
| Buildings and artificial surfaces (BL3) | This includes the network of roads, turbine bases, hardstands, and buildings associated with site office and substations. The habitat occurs throughout the Agannygal Substation site. | Low ecological value |
| Drainage ditches (FW4) | Frequent throughout the Prospective Development area. | Low ecological value |

## 6.3.4 Invasive species

No problematic alien invasive species were recorded on site.

Two individual non-native New Zealand Flax (*Phormium tenax*) occur along the roadside nearby the onsite substation. The plants are likely to have been planted there intentionally in the past. There is no evidence of this species spreading within the site.

The toxic weed Common Ragwort (*Senecio jacobaea*) is sparsely distributed in areas of recolonising bare ground proximate to the site infrastructure in association with Colt's Foot (*Tussilago farfara*).

Neither Japanese Knotweed (*Fallopia japonica*) or Rhododendron (*Rhododendron ponticum*) have been recorded within the site. However Japanese knotweed was previously recorded in close proximity to barrage 3 / the Derrybrien North stream south of the Black Road in the wider locality of the site.

## 6.3.5 Birds

### 6.3.5.1 Review of status of birds in study area, 1998-2018

#### 6.3.5.1.1 *Period prior to Derrybrien Wind Farm construction (1998-2003)*

An assessment of birds on the Derrybrien Wind Farm site for the original Environmental Impact Statements (prepared by Saorgus Energy Ltd., 1998 & 2001) had noted the presence of meadow pipit, skylark and snipe from the site. It was considered that various other species could occur in the area, including merlin, hen harrier, woodcock and red grouse (source of information stated to be from local NPWS ranger).

Information on the distribution of hen harriers within a radius of approximately 5 km of the wind farm was provided by NPWS to Brian Madden for the period 2000-2003. For the 2003 breeding season, there was a total of 12 known territories.

The total population for the Slieve Aughty Mountains in the first National Hen Harrier Survey in 1998 to 2000 was 15-23 pairs (Norriss *et al.*, 2002).

None of the breeding hen harrier territories in the 2000 to 2003 period were within the area of the wind farm nor was there any information available to indicate a historic territory in this area. The nearest two territories in 2003 were approximately 2 km to the northwest and approximately 2 km to the southeast. The territory to the southeast was approximately 1.5 km from the overhead line corridor. A further possible territory was approximately 1 km south of the Agannygal Substation site.

#### 6.3.5.1.2 *Status of birds during construction phase of Derrybrien Wind Farm (mid 2003 – March 2006)*

A survey took place in 2004 during the period when construction works were on hold due to the peat slide. Tree felling had taken place to facilitate the construction of the wind farm infrastructure, but the greater part of the required felling to construct the wind farm had not yet occurred. The majority of the road network was in place as well as 37 of the turbine foundations.

The main finding of the 2004 survey (BES, 2004) was that hen harriers were using the unplanted part of the Prospective Development site for foraging, with sightings over the bog in the eastern sector on three dates in May and June.

Within the hinterland area (to c. 5 km of the wind farm site) a total of ten breeding territories were located. Distribution of territories was similar to that in 2003. As in 2003, there were two territories within a 2 km distance of the wind farm. There were no signs of territorial behaviour by hen harriers within the wind farm site during the 2004 season.

### 6.3.5.1.3 *Status of birds during operation phase of Derrybrien Wind Farm (2006 – 2018)*

#### Usage of wind farm site by hen harrier

Surveys for hen harriers and other bird species were carried out during the operational phase of the wind farm in the years 2006, 2007, 2009, 2011, 2015 and 2018. These comprised vantage point surveys within the wind farm and hinterland surveys to locate breeding territories.

At no time in the monitoring period were hen harriers suspected of nesting within the wind farm site or within at least a 1 km radius of the wind farm. Hen harriers were, however, recorded foraging within or flying through the wind farm on at least one occasion in each of the survey years. All records were of single birds, involving both males and females. Sightings were both in the vicinity of the unplanted bog in the eastern sector of the site and in the areas which were clear felled to facilitate the wind farm. The clear-felled areas developed to a mix of low scrub (brambles, willows etc.) and re-vegetating bog species (heather, grasses etc.) which supported a range of potential prey items for hen harriers, especially meadow pipit and skylark.

While much of the wind farm had provided suitable foraging habitat for hen harrier during the operational phase, the likelihood of birds availing of the foraging potential was considered to be influenced largely by the proximity of nesting pairs to the site, and the availability of foraging habitats in the surrounding area. The amount of foraging habitat in the surrounding area is partly dependent on forestry management practices, with the unplanted bog and heath remaining fairly constant in area over time. When a substantial area of forest is harvested and replanted, hen harriers will invariably be attracted to the pre-thicket stage forest for foraging purposes and possibly even to attempt nesting.

In addition to the records described above, two *ad-hoc* sightings of hen harrier within the wind farm were made by John Curtin (ecologist) in 2020 as follows:

- 30th June 2020 - female perched on a stump in clear-fell in the western sector of site, then flew.
- 8th September 2020 – ringtail near substation.

#### Hen harrier breeding territories within 5 km of wind farm site

Since the start of the monitoring surveys for breeding territories in 2004, up to 14 breeding territories were identified within an approximate 5 km radius of the wind farm. Most of these were traditional territories dating to at least the late 1990s. However, in any one-year occupancy varied, with some territories showing no evidence of occupancy or perhaps being abandoned early in the season. Also, within each territory the exact location of the nest site will often vary between years.

Table 6-5 shows a summary of the number of territories occupied in various years since 2004 within a 5 km radius of the wind farm. Data from the respective National Hen Harrier Surveys for 2005 and 2010 are also given to supplement the years when monitoring did not take place at the wind farm. Two categories of breeding are given – confirmed (where nesting actually took place though may not have been successful) and possible (where territory was apparently occupied early in season only).

*Table 6-5 Summary of the number of territories occupied in various years since 2004 within a 5 km radius of the wind farm.*

| | 2004 | 2005 | 2006 | 2007 | 2009 | 2010 | 2011 | 2015 | 2018 |
|---|---|---|---|---|---|---|---|---|---|
| **Confirmed** | 9 | 14 | 11 | 12 | 11 | 8 | 6 | 2 | 2 |
| **Possible** | 1 | - | 2 | 2 | 2 | 4 | 4 | 4 | 3 |
| **Total** | **10** | **14** | **13** | **14** | **13** | **12** | **10** | **6** | **5** |

Since monitoring commenced in 2004, there had been two regular territories within a 1-2 km distance of the Derrybrien Wind Farm site. In 2011, the only successful nesting (i.e. young birds fledged) by the 10 pairs within the 5 km radius of the wind farm was from one of these territories, and this territory was still occupied in both the 2015 and 2018 surveys (though no young were known to be produced).

The monitoring of hen harrier territories within the 5 km radius of Derrybrien Wind Farm showed that the number of confirmed nesting attempts was fairly constant between 2004 and 2009 but there then followed a decline in 2011 which continued more markedly into 2015 and 2018 (with only 2 confirmed nesting attempts in each year). Between 2010 and 2018, the total number of pairs (confirmed and possible) dropped from 12 to 5.

### Status of breeding merlin in wind farm site

Merlin is a scarce breeding bird within the Slieve Aughty Mountains, with the Site Synopsis for the Slieve Aughty Mountains SPA (NPWS, 2015a) noting that "*The population size is not well known but is likely to exceed 5 pairs*".

There were no sightings of merlin within the wind farm site during the various breeding bird surveys between 2006 and 2018. A single sighting was made in the hinterland area several kilometres from the wind farm on 10th May 2011 during a search for hen harrier territories which probably indicated local breeding.

As merlin is a difficult species to survey due to its discrete breeding behaviour (Lusby *et al.* 2011), there is some chance that one or more pairs could breed in the hinterland of the wind farm and remain unnoticed. However, it is undoubtedly a rare breeding bird within the Slieve Aughty Mountains.

### Other breeding bird species recorded within wind farm site

A range of bird species characteristic of bog, heath, scrub and forest habitats was recorded on site during the various monitoring surveys. These are listed in Table 6-6, along with their expected breeding status.

Six of the species, kestrel, golden plover, snipe, red grouse, meadow pipit and grey wagtail, are Red-listed due to significant declines in the national breeding populations (Gilbert *et al.* 2021). Golden plover, along with hen harrier and merlin, is also listed on Annex I of the EU Birds Directive.

Kestrel is an occasional visitor and was recorded hunting within the site.

Red grouse was recorded on site in both 2009 and 2015, with sightings on the bog in the eastern sector of the site and alongside tracks in the western clear-felled area. A pair of grouse was observed flying into the northwest sector (near T59) of the site in April 2009 and a bird was seen leaving in the same area of the site towards the bog in May 2015. Grouse are likely to be attracted to the site both to feed on the heather, which can grow proficiently along track edges and also to pick for grit on tracks which is required for their digestion.

Golden plover was recorded in 2009 only, when flocks of 550 and 150 birds were present roosting on the bog in the eastern sector on 10th and 12th April respectively. These were birds on migration and could be expected to land within the cutover bog component of the site on occasions to rest and/or feed. Snipe is expected to breed on the cutover bog in the east of the site (1-2 pairs).

Meadow pipit is widespread within the Derrybrien Wind Farm. Young, fledged birds are often seen and post breeding flocks (often in excess of 50 birds) are a feature in late July and August. Grey wagtail is seen in most years and one pair probably breeds on site (often seen at the flooded borrow pit / quarry near site entrance, referred to as borrow pit/quarry 3).

A further seven species recorded within the site are Amber-listed (i.e. of moderate conservation concern). A pair of teal has been recorded in several years and is expected to breed on site. Teal utilise ponds and large drains as nesting sites. Mallard also breeds in ponds and drains on site. Skylark is fairly widespread as a breeding species throughout the site. Goldcrest breeds in scrub and woodland on site. House martin, while not recorded on site in 2022, has bred on the substation in the past. Swallow is regularly recorded feeding over the site and breeds annually in an abandoned corrugated iron shed on the cutover bog (east T 24). Wheatear has been recorded on migration in several of the surveys.

Other breeding species which are regular on site include mallard, sparrowhawk, cuckoo, mistle thrush, whitethroat, stonechat, chaffinch, lesser redpoll and reed bunting.

*Table 6-6 Status of birds recorded at Derrybrien Wind Farm during various summer surveys, 2006-2018. Breeding status given as possible, probable, confirmed or non-breeding after Breeding Atlas (Balmer et al. 2012). Conservation status after Gilbert et al. (2021).*

| Species | Breeding Status | Conservation Status |
|---|---|---|
| Mallard | Breeding probable – up to 5 birds seen together | A |
| Teal | Breeding probable in several years - a pair at small pond in clear-fell in west of site | A |
| Sparrowhawk | Breeding confirmed – regularly seen and heard | G |
| Kestrel | Non-breeding – occasionally seen hunting | R |
| Red grouse | Recorded on site in 2009 and 2015 – seen flying into site near T59 from bog to northwest. Nests on adjoining bogs. | R |
| Golden plover | Flock of up to 550 recorded on site in April 2009 – considered birds on migration | R |
| Snipe | Breeding probable on cutover bog in east of site | R |
| Woodpigeon | Breeding probable – regularly seen flying across site | G |
| Cuckoo | Breeding probable – annual summer visitor | G |
| Magpie | Breeding possible - occasional on site | G |
| Hooded crow | Breeding possible – regular on site, with flock of 24 in 2011 | G |
| Raven | Non-breeding. Passes over site regularly | G |
| Goldcrest | Breeding probable – mainly conifers | A |
| Great tit | Breeding probable | G |
| Coal tit | Breeding confirmed – mainly conifers | G |
| Skylark | Breeding confirmed – widespread | A |
| House martin | Has bred on Derrybrien Substation in some years | A |
| Swallow | Breeds in shed - regular over site during summer | A |
| Willow warbler | Breeding probable | A |

| Species | Breeding Status | Conservation Status |
|---|---|---|
| Whitethroat | Breeding confirmed | G |
| Wren | Breeding confirmed – widespread | G |
| Blackbird | Breeding probable | G |
| Song thrush | Breeding possible | G |
| Mistle thrush | Breeding probable – post breeding flocks of 20+ in July and August | G |
| Robin | Breeding confirmed | G |
| Stonechat | Breeding confirmed – 1-2 pairs | G |
| Wheatear | Occasional - non-breeding migrant birds | A |
| Grey wagtail | Breeding confirmed - 1 pair | R |
| Meadow pipit | Breeding confirmed – widespread | R |
| Chaffinch | Breeding probable | G |
| Goldfinch | Breeding possible | G |
| Lesser redpoll | Breeding probable | G |
| Reed bunting | Breeding confirmed | G |

Conservation Status: R – Red; A – Amber; G – Green

#### 6.3.5.1.4 *Winter bird species recorded within wind farm area*

##### Winter 2011/12

There were no sightings of hen harriers within or around the wind farm site during surveys between November 2011 and January 2012. However, a range of bird species characteristic of bog, heath, scrub and forest habitats was recorded.

Four of the species recorded on site, kestrel, golden plover, red grouse and meadow pipit, are Red listed (Gilbert *et al.* 2021), with golden plover also listed on Annex I of the EU Birds Directive.

On 21st December 2011, a flock of c. 500 golden plover landed near T33 and later flew up. A flock of c. 150 was still present on the bog near T33 on 23rd December 2011. On 22nd January 2012, a flock of 15 golden plover was recorded near T27.

Three red grouse were recorded on bog in the northwest of the site (near T3) on 9th November 2011. There was a further record of red grouse on 22nd January 2012, when two were flushed from along the roadside near T31.

Meadow pipit was present on site in all winter surveys, though in relatively low numbers (mostly single birds or small flocks up to 5).

Other species associated with the site in winter were sparrowhawk, hooded crow, raven, wren, chaffinch, lesser redpoll and crossbill.

##### Winter 2019/20

Hen harrier was not recorded on site from October 2019 to March 2020, nor were any winter roost sites located within a distance of up to 5 km of the wind farm. Several sightings of hen harrier made in the hinterland of the site (within c. 2 km and 4 km distance) in October 2019 were likely to be lingering summer birds, as follows:

- Male – observed in late morning period c. 2.5 km south-west of wind farm (Knocknarebana) during a reconnaissance visit on 12th October.

- Immature male – observed hunting c. 2 km north-east of Caheranearl at 10.45 hrs on 18th October.
- Immature male – recorded at 17.25 hrs on a lone pine tree preening and then flying to the south c. 4 km north-east of Caheranearl on 18th October – probable same bird as earlier.

A merlin was recorded off-site near Knocknarebana (approximately 2.5 km south-west of wind farm site) during a hen harrier dusk roost watch on 17th October 2019.

Golden plover were recorded on or over the site on four occasions between October 2019 and February 2020. Flock size varied from 16 to 260 birds.

Meadow pipit was present on site in all winter surveys, though in relatively low numbers (mostly single birds or small flocks up to 5). A loose flock of c. 40 was present within the wind farm on 22nd October 2019.

### 6.3.5.2 Review of hen harrier population in Slieve Aughty Mountains SPA

The population decline which had been recorded within the 5 km radius of the Derrybrien Wind Farm during the monitoring period was reflected in the Slieve Aughty Mountains SPA as a whole.

Survey results of the estimated population within the SPA in various years are presented in Table 6-7. Data are from the National Hen Harrier Surveys (Norriss *et al.* 2002, Ruddock *et al.* 2011, 2016) and from the Hen Harrier Project (2020, 2021).

*Table 6-7 Comparative population data from the national hen harrier surveys in 1998-2000, 2005, 2010, 2015 and 2022 for the Slieve Aughty Mountains, and for 2020 and 2021. Figures are total estimated pairs.*

| 1998-2000 | 2005 | 2010 | 2015 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| 10-21 | 24-27 | 16-24 | 8-14 | 7 | 8 | 3-5 |

**Note**: Survey effort in 1998-2000 survey was less than in subsequent surveys.

A detailed study of hen harriers in three areas (Slieve Aughty Mountains, Ballyhoura Mountains and West Clare hills) by researchers from University College Cork showed population declines in all three areas between 2007 and 2011 and also that the numbers of young fledged at successful hen harrier nests was quite low compared to other populations (Irwin *et al.* 2012).

The cause(s) of the marked population decline and low productivity within the Slieve Aughty Mountains SPA, and indeed in areas such as the Ballyhoura Mountains and the West Clare hills and several other SPAs, remain largely unknown but are expected to be due to a number of reasons, perhaps in combination, including the following (after Ruddock *et al.* 2016):

- Habitat change (largely forest management affecting prey availability).
- Predation.
- Persecution.
- Access and recreation (walking paths, cycling tracks etc).
- Non-intensive grazing.
- Wind energy and Utility and service lines.

Of relevance to power lines within the Slieve Aughty SPA, Ruddock *et al.* (2016) wrote the following:

> *"There appeared to be a positive association, although this was not statistically tested, and supported by behavioural observations, that habitat management (i.e. clearance) for power line infrastructure may provide corridors for movement and foraging by hen harriers within the forested landscape. The use of such corridors could prove useful to increasing connectivity with suitable nesting and foraging areas and particularly linking forested areas with open habitats which are shown to be used more frequently in Ireland."*

For the Slieve Aughty Mountains SPA, the 2020 Hen Harrier Project report noted the following:

> *"A number of potential pressures were noted in the SPA. These include forestry operations and recreational and vehicle traffic on access roads and tracks near nest sites. Turf cutting and pine marten were noted regularly near nest sites."*

The 2021 Hen Harrier Project report noted the following in relation to the Slieve Aughty Mountains SPA:

> *"A significant pressure on Hen Harrier in this SPA is the direct and indirect effects of habitat loss and fragmentation. The extent and age profile of the forest plantations in the SPA may be leading to an increased vulnerability top predation. Forestry activities along with recreational traffic are regularly observed near nest and pose an ongoing risk of disturbance".*

Following a further significant decline in the breeding population of the Slieve Aughty Mountains in 2022, Ruddock *et al.* (2024) wrote the following:

> *"The Slieve Aughties region (Co. Galway and Co. Clare), which is larger than the Slieve Aughty Mountains SPA, has had its population decline by around two thirds since 2015 and now holds fewer than six pairs of breeding hen harrier. The extent of declines here since previous surveys is severe, with an 82% decline when compared to the peak population recorded in 2005 (27 breeding pairs). The extent of losses of breeding hen harrier in the region are widespread and substantial in the national context. The range of pressures and threats recorded by surveyors include a predominance of coniferous forest plantation and the associated forest and plantation management and use, forest clearance (clear-cutting, removal of all trees) and wind energy developments and associated utility and service lines (e.g. power-lines, pipelines). There was also a spectrum of grazing levels across the region, from intensive grazing by sheep and deer to non-intensive grazing. In some areas, a notable abandonment of pastoral systems, and lack of grazing provided excellent suitable habitat but was countered by totally unsuitable habitat in other areas. The extent of turf cutting, including both hand-cutting of peat and mechanical removal of peat, is widespread, across large areas of supporting peatland habitat, and the associated impact includes human and machinery disturbance at key temporal periods during the breeding season. Various recreational activities including paths, tracks, cycling tracks, outdoor sports and leisure activities, recreational activities such as walking, horse-riding and various off-road vehicles were also recorded by surveyors. In addition, extensive and uncontrolled burning (e.g. widespread unmanaged and/or malicious burning) was reported by surveyors across the region which is likely contributing to the loss and/or poor condition of supporting habitats for both breeding hen harrier and their prey."*

From the available data on the hen harrier population in the Slieve Aughty Mountains SPA, it is concluded that the population has undergone a substantial decline (>67%) since the designation of the SPA in 2007.

## 6.3.5.3 Status of birds in study area in 2022 and 2024

### 6.3.5.3.1 *Vantage point watches*

Details of the vantage point watches carried out in the 2022 and 2024 breeding seasons are given in **Appendix 6-2**.

#### 2022 Survey Results: Hen harrier and merlin

There were no sightings of hen harrier or merlin within the wind farm site during the 2022 watches.

There was no evidence of an occupied hen harrier territory within at least a 2 km radius of the Prospective Development area.

There was one sighting of an adult male hen harrier hunting over bog to north of Coppanagh (M6208) on 28th April 2022 (this bird was observed whilst in transit to site). Location is approximately 4 km northeast of the wind farm.

There were no sightings of merlin during any of the 2022 hinterland surveys.

#### 2022 Survey Results: Other species

Kestrel: recorded on-site on two occasions, both involving hunting male birds: one on 29th March 2022 over bog near T33, and one on 28th June 2022 over regenerating bog near T66.

Teal: pair seen flying across regenerating bog south of T10 and T11 on 28th April 2022. Breeding likely on site.

Red grouse: birds heard calling on bog to west of northwest sector of site on 29th and 30th March 2022 (some fresh pellets also recorded in walk-over survey) (see Plate 6-8).

Snipe: displaying bird heard over cutover bog between T31 and T33 on 29th April.

Lesser Black-backed Gull: party of seven flew northwards over central area of site on 30th June 2022.

In addition, sparrowhawk (Green-listed) was recorded several times, with birds heard calling and crying in mature conifers in north-west sector of site. As in previous years, breeding is considered to have occurred on site.



*Plate 6-8 Blanket bog to northwest of wind farm which supports Red Grouse. Looking northwards towards Sonnagh Old Wind Farm, April 2022.*

## 2024 survey results; hen harrier and merlin

There were no sightings of hen harrier or merlin within the wind farm site during the 2024 watches.

There were two hen harrier sightings within approximately a 2 km distance of the wind farm as follows:

- 15th April: female flying in area from Bohaboy to within c.500 m of northern boundary of wind farm.
- 16th April: ringtail circling over forest near Knocknarebana c.2 km southwest of wind farm.

There were no further sightings from these two areas or elsewhere in May or June and it is believed that no breeding attempts were made at either location.

There were no sightings of merlin during any of the 2024 hinterland surveys.

## 2024 survey results: other species

Kestrel (Red list): recorded on-site on two occasions, one on 9th April 2024 hunting edge of bog near T30, and one on 10th May 2024 flying near T27.

Snipe (Red list): displaying bird heard over cutover bog between T31 and T34 area on 10th April 2024. Also, one flew up briefly from same area on 19th June.

Sparrowhawk (Green list): recorded two occasions in northwest sector near T53-T54-T55 locations. As in previous years, breeding is considered to have occurred on site.

#### 6.3.5.3.2 Transect breeding surveys

Details of the results of each transect survey within the wind farm and along the grid connection corridor for the 2022 and 2024 breeding seasons are given in **Appendix 6-3**. The conservation status (after Gilbert *et al.* 2021) for each species is given.

The results of the transect surveys both within the wind farm site and along the overhead line corridor show a good diversity of small bird species (passerines) nesting or at least feeding on the bog and regenerating bog vegetation. Low scrub, notably willow and bramble, is often present and provides good cover for small birds. Self-seeded conifers are also a feature in previously cleared areas both within the wind farm site and along the overhead line corridor.

Some of transects are through fairly open areas, e.g. T1, T3 and T7, whilst some are through mature conifer stands, e.g. T4, T5 and T6.

The survey showed that meadow pipit (Red-listed) and skylark (Amber-listed) are widespread species where open bog type vegetation occurs.

Kestrel (Red-listed) was recorded hunting along the overhead line corridor (transect no. 7).

Willow warbler (Amber-listed) is widespread in scrub and along woodland edges, while goldcrest (Amber-listed) is characteristic of conifer stands. Mallard (Amber-listed) is a localised species throughout the study area, occurring in the larger bog drains and ponds.

Other species which are widespread include wren, blackbird, song thrush, robin, whitethroat, stonechat, lesser redpoll and chaffinch.

Siskin and jay, species characteristic of conifer plantation, were recorded.

#### 6.3.5.3.3 Other breeding bird observations of note in 2022 and 2024

Grey wagtail was recorded at the rock quarry pond at site entrance (referred to as borrow pit/quarry 3) in 2022 and is expected to breed there.

A pair of swallows nest within a small dis-used corrugated iron 'shed' on the open bog just east of T24 – recorded in both 2022 and 2024.

House martins have nested on a wall under the apex of roof on the Derrybrien Substation building in the past. While there were no signs in 2022, birds were present in May 2024, though it appears successful nesting did not occur.

#### 6.3.5.3.4 Winter 2024/25 surveys

Hen harrier was not recorded within the wind farm site from October 2024 to March 2025, nor were any winter roost sites located within a distance of up to 5 km of the wind farm. However, there were two sightings of hen harrier in the hinterland of the site, as follows:

- Second year male – observed at 09.46 hrs on 16th December 2024 near Kilbeg within the Boolyneendorrish river valley, approximately c. 2 km north-west of wind farm site. Flew from conifer plantation to open bog hunting – struck at flushed snipe but no kill. Continued north towards Lough Belsrah. Watched for 240 sec at hights 2-25 m (approx.).
- Adult male – observed at 16.34 hrs on 14th February 2025 from Francis Gap to east of Sonnagh Old, approximately 2.5 km to north of wind farm. Bird flying northwards hunting, Watched for 250 sec at heights 1-5 m above ground.

There were no sightings of merlin during any of the winter surveys.

Golden plover were recorded on or over the wind farm site on three occasions in October and November 2024, as follows:

- 18th October 2024: flock of 14 birds flew northwards over western end of wind farm at c. 50 m height.
- 19th October 2024: six birds flew up (09.43 hrs) from open bog in eastern sector of site (near T31) and flew calling in a northwest direction gaining height.
- 13th November 2024: flock of 20+ birds flew eastwards over eastern end of site – flying quite low and at one point looked as if going to land on bog as did a circle over same.

Kestrel was recorded within the wind farm site in October, November, January and March. All records were of single birds hunting (3 males, 1 female).

As in previous surveys, meadow pipit was present on site in all winter surveys, though in low numbers from November to January. Highest count was a flock of 20+ on 18th October 2024.

#### 6.3.5.3.5 Ecological Evaluation of Bird Species

For the purposes of this assessment, the following ecological valuations have been assigned:

- Annex I bird species are considered to be of international importance.
- Red-listed bird species are considered to be of national importance.
- Amber-listed bird species are considered to be of county importance.
- Green-listed bird species are considered to be of local importance.

## 6.3.6 Bats

All Irish bat species are protected under the Wildlife Act 1976 (as amended) and Annex IV of the EU Habitats Directive 1992. Lesser horseshoe bat is also included in Annex II. Bats are further protected across Europe under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983).

This section sets out the findings of the desk study and baseline ecological survey work. It then goes on to evaluate the interest of the identified ecological features.

### 6.3.6.1 Desk Study

Bat Conservation Ireland (BCI) data were initially obtained for a 10 km[5] search area around the site in 2012 (Wilson, 2012). Two lesser horseshoe *Rhinolophus hipposideros* bat roosts were identified, at Thor Ballylee and Cloonbeg (both in County Galway) 9.3 km and 10 km west of the site respectively. In addition, roosts of brown long-eared bat *Plecotus auritus*, soprano pipistrelle *Pipistrellus pygmaeus* and *Myotis* sp. were identified at a location approximately 10 km to the east of the site.

*[5] A 10 km buffer was applied to the desktop search on a precautionary basis. As noted in section 6.2.3, industry guidance suggests a 10 km zone of influence is considered when assessing impacts of new wind farm proposals on bats; 'Bats and onshore wind turbines: survey, assessment and mitigation' (SNH et al., 2021)) and EUROBATS Guidelines for consideration of bats in windfarm projects (Rodrigues et al., 2015). However, the zone of influence for the decommissioning of a non-operational wind farm is likely to be very localised with regard to bats.*

Updated data from BCI was obtained for a 10 km search area around the site in 2024. This included an additional brown long-eared and Natterer's bat roost approximately 3.1 km south west of the site, and a second brown long-eared roost approximately7.1 km south west of the site.

A review of bat records from the National Biodiversity Data Centre and BCI data from 2024 indicates that common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle, Nathusius's pipistrelle *Pipistrellus nathusii*, lesser horseshoe bat, Leisler's bat *Nyctalus leisleri*, brown long-eared bat, Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus*, and Natterer's bat *Myotis nattereri* have been recorded within 10km of the site. The information obtained from BCI (Wilson, 2012) reflects these findings, with no other species recorded.

A review of planning applications within a 10 km radius of the Derrybrien Wind Farm Development Decommissioning Project within the last 10 years found one significant project with potential impacts on bats; the Ballinakill Quarry Extension Environmental Impact Statement (EIS). The EIS for this application had no mention of bats (Ballinakill Quarry Extension, 2015), suggesting no significant impacts were identified.

#### 6.3.6.1.1 Bat survey results 2022 and 2023

##### Building inspections at Derrybrien and Agannygal substations

No evidence of bats was found in the attic space of Derrybrien Substation, which was concluded to offer very limited opportunity for access by roosting bats (no obvious points of entry to the roof space were noted). External features are limited to very small gaps at the apex of the soffit boarding / boxed eaves on the eastern and western gable ends of the building. The building was considered to have low potential for roosting bats.

Approximately 10-15 bat droppings were found in the attic space of Agannygal Substation indicating occasional use by a low number of bats. No bats were recorded during the survey. External features are limited to very small gaps at the apex of the soffit boarding / boxed eaves on the northern and southern gable ends of the building. eDNA analysis confirmed that the droppings were from common pipistrelle and brown long eared bats.

##### Inspection of bridges

Three bridges were inspected for their potential for roosting bats. Results are outlined below:

- Bridge A (northmost bridge on Black Road), Bridge B (middle bridge on Black Road) and Bridge C (southern bridge on Black Road) are all stone bridges with very limited roosting features and capacity to support bats. All features could be fully inspected, and no bats or evidence of bat use was recorded. Each of the bridges has low roost potential, and no further survey is recommended (the features were fully inspected, and absence of bats was confirmed).
- Works are only proposed on two bridges, Bridge B and Bridge C.

##### Vegetation clearance turbines, overhead line route and construction compound area

Areas around the turbines and the overhead line where tree removal works will be completed, and where laydown is likely to occur, were assessed for their potential for roosting bats. Trees were all coniferous, with most being young (having grown after the wind farm was constructed). No trees were identified that had potential for roosting bats. Trees along the access route and around the construction compound were also assessed. Trees were all coniferous, with most being managed to allow continued access of wind farm traffic / power line maintenance. Trees / overhanging limbs did not have potential for roosting bats.

#### Emergence / re-entry surveys Derrybrien Substation

Surveys were completed on 15 August (emergence), 09 September (re-entry) and 26 September (emergence) in 2022, and on 20 July (re-entry) 2023. Very little activity was recorded during any of the surveys. However, a single common pipistrelle was recorded emerging from the apex of the south-eastern gable end approximately 20 minutes after sunset on 15 August 2022 and a single common pipistrelle was recorded re-entering at the same location on 20 July 2023. No bats were recorded on 09 or 26 September 2022.

#### Emergence / re-entry surveys Agannygal substation

Surveys were completed on 16 August (emergence), and 09 September (emergence) 2022, and on 19 July 2023 (emergence). Very little activity was recorded throughout the survey work. However, two common pipistrelles emerged from the apex of the northern gable end approximately 20 mins after sunset on 16 August 2022. On 08 September 2022 four common pipistrelle bats were recorded emerging from the northern gable end, and three common pipistrelle bats emerged from the southern gable end. On 19 July 2023 seven common pipistrelle bats emerged from a gap at the gable apex of the northern elevation and one soprano pipistrelle bat emerged from a gap at the gable apex of the southern elevation.

### 6.3.6.1.2 Bat survey results 2021

Static bat detectors recorded for a total of 960 nights, equating to 8,680.15 hours of survey time between spring, summer and autumn 2021.

A total of 48,095 passes from a minimum of six species of bat were recorded. These species were: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, (one or more) *Myotis* species, brown long-eared bat species[6] and Leisler's bat.

The highest activity was recorded for Leisler's bat, followed by common pipistrelle and soprano pipistrelle (3.3 P/h, 1.2 P/h and 0.6 P/h respectively); 59.7% of all the recorded passes were Leisler's bat. Low numbers of passes were recorded for all other species (0.1 P/h or less).

### 6.3.6.1.3 Bat survey results 2020

Static bat detectors recorded for a total of 624 nights, equating to 5,905.5 hours of survey time between summer and autumn 2020.

A total of 11,709 passes from a minimum of six species of bat were recorded. These species were: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, (one or more) *Myotis* species, brown long-eared bat and Leisler's bat.

The highest activity was recorded for common pipistrelle, followed by Leisler's bat (0.9 and 0.5 P/h respectively); 67.3 % of all the recorded passes were identified as pipistrelle bat species. Low numbers of passes were recorded for all other species (0.1 P/h or less).

### 6.3.6.1.4 Bat survey results 2019

Static bat detectors recorded bat calls for a combined total of 311 nights, equating to 3,519 hours of survey time during Autumn 2019. A total of 16,264 passes from at least six species of bat (Nathusius'

[6] *All long-eared bat species records were likely to be brown long-eared bat. Grey long-eared bat has not been recorded in Ireland to date.*

pipistrelle, common pipistrelle, soprano pipistrelle, *Myotis* species, brown long-eared bat and Leisler's bat) were recorded.

The highest activity rate was recorded for common pipistrelle, at an average of 2.4 P/h; 51% of all recorded passes were identified as common pipistrelle. The next most commonly recorded species were soprano pipistrelle (0.8 P/h) and Leisler's bat (0.6 P/h). *Myotis* species and brown long-eared bat were both recorded at low frequencies 0.2 P/h and <0.1 P/h respectively. Seven Nathusius' pipistrelle passes were recorded. The highest levels of activity were noted on plantation edge or close to it.

#### 6.3.6.1.5 Bat survey results 2016

In total 14 bat passes were recorded during the driven transect surveys: 12 Leisler's bat passes in April; one common pipistrelle and one soprano pipistrelle pass in August. No bat passes were recorded in June during the driven transect survey. All of the passes were recorded in the central – eastern sections of the wind farm site.

Static bat detectors recorded bat calls for a combined total of 406 nights, equating to 3,290.5 hours of survey time during April-August 2016. A total of 13,109 passes from at least five species of bat (common pipistrelle, soprano pipistrelle, *Myotis* species, brown long-eared bat and Leisler's bat) were recorded. The highest activity rate was recorded for Leisler's bat, at an average of 3 passes per hour (P/h). Of the total passes recorded, 74% were of Leisler's bat. The next most commonly recorded species were common pipistrelle (0.8 P/h) and soprano pipistrelle (0.1 P/h). *Myotis* species and brown long-eared bat were both recorded at low encounter rates of <0.1 P/h (97 and 20 bat passes respectively).

The highest levels of activity (>7 P/h) were recorded at T33, T71, T70, and T27. All of these detectors were located near to the denser areas of coniferous forestry. Detectors in more open areas, with plantation limited to strips of woodland, had lower bat activity (<1 P/h).

#### 6.3.6.1.6 Bat survey results 2011

Two bat passes were recorded during the November activity survey work, an unidentified bat pass and an unidentified pipistrelle sp. pass.

No roosts were identified in the desk study of the 2012 bat assessment, although it was noted that there are buildings in the area around the wind farm which might support roosting bats. These buildings were off site and were not inspected. The closest building to the wind turbines (other than the Derrybrien Substation) that was identified on aerial imagery was approximately 1.5 km to the north (Bing maps, 2019).

It was noted that the survey was carried out towards the end of the bat active season and that the results were likely to be an under-representation of bat activity at the site.

### 6.3.6.2 Evaluation of vulnerability of baseline bat assemblage

Applicable industry guidance (SNH *et al.*, 2021) suggests that the vulnerability of bat populations to wind farms is based on three factors:

1. *Relative abundance.*
2. *Collision risk.*
3. *Bat activity recorded at the site.*

Relative abundance is defined as 'common', 'rarer' and 'rarest' by SNH *et al.*, 2019; definitions adapted from criteria presented by Wray, *et al.* (2010), where:

- Rarest indicates populations under 10,000 within range (national).
- Rarer indicates populations under 10,000 – 100,000 within range (national).
- Common indicates populations over 100,000 within range (national).

Relative abundance of each British species is provided in the guidance for Scotland, England and Wales (as well as Northern Ireland) in Wray *et al.,* 2010, but not for Ireland. For the purposes of this chapter relative abundance has been defined for each species based on available Irish population data (Marnell *et al.*, 2019).

There is no collision risk during decommissioning as turbines are in a prolonged non-operational state (subject to maintenance by the turbine supplier) and the risk of collision with rotating turbine blades will be completely eliminated at the Derrybrien Wind Farm as a result of the Prospective Development. This criterion is therefore not considered when assessing vulnerability of bat populations in this document.

#### 6.3.6.2.1 *Common pipistrelle (Pipistrellus pipistrellus)*

Common pipistrelles are common in Ireland, and together with soprano pipistrelles are the most frequently recorded species (Schofield & Mitchell-Jones, 2011). The population in Ireland is thought to be increasing and is estimated to comprise 1-2 million mature individuals (Marnell *et al.*, 2019). Results from Bat Conservation Ireland's car-based bat monitoring scheme suggests populations of common pipistrelle increased between 2003 and 2009 (Roche *et al.*, 2011). The mammal red list for Ireland 2019 lists the species as of 'least concern' in Ireland (Marnell *et al.*, 2019).

The relative abundance of common pipistrelle is considered to be **Common** in Ireland.

Common pipistrelle feed in a wide range of habitats including woodland, hedgerows, grassland, farmland, suburban and urban areas (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011, Dietz & Keifer, 2016). Maternity roosts are mainly found in buildings, with males roosting in buildings and trees during the summer (Collins, 2023). Common pipistrelle bats have also been recorded roosting in bridges in Ireland (Masterson *et al.*, 2008). The species generally emerges from roosts around 20 minutes after sunset and flies 2-10 m above ground level (Bat Conservation Trust, 2010[a]).

The commercial plantation and open habitats at the site are widely available within the Slieve Aughty Mountains (local area). The condition of habitats and the ratio of commercial plantation to open habitats in this area are constantly changing due to the harvesting and planting of the coniferous plantation and the localised cutting of peat. The wind farm site is positioned at the highest elevation in the Slieve Aughty Mountains and is therefore more exposed to higher winds and cooler temperatures than surrounding areas. Whilst common pipistrelle is typically recorded at any exposed upland site that is intensively sampled and will make use of any available building in sparsely inhabited areas for roosting, habitats at lower, less exposed altitudes tend to have far higher levels of activity.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats, and common pipistrelle has been recorded using both buildings during the autumn. Numbers of common pipistrelle bats roosting and activity on site does not suggest that a maternity roost is present at Derrybrien Substation (there are not high numbers of calls close to sunset or sunrise, and there is not a peak in activity around maternity roost formation or typical dispersal time). It is more likely that Derrybrien Substation is used opportunistically by small numbers of bats. No activity data is available for Agannygal Substation; however, the low numbers of roosting common pipistrelle from July to mid-September indicates that the roost is likely to be used by non-breeding individual / small numbers of bats on an occasional basis. Both substations have limited opportunities for roosting bats (other buildings in the landscape such as stone farmhouses are more likely to support locally important roosts), but may have a role in supporting the local population.

The masonry bridges have a small number of crevices available that could be used by roosting bats. No bats have been recorded using these features. Masonry bridges are a feature of stream crossings in the local area. There are stone buildings within 400 m of each bridge which could provide similar features for roosting bats.

#### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm site is considered to be of **site value** to common pipistrelle.

Substations are considered to be of **local value** to common pipistrelle.

The masonry bridges are considered to be of **site value** to common pipistrelle.

### 6.3.6.2.2 *Soprano pipistrelle*

Soprano pipistrelles are common in Ireland, and together with common pipistrelles are the most frequently recorded species (Schofield & Mitchell-Jones, 2011). The population in Ireland is thought to be increasing and is estimated to comprise 0.54-1.2 million mature individuals (Marnell *et al.*, 2019). Results from Bat Conservation Ireland's car-based bat monitoring scheme suggest populations of soprano pipistrelle species increased between 2003 and 2009 (Roche *et al.*, 2011). The mammal red list for Ireland 2019 lists the species as of 'least concern' in Ireland (Marnell *et al.*, 2019).

The relative abundance of soprano pipistrelle is considered to be **Common** in Ireland.

Soprano pipistrelles typically feed in wetland habitats, for example over lakes and rivers, but also occur around woodland edge, along tree lines and hedgerows, and in suburban gardens and parks (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011; Dietz & Keifer, 2016). Soprano pipistrelle maternity roosts are mainly found in buildings (typically forming larger roosts than common pipistrelle), with males roosting in buildings and trees during the summer (Collins, 2023). Soprano pipistrelles have also been recorded roosting in bridges in Ireland (Masterson *et al.*, 2008). The species generally emerges from roosts around 20 minutes after sunset and flies 2-10m above ground level (Bat Conservation Trust, 2010[b]). As with common pipistrelle, lower levels of soprano pipistrelle activity would be typically expected at higher elevations than in lower, less exposed habitats.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. One soprano pipistrelle has been recorded roosting at Agannygal substation, during one of the three surveys completed, suggesting it is likely used by individual / small numbers of bats on an occasional basis. There are other more suitable buildings in the local area, but the substation may provide a supporting role.

The masonry bridges have a small number of crevices available for use by roosting bats. There are stone buildings within 400 m of each bridge which could provide similar features.

#### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm site are considered to be of **site value** to soprano pipistrelle.

Substations are considered to be of **local value** to soprano pipistrelle.

A precautionary assessment is that the masonry bridges are of **site value** to soprano pipistrelle.

#### 6.3.6.2.3 *Nathusius's pipistrelle*

Information on Nathusius' pipistrelle in Ireland is limited, it has been recorded breeding in Northern Ireland since 1997 and has been recorded on bat detectors in Ireland, but breeding has yet to be confirmed (Bat Conservation Ireland, 2019). The mammal red list for Ireland (2019) lists the species as of 'least concern' (Marnell *et al.*, 2019). The population in Ireland is estimated to be 10-18,000 (Marnell *et al.*, 2019). Between 2003 and 2011, 147 records of Nathusius' pipistrelle were recorded during car-based bat monitoring surveys across Ireland; 6,433 transects were driven during this time period. The closest record to the site is 18.5 km to the south-west; this was recorded in 2007.

The relative abundance of Nathusius' pipistrelle is considered to be **Rarer** in Ireland.

Nathusius' pipistrelle typically forages in woodland, often near to large water bodies (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011; Collins, 2023). They are strong flyers and are long distance migrants in mainland Europe (Dietz *et al.*, 2009; Marnell *et al.*, 2019). Whilst Nathusius' pipistrelle is known to use exposed upland sites, there is considerable alternative habitat at lower, less exposed altitudes where foraging is generally likely to be more energetically efficient.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. No evidence of roosting Nathusius' pipistrelle has been recorded and there are other more suitable buildings in the local area.

The masonry bridges have a small number of crevices available for use by roosting bats. There are stone buildings within 400 m of each bridge which could provide similar features.

##### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm are considered to be of **negligible value** to Nathusius' pipistrelle.

Substations are considered to be of **negligible value** to Nathusius' pipistrelle. There is no evidence from survey work and DNA analysis of droppings that the species uses them.

A precautionary assessment is that masonry bridges are of **site value** to Nathusius' pipistrelle.

#### 6.3.6.2.4 *Leisler's bat*

Leisler's bat is considered to be common in Ireland, which is a stronghold for the species (Schofield & Mitchell-Jones, 2011). Initial results from Bat Conservation Ireland's car-based bat monitoring scheme suggests Leisler's bat populations have increased between 2003 and 2009 (Roche *et al.*, 2011). The population in Ireland is thought to be increasing and is estimated to comprise 70,000-130,000 mature individuals (Marnell *et al.*, 2019). The mammal red list for Ireland 2019 lists the species as of 'least concern' (Marnell *et al.*, 2019).

The relative abundance of Leisler's bats is considered to be **Rarer** in Ireland.

Leisler's bats typically forage just above the canopy of trees, along forest trails and fire breaks, over waterbodies and around street lamps (Schofield & Mitchell-Jones, 2011). When they are hunting over pasture land, yellow dung flies and beetles are important dietary components and available throughout the year (Dietz *et al.*, 2009). Leisler's bats roost in both trees and buildings (Collins, 2023).

Whilst the data show that Leisler's bat uses the site (particularly in spring), there is considerable alternative habitat at lower, less exposed altitudes where foraging is likely to be more energetically efficient and therefore regular.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. No evidence of roosting Leisler's bat has been recorded.

The masonry bridges have a small number crevices available for use by roosting bats. There are stone buildings within 400 m of each bridge which could provide similar features.

#### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm are considered to be of **site value** to Leisler's bat.

Substations are considered to be of **negligible value** to Leisler's bat. There is no evidence from survey work and DNA analysis of droppings that the species uses them.

A precautionary assessment is that the masonry bridges are of **site value** to Leisler's bat.

### 6.3.6.2.5 *Brown long-eared bat*

Brown long-eared bats are common and widespread in Ireland (Schofield & Mitchell-Jones, 2011). The population is thought to be stable or increasing, and is estimated to comprise 64,000-115,000 individuals (Marnell *et al.*, 2019). Results from Bat Conservation Ireland's Brown Long-eared Bat Roost Monitoring Scheme also suggest the population in Ireland is stable (Aughney *et al.*, 2011; BCI, 2019). The mammal red list for Ireland 2019 lists the species as of 'least concern' (Marnell *et al.*, 2019).

The relative abundance of brown long-eared bats is considered to be **Rarer** in Ireland.

Brown long-eared bats typically forage in woodlands, and roost in buildings and trees (Schofield & Mitchell-Jones, 2011). They have also been recorded roosting in bridges (BCI, 2010). Studies suggest that brown long-eared bats spend most of their time foraging within 500 m to 1 km of their roosts, and flight distances are typically under 10 km (Dietz *et al.*, 2009, Hundt *et al.*, 2012).

Data collected at the wind farm show that there is some use of the site by brown long-eared bat. However, there is considerable alternative habitat at lower, less exposed altitudes where foraging is likely to be more energetically efficient and therefore regular.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. A small number of brown long-eared bat droppings were recorded in the roof space of Agannygal substation suggesting bats roost in this space on an occasional basis. No brown long-eared bats were recorded during the emergence / re-entry surveys of this building. The low number of droppings does not indicate the presence of a maternity roost (as a larger accumulation of droppings would be expected in an undisturbed roof space). There are other more suitable buildings in the local area.

The masonry bridges have a small number of crevices available for use by roosting bats. There are stone buildings within 400 m of each bridge which could provide similar features.

#### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm site are considered to be of **site value** to brown long-eared bat.

Substations are considered to be of **local value** to brown long-eared bat.

A precautionary assessment is that the masonry bridges are of **site value** to brown long-eared bat.

#### 6.3.6.2.6 *Natterer's bat*

Natterer's bats are widely distributed throughout Ireland (McAney, 2006; Schofield & Mitchell-Jones, 2011). The population in Ireland is thought to unknown; previously estimated to comprise 5,000+ mature individuals (Marnell *et al.*, 2009). The mammal red list for Ireland 2019 lists the species as of 'least concern' (Marnell *et al.*, 2019).

The relative abundance of Natterer's bats is considered to be **Rarest** in Ireland.

Natterer's bats predominately forage in woodland and open parkland and have broad wings enabling them to hunt within tree canopies or close to foliage (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011). They typically roost in trees, in both crevices and voids (BTHK, 2018; Dietz *et al.*, 2009) but have been recorded in crevices under bridges. Mortimer (2006) found 22 Natterer's bat roosts in coniferous plantation in North East Scotland, and that Natterer's were foraging within the plantation in which roosting occurred. Natterer's bats roosting sites typically change every 2-5 days and the size of some colonies varies constantly (Dietz & Keifer, 2016).

Data collected at the wind farm site show that there is some use of the site by *Myotis* species. This is likely to mainly refer to Natterer's bat, which commonly uses coniferous plantation habitat. Notwithstanding this, there is considerable alternative habitat at lower, less exposed altitudes where foraging is likely to be more energetically efficient and therefore regular.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. No evidence of roosting Natterer's bat has been recorded and there are other more suitable buildings in the local area.

The masonry bridges have a small number of crevices available for use by roosting bats, but no evidence of roosting bats was recorded. There are stone buildings within 400 m of each bridge which could provide similar features.

##### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm site are considered to be of **local value** to Natterer's bat.

Substations are considered to be of **negligible value** to Natterer's bat. There is no evidence from survey work and DNA analysis of droppings that the species uses them.

A precautionary assessment is that the masonry bridges are of **site value** to Natterer's bat.

#### 6.3.6.2.7 *Daubenton's bat*

Daubenton's bat is common and widespread in Ireland (Schofield & Mitchell-Jones, 2011). The population is thought to be stable or increasing slightly, and is estimated to comprise 81,000-103,000 individuals (Marnell *et al.*, 2019). The mammal red list for Ireland 2019 lists the species as of 'least concern' (Marnell *et al.*, 2019).

The relative abundance of Daubenton's bats is considered to be **Rarer** in Ireland.

Daubenton's bats are fast, agile bats, which typically forage over calm waterbodies within 6 km of roost sites (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011). They are typically a tree dwelling species,

favouring larger voids in trees rather than crevices (BTHK, 2018; Dietz *et al.*, 2009). Daubenton's bats are also regularly recorded in bridges (BCI, 2010).

Data collected at the wind farm site show that there is some use of the site by *Myotis* species. However, this is likely to mainly refer to Natterer's bat. There is considerable alternative habitat at lower, less exposed altitudes where foraging by Daubenton's bat is likely to be more energetically efficient and therefore regular. The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. No evidence of roosting Daubenton's bat has been recorded and there are other more suitable buildings in the local area.

The masonry bridges have a small number of crevices available for use by roosting bats, but no evidence of roosting bats was recorded. There are stone buildings within 400 m of each bridge which could provide similar features.

#### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm site are considered to be of **negligible value** to Daubenton's bat.

Substations are considered to be of **negligible** to Daubenton's bat. There is no evidence from survey work and DNA analysis of droppings that the species uses them.

A precautionary assessment is that the masonry bridges are of **site value** to Daubenton's bat.

### 6.3.6.2.8 *Whiskered bat*

Whiskered bats are widely distributed throughout Ireland (McAney, 2006). The population is unknown; previously, estimated to comprise 5,000+ mature individuals (Marnell *et al.*, 2009). The mammal red list for Ireland 2019 lists the species as of 'least concern' (Marnell *et al.*, 2019). The relative abundance of whiskered bats is considered to be **Rarest** in Ireland.

Whiskered bats forage in a wide range of habitats including parkland, broadleaved and mixed woodland, wet woodland, gardens and along water courses, flying fast and close to vegetation (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011). Most known summer roosts are in buildings, but they will roost in crevices in trees and bridges (Dietz *et al.*, 2009; BCI, 2010; BTHK, 2018).

Data collected at the wind farm show that there is some use of the site by *Myotis* species. However, this is likely to mainly refer to Natterer's bat. There is considerable alternative habitat at lower, less exposed altitudes where foraging by whiskered bat is likely to be more energetically efficient and therefore regular.

The substations at Derrybrien and Agannygal have features that are suitable for low numbers of roosting bats. No evidence of roosting whiskered bat has been recorded and there are other more suitable buildings in the local area.

The masonry bridges have a small number of crevices available for use by roosting bats, but no evidence of roosting bats was recorded. There are stone buildings within 400 m of each bridge which could provide similar features.

#### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm site are considered to be of **negligible value** to whiskered bat.

Substations are considered to be of **negligible value** to whiskered bat.

A precautionary assessment is that the masonry bridges are of **site value** to whiskered bat.

#### 6.3.6.2.9 *Lesser horseshoe bat*

Lesser horseshoe bat is mainly found in counties in the west of Ireland: Mayo, Galway, Clare, Limerick, Kerry and Cork, although its strongholds are found in Kerry/west Cork and in Clare (Roche *et al.* 2015). The population in Ireland appears to be increasing and is estimated at approximately 13,000 mature individuals (Marnell *et al.*, 2019). The mammal red list for Ireland 2019 lists the species as of 'near threatened' in Ireland (Marnell *et al.*, 2019).

The relative abundance of lesser horseshoe bats is considered to be **Rarer** in Ireland.

Lesser horseshoe bats are typically associated with broadleaved woodland, and are agile flyers, foraging very close to vegetation (Dietz *et al.*, 2009; Schofield & Mitchell-Jones, 2011). Summer roosts are predominately in buildings, and winter roosts in caves and mines (Dietz *et al.*, 2009).

The closest known roost to Derrybrien Wind Farm Development Decommissioning Project is at Lough Cutra Castle (approximately 13.5 km to south-west). Collins (2023) describes core sustenance zones for different bat species (based on extensive literature reviews). The term core sustenance zone refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost (Collins, 2023). The core sustenance zone for lesser horseshoe bats is given as 2 km. Therefore, bats from the Lough Cutra roost are unlikely to commute to the wind farm to forage, and there is no evidence from any of the previous data sets that the species uses the wind farm site.

The substations at Derrybrien and Agannygal and masonry bridges have features that are suitable for low numbers of roosting bats, however these features are typically used by crevice dwelling species. Lesser horseshoe bats fly into roosts (rather than crawling) so the features available at the substations are unlikely to be used by the species.

##### Evaluation

The commercial plantation and open habitats available in Derrybrien Wind Farm are considered to be of **negligible value** to lesser horseshoe bat.

Substations are considered to be of **negligible value** to lesser horseshoe bat.

The masonry bridges are considered to be of **negligible value** to lesser horseshoe bat.

### 6.3.6.3 Summary Evaluation of Bat Resources

The substations on site are considered to be of local importance to brown long-eared bat and common pipistrelle as roosting sites.

It is likely that at least one of the two substations is occasionally used by brown long-eared bat, for which a small number of droppings were recorded in the Agannygal substation. Surveys completed at the wind farm site have consistently recorded presence of brown long-eared bat, but encounter rates have always been very low (typically <1 p/h).

Common pipistrelle were seen emerging / re-entering both substations during emergence and re-entry work, albeit only one animal was recorded at the Derrybrien Substation. Internal inspections indicate neither substation offers much of a roosting resource to bats, and the small number of droppings found

at the Agannygal substation suggest transient use by dispersing animals following the break-up of maternity roosts (a maximum of 7 common pipistrelle were recorded on 8 September 2022 and 19 July 2023). There was no indication from data collected to inform the operational wind farm of a roost being present at other times (i.e. early and late calls indicating local emergence or re-entry to a roost on site).

While previous work to inform the remedial EIAR has demonstrated a range of bat species occur on the site, there is no evidence that they regularly use the substations for roosting. Where decommissioning will require localised loss of coniferous plantation or young self-seeded trees, these have been found to have negligible potential as bat roosts. While there is very limited capacity for them to do so, it is possible that small numbers of bats periodically opportunistically roost in the masonry bridges; there is no evidence of this, but the bridges (which were fully inspected) have some suitable features. The value of the site as a roosting resource to other species is therefore considered very low.

Habitats within the decommissioning footprint are evaluated as being of local value to Natterer's bat and of no more than site value to other bat species as a foraging or commuting resource. The limited value of the habitat resource to bats is due to the limited size of the wind farm decommissioning footprint and its abundance within the local landscape.

## 6.3.7 Mammals (other than bats)

### 6.3.7.1 European otter

Otter is protected in Ireland under the Irish Wildlife Act 1976 (as amended). It is also listed on the Irish Red Data book as 'Internationally Important'. Otter is also protected under Annex II and IV of the EU Habitats Directive (92/43/EEC) giving it strict protection as a species of community interest for which EU member states must designate SACs. Otter is also listed on Appendix II of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) which Ireland has ratified.

According to the NBDC database, the nearest records of otter are at Loughaniddaun lake, which is located approximately 880 m west of the grid connection corridor, and Lough Atorick, which is located approximately 1.6 km south-west of the proposed access route to Agannygal substation.

No evidence and/or signs of otter were recorded during the dedicated otter survey of the Derrybrien North stream (a tributary of the Owendalulleegh River) between Black Road Bridge and Flaggy Bridge, which was carried out on the 22nd August 2022 and 2nd December 2022. However, otter spraint and suspected mink scat were recorded under the Black Road Bridge during the bridge inspection for bats, which was carried out in August 2022.

No signs of otter were recorded during the survey of the wind farm site undertaken on the 20th July 2018. In August 2018 four sprainting sites were noted on the Flaggy Bridge tributary, approximately 300 m downstream of Flaggy Bridge and approximately 400 m upstream of the confluence with the Owendalulleegh. A further spraint was noted 580 m downstream of the confluence on the main channel. Most of the spraints were on large boulders and one was on a grassy bank. While undertaking Q-value assessments on the Boleyneendorrish River on the 10th October 2018, a spraint was also recorded downstream of the wind farm site.

Otter likely use the main river channels of the three river catchments within the Zone of Influence of the Prospective Development (Owendalulleegh, Boleyneendorrish and Duniry) and their tributaries as well as the unnamed stream crossed by the proposed access route to Agannygal substation that flows into Lough Atorick for breeding, foraging and commuting. The local otter population is valued as being of Local Importance (Higher Value) considering that they are common in the county, their

national conservation status is of 'Least Concern' (Marnell et al., 2019) and that local populations are not connected to any SAC designated for otter[7].

### 6.3.7.2 Other mammals

According to the NBDC database, there are records of the following protected mammal species (in addition to the mammal records described above in Sections 6.3.6 and 6.3.7.1) within the 10 km squares M50, M60 and R69 occupied by the Prospective Development: badger (*Meles meles*), hedgehog (*Erinaceus europaeus*), pine marten (*Martes martes*), pygmy shrew (*Sorex minutus*) and red squirrel (*Sciurus vulgaris*). These species are protected under the Wildlife Act (1976) and Wildlife (Amendment) Acts (2000 & 2010) and the Bern Convention (Appendix III). In addition, pine marten is protected under Annex V of the EU Habitats Directive (92/43/EEC)).

Pine marten was recorded at the wind farm site in July 2020[8] and August 2022[9]. This species and badger are both likely to occasionally forage on site, however they are unlikely to breed on site given the availability of more suitable breeding habitat in the surrounding coniferous forestry. Badgers are found throughout Ireland in areas of suitable habitat including mature coniferous woodland, though populations densities are typically lower in upland and mountainous areas. Hedgehog is unlikely to be present on site or within the surrounding area as this species generally avoids coniferous forest, moorland and damp ground in mountainous regions. Pygmy shrew is commonly found in a range of habitats in Ireland and is therefore likely to breed and forage on site. Red squirrel is unlikely to be present on site due to the lack of woodland habitat. The surrounding coniferous plantations likely offer suitable breeding and foraging habitat for all these mammal species except hedgehog.

All these mammals are valued as being of Local Importance (Higher Value) as they are common widespread species and their national conservation status is of 'Least concern' (Marnell *et al.*, 2019).

## 6.3.8 Other Fauna

According to the NBDC database, there are records of common frog (*Rana temporaria*), smooth newt (*Triturus vulgaris*) and the common lizard (*Lacerta vivipara*) within the 10 km squares M50, M60 and R69 occupied by the Prospective Development. These species are all protected under the Wildlife Act 1976 (as amended). They have a widespread distribution in Ireland and as such are likely to occur in areas of suitable habitat present on the wind farm site and along the OHL corridor as they have a widespread distribution in Ireland. Frogs and smooth newt can be found in drainage channels and other wetland habitats and both amphibians and reptiles live on bogs.

Common frog, smooth newt and common lizard are valued as being Local Importance (Higher Value) as they are common widespread species of 'Least concern' (King *et al.*, 2011).

[7] *Galway Bay Complex SAC (000268) is the nearest SAC designated for otter, which is hydrologically connected to the Prospective Development. This SAC is located approximately 45 km downstream of the Prospective Development, significantly beyond the normal territorial range of otter in Ireland –approximately 7.5 km ±1.5 km for female otter and approximately 13.2 km ±5.3 km for male otter (Ó'Néill et al., 2008). Therefore, any otter population present within the ZoI of the Prospective Developmentare not likely to be connected to the SAC population given the significant instream distance between the Prospective Development and nearest hydrologically connected SAC, Galway Bay Complex SAC.*

[8] *A trail camera set up to record scavenger removal rates as part of the bat monitoring programme recorded pine marten on the wind farm site in July 2020.*

[9] *The recent record from 15th August 2022 was observed at T51.*

# 6.4 Likely, Significant Impacts and Mitigation Measures Implemented

## 6.4.1 Do-Nothing Scenario

The do-nothing scenario is assessed as the evolution of the receiving environment of the site and environs if the Prospective Development does not proceed and activities associated with decommissioning do not occur (EPA, 2022).

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

The existing habitats present within the overall wind farm site comprise revegetating felled conifer plantation, and a variety of upland peatland habitats including remnant blanket bog, cutover bog and a dystrophic lake. It also includes areas of built ground, comprising the existing access tracks and hardstands at the turbine locations. There are also a number of drainage ditches present. The existing habitats present along the OHL comprise mostly felled conifer plantation. Either side of the line conifer plantations of varying stages of maturity occur. A mix of scrub, heath and bog vegetation has established in the corridor of the OHL, where the ground surface is uneven with frequent drainage channels and tree stumps present. The OHL crosses a number of minor watercourses and associated riparian habitats.

On one occasion in 2018, the cutting back of self-seeded tree growth to a 10 m width was required along four sections of track within the wind farm site to allow crane access. Also in 2018, self-seeded tree growth beneath the overhead line was cut back where required. No tree-felling as part of maintenance works has occurred at the wind farm site or OHL since An Bord Pleanála's decision to refuse Substitute Consent. Localised parts of the non-operational wind farm site and OHL are being gradually re-colonised by self-sown conifer trees though at a relatively slow rate. From aerial images, it appears that approximately 69 ha of the original felled area (222 ha) had been colonised by self-seeded conifers up to 2021. Overtime these localised parts of the site and OHL may transition from open upland habitats to more enclosed habitats re-colonised by self-sown conifer trees. While the landscape will retain a largely open character in the short to medium term, there may be a reduction in suitable foraging habitat for hen harrier across the wind farm site and along the OHL in the long-term as the existing canopy and some areas of open heathland gradually become more enclosed with self-sown conifers.

Overtime the retained hardstands and roads will become sparsely vegetated providing useful habitat for small birds and insects, which in turn may attract hunting hen harrier and kestrels. Hen harrier often like to hunt along linear features such as the edge of roads. The retained roads will provide this feature on site. Red grouse often use dry road surfaces to pick up grit, which aids their digestion, and also to dust bathe. The retained roads may provide useful habitat for red grouse in the locality. It is possible that this long-term re-vegetation of the site and the associated impedance of drainage over time may result in minor positive impacts on terrestrial habitats and some faunal species.

The maturing habitats may provide additional foraging habitat for bats. Low numbers of bats are likely to continue to opportunistically use Derrybrien and Agannygal Substations as bat roosts – i.e. common pipistrelle bat in the case of Derrybrien Substation and common pipistrelle and brown long-eared bat in the case of Agannygal substation.

Otter are likely to continue to use the main river channels of the three river catchments within the Zone of Influence of the Prospective Development (Owendalulleegh, Boleyneendorrish and Duniry) and

their tributaries as well as the unnamed stream crossed by the proposed access route to Agannygal substation that flows into Lough Atorick for breeding, foraging and commuting. Similarly, other mammal species (such as badger, pine marten, pygmy shrew and red squirrel), common frog, smooth newt and common lizard are also likely to continue to utilise lands within and adjacent to the Prospective Development as they currently are.

## 6.4.2 Impacts of the Prospective Development

### 6.4.2.1 Designated Nature Conservation Sites

#### 6.4.2.1.1 *European sites*

As part of the NIS, the Appropriate Assessment (AA) Screening process considered the possibility of potential impacts arising from the Prospective Development resulting in likely significant effects on European sites, either alone or in-combination with other plans or projects and in view of their conservation objectives.

A total of 24 European sites are located within a 15 km radius of the Prospective Development (4 SPAs and 19 SACs), 10 of which are hydrologically connected to the site boundary. 9 of these 10 European sites are located at an instream distance of between approximately 14.2 km to 30 km downstream of the Prospective Development. The only exception to this is the Slieve Aughty Mountains SPA, which the entire site boundary is located within. Considering the scale and nature of the Prospective Development as well as the substantial instream distance between the Prospective Development and European sites, which would allow for significant mixing and dilution of any potential contaminants arising from the Prospective Development, it was determined that only three European sites were within the ZoI of the Prospective Development – i.e. Slieve Aughty Mountains SPA, Lough Cutra SAC and Lough Cutra SPA.

Based on the findings of the screening assessment, it was determined that the likelihood of significant effects on the Annex II species of Lough Cutra SAC and the SCI species of Lough Cutra SPA as a result of the Prospective Development can be ruled out. In addition, considering the nature and scale of potential impacts on peat stability arising from the Prospective Development in isolation, it is considered to have no additive cumulative effects on peat instability when considered with the mechanical peat harvesting on site.

However, based on the assessment presented in the NIS, it was determined that in the absence of mitigation the Prospective Development, either alone or in-combination with other plans or projects, had the potential to adversely affect the integrity of the Slieve Aughty Mountains SPA, in view of its conservation objectives. In the context of the EIA directive, this would be a likely significant effect at the international geographical scale.

Slieve Aughty Mountains SPA is designated for the Special Conservation Interest bird species hen harrier and merlin. The potential impacts on this European site as a result of the Prospective Development are as follows:

- Loss and fragmentation of suitable habitat for SCI species hen harrier and merlin arising from small amounts of localised vegetation clearance within the wind farm site and along the OHL that will be undertaken during the enabling works to facilitate the decommissioning.
- Degradation of suitable habitat for hen harrier and merlin as a result of physical disturbance, a pollution event, the introduction and/or spread of invasive plant species.
- Increased levels of disturbance, associated with human presence, noise, vibration and lighting, resulting in the temporary displacement of hen harrier and merlin from

lands within the ZoI of the Prospective Development to suitable habitat beyond in the wider locality.
- Removal of collision risk and displacement of hen harrier due to decommissioning of turbines and OHL.

See Sections 6.3.3, 6.3.4, 6.3.5, 6.4.2.3 and 6.4.2.4 for full details regarding the existing baseline environment of sensitive habitats, hen harrier and merlin and the assessment of potential impacts on sensitive habitats, hen harrier and merlin. Full details with regards to how these potential impacts may affect the Site-Specific Conservation Objectives of the Slieve Aughty Mountains SPA (NPWS, 2022) are provided in the NIS.

The NIS concluded that following the implementation of the prescribed mitigation measures the Prospective Development, either alone or in-combination with other plans or projects, will not adversely affect the integrity of any European site in view of their conservation objectives.

## Mitigation Measures

The bird mitigation measures and monitoring specified in Sections 6.4.2.4.2, 6.4.2.4.3 and 6.2.4.4.6 will mitigate against any potential impacts on the Slieve Aughty Mountains SPA associated with habitat loss and disturbance. These measures will therefore ensure that the Prospective Development will not result in any likely significant negative effects on (adversely affect the integrity of) the Slieve Aughty Mountains SPA.

The terrestrial habitat protection measures specified in Section 6.4.2.3.1 will mitigate against any potential impacts on the Slieve Aughty Mountains SPA associated with habitat degradation arising from physical disturbance and introduction and spread of non-native species. These measures will therefore ensure that the Prospective Development will not result in any likely significant negative effects on (adversely affect the integrity of) the Slieve Aughty Mountains SPA.

In addition to the mitigation measures specified in Section 6.4.2.3.1, it is recommended that a pre-construction non-native invasive species survey is carried out prior to decommissioning in order to account for any changes that may occur in the baseline environment. If any problematic non-native plant species are recorded, an Invasive Species Management Plan (ISMP) will be prepared. The ISMP will include measures to avoid and/or control any non-native plant species that may be present, in accordance with The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020). In addition, all machinery will be checked and cleaned for non-native invasive species prior to entering site to avoid any potential introduction and/or spread of such species.

The water quality protection measures specified in Sections 7.4.2.3 and 7.4.2.4 of Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) will mitigate against any potential impacts on Slieve Aughty Mountains SPA associated with habitat degradation arising from a pollution event. These measures will therefore ensure that the Prospective Development will not result in any likely significant negative effects on (adversely affect the integrity of) the Slieve Aughty Mountains SPA.

## Residual Impact

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any adverse effects on the integrity of any European site, either alone or in combination with other plans or projects, in light of their Site-Specific Conservation Objectives. Therefore, the Prospective Development will not result in any residual impact on any European site at any geographic scale. Any risk of collision with the overhead line will be eliminated by the removal of the line as well as any potential cause of displacement (turbines) – thus, conditions will revert to the status prior to construction of the wind farm project.

### Significance of Effects

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any adverse effects on the integrity of any European site, either alone or in combination with other plans or projects, in light of their Site-Specific Conservation Objectives. Therefore, the Prospective Development will not result in any significant negative residual effects on any European site at any geographic scale. Any risk of collision with the overhead line will be eliminated by the removal of the line as well as any potential cause of displacement (turbines) – thus, conditions will revert to the status prior to construction of the wind farm project.

#### 6.4.2.1.2 *Natural Heritage Areas and Proposed Natural Heritage Areas*

One NHA (Slieve Aughty Bog NHA (001229)) and one pNHA (Lough Cutra pNHA (000299)) have been identified as being within the ZoI of the Prospective Development (i.e. having the potential to be impacted by the Prospective Development) for the reasons outlined in Section 6.2.3. Slieve Aughty Bog NHA is designated for peatland habitats. Lough Cutra pNHA is designated for the same reasons as Lough Cutra SAC and SPA and therefore potential impacts on this pNHA have been fully assessed above in Section 6.4.2.1.1 and in the screening assessment of the NIS.

The Slieve Aughty Bog NHA comprises six discrete areas located within close proximity to the Prospective Development. Angle mast AM24 along the grid connection is entirely within the boundary of the Slieve Aughty Bog NHA. In addition, the following minor sections of the site boundary partially overlap with this NHA: the grid connection corridor adjacent to AM24, the proposed access route to AM25 located north of the Owendalulleegh River and the Ennis-Shannonbridge 110 kV OHL reinstatement.

As described in Section 6.3.3, there are no habitats of high ecological value within the grid connection corridor, including where it overlaps with the Slieve Aughty Bog NHA. The dominant habitat present corresponds to Recently Felled Woodland (WS5). It is noted however that in some of these areas the habitat has rapidly regenerated with vegetation typical of upland blanket bog (see Section 6.3.3.1.2 for full details). On a precautionary basis, it has been assumed that peatland habitat (albeit not of high ecological value) may be present within the areas of the Prospective Development that overlap with the boundaries of this NHA.

The potential impacts on Slieve Aughty Bog NHA as a result of the Prospective Development are as follows:

1. *Habitat loss and fragmentation.*
1. *Habitat degradation.*

### Potential Impact – Habitat loss and fragmentation

The Prospective Development will not result in the direct loss of any peatland habitats located within the boundaries of Slieve Aughty Bog NHA.

Only the above ground components of angle mast AM24 will be dismantled and removed, while the foundations will be left in situ (see Section 4.8.6 of **Appendix 4-2**: Decommissioning Management Plan). This will ensure that there will be no direct loss of or any unnecessary disturbance to peatland habitat at AM24. There will be no removal of habitat associated with the Ennis-Shannonbridge 110 kV OHL reinstatement, however a small number of conifer trees located within the wayleave area will be removed. These proposed works will involve mid span joints and the re-conductoring of the OHL bypassing the Agannygal substation. There is no requirement for habitat removal along any of the proposed access routes to the OHL, including those areas that partially overlap with the Slieve Aughty Bog NHA.

See Sections 6.3.3, 6.3.4 and 6.4.2.3 for full details regarding the existing baseline environment of sensitive habitats and the assessment of potential impacts on sensitive habitats.

### Potential Impact – Habitat degradation

Peatland habitat that may be present within the areas of the site boundary that overlap with the boundaries of the Slieve Aughty Bog NHA could potentially degrade as a result of physical disturbance, a pollution event and/or the introduction and/or spread of invasive plant species.

In absence of mitigation, the tracking of machinery required to complete the decommissioning of the OHL may cause physical disturbance to sensitive habitats present along the access routes and at the works areas, in particular in areas of soft wet peaty ground. This could include areas of peatland associated with the Slieve Aughty Bog NHA. The scale of damage that may occur depends on the prevailing ground conditions, type of plant required and the number of movements. In addition, the use of bog mats in areas of soft, wet ground may in turn result in localised compaction and shading of the vegetation directly beneath the mats (as described in Section 6.4.3.1). The proposed access route to AM25 that slightly overlaps with the NHA follows an existing Coillte forestry track and therefore there will be no degradation of any sensitive habitats associated with the NHA.

A pollution event of a large enough magnitude during decommissioning, such as a petrol/oil spill, could potentially degrade habitat associated with the NHA. Whilst this is considered unlikely to occur, given the scale and nature of the Prospective Development in particular at the sections that overlap with the Slieve Aughty Bog NHA and that the peatland habitat present is likely to be sub-optimal, a precautionary approach has been applied and mitigation measures are recommended.

No non-native plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded during the surveys (see Section 6.3.4). However, there are desk study records of Himalayan balsam, Japanese knotweed and *Rhododendron ponticum* in the wider locality. In addition, Japanese knotweed was previously recorded in close proximity to barrage 3 / the Derrybrien North stream south of the Black Road in the wider locality of the site. In the absence of mitigation, machinery required to complete the decommissioning could unintentionally introduce problematic non-native invasive species. Once established these non-native invasive species could potentially degrade habitat associated with the NHA.

In the absence of mitigation, habitat degradation arising from the Prospective Development (i.e. physical disturbance, pollution event and introduction and/or spread of invasive species) could potentially result in a significant negative effect on the Slieve Aughty Bog NHA at the national geographical scale.

See Sections 6.3.3, 6.3.4 and 6.4.2.3 for full details regarding the existing baseline environment of sensitive habitats and the assessment of potential impacts on sensitive habitats.

### Mitigation Measures

The terrestrial habitat protection measures specified in Section 6.4.2.3.1 will mitigate against any potential impacts on the Slieve Aughty Bog NHA associated with habitat degradation arising from physical disturbance and introduction and spread of non-native species. These measures will therefore ensure that the Prospective Development will not result in any likely significant negative effects on the Slieve Aughty Bog NHA.

In addition to the mitigation measures specified in Section 6.4.2.3.1, it is recommended that a pre-construction non-native invasive species survey is carried out prior to decommissioning. If any problematic non-native plant species are recorded, an Invasive Species Management Plan (ISMP) will be prepared. The ISMP will include measures to avoid and/or control any non-native plant species that

may be present, in accordance with The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020). In addition, all machinery will be checked and cleaned for non-native invasive species prior to entering site to avoid any potential introduction and/or spread of such species.

The water quality protection measures specified in Sections 7.4.2.3 and 7.4.2.4 of Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) will mitigate against any potential impacts on Slieve Aughty Bog NHA associated with habitat degradation arising from a pollution event. These measures will therefore ensure that the Prospective Development will not result in any likely significant negative effects on the Slieve Aughty Bog NHA.

#### Residual Impact

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual impacts on any NHA or pNHA at any geographic scale.

#### Significance of Effects

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on any NHA or pNHA at any geographic scale.

##### 6.4.2.1.3 *Nature Reserves*

Four of these five Nature Reserves (Coole-Garyland, Pollnaknockaun Wood, Rosturra Wood and Derrycrag) are also designated as European sites and the assessment of potential impacts to these sites is addressed in Sections 6.2.3, 6.3.1.1 and 6.4.2.1.1 of this chapter and in the NIS. Caher (Murphy) Natura Reserve is also designated as a pNHA and the assessment of impacts to this site are addressed in Sections 6.2.3, 6.3.1.2 and 6.4.2.1.2.

### 6.4.2.2 Protected and/or Rare Species

No protected and/or rare plant species were recorded within or adjacent to the footprint of the Prospective Development during the surveys. It is considered, based on the type and condition of habitats present, that rare and protected plant species are highly unlikely to occur within the wind farm site. Therefore, no further assessment is required.

### 6.4.2.3 Terrestrial Habitats

The assessment of potential impacts is presented under the activities associated with the three main elements of the Prospective Development. Decommissioning and removal of the Derrybrien Wind Farm and associated ancillary components.

#### 6.4.2.3.1 *Potential Impacts*

A map showing the current distribution of terrestrial habitats within the site area is presented in Figure 6-5 and 6-6 above. Potential impacts on terrestrial habitats primarily relate to habitat loss or habitat alteration due to direct or indirect impacts. Potential impacts are considered relating to each part of the Prospective Development and are presented in tabular format below as follows:

- Wind Farm and Derrybrien Substation Decommissioning (See Table 6-15).
- Agannygal Substation Decommissioning (see Table 6-16).
- Derrybrien - Agannygal 110kV OHL Decommissioning (see Table 6-17).

*Table 6-8 Potential impacts on terrestrial habitats associated with the decommissioning of Derrybrien Wind Farm (including its substation)*

| Decommissioning works | Potential impacts | Potential Effects on terrestrial habitats |
|---|---|---|
| **Wind Farm and Derrybrien Substation Decommissioning** | | |
| Onsite enabling works | Hedge and scrub trimming will be required along access roads and adjacent to hardstand areas. Works will be confined to road and hard stand areas. Habitats of ecological interest will be avoided. Trimming of individual trees and shrubs encroaching on roads and hardstand will not result in any measurable impact on terrestrial habitats. | None identified. |
| Compound and site facilities | The site compounds are to be established on an existing hardcore area within the wind farm site. | None identified. |
| Site drainage | There will be no requirement for additional drainage associated with the decommissioning of the Derrybrien wind farm. Existing culverts will be checked and remediated if necessary. Any remediation work will be undertaken from stoned areas. Based on works proposed no additional drainage effects on surrounding habitats are foreseen. | None identified. |
| Widening of turbary road | Temporary road widening is required along the turbary road from the junction east of Turbine 25 and Turbine 45. Cutover bog occurs on either site of the existing floating road. The method of widening has been designed to minimise impacts on adjacent cutover bog habitat as follows:<br>Bog mats to be laid on a 2m wide strip on upslope side of road which will then be reinforced with a single layer of geogrid and 150mm of capping stone across the full width of the road.<br>In instances where the bog surface is above that of the existing road then the surface peat will be excavated to 150mm and stored for later reinstatement. Bog mats and stone will then be laid on excavated surface of peat as described above. The habitat in this area is currently degraded due to past drainage and | Minor temporary short-term impact on cutover bog habitat, a habitat of local importance, higher value (non-significant effect). |

| Decommissioning works | Potential impacts | Potential Effects on terrestrial habitats |
|---|---|---|
| | peat cutting. The works will not lead to any drainage effects on the surrounding peatland habitat as there is currently a roadside drain isolating the expanse of bog from the works area. | |
| Localised repairs on site roads and hardstands | Any minor repairs to roads or hardstands will be confined to the existing site infrastructure and will not encroach onto adjacent habitats. | None identified |
| Creation of turning heads | Turning heads (in the form of road widening) are required to be created at four locations within the wind farm site as described in the project description. The extent of widening is minor at each of the locations and is confined to roadside verges. These locations have been reviewed and it is confirmed that the habitats occurring at each location are of low ecological value. | Minor permanent impact on low value habitat (non-significant effect). |
| Turbine and anemometer mast dismantling | Most works will be confined to the hardstand areas of the site where all plant machinery will operate from. An exception to this is the temporary storage of turbine blades and rotors. They will be temporarily stored on straw bales on land adjacent to the road verge or beside the hardstand, subject to geotechnical and ecological assessment at each location. An initial review of habitats confirmed the presence of recently felled woodland (WS5), a habitat of local importance, higher value. The storage of turbine blades at these locations will require minor scrub and tree clearance and may lead to minor ground disturbance due to personnel movement in the area. All works associated with anemometer mast dismantling will be undertaken from hardstand surfaces and therefore no impacts on terrestrial habitats are identified. | Cutting back of scrub and regenerating trees will be required on land adjacent to hardstands to facilitate temporary storage of turbine blades. The clearance of scrub and trees in these areas will lead to a temporary neutral impact. The removal of trees from these areas will improve the quality of habitat in the area, however the ground disturbance associated with the works may have a very localised minor impact. Overall, the impact is deemed to be neutral short-term impact (non-significant effect). |
| Derrybrien Substation Decommissioning | Decommissioning will involve the dismantling and removal of all above ground elements of the substation. The hardstand area for the substation and control building will be left in place after decommissioning. All activities and materials storage will be confined to hardstand areas. | None identified |

| Decommissioning works | Potential impacts | Potential Effects on terrestrial habitats |
|---|---|---|
| | Considering the scale and nature of the works required and the characteristics together with the location of terrestrial habitats in the surroundings, no impacts on terrestrial habitats are foreseen. | |

*Table 6-9 Potential impacts on terrestrial habitats associated with the decommissioning of the Agannygal Substation*

| Decommissioning works | Potential impacts | Potential effects on terrestrial habitats |
|---|---|---|
| **Agannygal Substation Decommissioning** | | |
| Compound and site facilities | A temporary compound will be established on existing stoned hardstand areas, removed from any habitats of ecological interest. | None identified. |
| Agannygal Substation Decommissioning | Decommissioning will involve the dismantling and removal of all above ground elements of the substation. The hardstand area for the substation and control building and access road will be left in place after decommissioning. All activities and materials storage will be confined to hardstand areas. Considering the scale and nature of the works required and the characteristics together with the location of terrestrial habitats in the surroundings, no impacts on terrestrial habitats are foreseen. | None identified |

*Table 6-6-10 Potential impacts on terrestrial habitats associated with the decommissioning of the Derrybrien - Agannygal 110kV OHL and reinstatement of the Ennis-Shannonbridge 110 kV OHL.*

| Decommissioning works | Potential impacts | Potential effects on terrestrial habitats |
|---|---|---|
| **Derrybrien - Agannygal 110kV OHL Decommissioning and Ennis-Shannonbridge 110 kV OHL Reinstatement** | | |
| Access routes to works area | A network of existing roads and forest tracks will be used to gain access to overhead line structures to carry out works. The use of these roads and tracks will limit the tracking of machinery across terrestrial habitats that may be sensitive to ground damage and associated habitat disturbance. | Minor temporary short-term habitat disturbance in Recently Felled Woodland (WS5) habitat. Minor temporary impact (non-significant effect). |

| Decommissioning works | Potential impacts | Potential effects on terrestrial habitats |
|---|---|---|
| | The line occurs along a corridor within conifer plantations of varying ages. There are no habitats of high ecological value within the corridor of the overhead line. The main habitat in these areas corresponds with Recently Felled Woodland (WS5) as described in Section 6.3.3.1.2 above. This habitat is of local importance, higher value.<br><br>The tracking of machinery across this habitat may cause habitat disturbance along the access route particular in areas of wet peaty ground which is common on gently sloping terrain. Depending on the prevailing ground conditions, type of plant required at particular structures, and likely number of journeys plant requirements bog mats may potentially be required to facilitate access. In the case of bog mats being used, ground damage will be reduced although localised compaction and shading impacts on vegetation directly beneath the mats will result. | |
| Destringing of existing conductors | Stringing will be undertaken from Angle Mast locations along the OHL route. The use of machinery in these areas may cause ground damage due to tracking across soft ground within Recently Felled Woodland (WS5), a habitat of local importance, higher value. Bog mats will be used as a means of ground protection at these locations. Despite this the mats may result in localised compaction and shading impacts on vegetation directly beneath the mats. | Minor temporary short-term habitat disturbance in Recently Felled Woodland (WS5) habitat. Minor temporary impact (non-significant effect). |
| Retirement of wooden poleset structures | Plant requirement for the removal of wooden polesets include a tracked dumper and a tirfor hoist, or suitable alternative and a chainsaw. In some instances, a tracked excavator will be used to remove poles from site. No excavations will be undertaken at poleset locations as the base of poles | Minor temporary short-term habitat disturbance in Recently Felled Woodland (WS5) habitat at works location. Minor temporary impact (non-significant effect). |

| Decommissioning works | Potential impacts | Potential effects on terrestrial habitats |
|---|---|---|
| | will be left in-situ following works. Poles will be felled using a chainsaw and removed from 300mm below ground surface. Potential for habitat disturbance within the works area where machinery is required to work on soft ground. | |
| Retirement of steel tower structures | There are two different methods that can be employed to remove steel towers. In areas with poor ground conditions the standing tower will be dismantled manually by linesmen. The retired members will then be removed from site using a light weight tracked dumper. Where ground conditions allow access by a winch excavator / tracked dumper then the mast will be cut and pulled over before being manually dismembered. Potential for habitat disturbance within the works area where machinery is required to work on soft ground. | Minor temporary short-term habitat disturbance in Recently Felled Woodland (WS5) habitat at works location. Minor temporary impact (non-significant effect). |

No problematic alien plant invasive species were recorded on site (including no species listed on the Third Schedule of the Birds and Habitats Regulations), however Japanese knotweed was previously recorded in close proximity to barrage 3 / the Derrybrien North stream south of the Black Road in the wider locality of the site. In absence of mitigation, invasive species could be introduced to the site resulting in the degradation of habitats.

## Mitigation Measures

- Cutting back of vegetation during the site enabling works should be done from the hard surfaced areas. Where it is necessary to work on soft terrain away from hard stand areas then manual tools should be used to eliminate any impacts associated with ground compaction and disturbance from plant machinery.
- The project ecologist will undertake pre-construction verification surveys of turbine blade and rotor storage sites and advise on micro-siting to ensure minimal ecological impacts and will be agreed with the Geotechnical Engineer.
- All plant machinery required for the works associated with widening the turning heads will operate on existing adjacent road surface.
- All plant machinery required for the works associated with widening the turbary road will operate on existing adjacent road surface.
- The use of bog mats, geotextile and stone will ensure that the peatland habitat in the footprint of the road widening will be reinstated following completion of decommissioning.
- In the event that turves are removed from the turbary area to facilitate widening the following will be implemented:
    - Turves will be stored in an appropriate location in the wider site. The condition of turves will be monitored regularly and watering will be implemented if deemed necessary.

- In advance of works along the OHL route the project ecologist, Geotechnical Engineer and project contractor will undertake a joint walkover survey to demarcate agreed access routes and agree detailed approach. This walkover will verify ground conditions at the time of work. This will help inform the approach to access to individual structures during decommissioning. The Project ecologist will liaise with the contractor to decide on the most appropriate ground protection measures (bog mats, EPDM, aluminium mats) taking into consideration the following:
  - Prevailing ground and weather conditions.
  - Number of journeys required by plant to complete the work.
  - The type of plant required to complete the work at individual structures.
- A pre-construction non-native invasive species survey will be carried out prior to decommissioning in order to account for any changes that may occur in the baseline environment. If any problematic non-native plant species are recorded, an Invasive Species Management Plan (ISMP) will be prepared. The ISMP will include measures to avoid and/or control any non-native plant species that may be present, in accordance with The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020). In addition, all machinery will be checked and cleaned for non-native invasive species prior to entering site to avoid any potential introduction and/or spread of such species.

#### Residual Impact

Potential impacts associated with the Prospective Development are confined to two habitats of local value, higher importance (Cutover Bog (PB4) and Recently Felled Woodland (WS5)).

Residual impacts following the implementation of the above mitigation measures on these two habitats can be described as minor, short term, and temporary. It is expected that the habitats will recover fully from localised disturbance in the short term.

#### Significance of Effects

It is concluded that the potential impacts identified above will lead to non-significant effects considering the nature of the impacts and the value of the habitats affected.

### 6.4.2.4 Birds

The potential impacts on birds as a result of the Prospective Development which require consideration are considered to be the following:

1. *Loss of habitat.*
2. *Temporary loss and disturbance of habitat.*
3. *Disturbance to birds from decommissioning works.*
4. *Impacts on birds by removal of turbines and overhead line.*
5. *Change of habitats.*

#### 6.4.2.4.1 *Potential Impact – Loss of Habitat*

The enabling works will require the following:

- Minor improvements to existing tracks, which will include localised widening where necessary.

The above-described work will mostly involve removal of willow scrub, pine saplings (self-seeded), heather and rushes from along the edges of the tracks to allow widening as required. Such vegetation

has potential to provide nesting and feeding habitat for small birds such as wren and willow warbler. In compliance with the Wildlife Acts, 1976-2021, the widening works will be carried out outside of the bird breeding season and hence active nests will not be affected.

As similar habitat occurs abundantly throughout the wind farm site, the (unquantified) permanent loss of marginal strips of habitat is rated as a Non-Significant Negative effect of Permanent Duration. This effect is at the level of Local importance.

#### Mitigation Measures

While mitigation is not feasible for loss of habitat, it is considered that the rating of the effect does not justify the implementation of compensation measures, such as provision of replacement habitat.

#### Residual Impact

The residual impact by the loss of habitat to facilitate the works is rated as a Non-Significant Negative effect of Permanent Duration, at the level of Local importance.

#### Significance of Effects

The significance of the impact by the loss of habitat to facilitate the works is rated as a Non-Significant Negative effect of Permanent Duration, at the level of Local importance.

### 6.4.2.4.2 *Potential Impact – Temporary loss and disturbance of habitat*

The enabling and main works will require the following:

- Vegetation and scrub clearance, as required, at existing hardstand areas and access tracks.
- Temporary widening of the turbary track which runs from the junction east of turbine T25 to turbine T45 to provide safe access for the mobile crane. A strip of up to 1,450 m in length will be widened over a 2 m wide strip. The extended strip will be removed when works are complete and the edge of the turbary track re-profiled as required. Full details of the construction method are given in Section 3.5.5 of **Appendix 4.2**: Decommissioning Management Plan.
- Disturbance of vegetation to allow access to the polesets within the grid route corridor.

The above-described works will mostly involve clearance of willow scrub and heather from along the edges of the infrastructure, as required (see Plate 6-2), and disturbance from plant movement to bog vegetation and scrub along the grid route corridor (see Plate 6-3). Such vegetation has potential to provide nesting and feeding habitat for passerine bird species, as well as hunting opportunities for birds of prey including kestrel and hen harrier.

In compliance with the Wildlife Acts, 1976-2023, the required clearance will be carried out outside of the bird breeding season and hence active nests will not be affected.

The areas where the vegetation will be cleared, cut to base or disturbed, would be expected to recover within 1-3 years after the initial work.

As similar habitat occurs widely throughout the wind farm site, the (unquantified) temporary loss and disturbance of marginal vegetation at existing hardstands and access tracks, apart from the track within cutover bog, as well as at the poleset locations, the significance is rated as a Negative Slight effect of Short-term Duration, and at the Local level of importance.

The temporary loss of cutover bog habitat along the track between turbines T24 and T45, which provides potential foraging habitat for species such as hen harrier and kestrel, is rated as a Negative Slight effect of Short-term Duration, and at the County level of importance for kestrel (Red-listed) and at the International level of importance for hen harrier (SCI for SPA).

## Mitigation Measures

As noted, seasonal restrictions will apply to the various works, including the temporary widening of the floating road between turbines T25 and T45, so as to avoid disturbance to breeding passerine species which provide food items for kestrel and hen harrier. In compliance with the Wildlife Acts, 1976-2023, the required clearance will be carried out outside of the bird breeding season and hence active nests will not be affected. However, it is suggested that works could commence in August following a pre-construction survey to determine if any birds are still nesting (most species will have completed the breeding cycle by late July) – this would maximise the time for the recovery of the vegetation after the works are complete (see below).

Mitigation will be implemented to minimise disturbance to cutover bog by the temporary widening of the floating road between turbines T25 and T45, which provides suitable breeding habitat for various bird species. The objective is to minimise the area of exposed peat surface and to encourage rapid re-vegetation of the disturbed bog surface. This will be achieved by the removal of the vegetated bog surface within the work footprint, the storage of this material, and subsequent re-use along the section of track which had been disturbed (see NatureScot 2024).

Where the existing peat is lower than the floating road, a layer of bog mats will be placed on the existing intact peat and covered with varying depths of crushed rock granular fill over a 2 m wide strip along the upslope side of the road which will then be reinforced with a single layer of geogrid and 150mm on widened section followed by 2 layers of geogrid, 150mm of capping stone and 100mm running surface layer across the full width of the road.

Where the existing peat is higher than the floating road, turves will be excavated to a level of 300mm lower than the road and stored locally for reuse (see below), and then bog mats and stone will be placed on the exposed ground as noted above.

Prior to the removal of the peat turves, a suitable area within the site will be identified where the removed material can be stored for the duration of the works or until needed – it is noted that such areas will not be on other vegetated bog surfaces but rather on local hardcore areas covered with a geotextile layer (to minimise water loss). Also, it is important that the selected storage area will not be prone to disturbance for the duration of the required storage period.

The sods or 'turves' will be cut out using a dumper/digger with a bucket operating from the existing track. Care will be taken to keep the turves as intact as possible and the vegetated side upwards. The turves will be loaded to a trailer and transported to the pre-identified storage area. The turves will be off-loaded from the trailer and placed side by side and vegetation side upwards. They will be placed in single layers, i.e. not piled on top of each other.

The condition of the turves will be monitored regularly and watering will be implemented if deemed necessary.

When ready for placement at the location where the works took place along the track, the turves will be lifted with a dumper and bucket and taken to the destination. Here they will be off-loaded and placed side by side on the disturbed bog surface with vegetation side up. The turves will be bedded in with the bucket of a dumper so that they form a continuous layer without gaps between them. This approach will provide almost immediate cover of the bare surface.

All of the above processes will be monitored by the ECoW.

### Residual Impact

The residual impact by the temporary loss and disturbance of habitat and vegetation to facilitate the works is rated as a Non-Significant Negative effect of Temporary or at most Short-term Duration, at the level of Local importance.

### Significance of Effects

With mitigation implemented in full, the temporary loss of habitat and disturbance of vegetation is rated as a Non-Significant Negative effect of Temporary or, at most, Short-term Duration, and at the level of Local Importance.

## 6.4.2.4.3 Potential Impact – Disturbance to birds from decommissioning works

The works associated with the Prospective Development are expected to last up to approximately 24 months. The works have potential to cause disturbance effects on birds of conservation importance within the site and in adjoining and nearby areas. Disturbance would mainly affect breeding birds, as the study area does not support sensitive wintering species such as roosting hen harriers, or swan or goose species.

Scottish Natural Heritage (2016) write "*Different bird species have different tolerance levels to disturbance. Even within species, disturbance distance can vary according to time of year or geographical location. Some sensitive species may be disturbed by activity as much as 750 m away.*" SNH had published "*A review of disturbance distances in selected bird species*" prepared by Ruddock and Whitfield (2007). This review included 26 'priority' species and was based largely on expert opinion. The 2007 guidance note was replaced in 2022 by "*Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species*" (NatureScot Research Report 1283) prepared by Goodship and Furness. The 2022 review included 65 bird species.

Of the bird species which are identified as of conservation importance at the study area (based on past and recent, 2022, status), disturbance from decommissioning works is considered to have potential to cause a significant effect for the following species:

- Hen harrier.
- Merlin.
- Sparrowhawk.
- Red Grouse.
- Snipe.

The works are not considered to have potential to have significant effects on kestrel, as the species only uses the site for hunting purposes. Kestrel has been very successful in adapting to man-made environments for both nesting and hunting purposes and habituate easily to nearby human activities (Village 1990). As there is already forestry and turbary activities within the immediate areas, as well as activities associated with the wind farm, kestrel would still be expected to hunt on site during the period when works are in progress.

Golden plover, whilst of high conservation importance, is an occasional and irregular winter and/or autumn/spring visitor to the area of the wind farm site (open bog within and around the site) and would unlikely be affected by the works.

Passerine species, such as meadow pipit and skylark, are not perceived as being prone to disturbance by wind farm construction (SNH 2017) and, indeed, Pearce Higgins *et al.* (2012) found that densities of skylarks and stonechats increased on wind farms during construction. For passerine species, the significance of a disturbance effect is rated as Not Significant, at a Local level of importance.

### Hen Harrier

There was no hen harrier breeding activity recorded within the Derrybrien study area in 2022 breeding season.

While there were two records of hen harrier to the north (c. 500 m from boundary) and southwest (c. 2 km from boundary) of the wind farm in April 2024 (see section 6.3.5.1.4), there were no subsequent sightings through the season and no nesting attempts were known to have taken place.

Suitable habitat for breeding and foraging exists within and around the wind farm site. Winter roosting by hen harrier has not been recorded within or at least to a 2 km distance of the wind farm site.

Hen harrier is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'medium sensitivity' to disturbance, with a buffer zone of 300-750 m suggested for both breeding birds and non-breeding birds.

Should a breeding territory be established in the future within a 1 km distance of the study area, there is potential that decommissioning works could have disturbance effects on the breeding activities of birds due to increased levels of human presence, noise, vibration and/or lighting. This potential impact would only persist for the duration of the decommissioning works (i.e. 24 months). This potential effect is rated as a Negative, Significant Effect of Short-term Duration, at an International level of importance.

Due to the high conservation status of hen harrier, a pre-construction survey will be carried out in suitable breeding habitat within a zone of at least 1 km of the site and as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds.

### Merlin

The habitats in the study area, i.e., bog and conifer plantation, are suitable for supporting breeding merlin. While there was no evidence of merlin breeding in the study area in 2022 and 2024 breeding bird surveys or indeed in any of the past surveys, the possibility of future breeding cannot be ruled out. It is noted that merlin is a particularly difficult species to census and the traditionally used methods may not provide a true indication of the abundance, densities or distribution of the species (Lusby *et al.* 2011).

Merlin is considered in the NatureScot (2022) review of disturbance distances in birds. The species is rated as of 'medium sensitivity' to disturbance, with a buffer zone of 300-500 m suggested for breeding birds. For disturbance by forestry operations, Currie & Elliot (1997) gave a distance range of 200 m to 400 m for merlin.

Should merlin breed in future years within a 500 m distance of the wind farm development area, there is potential that decommissioning works could have disturbance effects on the breeding activities of birds due to increased levels of human presence, noise, vibration and/or lighting. This potential impact would only persist for the duration of the decommissioning works (i.e. 24 months). This potential effect is rated as a Negative, Significant Effect of Short-term Duration, at the level of International importance.

Due to the high conservation status of merlin, a pre-construction survey will be carried out in suitable breeding habitat within a zone of at least 500 m of the site and, as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds.

### Sparrowhawk

The habitat in the study area, i.e., conifer plantation and open bog, is suitable for supporting breeding sparrowhawk. The species was recorded in the past and breeding took place on site in 2022 and probably in 2024.

Sparrowhawk was not considered in the NatureScot (2022) review of disturbance distances in birds or in the review of 'safe working distances' for forestry workers to sensitive bird species by Currie and Elliot (1997). In the absence of such information, a buffer zone of 100-200 m is suggested for breeding birds (as for buzzard, a tree-nesting species and kestrel, a tree and cliff/crag nesting species, in the NatureScot review).

Within the Wind Farm site, decommissioning works will take place in an area that supported a nesting pair of sparrowhawk at least in the 2022 season. It is considered that the works would likely have a potential disturbance effect on breeding birds within a distance of possibly up to 200 m due to increased levels of human presence, noise, vibration and/or lighting. This potential impact would only persist for the duration of the decommissioning works (i.e. 24 months). This is rated as a Negative Significant Effect of Short-term duration, at the Local level of importance.

A pre-construction survey will be carried out in suitable breeding habitat within the site and, as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds.

### Red grouse

Habitat suitable for supporting red grouse occurs on open bog to the northwest of the wind farm site. The species was recorded in 2022 within at least a 500 m distance of the wind farm boundary. In the past, Red Grouse have been observed within the wind farm (though breeding is not expected within the wind farm boundary).

Red grouse is not considered in the NatureScot (2022) review of disturbance distances in birds. In a review of monitoring data from wind farms located on enclosed upland habitats in the UK, Pearce-Higgins *et al.* (2012) reported that densities of red grouse were significantly reduced at wind farms during construction but that the densities had recovered by the first-year post-construction. Owing to the high conservation status of red grouse and their sensitivity to disturbance, a precautionary buffer zone of 500 m is suggested.

From the above analysis, it is considered that the decommissioning of the wind farm would likely have a potential disturbance effect on breeding red grouse within a distance of possibly up to 500 m due to increased levels of human presence, noise, vibration and/or lighting. This potential impact would only persist for the duration of the decommissioning works (i.e. 24 months). This is rated as a Negative Significant Effect of Short-term duration, at the County level of importance.

Due to the high conservation status of red grouse, a pre-construction survey will be carried out in suitable breeding habitat within the site and a zone of at least 500 m of the site and, as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds.

### Snipe

Habitat suitable for supporting snipe occurs on the cutover bog in the eastern sector of the wind farm site (displaying bird recorded in both 2022 and 2024 seasons) and possibly elsewhere on the site.

Snipe was not considered in the NatureScot (2022) review of disturbance distances in birds. However, Pearce-Higgins *et al.* (2012) identified snipe as one of the species showing a reduction (53%) in densities on wind farms during construction.

It is considered that the decommissioning work is likely to have a potential disturbance effect on breeding snipe within a distance of possibly up to 400 m (following Pearce Higgins *et al.* 2009) due to increased levels of human presence, noise, vibration and/or lighting. This potential impact would only persist for the duration of the decommissioning works (i.e. 24 months). This is rated as a Negative Significant Effect of Short-term duration, at the County level of importance.

Due to the high conservation status of snipe, pre-construction survey will be carried out in suitable breeding habitat within the site and, as required, mitigation will be undertaken to reduce the significance of this potential effect on breeding birds.

### Mitigation Measures

The present study has identified the potential for significant disturbance effects on various breeding species which are of conservation importance as a result of the decommissioning works.

Best available evidence has been reviewed and it is suggested that these species could be disturbed by works at the following distances:

- Hen harrier 1,000 m.
- Sparrowhawk 200 m.
- Merlin 500 m.
- Red Grouse 500 m.
- Snipe 400 m.

Should any of these species be recorded breeding within the given distances of the works area (as established through confirmatory surveys before and/or during decommissioning – as described above), a buffer zone (using above distances) shall be established around the expected location of the nest (location will be identified as far as is possible without causing disturbance to the bird) and all works will be restricted within the zone until it can be demonstrated by an ornithologist that the species has completed the breeding cycle in the identified area. Any restricted area on site that is required to be set up will be marked clearly using hazard tape fencing and all site staff will be alerted through toolbox talks.

The above mitigation, which will apply from March to August (inclusive), will ensure that the works will not have significant negative effects on bird species of conservation importance.

### Other bird species

A range of passerine bird species breed within the site, including meadow pipit (Red-listed), skylark and willow warbler (both Amber-listed). As noted, disturbance to, or destruction of, active nests during the decommissioning activities could contravene Section 22 of the Wildlife Acts 1976 to 2023. Clearance of ground vegetation as required will take place outside of the bird breeding season (1st March – 31st August) to minimise the possibility of disturbance and destruction to occupied bird nests during the decommissioning.

However, it is possible that some ground may still need to be cleared of vegetation during the breeding season or that previously cleared ground will have developed colonising vegetation (such as brambles) which could attract nesting birds such as wren. Should these occurrences arise, the following protocol will be followed:

- The area will be surveyed by an ornithologist up to 5 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged.
- Should an instance arise where the placement of a restriction would have significant implications for the time frame of the decommissioning works, and where no alternative mitigation is available, the ornithologist will prepare a report (to include species, stage of breeding etc.) on the implications of removal of the nest in the context of the Wildlife Acts.

#### Residual Impact

With pre-construction survey and the implementation of mitigation measures as required, it is considered that the effect of disturbance to breeding birds as a result on construction works can be reduced to Non-Significant Negative Effect of Temporary duration, at the Local level of importance.

#### Significance of Effects

With pre-construction survey and the implementation of mitigation measures as required, it is considered that the effect of disturbance to breeding birds as a result on construction works can be reduced to Non-Significant Negative Effect of Temporary duration, at the Local level of importance.

### 6.4.2.4.4 *Potential Impact – Impacts on birds by removal of turbines and overhead line*

The existing wind farm infrastructure has potential to have negative effects on birds as a result of the following (SNH 2017):

- Displacement from the area around the turbines due to their physical presence
- Collision risk with power line (potential for collision with rotating turbine blades ceased when the machines were switched off).
- Barrier effect to migrating birds.

#### Potential collision impact

Collision risk posed to bird species is one of the main environmental concerns associated with wind energy developments. Essentially, birds are at risk of collision when their flight path overlaps with the rotor blade sweep area of a turbine, and birds whose flight heights coincide with the height of turbine rotor blade sweep are most at risk. As noted, the risk of collision with rotating turbine blades will be completely eliminated at the Derrybrien Wind Farm as a result of the Prospective Development.

However, collision with overhead lines is also a concern and a well-documented cause of bird mortality (Bevanger 1998, Ferrer & Janss 1999, Jenkins et al. 2010, SNH 2016b). Species at most risk are large birds such as eagles, vultures, storks, herons, swans and geese. While the birds may be able to manouever around large objects such as turbines or masts, their eyesight is rather poor at detecting thin horizontal objects ahead of them. In a review of 16 investigations of bird collision with power lines globally, Bevanger (1998) recorded collisions among hawks, vultures, eagles and falcons but did not list harriers. However, in a review of collision casualties with overhead lines for all bird species based on recovery data from the long-term BTO Ringing Scheme, Rose and Baillie (1989) recorded over 100 recoveries for hen harrier. The hit wire index (i.e. system to standardise the recovery samples) for hen harrier was particularly high relative to body size. They noted that hen harrier inhabits open moorland

areas and may hunt at heights which make them particularly vulnerable to collisions with overhead wires.

For the Derrybrien to Agannygal 110kV line, which does not have bird flight diverters as mitigation, the risk of collision exists presently for hen harrier and other large bird species. Any risk of collision with the overhead line will be eliminated by the removal of the line – thus, conditions will revert to the status prior to construction of the wind farm project.

### Displacement impact

Displacement of birds from otherwise suitable habitat as a result of the presence of wind turbines has been reported as a potential indirect impact of wind turbines (de Lucas *et al.* 2007, Pearce-Higgins *et al.* 2009). The displacement occurs as a result of behavioural responses that prevent or decrease the use of an area for activities such as nesting or foraging.

However, the results of studies on potential displacement have varied widely and in an overall review of the literature Madders & Whitfield (2006) concluded that displacement effects of wind turbines on raptors, and hen harrier in particular, are negligible for the most part. In a review of potential displacement effects on birds at twelve wind farm sites in Britain, Pearce-Higgins *et al.* (2009) reported an avoidance area of 250 m from turbines for hen harrier. At the Derrybrien wind farm, hen harriers have been recorded both foraging and flying through the wind farm, with distances often less than 50 m of the machines (Madden & Porter 2007, BES monitoring reports).

While there is no evidence to indicate that displacement has occurred for bird species within the Derrybrien Wind Farm due to the presence of turbines, this potential impact will be eliminated by the removal of the turbines – thus, conditions will revert to the status prior to construction of the wind farm project.

### Barrier effect due to turbines

The potential impact of lines of wind turbines creating a barrier effect to passing birds is mostly relevant to locations where migratory species pass regularly. Rees (2012) cites eight published studies of flight behaviour which reported changes in flight lines for swans or geese initially seen heading towards turbines, at distances ranging from a few hundred metres to 5 km (the larger distances were by birds on migration); 50-100% of individuals/groups avoided entering the area between turbines, but in some cases the sample sizes were small.

While there is no evidence that the Derrybrien site is within a migration route used by birds, either at a national or local level, the issue of a possible barrier effect to migrating birds created by the turbines will be eliminated by the removal of the turbines – thus, conditions will revert to the status prior to construction of the wind farm project.

### Mitigation Measures

As the Prospective Development will remove the source for any risk to birds from collision, displacement or a barrier effect, mitigation is not relevant.

### Residual Impact

The Prospective Development will remove (i) the risk of collision with overhead lines, (ii) the risk of displacement of birds from around turbines, and (iii) the risk that the turbines may be causing a barrier effect to migrating birds - thus, conditions will revert to the status prior to construction of the

### wind farm project. Significance of Effects

The Prospective Development will remove (i) the risk of collision with overhead lines, (ii) the risk of displacement of birds from around turbines, and (iii) the risk that the turbines may be causing a barrier effect to migrating birds – with elimination of these potential risks, conditions on site will be as they were prior to the construction of the wind farm.

## 6.4.2.4.5 *Potential Impact – Change to existing habitats*

Once turbine components have been removed from site, works shall be carried out at turbine bases and hardstands to level the area. At the majority of turbines where the foundation insert will remain in full, minor regrading of hardstands and foundations shall be carried out using a tracked excavator. At some locations foundation inserts will be partially or fully removed to allow grading of whole stoned area to provide an even grade without steps. Stone materials shall be excavated from the perimeter of the foundation insert and temporarily stored on the hardstand. The foundation inserts shall then be cut down to final levels and then area will be backfilled and graded. All works shall take place working off existing stoned areas and no disturbance/impact on existing ground external to the stoned areas will occur.

The hardcore surfaces will then be allowed to naturally revegetate. The amount of vegetation that will eventually colonise these surfaces will vary but it can be expected that a range of pioneering grasses and, herbaceous species will first colonise (as is already present at many of the hardcore location on site), and will followed with scrub such as willow and bramble over time. Such recolonising surfaces, which retain warmth in sunshine compared to surrounding areas of peat soil, tend to attract various invertebrate species as well as small mammal species. The habitat that would be expected to develop is likely to fall into a mosaic of semi-natural grassland (GS), developing scrub (WS1) and artificial stone surfaces (BL3). Passerine bird species, such as skylark and various finches (which feed on seeds), as well as birds of prey such as kestrel, would be expected to benefit from the potential food sources.

The natural re-vegetation of the above-mentioned surfaces is rated as a Positive effect of Moderate significance of Permanent Duration. The effect is considered to be at a Local level of importance for bird species.

### Mitigation Measures

As the Prospective Development will provide habitat that is likely to be positive for bird species, mitigation is not relevant.

### Residual Impact

The natural re-vegetation of the various hardcore surfaces is rated as a Moderate Positive effect of Permanent Duration. The effect is considered to be at a Local level of importance for bird species.

### Significance of Effects

The natural re-vegetation of the above-mentioned surfaces is rated as a Moderate Positive effect of Permanent Duration. The effect is considered to be at a Local level of importance for bird species.

#### 6.4.2.4.6 *Monitoring*

##### Prospective Development Monitoring

Prior to any works commencing during the bird breeding season (March-August inclusive) monitoring surveys within the area (wind farm and OHL corridor) will take place to a distance of 1 km from the Prospective Development. The purpose of the surveys is to confirm the locations of breeding territories of species identified as being prone to disturbance (as in Section 6.4.2.4.4) to ensure that mitigation is successfully implemented (Section 6.4.2.4.4**)** to avoid disturbance effects on breeding activities as a result of the works.

The surveys will be undertaken by a competent ornithologist, with experience of upland breeding species.

For hen harrier, the survey will follow the method of Ruddock *et al.* (2016) (as used in the 2022 and 2024 surveys).

For red grouse, the bogs to the north-west of the site will be surveyed for breeding territories using the tape lure method (under licence).

### 6.4.2.5 Bats

Potential decommissioning impacts on bats are:

- Loss of known roosting resources as a result of the demolition of the Agannygal and Derrybrien Substations.
- Loss of low potential roosting resources in bridges (with no recorded use by bats) as a result of work to the parapets.
- Displacement due to night-time lighting.
- Localised loss of foraging habitat around infrastructure within the non-operational wind farm footprint as a result of laydown and working areas.

##### Demolition Impacts

The demolition of the two substations has the potential to result in a significant impact on common pipistrelle, soprano pipistrelle and brown long-eared bat at the local level. There are very limited roosting opportunities on site, and use of habitats around the substations by foraging common pipistrelle, soprano pipistrelle and brown long-eared bat over their active season may decrease as a result.

Work to the bridge parapets are not considered likely to have a significant effect on bats at any geographical scale, as there is no evidence they are used for roosting on the bridges, and opportunities for doing so are limited. Any use is likely to be transitory in nature. However, the overall roosting resource at the local level will slightly decrease.

##### Displacement Impacts

Survey data from when the site was operational indicates that even for the more commonly recorded bat species activity levels are typically low. Bats are either therefore moving through the Site or are ranging over relatively wide areas. To illustrate this, work in 2021 involved deployment of detectors for a combined total of 960 (detector) nights during the active period; activity levels for the three most commonly recorded bat species averaged out to 3.3 Passes/hour (P/h) for Leisler's bat 1.2 P/h for common pipistrelle and 0.6 P/h for soprano pipistrelle. Anomalies in the data set (such as far higher

levels of activity around individual turbines during parts of the sampling period) are likely to reflect local foraging by individual animals.

There is potential for disturbance leading to localised displacement of foraging and commuting bats if night working takes place and lighting is required during decommissioning. The data indicate that displacement is most likely to occur if there is light spillage onto habitats used by foraging and commuting bats, such as forest edge; however, such effects will be localised and temporary in nature (as works will be phased), and based on the considerable data set available, the number of bats displaced is likely to be very small.

### Loss of Foraging and Commuting Habitat

Direct loss or degradation of foraging and commuting habitat will be temporary and localised in nature. Where working areas around turbines are required for decommissioning, these will be allowed to revegetate following work being completed. Localised clearance of conifers in a dynamic, commercially-managed landscape is typical of what is already occurring on a large scale. Effects will be temporary in nature and are unlikely to be significant at the site level for any species.

### Mitigation Measures

It is proposed to install pole-mounted bat boxes (three at Agannygal and one at Derrybrien) ahead of demolition of the substation buildings. This will be located on land owned by Gort Windfarm Ltd close to Borrow Pit 3[10] and at the Agannygal substation. The precise locations of these will be informed by a site visit by a bat ecologist, and are included in appended bat mitigation report.

To ensure legislative compliance during deconstruction there will need to be an initial thorough internal inspection of the substation buildings and bridges. Trees that will be felled / pruned will be checked for potential bat roost features by a bat licenced ecologist prior to felling to ensure none have developed in the time between survey and works being completed. The work with regard to the substations will be completed as per conditions set out in the bat derogation licence granted by the Wildlife Licencing Unit at NPWS (see the bat derogation licence (DER-Bat-2025-170) and bat mitigation report, Appendix 6-4), in which measures to ensure legislative compliance are detailed. Deconstruction of the bridges will be completed following an initial inspection by a bat licenced ecologist and under a precautionary working method statement.

If nocturnal task lighting is required the works should take account of industry guidance (Institution of Lighting Professionals & Bat Conservation Trust, 2018). This will include consideration of the location of lighting, the type of lighting used and the design of a lighting scheme to minimise light spillage onto forest edge habitats.

### Residual Impact

The erection and maintenance of bat boxes is likely to result in a neutral residual effect at the site level (in terms of available roosting resource).

Residual effects of Prospective Development lighting on bats are likely to be limited to the immediate zone of influence of construction works, will be short term and will have negligible effects.

### Significance of Effects

Effects on bats post mitigation are likely to be neutral at the Site level.

[10] Latitude / Longitude 53.099861 , -8.6011534

## 6.4.2.6 Mammals (other than bats)

### 6.4.2.6.1 *European otter*

Otter likely use the main channels of the three river catchments within the ZoI of the Prospective Development (Owendalulleegh, Boleyneendorrish and Duniry) as well as their tributaries for breeding, foraging and commuting.

Potential impacts on otter associated with the Prospective Development are as follows:

1. *Loss of breeding, foraging and/or commuting habitat.*
2. *Habitat degradation and a reduction in the abundance and quality of prey species due to a decline in water quality.*
3. *Habitat severance and barrier effect as a result of physical disturbance arising from instream works.*
4. *Increased levels of disturbance resulting in the temporary displacement of otter.*

#### Potential Impact – Loss of Breeding, Foraging and/or Commuting Habitat

According to the NBDC database, there are no recent (i.e. less than 10 years old) records of otter within 2 km of the Prospective Development. Based on the results of the surveys (as described in Sections 6.2.4.4.1 and 6.3.7.1), no otter holts or couch sites have been recorded at any watercourses surveyed within or adjacent to the wind farm site, the overhead line corridor or access routes. The proposed crossing point at the Owendalulleegh River follows an existing Coillte track that does not contain any riverbanks and therefore does not contain suitable breeding habitat for otter. Therefore, the Prospective Development will not result in a likely significant negative effect on the conservation status of otter, due to loss of breeding/resting sites, at any geographic scale.

Evidence of otter (spraint) has been recorded within the study area, in particular along the Derrybrien North stream as well as the Owendalulleegh River and Boleyneendorrish River. The Prospective Development will result in the loss of instream and riparian habitat[11], which may be suitable for foraging and/or commuting otter, at the following locations:

- Proposed access route to polesets PS17 and PS22 along the overhead line corridor from a northerly direction (referred to as 'Alternative No. 1', see Section 4.7 of **Appendix 4-2**: Decommissioning Management Plan for full details), which will involve the temporary crossing of the Derrybrien North stream and an unnamed stream using clear-span bridges as well as the felling of some mature trees.
- Proposed access route to INT30 along the overhead line corridor which will involve crossing a stream using bog mats or steep plates.
- Proposed access route to AM24 and polesets P23 and P25, which will involve the temporary crossing the Owendalulleegh River using heavy steel plates on the riverbed to ford the width of the crossing corridor.
- Proposed minor deviation from the existing Coillte forestry track along the proposed access route to Agannygal substation (see Section 5.5.2 of **Appendix 4-2**: Decommissioning Management Plan for full details), which will involve the temporary crossing of an unnamed stream facilitated by the construction of a new temporary culvert as well as some minor small tree and scrub removal.
- Proposed access route to Agannygal substation, which may require an existing culvert to be replaced, potentially with a larger-sized culvert.

[11] *Terrestrial otter habitat is defined as a 10 m zone of riparian habitat along the riverbanks (Department of the Environment, Heritage and the Gaeltacht, 2011).*

- Proposed access route at the Ennis-Shannonbridge 110 kV OHL reinstatement, which may involve the temporary crossing of a drain located west of the Agannygal substation with sleepers over a large plastic corrugated culvert pipe or another suitable construction (see Section 6 of **Appendix 4-2**: Decommissioning Management Plan for full details).

The proposed access route of Alternative No. 1 will involve temporarily crossing the streams using clear-span bridging structures (as part of its design), thereby avoiding the loss of instream habitat and minimising the loss of and damage to bankside habitat.

The proposed fording of the Owendalulleegh River will only be required to access three OHL structures (AM24 and polesets P23 and P25) and therefore will be very temporary in nature. It will involve the placement of heavy steel plates on the river bed to ford the width of the crossing corridor. The northern and southern banks at the crossing point are very low and as such there will be no requirement to remove any bankside vegetation to facilitate the crossing.

The size of the temporary culvert required at the proposed minor deviation from the existing Coillte foresty track is likely to be relatively small. The proposed temporary deviation and culvert will be designed and installed so that the integrity of the stream's banksides is maintained and the potential release of sediment is minimised (see Section 5.5.2 of **Appendix 4.2**: Decommissioning Management Plan for full details).

Overall, the extent of instream and bankside habitat loss is considered to be minimal. This is especially the case when compared to the extent of suitable alternative habitat in the wider Owendalulleegh River catchment. In addition, it is likely that more suitable foraging habitat for otter is present within the main channel of the Owendalulleegh River as the river generally supports a higher density of fish species (see Section 7.3.9 in Chapter 7 Biodiversity (Aquatic Ecology and Fisheries). With regards to the new temporary culverts and remediation works to an existing culvert along the proposed access route to Agannygal substation, otter are known to routinely use highly modified habitat within culverts and beneath bridges (Chanin, 2003). Therefore, it is concluded that habitat loss associated with the Prospective Development will not have a likely significant negative effect on the conservation status of otter at any geographic scale.

### Potential Impact – Habitat degradation and a reduction in the abundance and quality of prey species due to a decrease in water quality

Silt-laden and/or contaminated surface water runoff arising from the Prospective Development could potentially enter the downstream aquatic environment. This in turn could negatively affect the local otter population that may be present as a result of direct mortality, degradation of supporting habitat and/or a reduction in prey abundance/quality. If such a pollution event occurred of a large enough magnitude, it could potentially affect the species' conservation status and result in a likely significant negative effect on otter at a local geographic scale. Whilst this is considered unlikely to occur, given the scale and nature of the works and the availability of suitable alternative habitat upstream of the Prospective Development, a precautionary approach has been applied and mitigation measures are recommended.

### Potential Impact – Habitat severance and barrier effect as a result of physical disturbance arising from instream works

The proposed instream and bankside work (as described above under habitat loss) as well as increased levels of disturbance may result in the temporary severance of suitable supporting habitat for commuting and/or foraging otter, which in turn may cause a barrier effect to the local otter population. However, considering the small scale and temporary nature of these proposed works as well as the

availability of suitable alternative habitat elsewhere in the catchments, no likely significant negative effects on the conservation status of otter at any geographic scale is predicted.

### Potential Impact – Increased levels of disturbance resulting in the temporary displacement of otter

Various activities associated with the Prospective Development will result in increased levels of human presence, noise, vibration and lighting. This in turn could cause disturbance to local otter populations that utilise the watercourses within the ZoI, causing the temporary displacement of otter from these locations to suitable alternative habitat in the wider catchment.

As described above, no otter holts or couch sites have been recorded at any watercourses surveyed within or adjacent to the wind farm site, the overhead line corridor or access routes. Therefore, the Prospective Development will not result in a likely significant negative effect on the conservation status of otter, due to increased levels of disturbance, at any geographic scale.

The majority of activities associated with the Prospective Development will be set back from watercourses where foraging and/or commuting otter may be present and will be carried out during normal daytime working hours[12], when otter (a predominantly nocturnal species) are typically less active. The proposed works at watercourses located within the ZoI are relatively small in scale and duration, taking place within a restricted footprint, generally during normal daytime working hours, and completed within a few weeks.

Whilst the Prospective Development may result in very localised temporary disturbance to otter, it will not result in a likely significant negative effect on the conservation status of otter at any geographic scale. This is in consideration of the small scale and short duration of the proposed works, the mobile nature of otter and the availability of suitable alternative habitat in the wider catchments.

### Mitigation Measures

As there will be no likely significant negative effects on otter at any geographic scale as a result of habitat loss, habitat severance, barrier effect and/or disturbance, no mitigation measures are required. However, it is recommended that a pre-construction otter survey is undertaken prior to the commencement of decommissioning in order to account for any changes that may occur in the baseline environment. The presence of any new holt/couch sites will be managed in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA, 2008).

The water quality protection measures specified in Sections 7.4.2.3 and 7.4.2.4 of Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) will mitigate against any potential impacts on otter associated with a decrease in water quality and will therefore ensure no likely significant negative effects on the conservation status of otter, as a result of direct mortality, degradation of supporting habitat and/or a reduction in prey abundance/quality, at any geographic scale.

### Residual Impact

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual impacts on otter at any geographic scale.

[12] *The normal working hours of the Prospective Development will be 07:00 to 19:00 Monday to Friday, 08:00 to 13:00 on Saturdays and no activity on Sundays or bank holidays.*

### Significance of Effects

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on otter at any geographic scale.

## 6.4.2.6.2 *Other mammals*

Lands within and adjacent to the site boundary are likely to provide suitable breeding and foraging habitat for pygmy shrew and suitable foraging habitat for pine marten and badger. The surrounding coniferous plantations likely offer suitable breeding and foraging habitat for all these mammal species as well as red squirrel.

Potential impacts on these mammal species as a result of the Prospective Development are as follows:

1. *Loss of breeding, foraging and/or commuting habitat.*
2. *Habitat severance and barrier effect as a result of physical disturbance arising from proposed works.*
3. *Increased mortality and/or injury risk and/or increased mortality/injury risk.*

### Potential Impact – Loss of breeding and/or foraging habitat

A relatively small amount of localised vegetation clearance will be undertaken during the enabling works to facilitate decommissioning. This vegetation clearance will be confined to the following activities:

- Removal of willow scrub, self-sown conifer trees, heather and rushes at the blade and rotor set down areas, at the existing hardstand areas and along access tracks, which will include localised widening where necessary (including at the proposed turning heads located at T1, T4, T14 and also at the junction to west of T68).
- Removal of cutover bog habitat to allow for the temporary widening of the turbary road from the junction east of T25 to T45 (up to approximately 1,450 m in length), which is required to provide safe access for the mobile crane. This habitat will be reinstated on completion of works (see Section 3.5.5 of **Appendix 4-2**: Decommissioning Management Plan for full details).
- Removal of some mature trees to facilitate the proposed access route to polesets PS17 and PS22 along the overhead line corridor from a northerly direction (referred to as 'Alternative No. 1', see Section 4.7 of **Appendix 4-2**: Decommissioning Management Plan for full details).
- Removal of some small trees and scrub to facilitate the proposed minor deviation from the existing Coillte forestry track along the proposed access route to Agannygal substation (see Section 5.5.2 of **Appendix 4-2**: Decommissioning Management Plan for full details).

This vegetation clearance may result in the short-term loss of suitable habitat for foraging pine marten and badger and breeding and foraging pygmy shrew. Given the limited extent of vegetation clearance, the availability of large areas of suitable alternative habitat in the wider locality and the relatively low numbers of individuals of each species likely to be present, habitat loss as a result of the Prospective Development is unlikely to result in a significant negative effect on the conservation status of pine marten, badger or pygmy shrew at any geographic scale. In addition, peatland and scrub vegetation permanently cleared to facilitate decommissioning is likely to recover within 1 to 3 years following the completion of work.

### Potential Impact – Habitat severance and barrier effect as a result of physical disturbance arising from proposed works

Vegetation clearance and other decommissioning works could potentially result in the temporary severance of suitable supporting habitat for badger, pine marten and pygmy shrew, which in turn may cause a barrier effect to the local populations. However, considering the small scale and temporary nature of these proposed works as well as the availability of suitable alternative habitat elsewhere in the wider locality, no likely significant negative effects on the conservation status of badger, pine marten or pygmy shrew at any geographic scale are predicted.

### Potential Impact – Increased levels of disturbance resulting in the temporary displacement of badger, pine marten, pygmy shrew and red squirrel and/or increased mortality/injury risk

Various activities associated with the Prospective Development will result in increased levels of human presence, noise, vibration and lighting. This in turn could cause disturbance to local badger, pine marten, pygmy shrew and red squirrel populations that may utilise the habitats within or adjacent to the site boundary, causing the temporary displacement of these species to suitable alternative habitat in the wider locality. In addition, these activities (such as site clearance works) may also result in increased levels of mortality and/or injury risk of these species, which may arise from machinery associated with the decommissioning activities unintentionally causing harm to individuals of these species.

Due to the lack of suitable habitats present, it is considered unlikely that badger, pine marten and red squirrel breed within the footprint of the Prospective Development. However, the habitat onsite is considered to be suitable for breeding pygmy shrew. Vegetation clearance works will take place outside the breeding bird season (i.e. outside the months of March to August inclusive) thereby avoiding the majority of the breeding season for pygmy shrew including its peak months of June and July. This will minimise any potential disturbance and/or direct mortality/injury risk of breeding pygmy shrew.

Whilst various activities associated with the Prospective Development may result in very localised, intermittent, and temporary disturbance to these species, it will not result in a likely significant negative effect on their conservation status at any geographic scale. This is in consideration of the scale and short duration of the proposed works, the mobile nature of these species and the availability of suitable alternative habitat in the wider locality.

### Mitigation Measures

As there will be no likely significant negative effects on the conservation status of pine marten, badger, pygmy shrew or red squirrel at any geographic scale, no mitigation measures are required.

Although the habitat within the footprint of the Prospective Development is considered to be of low suitability for breeding badger, a precautionary approach has been applied and as such it is recommended that a pre-construction mammal survey is undertaken prior to the commencement of decommissioning in order to account for any changes that may occur in the baseline environment. The presence of any badger setts will be managed in accordance with the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006a).

### Residual Impact

The Prospective Development will not result in any significant negative residual impacts on any other mammals at any geographic scale.

### Significance of Effects

The Prospective Development will not result in any significant negative residual effects on any other mammals at any geographic scale.

## 6.4.2.7 Other Fauna

Lands within and adjacent to the site boundary are likely to provide suitable breeding, resting and hibernating habitat for common frog, smooth newt and common lizard. In the case of the amphibian species, these habitats comprise drainage ditches, pools of stagnant water (including the dystrophic lake) and bog, while in the case of common lizard they comprise heathland, bog and scrub habitats as well as areas of spoil and bare ground and recolonising bare ground.

Potential impacts on amphibian and reptile species as a result of the Prospective Development are as follows:

1. *Loss of breeding, resting and/or hibernating habitat.*
2. *Habitat degradation (amphibian species).*
3. *Habitat severance and barrier effect as a result of physical disturbance arising from proposed works.*
4. *Increased levels of disturbance resulting in the temporary displacement of these species and/or increased mortality/injury risk.*

### Potential Impact – Loss of breeding, resting and/or hibernating habitat

The existing drainage ditches and the dystrophic lake located within the wind farm site are likely to provide suitable breeding habitat for amphibians. The Prospective Development will not result in the direct loss of these habitats within the wind farm site. The works involves the temporary crossing of a drain located west of the Agannygal substation with sleepers over a large plastic corrugated culvert pipe or another suitable construction (see Section 6 of **Appendix 4-2**: Decommissioning Management Plan for full details). This drainage channel, which will be temporarily impacted by the works, may provide suitable breeding habitat for common frog and smooth newt. The other watercourses impacted by the works (as described in Section 6.4.2.6.1) are unlikely to be suitable for amphibians as they contain flowing water[13].

Given the very limited extent of habitat loss, the availability of large areas of suitable alternative habitat in the wider locality and the relatively low numbers of individuals of each species likely to be present, habitat loss as a result of the Prospective Development is unlikely to result in a significant negative effect on the conservation status of common frog or smooth newt at any geographic scale.

With regards to common lizard, suitable breeding and hibernating habitat is present within the Prospective Development site boundary, comprising heathland and bog habitats, scrub, spoil and bare ground and recolonising bare ground. A relatively small amount of localised clearance of these habitats will be undertaken during the enabling works to facilitate decommissioning. This vegetation clearance will be confined to the following activities:

- Removal of willow scrub, self-sown conifer trees, heather and rushes at the blade and rotor set down areas, at the existing hardstand areas and along access tracks, which will include localised widening where necessary (including at the proposed turning heads located at T1, T4, T14 and also at the junction to west of T68).

[13] *Smooth newt breeds in ponds and still-water ditches where pH is >5. They also show a preference for vegetated water bodies with surrounding terrestrial habitats that provide cover for foraging and hibernation. Common frog is found in a broad range of habitats and is well adapted to garden ponds (King et al., 2011).*

- Removal of cutover bog habitat to allow for the temporary widening of the turbary road from the junction east of T25 to T45 (up to approximately 1,450 m in length), which is required to provide safe access for the mobile crane. This habitat will be reinstated on completion of works (see Section 3.5.5 of **Appendix 4-2**: Decommissioning Management Plan for full details).
- Removal of some small trees and scrub to facilitate the proposed minor deviation from the existing Coillte forestry track along the proposed access route to Agannygal substation (see Section 5.5.2 of **Appendix 4-2**: Decommissioning Management Plan for full details).

With regards to common lizard, the largest amount of suitable habitat loss is associated with the widening of the turbary road. The cutover bog habitat along the turbary road provides suitable breeding, basking and foraging habitat for common lizard. In absence of mitigation, the removal of this supporting habitat could potentially result in a likely significant effect at the site scale. This is in consideration of the availability of large areas of suitable alternative habitat in the wider locality, the relatively low numbers of individuals of each species likely to be present and their national conservation status is of 'Least concern' (Marnell *et al.*, 2019). Notably however this habitat loss will be temporary as the removed turves will be reinstated at the same location following the completion of the works. With regards to the other peatland and scrub vegetation permanently cleared to facilitate decommissioning, it is likely recover within 1 to 3 years following the completion of the works and therefore no likely significant effects are predicted.

### Potential Impact – Habitat degradation (amphibian species)

Silt-laden and/or contaminated surface water runoff arising from the Prospective Development could potentially enter the downstream aquatic environment utilised by common frog and smooth newt. This in turn could negatively affect the local common frog and smooth newt populations that may be present as a result of direct mortality and/or degradation of supporting habitat. If such a pollution event occurred of a large enough magnitude, it could potentially affect the species' conservation status and result in a likely significant negative effect on common frog and smooth newt at a local geographic scale. Whilst this is considered unlikely to occur, given the scale and nature of the Prospective Development and the availability of suitable alternative habitat upstream of the site, a precautionary approach has been applied and mitigation measures are recommended.

### Potential Impact – Habitat severance and barrier effect as a result of physical disturbance arising from proposed works

Vegetation clearance and other decommissioning works could potentially result in the temporary severance of suitable supporting habitat for common frog, smooth newt and common lizard, which in turn may cause a barrier effect to the local populations. In particular, the removal of the cutover bog habitat along the turbary road could potentially result in the short-term severance of habitat utilised by common lizard. However, considering the small scale and temporary nature of these proposed works (i.e. cutover bog habitat will be reinstated), the availability of suitable alternative habitat elsewhere in the wider locality and the existing barriers on site (i.e. the turbary road and hard stands), no likely significant negative effects on the conservation status of common frog, smooth newt or common lizard at any geographic scale are predicted.

### Potential Impact – Increased levels of disturbance resulting in the temporary displacement of common frog, smooth newt and common lizard and/or increased mortality/injury risk

Various activities associated with the Prospective Development may result in increased levels of human, noise, vibration and lighting disturbance to local common frog, smooth newt and common lizard populations that may utilise the habitats within or adjacent to the site boundary, causing the temporary

displacement of these species to suitable habitat in the wider locality. In addition, these activities may also result in increased levels of mortality and/or injury risk of these species.

The majority of suitable amphibian habitat within the ZoI comprises the drains located within the wind farm site. These are abundant and are generally set back from the existing turbines, hardstands and access tracks, where works are proposed. In fact, all turbines will be accessed and dismantled from the existing tracks and hardstands, thereby avoiding any potential impact on adjacent sensitive habitats. The dystrophic lake, which is likely to provide suitable habitat for amphibians, is also located beyond the site boundary and will be avoided. The only exception to this is the drain located west of the Agannygal substation, which will be crossed as part of the Ennis-Shannonbridge 110 kV OHL reinstatement works; however, this proposed crossing is very limited in extent and temporary in nature.

The removal of cutover bog habitat to facilitate the widening of the turbary road may result in disturbance to common lizard, however it is recommended that these proposed works take place outside the breeding bird season (i.e. outside the months of March to August inclusive) thereby, avoiding the breeding season for common lizard of March to May. This will minimise any potential disturbance to and/or direct mortality/injury risk on breeding common lizard. The increased levels of disturbance may cause the temporary displacement of common lizard to suitable habitat in the wider locality. The magnitude of this potential impact is likely to be greater during the hibernation season when this species is inactive and less mobile.

Whilst various activities associated with the Prospective Development may result in very localised, intermittent, and temporary disturbance to these species, it will not result in a likely significant negative effect on their conservation status at any geographic scale. This is in consideration of the scale and short duration of the proposed works, the mobile nature of these species (during their active season), the availability of suitable alternative habitat in the wider locality and the buffer that exists between the proposed works areas and areas of suitable amphibian habitat. Despite this and in consideration of the legal protection afforded to amphibians and common lizard under the Wildlife Acts[14], mitigation measures are recommended to protect these species from disturbance and/or direct mortality/injury risk.

### Mitigation Measures

Suitable common frog, smooth newt and common lizard breeding and resting habitat (albeit limited in extent) will be directly impacted by the Prospective Development. In consideration of the legal protection afforded to amphibians and common lizard under the Wildlife Acts, mitigation has been provided.

If works are carried out in suitable amphibian habitat when frogspawn, tadpoles, adult newts, their eggs or larvae may be present (i.e. February to mid-summer in the case of common frog and mid-March to September in the case of smooth newt), a pre-construction survey will be undertaken to confirm if amphibians are present. If they are confirmed to be present, the individuals may be captured by a suitably qualified ecologist immediately prior to the works taking place and translocated to the nearest available suitable habitat. The approach to capture and translocation should be agreed with NPWS.

The water quality protection measures specified in Sections 7.4.2.3 and 7.4.2.4 of Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) will mitigate against any potential impacts on amphibians associated with a decrease in water quality and will therefore ensure no likely significant negative effects on their conservation status, as a result of direct mortality and/or degradation of supporting habitat, at any geographic scale.

[14] *Under the Wildlife Acts, it is an offence to intentionally kill or injure a wild animal (including common frog, smooth newt and common lizard) and/or wilfully interfere with or destroy its breeding or resting place.*

With regards to common lizard, vegetation clearance works will take place outside the breeding bird season (i.e. outside the months of March to August inclusive) thereby, avoiding the breeding season for common lizard of March to May. Any potential hibernacula for common lizard (e.g. log, brash, brick and/or rock piles) to be cleared will be removed during the active season under the supervision of a suitably qualified ecologist. The mitigation measures specified in Sections 6.4.2.3.1 and 6.4.2.4.2 will mitigate against any potential impacts on common lizard as a result of the temporary habitat loss along the turbary road. These measures will therefore ensure that the Prospective Development will not result in any likely significant negative effects on common lizard at any geographic scale.

#### Residual Impact

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual impacts on common frog, smooth newt and common lizard at any geographic scale.

#### Significance of Effects

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on common frog, smooth newt and common lizard at any geographic scale.

## 6.4.3 Potential Cumulative Impacts

The following projects/activities in proximity to the Prospective Development have been considered in the assessment of cumulative impacts (as well as those described in Chapter 4 of this EIAR). It is noted that not all projects/activities are considered relevant to all ecological features of interest due to the nature of potential impacts that may arise from the Prospective Development alone (along with the associated potential impact pathways and its Zone of Influence, as described in section 6.2.3). Those that are considered relevant include.

- Impacts of the Derrybrien Wind Farm Development Decommissioning Project – Retained Development.
- Turbary activity.
- Adjacent coniferous forestry plantations.

### 6.4.3.1 Designated Nature Conservation Sites

#### European sites

The assessment of potential cumulative impacts on Slieve Aughty Mountains SPA is presented below under Section 6.4.4.3.

Based on the findings of the screening assessment in the NIS, it has been determined that the likelihood of significant effects on the Annex II species of Lough Cutra SAC and the SCI species of Lough Cutra SPA as a result of the Prospective Development can be ruled out. In addition, considering the nature and scale of potential impacts arising from the Prospective Development in isolation, it is considered to have no additive cumulative effects when considered in-combination with other projects within the same ZoI (i.e. mechanical peat harvesting on site).

### Natural Heritage Areas and Proposed Natural Heritage Areas

One NHA (Slieve Aughty Bog NHA (001229)) and one pNHA (Lough Cutra pNHA (000299)) have been identified as being within the ZoI (i.e. having the potential to be impacted by the Prospective Development) for the reasons outlined in Section 6.2.3.

Slieve Aughty Bog NHA is designated for peatland habitats. Those activities that may act in-combination with the Derrybrien Wind Farm Development Decommissioning Project, turbary and conifer forestry activities, are not located within or adjacent to the Slieve Aughty Bog NHA and therefore there is no potential for cumulative negative effect to occur on this or any other NHA/pNHA.

Lough Cutra pNHA is designated for the same reasons as Lough Cutra SAC and SPA and therefore potential cumulative impacts on this pNHA have been fully assessed above and in the screening assessment of the NIS.

### Nature Reserves

Four of these five Nature Reserves (Coole-Garyland, Pollnaknockaun Wood, Rosturra Wood and Derrycrag) are also designated as European sites and the assessment of potential impacts to these sites is addressed in Sections 6.2.3, 6.3.1.1 and 6.4.2.1.1 of this chapter and in the NIS.

No hydrological connections and as such no potential impact pathways exist between the Prospective Development and Pollnakknockaun Wood, Rosturra Wood and Derrycrag nature reserves. Therefore, there is no potential for impacts to occur as a result of the Prospective Development either alone or in-combination with any other projects/activities. Coole-Garyland nature reserve is hydrologically connected to the Prospective Development, however at a significant instream distance (approximately 30 km). For reasons outlined in section 6.2.3, this nature reserve is considered beyond the zone of the influence of the Prospective Development. Therefore, there is no potential for impacts to occur as a result of the Prospective Development either alone or in-combination with other projects/activities.

Caher (Murphy) Natura Reserve is also designated as a pNHA and the assessment of impacts to this site are addressed in Sections 6.2.3, 6.3.1.2 and 6.4.2.1.2. No hydrological connection and as such no potential impact pathway exist between the Prospective Development and Caher (Murphy) Natura Reserve. Therefore, there is no potential for impacts to occur as a result of the Prospective Development either alone or in-combination with any other projects/activities.

## 6.4.3.2 Terrestrial Habitats

### Terrestrial Habitats within Prospective Development Area

The Prospective Development alone will not contribute to any permanent loss or disturbance of peatland habitat and therefore will not contribute to any cumulative negative effects associated with turbary activities. Considering the other projects and land-uses in the surrounding area together with the predicted impacts of the Prospective Development alone it is concluded that no cumulative effects are foreseen.

## 6.4.3.3 Birds

The Prospective Development will take place in the context of on-going forestry activities within the surrounding areas and ongoing turbary both within the site and in surrounding areas.

The age structure of the commercial forest plantations in the hinterland of the wind farm area is an important factor in the amount of habitat available to hen harriers in any one period. The importance of forestry as an influencing factor on the size of the hen harrier population in the Slieve Aughty

Mountains SPA was highlighted by Ruddock et al. (2016). Since monitoring for hen harrier at Derrybrien commenced in 2004, there have been marked changes in the age structure of the forest plantations in the surrounding areas. Since about 2016, large areas along the wind farm entrance road have been clear-felled and replanted and is now providing suitable foraging habitat for hen harriers.

Of particular relevance is the harvesting and replanting of the forest area immediately to the south-west of the wind farm (53.4 ha) by Coillte between 2016 and 2018. This area will provide suitable second rotation foraging habitat for hen harriers until at least 2030 – birds foraging here and in other replanted areas around the wind farm would be expected to also use the habitats within the wind farm.

As the Prospective Development will not result in the removal of suitable foraging habitat for hen harrier or merlin, and indeed is expected to have some positive effects for hen harrier and other bird species, the Prospective Development will not contribute to any cumulative negative effect when considered with forestry operations.

Turbary is confined to the eastern sector of the wind farm site and is also localised in the bog areas which surround the site. Turbary can remove suitable breeding and foraging habitat for bird species such as hen harrier and snipe, and can also cause disturbance to local breeding birds. While the negative effects from turbary within and around the wind farm site have not been quantified, the Prospective Development, with mitigation in place, will not contribute to any cumulative negative effect on birds by loss of habitat or disturbance.

It is considered that the Prospective Development will not contribute to any negative effects on birds when considered with other projects.

**Cumulative Impacts with the "Retained Development"**

When the impacts on birds by the Retained Development are considered with the Prospective Development, there are no significant cumulative impacts, as follows:

- While the Retained Development will result in a permanent loss of cutover bog habitat of some value to birds, the Prospective Development will not result in any permanent loss of bog habitat. Hence, there is no cumulative loss of habitat when both Developments are considered.
- The Retained Development is a passive development and will not result in any disturbance to birds.
- The Retained Development is not relevant to impacts on birds as a result of the removal of turbines and overhead line.
- The Retained Development will not result in any additional changes to habitats used by birds when considered with the Prospective Development.

#### 6.4.3.4 Bats

Commercial forest management and turbary activities occurring within the ZoI have been ongoing prior to the construction of the Derrybrien Wind Farm and its OHL. It is reasonable to assume these activities will continue in the future.

Coillte's forestry plans suggest that only very limited forestry works will be completed between 2025 and 2030. Therefore, there will be a negligible impact from forestry activities on bats for the duration of the Prospective Development. Turbary activities involve local reductions in vegetation and as such a reduction in foraging habitat; however given the extent of local foraging habitat available to bats, the impact of local small scall reduction through turbary activities is likely to have a negligible effect.

As the Prospective Development will result in neutral residual effect on bats, it is concluded that there is no potential for cumulative negative effects with forestry or turbary activities at any geographic scale.

The Retained Development includes underground utilities, ground level access tracks and mitigation measures installed during the peat slide at the site. The retention of these elements will have a negligible impact on bats. As the Prospective Development will result in neutral residual effect on bats, it is concluded that there is no potential for negative in-combination effects with the Retained Development.

#### 6.4.3.5 Mammals (other than bats)

##### European otter

The turbary and conifer forestry activities occurring within the ZoI have been ongoing for a number of years since prior to the construction of the Derrybrien Wind Farm and its OHL. Therefore, they form part of the existing baseline environment of the wider locality of the Prospective Development.

These activities could potentially result in a reduction in water quality. A reduction of a large enough magnitude could potentially result in direct mortality of otter, degradation of their supporting habitat and/or a reduction in their prey abundance/quality. If occurring during the same time as the decommissioning and in absence of mitigation, these activities could potentially act in-combination with the Prospective Development to negatively affect local otter populations. However, considering the scale and nature of these activities and the provision of effective mitigation measures for this Prospective Development, no measurable cumulative impacts are expected to arise either due to forestry or turbary activities.

Turbary and conifer forestry activities are generally undertaken set back from any watercourses and their locations are accessed via existing Coillte Forestry tracks; therefore, they are unlikely to result in any additional loss of breeding, foraging and/or commuting habitat, which may be utilised by local otter populations. Similarly, these ongoing activities are unlikely to result in any significant increases in disturbance and/or displacement of otter even when considered in-combination with the Prospective Development. Turbary and conifer forestry activities generally take place set back from watercourses involving small numbers of personnel and/or machinery and during normal daytime working hours, when otter (a predominantly nocturnal species) are typically less active.

Considering the scale and nature of these ongoing activities and that following mitigation the Prospective Development will not result in any significant negative residual effects on otter, it is concluded that there is no potential for cumulative negative effects on otter at any geographic scale.

##### Other mammals

The turbary and conifer forestry activities occurring within the ZoI have been ongoing for a number of years since prior to the construction of the Derrybrien Wind Farm and its OHL. Therefore, they form part of the existing baseline environment of the wider locality of the Prospective Development.

These activities take place within discrete locations that are accessed via existing Coillte Forestry tracks; therefore, they are unlikely to result in any additional loss of suitable habitat for foraging pine marten and badger and breeding and foraging pygmy shrew. Similarly, these ongoing activities are unlikely to result in any significant increases in disturbance and/or displacement to local badger, pine marten, pygmy shrew and red squirrel populations even when considered in-combination with the Prospective Development. Turbary and conifer forestry activities take place within discrete locations, which are already subject to disturbance, generally involving small numbers of personnel and/or machinery and during normal daytime working hours.

Considering the scale and nature of these ongoing activities and that the Prospective Development will not result in any significant negative residual effects on pine marten, badger or pygmy shrew, it is concluded that there is no potential for cumulative negative effects on otter at any geographic scale.

#### 6.4.3.6 Other Fauna

The turbary and conifer forestry activities occurring within the ZoI have been ongoing for a number of years since prior to the construction of the Derrybrien Wind Farm and its OHL. Therefore, they form part of the existing baseline environment of the wider locality of the Prospective Development.

These activities could potentially result in a reduction in water quality. A reduction of a large enough magnitude could potentially result in direct mortality of amphibians (common frog and smooth newt) and/or degradation of their supporting habitat. If occurring during the same time as the decommissioning and in absence of mitigation, these activities could potentially act in-combination with the Prospective Development to negatively affect local common frog and smooth newt populations. However, considering the scale and nature of these activities and the provision of effective mitigation measures for this Prospective Development, no measurable cumulative impacts are expected to arise either due to forestry or turbary activities.

Turbary and conifer forestry activities are generally undertaken set back from any water features and their locations are accessed via existing Coillte Forestry tracks; therefore, they are unlikely to result in any additional loss of breeding habitat, which may be utilised by local common frog and smooth newt populations. These ongoing activities are unlikely to result in any significant increases in disturbance and/or displacement of common lizard even when considered in-combination with the Prospective Development. Turbary and conifer forestry activities take place within discrete locations, which are already subject to disturbance, generally involving small numbers of personnel and/or machinery.

Considering the scale and nature of these ongoing activities and that following mitigation the Prospective Development will not result in any significant negative residual effects on common frog, smooth newt or common lizard, it is concluded that there is no potential for cumulative negative effects on common frog, smooth newt or common lizard at any geographic scale.

## 6.5 Residual Effects

### 6.5.1 Designated Nature Conservation Sites

#### 6.5.1.1 European sites

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any adverse effects on the integrity of any European site, either alone or in combination with other plans or projects, in light of their Site-Specific Conservation Objectives. Therefore, the Prospective Development will not result in any significant negative residual effects on any European site at any geographic scale. Any risk of collision with the overhead line will be eliminated by the removal of the line as well as any potential cause of displacement (turbines) – thus, conditions will revert to the status prior to construction of the wind farm project.

#### 6.5.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on any NHA or pNHA at any geographic scale.

#### 6.5.1.3 Nature Reserves

Four of these five Nature Reserves (Coole-Garyland, Pollnaknockaun Wood, Rosturra Wood and Derrycrag) are also designated as European sites and the assessment of residual effects to these sites is addressed in Section 6.5.1.1 of this chapter and in the NIS. Cahermurphy Natura Reserve is also designated as a pNHA and the assessment of residual effects to this site are addressed in Section 6.5.1.2.

## 6.5.2 Protected and/or Rare Species

No protected and/or rare plant species were recorded within or adjacent to the footprint of the Prospective Development during the surveys. It is considered, based on the type and condition of habitats present, that rare and protected plant species are highly unlikely to occur within the wind farm site or along the OHL. Therefore, no further assessment is required.

## 6.5.3 Terrestrial Habitats

### 6.5.3.1 Terrestrial Habitats within Prospective Development Area

There will be a long term positive residual impact on terrestrial ecology due to the continued establishment of bog and heath habitat across the substantial felled woodland area (within the wind farm site and the OHL corridor). This will have a significant positive effect at the local scale. There are no residual negative significant effects on terrestrial habitats due to the Prospective Development.

## 6.5.4 Birds

With the implementation of mitigation, as required, to minimise the potential for effects on birds associated with the Prospective Development area, the following are the residual impacts on birds from the Prospective Development:

- The residual impact by the loss of habitat to facilitate the works is rated as a Non-Significant Negative effect of Permanent Duration, at the level of Local importance.
- The residual impact by the temporary loss and disturbance of habitat and vegetation to facilitate the works is rated as a Non-Significant Negative effect of Temporary, or at most Short-term Duration, at the level of Local importance.
- Following pre-construction survey and the implementation of mitigation measures as required, it is considered that the effect of disturbance to breeding birds as a result on construction works can be reduced to Non-Significant Negative Effect of Temporary duration, at the Local level of importance.
- The Decommissioning will remove (i) the risk of collision with overhead lines, (ii) the risk of displacement of birds from around turbines, and (iii) the risk that the turbines may be causing a barrier effect to migrating birds - thus, conditions will revert to the status prior to construction of the wind farm project.
- The Decommissioning will remove the risk that the turbines may be causing a barrier effect to migrating birds – this is rated as a Positive effect of Permanent Duration, at a Local, but potentially higher, level of importance.
- The natural re-vegetation of the various hardcore surfaces is rated as a Positive effect of Moderate significance of Permanent Duration. The effect is considered to be at a Local level of importance for bird species.

## 6.5.5 Bats

Overall, the impact of the Prospective Development on bats is likely to be neutral. Demolition may result in very minor changes to how bats use the Site if night work is completed, but the legacy of the work will be additional purpose-built roosting resources allowing bats easier access to surrounding upland habitats for foraging.

## 6.5.6 Mammals (other than bats)

### 6.5.6.1 European otter

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on otter at any geographic scale.

### 6.5.6.2 Other mammals

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on any other mammals at any geographic scale.

## 6.5.7 Other Fauna

Following the implementation of the proposed mitigation measures, the Prospective Development will not result in any significant negative residual effects on common frog, smooth newt and common lizard at any geographic scale.

# 7. BIODIVERSITY (AQUATIC ECOLOGY AND FISHERIES INCLUDING WATER QUALITY)

## 7.1 INTRODUCTION

The Aquatic Services Unit (ASU), University College Cork, were commissioned by ESB to provide the Aquatic Ecology chapter to the Environmental Impact Assessment Report (EIAR) (prepared by MKO) in relation to the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development as described in detail in Chapter 4 of this EIAR. Where 'the Site' is referred to, this relates to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown on Figure 4-1 in Chapter 4 of this EIAR.

The aquatic impact assessment identifies aquatic ecological receptors and examines potential effects and impact significance during the decommissioning.

### 7.1.1 Background and Objectives

The Derrybrien Windfarm, OHL line, and Agannygal substation have been in operation since the early 2000's. Impacts associated with the construction phase of the Project, in particular those linked to the October 2003 peat slide into the Owendalulleegh valley were dealt with comprehensively in the 2020 remedial Environmental Impact Assessment Report (rEIAR). That publication concluded that the residual impacts related to that phase of the project, as they affected the aquatic receiving habitats, associated macroinvertebrate communities and fish populations, would have reverted to preconstruction conditions within 5 to 8 years after the peat slide. Thus, during the past ten years or so, all activities associated with the operation of the windfarm, OHL line and Agannygal substation would be expected to have had neutral impacts or at most, slight, temporary, reversible negative impacts on the receiving aquatic environment, the latter following periodic on-site maintenance, such as road repairs and or drain cleaning. These impacts, when they occurred, would have been confined to the upper reaches of the small streams directly draining the windfarm and would not have impacted the main channels of the Owendalulleegh and Boleyneendorrish Rivers, i.e. the main receiving waters of the windfarm and OHL corridor.

The objectives of the Aquatic Ecology assessment are as follows:

- Produce a baseline study of the existing surface water environment and aquatic ecological receptors in the study area that are hydrologically connected to the Prospective Development.
- Identify any potential impacts on surface waters and aquatic receptors during decommissioning and determine those impacts that are "likely" and "significant" in relation to the Prospective Development.
- Assess cumulative impacts of the Prospective Development in combination with other catchment activities and projects.
- Identify mitigation measures to avoid, remediate or reduce potential significant negative direct, indirect and cumulative impacts.
- Assess residual impacts of the Prospective Development.

## 7.1.2 Statement of Authority

The chapter was prepared by Gerard Morgan a graduate of University College Cork with an honours BSc in Zoology and MSc. in freshwater ecology. Ger has managed the Aquatic Services Unit, a UCC-based environmental consultancy specialising in aquatic systems, since 1986. He has over 30 years' experience in ecological consultancy, specialising in water quality impacts of a wide range of infrastructural projects including roads, bridge, pipelines, windfarms, power transmission and port and harbour facilities. He also specialises in protected species surveys, including for fish and pearl mussels. He is a specialist in algal surveys and identifications in rivers and lakes and is recognised by the Environmental Protection Agency (EPA) as a practitioner of the Q-value biotic index system. His clients include the EPA, Teagasc, Cork County Council, Port Authorities and several large environmental and engineering consultancies and industry. Recent projects include water quality monitoring of the construction phase of the Grousemount windfarm in Co. Kerry, the 2020 rEIAR for Derrybrien Wind Farm, aquatic ecological chapters for EIARs for a solar farm in Kanturk (2022), expansions to Dublin Port, (2016-2023), Ringaskiddy Port and Foynes Port, numerous Q-value and SSRS surveys, electrofishing surveys and pearl mussel surveys, nationwide macro-algal surveys in rivers for the EPA and phytoplankton identification of lake and reservoir samples for local authorities.

Lauren Williams BSc PGDip MCIEEM, a senior freshwater ecologist with 24 years professional consultancy experience, was consulted in the preparation of this chapter. Lauren holds a BSc in Zoology, a Certificate in Environmental Law and a Post Graduate Diploma in Environmental Monitoring Assessment and Engineering with Distinction from Trinity College Dublin. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). For 21 years Lauren worked as joint Principal Freshwater Ecologist in the Aquatic Services Unit (ASU), University College Cork (UCC) where she worked with Gerard Morgan (ASU Manager) who prepared the 2020 rEIAR for the Derrybrien Wind Farm Project and the 2024 EIAR for the Derrybrien Wind farm Development Decommissioning Project. Lauren assisted with those projects providing analysis and review of ASU biological water quality data between 2011 and 2020 and carrying out field studies and data analysis in 2022 as part of the 2024 EIAR Derrybrien Wind farm Development Decommissioning Project. Lauren specialises in water quality assessment, fisheries and protected aquatic species and habitat surveys, monitoring, aquatic ecological impact assessment (EcIA), regularly undertaking baseline studies and preparation of EcIA reports, EIAR chapters and Appropriate Assessment (AA) reporting in relation to a wide range of large infrastructural developments throughout Ireland. She has carried out aquatic sampling, monitoring, and reporting as part of EPA national river monitoring programmes. She is a recognized practitioner of the Q-value biotic index system and is a trainer for the EPA's Small Streams Risk Assessment (SSRS) method. Lauren is a recognized professional in aquatic protected species survey (freshwater pearl mussel and white-clawed crayfish, on behalf of NPWS), and an accredited River Habitat Survey (RHS) and River Hydromophology Assessment Technique (RHAT) practitioner.

## 7.1.3 Relevant Legislation

The authors has had regard to the following EU and National Legislation:

**EU Legislation**

- European Union Directive 2011/92/EU (the 'EIA Directive') as amended by Directive 2014/52/EU.
- EU Habitats Directive - Council Directive 92/43/EEC (1992).
- EU Water Framework Directive (2000/60/EC) (WFD).

**National Legislation**

- Part XAB of the Planning and Development Act, 2000 (S.I. 30/2000) as amended and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended that transpose the EU Habitats Directive into Irish law.
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) which give legal effect in Ireland to the WFD.

### 7.1.4 Relevant Guidance

- The following guidance has been reviewed, considered and applied by the authors: EPA (2022) Guidelines on the Information to be contained in Environmental Impact Statements.
- CIEEM (2018, Rev 1.2 2022) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine by the Chartered Institute of Ecology and Environmental Management.
- NRA (2009) Guidelines for assessment of ecological impacts of national road schemes, Revision 2.
- NRA (2003) Guidelines for assessment of ecological impacts of national road schemes, Revision 1.
- IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters. Inland Fisheries Ireland.
- European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report

## 7.2 Methodology

### 7.2.1 Overview of Methods for the Aquatic Study

The EIAR study was undertaken using a combination of fieldwork and desk study. The latter consisting of gathering relevant site-specific data on drainage features, water quality and fisheries in particular, supplemented as appropriate with observations from the scientific literature. Fieldwork centred on biological water quality (Q-value), water chemistry and fisheries surveys in the small streams draining the windfarm and the OHL corridor where the author's knowledge of the site suggested that the bulk of any impacts from the Prospective Development would occur. The fieldwork undertaken in 2022 was supplemented with data collected for the same watercourses or others adjoining or downstream from them for which recent data was already available from the rEIAR of 2020, most of which dates from 2019, but some earlier, where relevant.

### 7.2.2 Desk Study

The main sources of information accessed as part of the desk study were Inland Fisheries Ireland (IFI) for fish survey data for the Owendalulleegh River (Kelly *et al.,* 2017) and the EPA online data for biological water quality information for each of the four main watercourses within the study area. In a similar vein, NPWS online maps of Special Areas of Conservation (SACs) and associated conservation information was accessed for the study area and downstream connected waterbodies. Also examined were extensive mapping resources including EPA online maps of the watercourse network and associated identifiers, Ordinance Survey of Ireland (OSI) Discovery Series paper maps and online historical maps, and Google Earth aerial photograph-based mapping. In addition, the client provided detailed mapping of the windfarm site and the OHL corridor showing the onsite drainage network, roads and tracks, substations, turbine locations, decommissioning haul routes, barrage locations and the locations of conductor structures along the OHL corridor etc. Where relevant, scientific papers and reports, and water quality regulations and guidance were consulted to assist in data interpretation etc.

Data sources accessed for the desktop review included the following:

i. The baseline studies for the 2020 rEIAR for the Derrybrien windfarm.
ii. Inland Fisheries Ireland (IFI) Water Framework Directive Fish Survey Reports for the Owendalulleegh River on the Water Framework Directive WFD Fish website (available at http://wfdfish.ie/).
iii. Environmental Protection Agency (EPA) Online Mapping for recent and historical macroinvertebrate Q-value results for each of the main rivers draining the study area (available at https://gis.epa.ie/EPAMaps/). These data go back to the mid-1990's and are the most comprehensive record of the ecological condition of the surface waters in the study area that is available.
iv. NPWS online maps of SACs and associated conservation information for the study area and downstream connected waterbodies (available at https://www.npws.ie/maps-and-data).
v. Historic and current maps, reports and data relating to the wind farm site and adjoining areas provided by the client.
vi. Relevant reports and papers in the scientific literature.
vii. Water quality regulations and guidance.
viii. Consultation with IFI regarding certain aspects of the project.

### 7.2.3 Field Surveys

Field surveys were undertaken at 19 sites in 2022, with Q-values assessed at 15 of the 19 sites, water chemistry (W) at 13 sites, and fish (F) surveyed at 11 sites. Q-values were also assessed in the field at 6 key locations in 2024 (30th August, 30th September 2024), including main channel sites on the Owendalulleegh and Boleyneendoorish. The GPS locations of these are listed in Irish Transverse Mercator (ITM) in Table 7-1, indicating which survey type (Q, W or F) was undertaken at each site. In addition, locations of a further 16 sites, sampled mainly in 2019 for some or all of the parameters (Q, W and F) are also listed. Data for water analysis (W) are also included from 2018 and for fisheries for 2011 and 2014. The sites surveyed in 2022 or later are highlighted in pink and those surveyed prior to 2022 are not highlighted. All these sites and 5 others surveyed by the EPA for Q-values on the main channels of the Owendalulleegh, Boleyneendorrish and Duniry Rivers, and one Owendalulleegh tributary, are shown on the map in Figure 7-1. For completeness, IFI's survey sites for fisheries are also included in Figure 7-1. The 2022 Q-value surveys were undertaken on July 13th and 14th, water samples were collected on July 11th and 14th and the electrofishing surveys were carried out on September 24th. A few additional sites on small watercourse crossings along the proposed haul route for the Agannygal Substation decommissioning were checked for habitat quality and Q-values on October 10th 2022, and again on March 27th 2023.

The main parameter of interest for this assessment is Q-value, as it integrates the variations in water chemistry over a period of months, whereas water chemistry can vary rapidly and be reflective of a more limited time scale, although important nonetheless in characterising a catchment area or identifying a potential contaminant. Electrofishing surveys were undertaken as fish populations are key ecological value features of watercourses. Fishing sites were chosen mainly, although not exclusively, at sites larger than 1st order streams because some 1st order channels are too narrow to adequately electrofish and are physically unsuitable to hold a fish population or have proven in previous surveys of 2011 and 2014 to have extremely low fish densities. Overall, the choice of sites was determined by the anticipated routes of greatest impact combined with the pool of existing data from these and adjoining watercourses within the overall study area.

*Table 7.1 Site names and locations (ITM) of field survey sites sampled for Q-values (Q), water chemistry (W) and fish (F). Those highlighted in pink were surveyed 2022-2024 the others were surveyed earlier, mainly in 2019, but with a few sites sampled for water in 2018 and several more for fisheries in 2011 and 2014. These dates will appear in the relevant results tables.*

| Site | Easting | Northing | Test | Site | Easting | Northing | Test |
|---|---|---|---|---|---|---|---|
| B1 | 559242 | 707252 | WF | O4A | 561369 | 703628 | Q |
| B1A | 558999 | 707026 | QF | O4B | 560122 | 703936 | Q |
| B1B | 559684 | 706518 | Q | O5 | 561145 | 702597 | QWF |
| B1C | 559102 | 707013 | W | O5A | 560309 | 702507 | QWF |
| B2 | 557160 | 706458 | QF | O6 | 561114 | 701977 | F |
| B2A | 558830 | 705969 | Q | O6A | 561095 | 701268 | QWF |
| B3 | 555860 | 706871 | QW | O7 | 560139 | 701249 | QW |
| B3A | 556951 | 707095 | Q | O7A | 561059 | 701246 | QF |
| B4 | 555846 | 706780 | QWF | O7B | 561134 | 701215 | QF |
| B5 | 555451 | 706853 | QF | O7C | 562447 | 701486 | F |
| D1 | 564088 | 707702 | F | O8A | 558798 | 701824 | QW |
| D1A | 561580 | 707058 | QWF | O8B | 557263 | 701255 | Q |
| O1 | 562231 | 705635 | QWF | O9A2 | 555648 | 701680 | QW |
| O2 | 563548 | 703119 | QF | O9B | 557222 | 701285 | QW |
| O3 | 562729 | 702986 | QF | OHL1 | 562121 | 700691 | QWF |
| O3A | 561942 | 703971 | QW | OHL2 | 563756 | 697352 | Q |
| O4 | 561355 | 703613 | QWF | OHL2A | 563549 | 697832 | Q |
| | | | | OHL 3 | 565044 | 698238 | Q |

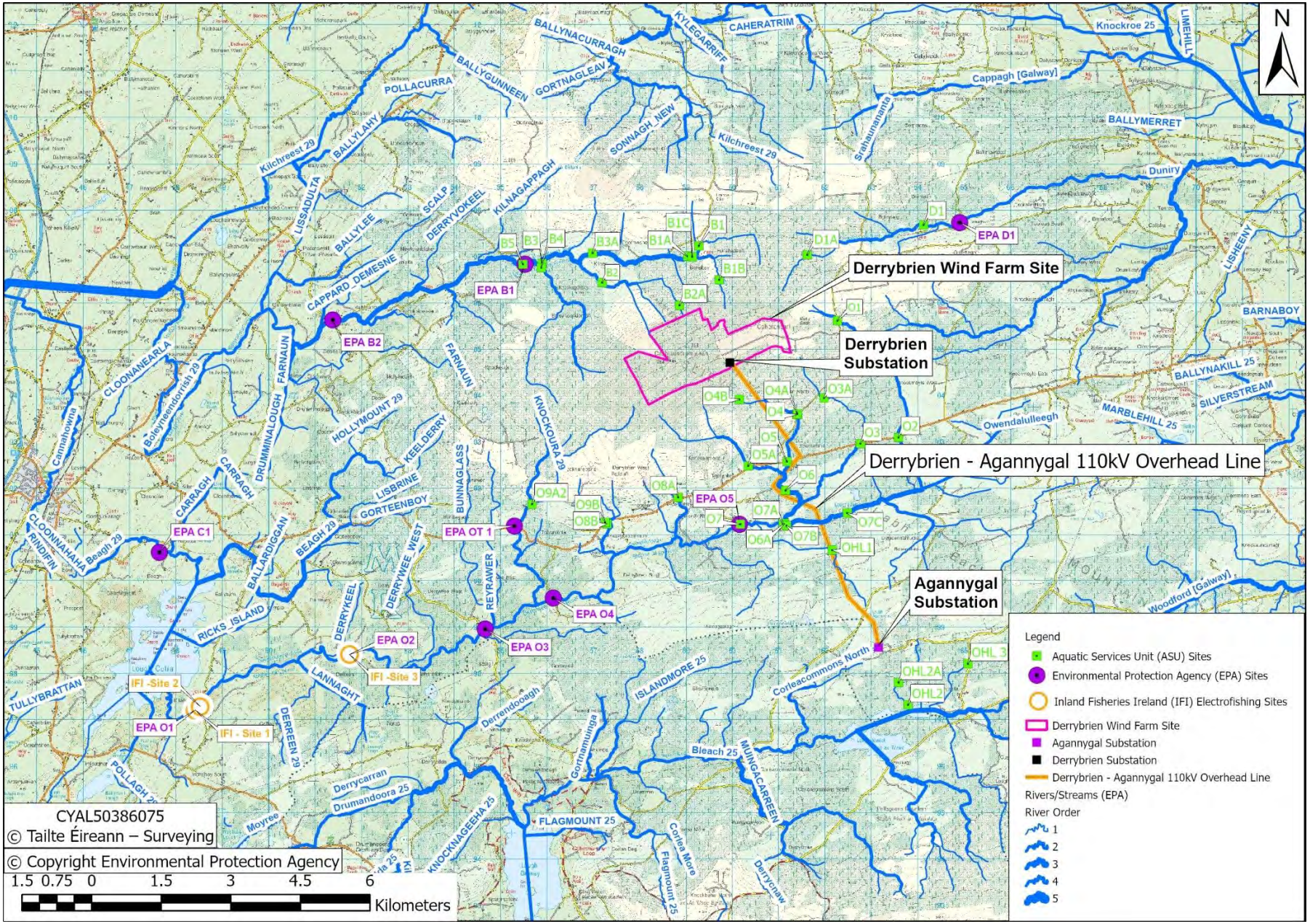



*Figure 7-1 Location of survey sites for current study, including selected EPA and IFI survey sites*

### 7.2.3.1 Macroinvertebrate Q-value Surveys

The Q-rating biotic index is used by the EPA on all their river water monitoring programmes and is based on interpreting collections of aquatic macroinvertebrates. The index assigns a score to the macroinvertebrate collection at a given site depending on the relative proportion of pollution sensitive and pollution tolerant organisms present. The greater the number and diversity of pollution sensitive types present at a site (particularly, certain mayflies, stoneflies and cased caddis flies) the higher the score or quality class assigned to that site. The highest score category is Q5 which indicates pristine water quality conditions and is recognised by having a high proportion of pollution sensitive species and very few if any pollution tolerant forms, whereas Q1 at the other end of the scale indicates gross pollution. Table 7-2 lists the Q-value scores, which can be assigned and the corresponding degree of pollution associated with each. This system, used in Ireland since the early 1970's, has been inter-calibrated with comparable European systems and now forms one of the cornerstones of Ecological Status classification under the Water Framework Directive (WFD) in Ireland. Table 7-2 also includes the corresponding WFD Status for each Q-rating category.

At each survey site (see map Figure 7-1) a three-minute moving kick-sample and one-two minute stone washing were taken in riffle-type habitat with a long-handled pond net (1 mm mesh). The material collected was sieved through a 500µm sieve to remove fines and examined on the bankside in a white tray. Relative abundance categories were assigned using the EPA method as follows: Few 1-5%, common 6-20%, numerous 21-50%, dominant 51-75%, excessive >75%. Q-values were then assigned based on these findings. In cases where a sample couldn't be definitively placed into one of two adjacent ratings intermediate rating can be used e.g., Q3-4 or Q2-3). In addition, in the results section, if a site's classification was very marginal, the category which most fitted the site was chosen but the category it was very close to was placed in brackets alongside it also, for reference, e.g. if a site was most identifiable as Good (Q4) but was almost or very close to High, then Q4-5 would be in brackets beside it.

The Q-value system responds to changes in river water chemistry over an extended period i.e. several months to a year, thereby giving a more integrated view of water quality at a given site. Water chemistry, in contrast, will tend to change over a much shorter timescale influenced by flow and catchment activities. Water chemistry is essential however in helping to show which parameters may be influencing the biological water quality e.g. nutrients, suspended solids or extremes of pH etc.

*Table 7.1 -1 Q-value relationship to water quality and WFD status*

| Q-value | Quality Description | Water Quality | WFD Ecological Status |
|---|---|---|---|
| Q5 | Unpolluted | Good | High |
| Q4-5 | Unpolluted | Fair-to-Good | |
| Q4 | Unpolluted | Fair | Good |
| Q3-4 | Slightly Polluted | Doubtful-to-Fair | Moderate |
| Q3 | Moderately Polluted | Doubtful | Poor |
| Q2-3 | Moderately Polluted | Poor-to-Doubtful | |
| Q2 | Seriously Polluted | Poor | Bad |
| Q1-2 | Seriously Polluted | Bad-to-Poor | |

### 7.2.3.2 Water Chemistry

Chemistry data was required in order to characterise the nature of the conservative parameters i.e. pH, conductivity, alkalinity, anions and cations etc., those that would be influenced by the nature of the overburden as well as the underlying geology in the various sub-catchments. In addition, Biological Oxygen Demand (BOD) and the nutrient content (phosphate, ammonia, [1]TON) were assessed to see if these data could help explain some of the water quality findings derived from the Q-value surveys.

Samples were collected using high-density polyethylene (HDPE) litre bottles and conductivity and pH were measured using WTW portable meters. Samples were placed in a cooler box with ice-packs in the field and delivered within hours of collection to the laboratory where they were either immediately processes or more usually retained in a fridge overnight at 4°C until analysis could start the following morning. The methods used to undertake chemical analysis are listed in Table 7-3. Survey locations are shown in Table 7-1 and Figure 7-1.

*Table 7.1-2 Water chemistry methods used for this study*

| Parameter | Units | Method |
|---|---|---|
| pH | | WTW pH330i pH meter |
| Conductivity | µS/cm @ 25°C | WTW LF330 Conductivity meter @ 25°C |
| Dissolved Oxygen | mg/l, $O_2$ | WTW portable meter (Oxi 320) |
| Suspended solids | mg/l | Gravimetric after filtration (GF/C) and drying 103-105°C |
| Alkalinity | mg/l $CaCO_3$ | Gran Titration |
| Colour | Hazen Units | Colorimetric method (read at 455nm) using platinum/cobalt solution as colour standard |
| Dissolved Total Organic Carbon | mg/l, C | SHIMADZU TOC-VCPH TOC analyser |
| Soluble Reactive Phosphorus | mg/l P | Automated Molybdate method using Lachat™ Quikchem FIA |
| Total Phosphorus | mg/l P | Manual molybdate method after sample digestion |
| Ammonia | mg/l N | Automated salicylate method using Lachat™ Quikchem FIA |
| Total Oxidised Nitrogen | mg/l N | Automated colourimetric method using Lachat™ Quikchem FIA after cadmium reduction |
| Potassium | mg/l $K^+$ | Flame AAS method |
| Sodium | mg/l $Na^+$ | Flame AAS method |

[1] TON = Total Oxidised Nitrogen (in mg/l, as N). This is the sum of nitrate and nitrite but because in well oxygenated water like that in the project area streams, the nitrite level is very low, TON is effectively the same as Nitrate (as N).

| Parameter | Units | Method |
|---|---|---|
| Calcium | mg/l $Ca^{2+}$ | Flame AAS method |
| Total Aluminium | µg/l Al | Graphite furnace AAS method |
| Monomeric Aluminium | µg/l Al | Graphite Furnace AAS method (after cation exchange resin separation) |
| Sulphate | mg/l $SO_4^{2-}$ | Automated IC method using Lachat™ Quikchem IC |
| Chloride | mg/l $Cl^-$ | Automated IC method using Lachat™ Quikchem IC |
| ANC | µeq/l | Calculation Alk µeq/l (Gran titration) + (5xDOC mg/l) – (3 x Al µeq/l) |

### 7.2.3.3 Electrofishing Surveys

Electrofishing surveys were carried out at a total of 10 sites in 2022, all but one on the small tributaries draining the windfarm and the OHL corridor all of which were surveyed previously. The only main channel site surveyed in 2022 was O7C on the Owendalulleegh, although data from previously surveyed main channel sites are also reported. The sites were chosen to be representative of the streams draining the windfarm and preferably sites that had been previously surveyed, these would be considered most likely to sustain impacts were they to arise. Data for main channel sites is included for completeness and to assess the one main channel vehicle crossing point at O7C. It's worth noting that several sites, where were surveyed for Q-values and water chemistry were not sampled for fish because they were either inaccessible (O9A2), too small to warrant a survey (O4B), have unsuitable habitat (OHL2A), not be directly impacted by the windfarm (O8B) or be considered too remote to be affected (OHL2).

On receipt of the necessary permits from IFI via the Department of the Environment, Climate and Communications (S14.2022.53) and following implementation of the specified biosecurity protocols, electrofishing was undertaken using 10-minute timed fishing, a method regularly used by IFI for juvenile fish surveys in wadeable rivers (Delanty *et al.,* 2022). Note that previous surveys undertaken in 2011, 2014 and 2019 (rEIAR, 2020), in the main employed the 3-pass depletion method, which is considered a quantitative method. The timed method, which is considered qualitative, was chosen on this occasion as it allows for more sites to be fished in a day, as there isn't a requirement to carry heavy stop-nets around. It usually also allows a longer stretch of channel to be fished. Importantly, the results between timed and quantitative methods tend to be strongly correlated (Kelly *et al.,* 2007) and the results obtained in the 2022 surveys compared well with surveys undertaken previously at the same sites using the quantitative method. The fish collected at each site were placed in a holding bin filled with fresh, well oxygenated water. A few drops of clove oil were added to temporarily anesthetise the fish while they were being counted and measured, after which they were placed in another bin of well oxygenated water until they had regained full movement and were returned to the stream. As fish data from previous surveys is also referenced in the findings of the current study, details of the equipment used in previous surveys is given here also. The 2011 survey employed a bankside generator system connected by a long cable to the operator while surveys in 2014 and 2019 employed a back-pack petrol generator system operated at a voltage of 400 or 750 volts at low ampage. The 2022 surveys were undertaken using a battery powered backpack electrofisher. At each of the surveyed sites notes were taken of the habitat present in the surveyed stretch including, fished channel length, average width and depth, substrate types, velocity, instream plants, degree of shading etc. Each site was also photographed.

## 7.2.4 Impact Assessment Methodology

In undertaking the impact assessment for the aquatic ecology chapter the following guidelines were consulted, particularly for the evaluation of sensitive receptors and characterising the significance of potential impacts:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018, Rev 1.2 2022)
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022).
- NRA Guidelines for the Assessment of Ecological Impacts of National Road Schemes – Version 2 (NRA, 2003, 2009).

## 7.2.5 Ecological Valuation of Watercourses

The criteria used for assessment of ecological value of watercourses are adapted from NRA (now Transport Infrastructure Ireland - TII) Ecological Impact Guidelines (NRA, 2003, 2009) involving careful consideration of fisheries value, water quality and consideration of contextual information for the resource at a geographic level. The evaluation criteria used to classify sites is shown in Table 7-4. This is mainly based on NRA (2003) guidelines which reference aquatic habitats or fisheries, with slight modifications based on NRA (2009) to set out criteria that classify aquatic habitat value within the study area. NRA (2003) guidelines provided more direction on classification of aquatic habitats, while NRA (2009) focused on terrestrial habitats. Only criteria with direct relevance to aquatic habitats and fisheries have been retained in Table 7-4. Baseline survey results and observations were assessed against the criteria in the context of national trends, guidelines and regulations and EU Water Framework Directive (WFD) criteria for ecological status, as appropriate. Expert opinion was also employed in several instances when attribution of value to a watercourse wasn't clear cut using the criteria outlined above.

*Table 7.1-3 Ecological evaluation criteria (Adapted from NRA, 2003, 2009)*

| Relevant Criteria | Category |
|---|---|
| **International Importance:**<br>› Sites designated (or qualifying for designation) as an SAC<br>› Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988)<br>› Major salmonid (salmon, trout, or char) lake fisheries | **A** |
| **National Importance:**<br>› Sites or waters designated or proposed as a Natural Heritage Area (NHA), Statutory Nature Reserve or National Park<br>› Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU habitats directive<br>› Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts; and/or; species listed on a Red Data list<br>› Major trout fishery rivers<br>› Waterbodies with major amenity fisheries value<br>› Commercially important coarse fisheries | **B** |
| **County Importance:**<br>› Small water bodies with known salmonid populations or with good potential salmonid habitat<br>› Undesignated sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive<br>› Large water bodies with some coarse fisheries value<br>› Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level | **C** |
| **Local Importance (Higher Value):** | **D** |

| Relevant Criteria | Category |
|---|---|
| › Small water bodies with some coarse fisheries value or some potential salmonid habitat.<br>› Any waterbody with unpolluted water (Q-value rating 4-5, Q5) | |
| **Local Importance (Lower value):**<br>› Water bodies with no current fisheries value and no significant potential fisheries value. | **E** |

## 7.2.6 Impact Assessment Criteria

The EIA Directive calls for the environmental effect(s) on the environment to be identified arising from a particular impact caused by the proposal. For the purpose of this assessment, therefore, impacts are defined as the changes resulting from an action, and effects are defined as the consequences of impacts. Environmental effects can be positive, negative or neutral, with their level of significance and duration assigned in this assessment according to the terminology of EPA (2022) as set out in Tables 7-5 and 7-6, respectively.

*Table 7.1-4 Ecological Impact Significance Criteria (from EPA, 2022)*

| Impact Significance | Criteria |
|---|---|
| Neutral | No impact |
| Imperceptible | An impact capable of measurement but without noticeable consequences |
| Not significant | An impact which causes noticeable changes in the character of environment but without significant consequences |
| Slight impacts | An impact which causes noticeable changes in the character of the environment without affecting its sensitivities |
| Moderate impacts | An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends |
| Significant impacts | An impact which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment |
| Very Significant | An impact which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment |
| Profound impacts | An impact which obliterates sensitive characteristics |

*Table 7-6 Ecological Impact Duration Criteria (from EPA, 2022 and CIEEM, 2018)*

| Impact Duration | Criteria |
|---|---|
| Momentary Effects | Effects lasting from seconds to minutes |
| Brief Effects | Effects lasting less than a day |
| Temporary Effects | Effects lasting less than a year |
| Short-term Effects | Effects lasting one to seven years |
| Medium-term Effects | Effects lasting seven to fifteen years |
| Long-term Effects | Effects lasting fifteen to sixty years |
| Permanent Effects | Effects lasting over sixty years |

| Impact Duration | Criteria |
|---|---|
| Reversible Effects | Effects from which spontaneous recovery is possible within a reasonable timescale or which may be counteracted by mitigation. |
| Irreversible Effects | Effects from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. |

Potential direct, indirect and cumulative impact significance associated with the Prospective Development were assessed in accordance with criteria set out in EPA Guidelines (EPA, 2022). Guidance was also sought from and NRA (2003, 2009).

### 7.2.7 Limitations/Difficulties Encountered

None that would have prevented a comprehensive assessment from being undertaken.

### 7.2.8 Scoping and Consultation

The project team consulted with IFI on the issue of fish passage in sub-catchment SC7(b) with a view to assessing the likely impacts of the do-nothing scenario in relation to Barrages 3 and 4. As part of this consultation IFI were provided with the summarised electrofishing data collected by the project team for several of the tributaries draining the windfarm including in sub-catchment SC7(b) where the two barrages are situated.

## 7.3 Receiving Environment

### 7.3.1 River Catchments - Overview

The drainage from the 344.5ha Derrybrien Wind Farm site flows to three river catchments. The Owenaglanna flows east becoming the Duniry River eventually discharging into Lough Derg, whereas the Boleyneendorrish and the Owendalulleegh flow westward, the latter discharging to Lough Cutra and the former joining a nexus of tributaries and dropping underground into the karst geology just northeast of Gort. The outflow from Lough Cutra, the Beagh River, also flows underground, re-emerges as the Canahowna River before sinking again in an area known as the Punchbowl just south west of Gort. All these underground watercourses discharge to the sea at Kinvarra Bay.

The 110kV OHL corridor drains mainly to the Owendalulleegh catchment but the southernmost portion flows south to a small unnamed stream which eventually enters the north shore of Lough Atorick, which is in the Shannon catchment.

### 7.3.2 Wind Farm On-Site Drainage

The Derrybrien wind farm is 344.5ha in area situated on a plateau in the Slieve Aughty mountains. Prior to construction of the wind farm, the use of the site was split between commercial coniferous plantation on the western side and turbary on the eastern side. While the turbary continued throughout the operational phase of the development and is still active, the forestry in the main was felled from the start and remains essentially absent from the site bar a few stands, although the site is being naturally self-sown conifers in places. One of the important features of the site is the extensive network of drainage channels, mainly through peat but also with mineral bases in places, that criss-cross the site (Figure 7-2). This is most extensive in the eastern portion of the site where the turbary occurs, most of which pre-dated the development of the site, but is extensive also on the western portion of the site. Much of the drainage within the turbary plots follows a fairly dense north to south, east to west grid-like

configuration with longer drains running east to west along both sides of the turbary roads. As part of the construction phase, additional drains were installed including a separate drainage channel for every turbine, designed to accommodate drainage from turbine hardstand areas and presumably any drainage from the turbines themselves intercepted during rainstorms. In total there are 39km of drains, 27km of which predated the wind farm's construction. It is intended to leave all existing onsite drainage in place without modification as part of the decommissioning.

### 7.3.3 Drainage from the Wind Farm

The wind farm site drains to three separate river catchments. 33.4% of the site (115.2ha) drains in a generally northern and north westerly direction toward the Boleyneendorrish River, while 66.2% (228ha) drains to the south and south-west toward the Owendalulleegh River. Additionally, a very small portion of the site (0.4%, 1.28ha) drains north-east to the headwaters of the Duniry River. The drainage from the site to these larger watercourses is conveyed in nine separate sub-catchments, SC1-SC 9 (Figure 7-3). SC1-SC4 drain to the Boleyneendorrish, SC5 drains to the Duniry and SC6-SC9 drain to the Owendalulleegh. Each sub-catchment drains a different portion of the site, each associated with a number of turbines, tracks, drains and open ground, principally cutover bog. SC7(a) for example, drains a large area toward the eastern side of the site which includes 19 turbines and associated tracks, whereas SC5 drains a very small area in the north-east of the site, which includes one turbine (T36).

The watercourses connecting the windfarm to the three main river channels tend in the main to be first or second order channels, generally dominated by coarse substrate including substantial stretches of bedrock, boulders and cobbles, reflecting the often-steep gradients involved. In addition, significant stretches of the channels are heavily shaded by bankside trees and scrub, all of which reduce the potential for fish productivity. However, in several of the channels, there are stretches where the gradients are shallower, the substrate is finer, including more gravel, pebbles and small cobbles and the banks are more open, providing conditions more conducive to trout spawning and nursery.

As part of the emergency protection measures initiated in response to the 2003 peat slide in sub-catchment SC7(b), 6 barrages were constructed along this watercourse in order to stem the flow of liquefied peat down into the Owendalulleegh. Since that time two of the barrages have been removed and four remain in place (Figure 4-4 in Chapter 4), and this EIAR will consider the potential impacts of removing or retaining some of these structures in terms of fisheries and general aquatic ecological effects. retaining some of these structures in terms of fisheries and general aquatic ecological effects. This is specifically dealt with in Chapter 3, Alternatives.

None of the small streams draining the windfarm are named on the OSI Discovery Series maps and most have not been named on the EPA online maps, indeed none have a unique identifying code. Instead, several channels within the same or adjoining sub-catchment tend to have been assigned the same Waterbody Code on EPA mapping.

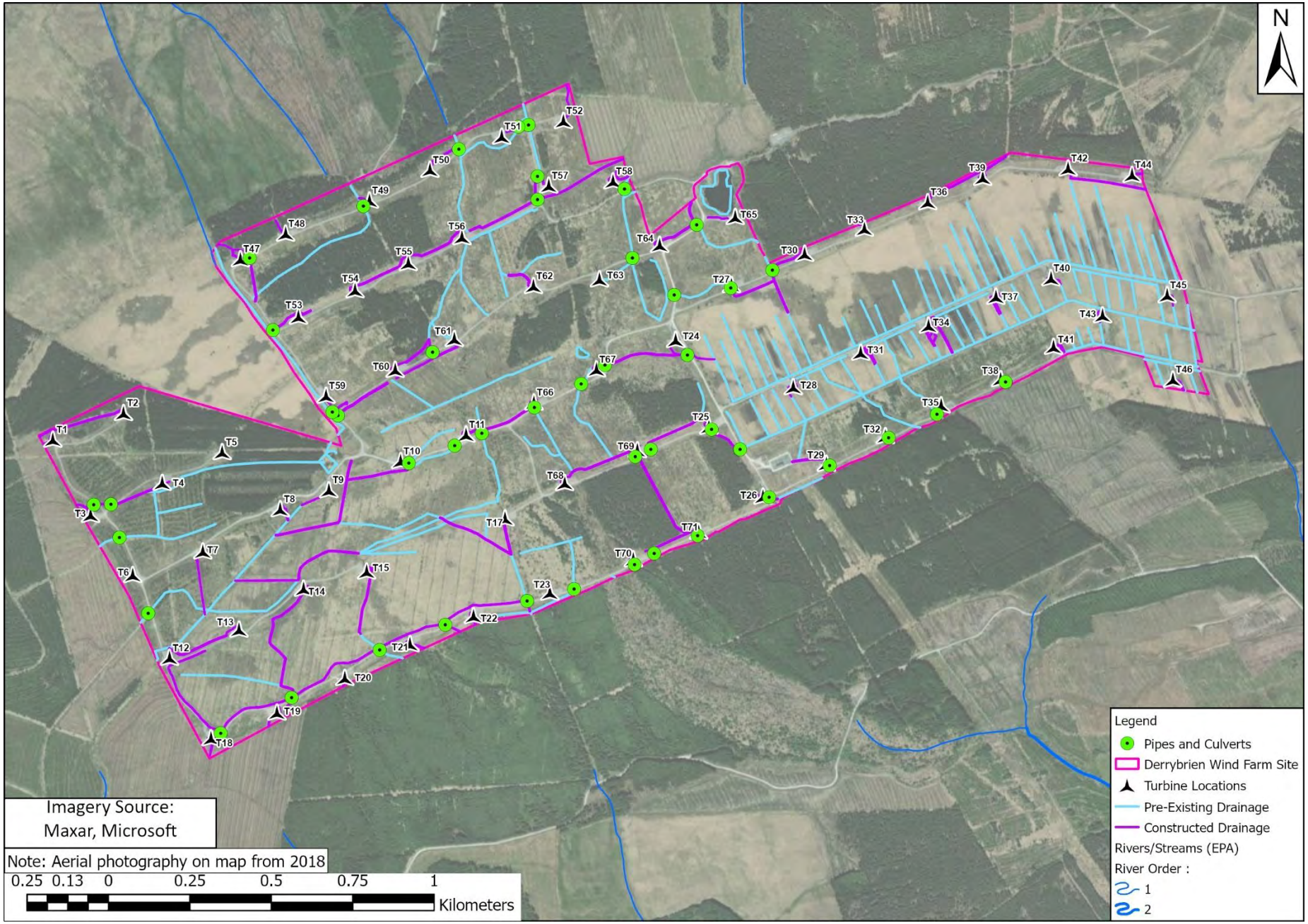



*Figure 7-2 Map of windfarm showing pre-construction and construction related drainage*

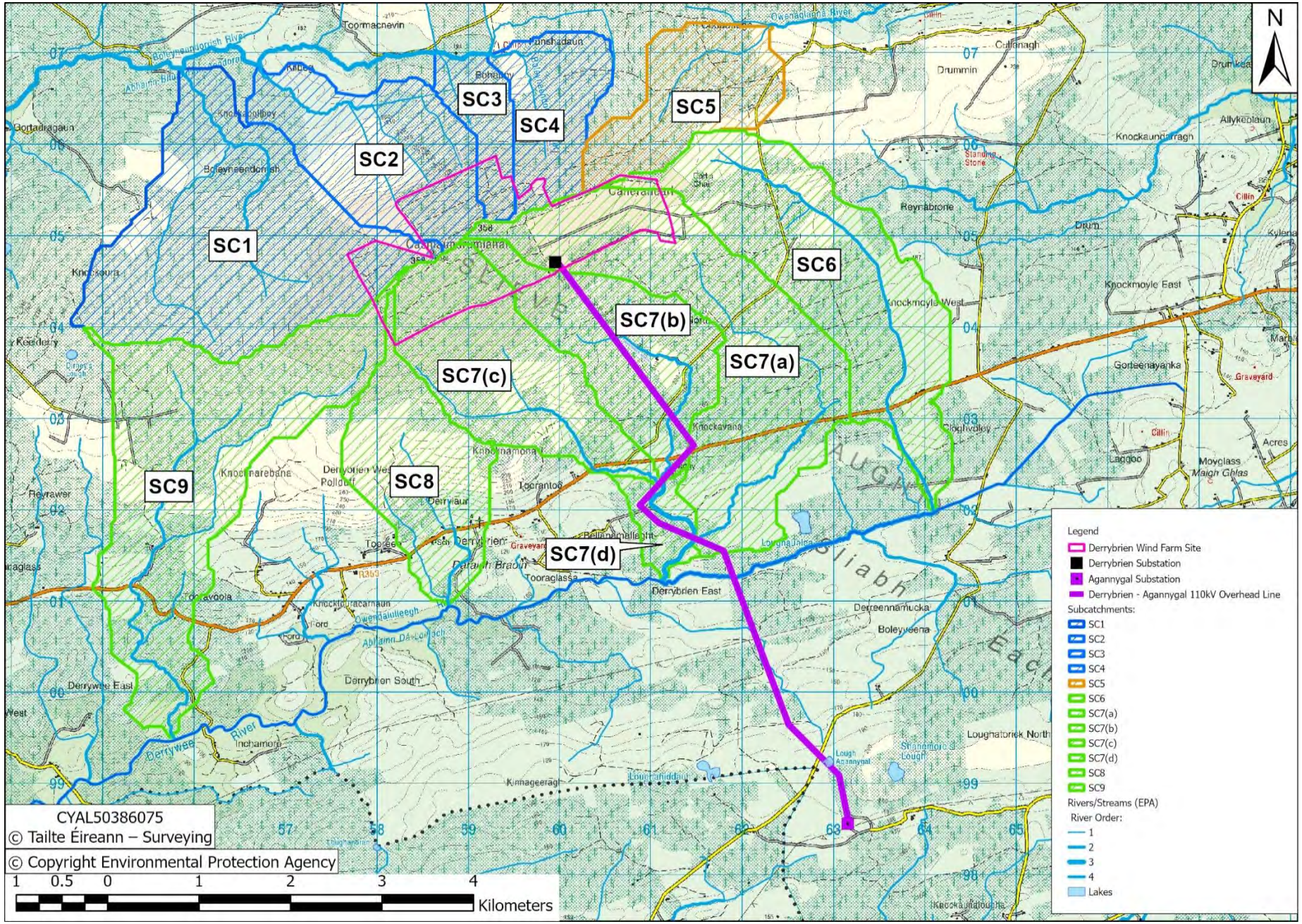



*Figure 7-3 Map showing sub-catchment extent of the streams draining the windfarm site*

### 7.3.4 Drainage of the Overhead Line (OHL) Corridor

To connect the wind farm to the grid, a 7.8km long overhead line (OHL) corridor was established, much of it through forestry plantation, which was felled at the time in order to accommodate the 43 structures (polesets and masts) required. The OHL line commences in the mid-southern edge of the wind farm at the Derrybrien wind farm substation and terminates at the Agannygal substation at the southern end of the line. The corridor crosses a small number of 1st and 2nd order streams, one main 3rd order channel (the Owendalulleegh River) and several small drains. 30.81 ha (92%) of the corridor's area is situated within the Owendalulleegh catchment, with the southern 2.26ha (6.8%) in the Lough Atorick/River Bleach catchment which eventually drains to Lough Derg on the Shannon. North of the Owendalulleegh crossing, virtually all of the 21.34 ha of the corridor (64.53% by area) is within the sub-catchment of the Flaggy Bridge Stream (SC7(b), Figure 7-3), while south of the Owendalulleegh channel, 9.47ha (28.64% by area) drains to a small 1st order tributary of the Owendalulleegh, designated on EPA maps as the first order channel IE_WE_29O01500. The remaining 2.26ha (6.83%) at the southern end of the corridor, including the Agannygal Substation flows via small surface drains to reach a small stream which flows into the northern shore of Lough Atorick some 2km downstream from the substation. The latter stream isn't listed in the EPA online drainage map of Ireland and isn't monitored by the EPA. For ease of description this is being named as Agannygal 'western stream'. A second small unnamed 1st order stream, rising 1.6km east of the entrance to Agannygal substation and referred to here as Agannygal 'eastern stream', flows about 2km south-west to the western stream joins the lough. The eastern stream is coded IE_SH_25B070100 on the EPA drainage map. Although this stream doesn't drain any of the OHL corridor it does flow under the Coillte track which will be used as the haul route for decommissioning the Agannygal substation and may require the insertion of a new culvert some 1.5km upstream of Lough Atorick to accommodate a short diversion off the track. Its water quality isn't monitored by the EPA.

### 7.3.5 Wider Drainage Area and connectivity to European Sites

The Owendalulleegh River eventually flows into Lough Cutra some 23km downstream of the wind farm. The outflow from Lough Cutra flows a further 14km, including 2km underground, successively as the Beagh, Cannahowna and Gort rivers to reach Coole-Garryland turlough complex SAC to the northwest.

The Boleyneendorrish flows in a roughly westerly direction for 18km, dropping underground near the townland of Carrowbaun East and from there travels 4 to 5km underground, also reaching the Coole-Garryland turlough complex SAC. The outflow from Coole-Garryland eventually reaches the sea near Kinvarra in Galway Bay by an underground course, a distance of about 7.5km to the northwest.

The Duniry River travels more or less due east for 25km as far as an embayment in the northwest corner of Lough Derg. Along that course it flows into the Cappagh River which in turn becomes the Kilcrow River before it enters Lough Derg.

The channel distance from the Lough Atorick as far as Lower Lough Derg on the Shannon at Scarriff is 34km, which includes two more lakes along the route, Lough Graney and Lough O'Grady.

Lough Atorick, which ultimately receives the drainage from the very southern section of the OHL corridor and Agannygal substation, is not directly monitored by the EPA but for the period 2016-2021 has been classified through modelling as being of Moderate Status. Its outflow, the Bleach River, was classified by the EPA as being of Good Status in 2021 at Corlea Bridge. Lough Graney (3.72km$^2$) is monitored by the EPA and was classified in the period 2016 – 2021 as of Moderate Status. Lough O'Grady, which is a small, shallow waterbody is not monitored or classified by the EPA. The lower portion of Lough Derg is not an SAC, however it is an SPA.

Lough Cutra is an SAC (site code: 000299) whose single Qualifying Interest is the lesser horseshoe bat (1303 *Rhinolophus hipposideros*).

The Duniry River, flowing via the downstream Cappagh River, eventually reaches the north-west shore close to or just within the boundary of the SAC: Lough Derg North Eastern Shore (site code: 002241). The site's Qualifying Interests are listed as:

- 5130 *Juniperus communis* formations on heaths or calcareous grasslands.
- 7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae.*
- 7230 Alkaline fens.
- 8240 Limestone pavements.
- 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnionincanae*, *Salicion albae*).
- 91J0 *Taxus baccata* woods of the British Isles.

Lough Derg (Shannon) SPA's Special Conservation Interest species are listed as:

- Cormorant (*Phalacrocorax carbo*) [A017].
- Tufted Duck (*Aythya fuligula*) [A061].
- Goldeneye (*Bucephala clangula*) [A067].
- Common Tern (*Sterna hirundo*) [A193].
- Wetland and Waterbirds [A999].

## 7.3.6 Biological Water Quality

### 7.3.6.1 EPA Monitoring

The EPA regularly undertakes surveys of several sites on the three main rivers into which the smaller tributaries of the Derrybrien wind farm flow. Monitoring began in 1989 on the Owendalulleegh and the Boleyneendorrish and in 1987 on the Duniry and in each case has been undertaken on a more or less 3-year cycle ever since, the most recent assessment having been undertaken in 2023. Table 7-7 presents the results of the last set of three 3-year cycles i.e., for 2015, 2018, 2021 and 2023. This shows that both sites on the Owendalulleegh (EPA O4 and O5) and Boleyneendorrish rivers (EPA B1 and B2) closest the windfarm (Figure 7-1) each returned High Status results (Q4-5 or Q5). The exception was an additional survey at EPA B1 on the Boleyneendorrish which returned a Good Status result (Q4) in 2019 which was preceded in 2018 and succeeded in 2021 by High Status results (Q5). The uppermost Duniry River monitoring site (EPA D1) returned Good Status in 2014, 2017 and 2021 and had dropped to Moderate Status in 2023 (Q3-4).

Historically, immediately after the 2003 peat slide, the quality at the two Owendalulleegh sites (EPA O4 and EPA O5) dropped from High Status to Moderate (Q3-4, EPA O4) and Bad Status (Q2, EPA O5) but both returned again to High Status (Q4-5) three years later and have remained so ever since. The Boleyneendorrish and Duniry rivers were not impacted by the 2003 peat slide.

The only minor tributary within the study area which is monitored by the EPA is EPA OT1 (Bridge west of Tooravoola), where the quality on and before 2012 was mainly High Status (Q4-5) but in more recent surveys has fluctuated between Good Status (Q4) and Moderate Status (Q3-4). The upper western section of this sub catchment receives drainage from a small proportion of the south-western corner of the wind farm but the dominant land use in the drainage area of EPA OT1 (SC9) is plantation forestry.

*Table 7-7 EPA Q-value Data Owendalulleegh, Boleyneendorrish and Duniry Rivers (2015-2023)*

| EPA River Station Code | EPA name | River Station | 2015 | 2018 | 2021 | 2023 |
|---|---|---|---|---|---|---|
| IE_WE_29O010500 | Owendalulleegh | EPA O5 (Ford @ Tooraglassa) | 4-5 | 4-5 | 4-5 | |
| IE_WE_29O010700 | Owendalulleegh | EPA O4 (Ford @ Inchamore) | 4-5 | 4-5 | 4-5 | |
| IE_WE_29O010800 | Owendalulleegh | EPA OT1 (Br. West of Tooravoola) | 3-4 | ǂ 4 | 4 | |
| IE_WE_29B04100 | Boleyneendorrish | EPA B2 (Ford west of Poolboy) | 4-5 | 5 | 5 | |
| IE_WE_29B04300 | Boleyneendorrish | EPA B1 (Br. N or Dunally West) | 4-5 | 4-5 | 4-5 | |
| IE_SH_25D070400 | Duniry | EPA D1 (Cullennagh Br.) | **4 | *4 | 4 | 3-4 |

ǂ also sampled in 2019 when it was Q3-4, * sampled in 2017 not 2018, ** sampled in 2014 not 2015

### 7.3.6.2 Q-Value Surveys for this Assessment

In the absence of EPA data for the biological water quality of the many smaller channels draining the wind farm and the OHL corridor, surveys were undertaken as part of this Prospective Development and for the 2020 rEIAR in order to establish the current baseline conditions in these watercourses. In total, 24 sites were sampled in 2019 and of these 12 were re-visited in 2022. In addition, two sites not previously visited (OHL 2A and OHL3) were also surveyed in 2022. While the majority of the sites were located on the smaller channels connecting the windfarm to the main channels of the three principal rivers, three were on the main channel of the Owendalulleegh farther upstream from the EPA monitoring sites, namely Sites O7A, O7B and O7C (Figure 7-1). Sites O8A and O8B were in sub catchment SC8, which received very little drainage from the wind farm, and Site O9B is in an unnamed adjoining catchment to the west which receives no drainage from the windfarm. Inclusion of these latter sites allowed for comparison with similar sized adjoining watercourses whose land use is unaffected or largely unaffected by the wind farm.

The results of the surveys are presented in Table 7-8, while the habitat descriptions of the sites visited in the 2022 surveys are tabulated in the following section (Table 7-9). The results show that there's a tendency for the larger channels sites e.g., B3, B3A, O6A, O5A, O7A, O7B and O7C to have either High or Good Status (i.e., Q4-5 or Q4) while smaller channels e.g., B1B, D1A and O1 were more likely to have Good or Moderate Status (Q4 or Q3-4). Where 2022 survey sites were repeats of 2019 surveys, the results tended to be the same or only marginally different. Two exceptions to this were sites B4 and OHL 1 both of which showed a decline in quality from High Status in 2019 to Moderate in 2022. No obvious explanation can be offered for these apparent declines. It should be noted, however, that smaller watercourses have less buffering to water quality change than larger channels by virtue of their smaller flows and therefore lower potential to dilute possible contaminants such as sediment and nutrients. They would also be more susceptible to fluctuations in discharge, especially low summer flows, all of which combined would be expected to result in more inter-annual fluctuations in quality as compared to larger channels. It is worth noting that all the sites visited in 2022 had much lower flows than when they were surveyed in 2019. Site OHL2A on a stream which is crossed by the Agannygal substation decommissioning haul route was surveyed at a point where a culvert is proposed to be replaced (ITM. 563549 697832). The habitat downstream of this site comprises a long very sluggish flow glide, while immediately upstream the substrate (stiff peat with tiny pockets of sand and fine gravel) was also unsuitable for a Q-value survey. However, a few fairly tolerant macroinvertebrates including *Asellus* and *Baetis* sp. were taken in net sweeps in the sluggish stretch downstream of the culvert, and more recently (March 2023) a few nemourid stone flies and *Simulium* were taken in a partial kick-sample just upstream of the culvert. These results along with its isolated afforested location and the sub-optimal sampling substrates at the site suggests that the water quality is likely to be at worst Moderate Status (Q3-4) and would more likely be of Good Status Q4.

*Table 7-8 Sites samples for Q-value assessment. Their locations are presented in Figure 7-1 and their sub-catchments where applicable are shown in Figure 7-3, the latter draining the windfarm only.*

| EPA Water Body Code | River Catchment | Sub-Catchment | Sample Site | Q-value | | |
|---|---|---|---|---|---|---|
| | | | | 2019 | 2022 | 2024 |
| IE_WE_29B04100 | Boleyneendorrish | SC4 | B1A | - | 4 | - |
| IE_WE_29B04100 | Boleyneendorrish | SC4 | B1B | 3-4 | - | - |
| IE_WE_29B04100 | Boleyneendorrish | SC2 | B2A | 4 | - | - |
| IE_WE_29B04100 | Boleyneendorrish | SC2 | B2 | 4-5 | - | - |
| IE_WE_29B04100 | Boleyneendorrish | Main channel | B3A | 4-5 | - | - |
| IE_WE_29B04100 | Boleyneendorrish | Main channel | B3 | 4-5 | - | - |
| IE_WE_29B04100 | Boleyneendorrish | SC1 | B4 | 4 (4-5) | 3-4 | 4-5 |
| IE_WE_29B04100 | Boleyneendorrish | Main channel | B5 | | | 5 |
| IE_SH_25D070100 | Duniry | SC5 | D1A | 3-4 (4) | 4 (3-4) | - |
| IE_WE_29O010500 | Owendalulleegh | SC6 | O1 | 3-4 (4) | 3-4 | - |
| IE_WE_29O010500 | Owendalulleegh | SC6 | O2 | 4 (3-4) | - | - |
| IE_WE_29O010500 | Owendalulleegh | SC7(a) | O3A | 4 (4-5) | 4-5 | 4-5 |
| IE_WE_29O010500 | Owendalulleegh | SC7(a) | O3 | 4-5 (4) | - | - |
| IE_WE_29O010500 | Owendalulleegh | SC7(b) | O4B | *4-5 | - | - |
| IE_WE_29O010500 | Owendalulleegh | SC7(a) | O4A | 4 | - | - |
| IE_WE_29O010500 | Owendalulleegh | SC7(b) | O4 | 4 (3-4) | 3-4 | - |
| IE_WE_29O010500 | Owendalulleegh | SC7(b) | O5 | 4-5 (4) | 4 (4-5) | 4-5 |
| IE_WE_29O010500 | Owendalulleegh | SC7(d) | O6A | 4 (4-5) | 4 | - |
| IE_WE_29O010500 | Owendalulleegh | SC7(c) | O5A | 4-5 (4) | 4 | - |
| IE_WE_29O010500 | Owendalulleegh | Main channel | O7 | #4-5 | | 4-5 |
| IE_WE_29O010500 | Owendalulleegh | Main channel | O7A | 4 | - | - |

| EPA Water Body Code | River Catchment | Sub-Catchment | Sample Site | Q-value | | |
|---|---|---|---|---|---|---|
| | | | | 2019 | 2022 | 2024 |
| IE_WE_29O010500 | Owendalulleegh | Main channel | O7B | 4 | - | - |
| IE_WE_29O010500 | Owendalulleegh | Main channel | O7C | 4 | - | - |
| IE_WE_29O010700 | Owendalulleegh | SC8 | O8A | 3-4 (4) | 3-4 | - |
| IE_WE_29O010700 | Owendalulleegh | SC8 | O8B | - | 4 (3-4) | - |
| IE_WE_29O010700 | Owendalulleegh | ‡ | O9B | 3-4 (4) | - | - |
| IE_WE_29O010800 | Owendalulleegh | SC9 | O9A2 | 3-4 (4) | 3-4 | - |
| IE_WE_29O010500 | Owendalulleegh | * | OHL 1 | 4-5 (4) | 3-4 | - |
| IE_SH_25B070100 | Atorick/Bleach | ** | OHL 2A | - | 3-4 / 4 | - |
| IE_SH_25B070100 | Atorick/Bleach | ** | OHL 2 | 4-5 | - | - |
| IE_SH_25B070100 | Atorick/Bleach | ‡‡ | OHL 3 | - | 4 | - |

‡O9B is in a sub-catchment between SC8 and SC9 but which does not receive drainage from the wind farm. *this small stream drains the bulk of the OHL corridor south of the Owendalulleegh; it also drains to the Owendalulleegh. ** this small tributary receives drainage from the very southern end of the OHL corridor and the Agannygal substation. ‡‡ This 'eastern stream' draining to Lough Atorick, doesn't receive any drainage from the OHL corridor but is crossed by the Agannygal haul route.

### 7.3.7 Habitat Description

The following table (Table 7-9) gives a habitat description of each of the sites sampled for Q-value status in 2022 including, channel width, depth, dominant substrate types, instream plant cover, flow type etc. A representative photo of each site is also included.

*Table 7-9. Habitat descriptions and photos of the Q-value survey sites surveyed in 2022. All sites were surveyed in July 2022, whereas bar OHL2A and OHL3 were surveyed in September 2022.*

| Q-Value Survey Sites | Photos |
|---|---|
| **B4** - (555833, 706785) – **Q4-5** (2024)<br><br>Width 2.6-3.0m, 10-18cm<br><br>Cobble dominated stream with interspersed pockets of clean gravel. Large cobble/boulder with high cover of the moss *Fontinalis squamosa* and leafy liverwort (*Chiloscyphus polyanthos* and *Scapania* sp.). *Batrachospermum* common (>1% cover). The flow was slightly higher than average (September 2024) with moderate velocity. The banks were open with *Luzula sylvatica* (Great Woodrush) *Equisetum telmateia* (Great Horsetail), ferns, backed by bramble and willow. Main habitat was a mix of glide/run. |  |
| **B5** - (555540, 706858) – **Q5** (2024)<br><br>Width 4.0-5.0m, 15-25cm<br><br>Main channel Boleyneendoorish (EPA B1). Cobble dominated ~60% with some larger boulders, some bedrock and interstitial clean gravel and coarse sand. High cover of *Fontinalis antipyretica and F. squamosa* plus leafy liverwort (*Pellia epiphylla, C. polyanthos* and *Scapania* sp.). Flow was slightly higher than average (September 2024) and quite fast. Clear but coloured water (humic). Banks generally wooded with willow dominant. Main habitat was a mix of glide/run and rapid. |  |
| **B1A** - (558999, 707026) – **Q4** (2022)<br><br>Width 1.3-1.5m, depth 3-11cm<br>Dominated by small angular cobble and large pebble with scattered larger cobble, ~20% cover of leafy liverwort, (*Chiloscyphus polyanthos*). Banks open, with rushes, ferns, *Rumex* sp. and other herbaceous species. Main habitat was shallow riffle. During kick-sampling much peat silt was dislodged from the substrate. Moderate-swift velocity. |  |

| Q-Value Survey Sites | Photos |
|---|---|
| **D1A** – (561565, 707050) – **Q4 /3-4** (2022)<br><br>Width 1.5-1.7m, depth 5-12cm.<br>Cobble dominated stream with heavy cover of leafy liverwort (*Chiloscyphus polyanthos*), mainly above waterline. Habitat of glides and narrow runs among cobbles. Mainly moderate velocity with patches of swifter flow. Moderate shade from high banks with rushes and ferns, backed by bilberry, willow and young conifer. |  |
| **O1** – (562294, 705591) – **Q3-4** (2022)<br><br>Width 0.5-1.2m, depth 5-12cm.<br><br>Large and medium cobble, often with a thick biofilm of peaty material with fine filamentous green alga and iron scum. The alga *Batrachospermum* was also present at the site. Habitat of glide, pools and short cascades, with evidence of cattle access. Moderate shade from banks with rushes, moss and bramble. Flow velocity moderate and moderate to swift. |  |
| **O3A** – (561854, 704061) – **Q4-5** (2022)<br><br>Width 1.5m (up to 2.5m in pools), depth 5-15cm (~20m in pools).<br><br>Dominated by cobble with patches of gravel, all largely plant-free. Scattered leafy liverwort on large cobble (*Scapania* sp.). Habitat mainly glide and glide/pool all with moderate flow velocities. |  |

| Q-Value Survey Sites | Photos |
|---|---|
| **O4** – (561372, 703602) – **Q3-4** (2022)<br><br>Width 1.5-2.1m, depth 5-7cm.<br><br>Substrate dominated by cobble (~80%) with large pebble and gravel also present. Cobble had an iron-coloured biofilm. Larger cobble had leafy liverwort (*Scapania* sp.) and scattered clumps of *Fontinalis antipyretica*. At the sampling stretch there was slight to moderate shade from overgrown banks (willow and conifer). The habitat comprised riffle/run and glide with moderate flow or locally moderate to swift velocity. |  |
| **O5** – (561145, 702594) – **Q4-5** (2024)<br><br>Width 2.2-2.7m, depth 8-15cm.<br><br>Cobble (~50%) with large pebble and gravel. The main habitat was glide with widely spaced short riffle/runs. The substrate was largely plant-free except for occasional clumps of leafy liverwort (*Chiloscyphus polyanthos*) on large cobble. The channel further upstream and downstream, particularly through and downstream of Flaggy Bridge, was dominated by bedrock. |  |
| **O5A** – (560311, 702513) – **Q4** (2022)<br>Width (wetted channel) 1.5m, depth 5-10cm.<br><br>Substrate of boulder and large cobble, and the wetted channel had ~60% small cobble and ~40% large pebble and gravel. The wetted channel was plant-free, with leafy liverwort (*Chiloscyphus polyanthos*) on larger cobble above the water line. The habitat consisted of shallow glide and riffle/run in moderate and moderate to slow velocities. The channel was heavily shaded by conifer and willow, with an understorey of mosses and woodland herbs. |  |

| Q-Value Survey Sites | Photos |
|---|---|
| **O7** – (560123, 701248) – **Q4-5** (2024)<br><br>Width 7.0-11.0m, depth 18-30cm.<br><br>Small boulder 20%, Cobble (~40%) with large pebble and gravel. Mainly glide habitat with a riffle/run in the shallows between the Stepping Stones of Tooraglassa Ford where the cahnnel broadens out. The instream areas were largely plant-free, but with patches of *F. antipyretica, Myriophyllum alterniflorum* and *Ranunculus flammula* at margins. Banks were wooded with ash, rowan, willow and hawthorn dominant. Water was very clear and slightly coloured (humic). |  |
| **O8A** – (558753 701811) – **Q3-4** (2022)<br><br>Width 1-1.5m, depth 3-9cm.<br><br>The substrate comprised roughly half and half cobble and gravel, with leafy liverwort (*Scapania* sp.) on medium sized cobble. The habitat was a mix of shallow glides and short riffle/runs in moderate or slow velocities. The channel was heavily shaded from overgrowing bankside trees. |  |
| **O8B** – (557263 701255) – **Q4 / 3-4** (2022)<br><br>Width 0.9-1.5m, depth 5-15cm.<br><br>The substrate, which was largely plant-free was dominated by boulders and cobble with pockets of pebble and gravel. The habitats consisted of short glide/pools and short step cascades, in moderate flow velocities. The banks were open with bramble and grasses on the left bank and occasional overhanging willow on the right bank casting slight shade. |  |

| Q-Value Survey Sites | Photos |
|---|---|
| **O6A** – (561083 701250) - **Q4** (2022)<br><br>Width 1.2-1.5m, depth 5-15cm.<br><br>Cobble dominated (~90%) with pebble and gravel, with leafy liverwort (*Scapania* sp.) on occasional larger cobbles. The habitat comprised riffle/run and glide in a moderate to swift flow. The channel is shaded by a high undercutting right bank topped by grass, gorse and bramble and overhanging willow on the left side of the channel dominated by a cobble berm. |  |
| **O9A2** – (555646 701673) – **Q3-4** (2022)<br><br>Width 0.8-1.5m, depth 5-20cm.<br><br>A boulder cascade stream with high leafy liverwort cover (*Scapania* sp.) and pockets of gravel in pools, moderate to slow flow velocities. The channel is heavily shaded in places due to overhanging will, mountain ash and conifers. |  |
| **OHL1** – (562121 700691) – **Q3-4** (2022)<br><br>Width 1-1.5m, depth 2-5cm.<br><br>The substrate comprised ~30% cobble and 70% pebble and gravel, with occasional leafy liverwort (*Scapania* sp.) and frequent *Batrachospermum*. The habitat comprised very shallow riffle with a moderate velocity situated between upstream and downstream glides. The channel was open and unshaded. The banks had rushes, grasses and herbs. |  |

| Q-Value Survey Sites | Photos |
|---|---|
| **OHL2A**– (563549 697832) – **Q3-4/4** (2023)<br><br>Deeply drained, widened, straightened channel through wet, rushy heath. Stagnant pools, and sluggish-moderate fast glides over peat/clay lined channel with heavy peat silt layer. Instream macrophytes include *Potamogeton polygonifolium* (+++); *Zannichellia palustris.* (++); *Glyceria maxima* (+); *Phragmites australis* (+); *Mentha aquatica* (+). Pond sweep revealed numerous *Asellus* and a few Baetid mayfly. Nemourid stoneflies noted in kick-sample upstream of track (March, 2023) |  |
| **OHL3** – (565030 698293) – **Q4** (2022)<br><br>Width 0.7m, depth 8-12cm.<br><br>A small drained and straightened stream along an apparent forestry fire-break, with some reasonable instream habitat. It is incised into clay / peat in wet heath, with occasional low willow along the stream corridor. It forms a riffle-run, glide, small pool sequence over substrates that are cobble/pebble dominated in fast water and peat silt/detritus dominated in slacker flows. |  |

## 7.3.8 Water Chemistry

### 7.3.8.1 EPA Data

The EPA do not undertake water chemistry analysis on any of the streams draining the windfarm nor in the upper and middle reaches of any of the three main rivers into which these tributaries flow.

### 7.3.8.2 Water Chemistry

### 7.3.8.3 Overview

Data on water chemistry from the main streams draining the wind farm and one small stream draining the OHL corridor (OHL 1) are available for 13 sites in 2022 and for 9 and 2 of the same sites respectively from 2019 and 2018, see Tables 7-10(a), 7.10(b) and 7.10(c). In addition, data is available for two of the larger channels (B3 and O7) from 2018. The 2019 and 2018 data reported here is taken from the 2020 rEIAR. The 2019 and 2018 data are reported here (i) in order to note any temporal trends in the watercourses and (ii) to take account of differences in flow during sampling runs. The latter can be evaluated because the 2019 samples were taken during a period of elevated flows in August of that year, whereas the 2022 and 2018 samples were taken during average to low flows in July and October, respectively.

### 7.3.8.4 pH, conductivity, alkalinity and calcium

The data for these parameters points to generally 'soft' water with a circumneutral to slightly acidic character in the surveyed channels. The only exception is Site 9B which had by far the highest pH, conductivity, alkalinity and calcium values in 2022 and again in 2019 when compared to most other sites, which suggests that some of the land in that sub-catchment may be limed from time to time for agricultural purposes. A number of sites had very low or negative alkalinities in 2019 suggesting that they have very low buffering capacity in their soils and may be susceptible to acid pulses on occasion. These include Sites D1A, O8A and O9A2. All three sites also had pH values at or just below 5 on the same occasion.

### 7.3.8.5 Colour and DOC

Bar a few exceptions, both DOC (dissolved organic carbon) and colour were elevated at all sites, confirming the prevalence of peat in the various sub-catchments (Liu *et al.,* 2014). Where a given site was surveyed both in 2019 and 2022, the results for 2019 were always significantly higher, which may have resulted from the elevated flows during the 2019 sampling.

### 7.3.8.6 BOD, ammonia and SRP

These three parameters are each listed in Table 9 of Schedule 5 of S.I. 272 of 2009 'European Communities Environmental Objectives (Surface Waters) Regulations 2009' i.e., '*Physico-chemical conditions supporting the biological elements*'. Using these data, the results listed in Tables 7-10(a), (b) and (c) for these three parameters have been classified as either corresponding to High (blue) or Good Status (green) based on the means reported for these two categories in the regulations, and if the concentrations are marginally higher than those means, they have been classified as Moderate (yellow), and as Poor (orange) if appreciably higher than the means. This is just a way of summarising the nutrient/water quality parameters and trying to place them into a WFD classification. They should be read in conjunction with the Q-values for the same sites.

Most of the sites on most occasions were either High Status or Good Status for all three parameters with a few Moderate Status results. The only site with a Poor Status result (for SRP, based on just one sample) was Site 8A and it was the only site which scored less than High Status for more than one of these parameters on more than one occasion, which may point to a slightly higher nutrient status in this sub catchment than in the others sampled. Approximately two thirds of the 2019 sites had at least one parameter less than High Status whereas this occurred in just a third of the 2022 sites. This is thought to be because the 2022 samples were taken in a period of low flow when diffuse nutrients would likely be less mobile, in contrast to the 2019 samples which were taken during elevated flows when nutrient and BOD runoff would have been facilitated. Felling of forestry on upland blanket peat is known to be associated with soluble phosphorus release for several years post felling (Rogers *et al.,* 2010) and this may be a source of some of the higher SRP results noted, especially as peat soils have a poor capacity to bind phosphorus. In addition, ammonia can be leached from mineralised peat, especially as it dries seasonally or is drained (Daniels *et al.,* 2012). Note that ammonia tends to rapidly oxidise to nitrate with distance downstream from headwater streams, so that elevated ammonia would be more likely to be observed in lower order, upland streams.

### 7.3.8.7 Iron

Most sites had elevated iron concentrations, with the highest concentrations (>1mg Fe/l) at Sites B1C, D1A, O1, O3A, O4 and OHL1. Definite iron staining of the substrate and/or iron floc on substrate was noted at Site O1.

### 7.3.8.8 Aluminium

Aluminium (total and monomeric) were also measured at the selected sites for completeness. Where the same sites were surveyed in 2019, it is clear that the corresponding concentrations of this metal were significantly higher than in 2022, which can be attributed to the higher flows occurring at the time. The significance of aluminium is that it can be toxic to fish, including brown trout (Brown, 1983). However, the aqueous chemistry of aluminium is very complex and is strongly influenced by pH and other chemical constituents in the water. The toxicity of aluminium increases as the pH drops below 5.5 because its solubility increases. In the pH range 6.0-7.5, solubility declines and generally so does toxicity (Crane *et al.,* 2007). It should be noted however that the toxicity of aluminium is ameliorated by the presence of TOC (equivalent to [2]DOC in Derrybrien waters) and calcium. Laudon *et al.,* (2005) suggested using the ratio: [3]ANC/$H^+$ as an index to predict brown trout mortality potential in acid-affected streams. Applying that index, only Sites B4, D1A and O8A had values for the index that brought them into the range where some trout might have been at risk in 2019, whereas none of the sites surveyed in July 2022 had a combination of aluminium concentration and pH likely to pose any risk to trout. Given the fact that precipitation and hence flow is a driver of both increased aluminium leaching and lower pH, especially in upland streams, it is clear that the potential toxic stress from this metal is likely to be variable throughout the year but only likely to be of significance in streams where pH regularly drops below 5.5. While pH does occasionally drop below 5.5 in some of these streams, it rarely drops appreciably below and even then, is often accompanied by elevated TOC/DOC and calcium, both of which help to counter the toxicity of this metal. In the larger channels further down in the catchment, the concentration of aluminium tends to decrease, and alkalinity and pH tend to increase, which has the effect of effectively eliminating the risk of aluminium toxicity.

### 7.3.8.9 Suspended Solids

Suspended solids (marked as 'solids' in the results tables) were only measured in 2022 and as the discharge at the time was very low, elevated concentrations wouldn't have been expected, indeed suspended solids concentrations are normally very variable and heavily dependent on the discharge levels at the time of sampling, as well as on the time elapsed from the last peak flow event, among other variables. For these reasons, spot samples of suspended solids tend to be of quite limited value unless sampling frequency is very high. In suspension, suspended solids are probably less problematic, unless in very high concentrations, but once settled out on the stream bed they can be associated with several negative impacts depending on the amounts involved. The principal concern in the context of the current project is the potential negative impact on fisheries. This would arise if fine solids (e.g., <1 mm) enter the streambed gravels and reduce the inter-gravel flow rates, thereby reducing the flux of dissolved oxygen to the streambed. This in turn could reduce the success of trout eggs hatching in redds and in extreme cases might also clog the gills of developing larvae or even prevent them from emerging from the gravel. Moreover, if the solids entering the sediments are high in organic solids, depending on the degree of degradability, they may also exert an oxygen demand in the bed sediments which in turn would add to the reduction of oxygen reaching buried trout eggs. It should be noted that none of the surveyed sites showed clear signs of sedimentation on the surface of the stream bed. However, this in itself wouldn't preclude the possibility of a built-up of fines in gravels below the surface. An indication of subsurface sediment is gauged if a turbidity plume develops during kick-sampling when the stream bed is disturbed and although this wasn't systematically checked it was noted as occurring at Sites B1C, O1 and to some extent at OHL1. In the three sites listed the solids in question were peat derived, and some level of peat solids was likely a feature at most of the survey sites to a limited extent.

[2] DOC = dissolved organic carbon which differs TOC (total organic carbon) only in that the sample is first filtered to remove particulates before analysis.
[3] ANC = Acid Neutralising Capacity

*Table 7-10(a). Water chemistry results for 2018, 2019 and 2022. Highlighted cells refer to comparison with 2009 surface water regulations for High (blue), Good (green), Moderate (yellow) and Poor (orange) Status waters (see text for details)*

| Parameter | B3 | B4 | B4 | B1 | B1C | D1A | D1A | O1 | O1 |
|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2018 | 2022 | 2019 | 2022 | 2019 | 2022 | 2019 | 2022 |
| Temp | 11.6 | 11.1 | 17.4 | 14.5 | 19.8 | 14.5 | 18.9 | 15.2 | 15.9 |
| pH | 7.3 | 6.3 | 7.12 | 6.73 | 7.48 | 4.75 | 7.49 | 5.97 | 7.10 |
| Conduct. (µS/cm) | 137 | 81 | 103 | 64.2 | 163 | 49.8 | 123 | 31.2 | 79 |
| Alkalinity | 38.8 | 7 | 19.5 | 13 | 46.7 | -0.3 | 35.0 | 2.7 | 21.2 |
| Calcium (mg/l, Ca) | 15.4 | 5.4 | 9.12 | 6.92 | 17.76 | 2.78 | 14.24 | 1.79 | 7.04 |
| BOD (mg/l, $O_2$) | 1.1 | 1.6 | 1.3 | 1 | 1.6 | 1 | 1.3 | 0.6 | 0.9 |
| Suspended Solids (mg/l) | - | - | 1.3 | - | 0.7 | - | 1.1 | - | 2.7 |
| Ammonia (mg N/l) | 0.024 | 0.070 | 0.036 | 0.034 | 0.030 | 0.052 | 0.024 | 0.02 | 0.038 |
| SRP (mg P/l) | 0.007 | 0.024 | 0.023 | 0.007 | 0.009 | 0.023 | 0.007 | 0.003 | 0.004 |
| Total P (mg P/l) | - | - | 0.047 | 0.021 | 0.028 | 0.048 | 0.023 | 0.014 | 0.016 |
| TON (mg N/l) | 0.02 | 0.02 | 0.018 | 0.03 | 0.049 | 0.05 | 0.119 | 0.03 | 0.021 |
| DOC (mg C/l) | - | - | 20.7 | 27.6 | 11.5 | 40.9 | 14.9 | 16.9 | 8.4 |
| Colour (Hazan) | 159 | 411 | 291 | 353 | 132 | 505 | 206 | 211 | 174 |
| Iron (mg Fe/l) | - | - | 0.870 | - | 1.236 | - | 2.083 | - | 1.481 |
| Total Al (µg/l) | - | - | 109 | 138 | 44 | 202 | 67 | 91 | 43 |
| Monomeric Al (µg/l) | - | - | 18 | 24 | <5 | 105 | 21 | 50 | <5 |

*Table 7-10(b). Water chemistry results for 2018, 2019 and 2022. (see Table 7-10(a) for more details)*

| Parameter | O3A | O3A | O4 | O4 | O4 | O5A | O5A | O5 | 06A |
|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2022 | 2018 | 2019 | 2022 | 2019 | 2022 | 2022 | 2022 |
| Temp | 14.7 | 18.3 | 12.5 | 14.0 | 16.0 | 13.9 | 16.3 | 18.2 | n/m |
| pH | 6.7 | 7.35 | 6.74 | 6.17 | 7.12 | 6.09 | 7.48 | 7.84 | 7.91 |
| Conduct. (µS/cm) | 50.4 | 113 | 124 | 51.4 | 195 | 48.4 | 100 | 157 | 201 |
| Alkalinity | 11.1 | 32.3 | 32.7 | 6.2 | 72.0 | 4.6 | 43.4 | 50.9 | 73.9 |
| Calcium (mg/l, Ca) | 6.46 | 13.32 | 13.5 | 4.63 | 24.84 | 3.96 | 16.68 | 19.08 | 26.3 |
| BOD (mg/l, $O_2$) | 1.4 | 1.1 | 1.3 | 1.2 | 1.1 | 1.2 | 1.0 | 1.1 | 1.2 |
| Solids (mg/l) | - | 0.9 | - | - | 1.1 | - | 0.7 | 0.9 | 1.0 |
| Ammonia (mg N/l) | 0.053 | 0.023 | 0.05 | 0.04 | 0.051 | 0.038 | 0.028 | 0.026 | 0.031 |
| SRP (mg P/l) | 0.009 | 0.010 | 0.006 | 0.006 | 0.007 | 0.059 | 0.008 | 0.005 | 0.004 |
| Total P (mg P/l) | 0.031 | 0.024 | | 0.026 | 0.015 | 0.099 | 0.022 | 0.011 | 0.011 |
| TON (mg N/l) | 0.07 | 0.029 | 0.02 | 0.04 | 0.045 | 0.05 | 0.074 | 0.048 | 0.108 |
| DOC (mg C/l) | 28 | 12.6 | | 30.7 | 10.3 | 31 | 12.4 | 9.3 | 6.6 |
| Colour (Hazan) | 391 | 150 | 179 | 415 | 109 | 379 | 116 | 87 | 50 |
| Iron (mg Fe/l) | - | 1.037 | - | - | 1.146 | - | 0.438 | 0.886 | 0.442 |
| Total Al (µg/l) | 163 | 69 | - | 236 | 60 | 160 | 45 | 50 | 25 |
| Monomeric Al (µg/l) | 42 | 32 | - | 81 | 18 | 57 | 23 | 25 | <5 |

*Table 7-10(c). Water chemistry results for 2018, 2019 and 2022. (see Table 7-10(a) for more details)*

| Parameter | O8A | O8A | O9B | O9B | O9A2 | O9A2 | O7 | OHL1 |
|---|---|---|---|---|---|---|---|---|
| | 2019 | 2022 | 2019 | 2022 | 2019 | 2022 | 2018 | 2022 |
| Temp | 13.9 | 16.0 | 14.5 | 15.5 | 13.9 | 16.6 | 14.7 | n/m |
| pH | 4.94 | 6.37 | 7.03 | 8.11 | 5.09 | 7.08 | 7.46 | 7.42 |
| Conduct. (µS/cm) | 46.5 | 84 | 66.3 | 316 | 41.6 | 90 | 162 | 135 |
| Alkalinity | 0.1 | 5.1 | 14.7 | 138.5 | 1 | 18.0 | 47.1 | 42.8 |
| Calcium (mg/l, Ca) | 2.05 | 5.08 | 7.12 | 49.6 | 2.44 | 7.88 | 20.3 | 15.2 |
| BOD (mg/l, $O_2$) | 0.9 | 1.5 | 1.2 | 1.2 | 1 | 1.1 | 1.3 | 1.3 |
| Solids (mg/l) | - | 0.7 | - | 0.9 | - | 1.6 | - | 2.3 |
| Ammonia (mg N/l) | 0.042 | 0.041 | 0.035 | 0.026 | 0.043 | 0.026 | 0.020 | 0.079 |
| SRP (mg P/l) | 0.242 | 0.028 | 0.05 | 0.024 | 0.062 | 0.010 | 0.001 | 0.004 |
| Total P (mg P/l) | 0.278 | 0.049 | | 0.029 | 0.094 | 0.024 | | 0.017 |
| TON (mg N/l) | 0.05 | 0.054 | 0.081 | 0.222 | 0.040 | 0.020 | 0.03 | 0.041 |
| DOC (mg C/l) | 32.5 | 20.6 | 0.05 | 5.4 | 35 | 17.1 | | 14.5 |
| Colour (Hazan) | 403 | 224 | 26.4 | 37 | 433 | 212 | 107 | 195 |
| Iron (mg Fe/l) | - | 0.643 | - | 0.083 | - | 0.620 | - | 1.183 |
| Total Al (µg/l) | 190 | 169 | 147 | 49 | 209 | 72 | - | 95 |
| Monomeric Al (µg/l) | 106 | 88 | 44 | 28 | 114 | 16 | - | 16 |

## 7.3.9 Fisheries

### 7.3.9.1 Overview

Data on fisheries in the study area comes from IFI surveys, surveys undertaken for the 2020 rEIAR and the current study. The IFI published results derived from their WFD monitoring programme, all of which are published on the WFD.ie website. They relate to sites on the lower stretch of the Owendalulleegh River before it enters Lough Cutra (see Figure 7-1). There are no other published IFI data for the upper reaches of the Owendalulleegh, Boleyneendorrish or Duniry Rivers and no data for the smaller tributaries draining the wind farm. Data for the latter watercourses comes from the 2020 rEIAR and the current study.

### 7.3.9.2 Findings of Fisheries Surveys

The IFI surveys undertaken on the Owendalulleegh in 2009, 2013 and 2016 in the lower reaches within 6km of the inflow to Lough Cutra (Kelly *et al.,* 2017) recorded the following species in the river: brown trout, eel, lamprey (*Lampetra* sp.), perch, gudgeon and stone loach. In addition to these, 3-spined stickleback, minnow and pike are also recorded from the Owendalulleegh, pike in the very lower reaches immediately upstream of Lough Cutra. In the IFI surveys total trout densities ranged from 0.026 to 0.070 fish per $m^2$ and stone loach densities ranged from 0.003-0.023 fish per $m^2$. The two dominant species on the main channel of the Owendalulleegh recorded as part of the 2020 rEIAR and the current study were brown trout and stone loach. Surveys on the upper reaches of the Boleyneendorrish and its smaller tributaries draining the wind farm for the 2020 rEIAR and the current study recorded exclusively brown trout, with the exception of one record of minnow in a single headwater channel (B1). While it's not possible to rule out other species, in particular eel, stickleback and lamprey, the fact that none were encountered despite surveys at several sites, some surveyed on more than one occasion, suggests that if they are present, these species are likely to be present only at very low densities. The upper Duniry (Site D1A) which is approximately 2.4km downstream of the boundary of the wind farm was surveyed in 2022 and the only species present was minnow, whereas when a site just over 3km farther downstream on the same river (Site D1) was surveyed in 2011 (2020 rEIAR) brown trout were also recorded (Table 7-11).

In terms of prevalence, brown trout was by far the most frequently encountered species (Table 7-11). This is to be expected as all of the sites fished had habitat suitable for salmonids even if it wasn't always optimal. Moreover, the Q-value surveys indicated that all of the sites were suitable in terms of biological water quality for the species (Kelly *et al.,* 2007). If the Owendalulleegh and Boleyneendorrish Rivers had open connections to the sea, i.e., without long underground river stretches, then the larger of the sites surveyed would almost certainly have had juvenile salmon present also, as the habitat and water quality are in most cases suitable.

Where sites were fished on more than one occasion in different years (e.g., B3, O3, O5A, O7C) the trout densities were generally found to be within a similar order of magnitude, which suggests that the fish populations in these streams are relatively stable. The actual trout densities encountered tended to be highest in the larger, open channels e.g., O7A, O7B and O7C, all on the main channel of the Owendalulleegh. The exception to this was B2, a smaller channel where comparatively higher densities were also recorded. However, B2 had a lower gradient than many of the other smaller channels, and it also had a more uniform, unshaded riffle with smaller grade, non-imbedded, substrate making it ideal for trout spawning and nursery. Several of the other channels were in areas of steeper gradients with coarser substrate, (B4, O5, O6, O5A), or with iron scum (O1) and/or peaty cover on or in the substrate (B1A, O1, O2, O3, O4 and OHL1), all of which would be sub-optimal for salmonid spawning, potentially resulting in lower densities or intermittent presence or absence of trout. There is evidence also that barriers to migration are affecting some sites. Despite surveys on three separate occasions at Site O5 and at Site O4 farther upstream on the same channel in sub catchment SC7(b), no fish were recorded at either site, even though the habitat was suitable at both. In contrast, fish were present at Site

O6 and O6A farther downstream on the same watercourse, which included trout, stone loach and eel. The absence of fish at the two upstream sites is thought to be mainly owing to the combined effects of two natural rock outcrop / waterfalls and a poorly constructed forestry culvert downstream of Site O5 (Flaggy Bridge). Given fish cannot access as far as Site O5 (Flaggy Bridge), the presence of the two rock armour Barrages (3 and 4) do not materially alter the passage of fish further upstream as far as Site O4. Very low fish densities at Site O5A (at the bottom of sub-catchment SC7(c)) may also be affected by the culvert referred to above, which is situated immediately downstream of where the O5A channel joins the O5 channel. There are also potential natural barriers (at least partial) at sites between O6A downstream and O6 farther upstream on the same channel which may also be influencing fish migration success i.e., at ITM: [561336, 701926] [561158, 701960] [561141, 701972].

Electrofishing surveys were not undertaken on either the eastern or western streams along the Agannygal substation haul route, but both are thought unlikely to have trout in the upper reaches closest to the Agannygal substation due to the very small size of the channels present. There was some potential trout habitat near OHL3 on the eastern stream but, if present, densities are likely to be low as the habitat is sub-optimal. Given however that the water quality in both streams is considered Good Status (Q4) at OHL3 (2022) and High Status at OHL2 (in 2019) trout are likely to be present in the lower reaches of both streams i.e., upstream of their inflow to Lough Atorick, where the habitat is more suitable on the western stream (based on observations there in 2019) and by extension also in the lower reaches of the eastern stream.

*Table 7-11 Results of electrofishing surveys taken in the upper reaches of the Owendalulleegh, Boleyneendorrish and Duniry Rivers as well as several tributaries draining the wind farm site. *Numbers of fish per $m^2$, total numbers in brackets*

| Sites | Trout | Trout | Trout | Trout | Stone loach | Stone loach | Eel | Eel | Stickleback | Minnow | Minnow |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2011 | 2014 | 2019 | 2022 | 2019 | 2022 | 2011 | 2014 | 2019 | 2011 | 2022 |
| B1 | 0.06 (4) | - | - | -- | - | - | - | - | - | - | - |
| B1A | | - | - | 0.020 (2) | - | - | - | - | - | - | - |
| B2 | 0.188 (10) | | 0.174 (18) | 0.130 (10) | - | - | - | - | - | - | - |
| B4 | 0.050 (6) | | 0.064 (7) | 0.117 (9) | - | - | - | - | - | - | - |
| B5 | 0.040-0.051 (13) | - | - | - | - | - | - | - | - | - | - |
| D1 | 0.13-0.18 (19) | - | - | - | - | - | - | - | - | 0.007-0.009 (1) | - |
| D1A | | - | - | - | - | - | - | - | - | - | 0.071 (3) |
| O1 | No Fish | - | - | - | - | - | - | - | - | - | - |
| O2 | No Fish | - | 0.032 (3) | - | - | - | - | - | - | - | - |
| O3 | - | - | 0.052 (3) | 0.056 (4) | 0.017 (1) | - | 0.013 (1) | - | - | - | - |
| O4 | No Fish | No Fish | | No fish | - | - | - | - | - | - | - |
| O5 | | No Fish | No Fish | No Fish | - | - | - | - | - | - | - |

| Sites | Trout | Trout | Trout | Trout | Stone loach | Stone loach | Eel | Eel | Stickleback | Minnow | Minnow |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O5A | 0.0102 (1) | | 0.017 (1) | No Fish | - | - | - | - | - | - | - |
| O6 | 0.011 (2) | 0.045 (9) | 0.014 (2) | 0.028 (5) | - | - | 0.009 (3) | | - | - | - |
| O6A | - | - | 0.143 (13) | - | 0.450 (41) | - | - | 0.011 (1) | - | - | - |
| O7A | - | - | 0.195 (43) | - | 0.226 (50) | - | - | - | - | - | - |
| O7B | - | - | 0.295 (39) | - | 0.152 (20) | - | - | - | - | - | - |
| O7C | - | - | 0.289 (34) | 0.139 (29) | 0.119 (14) | 0.029 (6) | - | - | 0.009 (1) | - | - |
| OHL 1 | - | - | - | 0.028 (1) | - | - | - | - | - | - | - |

*Where there's a range of densities that's because the length of channel fished was between 30m and 40m, resulting in a range of area ($m^2$) fished

*Table 7-12 Habitat details of electrofishing sites from September 2022*

| Fishing Site Descriptions (2022) | Photo of Site |
|---|---|
| **B4** – (563549 697832)<br>15% Boulder; 60% Cobble, 20% Pebble, 5% Gravel<br>Length sampled 22.6m over 10 minutes<br>All riffle/cascade<br>Average width: 3.4m Average depth: 0.14m<br>Heavy riparian cover, predominately willow and rowan<br>Trout (9) |  |

| Fishing Site Descriptions (2022) | Photo of Site |
|---|---|
| **B2** – (557160 706458)<br>20% Cobble, 50% Pebble, 30% Gravel<br>Length sampled 40.5m over 10 minutes<br>Mostly riffle/glide with one small pool at downstream end<br>Average width: 1.9m Average depth: 0.13m<br>Open, bank vegetation a mixture of *Festuca, Holcus* sp. and *Juncus effusus*<br>Trout (10) |  |
| **B1A** – (565030 698293)<br>60% Cobble, 40% Pebble, 10% Gravel<br>Length sampled 50m over 10 minutes<br>Riffle/Glide<br>Bank vegetation bramble, gorse, soft rush, grasses, ferns<br>Average width 2m Average depth 0.11m<br>Peat silt/detritus dominated in slacker flows.<br>**No fish caught** |  |
| **D1A –** (561580 707058)<br>90% Cobble, 5% Pebble, 5% Gravel<br>Riffle/Glide/Cascade<br>Average width: 1m Average depth: 0.15m<br>Bank vegetation overhanging willow and rowan with grasses and soft rush. One Sitka sapling in stretch above culvert<br>Length sampled 40m over 10mins (split above and below culvert)<br>Minnow (3) |  |

| Fishing Site Descriptions (2022) | Photo of Site |
|---|---|
| **O4** – (561355 703613)<br>80% Cobble, 15% Pebble, 5% Gravel<br>All glide<br>Average width 2.1m, Average depth: 0.2m<br>Heavily overgrown with gorse and bramble, overhanging riparian cover of willow<br>20m sampled (no fish caught)<br>**No fish caught** |  |
| **O3** – (563549 697832)<br>5% Cobble, 25% Pebble, 70% Gravel<br>Riffle/Glide (mostly glide)<br>Average width 2.3m, Average depth 0.16m<br>Length sampled 31m over 10 minutes<br>Riparian woodland of willow, some gorse overhanging<br>Trout (4) |  |
| **O5** – (561145 702597)<br>20% Cobble, 50% Pebble, 30% Gravel<br>Length sampled 40.5m over 10 minutes<br>Mostly riffle/glide with one small pool at downstream end<br>Average width: 1.9m Average depth: 0.13m<br>Open, bank vegetation a mixture of *Festuca*, *Holcus* sp. and *Juncus effusus*<br>**No fish caught** |  |

| Fishing Site Descriptions (2022) | Photo of Site |
|---|---|
| **O5A** – (565030 698293)<br>40% Boulder, 40% Cobble, 15% Pebble. 5% Gravel<br>24m sampled (no fish caught)<br>All riffle<br>Average width 3m, Average depth: 0.11m<br>Heavily overhung with Sitka spruce, some bramble and ferns on banks<br>**No fish caught** |  |
| **O6 –** (561114 701977)<br>40% Boulder, 20% Cobble, 5% Pebble, 5% Gravel<br>Riffle with a large deep pool at the upstream end at the culvert outflow<br>36m sampled over 10 minutes<br>Average width: 5m, Average depth: 0.29m<br>Trout (5) |  |
| **O7C** – (562447 701486)<br>60% Cobble, 30% Pebble, 10% Gravel<br>70% Glide/30% Riffle<br>36m sampled over 10 minutes<br>Average width 5.8m, Average depth: 0.22m<br>Trout (29)<br>Stone loach (7) |  |

| Fishing Site Descriptions (2022) | Photo of Site |
|---|---|
| **OHL1** – (563756 697352)<br><br>3% Boulder, 80% Cobble, 7% Pebble, 10% Gravel (Everything covered with a layer of peat sediment)<br><br>60% deep glide/40% riffle<br><br>Average width 1.3m, Average depth: 0.23m<br><br>28m sampled over 10 minutes<br><br>Trout (1) |  |

## 7.3.10 Ecological and Freshwater Value

### 7.3.10.1 Approach

In order to assign an ecological value to the rivers and streams draining the windfarm and the OHL corridor, and the watercourses into which the latter discharge, i.e. those which could also potentially be impacted by the Prospective Development, the classification system set out in Table 7-4 has largely been relied on. However, some watercourses have been slightly elevated or lowered in value class depending on more site-specific factors. The ecological and freshwater value assigned to each watercourse within the study area is presented in Table 7-13.

### 7.3.10.2 Overview of the Evaluation

Table 7-13 lists the ecological valuations assigned to each of the channels assessed as part of the EIAR. In terms of the proportion of area of the windfarm and the OHL corridor which ultimately drains to them, the two main watercourses potentially impacted by the decommissioning are the Owendalulleegh and Boleyneendorrish Rivers. The other two rivers which are connected to the windfarm and the southern end of the OHL corridor are, respectively, the Duniry River, which is in the Shannon catchment and the Lough Atorick/Bleach River catchment which is also in the Shannon catchment. However, in both cases the areas draining to these are very small and the watercourses involved are likewise very small. The main channel of the Boleyneendorrish and Owendalulleegh Rivers are both large 4$^{th}$ order channels in their mid to lower reaches. In addition, two and three sites respectively on these rivers have consistently returned the highest Q-value rating of Q5 over the past 20+ years, something which has become much rarer over the past 10-15 years in Irish rivers. In fact between 2012 and 2020, on average, just 27 sites, i.e. marginally less than 1% of all sites monitored for biological quality, were assigned the highest Q-rating of Q5 by the EPA (see EPA, 2020 and 2021). Moreover, both rivers have excellent salmonid habitats and documented confirmed populations of trout and other fish species. Therefore, both these main channels and sites on them have been accorded national level importance even though one couldn't really refer to them as 'major trout fisheries' which is one of the criteria indicated for a National importance designation in Table 7-4. Nevertheless, as part of the current ecological value assessment, the combination of a healthy trout population, excellent salmonid habitat and a natural hydromorphology, combined with consistently High Status (Q5) water quality has prompted a higher value designation for these two channels. Against that, the more upper reach sites on the Owendalulleegh (sites O7A, O7B and O7C), because they tended to return Good (Q4) rather than High Status water quality have been assigned County level value instead. All of the other streams draining the windfarm and the OHL corridor are much smaller, have variable water quality and

variable or low fisheries value and these have been assigned values from County level to Local level (low) ecological values depending on their individual hydromorphology and their monitored baseline results. Wherever there was uncertainty as to which one of two classifications to choose, the higher value was chosen as a precautionary approach.

*Table 7-13 Habitat evaluation for streams draining the wind farms and the OHL corridor.*

| Catchment | Site Code | Ecological Valuation Category (NRA, 2009) | Reason |
|---|---|---|---|
| Boleyneendorrish | BIA | D – Local Importance (High) | Some potential trout spawning / nursery habitat, and a low trout density confirmed (Q4) |
| | B1B | E – Local Importance (Low) | No significant salmonid potential (Q3-4) |
| | B1C | D – Local Importance (High) | Some potential trout spawning / nursery habitat |
| | B2A | E – Local Importance (Low) | Some potential trout spawning / nursery habitat. Good Status (Q4) |
| | B2 | C– County Importance | Good trout spawning and nursery habitat. Good trout population confirmed. High status (Q4-5) waters. |
| | B3A | C– County Importance | Good trout nursery habitat. 3rd order channel, High status (Q4-5) waters. |
| | B3 | C– County Importance | Good trout nursery habitat. 3rd order channel, High status (Q4-5) waters. |
| | B4 | C– County Importance | Good trout nursery habitat. Modest to good trout population confirmed. High status (Q4-5) waters. |
| Duniry | D1A | E – Local Importance (Low) | Some potential salmonid habitat present but minnow the only fish recorded, 1st order stream, Moderate – Good Status (Q4 or Q3-4) |
| Owendalulleegh | O1 | E – Local Importance (Low) | No fish present, Moderate Status (Q3-4) |
| | O2 | E – Local Importance (Low) | No fish present, Moderate Status (Q3-4) |
| | O3 | C– County Importance | Trout nursery habitat, confirmed trout population, High Status (Q4-5). |
| | O3A | D – Local Importance (High) | Trout nursery habitat present, High status (Q4-5) waters. |
| | O4B | E – Local Importance (High) | Some salmonid habitat but no trout present due to downstream barriers. High status (Q4-5) waters. |
| | O4A | E – Local Importance (Low) | Very small stream with limited salmonid habitat but no trout present due to downstream barriers. Good status (Q4) waters. |
| | O4 | D – Local Importance (High) | Good salmonid habitat but no trout present due to downstream barriers. Good or Moderate status (Q4, Q3-4) waters. |

| Catchment | Site Code | Ecological Valuation Category (NRA, 2009) | Reason |
|---|---|---|---|
| | O5 | E – Local Importance (Low) | Limited salmonid habitat but no trout present due to downstream barriers. High status (Q4-5) waters. |
| | O6 | D – Local Importance (High) | Some salmonid habitat but low densities of trout, possibly related to partial downstream barriers. High status (Q4-5, (2011) and Good Status (2014) |
| | O6A | C– County Importance | Salmonid nursery habitat, confirmed good trout population, 3rd order channel, Good Status (Q4) |
| | O5A | D – Local Importance (High) | Good salmonid nursery habitat but poor trout population due to downstream intermittent barrier. High or Good status (Q4-5, Q4) waters. |
| | O7A | C – County Importance | Good trout spawning and nursery habitat. Good trout population confirmed. Good status (Q4) waters, 3rd order channel. |
| | O7B | C – County Importance | Good trout spawning and nursery habitat. Good trout population confirmed. Good status (Q4) waters, 3rd order channel. |
| | O7C | C – County Importance | Good trout spawning and nursery habitat. Good trout population confirmed. Good status (Q4) waters, 3rd order channel. |
| | O8A | D – Local Importance (High) | Some potential trout spawning / nursery habitat. Good status (Q4) waters. |
| | O8B | D – Local Importance (High) | Some potential trout spawning / nursery habitat. Moderate status (Q3-4) waters. |
| | O9B | D – Local Importance (High) | Some potential trout spawning / nursery habitat. Moderate status (Q3-4) waters. |
| | O9A2 | E – Local Importance (Low) | Limited potential trout spawning / nursery habitat. Good status (Q4) waters. |
| | OHL 1 | D – Local Importance (High) | Some salmonid spawning and nursery habitat, low-density trout population. confirmed High and Moderate (Q4-5, Q3-4) waters. |
| Lough Atorick/Bleach | OHL 2 | D – Local Importance (High) | Some potential trout spawning / nursery habitat. High status (Q4-5) waters. |

| Catchment | Site Code | Ecological Valuation Category (NRA, 2009) | Reason |
|---|---|---|---|
| | OHL 2A | E – Local Importance (Low) | No significant potential fisheries value. |
| | OHL 3 | D – Local Importance (High) | Some potential trout spawning / nursery habitat. Good status (Q4) waters. |

# 7.4 Likely Significant Impacts and Mitigation Measures Implemented

## 7.4.1 Do-Nothing Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time. With no windfarm-related activity and no maintenance to tracks or drains,the site will gradually become overgrown. Vegetation willencroach onto hardstand areas from the margins, growing from the edges down into drains, all of which is likely to promote greater infiltration and evaporation, intercept suspended solids and reduce peak flows from the site. Assuming that the site wouldn't be vandalised, resulting in oil or other contaminants discharging from the substation plant, then it is expected that the streams draining the wind farm and the OHL corridor would remain largely as they are at present in terms of both water quality and fisheries. This is assuming that other activities within the catchments but outside of the windfarm and OHL corridor were to remain as they are currently.

## 7.4.2 Impacts of the Prospective Development

### 7.4.2.1 Relevant Characteristics of the Proposal

The Prospective Development can be divided into two main components, the windfarm decommissioning and the OHL line decommissioning, including the decommissioning of the Agannygal substation and reinstatement of the Ennis Shannonbridge 110kV line. A comprehensive description of every aspect of these operations can be found in Chapter 4, *Project Description* and Appendix 4-1 *The Decommissioning Management Plan* (DMP) and those have been used to list the activities which could give rise to negative effects in receiving waters. These are listed below:

*Wind farm and windfarm substation decommissioning*

- Offsite enabling works, namely roadside verge scraping.
- Onsite enabling works including vegetation clearance.
- Reestablishment of the main site works compound.
- Installation of substation works compound.
- Temporary widening of the turbary track between turbine T25 and T45 and other road repairs.
- Adding turning heads at T1, T4, T14 and at the junction west of T68.
- Removal of 70 no. turbines.
- Temporary stockpiling of imported or existing onsite aggregate.
- Vehicle refuelling.
- Soil damage due to off-track vehicle movements.
- Decommissioning the windfarm substation.

*OHL and Agannygal substation decommissioning*

- Ground damage associated with accessing OHL structures over soft ground.
- Refuelling vehicles.
- Siting temporary works compounds.
- Installation of stream crossing structures.
- Ground damage associated with crossing drains and small streams.
- Trafficking across the main channel of the Owendalulleegh.
- Removing 43 OHL structures including 34 polesets, 1 intermediate mast, 6 angle masts and 2 end masts.
- Installation of the works compound for the Agannygal substation.
- Decommissioning Agannygal substation.
- Reenergising the Ennis-Shannonbridge 110kV OHL.
- Culvert replacement on the Agannygal decommissioning haul route.
- Insertion of a crossing on the eastern stream along the Agannygal haul route.

### 7.4.2.2 Initial Considerations

It's worth noting the absence or near absence from this Prospective Development of activities often associated with the construction phase of windfarms in upland regions which can be associated with negative impacts on receiving waters in the absence of mitigation. These include forestry clear-felling, which won't be undertaken, all vegetation removal being confined to shrubbery and (possibly isolated immature trees) without the need for heavy machinery. No new drains will be installed, the extensive existing system being retained as is, and no major excavations or trenching will be undertaken. Moreover, the work will not require the use of cement. These positive aspects notwithstanding, careful management of all components of the decommissioning operations will be required to avoid or at least minimise the generation of fines both mineral and organic, and to prevent the escape of hydrocarbons, both of which, but particularly the former, are the main contaminants likely to give rise to negative impacts on aquatic systems. Mitigation strategies will also require to be adopted which will avoid or at least minimise direct damage to stream habitats and associated invertebrate and fish communities, due to watercourse crossings by works traffic.

### 7.4.2.3 Windfarm Decommissioning

#### 7.4.2.3.1 *Windfarm Decommissioning – Enabling Works*

| Activity | Description of potential impact and effect on receiving waters |
|---|---|
| Offsite enabling works - namely roadside verge scraping | Blockage of roadside drains could occur if scraped material is side-cast into them. This might result in the smothering of vegetation in these drains and diminish their current capacity to act as swales filtering fines surface runoff from the road surface. Washout of fines from this material into streams could lead to slight, localised siltation in stream beds with the effect being a slight reduction in macroinvertebrate diversity and/or fish productivity, although noting that the lower order streams affected will flush out the limited amount of fines within a short timeframe. |
| Significance of Effect | In the absence of mitigation the potential effect, though unlikely to occur, is an indirect slight negative of temporary duration in terms of reduction in macroinvertebrate diversity in small channels local to the upper drains of the wind farm. This will not have any significant effect on fisheries habitat further downstream. |

| Activity | Description of potential impact and effect on receiving waters |
|---|---|
| Mitigation | › Wet or dry roadside drains will not be cleared of vegetation and any scraped material will be removed for licensed disposal. |
| Residual Effect following Mitigation | Not Significant |

#### 7.4.2.3.2 *Windfarm Decommissioning – Establishment of the Main Works Compound*

| Activity | Description of potential impact and effect on receiving waters |
|---|---|
| Establishment of the main works compound and widening of entrance to facilitate abnormal loads. | The main works compound will be established on the existing hardstand area originally used for the same purpose during the construction of the windfarm. This area will need to be levelled in places and any potholes back-filled. The compound will be occupied for 24 months and used for vehicle parking, material storage, and bunded fuel storage. In addition, the main site entrance may be widened to facilitate vehicles carrying abnormal loads. The compound and the site entrance are within sub-catchment SC4. Roadside drainage from both the entrance to the west of the compound and the bulk of the compound itself falls to a low point at the western end of the compound (at ITM 559889, 705707) where it flows in a pipe beneath the road in a wide drain/flush into SC4. Some fines are likely to be entrained from the compound and roadside drains via this route intermittently during heavy rainfall. Accidental fuel spillage could occur from vehicles, plant and storage. The potential effect of sediment and spillage runoff is a reduction in macroinvertebrate diversity and possibly impaired trout hatching success in the small 1st order channel, B1B depending on the level of solids and/or pollutants that escape the site. |
| Significance of Effect (prior to mitigation) | Although unlikely to occur from a well-managed site, in a worst-case scenario, e.g., heavy sediment wash out and uncontrolled pollutant spillage from the compound, the potential effect on fish and macroinvertebrates would be indirect, slight to moderate negative of temporary to short-term duration within the upper B1B channel causing a decline in Q-value and parhaps a slight reduction in trout recruitment. This will be imperceptible negative in the Boleyneendoorish main channel and will have no significant effects there owing to the swift flows and considerable dilution. |
| Mitigation | › An ecological clerk of works (ECoW) will be appointed at the outset of the decommissioning to oversee the implementation of mitigation measures and to ensure their continued efficacy.<br>› Roadside drains taking surface run-off from the main entrance area, especially if this requires widening, will be furnished with a silt trap near the entrance and check dams going downhill to prevent solids washing east toward the works compound and into SC4, via the drain/flush referred to above. This latter channel will also be fitted with a silt trap, as it is the main outlet |

| Activity | Description of potential impact and effect on receiving waters |
|---|---|
| | for surface water exiting from the road and the compound towards SC4. In addition, the existing perimeter ringing the northern edge of the compound will be sufficiently banked up (possibly with a low earthen berm) to prevent any surface run-off flowing directly over the edge from the compound into SC4. Regular visual observation of silt control measures, and any required maintenance to same will be undertaken immediately as required, given that the compound will be in operation for 24 months.<br><br>Prevent/avoid hydrocarbons from entering watercourses by placing controls at all sources and pathways including, at a minimum, the following measures:<br><br>› Ensuring all fuels and oils are stored in bunded trays at least 50 m from any watercourses or surface water feature. Trays will be bunded to 110% of the capacity of the fuel volume;<br>› Refuelling activities to be restricted to designated, bunded areas, at least 50 m from any watercourse, drain or surface water feature;<br>› All construction plant to be regularly maintained and checked for oil and fuel leaks;<br>› Provision of spill kits and training of operatives in their use within the compound. |
| Residual Effect following Mitigation | Not Significant |

#### 7.4.2.3.3 *Temporary Widening of the Turbary Road*

| Activity | Description of potential impacts on receiving waters |
|---|---|
| Widening of turbary road between T25 and T45 | The existing turbary road between T25 and T45 (~1.5km) may need to be widened by 2 metres, on the upslope edge of the track, to accommodate the mobile crane required for turbine dismantling. This will be achieved as follows: where the existing peat is lower than the floating road, a layer of bog mats will be placed on the existing intact peat and covered with varying depths of crushed rock granular fill over a 2 m wide strip along the upslope side of the existing floating road which will then be reinforced with a single layer of geogrid and 150mm of capping stone across the full width of the road. Where the existing peat is higher than the floating road turves will be excavated to a level of 300mm lower than the road and stored locally for reuse, and then bog mats and stone will be placed on the exposed ground as noted above. Existing drains will not be disturbed during temporary storage of turves.<br><br>It's estimated that 4,500 tonnes of stone will be required to achieve this. This stone may be sourced from the existing hardstands, providing that geotechnical consultant confirms that it's acceptable to |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | do so and confirms that it is suitable for road construction. Otherwise, this stone will be sourced from nearby quarries. On completion of the works all stone and bog mats will be removed and turves replaced to return the area to the pre-decommissioning condition. Stone shall be returned to existing hardstands and levelled.<br><br>The risk to surface waters from this aspect of the decommissioning relates to the likely washout of mineral fines from the 150mm of granular fill, the excavation of granular fill from turbine hardstands along that stretch of track and possible temporary storage of imported fill if required on these same hard stands. In addition, peat silt generation may be associated with peat turves removal, storage and replacement, as well as any accidental damage to the trackside drains by construction traffic. In this event, the close proximity of drains to the works increases the likelihood that dislodged fines would reach surface waters. It is important to note however that the proposed widening will be on the upslope (northern) side of the existing track for a distance of 2m, whereas, the average distance to the track-side drain on that side of the track is about 4m, so that if this remains intact with its dense vegetated heath layer, this will act as a swale-type filter to intercept solids which might otherwise reach that drain. Nevertheless, some fines washout must be anticipated to reach the surface drainage under certain weather conditions. Drainage from the turbary road and associated turbine hardstands is split roughly 50:50 between sub-catchments SC7(a) and SC7(b) so that any impacts arising from these works would be confined to these channels.<br>The downstream (indirect)effects of solids escapement in this instance will depend on the amounts likely to arise. However, it is possible that they could give rise to a slight reduction in the hatching success of trout eggs in redds of the SC7(d) sub-catchment if these became heavily infiltrated by fines. This could also give rise to a reduction in the survival of trout fry which might be trapped in the gravels or have their gills damaged by deposited fines.<br>It's important to note that currently no fish exist in any of the upper reaches of SC7(b) due to the presence of two waterfalls (rock outcrops) and one poorly constructed forestry culvert, which in combination appear to be acting as a permanent barrier to the passage of trout even upstream as far as Flaggy Bridge. Moreover, there are two barrages farther upstream (Barrages 3 and 4) which both would act as barriers to fish passage into the upper most reaches of the catchment.<br>However, given fish do not reach even as far as Flaggy Bridge (owing to non-project related barriers downstream) these Barrages have no material effect on fish passage because there are no fish accessing this far upstream in any case. In addition, there might be a reduction in Q-rating in the SC7(b) and SC7(a) sub-catchment, from High to Good, or Good to Moderate as a result of fines washout, although the lower end of both these sub-catchments (which are the more sensitive in terms of potential fisheries habitat) would be very unlikely to display any measurable negative effects given the 2.5km separation distance from the turbary area to the lower sub-catchment zones. |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| Filling potholes | Throughout the internal road system, which will be used for the movement of heavy vehicles, local pothole filling will be undertaken to repair the road surface. Small volumes of stone may be imported for filling potholes. Alternatively, as hardstands are cleared of all parts, the capping layer on these hardstands will (where feasible) be stockpiled for road repair elsewhere on site, as required to reduce the volume of imported stone. Pothole filling may give rise to the washout of fines from the aggregate used, depending on the proximity to drains at the many locations where this may occur. Given that the pothole filling will be required at scattered locations throughout, the windfarm, washout of fines will potentially be distributed across all 11 sub-catchments draining the windfarm rather than be concentrated in any one catchment. This suggests that any impact, should it occur, is likely to be imperceptible with no significant direct or indirect effects on aquatic ecology downstream. |
| Significance of Effects (prior to mitigation) | As the runoff of solids associated with the widening and upgrade of 1.5km of turbary road will drain exclusively to the tributary streams in SC7(a) and SC7(b) the potential effect is likely to be slight to moderate, adverse , . In the absence of mitigation the indirect effect on macroinvertebrate diversity and fisheries habitat downstream could be locally significant, though temporary to short-term in duration and reversible. Any effect is likely to be felt less in SC7(b) due to the absence of fish from at least the upper to mid-reaches of this sub-catchment.<br><br>The effects of the run-off of fines associated with pothole filling are not expected to be significant given that the amount of fines likely to arise is small and these will be distributed between all the 11 sub-catchments rather than concentrated in just one or a few. |
| Mitigation | › An ecological clerk of works (ECoW) will be appointed at the outset of the decommissioning to oversee the implementation of mitigation measures and to ensure their continued efficacy.<br>*For Turbary Road Widening:*<br>› All vehicular traffic will be confined exclusively to hard stand areas, including tracks.<br>› Where it proves absolutely necessary for vehicles to track onto the adjoining peat, bog mats or other suitable ground protection methods will be used.<br>› Existing track-side drains will be kept free of blocking or damage during the widening works.<br>› Check dams and silt traps will be installed at regular intervals along the track-side drains in order to slow the velocity of flow after heavy rainfall and to intercept any solids being washed into them from the road works.<br>› Should it be necessary, check dams and silt traps will be regularly de-sludged in order to maintain their effectiveness (overseen by the ECoW)<br>› Drains adjoining aggregate stockpiles and peat turve storage areas will be fitted with silt fences to contain any washed-out fines. |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | › Drains adjoining areas where internal stone is sourced will be fitted with silt traps to retain any silt that is subsequently washed out from exposed ground following aggregate extraction. |
| Residual Effect following Mitigation | Not Significant |

#### 7.4.2.3.4 *Providing Turning Heads and Accommodating Temporary Storage for Rotor Blades*

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| Providing turning heads at 3 No. turbine hardstands and widening the road near T68<br><br>Vegetation clearance at 22 no. turbines to facilitate rotor blade temporary storage | In order to facilitate the turning of cranes and other large work vehicles at the hard stands at 3 no. turbines (T1, T4, T14), small turning heads will be installed by adding small areas of new hardstand, at each (see DMP 09 in Appendix 4-1). In addition, the road at the T-junction immediately west of T68 will be widened for the same reason (see DMP 09 in Appendix 4-1). The structure, materials and installation methods for these small additions will be the same as those used for the widening of the turbary road between T25 and T46 i.e. laying of bog mats directly on the peat, followed by crushed stone fill, a layer of geogrid and 150mm of granular capping. Depending on the height of the peat where these turning heads are required it may be necessary to remove peat turves initially. It is assumed that these turning heads would remain in place after the decommissioning and that any excess peat turves, should they arise, would be disposed of appropriately on or off site, in a manner compatible with waste legislation and in a fashion which would prevent them from becoming a source of peat silt wash-off. These works would be expected to result in some evolution of peat solids due to ground preparation works at each of the sites followed by possible mineral fines washout from the newly laid stone and aggregate. However, given that none of these sites is close to surface drains the likelihood of any fines reaching surface waters is considered to be very low. For this reason, indirect effects on downstream aquatic receptors are expected to be imperceptible. |
| Significance of Effects (prior to mitigation) | Not significant and temporary. |
| Mitigation | › As a precaution, the existing low gradient drains in proximity to the four turning locations shall have silt traps installed within the first 5-10m near the works areas for the duration of the proposed works to capture any sediment escapement (although unlikely to occur). |
| Residual Effect following Mitigation | Not Significant |

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| Vegetation clearance at 22 no. turbines to facilitate rotor blade temporary storage and the installation of set down areas for turbine blades at all 70 no turbine sites.<br><br>Location of turbine blade laydown areas beside drains. | As part of the decommissioning of each turbine, the rotor blades will need to be laid down on the peatland/heath adjoining each turbine hardstand for temporary storage. The blades will be placed on straw bales to keep them off the ground. In order to facilitate this there is a requirement to remove self-sown conifers at 22 of the 70 turbine sites. This clearance where required will be undertaken by hand in most, if not all, cases. The set down location for the blades will be on the turbine high side of the hard stands, with the exact location to be agreed with the project ecologist at the time and chosen to minimise potential damage to terrestrial ecology and to avoid drains.<br><br>In addition to vegetation removal required at 22 turbine sites, another 22 sites where the turbine blades will be temporarily laid down either directly overlap with existing drains or are very close to them. This implies that if these drains were to be mechanically damaged during the placement of the blades or if there was ground damage caused by the vehicles undertaking the work then peat solids could be mobilised into the drains in question and eventually reach the tributaries draining the sites. Again, however, the intention is that these will be micro-sited at each location to avoid interaction with or damage to drains, thereby avoiding this potential impact. |
| Significance of Effects (prior to mitigation) | In the absence of mitigation but with stated avoidance measures in place, no significant negative effects on downstream aquatic receptors will occur as the potential sources of e.g., sediment run-off, are very limited, with tenuous drainage pathways from the upper wind farm area to the actual watercourses downstream. No significant effects are expected to arise from this aspect of the Prospective Development. |
| Mitigation | The following measures are classified as avoidance rather than mitigation per se:<br><br>› Vegetation removal at the 22 turbine sites must be undertaken by hand, i.e. without vehicles in order to avoid ground damage.<br>› The ground layer of herbaceous vegetation must not be removed, i.e. the underlying peat must not be exposed, so that solids erosion can be avoided and the herb layer can continue to act as a natural filter for any solids generated.<br>› Turbine blades will be set down carefully at the 22 sites where drains impinge directly on or immediately adjoin the proposed laydown areas in a manner that avoids damaging the drains and thereby accidently releasing peat solids.<br>› Vehicles used to place the turbine blade must only work from the adjoining hardstand. |
| Residual Effect following Mitigation | Not Significant |

#### 7.4.2.3.5 *Decommissioning of the Windfarm Substation*

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| Decommissioning of the windfarm substation | This will first entail setting up a temporary works compound beside the substation which will operate in tandem with the main works compound by the site entrance. The temporary works compound will be located in the north-east corner of the windfarm site on existing hardstand in the vicinity of the substation adjacent to the pre-existing forestry track thereby obviating the necessity to establish a new area of hardstand. The hardstand area in question comprises the windfarm track itself where it has widened out to encompass an area used for containers, solid waste skips and waste oil storage containers etc., all of which is just upslope of the entrance to the substation and all of which drains to the same surface water outlet as the substation.<br><br>The actual decommissioning will be undertaken from the hardstand within the substation itself and around its perimeter fence. Given that the decommissioning of buildings and electrical masts will be done over existing hardstand and will not require any removal of below ground foundations for structures or masts, there should be minimal evolution of fines e.g. due to ground damage. Moreover, any fines generated are likely to be retained within the compound itself due to infiltration down through the existing surface layer of crushed stone. Nevertheless, regular movements of works traffic over the 4 weeks of the decommissioning may well give rise to some fines dislodgement, which in turn will drain to the existing outlet drain during heavy rainfall. If this occurs, it will eventually reach surface waters in sub-catchment SC7(a) where is could potentially give rise to a reduction in the survival of trout eggs and fry in spawning areas in that sub-catchment.<br><br>One of the critical operations in the decommissioning of the substation will be managing the oil contained in the following equipment: diesel generator and diesel tank, current and voltage transformers (CT and VT), house transformer and the 80-tonne step-up transformer. All bar the 80-tonne step-up transformers will be removed from the site still containing their oil, however, only after special measures will have been taken to secure the loads on the transport vehicles in order to avoid leaks in the case of the VT, CT and house transformers, each of which will also be provided with a suitably sized bund during the transport process in order to contain any accidental spillage. In the case of the 80-tonne step-up transformer its oil contents will be drained to an intermediate bulk container (IBC) which will in turn be sealed and secured on a transport truck, which will be provided with a suitably sized bund to contain any accidental spillage during transport. In addition to these measures which are designed to avoid major spillages, a range of routine measures will be undertaken to prevent oil escapement during more routine activities such as refuelling vehicles and plant, and containing leakage from stationary plant such as generators, e.g. the use of drip trays. The management of bulk oil in transformers etc. will most likely be delegated to a waste management company but under the supervision of Gort Windfarms Ltd., while the routine prevention measures will be managed by Gort Windfarms Ltd. |

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| | No surface water contamination with oil is anticipated because of the mitigation measures which will be undertaken during the substation decommissioning. Minor oil escapements to surface waters, i.e. surface water sheens may not result in a noticeable impact on macroinvertebrates and fisheries. However, a major spill could result in a fish kill in SC7(a) and carry on down into the main channel of the Owendalulleegh River, where it could give rise to a significant reduction in spawning and hatching success in particular of trout and stone loach, depending on the timing of the event. |
| Significance of Effects (prior to mitigation) | The overall impact of the decommissioning of the sub-station with all the good practice and avoidance measures implemented is at worst expected to result in indirect, negligible or slight negative impact on downstream receiving waters in SC7(a), which at worst would result in a slight reduction in the spawning and hatching success of trout and be of temporary duration. However, the impact of an uncontrolled, large oil spill would cause indirectsignificant negative effects on trout spawning and nursery habitat of the SC7(a) sub-catchment at O3A and downstream into the Owendalulleegh main channel for perhaps 0.5-1km with a short-term impact, i.e., lasting from 3 to 5 years. These latter effects, however, are considered very unlikely to occur. |
| Mitigation | In addition to the key measures summarised above, which are designed to avoid any major oil spill (see Appendix 4-1 for further details), the following mitigation measures are designed to remove more routine sources of contamination and impact i.e. from solids and trace hydrocarbon escapement.<br><br>› All decommissioning work on the substation will be undertaken from hardstands with no tracking onto the adjoining heath/bogland without the use of bog mats.<br>› All vehicle or plant refuelling will take place on level, preferably hardstand ground and accompanied with drip trays.<br>› Drainage from the temporary works compound will be directed to the same outlet drain currently draining the substation.<br>› The substation drain will be fitted with 3 silt traps, the first within no more than 5m of the head of the drain.<br>› The ECoW will oversee the implementation of these mitigation measures and will ensure their continued efficacy through regular visual checks. |
| Residual Effect following Mitigation | Not Significant |

### 7.4.2.3.6 *Combined Impacts of Decommissioning the Windfarm and Substation*

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| Windfarm Decommissioning Combined Impacts | The previous tables addressed the impacts of individual operations within the overall decommissioning of the windfarm. This section examines the combined impact of all of the works taken together. Essentially, the main impact arises from the generation of mineral and peat solids as a result of all of the operations addressed. A number of aspects of the site taken as a whole serve to reduce the opportunity for solids generation in the first place and others facilitate the effectiveness of the silt control mitigation measures proposed. The first is the fact that the site is already well supplied with stoned tracks and hardstand areas, which will effectively eliminate the need for off road vehicular traffic. Another is the presence of a very well-developed vegetated ground layer which serves as a natural filter for fines. The fact that much of the site is quite flat or only gently sloping also assists, as it slows the speed of water flowing in many of the drains thereby increasing the effectiveness of silt traps and other silt control in the proposed mitigation measures. The absence of any requirement for major excavation, earth movements or clear felling on the site, reduces the potential for more solids generation and effectively rules out any increase in nutrients within the drainage system. It should be noted, however, that the site is extremely well served with drains. This means that whenever solids are generated during the decommissioning, there is a greater chance that they will be near a drain and ultimately end up in one of the small streams draining the site.<br><br>The main activity likely to give rise to solids loss is the temporary widening of the turbary road between T25 and T46 and associated temporary storage of imported aggregate, as well as the sourcing of onsite stone from hardstands.<br><br>The next operation which has the potential for solids generation is the laying down of turbine blades beside turbine hardstands either over or right beside drains.<br><br>The decommissioning of the windfarm sub-station is also likely to generate solids, given the concentration of activity at that specific site.<br><br>More diffuse sources of solids runoff is associated with pothole filling around the site and regrading of some of the hardstands.<br><br>Finally, the preparation and occupation of the main works compound near the entrance to the site could also be the source of solids and possibly trace hydrocarbon washout during the 24 months of its operation.<br><br>While most of these activities will be fairly widely distributed in terms of potential washout to the 11 sub-catchments draining the windfarm, sub-catchments on the southern side of the site, in particular SC7(a) and SC7(b), and to a lesser extent SC7(c), are likely to be more susceptible to impact as there is a higher concentration of solids generating activities draining to these sub-catchments. For this reason, |

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| | despite the use of best practice and avoidance measures during the works, it is possible that some solids will escape to these streams from time to time and this may give rise to a reduction in the diversity of aquatic macroinvertebrates and reduced survival of trout eggs and fry in spawning areas. These effects would likely be confined to the upper and middle reaches of the three sub-catchments concerned.<br><br>Baseline surveys on these channels indicate that the water quality at sites O3 and O3A in SC7(a) was either High Status (both sites in 2019) or Good Status (O3A) in 2022, Sites O4 and O5 in SC7(b) had either Good and Moderate (O4) and High and Good (O5) in 2019 and 2022 respectively and at O5A in SC7(c) the status was High or Good in 2019 and 2022 respectively (see Table 7-8 for details). While the water quality was suitable in each of these channels for brown trout (the most recorded species in these small streams), no fish were recorded at Sites O4 and O5 in SC7(b) due most likely to downstream barriers, while moderate densities were recorded at Site O3 in SC7(a) and low densities at O5A in SC7(c) (see (Table 7-11 for details).<br><br>In the absence of mitigation measures the likelihood is that there would be a definite drop in water quality status in these three sub-catchments and a measurable decline in fish densities in SC7(a) and SC7(c), although the densities are currently so low in SC7(c) that this change might not be detectable. These effects would be locally slight to moderate, adverse and to last for up to one year after the completion of the decommissioning for water quality and perhaps up to 3 years for fisheries.<br><br>In the other tributary streams draining the windfarm, a measurable negative impact either on water quality (i.e. Q-value status) or fisheries is not anticipated to arise because the sources of solids are so dispersed between them that no single channel is likely to be sufficiently affected to register an impact, certainly after implementation of the recommended mitigation measures. Before implementation of the recommended mitigations some of the small tributary channels might register a non-significant or a slight adverse impact in both water quality and fisheries but these effects, were they to occur, would likely persist for no more than a year after completion of the decommissioning.<br><br>Importantly, given the low to negligible residual risk of peat failure associated with retained elements (as set out in Chapter 8 Land Soils and Geology), there is low residual risk of excessively contaminated peat slippage runoff arising and therefore no likely significant effects on water quality and downstream fisheries habitats of the main channel receiving waters of the Owendalulleegh, Boleyneendoorish or Duniry. |
| Significance of Effects (prior to mitigation) | Slight to moderate indirect, negative effect of temporary to short-term duration in sub-catchments SC7(a), (b) and (c), affecting Q-value and fish. Indirect slight, but not significant temporary negative in all other sub catchment tributary streams. There will be no significant negative |

| Activity | Description of potential impacts and effects on receiving waters |
|---|---|
| | effects on the main channel receiving waters of the Owendalulleegh, Boleyneendoorish or Duniry. |
| Mitigation | › As outlined in Sections 7.4.2.3.1 to 7.4.2.3.5 |
| Residual Effect following Mitigation | Not Significant |

## 7.4.2.4 Decommissioning of the OHL Line and Agannygal Substation

### 7.4.2.4.1 *Decommissioning of the OHL Line*

| Activity | Description of potential impacts on receiving waters |
|---|---|
| Decommissioning of the OHL line | The OHL line stretches 7.8km in a roughly southerly direction from the windfarm substation as far as the Agannygal substation. The OHL conductor is carried on 43 structures including 2 end masts at either end of the line, both sited within the terminating substations, 34 pole-sets, 6 angle masts and 1 intermediate mast. It is anticipated that it will take 12 weeks to decommission the line and remove all the above ground structures. The line is situated within 2 catchments, structures 1 to 39 in the Owendalulleegh catchment and structures 40 to 43 within the Lough Atorick/River Bleach catchment. In order to de-string the conductor and to remove all the structures, the line will be accessed via 10 separate routes, which have been designed in order to minimise ground damage and avoid unnecessary stream crossings. While the majority of the access routes to the structures will avoid crossing of watercourses, much of them utilising existing Coillte tracks or byroads, a small number of streams crossings and one crossing of the main channel of the Owendalulleegh will be required. Two of the stream crossings are necessitated due to a land ownership issue and this will be addressed by way of a variation of the route.<br><br>The main potential impacts associated with the decommissioning will be solids release to streams due to ground damage caused by tracking of work vehicles, associated with bridging of streams, and associated with vehicular crossing of unbridged streams. Solids will also potentially be released during tree felling and ground preparation works enabling access to streams earmarked for bridging.<br><br>*Ground damage due to vehicular traffic:*<br><br>The potential for ground damage and associated solids release can potentially occur anywhere along the route, especially in areas where the ground is soft and is being trafficked by heavy vehicles or is being trafficked frequently. If the likelihood of ground damage were equal throughout the route the risk of solids reaching streams from this source would likely be higher where the ground is steeper and this is appreciably more the case at the northern end of the OHL corridor between structures PS1 and PS5, to a lesser extent between structures |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | PS6 and PS25 and least between PS26 and EM41 (i.e. south from the Owendalulleegh crossing) where the ground is on average of much lower gradient.<br><br>Ground damage caused by vehicular traffic between PS1 and PS5 could give rise to excess solids washing into an upper tributary of SC7(b) resulting in a reduction in the water quality at Site O4, while traffic between PS6 and PS12 could have the same impact at Site O5. No fisheries impact is expected to occur in the upper reaches of SC7(b) however, because this section of the channel is without fish. Removal of PS13, AM14 and PS15 should have no adverse as they are all somewhat distant from the SC7(b) stream, the gradients are not especially steep and PS15 is close to the road.<br><br>The next set of structures to be removed is PS17 to PS22, mostly accessed via a Coillte track. The structures include 4 polesets and 2 angle masts all of which can be accessed by short back and forth excursions from the Coillte track. Given that most of the tracking to these structures will be on a solid Coillte track and that none of them is immediately beside the SC7(b) stream, solids loss to the stream is expected to be minimal at worst.<br><br>The next set of structures for removal, SP23, AM24 and PS25 are all along a track which has been used previously, they are not near any streams and their access and removal isn't expected to give rise to any solids washout to surface waters. These 3 structures will however be accessed from south of the Owendalulleegh River at Site O7C, which will require to be crossed from its southern bank to enable access to the structures. This crossing will be associated with potential impacts which will be discussed separately in relation to stream crossings below.<br><br>South of the Owendalulleegh all the structures from PS 26 to PS40 are on more or less flat or very gently sloping ground. Only structures PS28A to PS31 come close to the small stream which flows north and northwest to the Owendalulleegh and which was accessed close to PS 28A at site OHL1. Each of these polesets can be accessed without the necessity to cross this stream and therefore, no impact from solids escapement to surface waters is expected to occur along the OHL corridor south of the Owendalulleegh between PS26 and PS40. The only exception to this is the access route to INT30 from PS29, which will be crossed using steel plates or bog mats.<br><br>*Alternative No. 1:*<br><br>The removal of polesets PS17 to PS22 includes an alteration to the route described in the paragraphs above and referred to here as Alternative No. 1. This will see the decommissioning route diverted off the Coillte track between PS 16 and PS 17 in a small loop to the west and back again to the track to access the remaining structures as far as PS22 inclusive (see DMP 01 in Appendix 4-1). This diversion will require that the SC7(b) and SC7(c) channels be crossed. To access these crossings and to exit away back onto the Coillte track farther |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | south to complete the diversion, a small amount of trees, mainly well-spaced larch and some willow scrub, will have to be removed. It's also likely that in areas where the ground is soft along the route, the surface will need to be protected using bog mats or equivalent, sufficient to withstand the amount of traffic required to install crossings for the two streams and subsequently to remove 6 structures including 2 angle masts (i.e. structures PS17-PS22). Both stream crossings will be made using clear span bailey bridge type structures to avoid damaging the banks or the need to insert culverts in the channel, which would require more significant and potentially damaging procedures, e.g., temporary channel diversions.<br><br>The impact from this alternative will depend to some extent on the ground conditions encountered along the route of the detour and the area where trees and shrubs will need to be removed, as well as the precise nature of the banks at the 2 stream crossing points. If for example there's appreciable ground damage or if parts of the bank collapses or are damaged when the bailey bridges are put in place or removed, then washout of soil to the main SC7(b) and SC7(c) channels can be expected. This would likely result in a drop in water quality from High/Good to Good/Moderate, an effect which would likely be in evidence for a few hundred metres downstream, but unlikely to affect the main channel of the Owendalulleegh downstream of the confluence of SC7(d). In addition, solids deposited on spawning beds downstream would likely reduce the survival rate of buried trout eggs or emerging fry if the works are carried out during the spawning and incubation period (i.e. around October to May) but would still potentially have a residual impact on spawning habitats in SC7(d) i.e. downstream of the confluence of SC7(b) and SC7(c) even if undertaken during the IFI-recommended window for instream works, i.e. July to September, thereby resulting in a slight to moderate adverse impact of temporary to short-term duration.<br><br>*The Owendalulleegh crossing:*<br><br>To access PS23, AM24 and PS25 from the south, it will be necessary to cross the main channel of the Owendalulleegh at O7C (ITM: 562448, 701483) where the channel at the crossing point is about 10m wide. This crossing point is shallow enough to allow vehicles to ford it and there is some evidence that the river is forded at this point from time to time already. Fording is likely to give rise to localised bed disturbance and possibly fish mortalities. Electrofishing surveys in that general reach returned trout densities ranging from 0.129 to 0.295 trout per $m^2$. So that on average one could expect that in a crossing corridor of 5m x 10m the average number of fish present, mainly of 0+ and 1+ age groups, would be between 6 and 15 fish. Undoubtedly, there would be a possibility that at least a small number of these (especially 0+ trout) would be killed by each vehicle crossing, so that the impact would increase with higher numbers of vehicles, especially tracked vehicles, and with frequent over-and-back movements. It's worth noting however that young brown trout are quite territorial often occupying a fairly small home range of about 40-50$m^2$ (see Bridcut and Giller, 1993) This suggests that if some trout are killed by the |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | movement of works vehicles, the possibility of their territories being reoccupied by trout outside the home range is fairly low, at least over a short time scale. In addition to direct fish mortalities, fines released due to vehicle movements could result in some localised reduction in spawning success in gravel areas shortly downstream, depending on the amounts of fines released. |
| Significance of Effects | The impact of tracking and removing of PS1 to PS 12 may have a slight negative, temporary effect causing slight deterioration in water quality and Q-value in SC7(b) at sites including O4 and O5, while no effects on fisheries is anticipated, as there are no fish present in this stretch of the river owing to the presence of downstream barriers.<br><br>Removal of structures 26 to 40 along the OHL corridor south of the Owendalulleegh as far as Agannygal substation is at worst expected to have a slight, negative, temporary impact on the small Owendalulleegh tributary stream near OHL1.<br><br>The impact of the two stream crossings and associated access works for Alternative No. 1 combined with a separate crossing of the Owendalulleegh can be described as potential moderate to significant, negative impact of temporary to short-term duration owing to the combination of indirect (downstream as a result of washout of fines for example) and/or direct (i.e., fish mortality at the Owendalulleegh crossing point) negative effects on fish and localised temporary Q-value decline. |
| Mitigation | › Prior to OHL decommissioning, a pre-commencement survey, probably best undertaken using an ATV due to the nature of the ground in some stretches of the OHL corridor, will be carried out to identify soft ground, especially in areas where there are steep gradients e.g. between SP1 and SP12, and especially in areas where the ground slopes steeply toward streams. The pre-survey would also plot the exact locations of drains impinging on the decommissioning routes. The pre-commencement survey will recommend (i) suitable ground protection for the soft ground areas and (ii) that any drains crossing the path would be traversed using steel plates of log bridges to prevent or at least minimise damage to these and to minimise any associated solids release.<br>› For Alternative No. 1, do a detailed pre-commencement survey of the detour route between PS16 and PS17will be undertaken in order to identify soft and wet ground especially on steeper slopes.<br>› Use bog mats on any soft ground identified especially on the steep ground between the SC7(c) crossing and point B in DMP 01 in Appendix 4-1.<br>› Insert silt fences parallel to and downslope of the new track, especially if the track is through soft or wet ground e.g. between the SC7(b) stream and the SC7(c) stream crossing. |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | › The track side drains at the points of departure and return to the Coillte track for the detour will be piped and capped in order to allow free drainage while the detour is in place. Check dams will be installed in the drains downslope from these access points to prevent solids reaching SC7(b) downslope.<br>› Following agreement with the project ecologist the method of tree and scrub removal will be chosen to minimise ground damage.<br>› The crossing points of stream SC7(d) at ITM 561421, 701723, which has low banks and is shallow and therefore feasible to be forded, will be protected with heavy steel plates spanning the width of the crossing corridor (7-9m) to protect the stream bed from damage from vehicles. This approach is contrary to IFI advice (IFI, 2016) which stipulates that streams should not be forded. The reasoning for going against this advice is that this stream has low banks, the channel is shallow, and the work will be undertaken between July and September, i.e., outside the trout spawning period. Moreover, the number of vehicle crossings will be small relative to a major construction project for example, and will be designed to minimise the number of crossings required. Finally, steel plates will be used to protect the stream bed from rutting. Given these site attributes and the mitigation measures being recommended, it is suggested that the alternative of constructing a bridging structure here would give rise to greater impacts, because on the width of the stream, which probably rules out a clear span structure or laying large pipes and back filling to place a running track over them. These latter options would potentially introduce more fine sediment into the system than the managed fording approach being suggested.<br>› The upslope approaches to both streams (i.e., from both banks) will be fitted with bog mats or equivalent materials to prevent ground damage, especially during heavy rainfall, thereby reducing to an absolute minimum the amount of solids washing into these two streams.<br>› The stream crossings for Alternative No. 1, and the Owendalulleegh crossing will be undertaken between July and September (inclusive).<br>› On the sloping approach to the Owendalulleegh crossing in advance of the removal of PS23, AM 24 and PS25, if there is evidence of ground damage leading to solids washout during heavy rainfall, a french drain will be set diagonally into the Coillte track 5m north of the crossing point, in order to direct any silt contaminated run-off into the ditch at the side of the track so that it isn't flushed into the river.<br>› In order to minimise the potential for fish mortalities, immediately in advance of crossings on the Owendalulleegh, the channel for 15m upstream and downstream of the centre line of the crossing point, the channel will be electrofished (3 repeats) and the fish obtained will be removed in oxygenated water in a large plastic bin and poured back into the river about 1km downstream i.e. just below the confluence of the SC7(d) stream with the main channel. |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | › In Alternative No. 1, fish rescue is not recommended from stream SC7(b) or SC7(c), (i) because the densities are so low but mainly (ii) because bailey bridge type crossing structures are being installed at these crossings and as such no adverse impact on fisheries is anticipated.<br>› The narrowest feasible corridor across the Owendalulleegh will be delineated by the project ecologist using red and white tape and all works vehicles instructed to remain within that crossing corridor.<br>› The crossing corridor will be furnished with steel plates to protect the riverbed habitat from damage, and these will be removed after the operation is completed.<br>› This segment of the OHL decommissioning will be designed and managed to minimise the time and the number of vehicle movements required to complete, and will reduce the scale of any residual fish mortalities. |
| Residual Effect following Mitigation | Not Significant: Provided all the recommended mitigation measures are implemented in full with supervision by a suitably qualified and experienced ecologist to frequently assess their effectiveness, the decommissioning of the OHL corridor incorporating Alternative No. 1, is expected to result, at worst, in imperceptible to slight, indirect or direct negative, temporary-to-short-term effects on receiving waters but there are unlikely to be measurable effects in either Q-values or fisheries assessment in any of the channels impinged upon over and above the natural variation in these elements. |

#### 7.4.2.4.2 *Decommissioning of the Agannygal Substation*

| Activity | Description of potential impacts on receiving waters |
|---|---|
| Decommissioning of the Agannygal Substation | The Agannygal sub-station is situated within the Lough Atorick/River Bleach catchment which ultimately drains to the southwest corner of Lough Derg on the River Shannon. The substation itself is situated on a slightly raised hardcore platform roughly 46m x 62m.<br>Decommissioning will entail removal of all above ground structures including the steel palisade boundary fence, the various substation buildings and plant and masts.<br>The actual decommissioning itself should result in effectively no ground damage because it will be undertaken on an existing hardstand area and the nature of the materials to be removed, and the manner of their removal is likely to generate extremely little if any fines which could wash off into surface drainage. Accordingly, minimal escapement of fines to surface drainage is anticipated.<br><br>A temporary works compound will be established on existing hard stand areas adjoining the substation so that no new hardstand need be established on the adjoining heath.<br><br>Surface drainage from the substation and its immediate surrounds is confined to very small drains which flow in a generally southern |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | direction and which will eventually link up with the stream which was sampled at OHL2A. The precise hydrological route is tenuous because of the very dense forestry cover and network of mound and collector drains immediately south of the substation which attenuates run-off from the substation area. However, the drainage distance is likely to travel at least 0.9km before reaching the stream in question. An assessment of the stream in the area where any runoff from the substation is likely to reach it (OHL2A), indicated it is very sub-optimal for fish due to the lack of suitable habitats with no salmonid habitat, (see Table 7-9) and this combined with a long canal-like stretch which would intercept any escaped solids means that no adverse impact on fisheries is expected to arise. In the absence of mitigation, there is the possibility of very slight negative temporary impact on aquatic macroinvertebrates, but this is unlikely to be big enough to result in a measurable impact on Q-value status.<br><br>The greatest potential impact associated with the decommissioning of the sub-station, if it were it to occur, would be due to an oil spill from on-site oil containing equipment including the diesel generator and diesel tank, voltage and current transformers and the house transformer. However, these will all be transported off site without draining their oil contents. The details of how this will be managed safely is outlined in detail in Appendix 4-1, the Decommissioning Management Plan, which should therefore eliminate the possibility of a hydrocarbon spill. |
| Significance of Effects | Slight, indirect negative effects on water quality and fisheries habitat of temporary duration owing to limited fines escapement and possible trace hydrocarbon escapement. |
| Mitigation | › Silt traps will be installed on the surface drain emanating from the substation at present to intercept any solids arising from the substation decommissioning.<br>› Refuelling will always be supervised and always undertaken on level hardstand areas<br>› Mobile plant such as generators will be supplied with drip trays<br>› Any fuel storage tanks will be provided with a bund capable of containing its full contents with freeboard for rainfall. |
| Residual Effect following Mitigation | Not Significant: likely neutral effects on the OHL2A stream. |

#### 7.4.2.4.3 *Re-energising the Moneypoint to Shannonbridge OHL Line*

| Activity | Description of potential impacts on receiving waters |
|---|---|
| Re-energising of the Moneypoint-Shannonbridge 110kV OHL | This work is being undertaken close to a small drain/flush line which emanates from the northern side of the substation travels due west and then turns abruptly south to eventually join the stream on which OHL2A is situated. This drain can easily be avoided if the vehicles undertaking the reenergising confine their access to the 2 polestets in question and avoid tracking across the open ground directly between them. Some of the ground between the polesets is potentially soft in places, so there is a possibility of ground damage and solids loss to surface drainage. The latter could give rise to slight negative impacts on the water quality of the stream at OHL 2A, if the reenergising is poorly managed. However, the risk of this occurring, even without mitigation is considered fairly low. |
| Significance of Effects | This activity could lead to slight, temporary negative impacts in the form of reduced macroinvertebrate diversity following solids escapement to surface drains, although this isn't a given. The works are not expected to have any negative impact on fisheries in the OHL2A stream owing to the poor fisheries habitat present and the separation distance to the site of works. |
| Mitigation | › Undertake a walkover survey of the access route to the poles sets in advance of the works to locate any surface drains along or downslope of the route.<br>› Provide suitable vehicle crossing measures (e.g. bog mats over or equivalent) in order to protect any drains from damage.<br>› Employ low weight-bearing vehicles to undertake the work.<br>› Use bog mats or other suitable protection if the ground is likely to be cut up during the work.<br>› Monitor the works for solids escapement and take corrective measures, e.g. the installation of silt fences immediately downslope and across the full line of ground damage if it occurs. |
| Residual Effect following Mitigation | Not Significant |

### 7.4.2.4.4 *Upgrading the Agannygal Decommissioning Haul Route – Culvert Replacement*

| Activity | Description of potential impact and effects on receiving waters |
|---|---|
| Upgrading the culvert on the haul road at the crossing of OHL 2A (western stream) | The culvert which takes the western (OHL2A stream) under the Agannygal haul road is currently beginning to subside and will be replaced before the Agannygal substation can be decommissioned.<br><br>Immediately below the culvert the stream forms a long canal like stretch (Table 7-9) which is of very low fisheries value. The substrate in the area wasn't suitable for a kick-sample when it was assessed in autumn 2022 and just a few baetid mayflies and *Asellus* were detected in net sweeps in the slack water below the culvert. In March 2023, a partial kick-sample was undertaken in the stiff peat streambed on the channel upstream of the culvert, uncovering one or two nemourid stone flies and *Simulium* larvae, which suggests that the water quality is at worst Moderate Status (Q3-4) but more likely to be Good Status (Q4) considering the sub-optimal substrate conditions for undertaking a Q-value assessment. After rain, this stream is likely to carry a good flow, so at such times it would be difficult to use a pump-over method when replacing the culvert to reduce the quantity of sediment that might escape during that work. The works would give rise to some sediment loss but the long canal-like stretch immediately downstream would result in most except the absolute finest solids rapidly settling out and the latter would rapidly dilute with passage downstream resulting in imperceptible effects further downstream where the channel flows over gravels into Lough Atorick, something which could be more or less guaranteed by using the mitigation prescribed below. |
| Significance of Effects | Replacement of the culvert potentially will lead to slight, localised, temporary negative, reversible impact manifesting as a slight reduction in pond macroinvertebrate fauna inhabiting the canal like, drained reach downstream of the crossing point. No significant effects are likely further downstream than the ~200m or so, long canal-like drain downstream of the crossing point because the vast majority of suspended solids (if they do arise) will be attenuated and will settle out in the already silty, sluggish channel full of macrophytes. |
| Mitigation | › Undertake the work during the period July to September (inclusive) as it would be considered instream works by IFI.<br>› Only undertake the work after several days of dry weather when flow in the stream would be low.<br>› Use a pump-over method to keep the work area as dry as possible. This may not allow all the water to be over-pumped depending on the flow, but it would reduce the rate of solids washout, nevertheless.<br>› Carefully plan the method in advance and have all the necessary plant and materials to hand such that the culvert can be replaced in the shortest possible time which will reduce the quantity of solids potentially arising.<br>› Provide drip trays for all generators and pumps.<br>› Refuel vehicles off site whenever possible. |

| Activity | Description of potential impact and effects on receiving waters |
|---|---|
| | › Remove any excess fill or other loose substrate arising from the works for licensed offsite disposal. |
| Residual Effect following Mitigation | Not Significant |

#### 7.4.2.4.5 *Upgrading the Agannygal Decommissioning Haul Route – Localised Rerouting*

| Activity | Description of potential impacts on receiving waters |
|---|---|
| Diversion of haul route over the eastern stream at OHL 3 | It may be necessary to make a short detour (A, B, C, D – as per Figure 7-4) off and back onto the Agannygal haul route. This will necessitate the crossing of a small tributary of Lough Atorick which the EPA has given the identification code IE_SH_25B070100 to, although they don't monitor its water quality. It's referred to here as the 'eastern stream' to distinguish it from the other stream, also draining to Lough Atorick, where a subsiding culvert needs to be replaced (at OHL2A). The water quality in this stream was assessed at site OHL3 in autumn 2022 and found to be Good Status (Q4) and with substrate which would possibly be suitable although not optimal for trout spawning.<br><br>To effect the required detour, the vegetation between B and C and C and D will be removed in order to lay down the new detour track. The leg between C and D cuts through about 40m of mainly open willow scrub, while between B and C there's a mixture of damp grassland (mainly) and narrow willow screens. The ground between B and C is wet but within a shallow basin, so while vehicle movements across it may cause ground damage, solids would be retained within the area, without reaching surface water. It is important to note that the new track from point B as far as the stream by point C and the track from the far side of the stream as far as point D, will be laid down before the new culvert is installed in the stream, as this will maintain the integrity of the banks and prevent solids from the construction of the access tracks at both sides of the stream from entering it.<br><br>The substantial flow in the stream would make it difficult to pump over to allow a culvert to be inserted in the dry, although if the water levels are low at the time the crossing is being installed, this should be attempted regardless. An oversized diameter heavy duty plastic pipe will be placed into the channel directly and back filled with clean crushed stone and capped with bog mats. The embankments at the crossing point may require to be lowered by about 1m or so, so that the approach track, particularly from point B, wouldn't need to be ramped too much. The ensuing gap in the stream side embankments will be reinstated carefully after the works have been completed.<br><br>These operations will inevitably give rise to solids loss into the western stream, which if they are substantial enough could give rise to sedimentation of the streambed downstream, which if it persisted until the following spawning season could cause a reduction in the survival |

| Activity | Description of potential impacts on receiving waters |
|---|---|
| | of spawned trout eggs and fry and could also result in a reduction in the macroinvertebrate abundance and diversity, associated with a possible drop in status from Good (Q4) to Fair (Q3-4). However, it's important to note that the stream substrate within the crossing stretch is dominated more than 90% by sand and the likelihood is that the fisheries importance of that stretch is low or extremely low, such that if the operation is designed and undertaken with due care the impact on both fisheries and water quality should be low. |
| Significance of Effects | This detour could give rise to a slight, short-term negative effects on fisheries recruitment and water quality status of the eastern stream. |
| Mitigation | › Small tree and scrub removal to access the crossing point should ideally be undertaken by hand, i.e. without heavy machinery if feasible.<br>› The access tracks to the stream crossing should be laid from opposite points first, i.e. from points B and D to the crossing point (near point C) before the crossing is inserted.<br>› The exact position of the crossing point will be microsited on the ground to avoid as far as possible parts of the embankment which already have a lot of willow or other trees growing on it, as these are currently stabilising the banks.<br>› Any instream works must be confined to the period July to September.<br>› The culvert pipe should be large enough to accommodate large flows to avoid excess velocities. |
| Residual Effect following Mitigation | Not Significant: Imperceptible to slight, negative, temporary effects in the form of a reduction in the diversity of aquatic invertebrates which may depress the annual Q-value for one year after the works, but with no significant effects on fisheries value. |

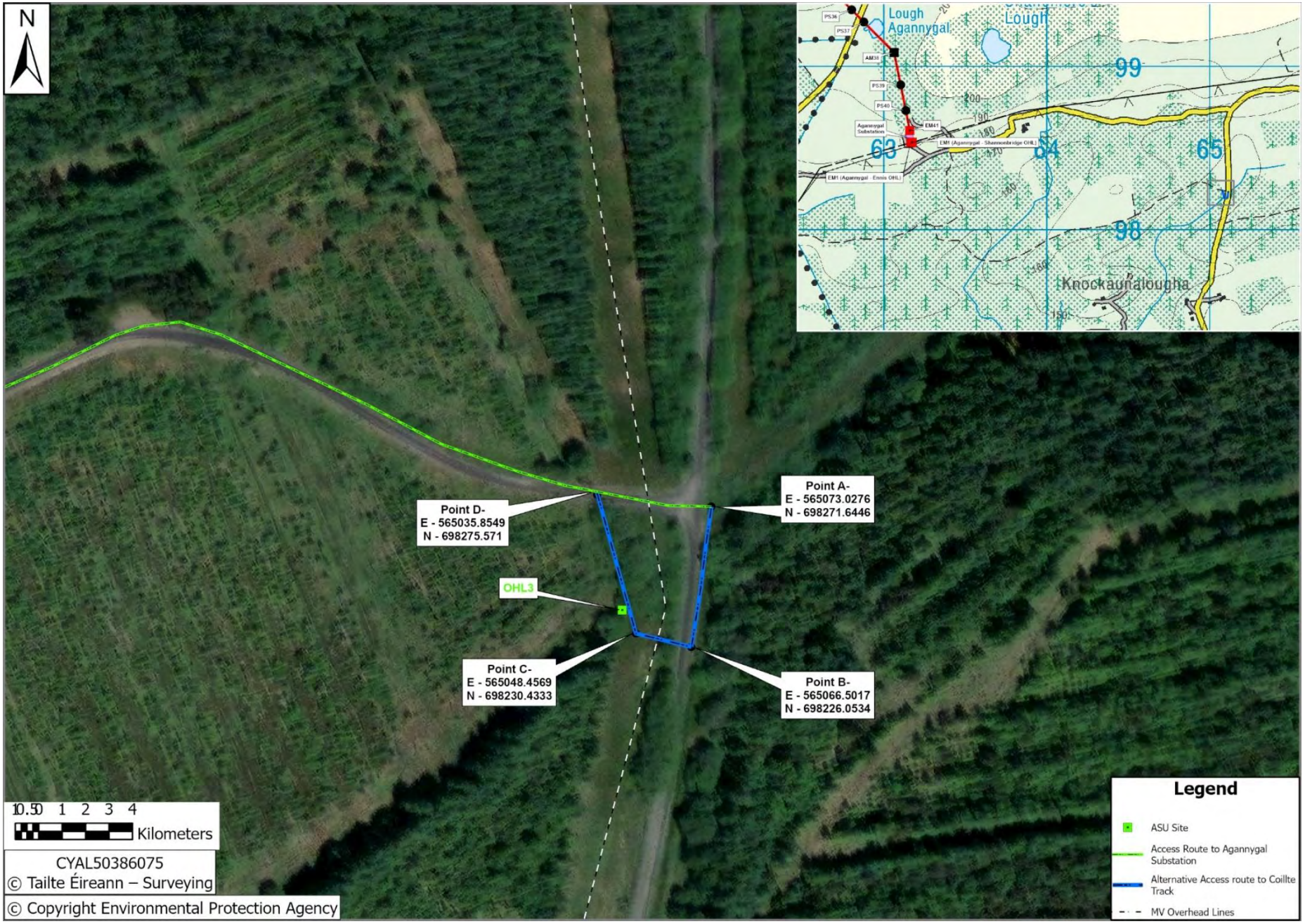



*Figure 7-4 Aerial photo showing detour off the Agannygal haul route*

## 7.4.3 Water Framework Directive Implications

A detailed assessment of the implications of the Prospective Development in terms of its residual effects on Water Framework Directive (WFD) objectives for relevant directly and indirectly affected surface water bodies is included in **Appendix 7-2.** WFD implications for groundwater bodies are included in the assessment (informed by Chapter 9 Hydrology and Hydrogeology) to address any potential interactions between water status effects in surface and ground water bodies.

## 7.4.4 Cumulative and In-Combination Effects

### 7.4.4.1 Overview

Biological water quality data from the two main catchments draining the windfarm and the OHL corridor, namely the Owendalulleegh and Boleyneendorrish Rivers have returned High Status water quality results for the best part 15 to 20 years, (see Section 7.3.2.1 and Table 7-7), which suggests that land-use activity within the drainage channels of the study area has had minimal impact on the biological water quality in these main channels, and by extension, their fisheries status. Furthermore, the current impact assessment for the Prospective Development has indicated either no or minimal impacts would be likely to reach the EPA river monitoring stations of these main channels as a result of the proposed works, meaning that effects will in all likelihood be neutral there. Accordingly, any cumulative impacts that may arise as part of the Prospective Development, would be expected to be confined to the small tributaries draining the windfarm and OHL corridor. Currently, the only activities occurring within the area drained by these channels that could give rise to cumulative impacts are forestry activities, in particular clear-felling, and turbary and these are discussed in the following paragraphs. There are no other proposed developments within the study area or drainage area of the upper reaches of the Boleyneendorrish, Duniry, Owendalulleegh Rivers or in the western or eastern Agannygal streams (near OHL2A and OHL3, respectively), i.e. within the expected zone of influence of the Prospective Development.

### 7.4.4.2 Cumulative Effects with Retained Development

The features proposed to be retained in-situ in perpetuity do not give rise to any emissions to surface waters that could result in any significant effects on aquatic ecology and fisheries. Therefore, there is no potential for cumulative residual effects of the Retained Development in combination with the Prospective Development.

### 7.4.4.3 Cumulative Effects of Prospective Development with Turbary and Clear-felling

#### 7.4.4.3.1 *General Description of Potential Clearfelling Effects*

Studies in the west of Ireland have shown that in upland blanket peat catchments forestry clear felling can result in a drop in water quality from Q4 to Q3-4 (O'Driscoll *et al.,* 2013). It is likely that this is mediated by an increase in nutrient run-off, in particular phosphorus and may also be contributed to by increased suspended solids in runoff following felling. Significantly increased concentrations of phosphorus have been shown by Rogers *et al.,* (2010) and Cummins and Farrell (2003a) to occur in small drainage channels following clear felling of conifers on upland blanket peat in the west of Ireland, particularly in the first 2 years after felling. Finnegan *et al.,* (2014) and Rogers *et al.,* (2011) have also shown that felling on blanket peat can give rise to increased solids in run-off, although the levels in general do not appear to be high or of extended duration.

It is very difficult to say with certainty the degree to which forestry felling has or is currently impacting the streams draining the windfarm or OHL corridor. An examination of a time series of Google Earth aerial photos suggests that the last significant round of clear-felling within the study area occurred in 2018 when felling was undertaken in SC1, SC3, SC4, SC7(a), SC7(b) SC7(c), SC8 and SC9. Based on these results it's possible that the slightly polluted conditions (Q3-4) at B1B, O8A, O9B and O9A2 in 2019 (see Table 7-8) may have been linked to that round of clear-felling, although that cannot be said with certainty. In the absence of clear-felling in the study area since 2019, forestry activity may not be influential in the Q3-4 ratings noted in 2022 at B4, O4, and OHL1. These water quality impacts may be linked to the increase in nutrient run-off and to a lesser extent suspended solids from clearfelling.

It is noted that while there may be noticeable interannual variation in water quality at some sites, e.g., between Q4 and Q4-5 or between Q4 and Q3-4, these changes may not show as clear a change if any on fisheries. This is because in Ireland Kelly *et al.*, (2007) have shown that while there may be statistically significant differences in trout densities between sites which vary in Q-value from Q3 to Q5, actual densities of salmonids (trout and salmon) don't drop off appreciably until Q-values drop below Q3 and on average, densities of trout at Q3-4 sites are not appreciably different from densities at sites with higher Q-ratings. Other species haven't been referred to here, as these in general are present in very low densities within the study area, with the exception of stone loach at a few sites, a species that is less sensitive than trout to water quality deterioration.

#### 7.4.4.3.2 General Description of Potential Turbary Effects

Cut-over bog where turbary rights occur exist widely within the sub-catchments that drain the Derrybrien wind farm and to a lesser extent the OHL route and Agannygal substation catchment (see Figures 4.5 in Chapter 4, *Project Description*). However, the existence of turbary rights provides no indication of the amount of peat extraction practiced. In addition, the overall intensity of extraction in any given year is likely to vary due to a range of factors including for example the price of other domestic heating fuels. It should also be noted that depending on the drainage of individually active plots within a larger block of cutover bog, their connectivity to surface water drainage and therefore the peat silt generated during peat extraction reaching watercourses is likely to vary from area to area.

There doesn't appear to be any literature on the impact of turf cutting in turbary plots on water quality in Irish rivers. However, the impact, should it occur is likely to be linked to the run-off of peat silt from the cuttings into watercourses. Surveys undertaken within the study area have encountered peat silt as several sites including B1A, O1, OHL2A and OHL3. Water quality at these sites varied from Q3-4 to Q4 and while it isn't possible to definitively say that peat silt was influencing the Q-ratings, it may have been a factor. This would be consistent with UK studies on small upland streams with drained blanket peat which were associated with greater amounts of fine organic particulate matter in sediments and a decline in the representation of more sensitive macroinvertebrates (Ramchunder *et al.,* 2012).

#### 7.4.4.3.3 Cumulative Effects of Turbary and Clearfelling with Prospective Development

The Prospective Development will only be associated with some minor clearfelling with in the windfarm site itself as well as limited areas of vegetation clearance elsewhere e.g. those associated with Alternative No. 1 of the OHL decommissioning between structures PS16 and PS17 (in SC7(b) and near OHL3 where a section of Coillte track may have to be bypassed over the eastern stream to Lough Atorick. None of these operations is likely to give rise to a measurable increase in nutrients in the receiving waters, given the small areas of tree removal involved and therefore this aspect of the works will not give rise to cumulative impacts. These and several other aspects of the decommissioning will potentially give rise to increased suspended sediment losses to the streams draining the windfarm and the OHL corridor. However, a combination of careful forward planning and good practice is expected to reduce these losses to levels unlikely to give rise to anything more than slight to moderate, negative impacts of temporary to short-term duration, without mitigation. The only exceptions to this could be with Alternative No. 1 of the OHL decommissioning of structured 16 to 25 as well as the short route

detour which may be required along the eastern end of the Agannygal haul route near OHL3. If these components of the decommissioning are not effectively mitigated, the likelihood of more significant negative impacts due to suspended solids escape is high. In these latter cases the cumulative impacts from forestry felling would likely only marginally add to the overall impact. However, given that very robust mitigation measures are being undertaken for these and every other potentially solids producing activity in the Prospective Development, no measurable cumulative impact is expected to arise either due to forestry or turbary activities.

#### Significance of Effects

The cumulative effect of the Prospective Development with turbary and forestry clear-felling will not give rise to any significant effects on aquatic receptors or fisheries value. This is because, the residual impacts post mitigation for the Prospective Development will not add in any measurable way to any impacts likely to be associated with clear felling or turbary.

### 7.4.5 Designated Nature Conservation Sites

There are no Nature Conservation Sites within the aquatic zone of influence of any aspect of the Prospective Development and therefore no adverse effects on integrity of designated sites will arise, either with or without mitigation.

## 7.5 Conclusion

With careful project design, along with full implementation of all recommended mitigation measures , the Prospective Development can be undertaken without any significant negative effects on the receiving aquatic environment. Any residual impacts will be localised to the upper, less sensitive reaches of small tributary streams and will be at worst, imperceptible to slight negative, temporary in duration and fully reversible. Furthermore, there will be no significant effects on the main channel receiving waters of the Owendalulleegh, Boleyneendoorish or Duniry.

# 8. LAND, SOILS AND GEOLOGY

## 8.1 Introduction

### 8.1.1 Scope of Chapter

AGL Consulting (AGL) and Fehily Timoney (FT), on behalf of Gort Windfarms Ltd., have carried out an assessment of the likely significant effects of the Derrybrien Wind Farm Development Decommissioning Project – the Prospective Development - on the land, soils and geology of the receiving environment. The project description is detailed in Chapter 4. AGL has assessed the impacts associated with decommissioning the wind farm and the first 4 twin polesets of the OHL. Fehily Timoney has assessed the impacts associated with decommissioning the remaining sections of the OHL, the Agannygal 110kV Substation and the reinstatement of the Ennis-Shannonbridge 110kV line.

This chapter of the Environmental Impact Assessment Report (EIAR) provides a baseline assessment of the environmental setting of the wind farm in terms of land, soils, and geology, and discusses the potential likely significant effects of the proposed decommissioning works.

The chapter includes an assessment of hydrology and groundwater insofar as it applies to the baseline conditions on the site, peat stability, and the effects of impacts on the peat. Impacts of the Prospective Development on hydrogeology and groundwater are assessed in detail in Chapter 9 (Hydrology and Hydrogeology) of this EIAR.

This chapter also presents any mitigation measures that are required to be put in place to mitigate any potentially significant effects of impacts on soils and geology and provides an assessment of cumulative and residual impacts.

### 8.1.2 Statement of Authority

**Derrybrien Wind Farm – AGL Consulting**

The assessment of the impacts related to the Derrybrien Wind Farm elements of the Prospective Development was carried out by Mr. Conor O'Donnell (BA, BAI, MS, FGS, CEng, MIEI, FConsEI), Managing Director at AGL Consulting. Mr. O'Donnell is a Chartered Engineer with over 25 years' experience as a geotechnical engineer in Ireland and the United States. He has an Honours Bachelor's Degree in Civil, Structural and Environmental Engineering from Trinity College Dublin, and a Master's Degree in Geotechnical Engineering and Structural Mechanics from Cornell University, Ithaca, New York.

Mr. O'Donnell has extensive experience with civil and earthworks design for wind farms in Ireland and the UK and has developed a particular area of expertise in assessing and managing the risk of peat stability for wind farms on upland blanket bogs at planning, detailed design and construction stage. He has carried out peat stability risk assessments and provided expert advice on geotechnical risk mitigation for several windfarms on upland blanket bogs in Ireland including the Grousemount Wind Farm in Co. Kerry, the Garvagh Glebe and Tullynahaw Wind Farms in Co. Leitrim and the Crockagarran Wind Farm in Co. Tyrone.

Mr. O'Donnell was the lead project geotechnical engineer responsible for managing the risk of peat stability for the completion of the civil works on the Derrybrien Wind Farm site after the peat slide in October 2003. He also prepared the chapter on soils, geology and land for the 2020 remedial Environmental Impact Assessment Report (rEIAR) for the Derrybrien Wind Farm.

Mr. O'Donnell was the geotechnical advisor to An Bord Pleanála on peat stability and ground movement for the Oral Hearing into the 2009 application for the Corrib Onshore Gas Pipeline. He was geotechnical consultant to Sligo County Council on spoil management for excess peat and mineral soil for the EIS and 2014 Oral Hearing for the N4 Collooney to Castlebaldwin Road Improvement Scheme. He has also provided expert advice and forensic investigation services to the Health and Safety Authority and Liberty Insurance in relation to peat slides that occurred on wind farm sites in Ireland.

**Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation – Fehily Timoney**

The assessment of the impacts related to the Derrybrien Wind Farm Overhead Line (OHL) elements of the Prospective Development was carried out by Mr Ian Higgins (BSc, MSc, FGS, MIEI). Ian is a Principal Geotechnical Engineer with over 25 years' geotechnical consultancy experience in Ireland and the UK. Ian has completed numerous geotechnical & geological impact assessments for wind farm developments in Ireland. In addition, he has significant experience in the geotechnical/civil design of wind energy projects at construction stage. He holds an Honours Bachelor's Degree in Engineering Geology from the University of Sunderland and a Master's Degree in Geotechnical Engineering from Heriot-Watt University, Edinburgh.

## 8.1.3 Relevant Legislation

This chapter of the EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 – 2018.
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999; S.I. No. 450 of 2000; S.I No. 538 of 2001); S.I. No. 30 of 2000 the Planning and Development Act, 2000; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment.
- Planning and Development Act, 2000, as amended.
- S.I. No 296 of 2018: S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law.
- The Heritage Act 1995, as amended.

## 8.1.4 Relevant Guidance

The land, soils and geology chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- Environmental Protection Agency (2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements).
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements).

- European Commission (2017) Guidance on Screening.
- European Commission (2017) Guidance on Scoping.
- European Commission (2017) Guidance on the preparation of the Environmental Impact Assessment Report.
- Institute of Geologists Ireland (2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Department of Housing, Planning and Local Government, Government of Ireland (2018), Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

## 8.2 Methodology

### 8.2.1 Desk Study

A comprehensive desk study of the Prospective Development site and surrounding study area was carried out for this report. The desk study involved collecting all the relevant data on soils, geology and land from the following sources:

- Geological Survey of Ireland (GSI) online Maps (www.gsi.ie) for:
  - National Draft Aquifer Map.
  - Quaternary Geology (Subsoils).
  - Bedrock Geology (1:100,000 Scale Map Series).
  - Geological Heritage.
  - Landslide Susceptibility.
  - Groundwater.
  - Aggregate Potential.
  - 6" Drift maps (Goldmine).
- Environmental Protection Agency (EPA) online mapping (www.epa.ie) for:
  - Subsoils.
  - Surface water features (hydrology).
- Ordnance Survey of Ireland - Geohive Map Viewer (www.geohive.ie) & Irish Townland & historical Map Viewer:
  - 1:50,000 Discovery Series mapping.
  - Aerial photography.
- Historical mapping:
  - 6" first edition black & white.
  - 6" last edition black & white.
  - 25" historical maps.

The desk study included a review of historical aerial photographs on Google Earth Pro, Light Detection and Ranging (LiDAR) topographical survey data for the site, and relevant information on ground conditions, bedrock geology from the various ground investigations that have been carried out in the area.

### 8.2.2 Walkover Surveys and Site Inspections

Derrybrien Wind Farm Site

Mr. O'Donnell of AGL consulting has carried out numerous site inspections and walkover surveys over the construction and operation phases of the Derrybrien Wind Farm Development.

Mr. O'Donnell was the lead geotechnical engineer and project director managing peat stability for the second phase of construction of the wind farm after the peat slide in October 2003. He supervised the supplemental geotechnical investigations in the slide area and across the site to manage the risk of peat instability. He also carried out regular periodic walkover surveys on the site and inspections of the construction works between August 2004 and May 2005.

Mr. O'Donnell also carried out follow-up walkover surveys and site inspections during the operation and maintenance phase of the Derrybrien Wind Farm Development:

- In 2012 to review the condition of the floating roads on the site and to inspect the slide area as well as the off-site barrages that were constructed in 2003 to contain peat from the slide.
- In 2014 to carry out full-scale load tests on the floating roads to confirm the extent of upgrade works that were required.
- In 2018 for follow-up full-scale testing of the upgraded floating roads and to carry out a site inspection for the rEIAR.
- In 2020 to inspect the site and an area of localised peat failure in the turbary area for the rEIAR.

Other geotechnical engineers from AGL had periodic presence on the site during construction and during the operation and maintenance phase of the wind farm development, including:

- In 2004/2005 to carry out supplemental geotechnical investigations for the floating roads and peat repository areas to manage peat stability during the second phase of construction.
- In 2014 to supervise the construction works to upgrade the floating roads on the site.
- In 2018 to carry out follow-up inspections of the condition and stability of the peat repository sites, borrow pits and bunded material storage areas for the rEIAR.

For this EIAR Mr. O'Donnell carried out a follow-up visual walkover inspection of the Derrybrien Wind Farm Development site in January 2024. The purpose of the inspection was to observe the existing conditions on the site for any surface indications of residual impacts to land, soils, and geology resulting from the historic construction and operation of the wind farm. Particular attention was paid to identifying any potential areas of peat instability that might be the result of wind farm activities on the site. He also carried out a walkover survey of the 110kV line between Polesets PS-1 and PS-4 for the peat stability risk assessment.

Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation

A walkover survey of the OHLwas undertaken by FT during October 2022. Previous walkover surveys of the OHL were undertaken by FT in 2019 and AGEC in 2018. The purpose of the walkover survey was to investigate the ground conditions at the pole set and angle mast locations, identify geotechnical constraints and to gather data for a peat stability assessment along the OHL route. The results of these three surveys were consistent each other, with no significant alterations to the depth, strength or condition of the peat or subsoils, or any noticeable erosion of exposed slopes. The data gathered from these surveys is considered to be representative of the ground conditions along the OHL in 2024.

### 8.2.3 Scoping and Consultation

The scope for this chapter of the EIAR has also been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties. This consultation process is outlined in Section 2.6 of this EIAR.

## 8.2.4 Impact Assessment Methodology

The methodology that was used to assess the impact of the various Prospective Development activities on the receiving soils, geology and land is based on the recommendations in Section 3.7 of the 2022 EPA Guidelines on Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022).

### 8.2.4.1 Baseline Condition

As highlighted in Section 1.7.2 of Chapter 1, the baseline date for the site conditions used in the impact assessment is 2024. All available information was used to establish the baseline conditions for soils, geology and land in the Prospective Development area and in areas off-site that could be potentially impacted by a peat slide. This included a comprehensive desk study of available information from published sources, observations from site walkover surveys and inspections, and a review of all the relevant ground investigation information. Section of this chapter gives a comprehensive summary of the available information.

### 8.2.4.2 Terminology

In this Chapter:

- An 'Impact' is defined as an action from a site activity that results in a change to the receiving soils, geology and land e.g. during the construction of the turbine foundations the impact on the receiving soils, geology and land was the excavation of the peat and glacial till to construct the foundations on the underlying rock.
- The 'Effect' is defined as the change or changes resulting from that impact, e.g., the changes to the characteristics of the peat and glacial till that occurred after they were excavated.

Impacts on soils, geology and land have been assessed for the Prospective Development works. This includes an assessment of the impact of the Prospective Development activities that are likely to be carried out over that period based on the nature and scope of the works in the proposed decommissioning plan.

Given the history of peat instability on the site, the impacts of site activities have been assessed as **Direct Impacts** and as **Stability Impacts**, as shown in the flow chart on Figure 8-1.

### 8.2.4.3 Direct Impacts

Direct impacts of project activities are those that have a direct physical impact on the receiving soils, geology and land use e.g. excavation of peat and glacial till has a direct impact on the peat habitat that is disturbed at the excavation site which changes the physical characteristics of the excavated materials (the *effect*).

The **Effects** of direct impacts that are likely to occur during decommissioning are assessed on a 7-point scale from **Negligible** to **High** based on the nature, extent, duration and frequency of the effects, and the probability of occurrence and quality of the impact (i.e. positive or adverse/negative).

### 8.2.4.4 Stability Impacts

Stability impacts are direct impacts where the effect on the receiving soils, geology and land increases or decreases the risk of instability on the site, typically in the peat, potentially triggering a peat slide in the worst-case scenario.

For example, if excavated peat and glacial till is placed on the intact peat slopes adjacent to the excavation (i.e. sidecast),

- The direct impact is covering the peat habitat with the excavated material; and
- The stability impact is the surcharge that is applied on the surface of the peat due to the weight of the excavated materials.

In this example, the primary *effect* of the stability impact is the increase in shear stress in the underlying peat, which increases the risk of a peat failure, potentially triggering a peat slide on sloping ground where the magnitude of loading is such that the downslope shear stresses exceed the strength of the peat.

Therefore, to identify site activities that have a higher risk of triggering a peat slide, the effects of stability impacts have been qualitatively assessed on a 7-point scale from Negligible to High as a function of:

- The **characteristics** of the site activity and stability impact (e.g. the magnitude, extent, frequency and duration of loading on the peat).
- The **quality** of the effect on the receiving soils, geology and land with respect to site stability [i.e. negative (increases risk of peat instability), or positive (reduces risk)].
- The **probability** of a peat failure occurring as a result of the effect.
- The possible **nature** and **extent** of a peat failure.

#### 8.2.4.4.1 Characteristics of Stability Impacts

In the majority of cases the stability impact of site activities involves a dead or live load surcharge on the intact peat slopes. The magnitude, extent and frequency of loading is a function of the characteristics of the activities, which have been assessed based on the proposed decommissioning plan. For impacts that are likely to occur, the probability of occurrence of the impact is also considered.

Where appropriate, stability impacts of different site activities in the same part of the site have been assessed in-combination to determine the significance of the effect. For example, the effect of the live load surcharge from construction traffic on the floating roads has been assessed in combination with the dead load surcharge from the road itself, which was constructed directly on the peat. In some cases, it was not appropriate to assess stability impacts in combination. For example, while consideration has been given to the magnitude, frequency and duration of construction traffic loading on the floating roads for each site activity, the live load surcharges from different activities have not been combined because they do not lead to a cumulative loading on the road, i.e. the roads are not wide enough to accommodate two-way traffic, or some of the activities will not be carried out at the same time or in the same part of the site.

#### 8.2.4.4.2 Quality of Stability Impacts

The direct physical *effect* of surcharge loads on the peat slopes involves an increase in shear stresses in the peat, which increases the risk of a peat failure, potentially triggering a large peat slide as a worst-case scenario. Therefore, surcharge loading has a **negative** impact on the peat with respect to site stability.

Activities that have a positive impact on the peat with respect to site stability are those which reduce the risk of peat failure – for example drainage improvements that reduce groundwater pressures within and below the peat and increase the strength of the peat where the groundwater table is lowered.

#### 8.2.4.4.3 Probability of Occurrence of a Peat Failure

The probability of a peat failure occurring has been assessed for each Prospective Development activity based on the characteristics of the stability impact (e.g. the magnitude, extent, duration and frequency

of loading) as well as the physical characteristics of the site such as the topography, peat depth, peat strength and groundwater conditions. This is consistent with the EPA Guidelines (EPA, 2022) as well as current best practice guidelines for peat landslide hazard and risk assessments in *"Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Projects,* 2nd Edition, April 2017 (Scottish Government – Energy Consent Unit, 2017).

For the Prospective Development, a Peat Stability Risk Assessment (PSRA) has been carried out for the site area in accordance with the 2017 best-practice guidelines from the Scottish Government Energy Consent Unit to assess the likelihood of a peat slide in zones across the site based on the site characteristics and other contributory factors that are known to lead to a higher risk of peat instability. The probability of occurrence (Likelihood) of a peat failure due to the wind farm site activities has been qualitatively assessed on a 5-point scale from Low to Possible in zones across the site to characterise the variation in conditions (e.g. topography, peat depth, peat strength, groundwater conditions). The results have been used to assess the probability of occurrence of a peat failure for the assessment of stability impacts, as illustrated in Figure 8-1.

The peat stability risk assessments for the wind farm site, the peat slide response works, and the grid connection are presented in Section 8.3.9.

The PSRA for the Prospective Development is the baseline condition for assessing stability impacts in this chapter

#### 8.2.4.4.4 *Extent of a Peat Failure*

For this Prospective Development, the possible **Extent** of a peat failure has been calibrated by the scale of the peat slide that occurred on the wind farm site on the 16th October 2003, and by the land that that was directly impacted by the slide. The slide covered an area of approximately 25 ha and is the largest peat slide that has ever been recorded in Ireland. Therefore, it has reasonably been considered as the worst-case scenario in assessing the effect of stability impacts on the Prospective Development.

Consideration has also been given to the potential scale and characteristics of smaller, more localised peat failures that could occur as a result of Prospective Development activities. These could include localised shear failure or small-scale peat slides around open excavations in deep peat, or a localised bearing failure under a surcharge load on the peat slopes in areas where there is a lower risk of a large peat slide.

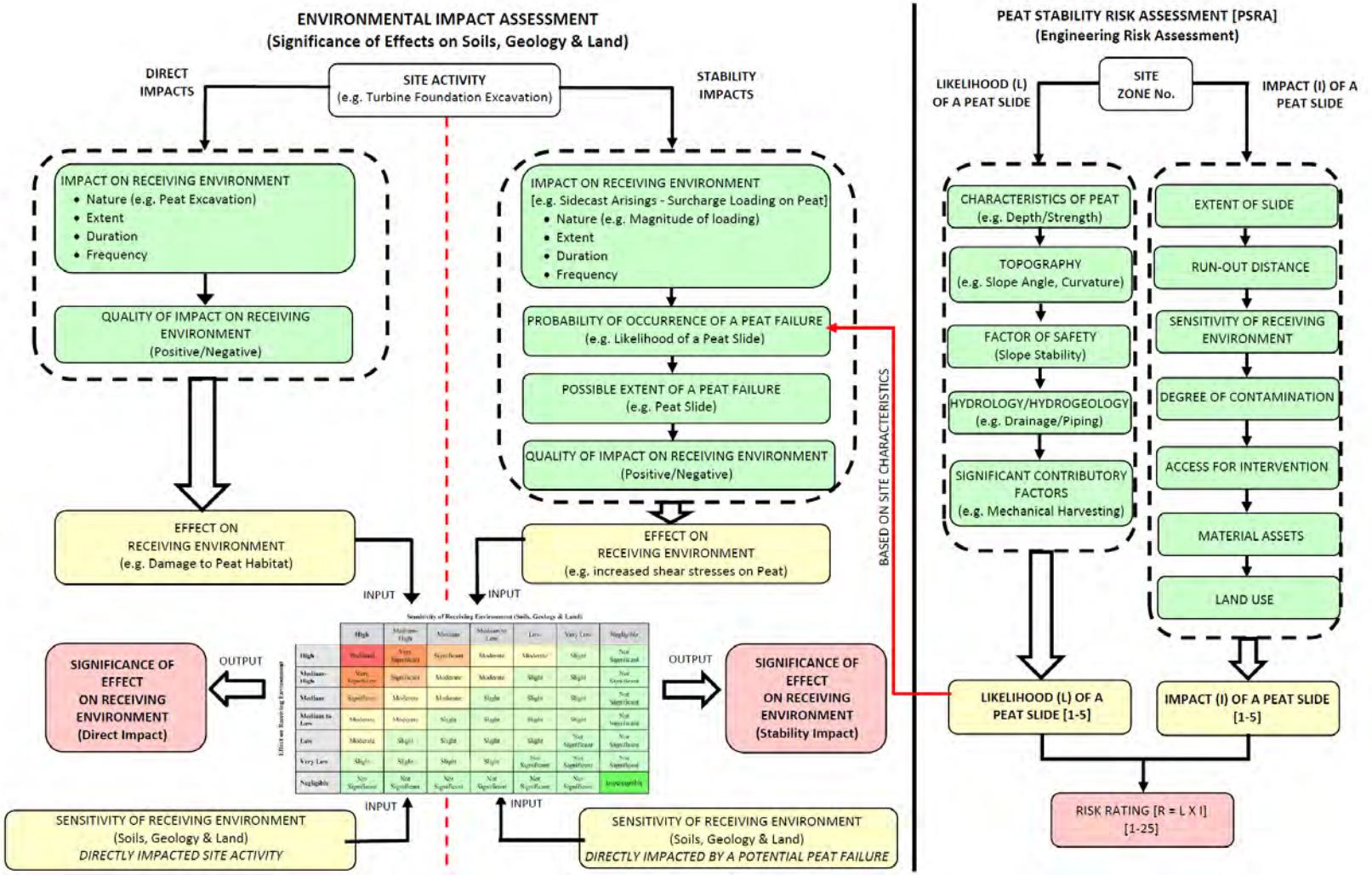



*Figure 8-1 Flow chart for assessment of direct impacts and stability impacts on soils, geology and land*

### 8.2.4.5 Sensitivity of the Receiving Environment for Direct & Stability Impacts

The baseline sensitivity of the receiving soils, geology and land impacted by the Prospective Development activities has been assessed on a 7-point scale from **Negligible** to **High** based on a combination of factors including the characteristics of the soils (i.e. peat, glacial till or rock), the ecological importance of the peat habitat, carbon storage potential (peat), geological heritage (glacial till/rock), and land use characteristics.

For stability impacts, consideration has been given to the characteristics of the receiving soils, geology and land outside the Prospective Development area that could be directly impacted by a peat slide. This has been calibrated by the scale of the very large peat slide that occurred on the site on the 16th October 2003, and by the land that that was directly impacted by the slide. The characteristics of the land use, topography, ground and groundwater conditions within the slide area are considered representative of the conditions that could potentially be impacted by a peat failure in other areas around the site. Therefore, it has reasonably been considered as the worst-case scenario in assessing the effect of stability impacts on this Prospective Development.

Consideration has also been given to the potential scale and characteristics of the smaller, more localised peat failures that could occur, which would have a significantly lower impact on the receiving environment, possibly confined within the Project area.

### 8.2.4.6 Significance of Effects for Direct & Stability Impacts

The **Significance** of the effects of direct impacts has been characterised on a 7-point scale from Imperceptible to Profound as a function of the effect of the impact and the sensitivity of the receiving soils, geology and land directly impacted by the project activity using the matrix in Figure 8-2, which has been adapted from the chart in Figure 3.4 of the 2022 EPA Guidelines.

**Sensitivity of Receiving Environment (Soils, Geology & Land)**

| Effect on Receiving Environment | High | Medium-High | Medium | Medium to Low | Low | Very Low | Negligible |
|---|---|---|---|---|---|---|---|
| **High** | Profound | Very Significant | Significant | Moderate | Moderate | Slight | Not Significant |
| **Medium-High** | Very Significant | Significant | Moderate | Moderate | Slight | Slight | Not Significant |
| **Medium** | Significant | Moderate | Moderate | Slight | Slight | Slight | Not Significant |
| **Medium to Low** | Moderate | Moderate | Slight | Slight | Slight | Slight | Not Significant |
| **Low** | Moderate | Slight | Slight | Slight | Slight | Not Significant | Not Significant |
| **Very Low** | Slight | Slight | Slight | Slight | Not Significant | Not Significant | Not Significant |
| **Negligible** | Not Significant | Not Significant | Not Significant | Not Significant | Not Significant | Not Significant | Imperceptible |

*Figure 8-2 Matrix used to assess the significance of effects for impacts on soils, geology and land*

The **Significance** of the effects of stability impacts has been determined as a function of the **Effect** that the impacts have on the peat with respect to site stability (which reflects the likelihood and possible extent of a peat failure), and the baseline **Sensitivity** of the receiving soils, geology and land potentially impacted by the peat failure, including land downslope and off-site from the wind farm in the case of a large peat slide.

To ensure that there is a consistent and representative methodology for assessing stability impacts of project activities on the receiving soils, geology and land, and the direct impact of peat failures that could potentially occur as a result of those activities:

- The worst-case scenario for the possible extent of a peat failure has been used to assess the significance of the effect of stability impacts on the receiving environment.
- Where there is a high probability of a peat failure occurring as a result of a site activity (i.e. very possible to likely), the significance of the effect of the stability impact of that activity on the receiving environment is the same as the significance of the effect of the direct impact of the peat failure that could occur in the worst case scenario as a result of that activity.

In this way the methodology identifies stability impacts that have significant effects whether or not a failure occurs so that appropriate design and construction mitigation measures can be implemented as a preventative measure.

### 8.2.4.7 Cumulative Impacts

Cumulative impacts from other projects on site or in the area are assessed in Section 8.4.5. Most of the other projects in the area are remote to the Prospective Development and will not have cumulative impacts on soils, geology and land in the project area. Therefore, the assessment of cumulative impacts is limited to any significant impacts from commercial forestry, and from peat extraction in turbary plots on the wind farm site and in the general area.

### 8.2.4.8 Remedial (Mitigation) Measures and Monitoring

Section 8.4.4 sets out the additional specific mitigation measures that will be implemented for decommissioning, which are consistent with the measures that have been successfully implemented on site to date.

### 8.2.4.9 Residual Impacts

Residual impacts that are likely to occur after the Prospective Development are addressed in Section 8.4.6. These are based on the proposed decommissioning plan for the Prospective Development and include impacts that are occurring and are likely to continue after decommissioning.

## 8.2.5 Limitations/Difficulties Encountered

Derrybrien Wind Farm Site & OHL Twin Polesets PS-1 to PS-4

This EIAR has been prepared based on available information and a site visit undertaken in January 2024. No significant limitations or difficulties were encountered in the preparation of the report.

The baseline conditions have been developed from the ground investigation works that were carried out at the construction stage of the Project as well as the site inspections and on-site testing that has been carried out since then. It is considered that there was sufficient information available to reliably establish the baseline conditions on the site for decommissioning.

Derrybrien Wind Farm OHL

This EIAR has been prepared based on available desktop information and a site visit undertaken in November 2022. As the site is an existing operational Overhead line and Substation, no further intrusive ground investigations were required to be carried out.

No significant limitations or difficulties were encountered in the preparation of this EIAR. The main difficulties that were encountered in the assessment of the impact of the wind farm on soils, geology and land on the site were related to the limited information that was available for the ground and groundwater conditions on the site prior to construction. However, it is considered that there was sufficient information available to reliably establish the baseline conditions on the site for decommissioning.

## 8.3 Receiving Environment

### 8.3.1 Introduction

All available information was used to establish the baseline conditions on the Derrybrien Wind Farm Development site, and in areas off-site that could be impacted by a peat slide. This included a comprehensive review of relevant information from the ground investigations that were carried out on the site, and a desk study review of historical aerial photographs, LiDAR topographical survey data, and relevant information on ground and groundwater conditions, bedrock, and geological heritage sites from online sources including the Geological Survey of Ireland (GSI), the Environmental Protection Agency (EPA) and the Ordnance Survey of Ireland (OSI).

Section 8.3.2 gives a summary of the ground investigations that were carried out on the Derrybrien Wind Farm Development site in 2001, prior to construction, and in 2004/2005 during the construction stage of the Derrybrien Wind Farm Development. This information would be considered representative of the general ground conditions on the Derrybrien Wind Farm Development site, particularly outside the slide area and where the ground conditions were not impacted by the Derrybrien Wind Farm Development. Therefore, all the relevant information from these investigations was used to establish the baseline site conditions for the Prospective Development.

Section 8.3.3 gives a summary of the baseline conditions for the topography and land use on the site based on the site walkover surveys, aerial photographs and LiDAR topographical survey data.

The peat, mineral subsoil and bedrock conditions interpreted from the desk study and site investigation information are presented in Section 8.3.1.

The available information on groundwater and surface hydrology is summarised in Section 0 and Section 8.3.6, respectively. Impacts of the Prospective Development on hydrogeology and groundwater are assessed in detail in Chapter 9 (Water) of this EIAR. The information included in this chapter is relevant to assessing the baseline conditions for the peat and subsoils in the Prospective Development area and for the assessment of the effects of impacts on the peat, particularly in relation to peat stability.

Section 8.3.2 and Section 8.3.3 present information on designated Geological Heritage Sites, active pits and quarries and aggregate potential for crushed rock or natural gravel within the project area from the Geological Survey Ireland (GSI) online mapping database.

The baseline sensitivity of the receiving soils, geology and land impacted by the Prospective Development has been assessed in Section 8.3.7 based on a number of factors including the characteristics of the materials that could be impacted (i.e. peat, glacial till or rock), the ecological importance of the blanket bog, carbon storage (peat), geological heritage (glacial till/rock), and land use characteristics. In assessing the impact of a peat slide related to activities on site for the Prospective

Development, consideration has also been given to the characteristics of the receiving soils and geology outside the Prospective Development site that could be directly impacted by a peat slide, downslope from the wind farm.

The Landslide Susceptibility Map for the Project area from the GSI is included in Section 8.3.8. The results of the baseline Peat Stability Risk Assessment (PSRA) for the Prospective Development are presented in Section 8.3.9 to characterise the likelihood of a peat slide across the wind farm site based on site characteristics related to topography, peat and subsoil conditions, hydrology, hydrogeology and other known contributory risk factors related to peat instability. The assessment identifies areas on the site where there are compounding risk factors with regard to peat stability that could lead to an elevated risk of a peat failure prior to the implementation of appropriate risk mitigation measures. For this report, the risk of a peat failure specifically refers to a failure resulting from a direct or indirect impact of the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development.

## 8.3.2 Geotechnical Investigations

### 8.3.2.1 Introduction

Extensive ground investigations have been carried out across the site to date at different phases of the Derrybrien Wind Farm Development, primarily at detailed design and construction stage. The investigations have been comprised of:

- A comprehensive desk study of available information on soils, geology and groundwater conditions.
- An aerial LiDAR survey of the wind farm and surrounding area to obtain an accurate model of ground levels and topography across the site.
- Trial pits to determine the depth and characteristics of peat and subsoils, and the depth to bedrock at shallow depths up to 3.0-4.0 m.
- Extensive peat probing to establish a profile of the depth of peat across the site.
- In-situ vane shear testing to establish the undrained shear strength of the peat.
- In-situ undisturbed piston sampling of the peat to obtain high-quality undisturbed samples for laboratory testing and inspection.
- Disturbed gouge-auger core samples of the peat and subsoil to inspect the characteristics of the peat at the interface with the underlying mineral soil.
- Rotary coreholes to establish the depth to rock and the rock mass characteristics at a number of turbine locations.
- Peat probing was undertaken along the route of the Overhead line (OHL) by AGEC (2018) and by FT (2019, 2022).

Figure 8-3 shows a consolidated layout plan of most of the investigation points, which illustrates the high level of coverage that has been achieved across the Prospective Development area. A more detailed copy of the drawing is included in AGL Report No. 11-147-R04 "*Derrybrien Wind Farm - Geotechnical Stability Report & Assessment of Stability Impacts of On-Site Activities*", which is included as Appendix 8-2 of this Chapter.

The following is an outline summary of the different phases of site investigations that were carried out on the Derrybrien Wind Farm Development site. Further details on the investigations and copies of the related factual reports are included in AGL Report No. 11-147-R01 in Appendix 8-2.

### 8.3.2.2 Pre-Construction Ground Investigation - IGSL Site Investigation (2002)

IGSL Ltd. carried out the pre-construction ground investigation on the site in December 2001. Access to the turbine locations was not possible for conventional ground investigation equipment to carry out

trial pits, boreholes or rotary coreholes because of the poor ground conditions and extensive forestry coverage on the site. Therefore, the works was comprised of the following:

- 8 No. trial pits to depths of 2.5-3.3 m with a wide-track hydraulic excavator.
- 58 No. dynamic probes using a light hand-held Mackintosh Probe – primarily located at Turbines T1-T46, with 12 No. additional probes at selected locations over the rest of the site.
- 24 No. auger samples of the peat at depths of 1.5 m across the site.
- Laboratory testing of the disturbed samples of the peat, which included 12 No. water contents and 6 No. chemical tests (SO3 & pH).

#### 8.3.2.3 AGL/BAM Supplemental Site Investigations – Construction Stage (Post-Slide – 2004/2005)

Extensive supplemental ground investigations were carried out on the site by AGL Consulting and the main civil works contractor, Ascon Ltd. (now BAM Civil) during the second phase of construction in 2004/2005, after the peat slide, to accurately characterise the topography and the depth, strength and characteristics of the peat and underlying glacial till across the site so that the risk of peat instability could be adequately assessed and managed for the completion of the wind farm.

The investigations were primarily concentrated along the site access tracks and at proposed peat deposition areas on the intact peat slopes. The fieldwork consisted of:

- Peat depth probing and sampling with a hand-operated 20 mm diameter steel probe with the 1.0 m long 20mm diameter gouge-auger core sampler.
- Slope angle measurements on the surface of the peat by GPS, optical survey and hand-held Abney Level.
- In situ vane-shear tests to determine the undrained shear strength of the peat using a Geonor H-10 65/130mm penetration vane.
- Rotary coreholes by Irish Drilling Ltd. at 27 No. turbine bases to determine the depth to rock and rock mass characteristics, with Standard Penetration Tests (SPT) in the overburden to assess the in-situ undrained shear strength of the glacial till.
- Installation of 10 No. 19mm diameter push-in piezometers to record groundwater levels in the peat across the site.
- Collection of high-quality undisturbed samples of the peat with 75 & 100mm thin wall Geonor piston samplers and by block sampling in trial pits.
- Specialist laboratory testing of undisturbed samples to classify the strength and material characteristics of the peat.

#### 8.3.2.4 AGEC Ground Investigation (2003)

AGEC carried out a ground investigation on the site after the peat slide in 2003. The investigation was comprised of:

- In-situ shear vane tests using the handheld Geonor H-60, 25.4mm diameter vane.
- In-situ shear vane tests by Fugro Ltd. to determine the undrained shear strength of the peat using a Geonor H-10 55/110mm penetration vane mounted on a 3-tonne mini crawler rig.
- Detailed walkover survey inspections and geotechnical mapping of site characteristics and material sidecast areas at turbine locations.

The investigations that were carried out by AGEC are included in their report titled "*Final Report on Derrybrien Wind Farm Post-Landslide Site Appraisal*" dated 04/02/2004 (Report no. 378_099)", which is included in Appendix 8-1. Their investigations formed part of an initial preliminary investigation of peat

stability across the site after the peat slide in October 2003. Therefore, they are located along the floating roads and near the turbine foundations that had been completed prior to the slide, where excavated material had been sidecast on the intact peat slopes.

#### 8.3.2.5 ESBIE Ground Investigation (2004)

Extensive supplemental geotechnical investigations were also carried out on the site by ESB International Engineering (ESBIE) between June 2004 and December 2004 to assess the stability of the site for the planned tree felling operations following the peat slide in October 2003. The fieldwork provided comprehensive coverage of the site between the floating roads and turbines and was comprised of:

- Slope angle measurements with a hand-held Abney level at 15-25m intervals along 219 No. profiles at representative locations across the site.
- 3162 No. peat depth probes with a hand-operated 20 mm diameter steel probe to establish the variation in peat depth and the slope at the interface with the underlying mineral soil or rock along the survey profiles.
- Peat sampling at 222 No. locations with the 1.0 m long 20mm diameter steel gouge-auger core sampler to provide visual classification of the peat.
- 1179 No. in-situ vane shear tests in the peat at representative locations with the Geotech AB 140mm x 280mm automated vane.
- Installation of piezometers in the peat at selected locations around the site in February 2004.

#### 8.3.2.6 AGEC Ground Investigation (2018)

2 no. trial pits were excavated by AGEC at Agannygal Substation in June 2018, referred to as TP10 and TP11. The trial pit locations are shown on Drawings 0001 and 0006 in Appendix 8-6 and are downslope of the substation. Trial pit TP10 found 1.0m of fill over natural ground consisting of mineral soil to a depth of 2.9m bgl. Trial pit TP11 found 0.7m of peaty fill over natural ground consisting of soft slightly organic clay to 1.7m bgl over mineral soil to 2.5m bgl.

The 2 no. trial pits are consistent with each other and suggest a ground profile consisting of deposited construction arisings from the substation excavation over a natural ground profile of soft organic topsoil over glacial till. A cutting is exposed at the Agannygal Substation site, and the exposed soil here is consistent with the descriptions from the trial pits.

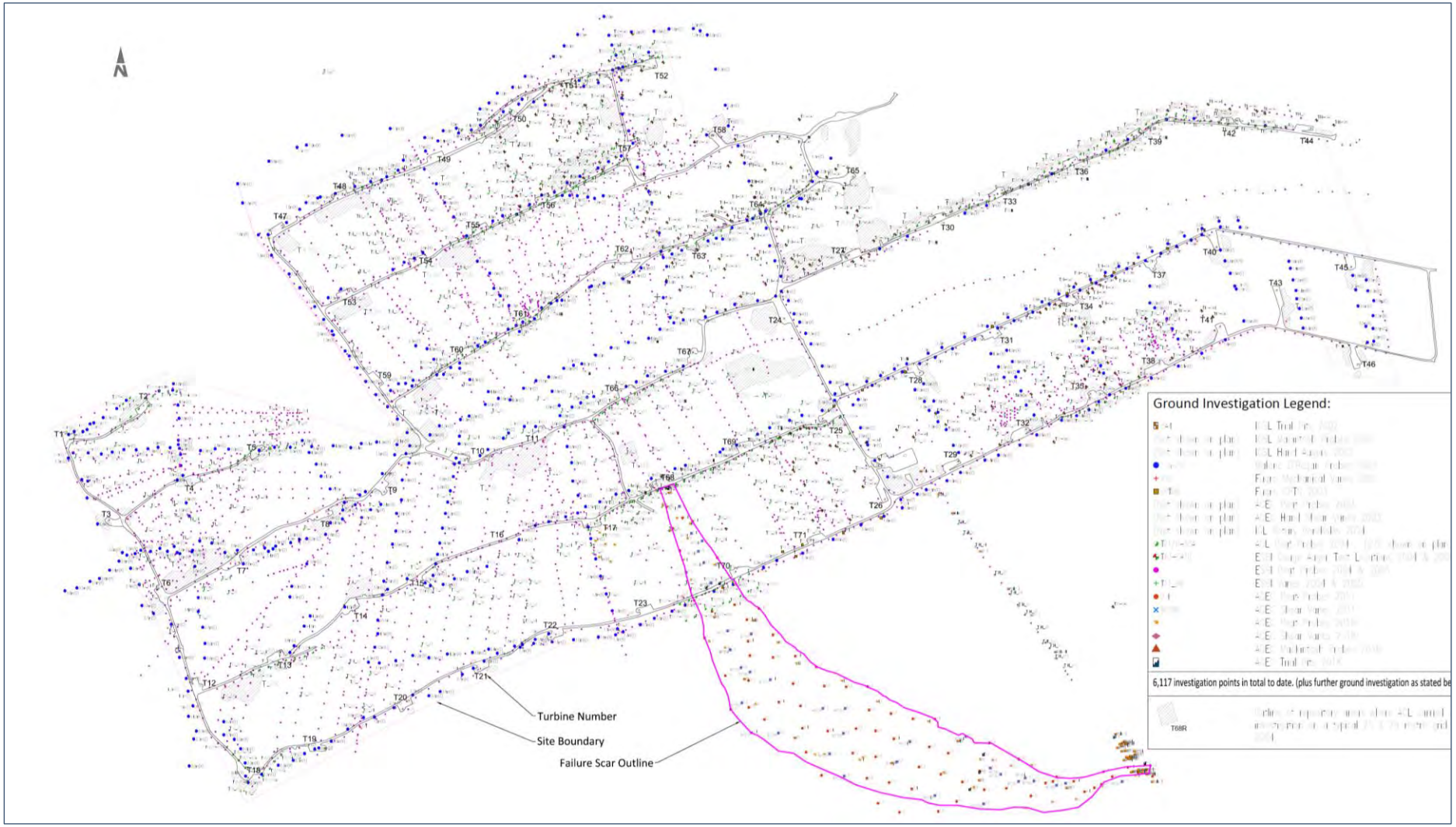



*Figure 8-3 Consolidation site investigation location plan (Ref: AGEC Drawing No. 003 – Ground Investigation Location Plan for Wind Farm & Failure Scar, Rev.0, 25th July, 2018)*

### 8.3.3 Land Use and Topography

The Derrybrien Wind Farm Development site is located on the upper slopes of the Cashlaundrumlahan Mountain in the Slieve Aughty Mountains in Co. Galway. The site is primarily characterised by upland blanket bog which has historically been used for commercial conifer forestry over the central and western parts of the site, and turf cutting in turbary plots on the east side. An aerial photograph of the site from May 2020 is shown on Figure 8-4. The photograph identifies some of the main features on the site, including:

- The wind farm infrastructure including:
- The wind farm access tracks, most of which are floating roads on the peat.
- The turbines and crane hardstanding areas.
- The substation.
- Main borrow pit BP-3 filled with water near the entrance to the site.
- The forestry furrows and open drains where the conifer plantations have been felled.
- The remaining conifer plantations within and around the wind farm site.
- The turbary plots in the open blanket bog at the east end of the site.
- The existing access roads to the turbary plots which were constructed as floating roads.
- Areas of deeper peat and high groundwater table characterised by darker vegetation or bog pools.
- Existing watercourses and drainage channels.
- Potential subsurface drainage channels along lines of vegetation.
- The slide area.

The pattern of tree furrows and the surface drainage network can be identified on the aerial photograph. In the area of peat harvesting on the east side of the site the network of surface drains is defined by the boundaries of the turbary plots. On the west side of the site the strips of darker vegetation are possibly indicative of subsurface drainage paths or concentrated subsurface flow.

Figure 8-5 and Figure 8-6 show the general topography of the site from the LiDAR survey data presented as 1m elevations and interpreted ground surface slope angles, respectively. The peak of Cashlaun-drumlahan Mountain is at Elev. +365 mOD near Turbine T10 at the centre of the site. Within the site the ground level drops away gently to between approximately Elev. +325 mOD and +345 mOD along the perimeter of the wind farm over a distance of approximately 700 m to the north and south, and 1.2km to the west. At the east end of the site the ground surface is lower and drops down to Elev. +290 mOD and +298 mOD at Turbines T46 and T44, respectively, which are approximately 2.6km from the peak.

There is a broad zone that runs across the full width of the site for approximately 250-300 m to the north and south of the peak of the mountain where the ground surface slopes gently away from the peak at slope angles typically <3°. This is within the central three rows of turbines on the site layout in Figure 8-5.

To the south of this zone the slope is convex in profile with slopes generally increasing up 4-5° degrees and locally 5.0-7.5° within the wind farm site, particularly between Turbines T21 and T41. Downslope from the site in this area the slopes increase more consistently typically up to 7.5° and locally up to 10.0°.

The northern upper slopes of the mountain within the wind farm site are characterised by a terraced profile with broad flat areas where the slope angles are <3°, separated by benches where the slopes are locally steeper at up to approximately 5.0-7.5°, locally up to 10°. This reflects a stepped profile to the underlying bedrock, which has sub-horizontal bedding. There are areas of deeper peat and ponded surface water on the flat terraces, as identified on the aerial photograph in Figure 8-4. These are

characterised by the change in colour to the darker natural vegetation on the blanket bog, or by pools of surface water, like the area near Turbine T61.

North of the wind farm site there is a convex break in slope to steeper more uniformly graded slopes up to 7.5-15.0°. Turbines T47 to T52 are located along the convex break in slope on this side of the site.

The OHL route starts within the southern boundary of the windfarm site at the Derrybrien substation at an elevation of approximately 330mAOD. From the Derrybrien substation, the OHL route follows a southern direction with elevation reducing as the route passes across the Owendalulleagh valley where it crosses the R353 road and the tributaries of the Owendalulleagh River at an elevation of approximately 130mAOD. From here, the route avoids the Slieve Aughty Bog NHA (site number 001229) before gaining elevation as it passes Lough Agannygal, at about 195mAOD. The route ends at the Agannygal Substation, at an elevation of about 190mAOD, which is located to the southeast of Cashlaundrumlahan Mountain and north of Lough Atorick. The length of the OHL route is 7.8km.

The land use along the Grid Connection route is dominated by commercial forestry plantations which have been planted into blanket bog, which covers most of the route. Directly along the line of the Grid Connection route, the commercial forestry was felled and removed by others prior to construction, though there is localised colonisation by conifer and deciduous tree growth (regrowth of previously felled area).

The route crosses the lower part of the peat slide area which occurred on 16th October 2003 between pole sets 5 and 6, and also crosses 2 no. containment barrages (Barrages 3 and 4).

## 8.3.1 Soils and Geology

### 8.3.1.1 Quaternary Geology Map – Geological Survey of Ireland

Figure 8-7 shows a map of the Quaternary Geology for the wind farm site and local area which was generated from the Geological Survey of Ireland (GSI) online Spatial Resources Mapping (www.gsi.ie). The wind farm site is covered by upland blanket peat (BkPt). Exposures of glacial till derived from Devonian Sandstones (TDSs) are identified on the steep slopes on the north side of the site and on the lower slopes downslope from the wind farm. The area of till identified on the west side of the wind farm has been incorrectly labelled and should be Blanket Peat, as noted on Figure 8-7. There are also many exposures of outcropping bedrock (Rck), particularly along the banks of streams and watercourses and on the lower slopes downslope from the wind farm. The GSI Quaternary Geology Maps for the project area is included in Appendix 8-7.




*Figure 8-4 Aerial Photograph (Google Earth, 2020)*

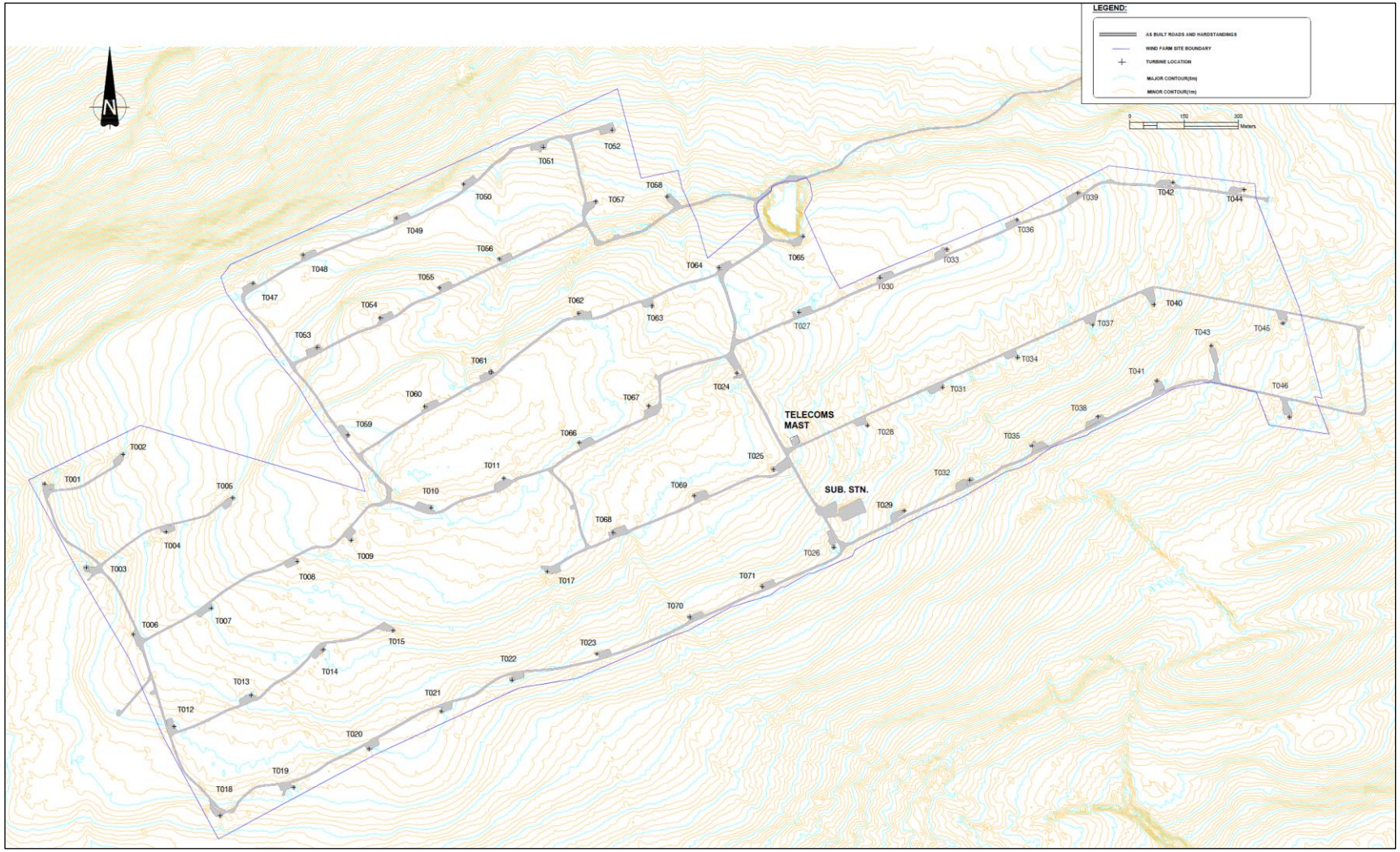



*Figure 8-5 LiDAR Topographical Survey*

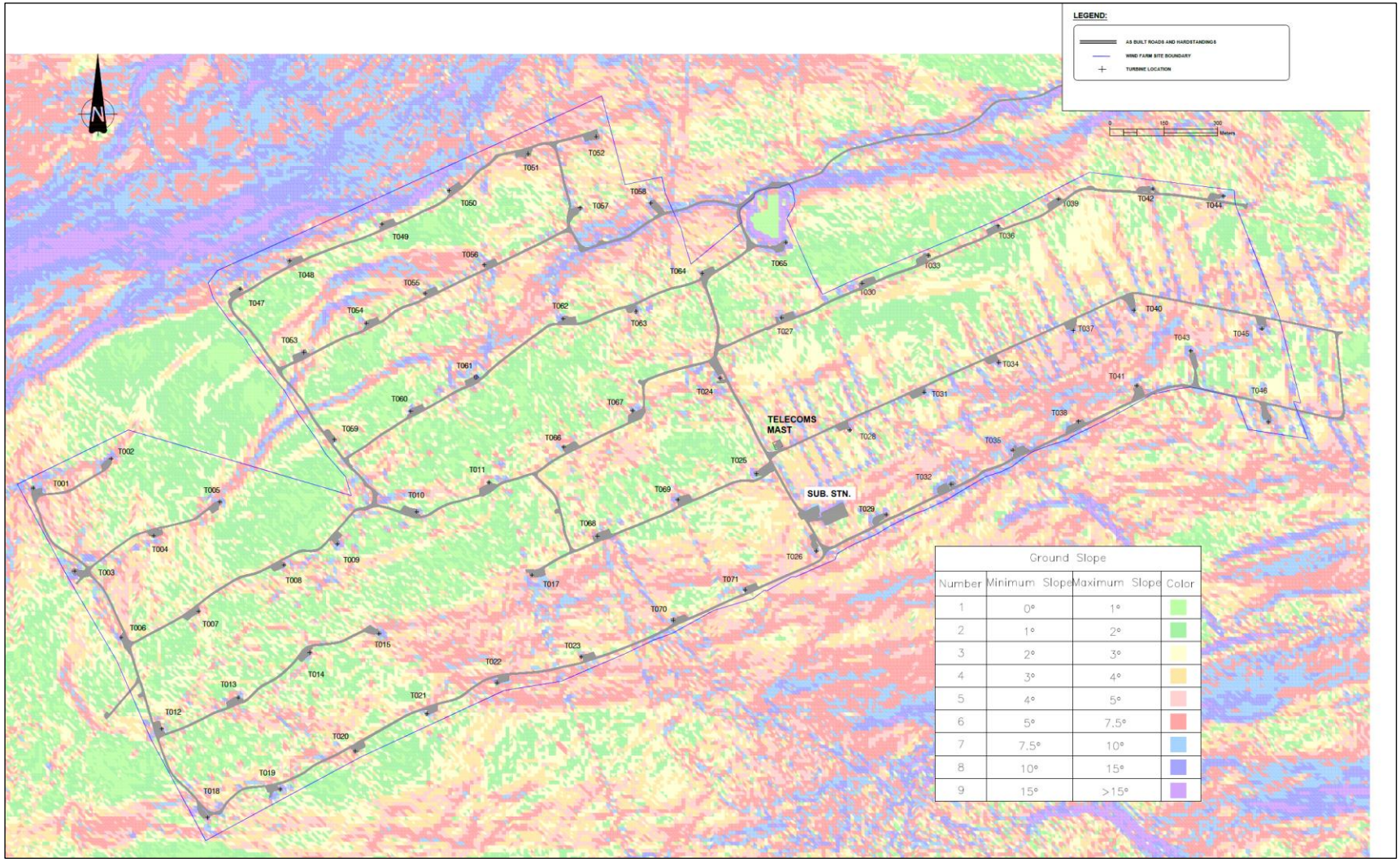



*Figure 8-6 Topography from LiDAR Survey – Slope Angles*

### 8.3.1.2 Peat (Upland Blanket Bog)

The majority of the wind farm site is covered by blanket peat. Figure 8-8 shows the depth of peat across the wind farm superimposed on the LiDAR survey. The depth of peat has been interpreted from the extensive number of peat probes that have been carried out on the site. In general, the depth of peat is proportional to the slope angles. The areas of deep peat up to 3-6 m deep, and locally >6.0 m, correspond to the broad flat or gently sloping ground across the central and western sections of the wind farm, and on the flat terraces on the north side. The slope angles in these areas are typically <2-3° (see Figure 8-6).

Peat depths <2m are generally confined to the areas of steeper slopes up to 5.0-7.5°, with shallow peat <1.0 m on slopes typically up to 7.5-10.0° along the benches at the edge of the terraces on the north side of the wind farm, and on the steep slopes along the perimeter of the wind farm between Turbines T47 and T50 to the north, and between Turbines T32 to T41 to the south. Peat depths of 2-3 m typically occur on the intermediate slopes of 3-5°.

The Grid Connection route is also covered in blanket bog (peat). The walkover survey and ground investigation undertaken previously by Applied Ground Engineering Consultants (AGEC, 2018) and FT (2019 and 2022) indicates that the upper 1m of peat is generally very fibrous and locally desiccated becoming less fibrous with depth. The base of the peat from observations within the peat slide source and in exposures in excavations and along drains along the route, was described using BS5930 (BSI, 2015) as very soft brown amorphous Peat with recognisable plant structure. Peat appeared to lay directly on bedrock or a weathered rock/glacial till.

Peat probing was carried out by ESB, AGEC and FT to establish peat depth contours along the OHL route. The depth of peat recorded along the route ranged from 0.2m to 5.6m bgl with an average of 1.35m bgl. Figure 8-9 shows the depth of peat between Polesets 1a and 7. It is 2.0 to 2.5m deep between PS-1 and PS-3 up at the wind farm site, but reduces to <0.5m further downslope at PS-6.

In the trial pits carried out pre-construction on the wind farm site by IGSL Ltd. the peat is described as soft brown fibrous organic PEAT. The characteristics of the peat were also examined with the extensive undisturbed piston and gouge auger probe sampling that was carried out by AGL during the construction stage of the project. In general, the degree of decomposition (humification) of the peat varies with depth – typically ranging from fibrous in the upper vegetated layer (the acrotelm) where there is still living plant matter (Von Post H4-H6), to slightly fibrous, amorphous or clayey with depth in the underlying catotelm peat, which is comprised of dead plant matter generally below the water table (Von Post H7-H10). There is more significant variability in the characteristics of the peat in the areas of deeper peat >2-3 m.

Water contents recorded by IGSL in the peat ranged from 150-450%, which are very low for peat. Water contents recorded by AGL during the construction stage of the Derrybrien Wind Farm Development were typically in the range of 800-1250%, which are more representative (Figure 8-10). The water content is expressed as the ratio between the mass of water to the mass of solids in the soil. Therefore, for water contents >1000%, over 90% of the peat mass is comprised of water, which is representative of blanket peat. Lower water contents of 20-75% were recorded in the clayey peat and organic clay layers at the base of the peat.

Mass loss on ignition tests carried out on samples of the peat indicated that the organic content is generally >95% (Figure 8-11). Lower values of 20-75% were recorded in the clayey peat and organic clay layers at the base. The bulk density of the peat samples tested by AGL ranged from 0.98 to 1.03 $Mg/m^3$ (Figure 8-12), increasing to 1.35-1.40 $Mg/m^3$ in the clayey peat and organic clay layers at the base.

Figure 8-13 shows typical profiles of unfactored undrained shear strength recorded in the peat on the wind farm stie by AGL/BAM with the Geonor H-10 in-situ penetration vane during the construction stage of the Derrybrien Wind Farm Development. In accordance with BS5930:2015+A1:2020 – BS Code of Practice for Site Investigations, the peat would be classified as Extremely Low Strength with an undrained shear strength <10 kN/m$^2$. The results were generally in the range of 5-10 kN/m$^2$, with a few locally lower values of 3.5-4.0 kN/m$^2$. The unfactored shear strengths recorded with the Geonor H-10 vane were validated on site by proof load testing on a test section of floating road during construction.

Figure 8-14 shows the results of vane shear tests that were carried out with a Geonor H-60 hand vane in the peat along the OHL by ESB, AGEC and FT. Shear strength profiles were also measured in the peat along the OHL. In 2004 and 2005 ESB carried out 27 no. shear vane strength tests at depths from 0.5m to 1.8m bgl at 13 No. locations between pole sets PS-2 and PS-4. The vane shear strength (unfactored) ranged from 5kPa to 10kPa with an average of about 8kPa. Shear strength testing was also undertaken at pole set and mast locations along the route of the OHL by AGEC in 2018 and FT in 2019 and 2022. 60 no. shear vane strength tests were undertaken at depths from 0.5m to 2.5m bgl. Values for vane shear strength ranged from 6kPa to 68kPa with an average of 21kPa.

Figure 8-15 shows the results of laboratory strength tests carried out on undisturbed samples of peat collected from the wind farm site by AGL. The tests were carried out at the soils laboratory of Trinity College Dublin for AGL/BAM and they included results of direct simple shear tests on samples collected adjacent to the slide. The results indicated that the undrained shear strength of the samples of peat tested in direct simple shear was generally greater than 4.5-6.0 kPa. However, some very low strengths on the order of 2.0-4.5 kPa were recorded on samples near the base of the peat in the vicinity of the slide (average = 3.5 kPa).

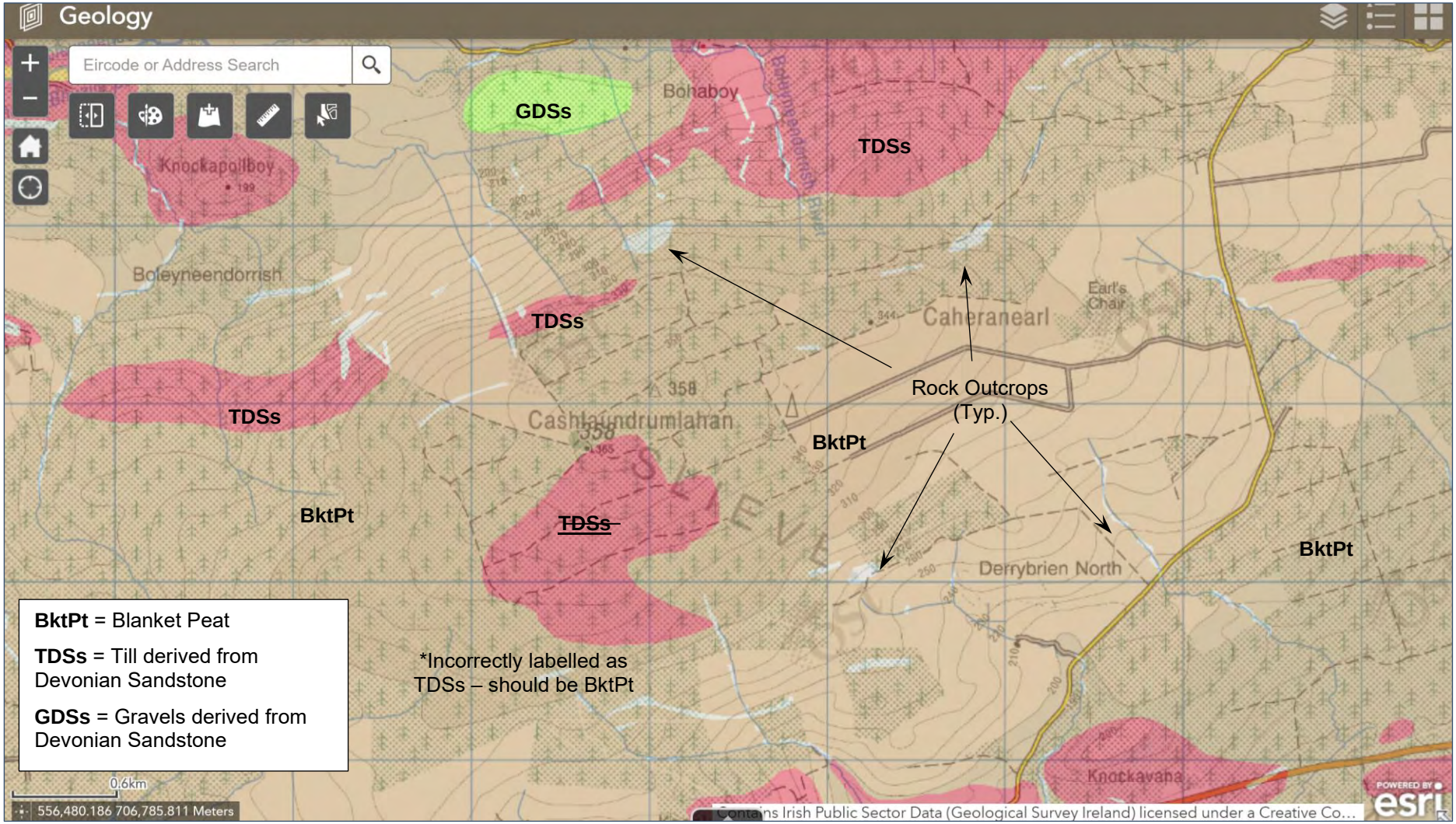



*Figure 8-7 Quaternary Geology Map of the Project Area (GSI online Spatial Resources Mapping, 2023)*

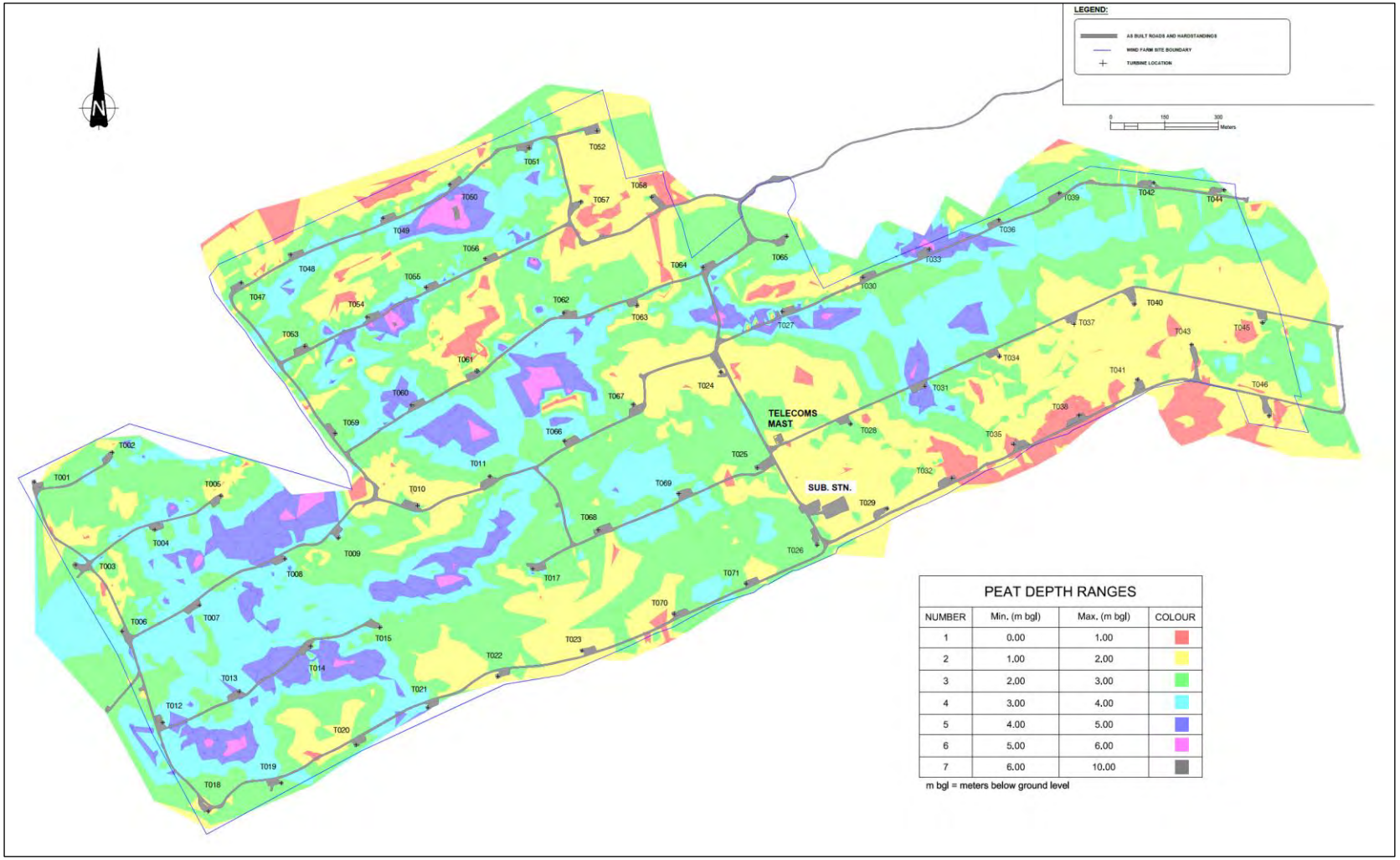



*Figure 8-8 Peat depth from peat probes across the site*

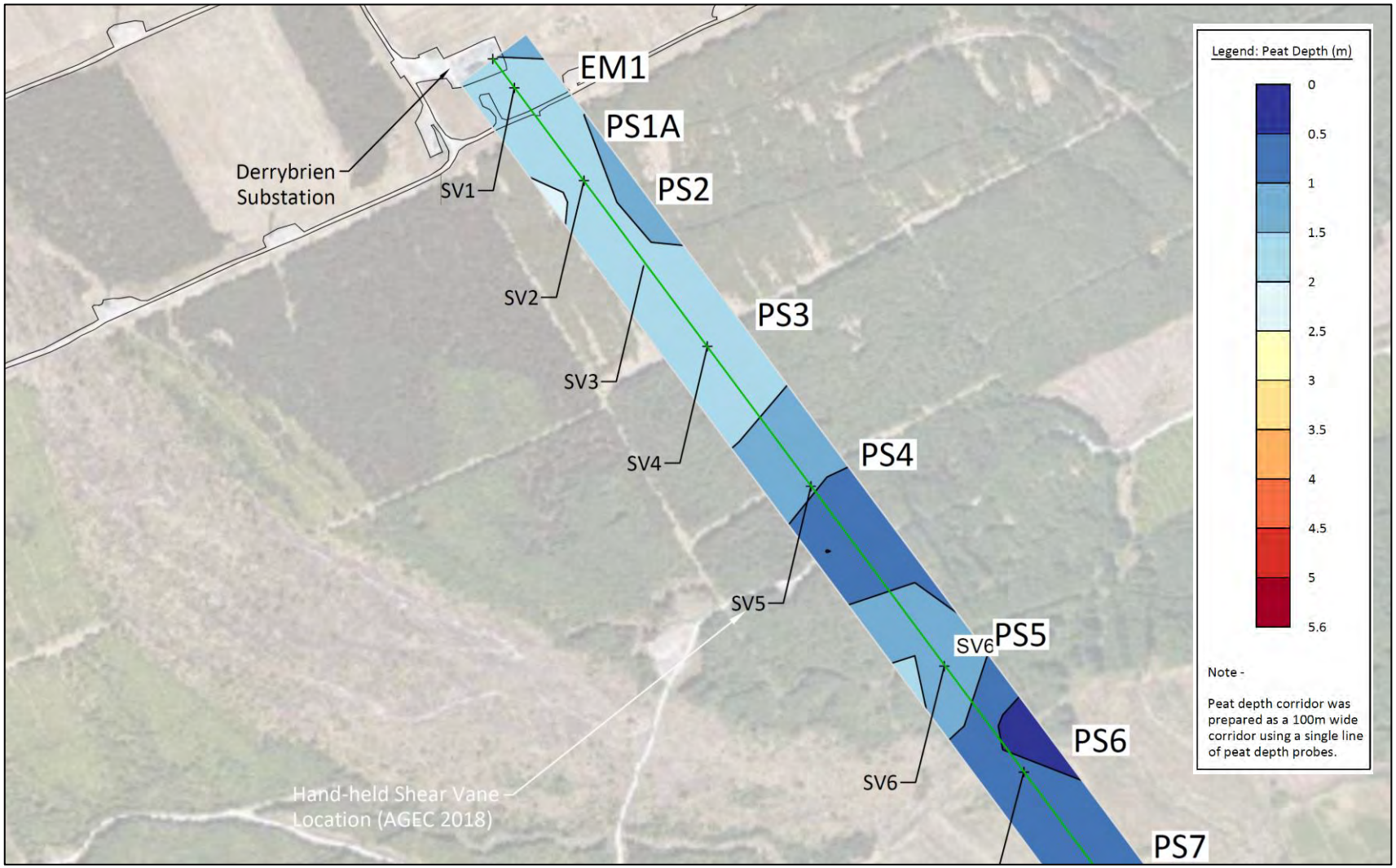



*Figure 8-9 Peat depth along OHL between Polesets 1a and 7*

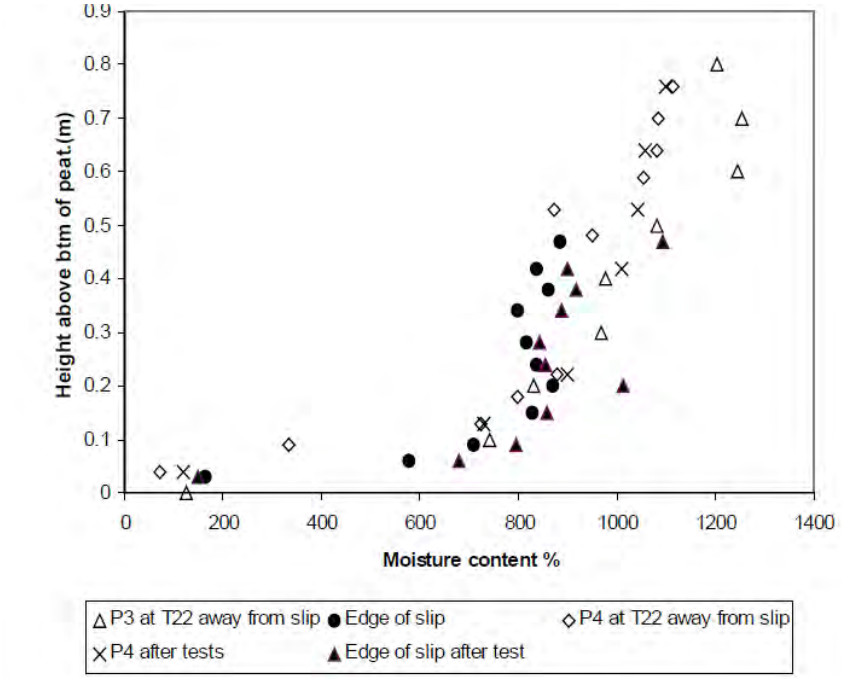



*Figure 8-10 Typical water content of peat*

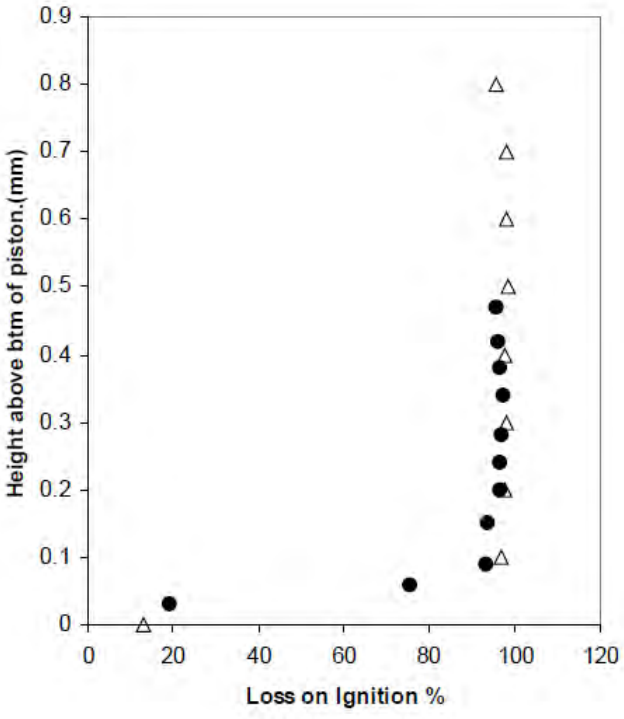



*Figure 8-11 Organic content of the peat by Mass Loss on Ignition*

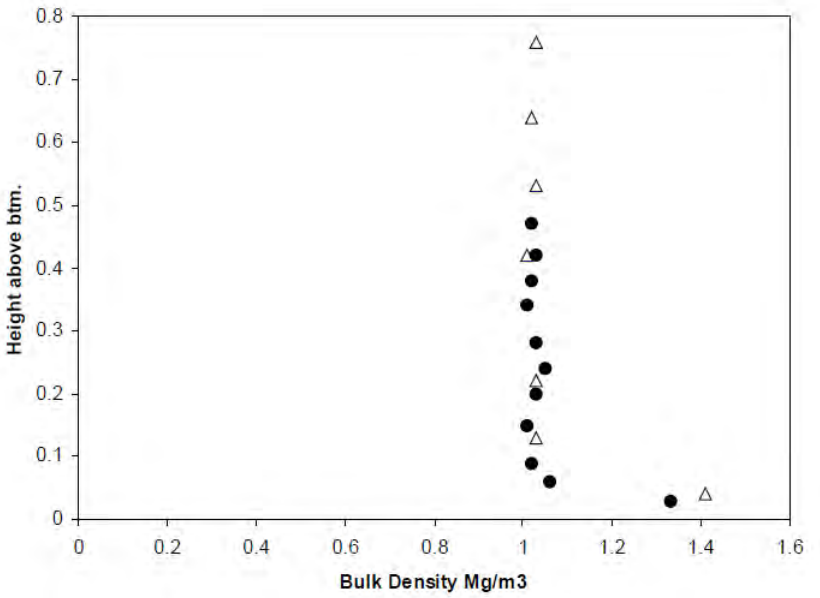



*Figure 8-12 Bulk Density of Peat*

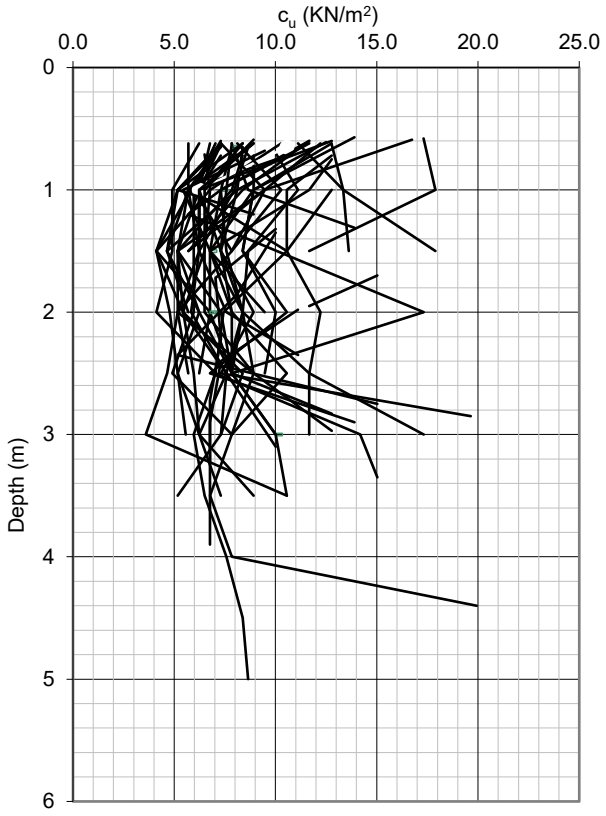



*Figure 8-13 Profiles of undrained shear strength ($c_u$) with depth recorded in the peat across the site with the Geonor H-10 vane*

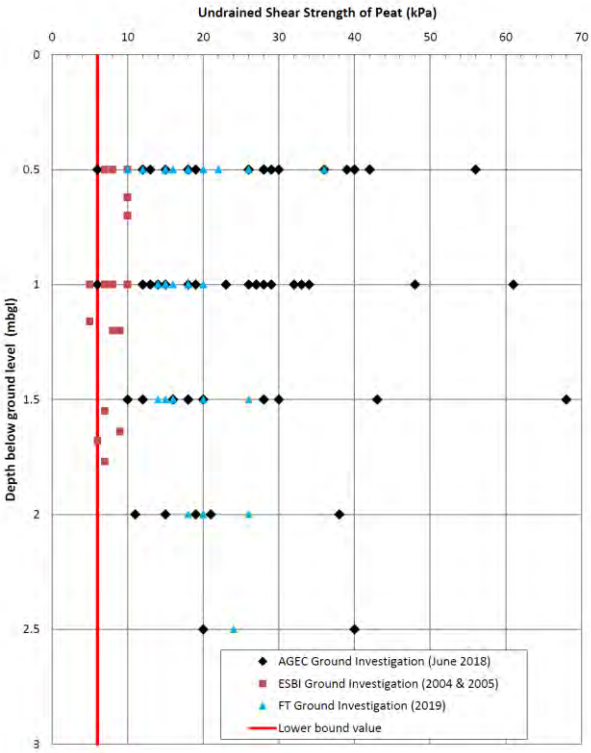



*Figure 8-14 Profiles of undrained shear strength ($c_u$) with depth recorded in the peat along the OHL with a hand vane*

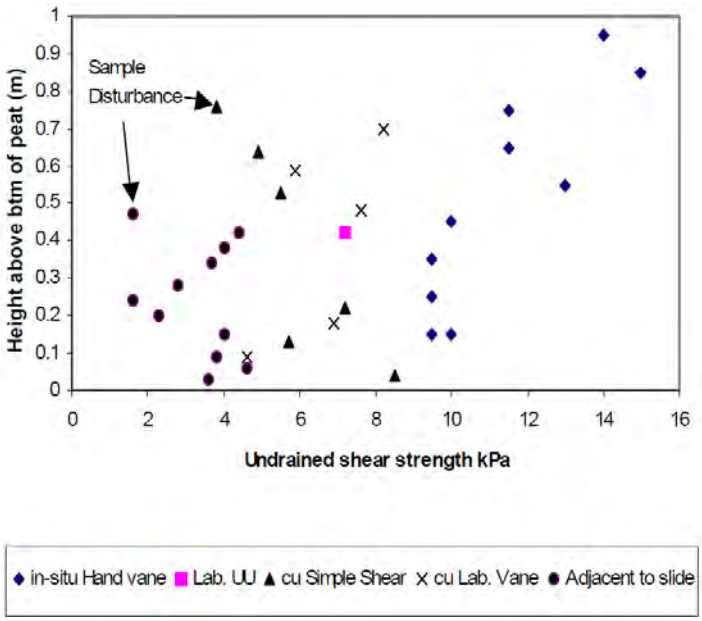



*Figure 8-15 Undrained shear strengths recorded on undisturbed samples of peat by hand vane, triaxial tests and direct simple shear tests*

### 8.3.1.3 Mineral Subsoil and Glacial Till

Where the full depth of peat was penetrated in 4No. of the trial pits carried out by IGSL Ltd. it is shown to be underlain by a 0.1-0.6 m thick layer of soft grey-white sandy SILT over glacial till described as Firm purple sandy gravelly CLAY. In areas of shallow rock, the peat may also be directly underlain by rock, although this was not generally the case.

Based on the rotary coreholes carried out by Irish Drilling Ltd. (IDL) at 27 No. of the turbines across the site (Turbines T6 – T8, T30, T33, T34, T36, T39, T47-T62, T64 & T70-T71), the glacial till layer ranges in thickness from 0.6m to 7.6 (typically between 0.6m and 3.5m) and is underlain by a weathered rock or rock. IDL generally describe the till as slightly sandy gravelly SILT, although samples recovered by conventional rotary coring may not be representative of the in-situ conditions.

Standard Penetration Tests (SPT) were carried out in the glacial till by IDL in some of the rotary coreholes. The SPT N-Values generally ranged from 10-33, which would correspond to an undrained shear strength ($c_u$) of 50 to 165kPa using the approximate empirical correlation $c_u \approx 5 \times N_{SPT}$ (CIRIA 143, 1995) In accordance with BS 5930 the strength of the till would be classified as Medium (40-75 kPa) to High (75-150 kPa) or Very High Strength (150-300 kPa).

Some lower SPT N-Values of 6-9 were recorded in the glacial till at depths of 3.5-4.5 m in the coreholes at Turbines T31, T33 and T64. These would locally correspond to undrained shear strengths of 30-45 kPa, which would be classified as Low (20-40kPa) to Medium Strength in accordance with BS5930.

Based on the available data, varying thicknesses of glacial soils are present beneath the peat along the OHL route corridor. The publicly available GSI (2022) mapping shows glacial till in the vicinity of the OHL to be derived from Devonian sandstones. Exposures of glacial till noted during the walkover surveys showed a reddish brown or whiteish brown well-graded material consisting of sandy slightly gravelly Clay/Silt with occasional sub-angular to rounded cobbles and boulders of sandstone.

The GSI (2022) mapping shows a line of ribbed moraines, which are hummocky wave ridges of sediment deposited by glacial movement, trending in a west-south-west to east-north-east direction traversing the OHL route close to the Owendalulleagh River.

Alluvium recorded along the OHL route corridor is associated with deposits of the Owendalulleagh River which crosses the route between pole sets 25 and 26. It was observed during the site walkover that the Owendalulleagh River riverbed consisted of a predominantly coarse-grained alluvial soil comprising sand, gravel, cobbles, and boulders.

#### 8.3.1.4 Bedrock Geology

Figure 8-16 shows the bedrock geology on the site of the Derrybrien Wind Farm and in the surrounding area from the 1:100,000 Geological Map from the Geological Survey of Ireland (GSI).

The site lies in a zone of bedrock from the Ayle River Formation which is described as being comprised of Mudstones, Siltstones and Conglomerates. The lower part of the formation is characterised by red Siltstones, Mudstones with carbonate concretions, Sandstones and Conglomerates. Sandstones are generally large-scale trough and planar bedded. Conglomerates are large-scale cross-bedded.

Figure 8-7 identifies where rock outcrops have been mapped in the area, generally on the steeper slopes downslope from the perimeter of the wind farm site, particularly to the north of the site. The geological map also shows the dip angle and dip direction of the bedding in the rock. It is typically sub-horizontal (0-10o) and dipping to the NE/SE on the north side of the mountain, and to the SW on the south side of the mountain.

On the steeper slopes to the north of the wind farm there is a zone of bedrock from the Derryfadda Formation, which is comprised of Greywackes, Siltstone and Mudstone. The Formation is dominated by grey-green, medium to thickly bedded (<3m), fine to coarse grained Greywacke, commonly containing conspicuous and diagnostic basal units of granule grade conglomerate.

Bedrock was cored by Irish Drilling Ltd. (IDL) at 27 No. turbines across the wind farm site (Turbines T6 – T8, T30, T33, T34, T36, T39, T47-T62, T64 & T70-T71). Bedrock at these turbines was generally

comprised of slightly weathered, strong to very strong, thinly to medium bedded, locally thinly laminated, purple fine to medium-grained SANDSTONE.

At Turbines T8, T53 and T60 the rock within the depth of the corehole was locally comprised of moderately strong or strong, slightly weathered purple thinly laminated slightly sandy SILTSTONE. Siltstone layers were also encountered within the Sandstone elsewhere on the site.

Along the north side of the site, the rock encountered in the coreholes at Turbines T47 to T51 was generally comprised of slightly weathered, strong to very strong, thinly to thickly bedded and massive cream fine to coarse-grained CONGLOMERATE.

The depth to the top of competent rock was variable but typically ranged from 3.0m to 6.2m. Shallower rock was encountered at a depth of 1.3-1.7 m at Turbines T47 and T49 at the north end of the site, and at a depth of 2.5 m at Turbine T58, near the site entrance.

Competent rock at Turbines T51 and T64 was initially at a depth of 8.0-10.3 m. However, additional coreholes carried out at the turbines indicated that the depth to rock was variable and rose to a depth of 5.5-5.6 m in places.

The Total Core Recovery (TCR) of the rock was generally 90-100%. The Rock Quality Designation (RQD) was variable and generally ranged from 0% to 57%, partially due to the thickness of the bedding in the rock. Higher RQD values of 78% and 100% were recorded in more competent Sandstone layers with thicker bedding. Bedding in the rock was generally sub-horizontal (0-10°) to gently dipping (10-20°).

There are sections of highly weathered rock noted at the transition from the overburden to rock. The weathered rock is described in the logs as a:

- Weak to moderately strong highly (locally completely) weathered green purple white medium grained thinly to medium bedded SANDSTONE with residual soil horizons.
- Gravel and cobble sized fragments of strong highly weathered purple thinly laminated SILTSTONE.
- Weak to moderately weak, highly to completely weathered orange brown medium grained thinly to very thinly bedded SANDSTONE.

The weathered rock was encountered predominantly in the north and northwest part of the wind farm. However, it was locally identified in T71 at the south end of the site and in T7 at the west end of the site. The weathered rock is noted above the bedrock at depths from 2.9m to 6.3mbgl, and it ranges in thickness from 0.8m to 3.4m. The Total Core Recovery (TCR) of the weathered rock ranged from 67% to 100% and the RQD was generally zero in the non-intact rock.

The bedrock geology along the OHL route corridor comprises the Ayle River Formation, the Derryfadda Formation, the Scalpnagown Formation, and Undifferentiated Visean Limestone.

The Ayle River Formation consists of red siltstones, mudstones with carbonate concretions, sandstones, conglomerates and mud-flake breccia. The Derryfadda Formation consists of greywackes, siltstones, and mudstones, and the Scalpnagown Formation consists of conglomerate, sandstone & siltstone.

The Undifferentiated Visean Limestones are impure Dinantian limestones (GSI, 2003 & 2019).

Rare bedrock exposures, consisting of sandstone, were observed in the vicinity of containment barrage 1, 3 and 4. The bedding was horizontal to sub-horizontal. Exposed bedrock was not encountered elsewhere along the route.

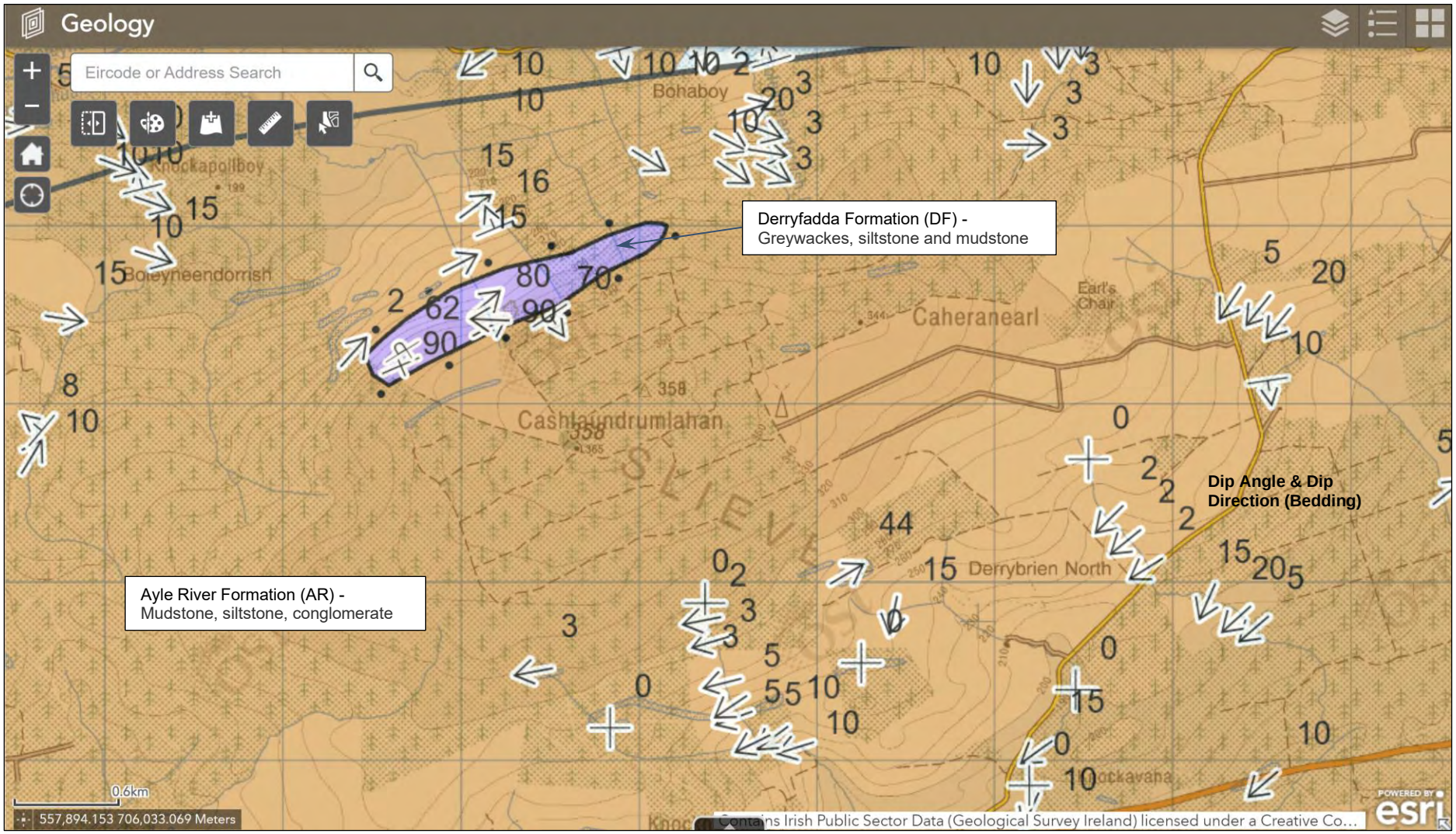



*Figure 8-16 1:100,000 Bedrock Geology Map of the project area (GSI online Spatial Resources Mapping – www.gsi.ie, 2023)*

## 8.3.2 Geological Heritage and Designated Sites

There are no audited or unaudited geological heritage sites identified on the wind farm site or in the project area on the Geological Survey of Ireland Spatial Resources interactive map viewer.

There are no geological heritage sites recorded along the OHL route corridor or at the Agannygal Substation.

## 8.3.3 Economic Geology

The GSI Online Minerals Database accessed via the online Spatial Resources Mapping shows no commercial pits or quarries within the vicinity of the Proposed Development.

The GSI online Aggregate Potential Mapping shows that the Proposed Development is generally in an area of "Very Low" potential for crushed rock aggregate and is not in an area identified as having granular aggregate potential (i.e. the potential for processing site won rocks or natural gravels into engineered fill materials is very low).

The GSI online Aggregate Potential Mapping Database shows that the OHL route corridor is not located within an area mapped as being of 'Very High' or 'High' granular aggregate potential (i.e. the potential for gravel reserves considered Low).

## 8.3.4 Soil Contamination

According to the EPA online mapping (https://gis.epa.ie/EPAMaps), there are no licenced waste facilities on or within the immediate environs of the Prospective Development.

There are no historic mines at or in the immediate vicinity of the Derrybrien Wind Farm Development site that could potentially have contaminated tailings. The site walkover survey did not identify any evidence of potential soil contamination and there is no record from the existing wind farm's operational phase of any environmental incidents with the potential to cause soil contamination.

## 8.3.5 Groundwater

The wind farm site is predominantly covered in Blanket Peat and there are areas of ponded water and small streams across the site. The aerial photograph in Figure 8-4 identifies areas of high groundwater level on the flat terraces or gently sloping ground across the site including:

- An area of ponded surface water with bog pools adjacent to Turbine T61 on the flat ground near the peak of the mountain.
- Areas of high groundwater level on the flat terraces associated with the change to the darker natural surface vegetation on the blanket bog.

In the pre-construction ground investigation carried out by IGSL Ltd. water strikes were recorded in the trial pits at depths of 1.0m to 1.5m and were qualitatively described as "seepage."

During construction, standpipes were installed by AGL at 6 No. locations along a north-south axis from the centre to the south of the wind farm in the vicinity of the peat slide to get a profile of the depth of groundwater down the slope. The readings that were taken from 17th November 2003 to 4th December 2003 indicated that the depth to groundwater ranged from 0.1m to 1.1mBGL.

In 2005, 12 No. electronic push-in vibrating wire piezometers were also installed around the wind farm site by ESBI to get continuous readings of water levels in the peat. The piezometers were installed in clusters adjacent to turbines T2, T18, T34 and T49/T40 at the approximate locations shown on Figure 8-17 and were labelled as follows:

- Turbine T2 (Logger Site 1): Pz-1 to Pz-3.
- Turbine T18 (Logger Site 2): Pz-4 to Pz-6.
- Turbine T34 (Logger Site 3): Pz-7 & Pz-9.
- Turbine T49/T50 (Logger Site 4): Pz-10 to Pz-12.

The piezometers were installed with the tip at the base of the peat to provide a continuous record of daily and seasonal groundwater level fluctuations in the peat. Groundwater levels were monitored between 2005 and the end of 2012. At the end of construction in 2005 the piezometers indicated that the depth to groundwater generally fluctuated between 0.3 and 1.1mBGL.

Figure 8-18 shows the change in groundwater level that was recorded in the piezometers at T2, T18 and T34 between January 2005 and November 2011. The readings from the piezometers at T49/T50 are not plotted because they malfunctioned after installation.

The short-term fluctuation in the data reflects seasonal fluctuations in groundwater level as well as changes in atmospheric pressure, which directly affect the water level readings. The data indicates that, between January 2005 and November 2011 the average groundwater level in the peat gradually dropped by about 0.40m at Turbine T18 in the SW corner of the wind farm site, to about 0.75m at T2 and T34 in the NW corner of the site and in the turbary area at the east end of the site, respectively.

This level of groundwater lowering would not have occurred uniformly across the windfarm site. The permeability of the peat is low, therefore, the extent of drawdown from the shallow open drains would be limited to within a few meters of the drains rather than generally across the site. However, the new drains that were installed during construction would have increased the rate of surface runoff from the windfarm site, which would have reduced the rate of infiltration into the peat. Over time this has resulted in a gradual lowering of the groundwater levels on the site. The impact would be greatest on the steeper slopes at the downslope perimeter of the site, where the piezometers were located. Less drawdown would be expected at the upper levels of the windfarm and on the terraces of flat or gently sloping ground across the windfarm site where surface water accumulates.

During the operation and maintenance phase of the windfarm between 2005 and 2022, maintenance works were carried out to improve the performance and efficiency of the drainage network. However, the capacity of the system was not significantly increased and most of the works were completed by 2012. Therefore, the majority of the groundwater lowering would have occurred by 2012 and any further changes over the remaining operational life of the windfarm should have been minor.

The groundwater levels in the piezometers had not stabilised fully by the end of 2011, but they did show a reduced rate of drawdown towards the end of the monitoring period. The piezometers were decommissioned in 2014.

Groundwater on the wind farm site would be expected to flow downslope through a network of natural open pipes within the peat as well as possibly through an open joint network in the underlying bedrock. Several springs have been identified on site, particularly within scarp faces on the northern slopes. The linear pattern of trees identified on the aerial photograph in Figure 8-4 is possibly indicative of concentrated subsurface drainage in the peat.

Based on information from the GSI database, the majority of the Grid Connection route and at the Agannygal Substation is underlain by rock which is considered a poor aquifer (bedrock which is generally unproductive except for local zones). However, the segment of the route underlain by Visean Limestone (between pole set 23 and 26 approximately) is considered a locally important aquifer

(bedrock which is moderately productive only in local zones) although no evidence for groundwater usage from this aquifer was found.

Groundwater vulnerability (GSI, 2022) ranges from low to extreme across the route, due to the shallow depth to bedrock. All drainage features along the OHL route are noted as giving rise to extreme groundwater vulnerability.

### 8.3.6 Surface Water, Watercourses and Surface Drainage

Figure 8-17 shows the network of natural watercourses and man-made drains that were on the wind farm site prior to construction and the new drains that were constructed for the wind farm. All of the drains and watercourses are typically narrow open channels 1-2 m deep. Where the peat is shallow the drains and watercourses penetrate into the underlying glacial till. In peat >1-2 m deep the drains are only excavated into the peat.

At the east end of the site the drainage network reflects the outline of the turbary plots. Over the rest of the site the drains follow improved natural watercourses or connect the turbines to the watercourses. Control of groundwater levels is a design requirement for the turbine foundations.

Figure 8-17 also illustrates how the site drainage feeds into the regional network of streams and rivers downslope from the site. Further information on hydrology is provided in Chapter 9 – Hydrology and Hydrogeology. Hydrology plays an important role in peat stability. Figure 8-17 illustrates how the peat slide that occurred during construction in 2003 is in the natural drainage channel for the watercourse in subcatchment SC7(b) (as described in Chapter 9). Groundwater and surface runoff from that part of the site has formed streams of concentrated flow in shallow channels on the glacial till or rock below the disturbed peat within the slide area. These streams flow into stream SC7(b) downslope from the site.

Several watercourses exist along the OHL route corridor, the largest being the Owendalulleagh River, approximately 6m wide, which passes beneath the OHL between pole sets 25 and 26. Major hydrological features tend to run east to west in the OHL corridor, with minor tributary features aligned approximately north to south to tie into the major drainage features.

The terrain along the route comprises several areas of naturally shallow depressions where local ponding of surface water naturally occurs. Such a feature, Lough Agannygal, is located between pole set 37 and angle mast 38.

Streams and ditches crossing the route have typically been regraded and tied into existing forestry/land drainage.

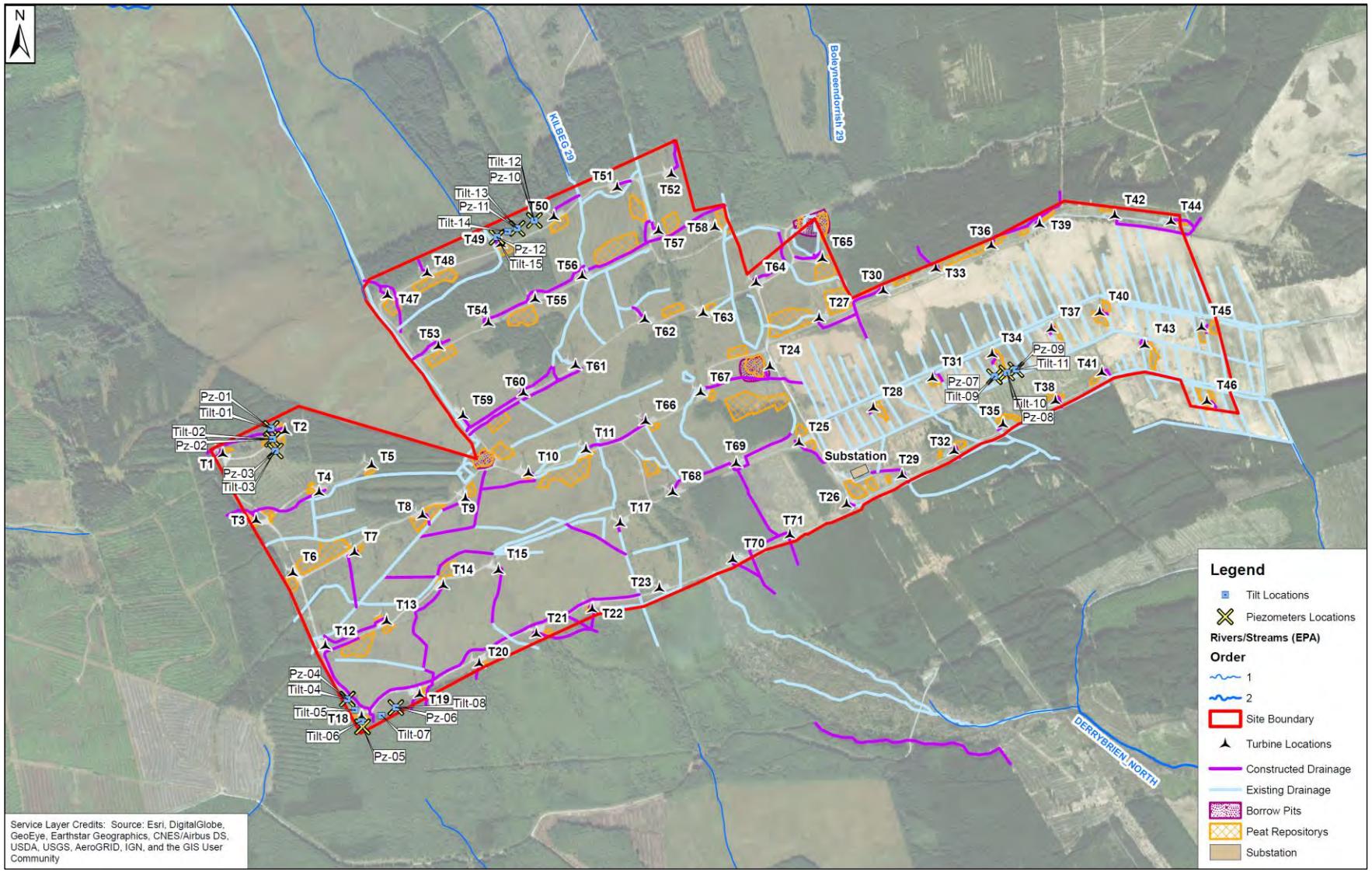



*Figure 8-17 Existing and as-constructed drainage, natural watercourses and location of electronic vibrating wire piezometers (Pz-01 to Pz-12) (Ref. ESB Drawing No. QS-00192-01-D451-016)*

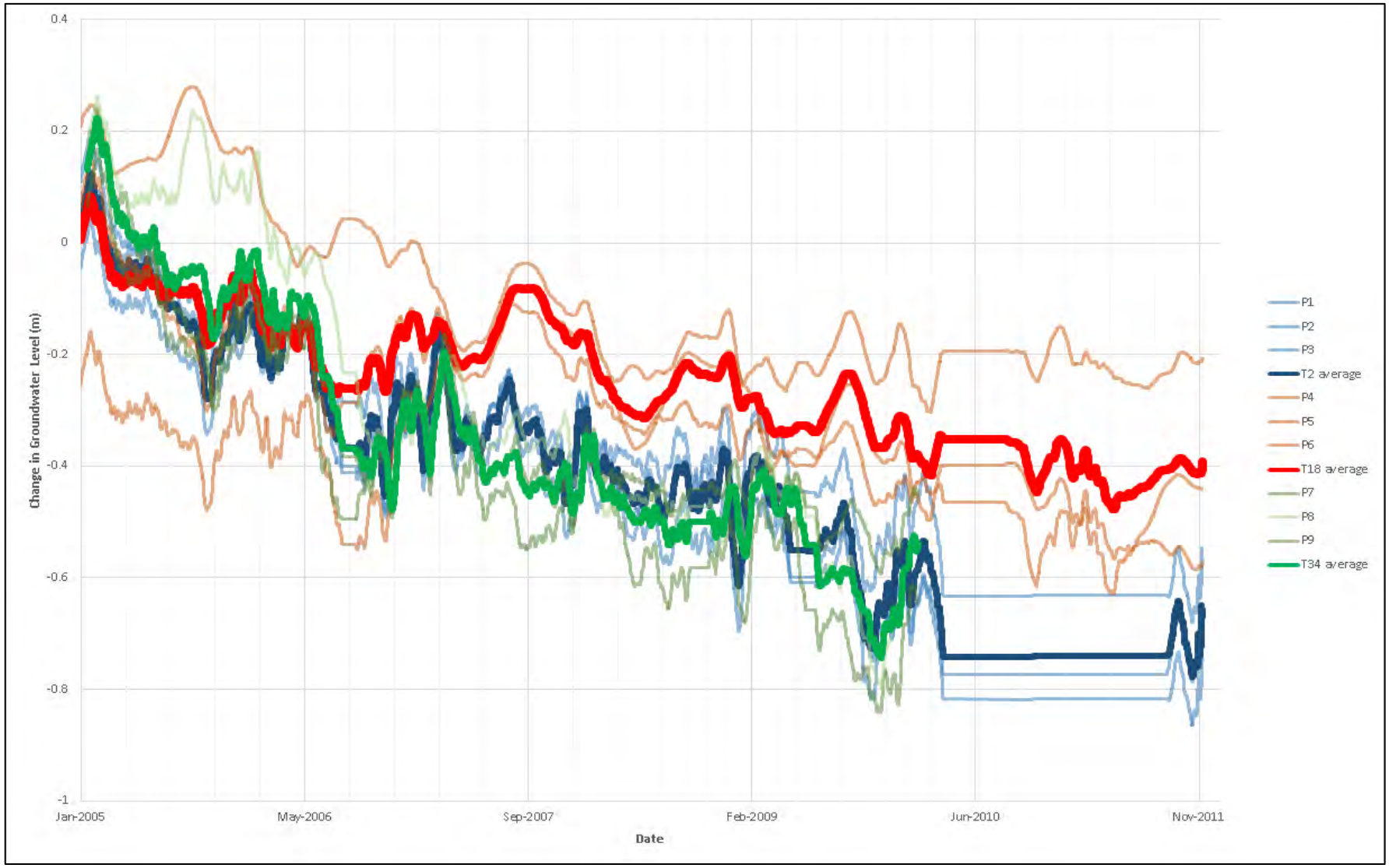



*Figure 8-18 Change in groundwater level readings from electronic piezometers at Turbines T2, T18 & T34*

## 8.3.7 Baseline Sensitivity of the Receiving Environment (Soils, Geology & Land Use)

The significance of effects on soils, geology and land has been assessed as a function of the sensitivity of the receiving environment using the matrix in Figure 8-2. The sensitivity of the receiving environment is classified on a 7-point scale from Negligible to High as a function of the characteristics of the soils, geology and land that could be directly impacted by the project.

For this project, the majority of the significant effects on soils, geology and land relate to the upland blanket bog that covers most of the wind farm site and surrounding area, including the OHL and grid connection site. Therefore, the characteristics of the blanket bog in the area govern the classification of the baseline sensitivity of the receiving environment. For stability impacts, consideration has also been given to the sensitivity of the blanket bog outside the wind farm site that could be directly impacted by a peat slide at the site. The potential impact of the project on Geological Heritage Sites has also been assessed.

For this project the baseline sensitivity of the receiving soils, geology and land has been classified as MEDIUM based on a combination of factors, i.e.,

- Geological Heritage Sites that could be impacted by the project.
- The ecological importance of the blanket bog.
- The significance of the peat for carbon sequestration.
- The use and value of the land impacted by the project.

There are no audited or unaudited Geological Heritage Sites identified on the wind farm site or in the project area on the Geological Survey of Ireland Spatial Resources interactive map viewer. Therefore, the bedrock is not a sensitive receptor on the project.

The habitat impacted by the project is predominately conifer plantation on upland blanket bog that has been degraded by drainage and by the planting of the trees and is therefore of low ecological value.

The open bog in the eastern portion of the site that was used for turbary was degraded due to drainage and turf cutting and was also of low ecological value. However, the open areas are rare in the wider landscape and suitable for use by hen harrier. Therefore, when all habitats are taken into account, the overall ecological value of the habitats is of Local Importance (higher value). This would be equivalent to a Medium to Low sensitivity.

Blanket bog is a significant source of carbon sequestration in Ireland. Stored carbon in the peat can be negatively impacted by excavation, disturbance and drainage. The rate of decomposition of peat significantly increases when exposed to an aerobic environment above the water table and this results in a release of stored carbon as carbon dioxide. Carbon can also be lost in solution due to erosion of disturbed peat.

To give context to the scale of the impact of the project on carbon storage in the peat:

- The extent of upland blanket bog on the wind farm site (approximately 340 ha) is <0.1% of the total area of upland blanket bog in Ireland (≈436,690 ha in 1979 Hammond (1981), Conaghan (2000)).
- Less than 7.5% (≈25 ha) of the blanket bog on the site was directly impacted by the project (i.e. by the turbines, crane hardstandings, substation, borrow pits, material sidecast areas and peat repositories).
- A similar area of blanket bog (≈25Ha) outside the wind farm site boundary was directly impacted by the peat slide that occurred at the site in October 2003.

- The mass of carbon stored in peat is on the order of 0.055 tonnes/$m^3$ (Holden & Connolly (2011) & Milne & Brown (1997)). This is equivalent to 0.2 tonnes $CO_2$ /$m^3$ if fully oxidised by decomposition.
- The total volume of peat excavated for the turbines, crane hardstandings, substation and borrow pits was approximately **185,000 $m^3$**. About a further **450,000 $m^3$** of peat was displaced in the peat slide at the site in October 2003. If it is assumed that 100% of the combined volume of excavated peat and displaced peat could be lost due to a combination of excavation/displacement, and long-term erosion and/or decomposition on exposure then this would be equivalent to releasing **127,000 tonnes of $CO_2$** into the atmosphere. However, this is very conservative as there is still approximately 200,000 $m^3$ of disturbed peat within the slide area. Also, the excavated peat was all stored in designated storage areas on site and vegetation has re-established on the surface of the peat, which will slow down the rate of decomposition. Therefore, the actual long-term carbon release from the excavated and displaced peat will be significantly lower, possibly on the order of **40-60% of the total (i.e. 50-75kt $CO_2$).**
- In terms of recent national statistics for greenhouse gas emissions in Ireland, **50-75 kt $CO_2$** is **≈ 0.10-0.15%** of Ireland's total estimated annual $CO_2$-equivalent GHG emissions in **2023 (55,000 kt-$CO_{2-eq}$)** and **≈ 0.65-0.95%** of the total emissions related to energy industries in that year **(7,865 kt-$CO_{2-eq}$)** [www.epa.ie, 2024].

Therefore, the impact of the project on carbon storage is relatively Low and would be compensated by the net carbon gain over the design life of the wind farm.

In terms of land use, the value of the land impacted by the project is largely determined by the forestry plantations and turbary plots on the wind farm site, along the OHL and at the Agannygal Substation site, which are of relatively Low commercial value. The mature timber on the site was harvested during construction, but the trees could not be re-planted after the wind farm was completed. The wind farm also directly impacted approximately 25 ha of land on the site for the turbines, crane hardstandings, substation, borrow pits, material sidecast areas and peat repositories.

Based on the relatively Low ecological importance of the land, the sensitivity of the receiving environment could be characterised as Medium to Low. However, when combined with the additional environmental value of the land as a carbon store and the relatively low commercial value of the land for forestry/agriculture, this is sufficient to raise the combined level of sensitivity of the peat to "**MEDIUM**".

For the assessment of stability impacts the sensitivity of the receiving soils, geology and land that could be impacted by a peat slide has also been classified as **MEDIUM** based on the characteristics of the very large peat slide that occurred on the site in October 2003, and the land that that was directly impacted by the slide, i.e.:

- The land that was disturbed by the peat slide covered an area of approximately 25 ha, which is comparable to the wind farm, and it was comprised of coniferous forests of low ecological and commercial value.
- Approximately 450,000$m^3$ of peat was displaced in the slide, but about 200,000$m^3$ of this is still present on the slope.
- The agricultural land downslope from the main slide area that was impacted by peat from the slide was also of low ecological and commercial value.

Therefore, the impact on the blanket bog habitat, carbon storage and land use is of a similar scale and sensitivity to the wind farm project. The characteristics of the topography, ground and groundwater conditions in the area are also representative of the general conditions around the site that could be impacted by the project where there is a risk of a large peat slide. Therefore, for this project it has

reasonably been considered as the worst-case scenario for assessing the impact of site activities on the receiving soils, geology and land with respect to site stability.

To accurately assess stability impacts on soils, geology and land, consideration has also been given to the scale and characteristics of the smaller, more localised peat failures that occurred on site during construction. For example, around the perimeter of the open excavations for the turbine foundations the risk of peat instability was limited to localised shear failure or very small-scale peat slides where the side slopes were not adequately supported, which had a significantly lower impact on the receiving soils, geology and land.

### 8.3.8 Landslide Susceptibility Mapping

Figure 8-19 shows the Landslide Susceptibility Map for the Project area from the Geological Survey of Ireland (GSI) superimposed on the OSI 1:50,000 Discovery Series map. This map provides information on areas which are pre-disposed to landslides using a classification system based on slope angle, soil type and a parameter referred to as the Topographic Flow Index (TFI), which is a measure of how overland flow of landslide debris is concentrated or dispersed by the terrain, also taking into account flow velocity.

The slope angle is derived from the 20m Digital Elevation Model (DEM) and values can range from 0 to 90 degrees. Soil types are generalised into 5 main groupings based on their grain size distribution (i.e. fine or coarse-grained), and/or particular characteristic, including Peat, which is particularly relevant for the Derrybrien Wind Farm. The TFI is also derived from the 20m DEM and is calculated using factors related to slope angle, flow direction and flow accumulation.

The classification model is weighted by applying a known inventory of landslide events to particular combinations of factors that have a higher incidence of landslides. The results are banded into four categories of landslide susceptibility ranging in classification from Low to High. The resolution of the mapping is on a local to regional level based on the accuracy of the DEM (20m) and the scale of the base mapping (1:50,000).

The landslide susceptibility map for the Project area (Appendix 8-7) shows that much of the wind farm site would be classified as being of Low susceptibility to landslides. There is a broad area on the steeper slopes on the south side of the wind farm and across the turbary plots on the east side of the wind farm where the susceptibility is classified as Moderately Low. This includes the area where the peat slide occurred at Turbine T68 in October 2003, during construction of the wind farm. The location and extent of the peat slide are recorded on the GSI database.

The Landslide Susceptibility Map indicates that conditions on the windfarm site are suitable for the project with appropriate design and mitigation measures for working in peat, particularly in the areas of Low and Moderately Low susceptibility.

The areas of Moderately High and High susceptibility are generally limited to the steeper slopes offsite to the north and south of the wind farm, particularly to the north.

It should be noted that there is an area on the west side of the site where the surface soils have been misclassified as glacial till instead of peat on the GSI Quaternary Geology map (see Section 8.3.1.1 and Figure 8-7). If this soil was classified correctly then the landslide susceptibility on the steeper slopes >3° in this area would increase to Moderately Low, similar to where the slide occurred (see Figure 8-6).

The Grid Connection route and Agannygal Substation is classified as having 'low' to 'moderately low' peat/landslide susceptibility with locally 'moderately high' susceptibility between Polesets 10-11 and 22-23 (GSI, 2022).

A review of historical records of peat slides/landslides (GSI, 2022) indicates that peat slides have occurred in the Slieve Aughty Mountains in the past. With the exception of the 2003 peat slide on the Derrybrien wind farm site, two previous slides have been noted within 5km of the OHL. One was in 1890 and occurred at a location some 2.5km to the east of the substation at the southern end of the OHL, in an area called Loughatorick North. An area of 100 acres was covered with a 'foot' of peat, the upper part of the 'bog subsiding 10 to 15 feet'. The peat slide was described as a flow within blanket peat. The other slide occurred 5km to the north of the OHL, on the Sonnagh Old Wind Farm site. This occurred during October 2003 and is described as a flow in blanket peat adjacent to an access road.

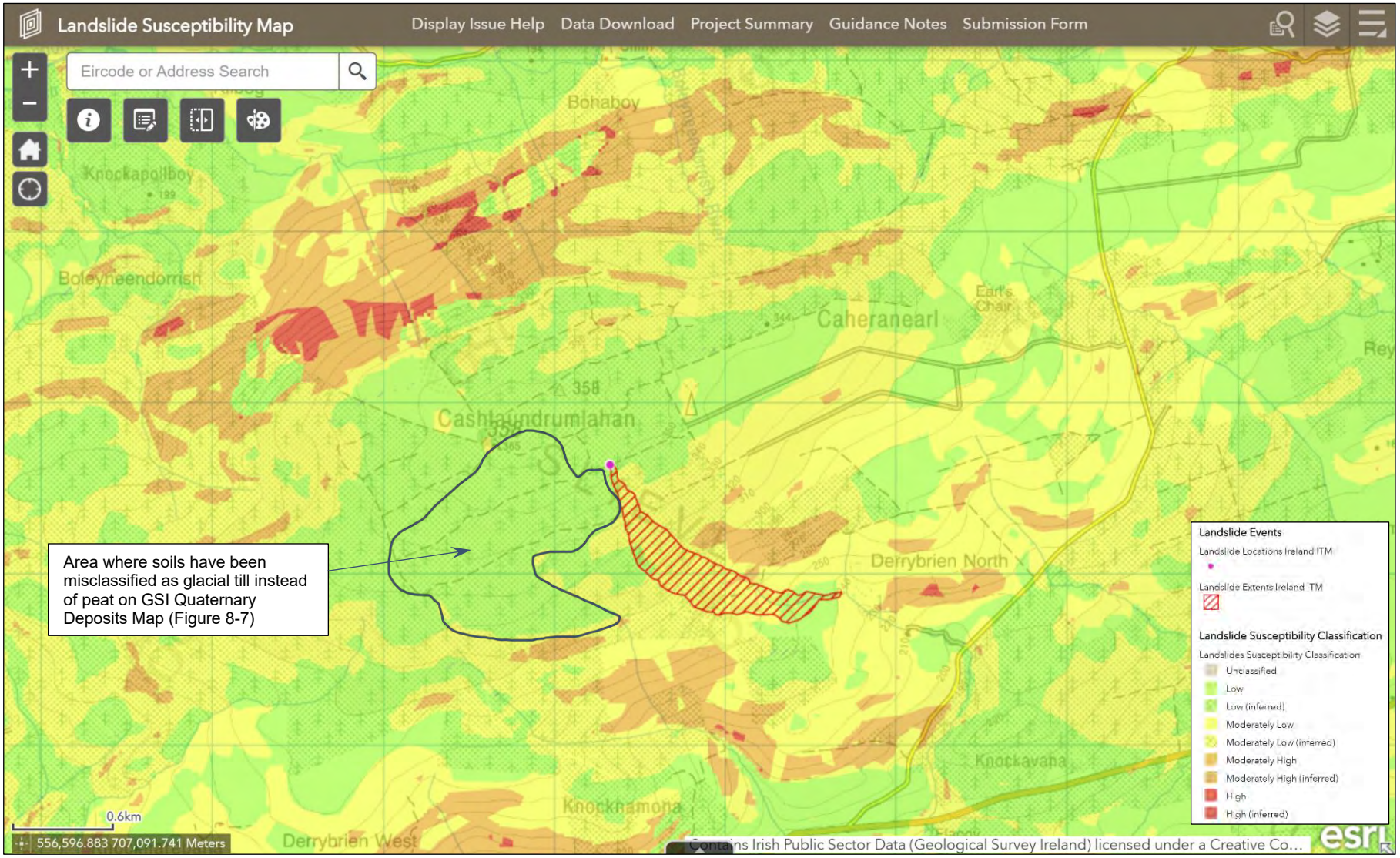



*Figure 8-19 Landslide Susceptibility Map (GSI online Spatial Resources Mapping, www.gsi.ie, 2023)*

## 8.3.9 Peat Stability Risk Assessment (PSRA)

Peat stability risk assessments have been carried out for the following elements of the project:

- Derrybrien Wind Farm and associated ancillary works.
- Polesets PS-1 to PS-4 of the 110kV Overhead Line (OHL).
- The turbary areas on the wind farm site.
- The grid connection comprising the rest of the Derrybrien-Agannygal 110kV Overhead Line and the Agannygal Substation connection into the Shannonbridge – Ennis 110kV Overhead Line and associated ancillary works.
- Works undertaken in response to the peat slide and associated ancillary works.

The peat stability assessments have been carried out in accordance with the best practice guidelines given in "Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Projects, published by the Scottish Government Energy Consent Unit (2nd Edition, April 2017)". The best practice guidelines identify a number of techniques that can be used to assess peat stability, and a number of these techniques are used in this case to suit the proposed construction works, ground conditions and type of development.

The best practice guidelines give no preferred technique but note that whatever techniques are employed should be clearly explained and incorporate consideration of the likelihood of instability and the consequences should it occur. Details of the techniques employed are included in the following documents contained in the Appendices of this chapter, respectively, as outlined in the sections below:

- **Appendix 8-2:** (Wind Farm Site) "Derrybrien Wind Farm - Geotechnical Stability Report & Assessment of Stability Impacts of On-Site Activities", by AGL Consulting, Issue 02, Rev.3, 5th December 2024.
- **Appendix 8-3:** *Peat Stability Risk Assessment (PSRA) for Decommissioning of Polesets PS-1a to PS4 of the 110kV Derrybrien to Annygal Overhead Line (OHL)*, Report No. 22-149-R001 by AGL Consulting, Rev.0, 6th May, 2024.
- **Appendix 8-4:** *Peat Stability Risk Assessment (PSRA) for Turbary Plots at East End of Wind Farm Site*, Report No. 11-147-R06 by AGL Consulting, Issue 02 Rev.0, 5th December, 2024.
- **Appendix 8-5:** Geotechnical & Peat Stability Report – Derrybrien Wind Farm – Grid Connection and Ancillary Works (January 2023).
- **Appendix 8-6:** Geotechnical & Peat Stability Report – Derrybrien Wind Farm – Grid Connection and Ancillary Works (July 2020).

Considering that the origin of the peat slide on 16th October 2003 was within the wind farm site, a more detailed description of the peat stability risk assessment carried out at the wind farm site is provided in this chapter.

The methodology that has been adopted for this report has been to characterise the likelihood of peat instability across the site for the initial conditions prior to construction to identify areas where there are compounding factors that could lead to an elevated risk of a peat slide. The likelihood of a peat slide has then been reviewed over the lifespan of the project to reflect changes in the site activities related to the wind farm, improvements in the site conditions, and the impact of additional geotechnical investigations, stability analyses and on-site testing that reduce the risk of a peat failure.

The assessment of the current conditions in 2024 forms the baseline condition for the Prospective Development. It should also be recognised that the peat stability risk assessments for this report specifically assess the risk of peat instability for site activities related to the Derrybrien Wind Farm Development Project – Perspective Works and Retained Development. PSRA for Wind farm Site – Initial Conditions Prior to Construction

A Peat Stability Risk Assessment (PSRA) has been carried out for the wind farm site to characterise the relative risk of peat instability in defined zones across the site prior to construction of the wind farm. The purpose of the PSRA was to identify where there are compounding risk factors that could lead to a higher risk of peat instability so that appropriate mitigation measures can be implemented to ensure that the risk of peat instability can be reduced to an acceptable level for each site activity during decommissioning.

The results of peat stability risk assessment are presented in the report titled "*Derrybrien Wind Farm - Geotechnical Stability Report & Assessment of Stability Impacts of On-Site Activities",* by AGL Consulting in Appendix 8-2 of this Chapter. The following is an overview of the methodology.

For this assessment, the wind farm site has been split up into 71 No. representative zones corresponding to sections of the site around the turbines and access tracks on peat. A qualitative Peat Stability Risk Assessment (PSRA) has been carried out for each zone to assess the Risk Rating (R) for a peat slide based on the interpreted Likelihood (L) (i.e. probability) of occurrence and Impact (I) of failure.

The PSRA has been carried out in accordance with the current best practice guidelines for peat landslide risk assessments for wind farms on upland blanket bogs (Scottish Government, Energy Consent Unit, 2017). The method of risk assessment is also consistent with the Institution of Civil Engineers' publication outlining UK best practice in "Managing Geotechnical Risk" (Clayton, 2001).

The Likelihood (L) of a peat slide in each zone has been interpreted by evaluating factors related to the peat and subsoil conditions, topography, site hydrology/hydrogeology and other significant contributory factors such as peat harvesting or slide history to determine where there are conditions that could lead to an elevated risk of a peat slide.

The potential Impact (I) of a peat slide in each zone has been interpreted by evaluating factors related to the potential volume of peat, degree of contamination, sensitivity of the receiving environment, access for intervention, and land use and existing infrastructure within the potential run-out distance.

A Risk Rating (R=L x I) has then been calculated for each zone prior to the implementation of risk mitigation measures to characterise the risk of peat instability across the site to identify where specific design, construction & operational mitigation measures are required to mitigate the risk of peat instability to an acceptable level.

The PSRA presented in the AGL report in Appendix 8-2 is an ***engineering*** risk assessment where the potential Impact of a peat slide includes factors other than those that are relevant to the assessment of the ***environmental*** impact of the project on the receiving soils, geology and land. Therefore, only the interpreted Likelihood of a peat slide across the wind farm site is introduced here because it is an index of the probability of a peat slide based on the site conditions, which is an input parameter for the environmental assessment of stability impacts presented in this chapter, as shown on the flow chart in Figure 8-1.

Figure 8-20 shows the interpreted Likelihood (L) of a peat slide across the site for the initial conditions on the site, prior to construction. It should be noted that this is a qualitative assessment that reflects the interpreted probability of a peat slide occurring on the site based on site conditions in 1998-2003 prior to the implementation of appropriate design and construction risk mitigation measures. It identifies areas of the site where there were compounding risk factors that lead to a higher likelihood of peat instability on the site without appropriate controls.

The site conditions vary across each zone. Therefore, the interpreted Likelihood of a peat slide in each zone is generally representative of the worst conditions within the zone. However, greater emphasis is applied to the site conditions along the corridor of the wind farm project, where the majority of the site activities related to the wind farm occurred.

The peat stability risk assessment identified 38 No. zones across the site where the Likelihood of a peat slide, was initially characterised as Very Possible (L=4) or Likely (L=5), prior to implementing appropriate risk mitigation measures. These zones were located in areas across the site where there were compounding risk factors in relation to peat stability, including, for example:

- Deposits of deep (3-6 m) and relatively deep (2-3m) weak peat ($c_u \approx 5$ kPa) with low Factor of Safety (FoS) for infinite slope stability analyses.
- Areas of intermediate slope angles of 3-5° in close proximity to a convex breaks in slope to angles >5°.
- Zones that are in the broad valleys directly upslope from the rivers and streams that emerge downslope from the perimeter of the wind farm site.
- Zones of deep peat with poor drainage and ponded surface water at the head of a watercourse, or along the edges of the terraces on the north side of the site.
- Areas adjacent to the previous slide that have similar site characteristics.

The highest Likelihood (L=5) of a peat slide occurred where there were compounding risk factors that led to an elevated likelihood of peat instability i.e.,

- at Turbines T17, T68 and T21 to T70 in the vicinity of the slide in relatively deep peat on a convex breaking slope directly upslope from the rivers and streams on the south side of the site.
- at Turbines T49 to T51 where there are deep deposits of peat in close proximity to a distinct convex break in slope to angles >5.0-7.5° directly upslope from the rivers and streams on the north side of the site.
- at Turbines T60 to T62 where there are deep deposits of very soft peat with a high water table and ponded surface water at the head of a watercourse and along the edge of a terraced slope.

In the remaining 33 No. zones across the site the Likelihood of a peat slide, prior to mitigation measures was characterised as Possible (L=3) or Low (L=2), which would require early or regular attention with appropriate mitigation measures to reduce the risk of peat instability or to manage the risk on site. These were in areas where there were mitigating conditions that reduced the risk of peat instability. For example:

- Areas of shallow (<1.0 m) or relatively shallow (1-2 m) peat.
- Areas of gently sloping ground (<3°) set well back from any convex break in slope to slopes >5°.
- Areas of relatively high infinite slope Factor of Safety (FoS >1.5).
- Zones where there is well-developed drainage, and which are not directly upslope from the rivers and streams outside the wind farm site.

It should be noted that the methodology that was used in this case for the initial peat stability risk assessment was developed after the peat slide at the site of the Derrybrien Wind Farm and was based on research and guidelines that were published as a result of the slide. The methodology has also been calibrated by the peat slide at the Project site, and by large peat slides that occurred on the site of other wind farm projects on upland blanket bogs in Ireland since 2003. Therefore, while it is consistent with current best practice guidelines and is representative of the conditions on the Derrybrien wind farm site prior to construction of the wind farm, it represents a level of assessment that far exceeds that which would have been carried out for the site at the time of construction in 2003 when the construction industry's general knowledge of failures on peat slopes was very limited.

Furthermore, although the baseline PSRA identifies that there are areas of the Derrybrien wind farm site that had a high initial risk of peat instability prior to implementing appropriate mitigation measures, based on our current experience with managing peat stability under similar conditions it would not be

considered an abnormal or exceptional risk for a wind farm project on an upland blanket bog in Ireland.

The qualitative risk assessment methodology is simply a tool that is used to identify where appropriate risk mitigation measures need to be implemented to reduce the risk of a peat slide to an acceptable level. This is consistent with the approach in the ICE Publication – Managing Geotechnical Risk (Clayton, 2001).

Many of the design and construction mitigation measures that were successfully implemented on the Derrybrien site after the slide are now standard measures that are commensurate with the geotechnical risk of a peat slide and are routinely implemented on similar sites on upland blanket bogs across Ireland and the UK. However, they would not have been standard practice at the time of construction on the Derrybrien Wind Farm in 2003.

### 8.3.9.1 Changes in the Likelihood of a Peat Slide over the Project Life Cycle and Baseline Conditions for Decommissioning – Wind Farm Site

The impact of site activities on peat stability has reduced significantly over the project life cycle from the initial conditions prior to construction through to the second phase of construction after the peat slide (2004-2006), over the operation and maintenance phase through to decommissioning (2006-2024). This is due to changes to the likelihood or probability of occurrence of a peat slide as a result of:

- *Changes to the characteristics of the project-related site activities* (i.e. the highest level of activity and initial loading on the peat was during construction).
- *Implementation of effective design mitigation measures and alternative construction methods* (e.g. alternative methods of spoil management during the second phase of construction).
- *Additional geotechnical investigations, stability analyses, testing, monitoring and geotechnical supervision* (e.g. geotechnical assessment and full-scale proof testing of the floating roads).
- *Changes to the site characteristics due to improved drainage and an increase in the strength of the peat under sustained dead load surcharges* (i.e. under the floating roads, peat repositories and material sidecast areas).

The assessment of the impact of site activities on the peat for the Prospective Development necessarily takes account of the specific activities that will be involved during decommissioning as well as the reduction in the likelihood of a peat slide since construction due to improved site conditions.

The activities that will be required to decommission the wind farm will be much less intensive than during the construction stage of the Project. Therefore, they will have a significantly lower impact on peat stability. Most of the surcharge loading on the peat will be from construction traffic travelling along the floating roads which were upgraded with additional capping and geogrid reinforcement in 2014, and which were proof tested in 2018 to verify their capacity, stability and performance under the design crane loads, as described in Section 8.3.9.2.

The improved site conditions since construction are largely due to the improved drainage and the increase in the strength of the peat under the sustained dead load surcharges from the floating roads, peat repositories and material sidecast areas on the intact peat slopes. For these elements of the project the highest stability risk was in the short-term condition when the load was initially placed on the slopes during construction. Since then, the peat has increased in strength as it consolidated and compressed under the applied loads so that the probability of a peat slide has reduced significantly over time.

The increase in strength and stiffness of the peat as it consolidated under sustained load is a fundamental and well-established geotechnical principle which has been verified by testing on site. Taking account of the reduced likelihood of a peat slide at this stage in the project life cycle is also consistent with the 2022 EPA Guidelines which includes the probability of occurrence as an input parameter for impact assessments.

The changes in the Likelihood of a peat slide over the life cycle of the wind farm are illustrated on Figure 8-20 to Figure 8-22.

- Figure 8-20 shows the initial conditions on the site prior to construction and prior to implementation of effective design and construction mitigation measures.
- Figure 8-21 reflects the reduced likelihood of a peat slide on the site with the mitigated site activities during the second phase of construction (e.g. the alternative methods of spoil management), and with the improved site conditions at the end of construction (e.g. improved drainage, increased strength under the floating roads – verified by full scale proof load testing).
- Figure 8-22 reflects the current baseline conditions for the site activities that will be required for decommissioning after the operation and maintenance phase (2006-2024) and ceased operations phase of the project (2022-2024). It also reflects ongoing improvements in site conditions and the performance of the floating roads due the drainage improvements and the increased strength of the peat.

In each case the likelihood of a peat slide is representative of the range of site activities that occurred or are likely to occur over the corresponding period within the project life cycle.

Significantly, at this stage, with the improvement of site conditions, the likelihood of a peat slide has reduced to negligible across the site for the project activities that are likely to be carried out on site during the Prospective Development.

#### 8.3.9.2 Summary of full-scale proof testing carried out on all of the floating roads in 2018

The majority of the surcharge loading on the peat during decommissioning will be from construction traffic travelling on the floating roads. On the 17th of July, 2018, a full-scale proof load test was carried out on all of the floating roads on the site to assess the performance of the upgraded roads in their existing condition and to verify the capacity of the roads to support the maximum design crane load.

The test was carried out under the supervision of Mr. Conor O'Donnell from AGL Consulting and the results are presented in AGL Report No. 11-147-R05 - Derrybrien Wind Farm access roads – road test on upgraded floating roads, dated 30th October 2018. A copy of the report is included in the geotechnical stability report for the wind farm site in Appendix 8-2.

The floating roads for the Derrybrien Wind Farm were designed to support a 300 tonne Grove GMK6300 All-Terrain mobile crane which has a travelling load of 72 tonnes over 6 axles (12 tonnes per axle). This was the maximum crane size that was used to erect the turbines during construction.

The proof load test in 2018 involved observing the performance of the floating roads under the weight of a 95-tonne Liebherr LTM 1095-5.1 mobile crane, or a fully-loaded Volvo A25D articulated dumper truck travelling steadily along the road at a speed of approximately 5 kph.

Most of the roads were tested using the 95 tonne Liebherr LTM 1095-5.1 mobile crane with additional ballast to give a total load of 60 tonnes on 5 axles at a maximum load of 12 tonnes per axle. The axles are 2.75 m wide and the total wheel contact area is approximately 7.75 x 2.75m. This equates to a characteristic UDL of 27.6 kN/m2, or 76 kN/m length of road.

The narrower turbary road along the east side of the site (T25 to T45) and the floating road between T27 and T44 were tested using a Volvo A25D articulated dump truck with a full payload capacity of granular rockfill to give a combined load of approximately 45.6 tonnes on 3 axles with axle loads of 14.1-15.7 tonnes over a wheel contact area of 6.45 x 2.86 m. This equates to a characteristic (unfactored) UDL of 24.2 kN/m$^2$, or 69 kN per metre length of road when travelling.

The loads applied to the floating road by the Grove GMK6300 All-Terrain crane are summarised on Table 8-1 along with the comparable loads from the 95 tonne Liebherr LTM 1095-5.1 mobile crane and the Volvo A25D articulated dump truck. The Liebherr LTM 1095-5.1 mobile crane and the Volvo A25D dump truck have a lower total mass than the Grove GMK 6300. However,

- The Leibherr LTM 1095-5.1 was loaded with extra ballast to give it the same axle load as the larger Grove GMK6300 crane (12 tonnes/axle).
- The Volvo A25D had a full payload of granular rockfill so that the axle loads were higher than the Grove GMK6300 crane (14.1-15.7 tonnes/axle).
- The load applied by the Volvo A25D and the Liebherr LTM 1095-5.1 per metre length of road were approximately 10-20% greater than the comparable load from the Grove GMK6300 with the larger wheel base.

Therefore, the loads from the Liebherr LTM 1095-5.1 and the Volvo A25D were sufficient to verify the ULS performance and capacity of the roads across the site for the design load from the maximum crane size that will be used for decommissioning.

The SLS performance of the roads was assessed by observing the deflection of the road under the concentrated axle loads, and the bearing capacity was assessed based on the load per meter length of road, which was distributed across the surface of the underlying peat by the layers of geogrid reinforcement in the road (the "snowshoe effect").

*Table 8-1 Truck/Crane Type used in Proof Load Test including pressure on floating road*

| | Grove GMK 6300 | Leibherr LTM 1095-5.1 Note 2 | Volvo A25D with 24 tonne payload |
|---|---|---|---|
| **Total Mass** | 72 tonnes | 60 tonnes | 45.6 tonnes |
| **Axle Load** | 12 tonnes | 12 tonnes | 14.1/15.7 tonnes (Front/Rear) |
| **Contact Wheel Base** Note 1 | 11.1m x 3.0m | 7.75m x 2.75m | 6.45m x 2.86m |
| **UDL on Floating Road** | 21.2 kN/m$^2$ | 27.6 kN/m$^2$ | 24.2 kN/m$^2$ |
| **Load/m Length of Road** | 63.6 kN/m | 76 kN/m | 69.3 kN/m |

*Notes:*
*1. Assumes 0.5m tyre contact length for Liebherr & Grove Cranes & 0.6m for Volvo A25 (23.5R25 tyres)*
*2. Carrying additional ballast*

All of the floating roads were successfully proof tested for the design crane load without any indication of bearing failure or shear failure in the peat.

The SLS performance of the roads was classified based on the condition of the road surface and the deflection under the concentrated axle loads using the criteria in Table 8-2.

The roads performed exceptionally well and generally deflected rigidly under the axle loads from the mobile crane or Volvo dump truck. The performance of most of the roads was classified as "Very Good" with only localised areas where slight deflections were observed, as shown on Figure 8-23. In the few areas where there was a more continuous stretch of road where slight deflections were noted

under the applied axle loads, such as along the Turbary road between Turbines T34 and T43, the performance of the floating road has still been classified as "Good".

There has been a noticeable progressive improvement in the performance of the floating roads from the time that they were initially tested during construction, when they were tested before and after the upgrade works in 2014 and by the time that they were re-tested in 2018.

The improvement is largely due to the increase in strength and stiffness that has occurred in the underlying peat due to consolidation under the weight of the roads since they were constructed in 2005, and again under the weight of the additional capping layer that was placed on the sections of road that were upgraded in 2014.

The additional layer of geogrid reinforcement placed in the upgraded roads would also have significantly improved the performance of the roads – stiffening them up and more effectively spreading the load out across the surface of the peat. This effect would also become more pronounced over time as the roads continued to settle into the peat so that the geogrids effectively become "post-tensioned".

*Table 8-2 Floating road performance criteria for full-scale serviceability load tests.*

| Road Performance Classification | Performance Criteria |
|---|---|
| **Very Good** | › psraRoad deflects rigidly under crane/truck load with only slight deflections noticeable in some localised areas under the crane load.<br>› Road surface is even with no obvious rutting and no loose rockfill. |
| **Good** | ›<br>› Road deflections generally <10 mm.<br>› Road deflects relatively rigidly under truck load with only slightly greater deformation locally under the wheel load at localized soft spots.<br>› Road surface is even with minor rutting and no loose rockfill. |
| **Fair** | › Road deflections between 10 and 30 mm.<br>› Road deflects noticeably under wheel loads.<br>› Road surface is relatively even with some rutting along the line of the wheels. The rockfill is generally dense.<br>› Local transverse rutting occurs at soft spots where the rockfill has loosened over weak peat, or where there are gaps in the basal reinforcement trees. |
| **Poor** | › Road deflections are greater than 30 mm (up to about 60 mm).<br>› Road deforms very noticeably under wheel loads in wave-like motion.<br>› Deformations are uneven causing the truck to tilt slightly on local soft spots.<br>› Road surface is in poor condition with both longitudinal and transverse rutting creating an uneven road surface.<br>› Rockfill is loosened over worst areas. |

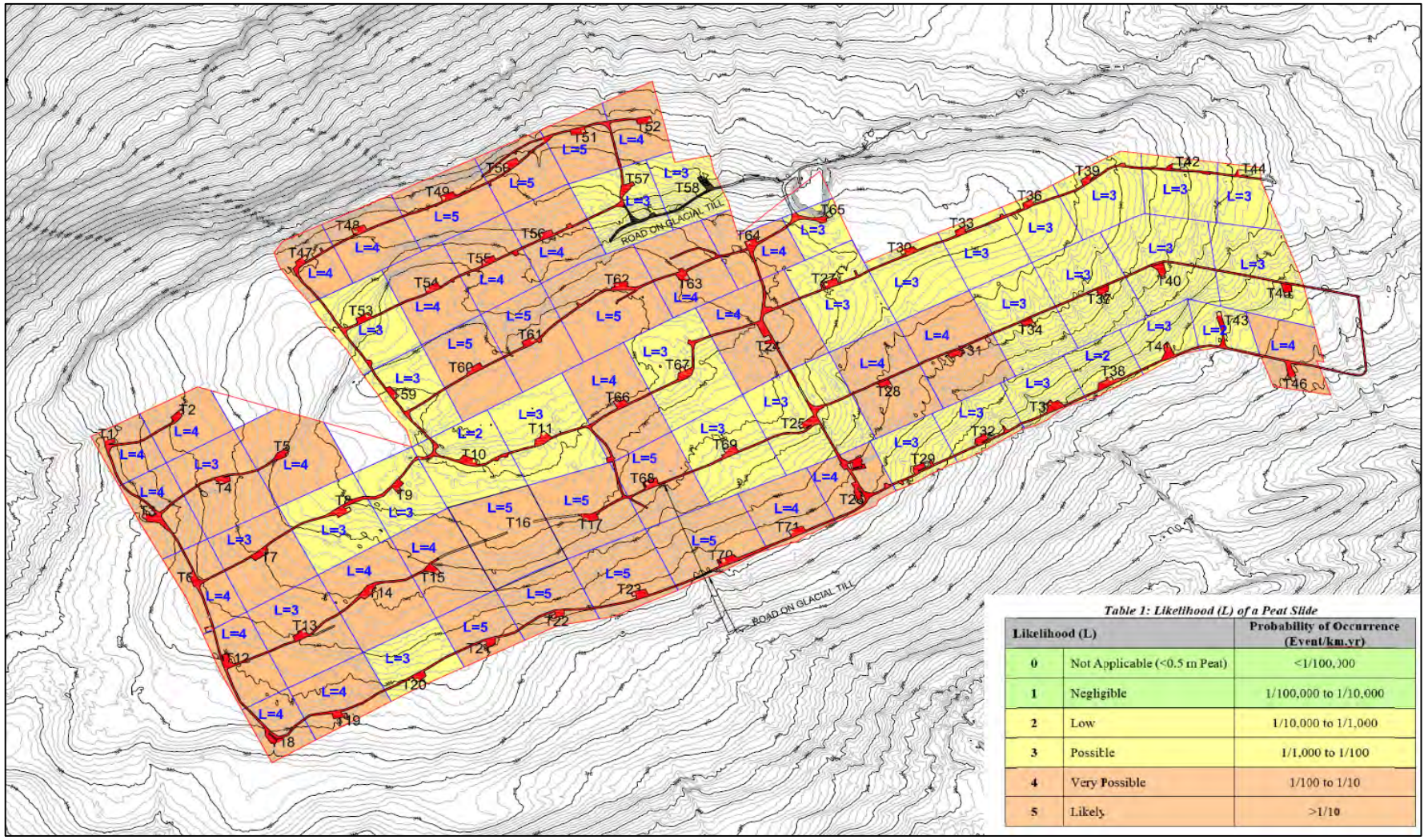



*Table 1: Likelihood (L) of a Peat Slide*

| Likelihood (L) | | Probability of Occurrence (Event/km.yr) |
|---|---|---|
| 0 | Not Applicable (<0.5 m Peat) | <1/100,000 |
| 1 | Negligible | 1/100,000 to 1/10,000 |
| 2 | Low | 1/10,000 to 1/1,000 |
| 3 | Possible | 1/1,000 to 1/100 |
| 4 | Very Possible | 1/100 to 1/10 |
| 5 | Likely | >1/10 |

*Figure 8-20 PSRA Likelihood of a peat slide prior to construction in 2003 prior to implementation of effective design/construction risk mitigation measures*

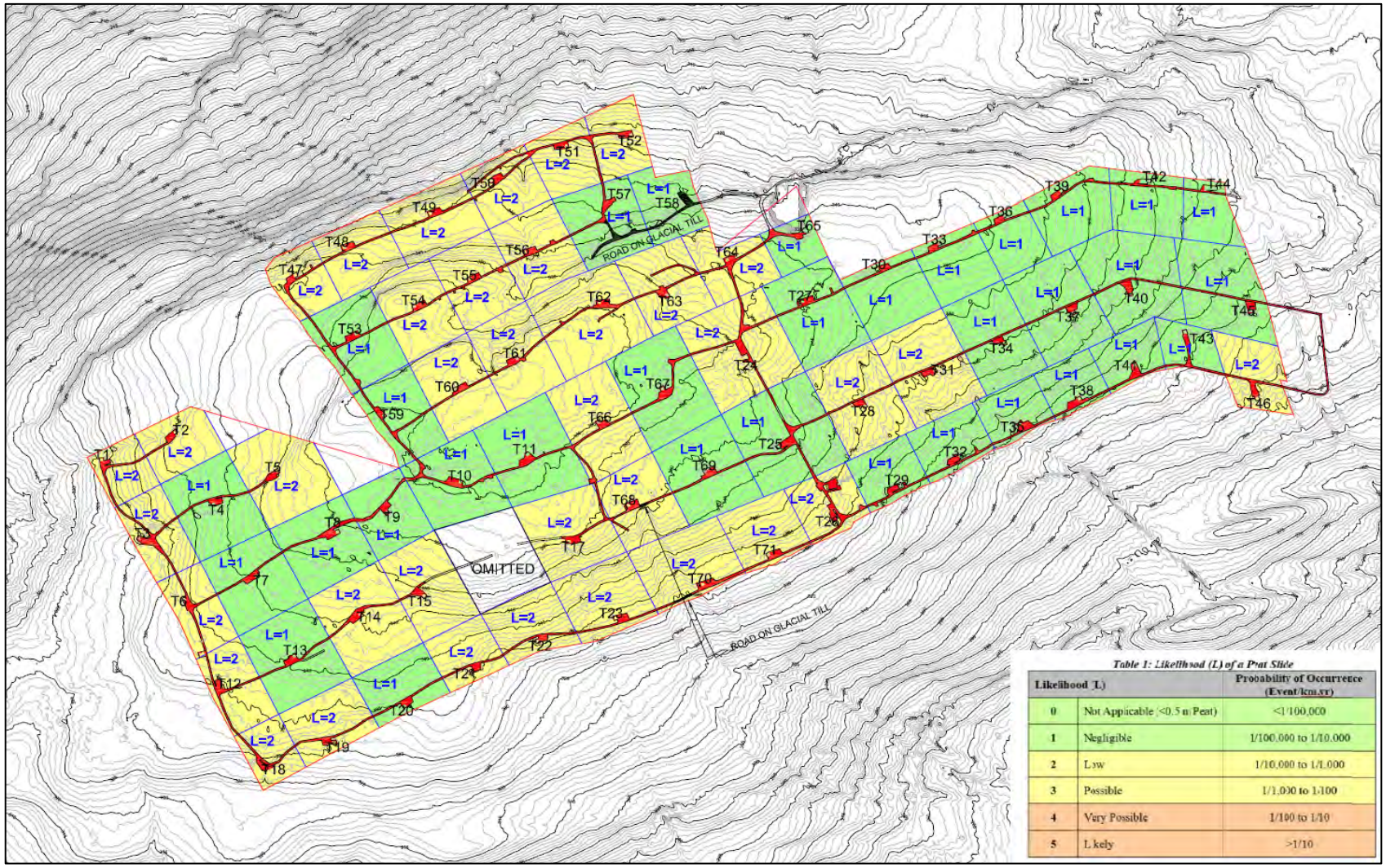



*Figure 8-21 PSRA Reduced likelihood of a peat slide during second phase of construction in 2004/2005 after implementation of effective design/construction risk mitigation measures*

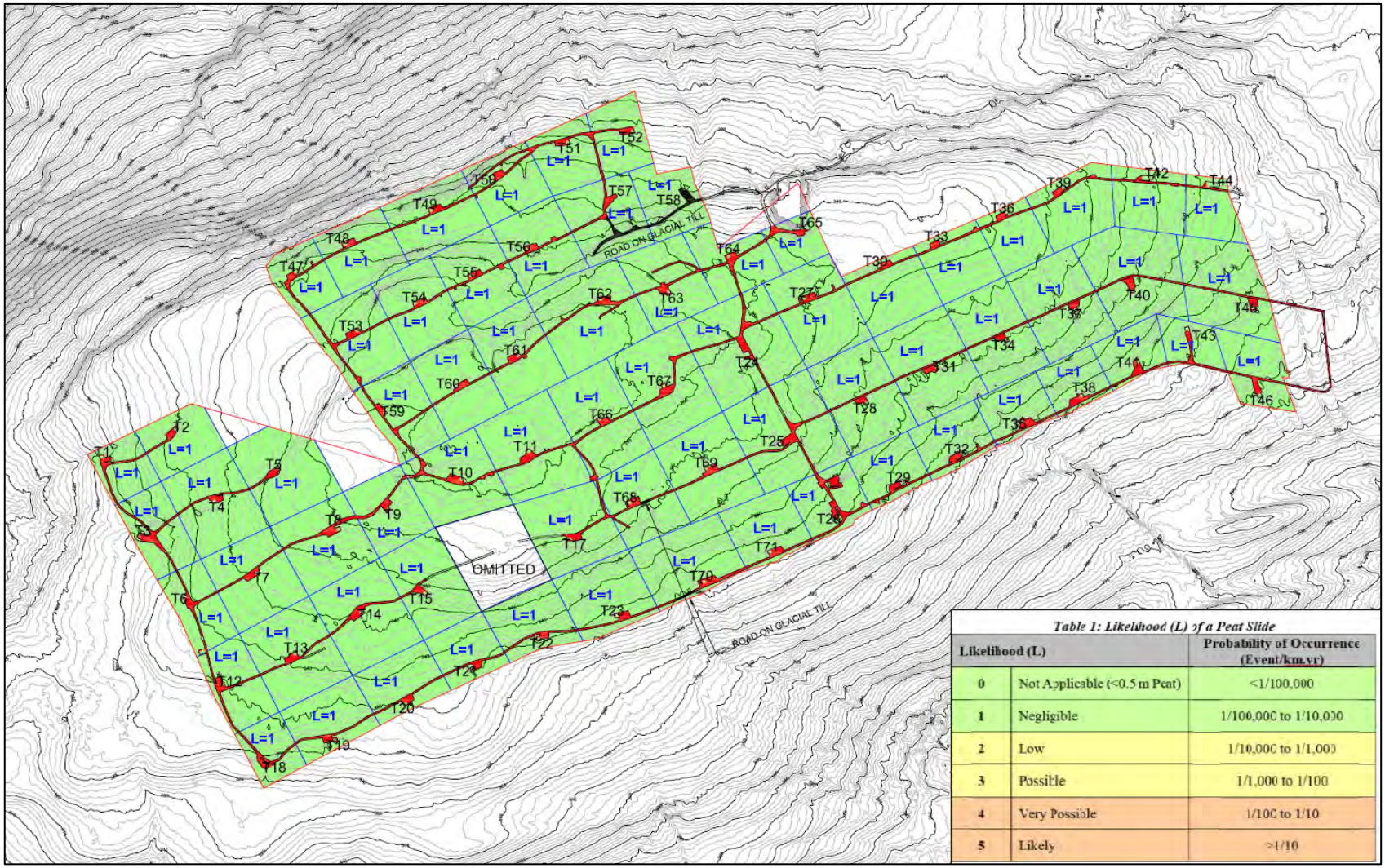



*Table 1: Likelihood (L) of a Peat Slide*

| Likelihood (L) | | Probability of Occurrence (Event/km.yr) |
|---|---|---|
| 0 | Not Applicable (<0.5 m Peat) | <1/100,000 |
| 1 | Negligible | 1/100,000 to 1/10,000 |
| 2 | Low | 1/10,000 to 1/1,000 |
| 3 | Possible | 1/1,000 to 1/100 |
| 4 | Very Possible | 1/100 to 1/10 |
| 5 | Likely | >1/10 |

*Figure 8-22 PSRA – Existing Baseline Condition–Likelihood of a peat slide during decommissioning after implementation of effective design/construction risk mitigation measures*

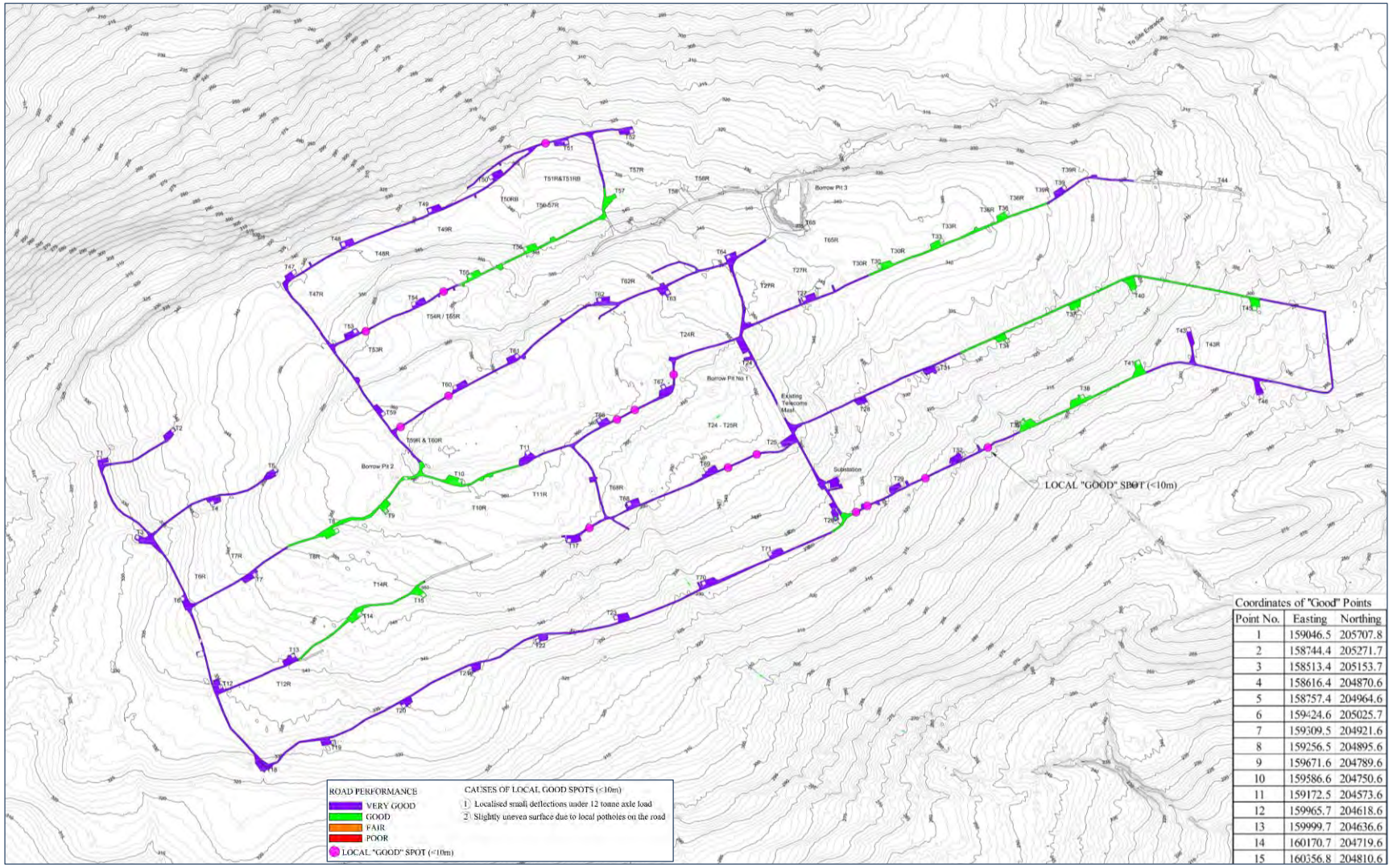



*Figure 8-23 Results of the full-scale proof load tests carried out on the upgraded floating roads in 2018*

### 8.3.9.3 PSRA for PS-1 to PS-4 of the 110kV OHL between Derrybrien and Agannygal

A peat stability risk assessment (PSRA) has also been carried out for the Grid Connection, which is comprised of the 110kV Derrybrien to Agannygal Overhead Line (OHL) and the Agannygal Substation.

This section presents the results of the PSRA for Polesets PS-1a to PS-4 which are along the first 700m of the OHL between the Derrybrien Wind Farm Substation and the existing Coillte forestry access track downslope from the wind farm, as shown on Figure 8-24.

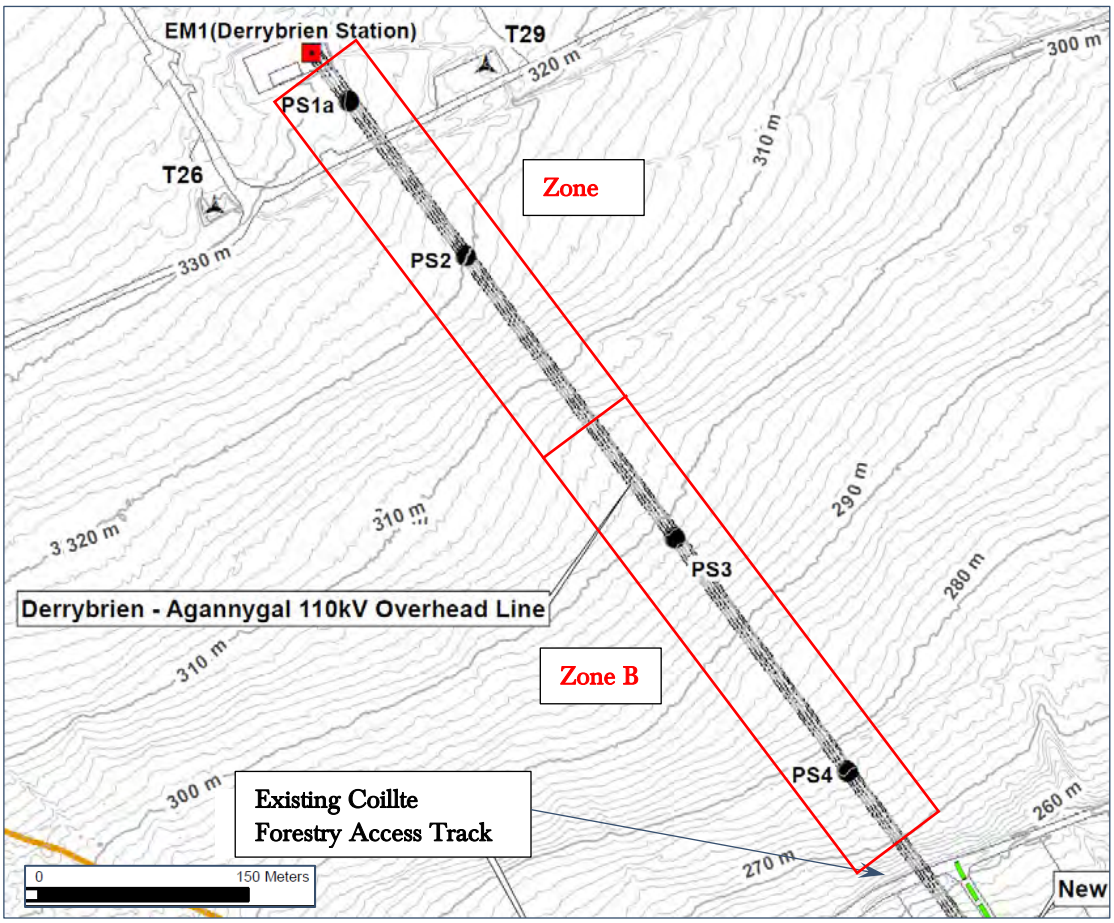



*Figure 8-24 Location of Polesets PS-1a to PS-4 along the 110kV Derrybrien-Agannygal Overhead Line (OHL)*

The PSRA has been carried out using the same methodology as for the wind farm site (as described in Section 8.3.9.1) to characterise the relative risk of peat instability in defined zones along the OHL.

For the assessment this section of the OHL has been split up into 2 No. zones based on site topography and the characteristics of the peat (e.g. depth/strength), as shown on Figure 8-24:

- Zone A: PS-1a & PS-2.
- Zone B: PS-3 & PS-4.

The Likelihood (L) of a peat slide in each zone has been interpreted by evaluating risk factors related to the existing peat and subsoil conditions, topography, site hydrology/hydrogeology and other significant contributory factors such as peat harvesting or slide history to determine where there are compounding

risk factors that could lead to an elevated risk of peat instability without appropriate controls or mitigation measures. These are the baseline conditions for decommissioning.

The Likelihood of a slide was then reassessed for the site activities that will be carried out in the area during decommissioning to de-energise, dismantle and remove the 110kV OHL and twin polesets using appropriate mitigation measures and construction methodologies to minimise the impact on peat stability.

The results of the assessment are presented in AGL Report No. 22-149-R001 - *Peat Stability Risk Assessment (PSRA) for Decommissioning of Polesets PS-1 to PS4 of the 110kV Derrybrien to Annygal Overhead Line (OHL),* Rev.0, 6th May, 2024, which is included in Appendix 8-3.

Figure 8-25 shows the interpreted Likelihood (L) of a peat slide occurring in the area based on the existing baseline site conditions prior to the implementation of appropriate risk mitigation measures for decommissioning.

The Likelihood of peat slide in both areas under uncontrolled conditions has been interpreted as **Possible (L=3)**. Other than the proximity to 2003 slide, which was 550m to the west on the same side of the mountain, there are no significant compounding high risk factors for peat instability along this section of the OHL. The interpreted likelihood of a peat slide is governed by the intermediate peat depths (1.0-2.2m) and relatively low peat strengths ($c_u$ = 5.0-7.5kPa) that were recorded in the area combined with the convex breaking slopes to angles >5° at the polesets due to the terraced profile of the slopes. The polesets have generally been constructed on the more gently sloping terraces with slopes <4-5°.

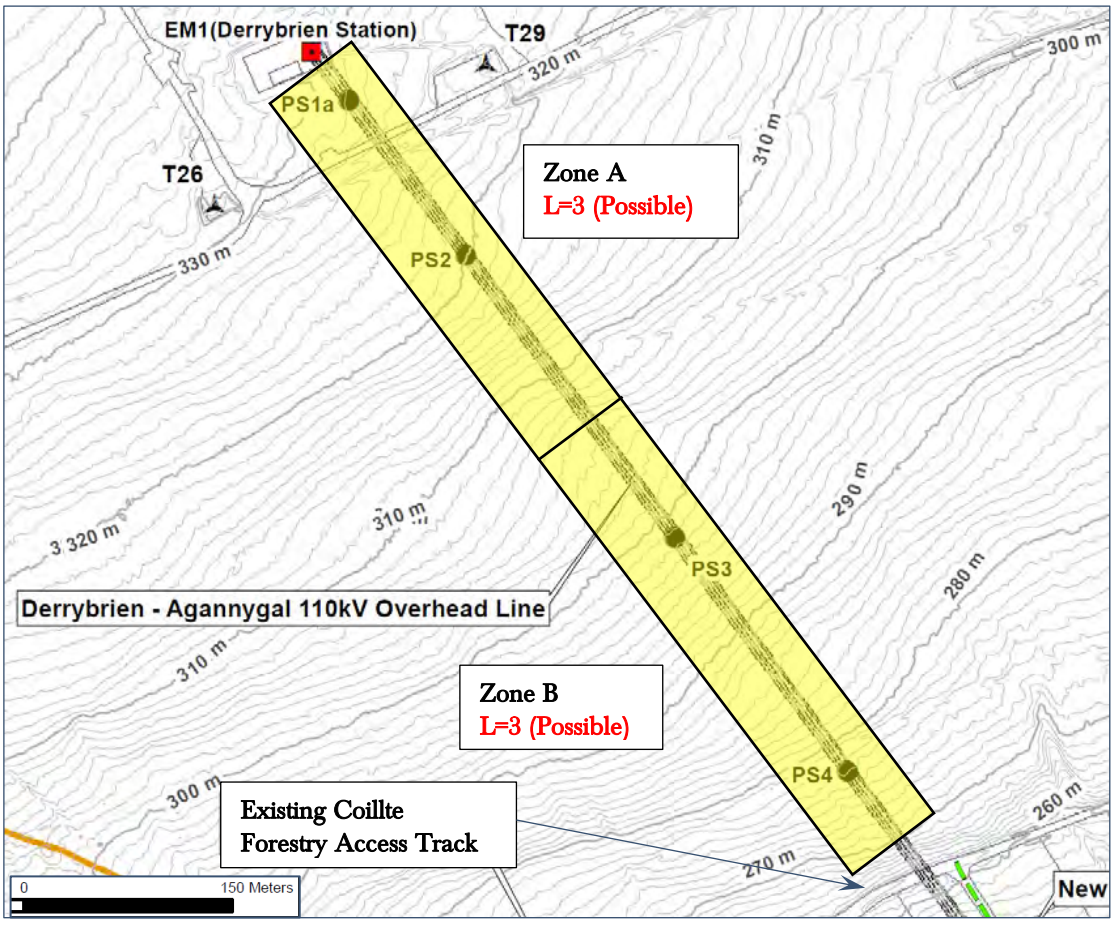



*Figure 8-25 Interpreted Likelihood of a peat slide along OHL between PS-1a and PS-4 for existing baseline conditions prior to implementation of mitigation measures*

The conditions are slightly more unfavourable in Zone A (PS-1a & PS-2), where the peat is up to 1.9-2.2m deep and the lowest shear strengths were recorded ($c_u$ = 5.0kPa). In Zone B (PS-3 & PS-4) the peat depth was lower (1.0-1.9m) and the shear strengths were slightly higher ($c_u$ = 7.5kPa). However, the slopes are locally steeper (up to 7°-10°) downslope from the polesets.

Surface water conditions on the slopes are dry and favourable and there is no evidence of concentrated subsurface groundwater flow and the polesets are not located in a buried valley upslope from one of the streams on this side of the site.

The depth of peat reduces to 0.0-1.0m on the steep slopes downslope from PS-4, which will mitigate the extent and potential impact of a peat slide in this area. The existing Coillte track in the area is also constructed on glacial till or rock below the peat, which will impede the progression of a slide downslope from the track. Therefore, the potential Impact of a peat slide would be lower than the slide that occurred on the site in 2003 during construction.

Decommissioning the OHL and twin polesets will involve trafficking across the surface peat to get to the polesets to take down the OHL, cut down the polesets and transport them off site. However, this work will be carried out using low ground-bearing pressure wide-tracked excavators and ATVs suitable for working directly on the peat, similar to the equipment that would have been used to fell the conifer forests that were originally along the OHL corridor. The foundations for the polesets will be left in place so there will be no excavations or temporary surcharge loading on the peat with spoil. Therefore, the Likelihood of a peat slide occurring during decommissioning of the OHL in this area under controlled conditions has been interpreted as **Low (L=2)**, as illustrated in Figure 8-26.

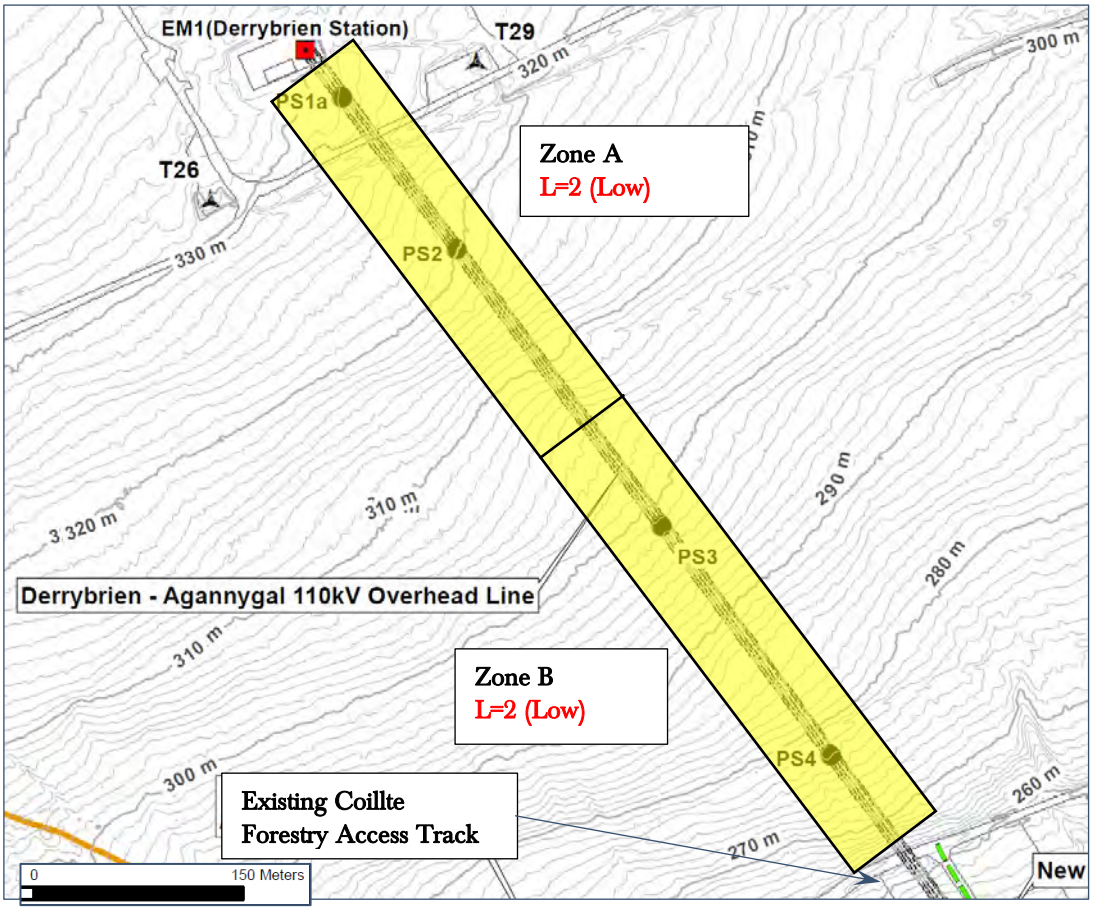



*Figure 8-26 Likelihood (L) of a peat slide along OHL between PS-1a and PS-4 for decommissioning the OHL and polesets using appropriate methodologies to minimise the impact on peat stability*

### 8.3.9.4 PSRA for Grid Connection: 110kV OHL (PS-5 to EW-41) & Agannygal Substation

The results of the peat stability risk assessment for the rest of the Grid Connection (Polesets PS-5 to EW-41 of the 110kV OHL) and for the Agannygal Substation are presented in this section.

The PSRA has been carried out in accordance with the current best practice guidelines for peat landslide risk assessments for wind farms on upland blanket bogs (Scottish Government, Energy Consent Unit, 2017). The method of risk assessment is also consistent with the Institution of Civil Engineers' publication outlining UK best practice in "Managing Geotechnical Risk" (Clayton, 2001).

The Likelihood (L) of a peat slide in each zone has been interpreted by evaluating factors related to the peat and subsoil conditions, topography, site hydrology/hydrogeology and other significant contributory factors such as peat harvesting or slide history to determine where there are conditions that could lead to an elevated risk of a peat slide.

The potential Impact (I) of a peat slide in each zone has been interpreted by evaluating factors related to the potential volume of peat, degree of contamination, sensitivity of the receiving environment, access for intervention, and land use and existing infrastructure within the potential run-out distance.

A baseline Risk Rating (R=L x I) has then been calculated for each zone prior to the implementation of risk mitigation measures to characterise the risk of peat instability across the site to identify where specific design, construction & operational mitigation measures are required to mitigate the risk of peat instability to an acceptable level.

The PSRA presented in the FT report in Appendix 8-5 is an engineering risk assessment where the potential Impact of a peat slide includes factors other than those that are relevant to the environmental impact of the project on the receiving soils, geology and land. Therefore, only the interpreted Likelihood of a peat slide across the site is introduced here because it is an index of the probability of a peat slide based on the site conditions, which is an input parameter for the environmental assessment of stability impacts presented in this chapter.

The site conditions vary across each zone. Therefore, the interpreted Likelihood of a peat slide in each zone is generally representative of the worst conditions within the zones.

The Overhead line and Agannygal Substation have been divided into eight sections. Each of these sections recorded a Likelihood of a peat slide of ‘Low’ or ‘Negligible’, as shown in Table 8-3 below.

The Likelihood (L) of a peat slide in each zone has been interpreted by evaluating factors related to the peat and subsoil conditions, topography, site hydrology/hydrogeology and other significant contributory factors such as peat harvesting or slide history to determine where there are conditions that could lead to an elevated risk of a peat slide.

The potential Impact (I) of a peat slide in each zone has been interpreted by evaluating factors related to the potential volume of peat, degree of contamination, sensitivity of the receiving environment, access for intervention, and land use and existing infrastructure within the potential run-out distance.

A baseline Risk Rating (R=L x I) has then been calculated for each zone prior to the implementation of risk mitigation measures to characterise the risk of peat instability across the site to identify where specific design, construction & operational mitigation measures are required to mitigate the risk of peat instability to an acceptable level.

The PSRA presented in the FT report in Appendix 8-5 is an engineering risk assessment where the potential Impact of a peat slide includes factors other than those that are relevant to the environmental impact of the project on the receiving soils, geology and land. Therefore, only the interpreted

Likelihood of a peat slide across the site is introduced here because it is an index of the probability of a peat slide based on the site conditions, which is an input parameter for the environmental assessment of stability impacts presented in this chapter.

The site conditions vary across each zone. Therefore, the interpreted Likelihood of a peat slide in each zone is generally representative of the worst conditions within the zones.

The Overhead line and Agannygal Substation has been divided into eight sections. Each of these sections recorded a Likelihood of a peat slide of 'Low' or 'Negligible', as shown in Table 8-3 below.

*Table 8-3 Summary of Likelihood of Peat Slide*

| Infrastructure | Likelihood of Peat Slide Pre-Control Measure Implementation |
|---|---|
| PS5 to AM14 | Low |
| AM14 to AM18 | Negligible |
| AM18 to AM24 | Negligible |
| AM24 to PS28A | Low |
| PS28A to PS34 | Low |
| PS34 to PS38 | Low |
| AM38 to EW41 | Low |
| Agannygal Substation | Negligible |

# 8.4 Likely, Significant Impacts and Mitigation Measures Implemented

## 8.4.1 Do-Nothing Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time".

The "Do-Nothing" scenario would involve maintaining the status quo. All elements of the wind farm infrastructure would remain in place, including the turbines, foundations, crane hardstandings, site access roads, drainage channels, underground cables, substation, anemometers and overhead transmission lines. The turbine blades would be left feathered to reduce wind loads on the turbines and foundations. No electricity would be generated or transmitted from the wind farm and no routine or preventative maintenance would be carried out on any element of the site or project infrastructure.

The effects of the Do-Nothing scenario are listed below:

**Stability Impacts:**

- **Site access tracks:** The highest risk of shear or bearing failure under the floating roads was when they were constructed in 2004/2005. The peat has gained in strength as it consolidated and compressed under the weight of the rockfill. Sections of the roads were upgraded in 2014 and all the roads were proof tested to the full design load in 2018. There will be no further traffic on the roads related to the Prospective Development. Therefore, the probability of a failure occurring in the peat due to the residual impact of the roads is **negligible** so that the effect of the surcharge load on the stability of the peat will be **negligible** and **Not Significant**.
- **Turbines, turbine foundations & crane hardstandings:** The turbines and crane hardstandings are supported on the bedrock and glacial till below the peat. Therefore, they do not apply any load on the peat and the effect of the impact on the stability of the glacial till and rock will be **negligible** and **Not Significant**. Furthermore, the turbine foundations and crane hardstandings will act as a shear key preventing shear failure in the peat directly upslope from them, which is a positive impact with respect to site stability which will be **Slightly Significant**. In the long term the reinforced concrete foundations would not be expected to disintegrate or reduce in strength sufficiently to reduce the positive shear key effect on peat stability although the stability of the site is not reliant on this effect.
- **Peat repositories:** The highest risk of shear failure under the peat repositories was when the excavated peat was placed there in 2004/2005. The excavated peat has dried out and re-vegetated and the underlying in-situ peat on the slopes has gained in strength as it consolidated and compressed under the weight of the excavated materials. Therefore, the probability of a failure occurring in the peat due to the residual impact of the repository sites is **negligible** so that the effect of the surcharge load on the stability of the peat will be **negligible** and **Not Significant**.
- **Drainage:** The additional drains that were constructed for the wind farm have had a sustained positive impact on site stability. Where the site drainage has been improved and where the groundwater level has been lowered, the positive effect on the stability of the peat relative to the initial conditions prior to construction has been assessed as **Medium** and **Moderately Significant**. Only minor works have been required to maintain the efficiency and capacity of the existing system over the

operational life of the wind farm to date. The existing drainage network has also had sufficient capacity to handle exceptionally high and sustained levels of rainfall without any occurrences of peat instability related to the windfarm. The drains will not be blocked in the "Do-Nothing" scenario. Therefore, this effect will be sustained into the future. However, as no maintenance will be carried out on the drains, their efficiency could possibly reduce over time as vegetation becomes further established on the slopes. Based on the low level of maintenance that has been required to maintain the efficiency and capacity of the system over the last 10years, it is expected that any changes would happen gradually so that the negative impact on the drainage and its effect on the stability of the peat relative to the current baseline condition is **Low**, which is only **Slightly Significant**. The net impact on site stability relative to the original conditions prior to construction of the wind farm would still be expected to be **positive**.

- **Borrow pits:** The borrow pits have been closed since construction was completed in 2005. It is not anticipated that there will be any deterioration or change in the condition of the borrow pits over time. Therefore, the impact that they will have on soils, geology and land in the area with respect to site stability will be **Imperceptible**.
- **Buried LV, SCADA and fibre-optic communication cables**: Similarly, the cables that were directly buried have been in place since they were installed. They do not impart any load on the peat and the vegetation has re-established over the trenches that were cut into the peat during installation. Therefore, if they are left in place, the long-term effect that they will have on the stability of the peat will be **Imperceptible**.

**Direct Impacts:**

- **Drainage:** The additional drains that were constructed for the wind farm resulted in a gradual lowering of the groundwater level in the peat in some areas of the site by up to 0.25-0.75m. The direct impact of this was to increase the rate of aerobic decomposition of the peat in the areas where the groundwater table was lowered, which was a **Slightly Significant** negative effect relative to the original conditions on the site prior to construction. If the efficiency of the drains reduces over time without further maintenance, then this will have a **Slightly Significant** positive effect by slowing down the rate of decomposition of the peat relative to the current baseline conditions where the original groundwater levels are gradually restored.

## 8.4.2 Prospective Development (Wind Farm & Polesets PS-1a to PS-4 of the 110kV OHL)

### 8.4.2.1 Site Activities – Decommissioning of Wind Farm & Polesets PS-1a to PS-4 of the 110kV OHL

Decommissioning will involve the final shutting down and closure of the windfarm and de-energising and dismantling the OHL for the grid connection. The effects of the decommissioning works for the wind farm and for polesets PS-1a to PS-4 of the 110kV OHL from Derrybrien to Annygal are assessed in this section of the chapter. The effects of the decommissioning works for the remaining sections of the 110kV OHL to Annaygal as well as the Annaygal substation are assessed separately in Section 8.4.3.

It is considered that minimal decommissioning works will be the best approach on this site in terms of both site stability and environmental protection. Therefore, the decommissioning plan will involve the following elements of the wind farm infrastructure:

- De-energising the site by initially disconnecting the high voltage (HV) lines at the substation, followed by low voltage (LV) disconnection at each of the turbines as well as the 110kV OHL for the grid connection.
- Temporary widening of the narrow sections of the site access tracks in the turbary area and at selected junctions to provide safe access for mobile cranes to the turbines.
- Controlled dismantling of the turbine blades, nacelle and masts. The decommissioned components will be removed from the site for re-cycling, disposal or re-use elsewhere.
- Removal of the sub-station and associated buildings-including removal of all the electrical transmission components, capacitors, transformer, concrete plinths, control building and foundations.
- Controlled dismantling and removal of the steel lattice tower and timber twin polesets for the 110kV Overhead Line (OHL).
- Dismantling of the steel lattice towers for the anemometers.

The features of the Derrybrien Wind Farm Development to remain *in situ in* perpetuity after the Prospective Development has been completed are listed below:

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approximately 17.5km of access tracks and 70no. hardstand areas.
- Direct buried underground electrical and communications cabling.
- 3no. Borrow Pits / Quarries.
- Naturalised Peat Repository areas.
- Onsite Drainage Infrastructure.

The turbines and masts will be dismantled by large mobile cranes operating on the adjacent granular hardstanding areas, which are designed to support the crane loads on the glacial till or rock below the peat. Where necessary, steel plates will be used to reduce the bearing pressure under high concentrated loads on the crane outrigger pads to prevent localised bearing failure.

When the turbines are being dismantled the 3 No. blades will be temporarily set down on the surface of the peat in a designated area 26.0 x 12.0m in plan area on the upslope side of the crane hardstanding area. The blades, which are 26m long and weigh approximately 1,900 kg each, will only impart a surcharge load of <1.5kPa on the surface of the peat along the length of each blade, which is very low. The hardstanding area will also act as a shear key to prevent shear failure in the peat.

The substation and control buildings will also be dismantled from the hardstanding area so that there is no loading on the peat.

The mobile cranes will be required to travel across the floating roads to access the turbines and substation site. It is anticipated that a larger 250 or 300 tonne mobile crane will be required for dismantling the turbines and transporting the components offsite. The design crane for the site is the Grove GMK6300, which has a 300-tonne lifting capacity and a travelling weight of 72 tonnes spread over 6 axles at a maximum load of 12 tonnes per axle, as shown on Table 8-1.

As described in Section 8.3.9.2, full-scale proof load tests were carried out on all the floating roads in July 2018 to verify the capacity and performance of the floating roads for the maximum crane size that will be used for decommissioning.

The floating roads will also be used by specialist low-loader transporter vehicles to remove oversized or heavy components from the turbines and substation. The heaviest component that was brought to site during construction was the substation transformer, which, along with the transporter, had a combined

weight of 130 tonnes spread out over 12 axles at a maximum load of 12 tonnes per axle, as shown in Figure 8-27. The highest load concentration was under the trailer carrying the transformer, which had a combined load of 96 tonnes over a wheel contact area of 18.5 x 3.0m = 55.0m$^2$. This equates to a characteristic UDL of 17.1 kN/m$^2$, or 51.4 kN/m length of road, which is less than the concentration of the design load from the 300 tonne Grove GMK6300 crane and within the capacity proven by the full-scale proof tests carried out on the roads in July 2018.

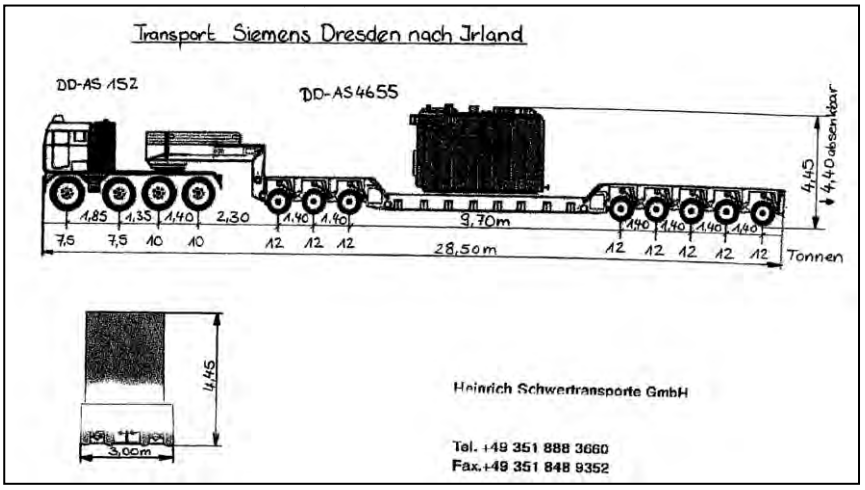



*Figure 8-27 Load of Transformer and Low-Loader Transporter*

The transformer will be taken off site using a similar transporter to the one that was used to bring it to the substation during construction. It will also follow the same direct route between the substation and the site entrance, which has proven capacity to support the loads. Special precautions will be taken to ensure that the 28.5 m long vehicle can safely navigate along the roads.

Where necessary, the narrow sections of turbary road between Turbines T35 and T45 and between T43 and T46 will be temporarily widened by about 1.0-1.5m to provide safe access to the turbines for the Grove GMK6300 mobile crane for decommissioning. A typical detail for the temporary road widening is shown in Figure 8-28. The minor civil works will involve widening the existing floating road with a min. 300mm thick layer of Class 6F2 crushed rock granular capping material supported on a layer of timber bog mats placed on the peat. The capping layer will be reinforced with geogrids and surfaced with a 100mm thick layer of Cl.804 crushed rock granular subbase material. The capping/subbase layers and the geogrid reinforcement will be extended across the full width of the road, with a minimum thickness of 150 mm for the section of capping over the existing road to minimise the additional load.

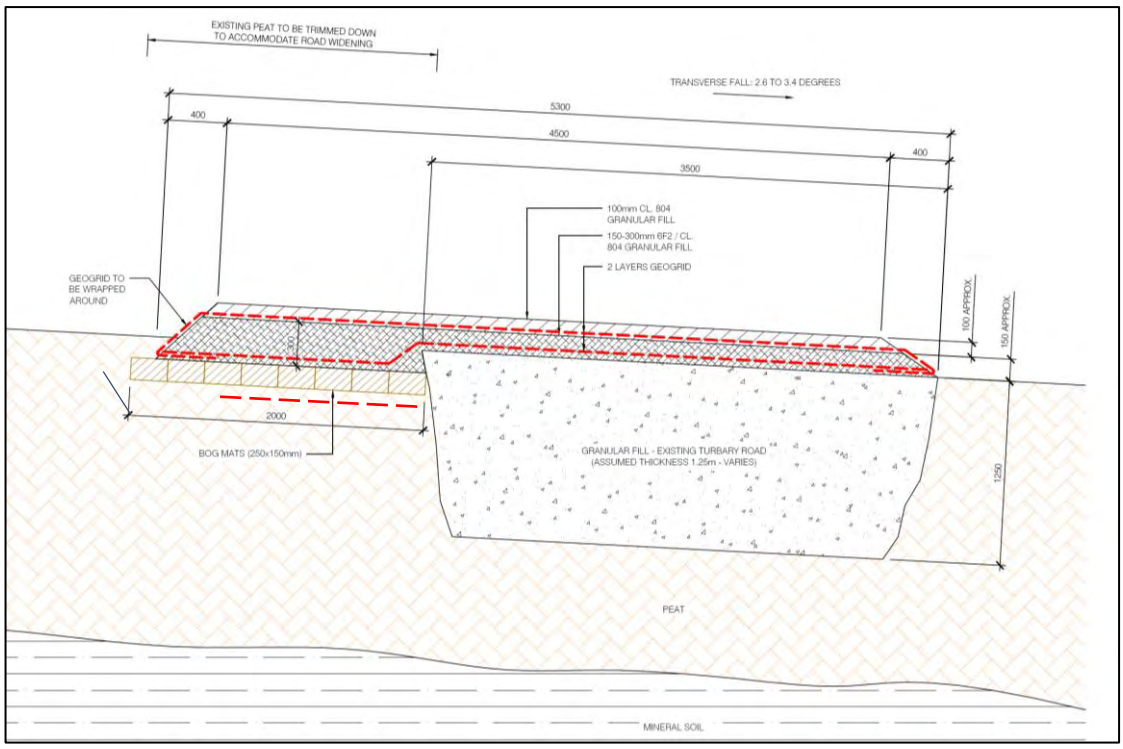



*Figure 8-28 Typical temporary road widening detail.*

The geogrids will have a wraparound detail at the edges to provider a stiffer response to the wheel loads and to provide enhanced anchorage to the existing road. Where necessary the peat under the widened section of the road will be trimmed down to ensure that the finished surface of the road has a uniform profile across the full width. The peat will be excavated in intact vegetated turves and retained on site for reinstatement of the areas on completion of the decommissioning works.

Wherever possible the road will be widened on the upslope side. This will reduce the likelihood of peat instability compared to widening on the downslope side because the peat under the existing road has compressed under the weight of the fill giving it a higher strength and a greater resistance to shear failure than the virgin peat downslope from the road.

Some minor works will be required on the existing roads at 4 No. locations to provide the necessary width and turning space for the vehicles that will be required to transport the turbine components off the site, as shown in Figure 8-29 to Figure 8-32:

- Widening up to 2.5m at the bend of the T-junction to the west of Turbine T68 (Figure 8-29).
- Widening the approach road and hardstanding area at Turbine T14 by 1.5-2.0m (Figure 8-30).
- Providing an 8.9m long x 4.6m wide spur to increase the length of the hardstanding at T4 for reversing vehicles (Figure 8-31).
- Widening the access road on the approach to Turbine T1 by 0.5m (Figure 8-32).

With the exception of the spur extension to the hardstanding at T4, the junction and road widening works would use a similar detail to that shown for the temporary road widening on Figure 8-28.

The spur extension to the hardstanding at Turbine T4 will be constructed as a floating road comprised of 600mm of crushed rock granular fill reinforced with two layers of geogrids.

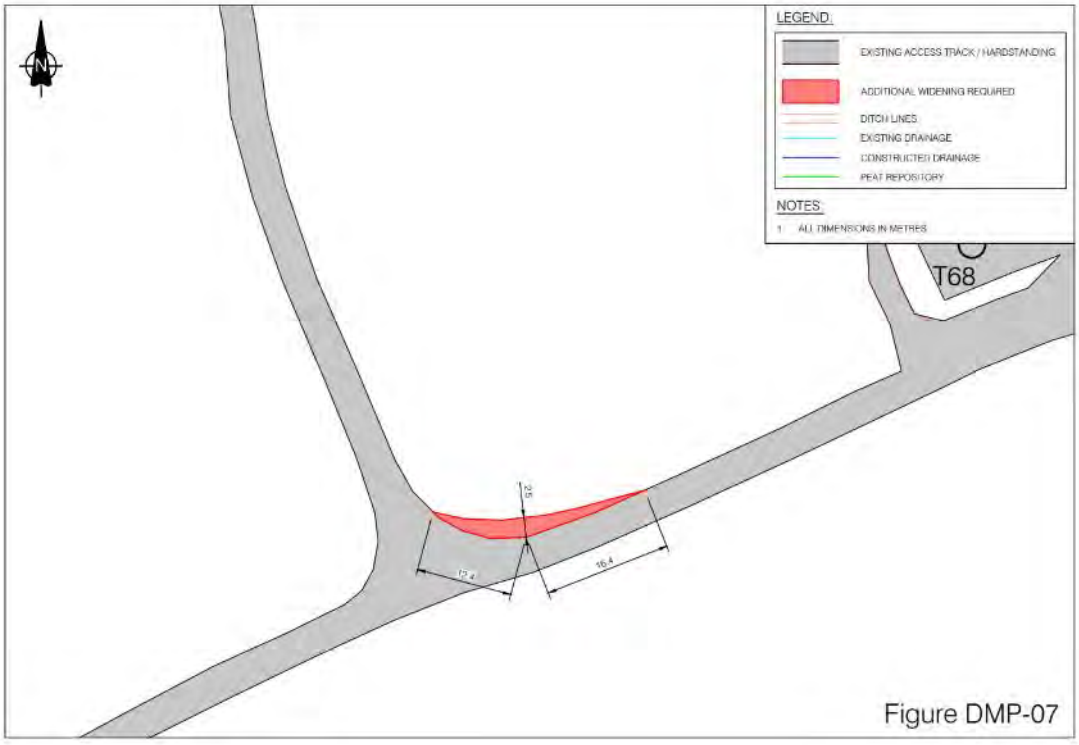



*Figure 8-29 Proposed minor road widening works at Turbine T68 for decommissioning.*




*Figure 8-30 Proposed minor road widening works at Turbine T14 for decommissioning.*

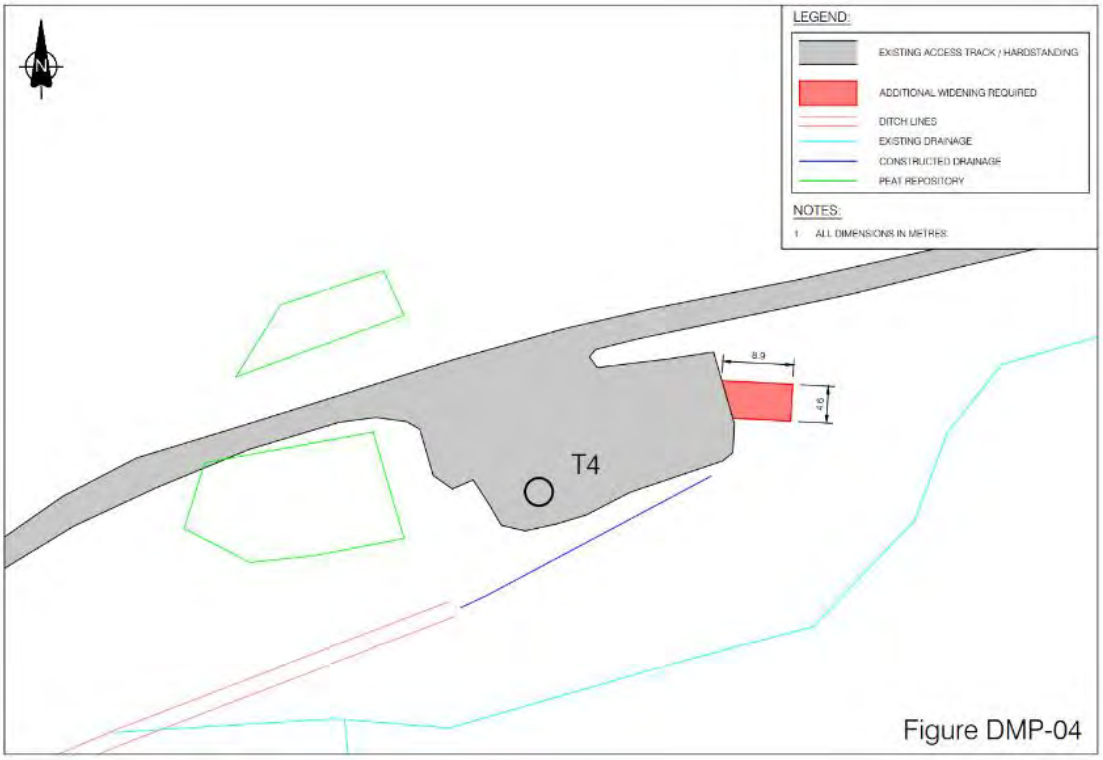



*Figure 8-31 Proposed minor road widening works at Turbine T4 for decommissioning.*

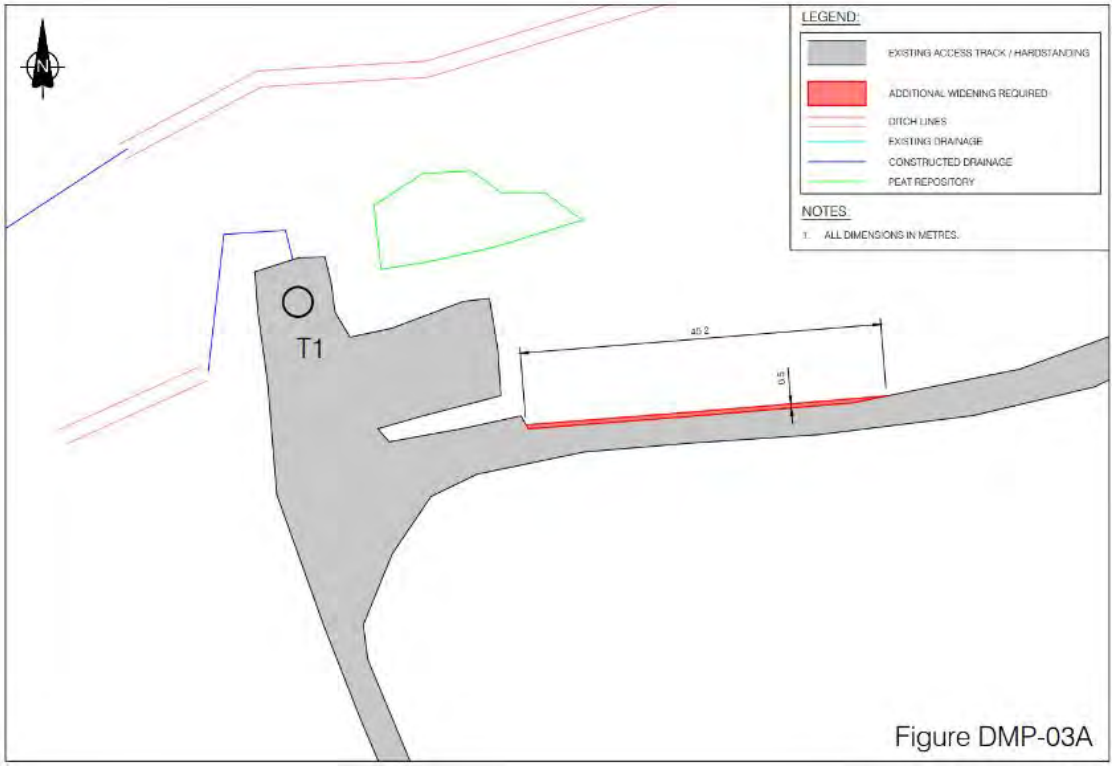



*Figure 8-32 Proposed minor road widening works at Turbine T1 for decommissioning.*

At the substation site, demolition of the control building and foundation plinths will be carried out on the hardstand areas with mechanical demolition equipment and hydraulic breakers for the reinforced concrete foundations. All the electrical transmission equipment, capacitors and transformers will be dismantled and taken off site for re-cycling, disposal or re-use elsewhere. The granular hardstand area will be left in place.

The electrical cables fibre-optic cables, and copper earth & SCADA cables connecting the turbines to the substation are all direct buried in shallow trenches in the peat at a depth of about 0.9-1.1m below ground level. The trenches were backfilled over the cables with the excavated peat. The cables were only laid in uPVC ducts at the road crossings and at the turbine connections. To decommission the wind farm all the cables will be disconnected at the turbines and substation and the ducts will be cut at ground level and backfilled with cement grout. The remaining length of cables will be left in place buried in the peat.

The steel lattice towers for the anemometers and for the 110kV Overhead Line (OHL) at the substation will be dismantled using mobile cranes operating on the adjacent hardstanding areas. The dismantled components will then be transported off site for recycling. The reinforced concrete pad foundations and the adjacent hardstanding areas will be left in place.

The timber twin polesets for the 110kV OHL that will be decommissioned with the wind farm (PS-1a to PS-4) will be cut down at ground level, cut into sections and transported off site for disposal. The de-energised cable will first be lowered from the supports, cut into sections and winched up onto reels from the Coillte forestry roads or wind farm access roads to be transported off site. Work along the OHL will be carried out using standard forestry equipment suitable for working on peat, including low ground-bearing pressure wide-tracked excavators fitted with chainsaw cutters to fell and cut-up the polesets, and ATV to transport the timber and de-energised electrical cables to a collection point on the windfarm or Coillte access roads for disposal offsite. The embedded foundations for the polesets will be left in place.

It is not proposed to carry out any final remedial or reinstatement works on the elements of the windfarm that will be left in place after decommissioning, including the turbine foundations, crane hardstanding areas, floating roads, peat repository sites, borrow pits or substation hardstanding area.

It is also not proposed to carry out any improvement works on the site drainage. However, if any blockages are encountered at the culverts under the floating roads or along sections of open drains, minor civil works will be carried out to remove the blockages during decommissioning, as necessary.

#### 8.4.2.2 Assessment of Direct Effects During Decommissioning

As the decommissioning work will be limited to removing the above ground elements of the Derrybrien Wind Farm Development, there will be no excavations required other than trimming of peat banks, where necessary, along the edges of the existing floating roads where localised widening works are required, or to clear blockages in open drains. Where peat is excavated to widen the roads, it will be excavated in intact vegetated turves and retained on site for reinstatement of the areas on completion of the decommissioning works.

The majority of the decommissioning works will also not require any new crushed rock aggregates. Therefore, it will not be necessary to re-open the main borrow pit on the site to extract rock to process it into suitable rockfill materials. Where small volumes of aggregates are required for the localised road widening works these will be imported from a nearby quarry or re-cycled from the existing hardstandings elsewhere on the site.

Therefore, there will be **no significant direct effects** on soils, geology or land during decommissioning.

#### 8.4.2.3 Assessment of Stability Effects During Decommissioning

This section of the report presents the assessment of stability effects for the decommissioning of the windfarm and polesets PS-1a to PS-4 of the OHL, i.e. the assessment of direct impacts of site activities on the receiving soils, geology and land that could have an effect on site stability, particularly in relation to the peat. The results are summarised in Table 8-4.

For each activity, Table 8-4 states the **characteristics of the stability impact** – typically a dead or live load surcharge on the intact peat slopes - as well as the extent, duration and frequency of that impact. The characteristics of the impact are based on the site records for comparable activities during the construction stage of the project, which typically detail the methodology that was adopted in carrying out the works and the equipment that was used on the site.

As described in Section 8.2.4.4, the corresponding **effect** on the receiving soils, geology and land has been assessed as a function of the characteristics of the site activity, the quality of the impact with respect to site stability, the probability of a peat failure occurring, and the possible nature and extent of a peat failure.

The **Significance** of the effects of the stability impacts has been assessed as a function of the sensitivity of the receiving soils, geology and land potentially impacted by a peat failure, using the matrix in Figure 8-2.

For this project the **sensitivity of the receiving soils, geology and land** has been classified as **Medium** based on the characteristics of the peat failures that occurred during construction, as discussed in Section 8.3.7.

Therefore, the Significance of effects in Table 8-4 Assessment of Stability Impacts for Decommissioning reflects:

- The **probability** of a peat failure occurring due to the effect of the stability impacts on the peat (e.g. due to the increased shear stresses under applied surcharge loads).
- The potential **scale and characteristics** of a peat failure.
- The **sensitivity** of the soils, geology and land potentially impacted by a peat failure.

#### 8.4.2.3.1 *Dismantling of Turbine Blades, Nacelle and Masts*

The stability impacts on soils, geology and land during the decommissioning of the turbines will be:

- The concentrated crane loads on the hardstanding areas during the dismantling of the turbines.
- The temporary surcharge load on the peat in the blade set-down area.
- The live load surcharge on the floating roads when the cranes are travelling to the turbines along the floating roads.
- The live load surcharge on the floating roads from specialist low-loader transporter vehicles transporting heavy or oversized components of the turbines off site.

All of the heavy dismantling works will be carried out from the crane hardstanding areas adjacent to the turbine. The hardstanding areas are constructed of crushed rock granular fill supported on the glacial till below the peat. They were used for the erection of the turbines during construction, and they are designed to support the concentrated loads from the cranes and service vehicles without applying any load on the peat slopes. Therefore, the effect that these loads will have on site stability is **Negligible** and **Not Significant**.

When the turbines are being dismantled the 3 No. blades from each turbine will be temporarily set down on the surface of the peat in a designated area 26.0 x 12.0m in plan area on the upslope side of the crane hardstanding area. The blades, which are 26m long and weigh approximately 1,900 kg each, will be laid out across the peat so that the load is distributed along the length of the blade. In this way they will only impart a surcharge load of <1.0-2.0kPa on the surface of the peat along the length of each blade, which is very low (i.e. equivalent to the load from a 100-200mm thick strip of peat). The crane hardstanding downslope from the set down area will also act as a shear key to prevent shear failure in the peat. Therefore, the effect that these loads will have on site stability is **Negligible** and **Not Significant**.

The large mobile cranes that will be used to dismantle the turbines will travel along the floating roads to access the turbines. Therefore, they will apply a locally concentrated live load surcharge on the peat slopes when they travel across the site. The decommissioning works are expected to take approximately 12-18 months. During that time, it is expected that the mobile cranes will be operating continuously on site when the turbines are being dismantled. They will be primarily set up at the hardstanding areas adjacent to the turbines but will travel along the floating roads when they are moving between turbines. There may also be more than one mobile crane on the site at any one time. Therefore, the loading will be **Regular** but the duration of loading will be **Temporary**.

Proof load tests were carried out on all of the floating roads on the site in July 2018 using a mobile crane and articulated dumper truck to verify the capacity, performance and stability of the roads under the design crane load. The live load surcharge from the mobile crane used for dismantling the turbines will not exceed the design crane load. Furthermore, the roads showed a visible improvement in performance in 2018 compared to when they were tested in 2005 and 2014 due to the increase in the strength and stiffness that occurred in the underlying peat as it compressed under the weight of the road, and also due to the upgrade works that were carried out on sections of the road in 2014. Therefore, the likelihood of a peat failure occurring under the surcharge loads from the mobile cranes will be **Very Low**, the effect of the loading on the stability of the peat will be **Very Low** and only **Slightly Significant**.

Specialist trucks and low-loader transporters will be **Frequently** required to remove the heavy and oversized components of the turbines from the site. The mass and length of the main turbine components are as follows for the Vestas V52/850 turbine:

- Nacelle: 22 tonnes.
- Rotor: 10 tonnes.
- Rotor Blades (26 m) 1.9 tonnes.
- Mast (Hub Height 55 m): 55 tonnes.

The mast can be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland. Therefore, the load from the transporters on the floating roads will not exceed the design load of the mobile crane so that the effect of the live load surcharge on the stability of the peat will also be **Very Low** and only **Slightly Significant**.

#### 8.4.2.3.2 *Dismantling of Substation & Demolition of Control Building*

The main stability impacts on soils, geology and land during the dismantling of the substation and demolition of the control building will be:

- The concentrated loads on the hardstanding areas around the substation during the works.
- The live load surcharge on the floating roads from the vehicles and low-loader transporters transporting equipment, demolition waste and electrical components to and from the site.

All of the dismantling and demolition works for the substation, control building and electrical transmission and transformer components will be carried out in-situ on the existing hardstanding area at the substation site. The hardstanding is constructed of crushed rock granular fill supported on the glacial till below the peat. It was used for the construction of the substation and it is designed to support the concentrated loads from the Mobile Elevated Work Platforms (MEWP), mobile cranes and service vehicles without applying any load on the peat slopes. Demolition of the control building and reinforced concrete plinths for the electrical transmission and transformer components will also be done in-situ from the hardstanding area using mechanical excavators and hydraulic breakers without blasting.

Therefore, the effect that the concentrated loads on the hardstanding area will have on site stability is **Negligible** and **Not Significant**.

The vehicles travelling along the floating roads to the substation apply a locally concentrated live load surcharge on the peat slopes when they travel across the site. Generally, the traffic will be limited to the commercial vehicles and trucks that will be used to transport personnel, waste materials and equipment to and from the substation and control building. All of the small decommissioned electrical components and demolition waste will be taken off-site for re-cycling or to a licensed waste disposal site on standard dump trucks which have a maximum load of 37.5 tonnes on 4 axles at up to 10 tonnes per axle. For the duration of the decommissioning contract the **Frequency** of this traffic loading will be **Regular** and the **Duration** of loading will be **Temporary**. However, the load that these vehicles apply on the floating roads is significantly lower than the design crane loads for which the roads were tested. Therefore, based on the improved performance of the roads when they were tested in 2018, the effect of the loading on the stability of the peat will be **Negligible** and **Not Significant**.

The transformer was the largest single load for all of the components that were transported to the site during construction. Section 8.4.2.1 gives details of the low-loader that was used to transport the transformer to the substation during construction. The combined weight of the transformer and low-loader transporter was 130 tonnes, which was spread out over 12 axles at a maximum load of 12 tonnes per axle. The equivalent live load surcharge over the 28.5m length of the vehicle was within the design load for the floating road. The mobile crane that will be required to lift the transformer onto the low-loader at the substation site will also be smaller than the crane that will be used to dismantle the turbines. Similar vehicles will be used to take the transformer off site and they will follow the same route when traveling to and from the substation. Therefore, the likelihood of a peat failure occurring under the surcharge loads will be **Very Low**, the effect of the loading on the stability of the peat will also be **Very Low** and the Significance of the effect will be **Slight.**

#### 8.4.2.3.3 *Localised Works to Temporarily Widening the Existing Floating Roads*

Minor works will be required to locally widen the existing floating road at Turbines T68, T14 and T1, and to extend the crane hardstanding at T4 to facilitate reversing long vehicles that will be used to transport the turbine components offsite.

Where necessary, the narrow sections of turbary road between Turbines T35 and T45 and between T43 and T46 will also be temporarily widened by about 1.0-1.5m to provide safe access to the turbines for the Grove GMK6300 mobile crane for decommissioning.

A typical detail for the temporary road widening is shown in Figure 8-28. The minor civil works will involve widening the existing floating road with a min. 300mm thick layer of Class 6F2 crushed rock granular capping material supported on a layer of timber bog mats placed on the peat. The capping layer will be reinforced with geogrids and surfaced with a 100mm thick layer of Cl.804 crushed rock granular subbase material. The impact of this will be to apply a small dead load surcharge of approximately 8.5kN/m$^2$ on the peat upslope from the road. This is equivalent to the dead load from less than 1.0m of peat over the same area, which is low.

The capping/subbase layers and the geogrid reinforcement will be extended across the full width of the road, with a minimum thickness of 150 mm for the section of capping over the existing road to minimise the additional load. The geogrids will have a wraparound detail at the edges to provider a stiffer response to the wheel loads and to provide enhanced anchorage to the existing road. Where necessary the peat under the widened section of the road will be trimmed down to ensure that the finished surface of the road has a uniform profile across the full width.

The existing 3.0-3.5m wide road was fully proof load tested for the design live load surcharge in 2018 and the peat has consolidated and gained strength under the road since it was constructed. Wherever possible the road will be widened on the upslope side as the higher strength peat under the existing

road will provide greater resistance to shear failure than the virgin peat downslope from the road, which will reduce the likelihood of peat instability.

The widened road will spread the same traffic load out over a wider area (approx. 5m). Therefore, the effect that the load from the widened road will have on the stability of the peat will be **Low**, and the Significance of the effect will be **Slight.**

With the exception of the temporary spur extension to the hardstanding at T4, the junction and road widening works would use a similar detail to that shown for the temporary road widening on Figure 8-28.

The short temporary spur extension to the hardstanding at Turbine T4 will be constructed as a floating road comprised of 600mm of crushed rock granular fill reinforced with two layers of geogrids. This will result in a localised dead load surcharge of approximately 12 kN/m$^2$ on the peat, which is equivalent to about 1.2m of peat, which is low. The section of road will also be connected to the hardstanding by the embedded geogrid reinforcements. Therefore, the effect that this will have on the stability of the peat will be **Low**, and the Significance of the effect will be **Slight**.

The additional surcharge loading from the widened roads and extended hardstanding will be **sustained** during decommissioning. However, the fill will be removed on completion of the works and the areas re-instated. Therefore, the effect will be **temporary**.

#### 8.4.2.3.4 *Dismantling The Anemometers*

The stability impacts on soils, geology and land during the dismantling of the anemometers will be:

- The concentrated loads from the mobile crane operating on the hardstanding areas around the anemometers during the works.
- The live load surcharge on the floating roads from the mobile crane used to dismantle the lattice steel towers, and from the support vehicles used to transport the materials off the site for recycling.

All the dismantling and demolition works will be carried out in-situ on the hardstanding areas at the anemometers. The hardstanding areas are constructed of crushed rock granular fill supported on the glacial till below the peat. They were used for the construction of the anemometers so they are designed to support the concentrated loads from the mobile cranes and service vehicles without applying any load on the peat slopes. Therefore, the effect that the concentrated loads on the hardstanding area will have on site stability is **Negligible** and **Not Significant**.

The live load surcharge from the mobile crane and support vehicles that will be used to dismantle the anemometers will not exceed the maximum design capacity of the floating roads, which has been verified by full scale proof load tests. Therefore, the likelihood of a peat failure occurring under the surcharge loads will be **Very Low**, and the effect of the loading on the stability of the peat will be **Very Low** and only **Slightly Significant**.

#### 8.4.2.3.5 *Dismantling Timber Twin Polesets PS-1a to PS-4 and the 110kV OHL*

The main stability impacts on soils, geology and land during the dismantling of Poleset PS-1a to PS-4 of the OHLwill be the live load surcharge on the peat from the equipment that will be used to lower, cut and remove the electrical transmission cable, and to cut down the timber polesets and transport them offsite.

The timber twin polesets for the 110kV OHL that will be decommissioned with the wind farm (PS-1a to PS-4) will be cut down at ground level, cut into sections and transported off site for disposal. The de-

energised cable will first be lowered from the supports, cut into sections and winched up onto reels from the Coillte forestry roads or wind farm access roads to be transported off site.

Work along the OHL will be carried out using standard forestry equipment suitable for working on peat, including low ground-bearing pressure wide-tracked excavators fitted with chainsaw cutters to fell and cut-up the polesets, and ATV to transport the timber and de-energised electrical cables to a collection point on the windfarm or Coillte access roads for disposal offsite. The embedded foundations for the polesets will be left in place.

The work will be carried out in an area of established coniferous forestry therefore, the likelihood of a peat failure occurring under the surcharge loads will be **Very Low**, the effect of the loading on the stability of the peat will be **Very Low** and only **Slightly Significant**.

#### 8.4.2.3.6 *Cables & Ducting*

De-energising the buried LV and HV electrical cables connecting the turbines to the substation will have an imperceptible impact on the peat. Therefore, the effect that it will have on site stability will be **Negligible** and **Not Significant**.

All the electrical cables fibre-optic cables, and copper earth & SCADA cables connecting the turbines to the substation were direct buried in shallow trenches in the peat at a depth of about 0.9-1.1m below ground level. The trenches were backfilled over the cables with the excavated peat. The cables were only laid in uPVC ducts at the road crossings and at the turbine connections. To decommission the wind farm all the cables will be disconnected at the turbines and substation and the ducts will be cut at ground level and backfilled with cement grout.

All this work will be carried out from the hardstanding areas at the turbines and substation with no loading or excavations on the peat. Therefore, the effect that it will have on site stability will be **Negligible** and **Not Significant**. The remaining length of cables will be left in place buried in the peat after the wind farm is decommissioned.

*Table 8-4 Assessment of Stability Impacts for Decommissioning*

| Activity | Characteristics of Site Activities | | | | | Impact Assessment - Site Stability (Peat Slide) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nature of Primary Impact | Probability of Occurrence | Extent | Duration | Frequency | Quality of Geotechnical Impact | Possible Extent of Impact (Peat Slide) | Probability of Occurrence (Impact) | Geotechnical Impact of Primary Effect on Site Stability | Sensitivity of Receiving Soils, Geology & Land | Significance of Geotechnical Impact |
| **Dismantling of Turbine Blades, Nacelle & Mast** | Crane Loading on Hardstanding Areas | Likely | Hardstanding areas adjacent to turbines | Temporary | Regularly | Slight Negative | Not Applicable | Negligible | **Negligible** | **Medium** | **Not Significant** |
| | Blade loading on peat in temporary set down areas | Likely | On peat on upslope side of crane hardstanding areas at each turbine | Temporary | Occasional (3 No. blades at each turbine) | Slight Negative | Not Applicable | Negligible | **Negligible** | **Medium** | **Not Significant** |
| | Crane Loading on Floating Roads | Likely | Along floating roads between turbines and site entrance | Temporary | Regularly | Negative | Small ($100m^2$-$2500m^2$) to Very Large (>10Ha) | Very Low | **Very Low** | **Medium** | **Slight** |
| | Low-Loader Transporter Loading with Turbine Components on Floating Roads | Likely | Along floating roads between turbines and site entrance | Temporary | Frequently | Negative | Small ($100m^2$-$2500m^2$) to Very Large (>10Ha) | Very Low | **Very Low** | **Medium** | **Slight** |
| **Dismantling of Substation & Demolition of Control Building** | Mobile Crane, MEWP and Vehicle Loading on Hardstanding Areas | Likely | Hardstanding area at Substation site | Temporary | Frequently | Slight Negative | Not Applicable | Negligible | **Negligible** | **Medium** | **Not Significant** |
| | Service Vehicle Loading on Floating Roads | Likely | Along Floating Roads to/from Substation Site | Temporary | Regularly | Slight Negative | Not Applicable | Negligible | **Negligible** | **Medium** | **Not Significant** |
| | Mobile Crane or Low-Loader Transporter Loading with Transformer on Floating Roads | Likely | Along Floating Roads from Substation Site | Brief | Occasional | Negative | Small ($100m^2$-$2500m^2$) to Very Large (>10Ha) | Very Low | **Very Low** | **Medium** | **Slight** |
| **Localised Temp. Widening of Floating Roads & Hardstandings** | Load from additional rockfill and crane wheel load on widened side of existing floating road | Possible | Localised Areas at T1, T4, T14 & T68, and possibly access track in turbary areas between Turbines T35 and T45, & T43-T46 | Temporary | Occasional (Crane Load) Sustained (Add. Rockfill) | Negative | Small ($100m^2$-$2500m^2$) to Very Large (>10Ha) | Very Low to Low | **Low** | **Medium** | **Slight** |
| **Dismantling the Anemometers** | Mobile Crane and Vehicle Loading on Hardstanding Areas | Likely | Hardstanding area at Anemometers | Temporary | Occasional | Slight Negative | Not Applicable | Negligible | **Negligible** | **Medium** | **Not Significant** |
| | Mobile Crane or Transporter Loading with Anemometer Components on Floating Roads | Likely | Along Floating Roads from Anemometer Sites | Brief | Occasional | Negative | Small ($100m^2$-$2500m^2$) to Large (5Ha) | Very Low | **Very Low** | **Medium** | **Slight** |
| **Dismantling OHL Timber Twin Polesets** | Loading on Peat from Wide-Tracked Excavators and All-Terrain Vehicles (ATV) | Likely | Across pat slops from forestry access roads to OHL polsets PS-1a to PS-4 | Brief | Occasional | Negative | Small ($100m^2$-$2500m^2$) to Very Large (>10Ha) | Very Low | **Very Low** | **Medium** | **Slight** |
| **Cables & Ducting** | De-energising and disconnecting HV and LV cables | Likely | At Substation (HV) and at Turbines (LV) | Temporary | Occasional | Neutral | Not Applicable | Negligible | **Negligible** | **Medium** | **Not Significant** |

## 8.4.3 Prospective Development Effects (OHL)

### 8.4.3.1 Site Activities - Decommissioning of Overhead Line and Agannygal Substation

The decommissioning plan for the Overhead Line and Agannygal Substation will involve the following:

- Overhead Line preparatory works (Access).
- Retirement of existing conductor and shieldwire (destringing).
- Retirement of wooden poleset structures.
- Retirement of steel tower structures.

The decommissioning of Agannygal Substation will involve the removal of the above ground elements of the substation and will entail:

- De-energising of the electrical equipment in site.
- Removal of sub-station building and equipment.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

The following elements of the OHL and Agannygal Substation will be left in place in their final configuration after decommissioning:

- Below ground elements of 34no. double wooden pole sets.
- Reinforced concrete foundations for 2no. end masts.
- Reinforced concrete foundations for 5no. angle masts.
- Reinforced concrete foundations for 1no. intermediate mast.
- Reinforced concrete foundations of structures within the Agannygal Substation compound.

The existing network of roads will be used to access a pole set or an angle mast on the OHL. From there it will be necessary to transport material, plant, and personnel over land.

Where very poor and/or soft boggy ground is encountered, it may be necessary to construct a temporary track with mats (wooden, aluminium, EPDM/Duraflex etc) to facilitate access to the overhead line site.

Tracked machines and bog mats may have to be utilised in all areas. In some instances, where the area is dry or damaged through bog cutting, there may be no need to use these measures. In such an instance, it will be the responsibility of the Project Ecologist to recommend the best practice. Similarly, if conditions are particularly wet/dry, construction measures will have to be implemented to meet these conditions.

A full description of the Decommissioning Works can be found in the Decommissioning Management Plan (Appendix 4-2 of this EIAR).

### 8.4.3.2 Assessment of Direct Effects During Decommissioning

The following section gives a summary of the assessment of the decommissioning of the OHL, Agannygal Substation and Ancillary work activities that had a direct effect on soils, geology and land that were of significance.

The activities and related impacts are given in Table 8-5.

The assessment details of the potential significance of these effects on soils, geology and land is given in Table 8-6.

*Table 8-5 Activities and Related Impacts*

| Activity/Item | Effect on Soils, Geology and Land Use | |
|---|---|---|
| | Direct | Secondary (Indirect) |
| Forestry – Felling of regrowth | Settlement/Consolidation<br>Stability of weak ground | No indirect effects |
| Demolition of the Agannygal Substation and removal of the components off-site | Land use<br>Stability of ground | No indirect effects |
| Removal of the polesets and masts for the 110kV line | Settlement/Consolidation<br>Stability of weak ground | No indirect effects |

The potential significance of the impact of the following primary work activities/events on soils, geology and land during the Prospective Development will be **Slight**:

- Forestry – Felling of Regrowth.
- Removal of polesets and masts for the 110kV line.

#### 8.4.3.2.1 *Forestry – Felling of Regrowth*

Some tree topping is likely to be carried out along the route of the Grid Connection to trim back some of the small trees that re-established naturally on the slopes where clear felling had taken place. The work will be carried out using light LGBP wide-tracked harvesters operating on the peat. The small trees will be cut down and left in place on the slopes so that no forwarders will be required.

Loading resulting in settlement and consolidation of the underlying peat from trafficking of LGBP machines would be transient and very limited in extent. The potential effect is assessed as **Very low.**

The overall potential significance of these effects during decommissioning is **Slight.**

#### 8.4.3.2.2 *Removal of the Grid Connection Polesets (Deep Peat Area)*

One of the poleset locations (AM38) was accessed during construction by the use of a temporary floating road constructed from felled trees, and by the use of LGBP wide tracked excavators and similar methods will be used in the decommissioning of the Grid Connection. This will result in a live load on the peat surface over a limited area during the decommissioning of these particular pole sets.

Construction traffic loading will result in negligible consolidation of the underlying peat, due to the use of LGBP machinery. The potential effect of the additional traffic loading is assessed as **Low**.

The overall potential significance of these effects during decommissioning is **Slight.**

#### 8.4.3.2.3 *Removal of the Grid Connection Polesets (All Other Areas)*

The majority of the polesets and masts will be removed using existing Coillte access tracks, and the effect of this works is assessed as **Negligible.** The potential significance of these works is **Not Significant** due to the limited numbers of vehicle movements required for these works, and the fact that existing tracks will be used to access these locations.

#### 8.4.3.2.4 Demolition of the Agannygal Substation

Decommissioning of the Agannygal Substation will involve the removal of all substation equipment and buildings from the substation site. This work will be undertaken from the existing granular fill platform at the substation and the existing Coillte access track will be used to access the substation and to remove the equipment. The effect of these works is assessed as **Negligible**. The potential significance of these works is **Not Significant**, as these works will involve the removal of above ground structures and no disturbance of the ground.

### 8.4.3.3 Assessment of Stability Impacts During Decommissioning

This section of the report presents the assessment of stability impacts for the decommissioning of the OHL and Agannygal Substation, i.e. the assessment of direct impacts of site activities on the receiving soils, geology and land that had an effect on site stability, particularly in relation to the peat. The results are summarised in Table 8-6.

For each activity, Table 8-6 states the characteristics of the **stability impact** – typically a dead or live load surcharge on the intact peat slopes - as well as the extent, duration and frequency of that impact. The characteristics of the impact are based on the site records for comparable activities during the construction stage of the Project, which typically detail the methodology that was adopted in carrying out the works and the equipment that was used on the site.

As described in Section 8.2.4.6, the corresponding **effect** on the receiving soils, geology and land has been assessed as a function of the characteristics of the site activity, the quality of the impact with respect to site stability, the probability of a peat failure occurring, and the possible nature and extent of a peat failure.

The **Significance** of the effects of the stability impacts has been assessed as a function of the **sensitivity** of the receiving soils, geology and land potentially impacted by a peat failure, using the matrix in Figure 8-2. For this project the sensitivity of the receiving soils, geology and land has been classified as **Medium** based on the characteristics of the peat failures that occurred during construction.

Therefore, the **Significance** of **effects** in Table 8-7 reflects the probability of a peat failure occurring due to the effect of the stability impacts on the peat (e.g. due to the increased shear stresses under applied surcharge loads), the potential scale and characteristics of a peat failure, and the sensitivity of the soils, geology and land potentially impacted by a peat failure.

#### 8.4.3.3.1 Forestry – Felling of Regrowth

Some felling of regrowth is likely to be carried out along the route of the OHL to trim back some of the small trees that re-established naturally on the slopes where clear felling had taken place. The work will be carried out using light LGBP wide-tracked harvesters operating on the peat. The small trees will be cut down and left in place on the slopes so that no forwarders will be required.

The risk of a peat slide under such machine loading would be limited. The effect in terms of site stability is **Low**, and the potential significance of the effect is **Slight,** due to the use of LGBP machinery and the shallow nature of the peat.

#### 8.4.3.3.2 Removal of the Grid Connection Polesets (Deep Peat Area)

One of the poleset locations (AM38) was accessed during construction by the use of a temporary floating road constructed from felled trees, and by the use of LGBP wide tracked excavators and similar methods will be used in the decommissioning of the OHL. This will result in a live load on the peat surface during the decommissioning of these particular pole sets. The effect of the additional traffic

loading is assessed as **Medium to Low.** The potential significance of this effect in terms of site stability is **Slight**, due to the use of a floating road and LGBP machinery, along with the low slope angles recorded at this location.

#### 8.4.3.3.3 *Removal of the Grid Connection Polesets (All Other Areas)*

The majority of the polesets and masts will be removed using existing Coillte access tracks, and the effect of this works is assessed as **Negligible** in terms of site stability. The potential significance of these works is **Not Significant** due to the works being undertaken using existing track and no loading of the in-situ peat.

#### 8.4.3.3.4 *Demolition of the Agannygal Substation*

Decommissioning of the Agannygal Substation will involve the removal of all substation equipment and buildings from the substation site. This work will be undertaken from the existing granular fill platform at the substation and the existing Coillte access track will be used to access the substation and to remove the equipment. The effect of these works is assessed as **Negligible** in terms of site stability. The potential significance of these works is **Not Significant**, as there is no peat present within the footprint of the substation.

*Table 8-6 Impact Assessment on Soils, Geology and Land Use (Decommissioning)*

| Activity/Item | Characteristic of Primary Effect of Site Activties | | | | Impact Assessment - Soils, Geology and Land | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Nature of Primary Effect | Extent of Activity | Duration | Frequency | Quality of Effect | Probability of Occurrence (Effect) | Impact of Primary Effect on Soils, Geology and Land | Sensitivity of Receiving Soils, Geology and Land | Significance of Effect |
| **Forestry - Felling of Regrowth** | Loading from low ground pressure machinery on peat slopes, removal of trees - change of habitat, compression of peat, disturbance of peat surface | Along the OHL route | Temporary | Once | Slight Adverse | Possible | Low | Medium | Slight |
| **Demolition and removal of Agannygal Substation** | Removal of substaion equipment on building, excavation of foundations, removal of stone platform | At substation location only | Temporary | Once | Slight Adverse | Possible | Low | Medium | Not Significant |
| **Removal of polesets & masts for 110kV line (deep peat area)** | Loading from low ground pressure machinery on peat slope, compression of peat, disturbance of peat surface | At AM38 only | Brief | Once | Adverse | Possible | Medium to Low | Medium | Slight |
| **Removal of polesets & masts for 110kV line** | Loading from machinery on competent ground, disturbance of ground when removing polesets | Along the OHL route | Temporary | Once | Adverse | Possible | Low | Medium | Not Significant |

*Table 8-7 Assessment of Stability Impacts – Prospective Development*

| Activity | Characteristics of Primary Effect of Site Activties with respect to Site Stability | | | | Assessment of Site Stability Impacts on Soils, Geology & Land | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nature of Primary Effect | Extent of Primary Effect | Duration | Frequency | Quality of Effect | Possible Extent of a Peat Failure | Probability of Occurrence (Peat Failure) | Impact on Receiving Environment | Sensitivity of Receiving Soils, Geology & Land | Significance of Effect |
| **Forestry - Felling of Regrowth** | Low ground pressure machinery on peat slopes | Along the OHL route | Temporary | Once | Slight Adverse | Small ($100m^2$-$2,500m^2$) | Negligible to Low | Low | Medium | Slight |
| **Demolition and removal of Agannygal Substation** | Excavation of foundations, removal of stone platform | At substation location only | Temporary | Once | Slight Adverse | Not Applicable | Negligible | Low | Medium | Not Significant |
| **Removal of polesets & masts for 110kV line (deep peat area)** | Low ground pressure machinery on peat slopes | At AM38 | Brief | Once | Adverse | Small ($100m^2$-$2,500m^2$) | Negligible to Low | Medium to Low | Medium | Slight |
| **Removal of polesets & masts for 110kV line** | Loading from machinery on competent ground | Along the OHL route | Temporary | Once | Adverse | Not Applicable | Negligible | Low | Medium | Not Significant |

## 8.4.4 Geotechnical Monitoring and Mitigation of Site Activities during Decommissioning

The site activities that are likely be carried out on the site during decommissioning of the windfarm that could have an impact on soils, geology and land with significant effects include the following:

- Dismantling the turbines, substation and anemometers and transporting the components off-site for re-use, recycling or disposal.
- Localised widening or extension of the existing floating roads, including the narrow turbary road between Turbines T31 and T45 (if required).
- Demolition and disposal of the OHL and twin polesets for the 110 kV line.

This is based on the proposed decommissioning plan for the Derrybrien Wind Farm Development Decommissioning Project, which will involve removing all the above ground elements of the turbines, substation and transmission structures. The turbine foundations and the granular hardstanding areas for the cranes, substation, site compound and anemometer masts will be left in place along with all the site access tracks, peat repository sites, borrow pits, material deposition areas, the improved drainage network and the buried network of fibre-optic, LV and SCADA cables in the peat.

The negative impacts of these site activities will be limited to:

- The live load surcharge of the large mobile cranes or the low-loader transporters carrying heavy turbine components or transformers on the floating roads.
- The additional dead and live load surcharge on the peat along the widened sections of the existing floating roads or extended hardstanding areas.
- The live load surcharge on the peat from the wide-tracked excavators and timber forwarders used to take down the transmission line and timber twin pole-sets for the 110kV OHL.

The likelihood of a peat failure occurring as a result of these impacts is considered to be **Very Low to Low**. Therefore, the effect that the impacts will have on the stability of the peat will only be **Slightly Significant**.

AGL Report No. 11-147-R04 in Appendix 8-2 outlines the measures that were taken to mitigate stability impacts of site activities during the construction stage of the Project, and during the operation and maintenance phase of the windfarm up to the end of 2022. These measures have been incorporated into the standard operating procedures for routine maintenance and repair works on the windfarm site and will continue to be applied for site activities that have a comparable impact during decommissioning (e.g. for dismantling/demolition vs assembly/construction of turbines and substation, and for construction traffic loading on floating roads and on the intact peat slopes). Therefore, none of the site activities during decommissioning will have a stability impact that will have a Significant or Moderately Significant effect on the receiving soils, geology and land.

In addition to the standard operation procedures that have already being routinely implemented on the site, the following additional mitigation measures will be implemented during decommissioning to mitigate the **Slightly Significant effects** of the stability impacts on soils, geology and land:

- The carriageway requirements for the large mobile crane that will be used to dismantle the turbines along the narrow section of turbary road between Turbines T35 and T45 and between T43 and T46 will be reviewed in advance of the works and the road will be widened, where necessary, to provide safe access to the turbines.
- Where it is necessary to widen or extend the existing floating roads then:

- Detailed design of the road improvements will be carried out by a suitably qualified geotechnical engineer.
- Additional site investigations will be carried out, where necessary, to characterise the depth and strength of the peat and the composition of the existing floating road.
- Stability analyses will be carried out in advance of the works on site in accordance to confirm that the stability of the widened road is acceptable in accordance with IS EN 1997-1: Eurocode 7 for Geotechnical Design, Part 1 – General Rules.
- The works on site will be supervised by a suitably qualified geotechnical engineer on behalf of Gort Windfarms Ltd.

- The size, weight and axle load of the large mobile crane that is used to dismantle the turbines shall not exceed the design load for the floating roads (i.e. the 300 tonne Grove GMK6300 all-terrain mobile crane with a travelling weight of 72 tonnes on 6 axles – max 12 tonnes/axle).
- The size, weight and axle load of the low-loader transporter used to transport the transformer off the site shall not exceed the combined design load of the vehicle that was used to bring the transformer to the substation site during construction (i.e. a total combined load of 130 tonnes over 28.5m x 3.0m area with 12 axles and a maximum axle load of 12 tonnes).
- The decommissioning works will be supervised by a suitably qualified engineer from ESB Engineering and Major Projects (ESB – E&MP).
- A permit to work scheme will be implemented on the site for the works.
- The Contractors method statements will be reviewed and certified by a suitably qualified geotechnical engineer.

On completion of the decommissioning works, a Safety File will be prepared for the Prospective Development by Gort Windfarms Ltd. and handed over to the landowner to mitigate any residual impacts on soils, geology and land from the elements of the wind farm that will be left in place (the Retained Development).

Among other information, the Safety File for the wind farm will include:

- Construction records from the decommissioning works to confirm compliance with the design and specifications for the works.
- Design and as-built construction details for all the elements of the windfarm that have been left in place after decommissioning (the Retained Development), including:
  - The reinforced concrete bases for the turbines and anemometer masts.
  - All of the site access tracks including the floating roads on the peat.
  - The crane hardstanding areas adjacent to the turbines.
  - The hardstanding area for the substation and control building.
  - All of the de-energised and disconnected LV electrical cables and fibre-optic cables that are direct-buried in the peat between the turbines and in ducts below the roads.
  - The construction phase peat repository sites and material sidecast areas.
  - The construction phase borrow pits.
  - The site drainage network.
- Records of significant maintenance works that have been carried out on the retained elements of the project, including the 2014 upgrade of the floating roads and the 2017 fibre-optic upgrade of the turbine control systems.
- Reports on all the full-scale serviceability and proof load tests that have been carried out on the floating roads across the site, which includes the design criteria for the maximum axle loads and live load surcharges from the mobile cranes that govern the capacity of the roads.

- Records of all the site investigation works and in-situ tests that were carried out for the project during construction and over the operational and maintenance phase of the project.
- Results of stability analyses that have been carried out for the floating roads and peat repository sites.
- Geotechnical stability report for the wind farm site including the Peat Stability Risk Assessment (PSRA) for the site and design/construction mitigation measures that have been implemented to mitigate the risk of peat instability for the wind farm activities.
- Peat Stability Risk Assessment for the turbary area on the east side of the site, including mitigation measures that have been recommended to manage the risk of peat instability due to mechanical peat harvesting in that part of the site.

The Safety File will provide the landowner with all relevant information necessary to make informed decisions on the maintenance and safe use of the Retained Development post-decommissioning.

## 8.4.5 Potential Cumulative Impacts

### 8.4.5.1 Introduction

This section addresses potential cumulative impacts on Soils, Geology and Land in the project area related to the following activities which are not related to the decommissioning of the wind farm:

- Forestry activities in the adjacent coniferous forestry plantations.
- Peat extraction outside the project area.
- Peat extraction from turbary plots within and immediately adjacent to the wind farm site.

### 8.4.5.2 Cumulative Impacts with Retained Development

There will be no cumulative impacts associated with the Prospective Development in combination with the Retained Development beyond those discussed in detail in Section 8.4.6 of this EIAR.

### 8.4.5.3 Cumulative Impacts from Adjacent Coniferous Forestry Plantations (Not Part of Prospective Development)

This section assesses the potential cumulative impact of forestry operations on lands adjacent to the Prospective Development area. The majority of these are owned and operated by Coillte. According to their records forestry represents over 50% of land use within the river sub-catchment areas within which the wind farm site is located.

Figure 8-7 shows the Ordnance Survey of Ireland (OSI) 1:50,000 Discovery Series topographical map of the area around the wind farm site with the forestry plantations superimposed on the quaternary geology map from the Geological Survey of Ireland (GSI). This indicates that many of the forests around Derrybrien Wind Farm are located on the upland blanket bog. On the lower slopes to the west and east the blanket bog is absent and some of the forests are on the glacial till subsoil.

The forests in the area were mainly planted in the 1960s and 1970s. Therefore, most of the drainage, access tracks and site infrastructure required for the planting and management of the forests was in place prior to the construction of the Derrybrien Wind Farm. The extent of forestry has not changed significantly since the wind farm was constructed. However, due to its age profile, much of the forestry has recently required felling and replanting as part of the normal life-cycle of such commercial operations. For example, between 2016 and 2018 a total of 275ha of forestry was earmarked for felling on Coillte land within the catchments in which Derrybrien Wind Farm is located, although the actual date of felling is not known. It is likely that felling and replanting of the forests in the project area will continue and could occur during the decommissioning of the wind farm development. Previously, some of the felled timber was temporarily stockpiled on the wind farm site for transport off-site via the site road network. However, this will not be carried out during the decommissioning of the wind farm.

Coillte have extensive experience with management, felling and planting of conifer trees in these conditions. Assuming that the work will be carried out by experienced contractors using standard harvesting equipment and forwarders, as on the Derrybrien Wind Farm, then the direct impact that this will have on the degraded blanket bog in the area will be **Very Low**, which is of **Slight Significance**.

All of the drainage, tree felling and planting on adjacent forestry plantations has been and will be carried out outside the site of the Derrybrien Wind Farm and downslope or topographically remote from the site (i.e. in different river sub-catchments, or on different slopes within the same river sub-catchment). Furthermore, all the forestry along the Grid Connection route, at the site of the Agannygal Substation and in the areas of the Peat Slide and Response Works were cleared for the Project during construction and not replanted. Therefore, the impact of the site activities for the forestry on the

adjacent plantations will not give rise to any significant cumulative direct or stability impacts on the receiving soils, geology and land in the Prospective Development area.

If timber felled from the adjacent plantations is transported up to the Derrybrien Wind Farm site and stockpiled on the peat during decommissioning, then this could result in occasional short-term localised surcharge loads up to about 15.0kN/m$^2$ on the peat adjacent to the floating roads at the stockpile locations. The effect of the live load surcharge from the forestry equipment and temporary timber stockpiles on the stability of the peat should be **Medium to Low**, which is of **Slight Significance**. Nevertheless, the prohibition on timber stockpiling on the site should be maintained up to and during decommissioning so that it does not lead to a significant cumulative stability impact on the wind farm site.

### 8.4.5.4 Cumulative Impacts from Peat Extraction outside the Prospective Development Site

Figure 4.6 in Chapter 4 shows the extent of habitat identified as "cutover bog" by the National Parks and Wildlife Service (NPWS) Hen Harrier mapping project for the Slieve Aughty Mountains SPA. This category identifies areas where part of the original mass of peat has been removed through turf cutting or other forms of peat extraction. No peat extraction activities subject to a development consent have been identified in the vicinity of the Prospective Development. Therefore, the extent of cutover bog identified by the NPWS has been used as an indication of the extent of turbary turf cutting in the Prospective Development area.

Turf cutting has likely been carried out and will continue to be carried out in many of these areas under turbary rights. This typically involves small scale seasonal peat extraction or turf cutting by individuals for personal use as fuel. It does not involve large scale intensive commercial mechanical peat harvesting. Historically turbary turf cutting in turbary plots has been carried out by hand using traditional peat spades or slanes. More recently, in some areas, where possible, the peat has been extracted by mechanical means using saw cutting machines, hydraulic excavators and hoppers to excavate the peat and extrude it into peat sods. Where turf cutting has been carried out on blanket bog a network of drains has normally been developed along the boundaries between turbary plots to drain and dry out the peat. It is likely that most of the areas of cutover bog identified on Figure 4.6 in Chapter 4 were existing prior to the construction of the Derrybrien Wind Farm.

The cumulative impact of the turbary turf cutting on the Derrybrien Wind Farm site is assessed in Section 8.4.5.5. With the exception of the turbary plots just outside the site boundary at the east end of the wind farm, (which are also addressed in Section 8.4.5.5), all of the areas of cutover bog outside the site that are shown on Figure 4.6 in Chapter 4 are remote to the site and separated from it by conifer plantations. Therefore, the site activities related to the turf cutting will not give rise to significant cumulative direct or stability impacts on the receiving soils, geology and land in the Prospective Development area during decommissioning.

### 8.4.5.5 Cumulative Impacts from Mechanical Peat Harvesting in Turbary Plots Within and Immediately Adjacent to the Wind Farm Site

#### 8.4.5.5.1 *Baseline Conditions*

Figure 8-33 shows the extent and layout of the turbary plots at the east end of the wind farm. There are a total of 136 No. plots. 114 of these are within the wind farm site boundary. The remaining 22 No. (#41-45, #178-180, #219-221, #223A, #223B, #224-232) are just outside the site at the east end of the wind farm.

26 No. of the plots (#182-207) have been used by Coillte for commercial forestry. The majority of the conifer trees that had been planted in this area were felled in 2004/2005, during construction of the wind farm, and were not subsequently re-planted. Some small trees have re-grown naturally in the area since construction was completed. However, the turbary plots have not and will not be used for peat extraction up to or during decommissioning of the wind farm.

The remaining turbary plots in this area have been used for low-volume seasonal peat extraction (turf cutting) for individual use as fuel. There has been no high-volume intensive commercial mechanical peat harvesting in the area.

The baseline conditions on the wind farm site, which includes the turbary area, are summarised in Section 8.3. Prior to construction of the wind farm, peat had been historically extracted from a significant number of the turbary plots. An extensive network of drains had been developed along the north-south boundaries between the turbary plots, and east-west collector drains had been constructed to link these to the main watercourses at this end of the wind farm site. The network of pre-existing drains in the turbary area is shown on Figure 8-17 along with those that were constructed for the wind farm. The existing access tracks on the site are identified on the aerial photograph from 2020 in Figure 8-4.

The majority of these are floating roads on the peat. The narrow track along the centre of the turbary area between plots 141 and 180 was in place prior to the construction of the windfarm along with a short spur down to plots 232 and 223A in the southeast corner of the turbary area. These tracks were partially upgraded with additional capping and geogrid reinforcement during the construction of the wind farm in 2004/2005.

As described in Section 8.3.7, based on the relatively Low ecological importance of the degraded blanket bog in the turbary areas the sensitivity of the receiving environment for the assessment of direct and stability impacts related to the mechanical peat harvesting could be characterised as **Medium to Low**. However, when combined with the additional environmental value of the peat as a carbon store and the relatively low commercial value of the land, this is sufficient to raise the combined level of sensitivity of the peat to **Medium**. This would also apply to land that could potentially be impacted by a peat slide in this area.

#### 8.4.5.5.2 *Turbary Activities – Peat Extraction*

There are no complete comprehensive records of the peat extraction that has been carried out in this area. However, based on consultations with the wind farm manager for Gort Windfarms Ltd., a local peat cutting contractor and some of the turbary plot holders it is understood that:

- Up until 2012 the extent of turf cutting carried out mechanically in the area is not known. However, the level of peat extraction was low and turf cutting was carried out by hand on a number of plots, normally in late Spring/early Summer.
- Since 2012 a local peat cutting contractor has been retained by some of the plot owners to mechanically cut turf so there has been an increase in the number of plots where mechanical peat harvesting has been carried out. The contractor has worked in 34 No. of the turbary plots as follows: 6, 7, 9, 10, 15, 24, 27-29, 31-35, 39, 40, 42-44, 142, 143, 155, 159-162, 219-221, 228-232. These are identified on the aerial photograph in Figure 8-34. Figure 8-35 identifies typical evidence of recent peat extraction that was evident in April 2020.
- The mechanical peat harvesting was carried out by the contractor with a wide track low ground bearing pressure hydraulic excavator and a Difco Bogmiser hopper, which is shown in Plate 8-1. It is a specialised track-mounted self-propelled diesel-powered machine for mechanical peat harvesting that has a rear-mounted hopper and auger system to hold, compress, extrude and cut the peat into sods of turf. The peat below the vegetated surface layer is first loaded into the hopper by a hydraulic

excavator that excavates the peat from the active bank or trench excavation. When fully-loaded, the hopper is then driven away from the excavation area and the peat is extruded in 8 No. continuous rows of turf sods 100mm x 90mm in cross-sectional area over an 80m long strip on the surface of the peat in the turbary plot to allow it to dry. Subsequent loads are laid out in parallel strips across the turbary area. They are left to air-dry over a number of weeks before being bagged and collected for transport off site.



*Plate 8-1 – Difco Bogmiser Peat Hopper extruding rows of peat sods*

- When the hopper is fully loaded with peat it weighs on the order of 32 tonnes (≈315 kN). The hopper is fitted with low ground bearing pressure wide-tracks to spread the load out on the surface of the peat. Each track is 1.5m wide x 6.0m long so that, when the hopper is fully-loaded the bearing pressure under the tracks is on the order of 17.5 kN/m$^2$. This is equivalent to the surcharge load from approximately a 1.75m thick layer of intact peat over the same area.
- The mechanical peat harvesting is typically only carried out once in each turbary plot each year, in late Spring/early Summer. The volume of peat that is extracted in each area is on the order of 50-75m$^3$, which is equivalent to 8-10 hopper loads. Each hopper load creates a single row of 8No. 80 m long strips of peat sods along the length of the turbary plot and spaced evenly out across the width of the plot.
- Peat is not extracted from all of the turbary plots each year. However, if all 34 No. of the plots operated by the peat cutting contractor were active each year, then this could involve the harvesting of up to about 2,500m$^3$ of peat.
- Mechanical peat harvesting has been carried out by saw cutting in 1 No. turbary plot between plots 20 and 30. The aerial photographs would indicate that this could have been in Plot #21 (Figure 8-35). Plate 8-2 shows a typical saw cutting device for mechanical peat harvesting. It is a specialised attachment that fits to the back of a tractor that resembles a large chainsaw. It cuts a narrow slot up to about 1.2m deep into the peat. Similar to the hopper, an auger system then compresses and extrudes the excavated peat directly into continuous rows of turf sods on the surface of the peat adjacent to the saw cut line. Again, the sods are left to air-dry over a number of weeks before being bagged and collected for transport off site. The saw cutting is normally carried out along closely-spaced parallel rows. The aerial photograph in Figure 8-35 indicates that these could be aligned north-south along the long axis of the turbary plot #21. Saw cutting is sometimes also carried out along perpendicular

lines. However, this is not reflected in the marks on the peat and the narrow plot would make saw cutting less efficient across the width of the plot.




*Plate 8-2 Typical saw cutting attachment for extracting peat*

- Traditionally peat harvesting would have been carried out in the turbary plots by hand using a specialised turf spade called a slane. Manual turf cutting is still carried out in a small number of turbary plots in the area, albeit on a very limited scale.
- Some minor drainage works have also been carried out in the area to clear out the main east-west drainage ditch on the south side of the central turbary road, and, recently, to improve drainage to some of the plots that have become recently active for machine cutting (see Figure 8-35).

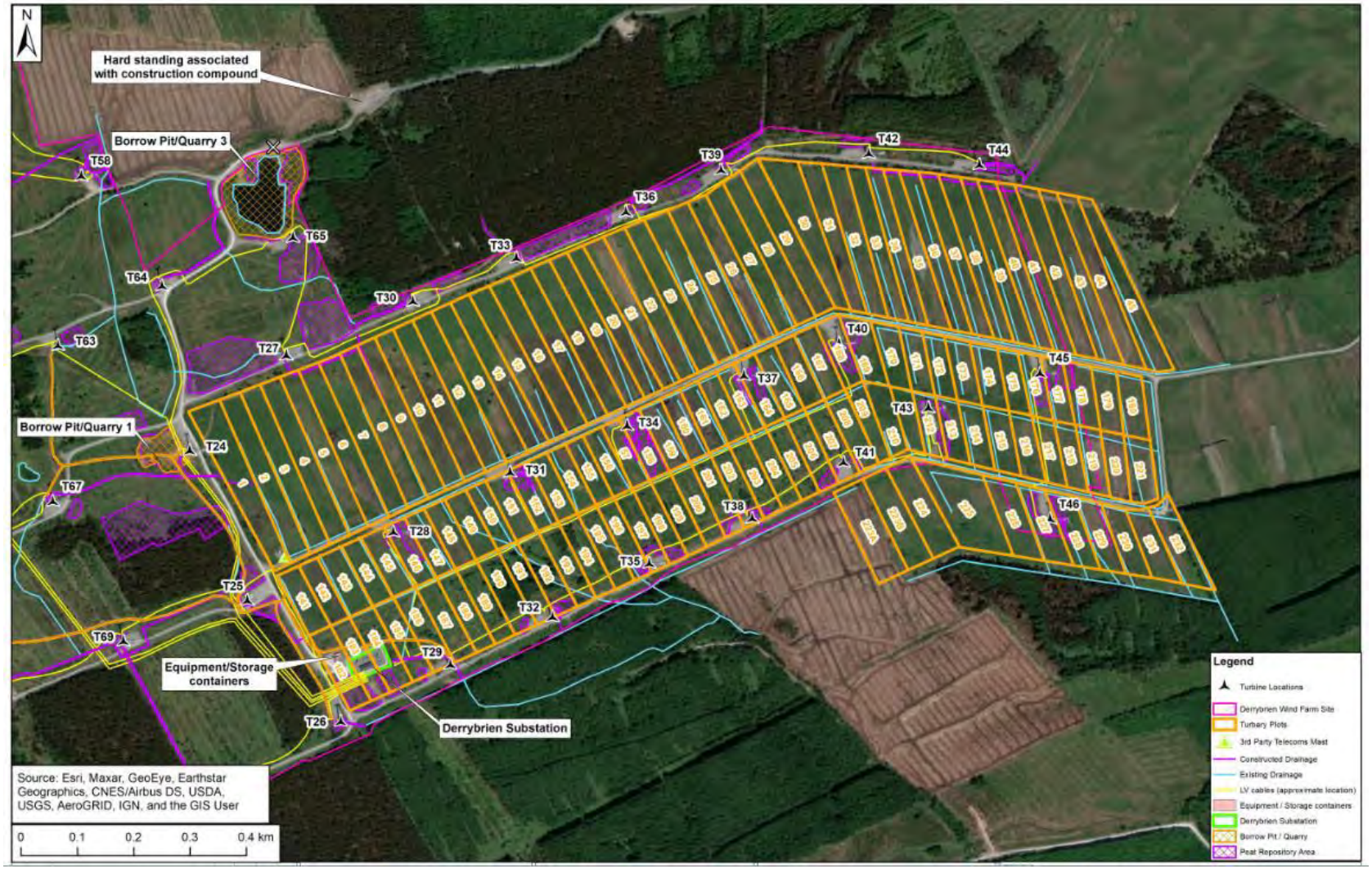



*Figure 8-33 Turbary plots at east end of wind farm site (ESBI Drawing No. QS-000280-01-0460-011-020-000)*

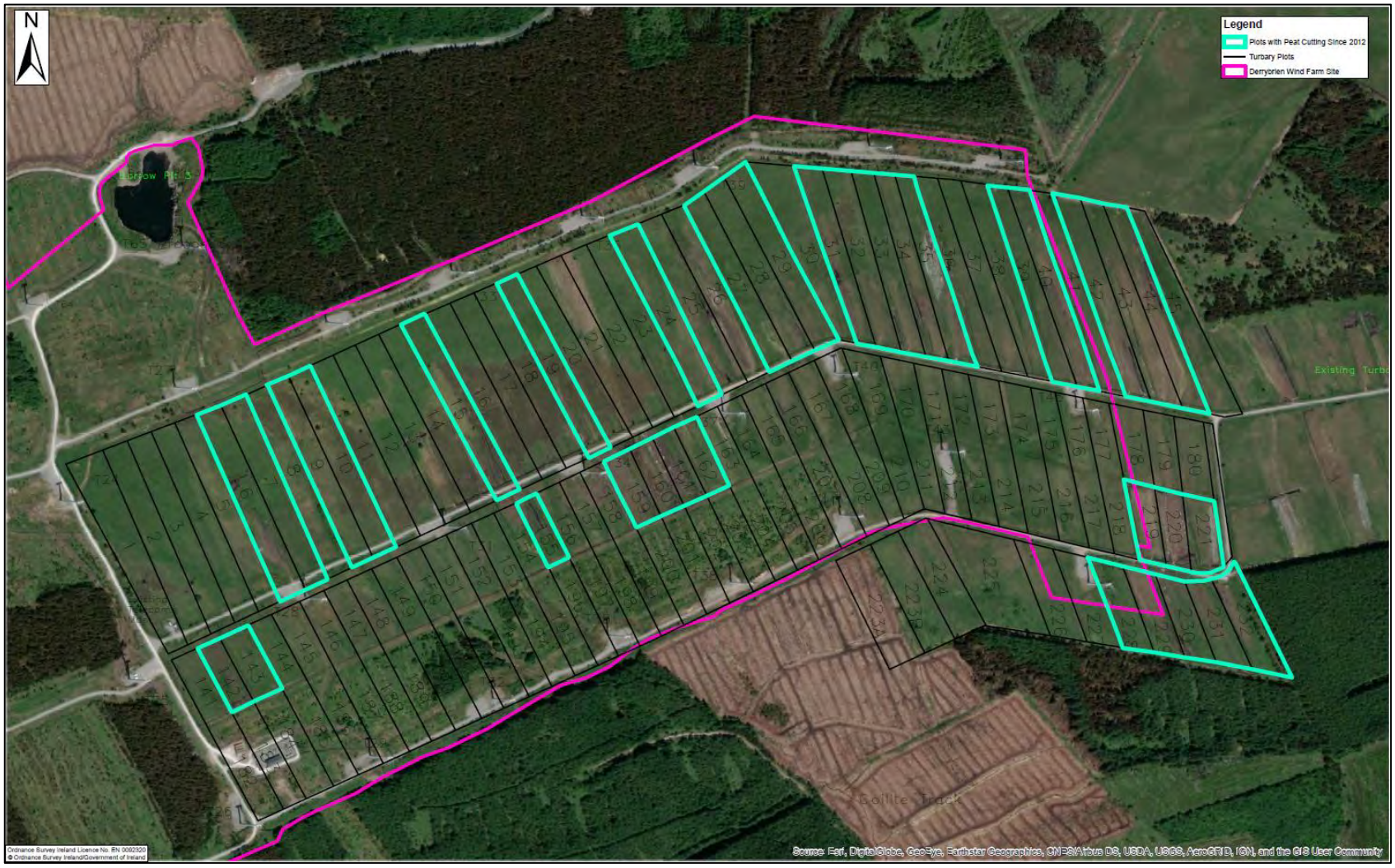



*Figure 8-34 Turbary plots where mechanical peat harvesting has been carried out by a local contractor since 2012*

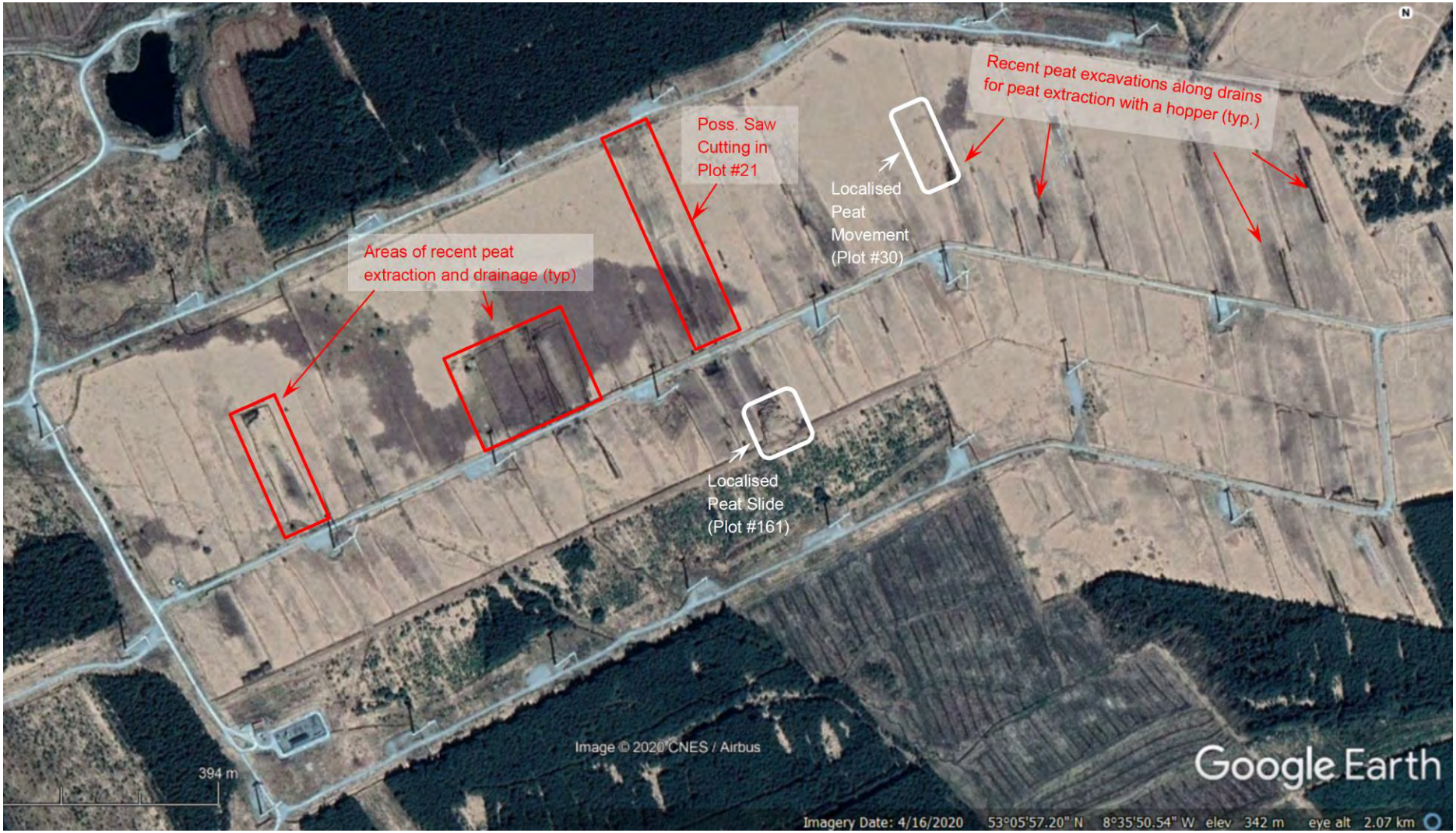



*Figure 8-35 2020 Aerial photo of turbary plots illustrating recent peat extraction activity & areas of local peat instability*

#### 8.4.5.5.3 Cumulative Direct Impacts of Mechanical Peat Harvesting from the Turbary Plots

The direct impacts of site activities related to mechanical peat harvesting from the turbary plots on the receiving soils, geology and land on the wind farm site are:

- The damage to the peat habitat from the peat excavation and from the machinery tracking over the surface of the bog.
- Groundwater lowering due to drainage.

Although these activities are not related to the wind farm project, they have been carried out within and immediately adjacent to the wind farm site and could be carried out during decommissioning of the wind farm. Therefore, the cumulative impact on soils, geology and land in the project area has been assessed.

The turbary plots, drainage network and turbary access roads were pre-existing on the site prior to the construction of the wind farm. Therefore, as described in Section 8.4.5.5.1, the baseline sensitivity of the degraded blanket bog habitat in the area is **Medium**.

Tracking across the surface of the peat damages the surface vegetation. The peat that is excavated from the site is used for fuel so there is a corresponding loss in stored carbon as $CO_2$. However, the volume of annual mechanical peat harvesting is low, probably less than 2,500$m^3$ per annum. Therefore, the effect that this has on the peat is **Low** and only **Slightly Significant.**

As described in Section 8.4.2.2, the decommissioning work for the wind farm will be limited to removing the above ground elements of the wind farm. There will be no excavations required other than trimming of peat banks, where necessary, along the edges of the existing floating roads where localised widening works are required, which will not have any significant impact on the peat. Therefore, if mechanical peat harvesting is carried out during decommissioning the cumulative effect on the peat will be **Low** and only **Slightly Significant** due to the low volumes of peat involved.

The electronic piezometers that were installed in the turbary plot downslope from Turbine T34 during construction of the wind farm indicate that the average groundwater level recorded in the peat was gradually lowered by about 0.75m over the monitoring period between December 2005 and November 2011, before monitoring was discontinued. The piezometers indicated that the rate of groundwater lowering had significantly reduced by 2011 and no significant works were carried out on the drainage system since then. Therefore, any further groundwater lowering since that time is expected to be minimal.

Long term drawdown of the groundwater table will have increased rate of decomposition of the peat in the partially saturated aerobic conditions above the water table. The effect that this has on the peat relative to the pre-existing condition prior to the construction of the windfarm is **Low**, which is **Slightly Significant**.

The impact is **long-term** and **sustained**. Therefore, it will occur as an impact during and after decommissioning of the wind farm with a similar effect relative to the current baseline condition. However, only minor improvements were carried out to the drainage networks for the turbary areas during the construction and operational phases of the wind farm. Therefore, it is considered that the groundwater lowering was largely due to the improved drainage for the wind farm - combined with the network of pre-existing drains in the turbary area.

No further drainage improvements are anticipated in the turbary area to facilitate peat extraction during the Prospective Development. Therefore, there will be **no significant cumulative effects** on the peat as a result of groundwater lowering due to drainage in the turbary area of the wind farm site.

### 8.4.5.5.4 Baseline Peat Stability Risk Assessment for Mechanical Peat Harvesting in the Turbary Area and the Interpreted Likelihood of a Peat Slide prior to Mitigation

A baseline peat stability risk assessment (PSRA) has been carried out for mechanical part harvesting in the turbary plots to assess the likelihood of a peat slide in each plot ***prior to mitigation*** based on site characteristics related to the peat/subsoil conditions, topography, hydrology, infinite slope factor of safety calculations, and other factors that are known contributory factors for peat instability including the methods of mechanical peat harvesting that have been carried out on the site since 2012, and evidence of pre-existing peat instability in the area.

The136 No. turbary plots on the site are numbered as follows, as shown on Figure 8-36:

- 1-45.
- 144-180.
- 182-221.
- 223A, 223B and 224-232.

Plots 1-45 are relatively long and almost double the size of the other turbary plots on the site. Therefore, for this assessment they have been split up into two zones (north and south) that are of comparable area to the other turbary plots, as shown on Figure 8-36.

The results of the PSRA are presented in AGL Report No. 11-147-R06 - "Peat Stability Risk Assessment (PSRA) for Mechanical Peat Harvesting in Turbary Plots at East End of Wind Farm Site", which is included in Appendix 8-4 of this chapter.

The PSRA has been carried out in accordance with the methodology described in Section 0. However, to get better definition of where there is a higher risk of peat instability in the turbary areas, additional intermediate categories of Likelihood (L) have been added at L=3.5 and L=4.5 based on the interpreted hazard rating for the site characteristics as shown on Table 8-8.

*Table 8-8 Total Hazard Rating and Likelihood (L) of a Peat Slide for Turbary Plots on Derrybrien Wind Farm site*

| Total Hazard Rating | Likelihood (L) | | Probability of Occurrence (Event/km.yr) |
|---|---|---|---|
| **0** | **0.0** | Not Applicable (<0.5 m Peat) | <1/100,000 |
| **0-19** | **1.0** | Negligible | 1/100,000 to 1/10,000 |
| **20-39** | **2.0** | Low | 1/10,000 to 1/1,000 |
| **40-59** | **3.0** | Possible | 1/1,000 to 1/500 |
| **60-69 [Added]** | **3.5** | Possible to Very Possible | 1/500 to 1/100 |
| **70-79** | **4.0** | Very Possible | 1/100 to 1/50 |
| **80-89 [Added]** | **4.5** | Very Possible to Likely | 1/50 to 1/10 |
| **90-100** | **5.0** | Likely | >1/10 |

The results of the baseline PSRA for the site activities related to peat extraction and turf cutting in the turbary areas on and adjacent to the wind farm site *prior to implementing appropriate mitigation measures* are shown on Figure 8-36.

This is representative of the baseline site characteristics within the turbary plots for the methods of mechanical peat harvesting that have recently been carried out on the site, particularly since 2012. It has been assumed that the activities have not been restricted to the turbary plots where mechanical peat harvesting has been undertaken previously. Consideration has also been given to the areas where saw cutting is likely to have been carried out based on the available information.

The results show that there are significant areas of the turbary plots where the likelihood of a peat failure for mechanical part harvesting without appropriate mitigation measures could be Very Possible to Likely (L=4.0 to 5.0). These zones are in areas where there are compounding risk factors in relation to peat instability, including, for example:

- The zone of deep weak peat (3-6m deep) along the subsurface drainage channel between Turbines T27 and T35 where there is a convex break in slope at the head of the watercourse that flows off site to the south of T35 (Plots #7-13, #148-154; #191-195).
- The zone of deep weak peat upslope from the central turbary road between T28 and T37 where there are indications of subsurface seepage in the peat to the convex breaking slope downslope from the road (Plots #14-22).
- The plots on the convex breaking slope downslope from the central turbary road in the zone of deep peat between Turbines T28 and T37, where there are indications of subsurface seepage in the peat (Plots #155-164, #197-204) and low Factors of Safety (FoS) for slope stability.
- Along the watercourse channel in the peat at the west end of the turbary areas between Turbines T24 and T29 (Plots #1-5, #147 & #191).
- The area of relatively deep peat (2-3m) with the convex breaking slope at the southeast corner of the wind farm (Plots #219-221 & #229-232).
- Various plots at the east end of the site where there is locally a convex breaking slope in relatively deep peat (2-4m) and locally low FoS for slope stability (e.g. Plots #30-36, between #168 & 176, and #213-214).

In the remaining turbary plots across the site the Likelihood of a peat slide for mechanical part harvesting prior to mitigation measures would be characterised as Possible to Very Possible (L=3.5). These are in areas where there are mitigating conditions that reduce the baseline risk of peat instability. For example:

- Areas of shallow (<1.0 m) or relatively shallow (1-2 m) peat.
- Areas of gently sloping ground (<3˚) set well back from any convex break in slope where the slope angles increases to >5˚.
- Areas of relatively high infinite slope Factor of Safety (FoS >1.5).
- Zones where there is well-developed drainage, and which are not directly upslope from the rivers and streams outside the wind farm site.

The risk of a peat failure in the turbary plots could range from localised shear failure of an unsupported peat face in an open excavation or small-scale peat slide confined within a turbary plot, to the worst-case scenario of a large or very large-scale peat slide along existing drainage channels similar to the slide that occurred at the site in October 2003, during the construction of the wind farm.

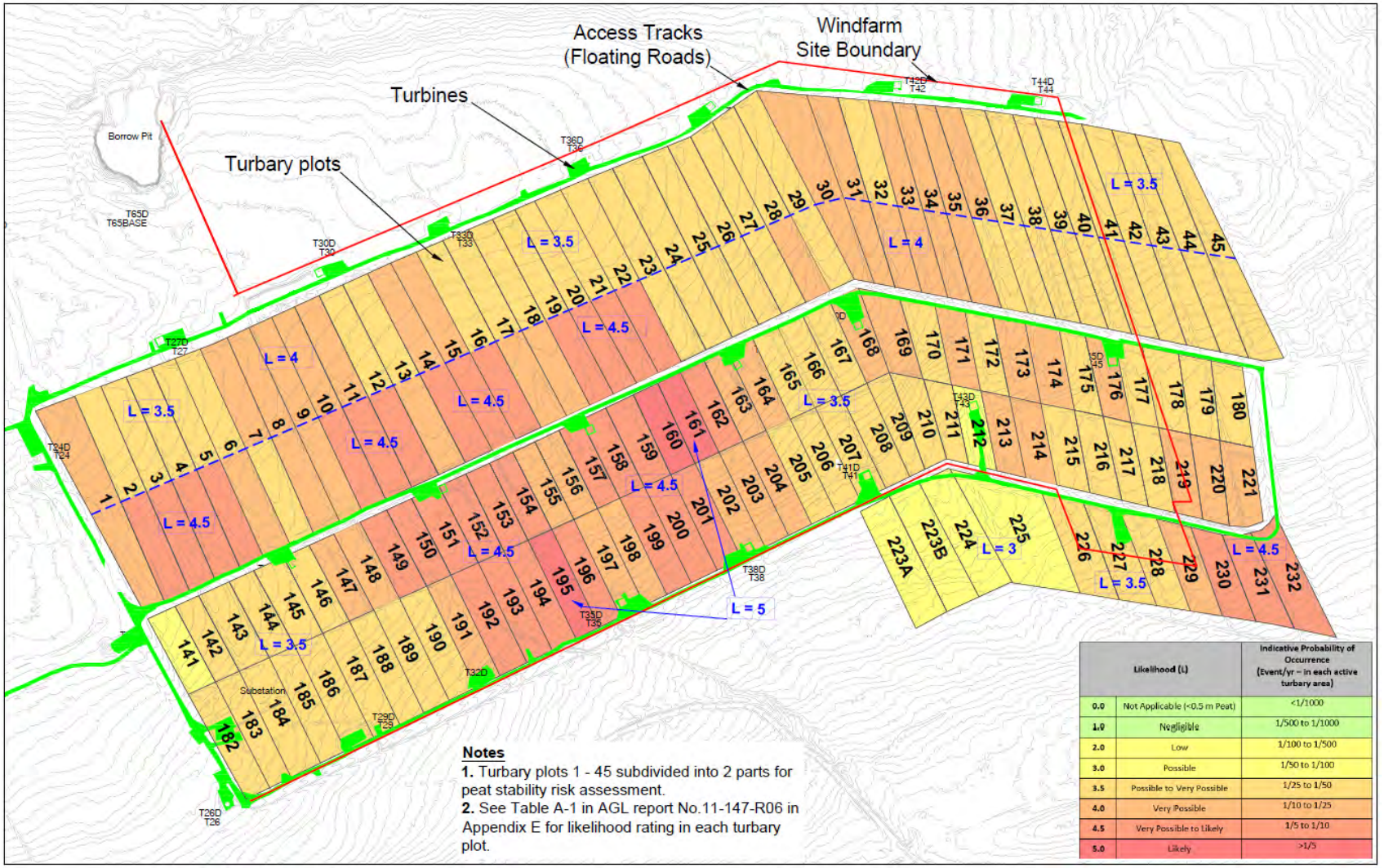



*Figure 8-36 Likelihood of a peat failure due to mechanical peat harvesting in the turbary plots prior to mitigation*

### 8.4.5.5.5 Mechanical Peat Harvesting in Turbary Plots On Wind Farm Site – Assessment of Stability Impacts Prior to Mitigation

The impacts of site activities related to mechanical part harvesting in the turbary plots that can have an effect on the stability of the peat are:

- The live load surcharge from the mechanical peat harvesting equipment operating directly on the surface of the peat.
- Damage to the integrity of the peat mass from mechanical excavation or by saw cutting.
- Removal of support to peat faces by bulk excavation for mechanical peat harvesting, or along drainage trenches.

The primary *effect* of the live load surcharge is the increase in shear stress in the underlying peat, which increases the risk of a peat failure, potentially triggering a peat slide on sloping ground where the magnitude of loading is such that the downslope shear stresses exceed the strength of the peat.

Saw cutting and mechanical excavation can also effect the integrity and stability of the peat by creating lines of weakness where vegetative fibres in the upper fibrous acrotelm layer are severed along saw cut lines, open drains or trench excavations, or by increasing the shear stresses in peat directly adjacent to or upslope from an unsupported open excavation, particularly where the slope has been undermined along an exposed peat bank at the downslope end of a turbary plot.

Saw cutting and mechanical excavation can also disrupt the existing pattern of surface water drainage in the turbary area, allowing water to infiltrate down into the lower peat layers which can lead to an increase in water content, swelling and reduction in shear strength.

As discussed in Section 8.3.9.1, drainage on the site has had and will continue to have a long-term sustained positive impact on the peat with respect to site stability. However minimal drainage improvements have been carried out for the turbary plots. Therefore, it is considered that the positive stability impact of drainage in this area is primarily related to the improved drainage for the wind farm development. Any further minor drainage improvements that are carried for the turbary plots during the decommissioning of the windfarm would not have a significant positive effect on the stability of the peat relative to the current baseline condition.

As noted in Section 8.4.5.5.4, the risk of a peat failure due to mechanical peat harvesting in the turbary plots could range from localised shear failure of an unsupported peat face in an open excavation or small-scale peat slide confined within a turbary plot, to the worst-case scenario of a large or very large-scale peat slide along existing drainage channels similar to the slide that occurred at the site in October 2003, during the construction of the wind farm.

Assuming that, in the worst-case scenario, peat failure due to excessive or intensive mechanical peat harvesting in the turbary plots without appropriate mitigation measures could involve a very large-scale peat slide, which is consistent with the methodology for the assessment of stability impacts for the wind farm (see AGL Geotechnical Stability Report in Appendix 8-2), then:

- Where the likelihood of a peat failure is Very Possible to Likely (L=4.0 to 5.0) as a result of mechanical peat harvesting on the turbary plots without appropriate mitigation measures, then the effect of the stability impacts on the peat would be **High** and **Significant**.
- Where the likelihood of a peat failure is Possible to Very Possible (L=3.5), then the effect of the stability impacts on the peat would be **Medium to High** and **Moderately Significant**.

It should be noted that this is an assessment of the significance of the *effects* of the stability impacts – i.e. the increase in shear stresses under the live load surcharge of the equipment, or the effects of saw cutting or mechanical excavation on the integrity of the peat.

In this context, the significance of the effects on the peat reflects the relative risk of a peat failure being caused by the corresponding peat harvesting activity, which has been calibrated by the potential impact of a large-scale peat slide as the worst-case scenario. The methodology therefore identifies stability impacts that have significant effects whether or not a failure occurs so that appropriate design and construction mitigation measures can be implemented as preventative measures, where possible.

In reality, the interpreted likelihood of a peat failure shown on Figure 8-36 is more representative of smaller more localised peat failures, which would have a significantly lower impact on the peat. Therefore, the method of assessment is conservative.

It should also be noted that the risk of a peat failure due to mechanical peat harvesting is independent of the wind farm activities and has not been exacerbated by the development of the wind farm.

Mechanical peat harvesting is currently only being carried out in about 35 No. of the 136 No. turbary plots and not all of these are cut each year (see Figure 8-35). No peat harvesting is carried out in Plots No. 182 to 207 along the southern boundary of the site, which have been used for forestry by Coillte.

The active turbary plots are only cut seasonally once a year in late spring/early summer so the frequency of the stability impact is Occasional. Mechanical peat harvesting within any turbary plot only takes a few days. Therefore, the duration of the impact is Brief to Temporary.

#### 8.4.5.5.6 Evidence of Pre-Existing Peat Instability in the Turbary Areas

No large or very large-scale peat failures have occurred in the turbary area on or immediately adjacent to the Derrybrien Wind Farm site over the project lifetime. However, there are 2 No. areas where localised peat instability has occurred in the turbary plots during the operational phase of the wind farm, which are identified on the aerial photograph in Figure 8-35 - **Plots No. 161 and 30.**

**Plot 161:** Plate 8-3 shows an image of the peat failure that has occurred at the south (downslope) end of Turbary Plot No. 161, which is directly upslope from Turbine T38.




*Plate 8-3 Peat Failure in Turbary Plot #161 (Site Photo May 2020)*

The slide occurred as a planar slide in peat up to 2.0m deep over an area of approximately 2,500m$^2$ on the steeper lower slopes at the south end of the turbary plot. There is a convex break in slope to angles of 5.0°-7.5° at this end, compared to shallower slopes of 3.0°-4.0° on the upper half of the plot, near the central access track that runs between Turbines T34 and T37. There is also a large open drain running east-west along the southern, downslope end of the turbary plots on this side of the site.

The peat at the downslope (south) end of the turbary plot sheared along a surface at or near the base of the peat and slid downslope into the drain. The majority of the vegetated surface layer of the failed peat remained intact. There were large open water-filled tension cracks at the upslope end of the failed area. At the downslope end the drain was completely infilled and the displaced peat "buckled" and spilled over onto the surface of the peat in the firebreak that runs along the downslope side of the open drain, where the slope angle is locally flatter.

Based on historical aerial photographs from Google Earth and the OSI Geohive online portal, the peat slide appears to have initiated sometime between April 2015, when there were no tension cracks visible, and July 2018, when the tension cracks were visible in the peat and the drain on the downslope side had closed over. By May 2020 the failure had extended further upslope with a wider area of tension cracks on the upslope side. The main body of failed peat at the downslope end has also been pushed further onto the firebreak, indicating progressive downslope movement of the peat between July 2018 and May 2020. Some drainage works were carried out in 2020 to relieve ponded water in the tension cracks as a mitigation measure to prevent the slide progressing further upslope, as recommended in AGL Report No. 11-147-R06 in Appendix 8-4. The area was inspected again in January 2024 by AGL and appeared to be stable. There was no apparent significant upslope progression of the slide, or downslope movement of the peat within the failed area.

The peat slide was not caused by site activities related to the wind farm. The slope was intact up to April 2015, approximately 10 years after construction of the wind farm was completed and the slide is remote to the wind turbines and site access tracks. The trench for the electrical transmission cables along the firebreak at the south end of the turbary plot was also not impacted by the peat movement.

It is likely that the slide was caused by a combination of factors including poor or impeded drainage in the area, undercutting of the toe of the slope for the drain that runs across the downslope end of the plot, and possibly by the surcharge loads on the peat from mechanical harvesting equipment. Recent peat extraction has been limited to the zone upslope from the failed area. However, there is evidence of old machine track marks on the peat within the failed area.

**Plot 30:** Plate 8-4 shows an aerial view of the peat failure that has occurred at the centre of Turbary Plot No. 30.

The failure occurred as planar movement in peat 1.7 to 2.7m deep over an area of approximately 2,500m$^2$ along the boundary with Plot No.31 to the east. There is a local shallow convex break in slope to angles of 3.0˚-4.0˚ in the area. The peat appears to have failed upslope from an excavation for peat extraction in Plot No. 31. The peat has moved into the excavation and closed over a section of the drain along the boundary between the two turbary plots. The majority of the vegetated surface layer of the failed peat has remained intact. However, tension cracks have opened up along the edge of the failed area, within Plot No. 30.

Based on historical aerial photographs from Google Earth and the OSI Geohive online portal, there may have been some movement of the peat in this area prior to 2011. However, it appears that the main movement occurred and the tension cracks formed when peat was excavated from the open excavation along the drain for peat extraction sometime around 2018. Therefore, this is the most likely cause of the recent movement. Undercutting of the toe of the slope in the drain along the site boundary would also have contributed to the peat movement.

The area was re-inspected by AGL in January 2024 and appeared to be stable. There has been no apparent further movement of the peat and the tension cracks are not as evident because thicker vegetation has established in the area.

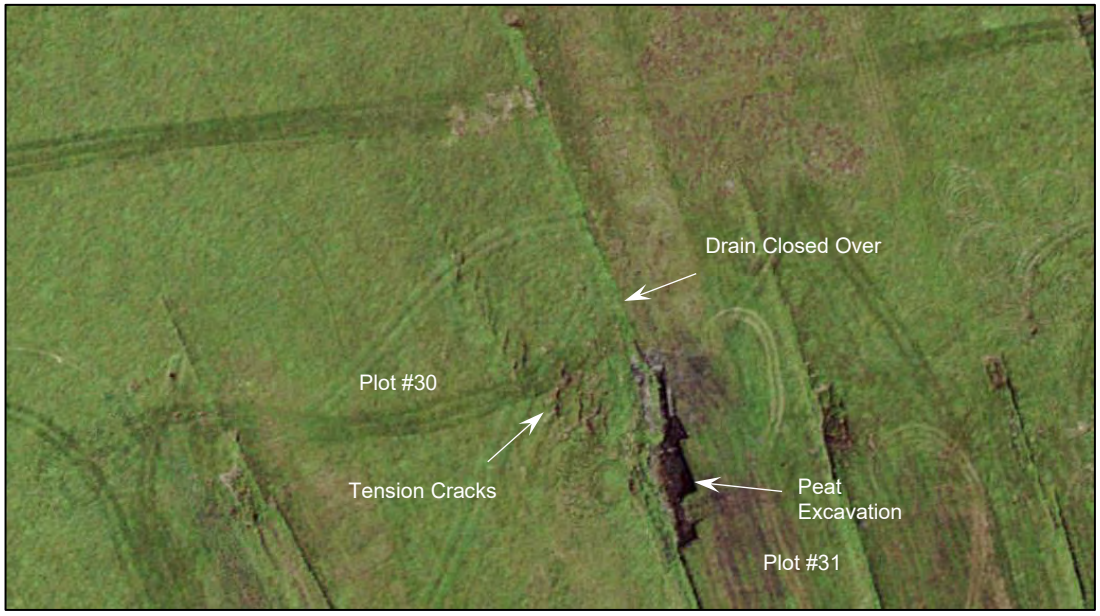



*Plate 8-4 Peat Movement in Turbary Plot #30 c2015-2018 (OSI Geohive Portal, 2020)*

Both of these peat failures involved about 5,000m$^3$ of peat over an area of about 2,500m$^2$, which are small scale peat slides (1,000-5,000m$^3$). The baseline sensitivity of the degraded blanket bog in the area has been classified as **Medium**. Therefore, the combined effect of the peat slides on the disturbed peat would be classified as **Low** and only **Slightly Significant**. As these are pre-existing peat failures they will not lead to any cumulative impacts on the peat during the decommissioning of the windfarm.

Some drainage was carried out in Turbary Plot 161 in early August 2020 to relieve ponded water in the tension cracks as a mitigation measure to prevent any further movement of the peat. The details are shown on ESB Drawing No. QS-000314-01-D476-001-001-000 which is included as Figure 8-37.

Drains were hand excavated along the sides of the failed area to relieve the ponded water trapped in the tension cracks and divert it into the large open radial drain that runs east-west along the south end of the plots through this part of the site. Plot 161 is at a watershed along the drain so that the water diverted to either side of the failed area flows away from the turbary plot to the east and west. The existing drain along the west side of the turbary plot was also cleared out up to the access road between Turbines T34 and T27 at the north end of the plot. Check dams were installed in the radial drain for erosion and sediment control. The remedial drainage works were completed by early August 2020.

20 No. survey monitoring points were also installed on the surface of the peat within and around the failed area in Turbary Plot 161. The locations of the monitoring points are shown on the ESB Drawing reproduced in Figure 8-38. Points No. 10-20 are the most relevant in and around the failed area.

The location and elevation of the monitoring points was recorded to ITM coordinates by GPS survey over an initial period of 7 months between 21st May and 22nd December 2020 (Day 0 to Day 215). Follow up sets of readings were then taken on the 23rd November 2021 and again on the 23rd November, 2023.

Some of the points were damaged over the course of the monitoring period (#5, #8, #12 and #13) and had to be reset. Point No. 14 could not be located for the final set of readings in December 2021.

Figure 8-39 shows the change in the Northing coordinate for each of the monitoring points over the survey period. A negative reading represents downslope movement of the peat to the South, which would be the main direction that the failed peat could move if the slide area was unstable. Given the remote location and the variability in the readings, the degree of accuracy of the measurements is probably on the order of **+/- 10-20mm**. The peat could also exhibit movements of this order due to seasonal changes in moisture content and groundwater level.

Monitoring point MP-14 was located on the main body of displaced peat in the failed area. Although it could not be located for the set of readings taken in December 2021, the readings that were taken over the 7-month period between May and December 2020 indicated that the movement of the peg was within the range of +/-20mm (i.e. upslope/downslope), which is within the expected range of accuracy and indicates that main body of peat in the failed area is stable.

MP-17 to MP-20 were located along the approximate line of the wind farm underground cables along the south side of the drain downslope from the turbary plots in this area. MP-18 and MP-19 are on the downslope side of the peat slide. By November 2021 MP-18 and MP-19 had moved downslope by **<5mm** and **<25mm**, respectively. Most of this movement was recorded prior to the end of June 2020, which indicates that there has been no further movement in the peat downslope from the failed area since then. The failed peat is being supported by the buttressing effect of the intact peat downslope from the turbary plot. More recently an upslope change in position was recorded between the readings taken in 2021 and 2023. This could be an error or the survey pegs may have been disturbed. Nevertheless, the movements are slight and there is no indication of any significant downslope movement at this end of the slide, which confirms that the area of failed peat is stable.

Downslope movement of **60 mm** and **120mm** has been recorded at monitoring points MP-11 and MP-15, which are located on the surface of blocks of peat between tension cracks in and around the margins of the failed area. This is consistent with the movement that could occur in these areas due to the potential for the displaced blocks of peat to move or slump downslope into the tension cracks, particularly when the ponded water was drained away. Significant eastward displacement of approximately 500mm was also recorded at MP-15, which is consistent with the location of the peg on the west side of the slide area. This is directly upslope from MP-18 where no downslope movement has

been recorded. This indicates that the movement at MP-15 is localised displacement along the margins of the failed area, which is to be expected. MP-11 has been stable since 2021.

Downslope movement of about 50mm has been recorded at monitoring point MP-16, which is on intact peat at the downslope end of Turbary Plot #159, to the west of the failed area. The aerial photo in Figure 8-37 indicates that the arterial drain at the south end of this plot could have partially closed over. This would be consistent with the movement that was recorded at MP-16 and identifies the risk of a potential peat failure in this area if any further mechanical peat extraction is carried out along the drain at the south end of the turbary plot, which could undermine the slope. MP-16 has been stable since 2011 and no downslope movement was recorded at MP-17 on the southern bank of the arterial drain, which indicates that the potential movement in the peat is localised to the upslope side of the drain.

The movements recorded at MP-1 to MP-10 and at MP-12 in 2023 were all very low and possibly within the degree of accuracy of the survey readings (i.e. ±10-15mm). Therefore, they indicate that the peat upslope from the failed area is stable, and that the peat slide has not progressed further upslope from the extent observed in Turbary Plot 161 in 2020.

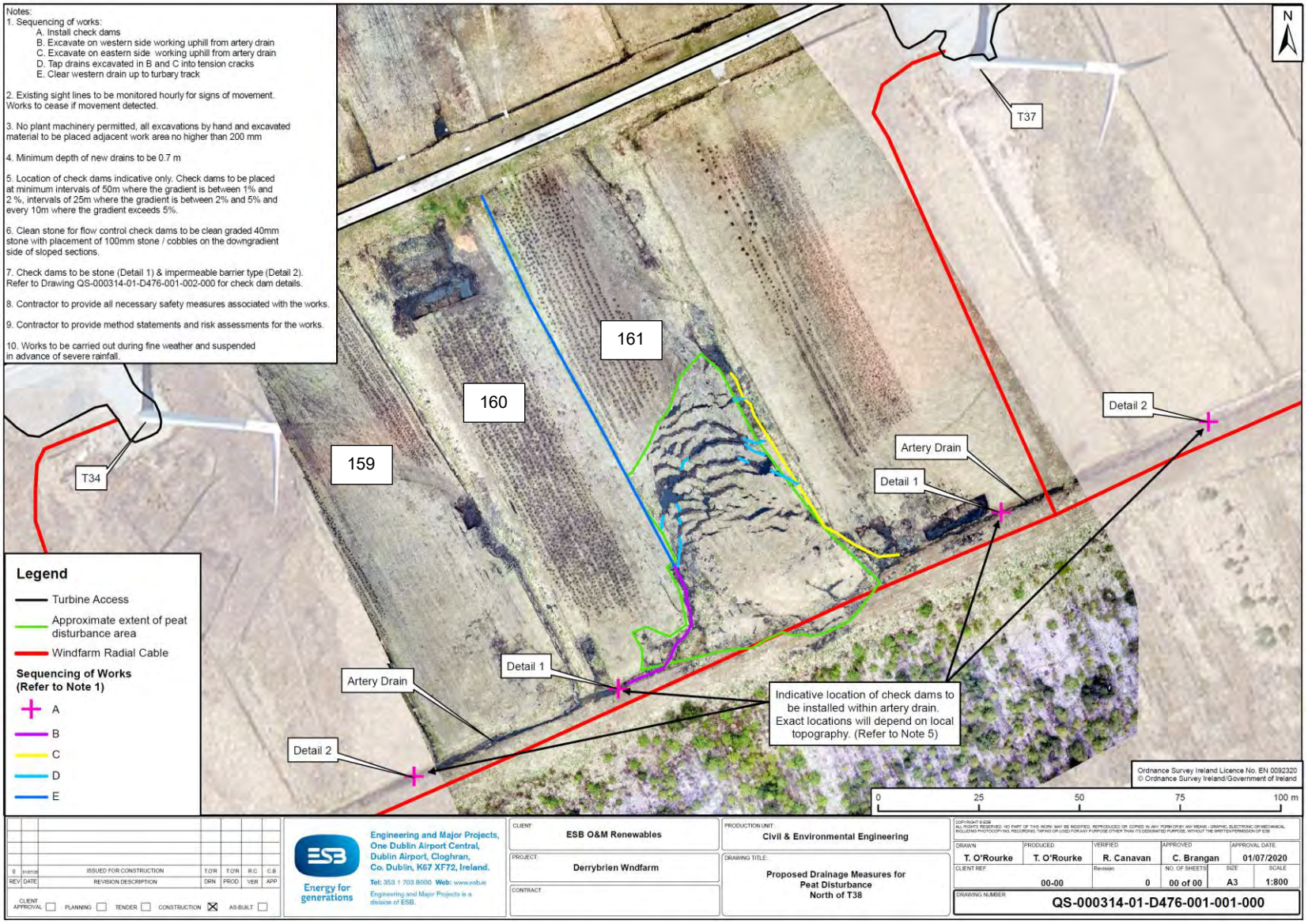



*Figure 8-37 Drainage works carried out in early August 2020 to relieve water pressures in zone of peat failure in Turbary Plot 161*




*Figure 8-38 Survey monitoring points on the surface of the peat in and around the zone of peat failure in Turbary Plot 161*

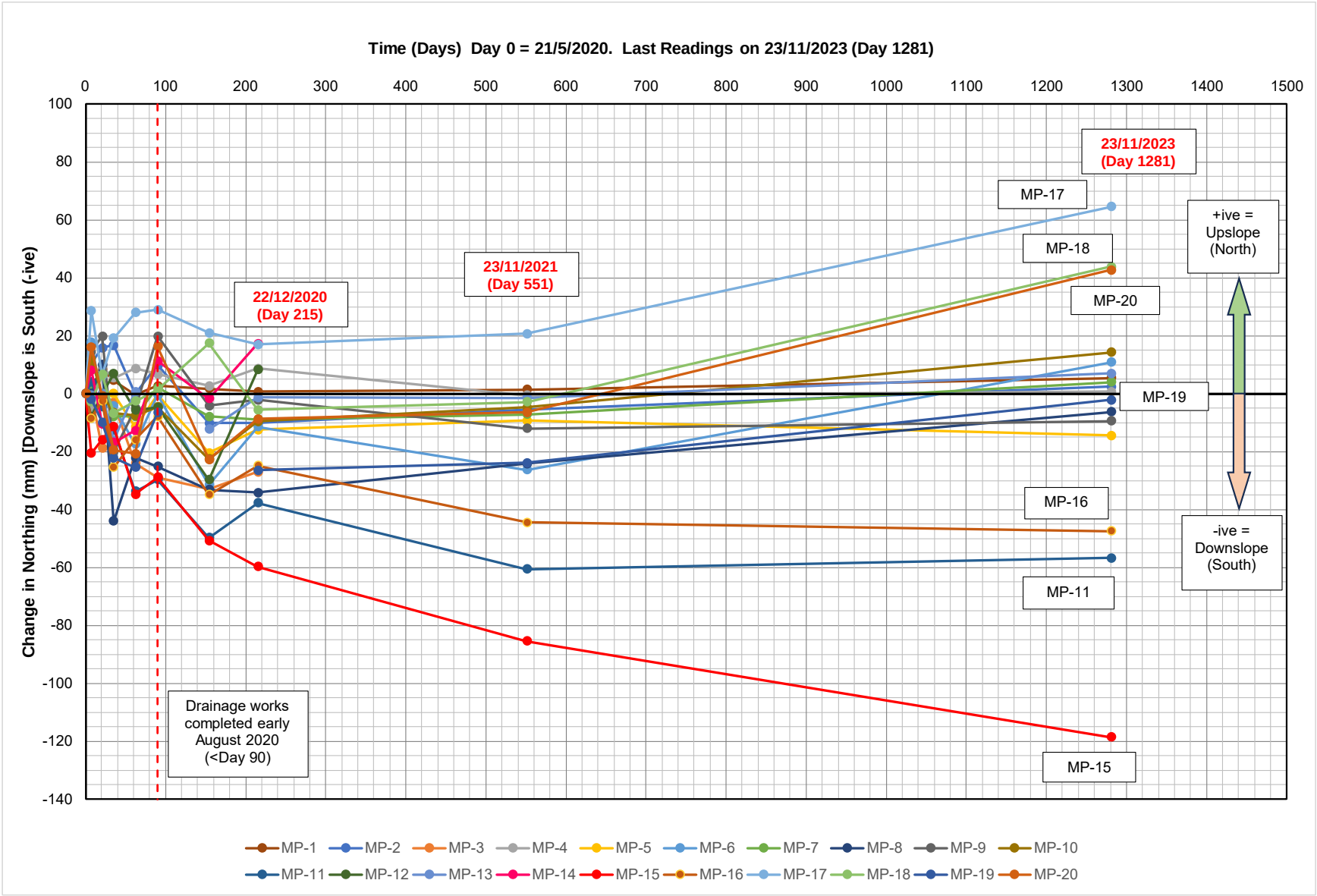



*Figure 8-39 Surveyed movement of monitoring points in zone of peat failure in Turbary Plot 161 in 2020/2021 (Day 0 = 21/5/2020)*

### 8.4.5.5.7 Mitigation Measures for Mechanical Peat Harvesting and Assessment of Stability Impacts after Mitigation

The AGL Report No. 11-147-R06 in Appendix 8-4 presents mitigation measures that, when employed by Gort Windfarms Ltd and turbary rights users for future mechanical peat harvesting in the turbary plots on and adjacent to the windfarm site, will reduce the likelihood of a peat failure and the effect of the activities on the stability of the peat in the Prospective Development area to an acceptable level during decommissioning.

The following mitigation measures have been implemented by Gort Windfarms Ltd to reduce the likelihood of a peat failure occurring during mechanical peat harvesting:

- The peat stability risk assessment and the associated mitigation measures have been shared with the turbary rights holders whose plots have been or are proposed to be harvested by mechanical means, and the turbary rights holders have been made aware of the potential site stability risks associated with mechanical peat harvesting methods in the absence of mitigation.
- Warning signs have been erected at the site by Gort Windfarms Ltd. to raise awareness of the peat stability risks associated with mechanical peat harvesting in the turbary area and to highlight the recommended mitigation measures.
- Where possible, communication has been established between the turbary plot owners, turf cutting contractors and the windfarm site manager for Gort Windfarms Ltd. to give notice of mechanical peat harvesting activities and to report any peat instability on the site.
- Gort Windfarms Ltd. have implemented the recommended remedial drainage works and survey monitoring in the failed area at the south end of Turbary Plot 161 to ensure that the peat there is stable.
- Any further maintenance that is required to maintain the existing drainage network will only be carried out during the drier months of May to September; and
- Periodic inspections of the mechanical peat harvesting are being carried out by the wind farm site manager for Gort Windfarms Ltd.

The following is a summary of the mitigation measures that are recommended in the AGL Report No. 11-147-R06 in Appendix 8-4 which specifically relate to mechanical peat harvesting in the turbary area and which are recommended to be implemented by the turbary rights holders:

- No mechanical peat harvesting should be carried out by saw cutting in any of the turbary plots.
- No mechanical peat harvesting should be carried out in the turbary plots where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Very Possible to Likely (L=4.0 to 5.0). Manual turf cutting can be carried out but should be done during the drier months between May and September.
- Where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Possible to Very Possible (L=3.0 to 3.5) the limitations recommended in Section 6.0 of AGL Report No. 11-147-R06 on the type and size of equipment that can be used for mechanical peat harvesting in the turbary plots and on the maximum level of surcharge loading on the peat should be implemented.
- The operational control measures for mechanical peat harvesting that are recommended in Section 6.0 of AGL Report No. 11-147-R06 should be implemented by the turbary plot owners and their turf cutting contractors to manage the stability of peat excavations and to prevent excessive damage to the integrity of the vegetated surface of the peat.
- No mechanical peat harvesting should be carried out in the turbary area during the Prospective Development.

Where the mitigation measures are implemented by the turbary rights holders, their agents and by Gort Windfarms Ltd. then the interpreted likelihood of a peat failure occurring as a result of mechanical peat harvesting in the turbary plots will reduce to a residual level of **Low (L=2)**, as illustrated on Figure 8-40.

The corresponding effect on the stability on the peat will be **Medium to Low**, which is of **Slight Significance**. This would also represent the residual effect of stability impacts on the peat where no mechanical peat harvesting is being carried out in the turbary areas in their existing condition.

The stability impact for mechanical peat harvesting will only occur in the turbary plots where peat extraction is likely to be carried out, which is currently about 35 No. of the 136 No. plots in the area. The active turbary plots will only be cut seasonally once a year between May and September so the frequency of the stability impact will be **Occasional**. Annual peat extraction within any turbary plot will only take a few days. Therefore, the duration of the impact will be **Brief** to **Temporary**.

#### 8.4.5.5.8 *Cumulative Stability Impacts due to Mechanical Peat Harvesting in the Turbary Plots Within and Immediately Adjacent to the Wind Farm Site*

This section discusses the cumulative stability impacts that could occur due to mechanical peat harvesting in the turbary areas within and immediately adjacent to the wind farm site during the Prospective Development.

Stability impacts directly related to the wind farm decommissioning works are assessed in Section 8.4.2.3 and the results are summarised on Table 8-4. The activities that were assessed as having significant impacts on the stability of the peat in the turbary area were limited to:

- Heavy construction traffic loading on the floating roads from the mobile cranes and low-loader transporters that will be used to dismantle the turbines, substation and anemometers and to transport the components offsite.
- Additional loading on the peat where the crane hardstanding needs to be temporarily extended (T4) or where narrow sections of the existing site access road need to be temporarily widened at the east end of the turbary area, and near Turbines T68, T14 and T1.
- Loading on the peat from the low ground bearing pressurs (LGBP) wide-tracked excavators and ATV that will be used to take down & remove timber polesets PS-1a to PS-4 for the 110kV OHL.

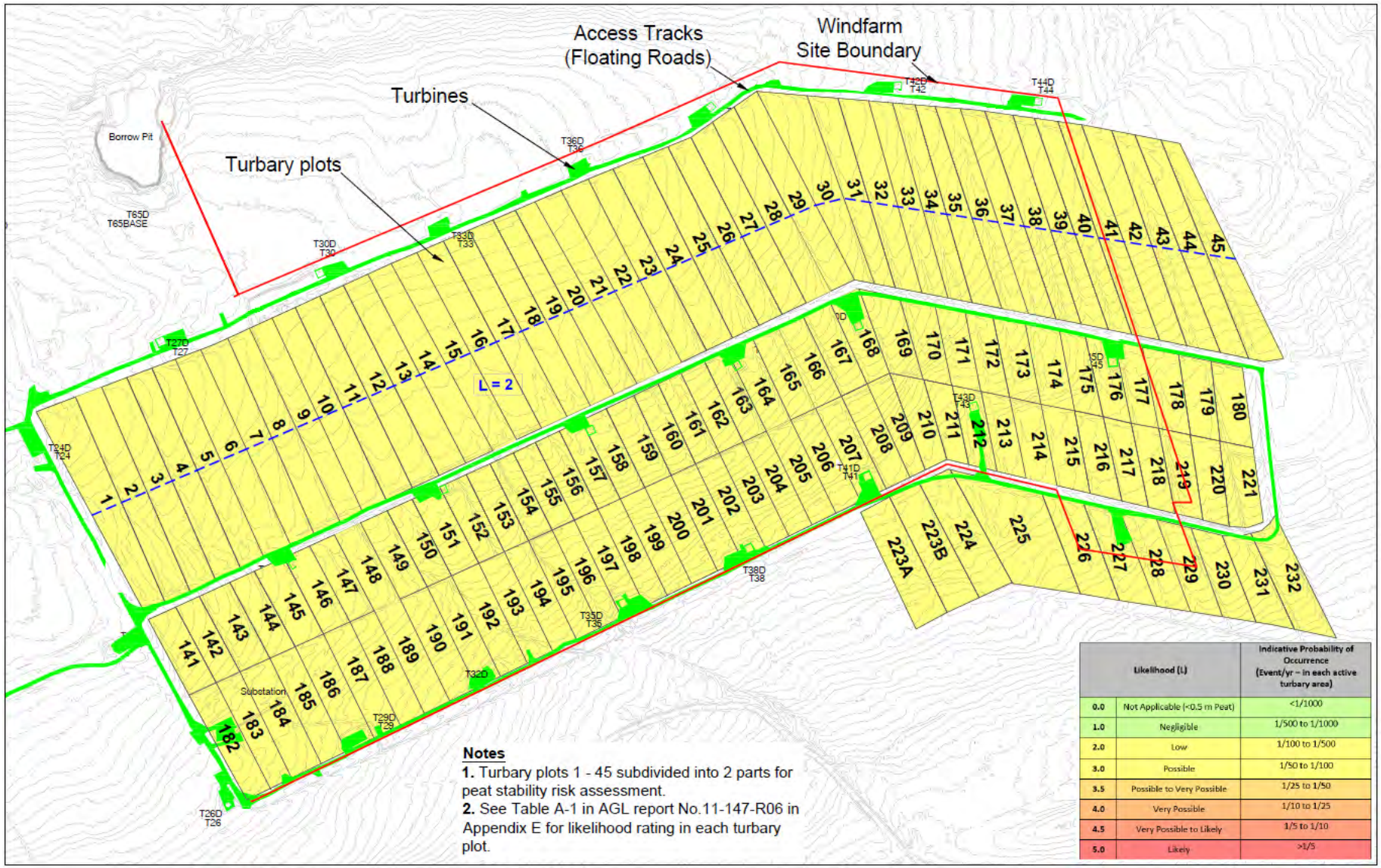
It was assessed that the likelihod of a peat slide occurring as a result of these activities was very low to low so that the effect on the stability of the peat was **Very Low to Low**, and only **Slightly Significant**.

The impact of the construction traffic loading on the existing floating roads will be **occasional** to **regular**, but only **temporary** or **brief** – limited to when the large mobile cranes and low-loader transporters are travelling along the roads. Also, all the existing floating roads have been successfully proof tested for the maximum design load.

The impact from the additional load from the widened roads will be **temporary** as the fill will be removed at the end of the decommissioning works. It will also be limited to the section of the existing access track between Turbines T35 and T45 and/or between T43 and T46.

The loading on the peat to dismantle the OHL downslope from the substation will also be **brief** and limited to the area where polesets PS-1a to PS-4 will be dismantled.

The potential cumulative stability impacts due to mechanical peat harvesting on the wind farm site will not arise as a direct result of the wind farm decommissioning, but from the separate and unrelated activities for peat extraction in the turbary areas under established turbary rights, which are outside of the control of Gort Windfarms Ltd.




| Likelihood (L) | | Indicative Probability of Occurrence (Event/yr – in each active turbary area) |
|---|---|---|
| 0.0 | Not Applicable (<0.5 m Peat) | <1/1000 |
| 1.0 | Negligible | 1/500 to 1/1000 |
| 2.0 | Low | 1/100 to 1/500 |
| 3.0 | Possible | 1/50 to 1/100 |
| 3.5 | Possible to Very Possible | 1/25 to 1/50 |
| 4.0 | Very Possible | 1/10 to 1/25 |
| 4.5 | Very Possible to Likely | 1/5 to 1/10 |
| 5.0 | Likely | >1/5 |

*Figure 8-40 Likelihood of a peat failure due to mechanical peat harvsting in the turbary plots after mitigation measures have been implemented.*

Stability impacts related to mechanical peat harvesting do not increase or amplify the effects of stability impacts from the wind farm decommissioning activities because the location and characteristics of the impacts are different (e.g. mechanical peat harvesting in the turbary plots vs surcharge loading on the floating roads between the plots from construction traffic during decommissioning). Therefore, in this case the cumulative impacts represent the impact of the activities that have a greater effect on the stability of the peat at that time. Furthermore, cumulative impacts only occur when mechanical peat harvesting is carried out at the same time as the wind farm decommissioning works.

Section 8.4.5.5.7 summarises the mitigation measures that have been implemented and recommended to reduce the likelihood of a peat failure due to mechanical peat harvesting in the turbary areas. However, some of these relate to the turbary activities that are outside of the control of Gort Windfarms Ltd., therefore two scenarios have been considered in assessing the potential cumulative stability impacts:

1. Cumulative impacts that could occur if the recommended mitigation measures are not implemented by the turbary plot holders.
2. Cumulative stability impacts that could occur if the mitigation measures are implemented by the turbary plot holders.

Cumulative stability impacts are also considered if no mechanical peat harvesting is carried out in the turbary area during the Prospective Development.

### Cumulative Stability Impacts that Could Occur If the Recommended Mitigation Measures are not Implemented by the Turbary Plot Holders:

As discussed in Section 8.4.5.5.5, the impacts of site activities related to mechanical peat harvesting from the turbary plots that can have an effect on the stability of the peat are:

- The live load surcharge from the mechanical peat harvesting equipment operating directly on the surface of the peat.
- Damage to the integrity of the peat mass from mechanical excavation or by saw cutting.
- Removal of support to peat faces by bulk excavation for mechanical peat harvesting, or along drainage trenches.

The primary *effect* of the live load surcharge is the increase in shear stress in the underlying peat, which increases the risk of a peat failure, potentially triggering a peat slide on sloping ground where the magnitude of loading is such that the downslope shear stresses exceed the strength of the peat.

Saw cutting and mechanical excavation can also effect the integrity and stability of the peat by creating lines of weakness where vegetative fibres in the upper fibrous acrotelm layer are severed along saw cut lines, open drains or trench excavations, or by increasing the shear stresses in peat directly adjacent to or upslope from an unsupported open excavation, particularly where the slope has been undermined along an exposed peat bank at the downslope end of a turbary plot.

Saw cutting and mechanical excavation can also disrupt the existing pattern of surface water drainage in the turbary area, allowing water to infiltrate down into the lower peat layers which can lead to an increase in water content, swelling and reduction in shear strength.

The interpreted likelihood of a peat failure occurring as a result of mechanical peat harvesting in the turbary plots without appropriate mitigation measures is shown on Figure 8-36. As discussed in Section 8.4.5.5.4, the failure could range from localised shear failure of an unsupported peat face in an excavation or a small-scale peat slide confined within a turbary plot, to the worst-case scenario of a large

or very large-scale peat slide along existing drainage channels similar to the slide that occurred at the site in October 2003, during the construction of the wind farm.

Assuming that, in the worst-case scenario, peat failure due to excessive or intensive mechanical peat harvesting in the turbary plots without appropriate mitigation measures could involve a very large-scale peat slide, then:

- Where the interpreted likelihood of a peat failure shown on Figure 8-36 is **Very Possible** to **Likely (L=4.0 to 5.0)**, then the effect of the stability impacts on the peat would be **High** and **Significant**.
- Where the likelihood of a peat failure is **Possible** to **Very Possible (L=3.5)**, then the effect of the stability impacts on the peat would be **Medium to High** and **Moderately Significant**.

In reality, the interpreted likelihood of a peat failure shown on Figure 8-36 is more representative of smaller more localised peat failures, which would have a significantly lower impact on the peat. Therefore, the assessment is conservative.

As the mechanical peat harvesting activities without mitigation have a more significant effect on the stability of the peat than the activities related to the Prospective Development, they represent the cumulative effects of stability impacts that could occur if mechanical peat harvesting is carried out during decommissioning and if the recommended mitigation measures are not implemented by the turbary plot holders.

The cumulative impacts will only occur in the turbary plots where mechanical peat harvesting is likely to be carried out during decommissioning, which is currently about 35 No. of the 136 No. plots in the area and not all of these are cut each year (see Figure 8-35). No peat harvesting is carried out in Plots No. 182 to 207 along the southern boundary of the site, which have been used for forestry by Coillte.

The active turbary plots will only be cut seasonally once a year between May and September so the frequency of the stability impact will be **Occasional**. Annual mechanical peat harvesting within any turbary plot will only take a few days. Therefore, the duration of the impact will be **Brief** to **Temporary**.

It should be noted that this is an assessment of the significance of the ***effects*** of the stability impacts – i.e. the increase in shear stresses under the live load surcharge of the equipment, or the effects of saw cutting or mechanical excavation on the integrity of the peat. In this context, the **Significance** of the effects reflects the relative risk of a peat failure being *caused* by the corresponding mechanical peat harvesting activity, which has been calibrated by the potential impact of a large-scale peat slide as the worst-case scenario. The methodology therefore identifies stability impacts that have significant effects *whether or not a failure occurs* so that appropriate mitigation measures can be implemented as preventative measures, where possible.

### Cumulative Stability Impacts that Could Occur If the Recommended Mitigation Measures are Implemented by the Turbary Plot Holders:

Section 8.4.5.5.7 gives a summary of the mitigation measures that are recommended to be implemented by the turbary rights holders for mechanical peat harvesting in the turbary areas within and immediately adjacent to the wind farm site. If the mitigation measures are implemented, then:

- No mechanical peat harvesting will be carried out by saw cutting in any of the turbary plots.
- No mechanical peat harvesting will be carried out in the turbary plots where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Very Possible to Likely (L=4.0 to 5.0), as shown on Figure 8-36. Peat harvesting in

these areas (if any) will be limited to manual turf cutting during the drier months between May and September.

- Where mechanical peat harvesting is carried out in areas where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Possible to Very Possible (L=3.0 to 3.5) then restrictions will be placed on the type and size of mechanical harvesting equipment that will be used, as recommended in Section 6.2 of AGL Report No. 11-147-R06 in Appendix 8-4, and the works will only be carried out during the drier months between May and September.
- The turbary plot owners and their turf cutting contractors will implement the operational control measures for mechanical peat harvesting that are recommended in Section 6.0 of AGL Report No. 11-147-R06 to ensure that good practice is adopted to manage the stability of peat excavations and to prevent excessive damage to the integrity of the vegetated surface of the peat.

As discussed in Section 8.4.5.5.7, where the mitigation measures are implemented by the turbary rights holders, their agents and by Gort Windfarms Ltd. then the interpreted likelihood of a peat failure occurring as a result of mechanical peat harvesting in the turbary plots will reduce to a residual level of **Low (L=2)**, as illustrated on Figure 8-40. The corresponding effect on the stability on the peat will be **Medium to Low**, which is of **Slight Significance**.

When compared to the Prospective Development activities, mechanical peat harvesting in the turbary plots with appropriate mitigation measures has a slightly higher effect on the stability of the peat because it mainly involves excavation works with plant and equipment operating directly on the surface of the peat **(i.e. Medium-Low vs Low/Very Low)**. However, using the matrix in Figure 8-2, the significance of the effects is the same **(Slight)**. Therefore, this will represent the cumulative effect of stability impacts that could occur if mechanical peat harvesting is carried out during decommissioning and if the recommended mitigation measures on mechanical peat harvesting are implemented by the turbary plot holders and their agents.

The cumulative impacts will only occur in the turbary plots where mechanical peat harvesting is likely to be carried out during decommissioning, which is currently about 35 No. of the 136 No. plots in the area and not all of these are cut each year (see Figure 8-35). No peat extraction is carried out in Plots No. 182 to 207 along the southern boundary of the site, which have been used for forestry by Coillte.

The active turbary plots will only be cut seasonally once a year between May and September so the frequency of the stability impact will be **Occasional**. Annual mechanical peat harvesting within any turbary plot will only take a few days. Therefore, the duration of the impact will be **Brief** to **Temporary**.

### Cumulative Stability Impacts that Could Occur If No Mechanical Peat Harvesting is Carried Out in the Turbary Area during the Prospective Development:

The mitigation measures in Section 6 of AGL Report No. 11-147-R06 in Appendix 8-4 include a recommendation that no mechanical peat harvesting should be carried out in the turbary areas during decommissioning of the wind farm. If this is agreed with the turbary rights owners, then there will be no significant cumulative impacts due to mechanical peat harvesting in the turbary plots on and immediately adjacent to the site during the Prospective Development.

## 8.4.6 Residual Impacts

This section of the report assesses potential residual impacts of the Prospective Development.

During decommissioning all of the above ground elements of the windfarm will be dismantled or demolished and taken off site, including:

- The turbine rotors, blades, nacelles and masts.
- The substation electrical transmission and transformer components, concrete plinths, control building and concrete foundations.
- The electrical transmission cable, steel lattice tower and timber twin polesets for the 110kv Overhead Line (OHL).
- The steel lattice towers for the anemometers.

Additional rockfill placed to temporarily widen sections of the site access tracks in the turbary area and at narrow junctions will also be removed offsite and any vegetated peat turves that were excavated will be reinstated along the edge of the road.

The following elements will be left in place on the site after decommissioning:

- The site access tracks, including 16.7 km of floating roads constructed on the peat with 0.6-1.0 m of granular rockfill reinforced with 1-2 layers of geogrids and a basal layer of timber, branches or small trees.
- The hardstanding areas adjacent to the turbines and at the substation, which are constructed of crushed rock granular fill supported on the glacial till or rock below the peat.
- The foundations for the turbines and anemometer lattice towers, which were constructed as reinforced concrete pad foundations supported directly on rock or on a layered profile of structural fill comprised of lean mix concrete and crushed rock granular fill down to rock.
- All of the de-energised and disconnected LV electrical cables and fibre-optic control cables that are direct-buried in the peat between the turbines and in ducts below the roads.
- The existing network of open drains and culverts across the site.
- The construction phase peat repository sites and material deposition areas with re-generated surface vegetation.
- The closed construction phase borrow pits including the main borrow pit near the site entrance.

### 8.4.6.1 Residual Direct Impacts

#### 8.4.6.1.1 *Degradation of Excavated Peat from Wind Farm site and Displaced Peat in Slide Area*

During the construction of the wind farm in 2003-2005 approximately 185,000m$^3$ of peat was excavated from the intact blanket bog over an area of about 7.7Ha for the turbine foundations, crane hardstanding areas, substation site, borrow pits and anemometers.

The peat slide that occurred at the wind farm site in October 2003 also disturbed about 450,000m$^3$ of intact peat over an area of approximately 25ha in blanket bog that was covered in coniferous forest plantations, the majority of which was outside the wind farm site boundary.

When the direct impact of the peat slide on the intact blanket bog is assessed in combination with the peat that was excavated for the wind farm infrastructure:

- The extent of upland blanket bog on the wind farm site (approximately 340 ha) is <0.1% of the total area of upland blanket bog in Ireland (≈436,690 ha in 1979 Hammond (1981), Conaghan (2000)).
- Less than 7.5% (≈25 ha) of the blanket bog on the site was directly impacted by the project (i.e. by the turbines, crane hardstandings, substation, borrow pits, material sidecast areas and peat repositories).
- A similar area of blanket bog (≈25Ha) outside the wind farm site boundary was directly impacted by the peat slide that occurred at the site in October 2003.
- The mass of carbon stored in peat is on the order of 0.055 tonnes/$m^3$ (Holden & Connolly (2011) & Milne & Brown (1997)). This is equivalent to 0.2 tonnes $CO_2$ /$m^3$ if fully oxidised by decomposition.
- The total volume of peat excavated for the turbines, crane hardstandings, substation and borrow pits was approximately **185,000 $m^3$**. About a further **450,000 $m^3$** of peat was displaced in the peat slide at the site in October 2003. If it is assumed that 100% of the combined volume of excavated peat and displaced peat could be lost due to a combination of excavation/displacement, and long-term erosion and/or decomposition on exposure then this would be equivalent to releasing **127,000 tonnes of $CO_2$** into the atmosphere. However, this is very conservative as there is still approximately 200,000 $m^3$ of disturbed peat within the slide area. Also, the excavated peat was all stored in designated storage areas on site and vegetation has re-established on the surface of the peat, which will slow down the rate of decomposition. Therefore, the actual long-term carbon release from the excavated and displaced peat will be significantly lower, possibly on the order of **40-60% of the total (i.e. 50-75kt $CO_2$).**
- In terms of recent national statistics for greenhouse gas emissions in Ireland, **50-75 kt $CO_2$** is **≈ 0.10-0.15%** of Ireland's total estimated annual $CO_2$-equivalent GHG emissions in **2023 (55,000 kt-$CO_{2\text{-eq}}$)** and **≈ 0.65-0.95%** of the total emissions related to energy industries in that year **(7,865 kt-$CO_{2\text{-eq}}$)** [www.epa.ie, 2024].

The combined effect of this on the peat in the blanket bog on the site and in the slide area was **High**. The blanket bog in these areas was of low ecological importance as it had been degraded by coniferous forest plantations and drainage. Therefore, the sensitivity of the receiving soils, geology and land was **Medium** and the combined effect on the intact blanket bog was **Significant**. There are no geological heritage sites in the project area.

All the peat that was excavated from the turbine foundations, hardstanding areas and borrow pits was retained on the wind farm site and stored in the borrow pits, peat repository sites and material sidecast areas. Much of this material is still on site and has not fully decomposed. The peat in the repository sites has also sunk into the underlying intact bog and peatland vegetation has re-established on the surface. This will have significantly slowed down the rate of decomposition of the intact and disturbed peat because

- More of the intact peat is submerged below the groundwater table, where the rate of decomposition is lower in an anaerobic environment.
- The growth of vegetation on the surface of the disturbed peat will promote regeneration of the bog and long-term peat growth on the surface.

There is also about 200,000$m^3$ of peat debris remaining in the slide area. The balance was displaced from the side area and flowed downslope along the channel for the stream in sub-catchment SC7(b). The enhanced drainage that formed within the slide area is likely to result in further erosion, degradation and decomposition of the disturbed peat. However, this is unlikely to result in loss of all the peat that has remained in the slide area. Furthermore, as in the repository areas, peatlands vegetation has established on the disturbed peat within the slide area, which will significantly reduce the rate of further erosion and decomposition of the peat.

The full impact of the peat slide and the peat excavations on the wind farm site will have a long-term effect that will continue as a residual impact after decommissioning with ongoing degradation and decomposition of the disturbed and excavated peat. However, there is evidence that the full effect will be partially mitigated by natural regeneration and revegetation of the disturbed areas of blanket bog over time. In the long-term it is possible that this could result in a new equilibrium of peat accumulation and net carbon storage, which would be a **positive** impact relative to the current baseline conditions in the project area. The effect on the peat would be **Low**, but this would still be **Slightly Significant**.

#### 8.4.6.1.2 *Site Access Tracks, Peat Repository Sites & Material Sidecast Areas*

During the construction of the wind farm in 2003-2005 most of the site access tracks were constructed as floating roads that were constructed directly on the original vegetated surface of the peat typically using 600-800mm of crushed rock granular fill reinforced with 1-2 layers of geogrids and a basal layer of timber brash.

The material sidecast areas were the locations where peat and mineral soil excavated from the foundation excavations was sidecast and spread out over the intact peat surface to depths of 0.5-1.5m adjacent to the excavations for the 39 No. turbine foundations that were completed during the first phase of construction, prior to the slide in 2003.

The peat repository sites were used to store up to 1.0m of remoulded peat that was excavated from the sites of the turbine foundations, crane hardstanding areas and substation site during the 2nd stage of construction in 2004/2005. The peat was spread out over the original vegetated surface of the peat in designated low-risk areas of the site with gently sloping ground.

The site access tracks, peat repository sites and material sidecast areas cover a combined area of approximately 24.0Ha, which is 7.2% of the total area of the wind farm site (340Ha). The materials covered the original peatlands vegetation on the surface of the blanket bog. The combined effect that this impact had on the underlying peat habitat during construction was **Medium to Low** because the because the degraded habitat in the areas of forestry and turbary plots was of low ecological value. This has been assessed as **Slightly Significant** relative to the original baseline condition prior to construction.

The site access tracks, peat repository sites and material sidecast areas will be left in place after decommissioning. Therefore, the effect that they have on the underlying peat will continue as a residual impact after decommissioning. However, the re-establishment of peatlands vegetation on the surface of the excavated peat in the repository sites and material sidecast areas will help the long-term regeneration of the disturbed areas of blanket bog, which is a **positive** residual impact. Relative to the current baseline conditions on the site, the long-term effect on the peat will be **Low** and **Slightly Significant**.

Placing the materials directly on the slopes would have had a **negligible** effect on carbon storage in the underlying peat because the peat was left intact on the slopes and the loss of the existing surface vegetation that was covered by the deposited materials would have been compensated for by the reduction in the rate of decomposition of the additional volume of peat that was submerged below the water table as it compressed under the applied surcharge loads. The rate of decomposition of peat is dramatically slower under anaerobic conditions below the water table.

In terms of land use, the peat repository sites and material deposition areas were disturbed habitats that would not have been suitable for re-forestation during the construction and operational phases of the wind farm. However, the disturbed peat in these areas has dried out and re-vegetated over time so that they would not restrict future forestry on the site after decommissioning of the wind farm. Therefore, they would not have an adverse residual impact on land use on the site. Furthermore, the floating roads provide improved access across the site for forestry equipment, which is a net **positive** impact that will

continue as a residual impact after the Prospective Development, particularly as forestry would no longer be restricted by the operation of the wind farm. The effect on future land use on the wind farm site will be **Significant**.

#### 8.4.6.1.3 *Improved Drainage*

During construction of the wind farm, additional drains were constructed in the peat to provide drainage for the turbine foundations, which was a design requirement, and to improve the control of groundwater and surface runoff in areas of poor drainage and high water table, particularly in the coniferous forests where the majority of the additional drains were constructed. The locations of the new drains are also shown on Figure 8-17. These were constructed as shallow open trenches in the peat with piped culverts under the site access tracks.

As the permeability of the peat is low, the extent of drawdown from the shallow open drains is limited to within a few meters of the drains rather than generally across the site. Nevertheless, the increased rate of surface runoff from the site reduces the rate of surface water infiltration into the peat, and this would have had a negative impact on the ecology of the blanket bog by draining areas of ponded surface water and gradually lowering the water level in the upper acrotelm layers in some areas of the site.

The improved drainage would have had a negative impact on the peat with respect to carbon storage in areas where the groundwater table was lowered i.e. the rate of decomposition of peat is greater in aerobic conditions above the water table, which releases stored carbon as $CO_2$. As the existing habitat was of low ecological value and was already degraded by drainage for the forestry and turbary plots, the effect that the improved drainage had on the peat was assessed as **Low** and **Slightly Significant**.

The network of drains will be left in place after the Prospective Development. Therefore, the effect that they have on the peat will continue as a residual impact. However, no further maintenance will be carried out on the drains after decommissioning by Gort Windfarms Ltd. Therefore, in the long-term the efficiency of the drains could reduce if they become clogged by vegetation over time, which would result in a partial gradual restoration of groundwater levels on the site, which will have a Slightly Signficant **positive** effect on the rate of peat decomposition relative to the current baseline conditions on the site, which will be **Slightly Significant**.

The site maintenance records indicate that maintenance on the drainage network has been at a residual level since 2011– with only minor works required to maintain the efficiency and capacity of the existing system. There has been no experience of drains clogging or getting blocked because of vegetation growth, blocking or collapse over that time. Therefore, any reduction in the efficiency of the drainage network after decommissioning is expected to be minor and to occur gradually over time.

### 8.4.6.2 Residual Stability Impacts

#### 8.4.6.2.1 *Site Access Tracks*

The floating roads that are on the site will have been in place for approximately 20 years by the time the wind farm is decommissioned. The highest risk of shear or bearing failure in the peat was when the roads were originally constructed in 2003-2005, particularly under the design live load surcharge from the mobile crane that was used to erect the turbines. Since then, the peat under the roads has increased in strength as it consolidated and compressed under the weight of the rockfill, which has reduced the probability of shear failure occurring. No failures have occurred under the floating roads during construction or during the operation and maintenance period of the windfarm to date. They have also been fully proof load tested for the design crane loads. The most recent tests were carried out in 2018 and it was found that the performance of the roads had significantly improved due to the improvement in the strength and stiffness of the peat under the roads by that time (see Section 8.3.9.2).

After the Prospective Development no further heavy construction traffic loading will be required on the floating roads for the wind farm, grid connection or ancillary works by Gort Windfarms Ltd. (GWFL). As described in Section 8.4.4, the design loading criteria for the floating roads will be set out in the Safety File for the Prospective Development, which will be handed over to the landowner by GWFL on completion of the works. Therefore, provided that future use of the roads by others does not exceed the capacity of the roads, the probability of a failure occurring in the peat due to the residual impact of the roads is **negligible** so that the effect of the surcharge load on the stability of the peat will be **negligible** and **Not Significant**.

The site access tracks across the slide area at T68 and T70 are constructed as rockfill berms supported on the glacial till below the peat. Therefore, the residual impact of the berms and the effect on the stability of the underlying glacial till or rock will be **negligible** and **Not Significant**.

The floating roads adjacent to the slide area at Turbines T68 and T70 were inspected by AGL Consulting in January 2024 and there was no evidence of further instability in the peat at the edges of the slide area. Therefore, the residual impact of the slide on the peat in the area and the corresponding effect on the stability of the floating roads should be **negligible** and **Not Significant**.

#### 8.4.6.2.2 *Turbine Foundations & Crane Hardstandings*

The hardstanding areas adjacent to the turbines and at the substation site are constructed of crushed rock granular rockfill supported on the glacial till or rock below the peat. Therefore, they do not apply any load on the peat and the effect of the residual impact on the stability of the underlying glacial till or rock will be **negligible** and **Not Significant**.

Furthermore, the hardstanding areas will act as a shear key or buttress preventing shear failure in the peat directly upslope from them, which is a ***positive*** residual impact with respect to site stability. The effect of the support they provide will be **Slightly Significant**.

Similarly, the reinforced concrete turbine foundations are supported on rock or lean mix fill down to rock below the peat and glacial till so that they do not apply any load on the peat. Also, after the turbines are removed there will be no loading on the foundations. Therefore, the effect of the residual impact on the stability of the underlying glacial till or rock will be **negligible** and **Not Significant**.

The turbine foundations will also act as a shear key or buttress preventing shear failure in the peat directly upslope from them, which is a ***positive*** residual impact with respect to site stability. The effect of the support they provide will be **Slightly Significant**.

The reinforced concrete bases would have been designed for the chemical exposure classification relevant to the ground conditions on the site so that they would not be expected to disintegrate or deteriorate sufficiently in strength over time to reduce the positive buttressing effect that they have on site stability. Nevertheless, the long-term stability of the peat slopes after decommissioning is not dependent on this effect.

#### 8.4.6.2.3 *Drainage*

Poor drainage is a recognised contributory risk factor for peat instability. Therefore, as discussed in Section 8.3.9.1, the improved drainage network that was constructed on the site for the wind farm has had a **sustained positive** effect on peat stability over the operational life of the wind farm. The improved drainage network has also had sufficient capacity to handle exceptionally high and sustained levels of rainfall without any further occurrences of peat instability related to the windfarm activities – for example during the high levels of rainfall recorded in December 2015.

The positive effect of the drainage improvements on the stability of the peat has been assessed as **Medium** and **Moderately Significant** relative to the original conditions on the site prior to construction. This forms the baseline conditions for decommissioning.

The existing network of open drains and culverts across the site will be left in place at the end of decommissioning. It is not proposed to plug any of them to re-wet the blanket bog as this could have an adverse impact on peat stability. Therefore, the sustained positive effect that the drainage improvements have on the stability of the peat will continue after decommissioning.

No further maintenance will be carried out on the drains after decommissioning. Therefore, in the long-term the efficiency of the drains could reduce if they become clogged by vegetation over time, which would result in a partial gradual restoration of groundwater levels on the site.

The site maintenance records indicate that maintenance on the drainage network has been at a residual level since 2011– with only minor works required to maintain the efficiency and capacity of the existing system. There has been no experience of drains clogging or getting blocked because of vegetation growth, blocking or collapse over that time. Therefore, any reduction in the efficiency of the drainage network after decommissioning is expected to be minor and to occur gradually over time so that the effect on the stability of the peat relative to the current baseline conditions on the site will be **Low** and only **Slightly Significant**.

#### 8.4.6.2.4 *Peat Repositories*

The peat repositories were used to store up to 1.0 m of peat from the excavations for the turbine foundations, crane hardstandings, substation site, borrow pits and anemometer masts during the second phase of construction in 2004/2005. All of the repository sites were located on the intact peat slopes in areas of gently sloping ground on the site. AGL Report No. 11-147-R04 in Appendix 8-2 describes the investigations and stability analyses that were carried out to assess each repository site as well as the control measures that were implemented when the peat was being placed on the slopes.

With the mitigation measures that were implemented during construction, the probability of a peat failure occurring in the peat repository areas was **Very Low** to **Low** so that the effect of the live load surcharge on the stability of the peat slopes was **Medium to Low** and only **Slightly Significant**.

The highest risk of a peat slide under the surcharge loads was at the time that the peat was placed in the repository during construction (i.e. the short-term undrained condition). Over time the peat has settled into the slope and the underlying peat has consolidated and increased in shear strength, which has reduced the likelihood of a peat failure. The remoulded excavated peat has also become more stable on the surface of the slope as it has dried out and vegetation has re-established on the surface, in many cases making the repository areas difficult to distinguish from the surrounding undisturbed ground.

The peat repositories will be left in place after the Prospective Development. Therefore, the residual impact of the repository sites will be permanent and the effect that they will have on the stability of the peat will be **Negligible** and **Not Significant**.



*Plate 8-5 Re-vegetated surface of peat repository site opposite Turbine T50 in January 2024*

#### 8.4.6.2.5 Borrow Pits

The borrow pits have been closed since construction was completed in 2005 and have remained undisturbed and stable since then. The main borrow pit (No.3) near the site entrance, where most of the rock was excavated, has been allowed to flood and the level of groundwater in the pit has stabilized at a long-term natural groundwater level 1.0-1.5 m below the level of site access road at the entrance to the borrow pit. There are bunded cells of excavated peat contained by rockfill berms within the borrow pit, which were observed to be stable during the site inspections in 2018 and 2024.

No work will be carried out in the borrow pits during decommissioning and it is not anticipated that there will be any deterioration or change in the condition of the pits after decommissioning. Therefore, the residual impact that they will have on soils, geology and land in the area with respect to site stability will be **imperceptible**.

#### 8.4.6.2.6 Barrages 3 and 4

Barrages 3 and 4 are constructed as rockfill berms supported on the glacial till below the peat. Therefore, the residual impact of the berms and the effect on the stability of the underlying glacial till or rock will be **Negligible** and **Not Significant** due to the limited size and extent of these barrages.

#### 8.4.6.2.7 Concrete Foundations for Polesets

The concrete foundations are supported on lean mix fill down to glacial till below the peat so that they do not apply any load on the peat. Also, after the polesets are removed there will be no loading on the foundations. Therefore, the effect of the residual impact on the stability of the underlying glacial till or rock will be **Negligible** and **Not Significant**.

#### 8.4.6.2.8 Concrete Foundations for Agannygal Substation

The concrete foundations are supported on a hardstand of granular fill to glacial till below the peat so that they do not apply any load on the peat. Also, after the substation buildings are removed there will be no loading on the foundations. Therefore, the effect of the residual impact on the stability of the underlying glacial till or rock will be **Negligible** and **Not Significant**.

# 8.5 Conclusions

## 8.5.1 Wind Farm & Polesets PS-1a to PS-4 of 110kV OHL

Decommissioning the wind farm will involve de-energising the site, disconnecting the underground cables at the turbines and controlled dismantling and removal of all the above-ground elements of the wind farm and substation for re-cycling, disposal or re-use elsewhere.

Where necessary, narrow sections of the existing access tracks will be temporarily widened to provided safe access for mobile cranes to the turbines in the turbary area at the east end of the site (e.g. T35-T45 & T43-T46) and at junctions near Turbines T68, T14 & T1. The existing crane hardstanding at Turbine T4 will also need to be temporarily extended to facilitate reversing long vehicles that will be used to transport the turbine components offsite.

Peat excavations during the decommissioning works will be limited to localised trimming of intact turves of vegetated peat along the edge of the access tracks where they need to be widened, which will be reinstated on completion of the decommissioning works. Borrow pits on the site will not be re-opened and small volumes of aggregates that will be used for the widening works, where required, will be imported from nearby quarries. Therefore, there will be **no significant direct effects** on soils, geology or land on the wind farm site during decommissioning.

The majority of the heavy lifting activities for the decommissioning works will be carried out from the hardstanding areas adjacent to the turbines and at the substation site, which are designed for the corresponding loads. Therefore, there will be **no site activities with stability impacts that will have a Significant or Moderately Significant effect on the stability of the peat**.

The activities that have been assessed as having likely significant impacts on the stability of the peat on the wind farm site are limited to:

- Heavy construction traffic loading on the floating roads from the mobile cranes and low-loader transporters that will be used to dismantle the turbines, substation and anemometers and to transport the components offsite.
- Additional loading on the peat where the crane hardstanding needs to be temporarily extended (T4) or where narrow sections of the existing site access road need to be temporarily widened at the east end of the turbary area (e.g. T35-T45 & T43-T46) and at junctions near Turbines T68, T14 & T1.
- Loading on the peat from the low ground bearing pressure (LGBP) wide-tracked excavators and ATV that will be used to take down & remove timber polesets PS-1a to PS-4 for the 110kV OHL.

It was assessed that the likelihood of a peat slide occurring as a result of these activities was very low to low so that the effect on the stability of the peat was **Very Low** to **Low,** which is only **Slightly Significant**.

All the existing floating roads have been successfully proof tested for the maximum design load from the mobile crane that will be used for decommissioning. The impact of the construction traffic loading on the roads will be **occasional** to **regular**, but only **temporary** or **brief** – limited to when the large mobile cranes and low-loader transporters are travelling along the roads.

The impact from the additional load from the widened roads will be **temporary** as the fill will be removed at the end of decommissioning. It will also be limited to the section of the existing narrow access track that need to be widened between Turbines T35 and T45 and/or between T43 and T46 at junctions near Turbines T68, T14 & T1. The additional load on the peat will be minimised through the

use of timber bog mats and geogrid reinforcement, and the road will be widened on the upslope side where possible to take advantage of the stronger compressed peat under the existing roads.

The loading on the peat to dismantle the OHL downslope from the substation will also be **brief** and limited to the area where polesets PS-1a to PS-4 will be dismantled. The plant and equipment operating on the peat will be limited to low ground bearing pressure wide-tracked excavators and ATV equipment suitable for working on peat.

**Cumulative Effects** on soils, geology and land are limited to areas where mechanical peat extraction is carried out in the turbary areas during the decommissioning works. The potential impacts will not arise as a direct result of the wind farm decommissioning, but from the separate and unrelated activities for peat extraction in the turbary areas under established turbary rights, which are outside of the control of Gort Windfarms Ltd.

Cumulative direct impacts will be limited to the effect of mechanical peat harvesting in the turbary areas on or immediately adjacent to the wind farm. Based on recent estimates the volume of peat extraction in the area is low, probably less than 2,500m$^3$ per annum. Therefore, the effect that this has on the peat is **Low** and only **Slightly Significant.**

The effect of cumulative impacts on peat stability would depend on the extent to which recommended mitigation measures are implemented by the turbary rights holders for mechanical peat harvesting. Warning signs have beeen erected at the site by Gort Windfarms Ltd. (GWFL) to raise awareness of the peat stability risks associated with mechanical peat harvesting in the turbary area. GWFL have also recommended mitigation measures to the turbary rights holders to manage the risk of peat stability if they are carrying out mechanical peat harvesting in the area. The measures include recommended restrictions on mechanical harvesting of some turbary plots with a higher likelihood of instability, and appropriate controls and restrictions for mechanical harvesting in the remaining turbary plots. It is recommended that no harvesting take place during decommissioning.

If the recommended mitigation measures are **not** adopted by the turbary rights holders, then there is a risk of a peat failure occurring within the turbary areas so that the effect of cumulative stability impacts on the peat could be **Medium to High** or **High**, which is **Moderately Significant to Significant**.

If the recommended mitigation measures **are** adopted by the turbary rights holders then there will be a lower likelihood of a peat failure so that the cumulative effect on the stability of the peat will be **Medium to Low**, which is of **Slight Significance**.

The cumulative impacts will only occur in the turbary plots where peat extraction is likely to be carried out during decommissioning, which is currently only about 35 No. of the 136 No. plots in the area and not all of these are cut each year. The active turbary plots will only be cut once a year between May and September so the frequency of the stability impact will be **Occasional**. Peat extraction within any turbary plot will only take a few days. Therefore, the duration of the impact will be **Brief** to **Temporary**.

If no peat extraction is carried out in the turbary areas during the Prospective Development, then there will be no significant cumulative impacts due to mechanical peat extraction in the area.

The following elements of the windfarm will be left in place after decommissioning:

- The site access tracks, including 16.7 km of floating roads constructed on the peat.
- The hardstanding areas adjacent to the turbines and at the substation, which are constructed of crushed rock granular fill supported on the glacial till or rock below the peat.
- The foundations for the turbines and anemometer lattice towers, which were constructed as reinforced concrete pad foundations supported directly on rock or on

a layered profile of structural fill comprised of lean mix concrete and crushed rock granular fill down to rock.
- All of the de-energised and disconnected LV electrical cables and fibre-optic control cables that are direct-buried in the peat between the turbines and in ducts below the roads.
- The existing network of open drains and culverts across the site.
- The construction phase peat repository sites with re-generated surface vegetation; and
- The closed construction phase borrow pits including the main borrow pit near the site entrance.

**Residual Impacts** have been assessed relative to the current baseline conditions on the site and will be comprised of ongoing impacts from the construction, operation and maintenance phases of the wind farm as well as residual impacts from the components of the windfarm that will be left in place after decommissioning.

The original direct impact of the volume of peat excavation during construction combined with the volume of peat displaced in the slide area was assessed as **High**. The blanket bog in these areas was of low ecological importance as it had been degraded by coniferous forest plantations and drainage. Therefore, the sensitivity of the receiving soils, geology and land was **Medium** and the combined effect on the intact blanket bog was assessed as **Significant**.

All the peat that was excavated from the wind farm site during construction was retained on the site and stored in the borrow pits, peat repository sites and material disposal areas. Much of this material is still on site and the rate of decomposition of the peat in the repository sites has significantly slowed because they have settled into the underlying intact peat and peatland vegetation has re-established on the surface. There is also about 200,000m$^3$ of peat debris remaining in the slide area where peatlands vegetation has also established, which will significantly reduce the rate of further erosion and decomposition of the displaced peat.

The full impact of the peat slide and the peat excavations on the wind farm site will have a long-term effect that will continue as a residual impact after decommissioning with ongoing degradation and decomposition of the disturbed and excavated peat. However, the effect will be partially mitigated by natural regeneration and revegetation of the disturbed areas of blanket bog over time. In the long-term this could result in a new equilibrium of peat accumulation and net carbon storage, which would be a **positive** impact relative to the current baseline conditions in the project area. The effect on the peat would be **Low**, but would still be **Slightly Significant**.

Re-establishment of peatlands vegetation on the surface of the excavated peat in the repository sites and material sidecast areas will also help the long-term regeneration of the disturbed areas of blanket bog that were covered during construction, which is a **positive** residual impact on the peat habitat. Relative to the current baseline conditions on the site, the long-term effect on the peat will be **Low** but **Slightly Significant**.

The wind farm access tracks provide improved access across the site. Therefore, leaving them in place after the Prospective Development will have a **Significant positive** effect on land use that will continue as a residual impact after decommissioning, particularly as forestry would no longer be restricted by the operation of the wind farm.

The improved drainage network on the wind farm site has had a negative impact on the peat with respect to carbon storage in areas where the groundwater table was lowered which has been assessed as a **Slightly Significant** effect on the degraded blanket bog relative to the original baseline condition prior to construction.

The existing network of drains will be left in place with the Prospective Development. Therefore, the effect that they have on the peat will continue as a residual impact after decommissioning. However,

no further maintenance will be carried out on the drains by Gort Windfarms Ltd. Therefore, in the long-term the efficiency of the drains could reduce if they become clogged by vegetation over time. This will result in partial gradual restoration of groundwater levels on the site which will have a **Slightly Signficant positive** effect on the rate of peat decomposition relative to the current baseline conditions on the site.

The improved drainage has also had a sustained ***positive*** effect on the stability of the peat which has been assessed as **Moderately Significant** relative to the original conditions on the site prior to construction. This effect will continue after decommissioning. However, the efficiency of the drains could reduce if they become clogged by vegetation, which would reduce the positive effect on peat stability. The site maintenance records indicate only minor works have been required to maintain the efficiency and capacity of the existing system since 2011 and there has been no experience of drains clogging because of vegetation growth, culvert blocking or sidewall collapse since then. Therefore, any reduction in the efficiency of the drainage network after decommissioning is expected to be minor and to occur gradually over time so that the effect on the stability of the peat relative to the current baseline conditions on the site will be **Low** and only **Slightly Significant**.

The turbine foundations and crane hardstanding areas will act as a shear key or buttress preventing shear failure in the peat directly upslope from them, which is a ***positive*** residual impact with respect to site stability. The effect of the support they provide will be **Slightly Significant**. The reinforced concrete bases would not be expected to disintegrate or deteriorate sufficiently in strength over time to reduce the positive buttressing effect that they have on site stability. Nevertheless, the long-term stability of the peat slopes after decommissioning is not dependent on this effect.

Loading on the peat from the site access tracks, peat repository areas and material sidecast areas that will be left in place after decommissioning **will not have a significant residual effect on the stability of the peat**. The highest risk of a peat slide under the surcharge loads was during construction. Over time the underlying peat has consolidated and increased in shear strength, which has reduced the likelihood of a peat failure so that now there is a negligible risk of a peat slide under the sustained surcharge loads. The remoulded excavated peat in the repository areas has also become more stable as it has dried out and peatland vegetation has re-established on the surface.

After the Prospective Development no further heavy construction traffic loading will be required on the floating roads for the wind farm, grid connection or ancillary works by Gort Windfarms Ltd. All the roads have been successfully proof tested for the design loads for the Derrybrien Wind Farm Development. The design criteria and load test results will be set out in the Safety File for the Prospective Development, which will be handed over to the landowner by Gort Windfarms Ltd on completion of the works. Therefore, provided that future use of the roads by others does not exceed the design capacity of the roads, the likelihood of a failure occurring in the peat due to the residual impact of traffic loading on the roads is **negligible** so that the effect of the surcharge load on the stability of the peat is **Not Significant**.

The Safety File will provide the landowner with all relevant information necessary to make informed decisions on the maintenance and safe use of the Retained Development post-decommissioning.

### 8.5.2 Grid Connection: 110kV OHL & Agannygal Substation

The Prospective Development (decommissioning of the Overhead Line and Agannygal Substation and re-instatement of the Ennis-Shannonbridge 110kV Line ) does not involve any construction works including excavations or otherwise that may have the potential to impact local soils or underlying geology. Historically, groundworks including excavations for poleset foundations, and construction of the Agannygal Substation, formed part of the construction of the wind farm in 2002.

**No Significant Effects** to the land, soil and geology at the site are anticipated during the Prospective Development works.

# 9. HYDROLOGY AND HYDROGEOLOGY

## 9.1 Introduction

### 9.1.1 Chapter Scope

This chapter provides an assessment of the likely significant effects of the Prospective Development (as described in Chapter 4) with respect to hydrology and hydrogeology. The assessment process highlights any areas where mitigation measures may be necessary to protect the surrounding water environment from any negative impacts associated with the works above.

It should be noted that assessment of the surface water quality associated with the Prospective Development is discussed in detail in Chapter 7 Biodiversity – Aquatic Ecology and Fisheries.

### 9.1.2 Statement of Authority

This chapter has been prepared by Harry Griffin BA BAI, MSc Hydrology and Climate Change, C.Eng., MIEI, ESB Engineering and Major Projects (EMP). Mr. Griffin has over 10 years of experience in hydrological/hydrogeological assessment, flood risk analysis and drainage design. He is appropriately experienced and competent to undertake the assessment having worked on flood risk assessments associated with Grousemount and Crockahenny Wind Farms and, drainage design for Cappawhite, Castlepook and Crockdun Wind Farms and a large number of hydrological and hydrogeological assessments for electrical substations, power stations and other ESB developments across the country.

The assessments undertaken within this chapter were carried out in association with Anthony Cawley B.E. M.EngSc. C.Eng. M.I.E.I Consulting Hydrologist and director of Hydro Environmental Ltd. Mr. Anthony Cawley has over 30 years professional consulting experience in the water engineering field, in a wide variety of activities relating to hydrology, hydrogeology, flooding, and hydrodynamic and water quality assessments. Over that period, he has carried out well over 100 flood risk assessment studies which included groundwater, rivers, estuarine and coastal flooding throughout Ireland and also in the UK. He has over the past twenty years been involved in preparing the Hydrological Impact Assessments for over 20 major road schemes throughout Ireland, hydrological and flood risk assessment of two major solar farm projects and five large wind farm developments. He has been an expert witness on hydrology and flooding related issues at numerous oral hearings for major infrastructure projects (such as the M6, M20/M21, N23, Lansdowne Stadium redevelopment, Galway Harbour Development). He was also retained as an expert consultant to An Bord Pleanála for large housing development proposals at Kilcock, the Dublin Docks Gateway and Alexandra Basin projects in respect to flooding and hydrodynamic processes and is experienced in the requirements of strategic environmental assessments (SEA) and environmental impact assessments (EIA).

### 9.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of the 'EIA Directive' (Directive 2011/92/EU as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment. The requirements of the following legislation are also complied with:

- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).

- Planning and Development Act, 2000, as amended.
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy or, for short, the EU Water Framework Directive (WFD), established a framework for the protection of both surface and groundwater. Transposing Irish legislation with regard to surface waters, namely S.I. 272 of 2009, European Communities Environmental Objective (Surface Water) Regulations 2009 (as amended), outlines the water protection and water management measures required in Ireland to maintain high status of surface waters where it exists, prevent any deterioration in existing water status and achieve at least good status for all waters i.e., requirement to implement the WFD.
- The EU Floods Directive 2007/60/EC.
- S.I. 722 of 2003, European Communities (Water Policy) Regulations, as amended.
- S.I. 350 of 2014, European Union (Water Policy) Regulations 2014.
- S.I. 9 of 2010, European Communities Environmental Objectives (Groundwater) Regulations.
- Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances.
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration.
- S.I. 122 of 2010, European Communities (Assessment and Management of Flood Risks) Regulations.

### 9.1.4 Relevant Guidance

This chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- European Union (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report.
- National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009).
- "The Planning System and Flood Risk Management - Guidelines for Planning Authorities (DECLG/OPW, 2009)."
- Galway County Development Plan 2022-2028 Strategic Flood Risk Assessment.
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission, 1999). Forest Road Manual Guidelines for the design, construction and management of forest roads (COFORD, 2004).
- Climate Change Sectoral Adaptation Plan. Flood Risk Management (2015-2019). FRAM Section, Office of Public Works (OPW, 2019).
- Drainage of Runoff from Natural Catchments. Volume 4 Section 2 Part 1. NRA HD 106/15 (TII, 2019).
- A number of River Basin Management Plans (RBMPs) were developed to address the requirements of the WFD. The first cycle RBMP of relevance to this assessment (the Western RBMP 2009-2015) was adopted in 2009 and this included a programme of measures required to facilitate the achievement of the WFD objectives. This programme of measures included full implementation of existing legislation including the Water Pollution Acts, Water Services Act, Bathing Water Quality Regulations, Integrated Pollution Prevention and Control (IPPC) Regulations, Urban Wastewater Treatment Regulations and the Birds and Habitats Directives (particularly the Appropriate Assessment (AA) process).

- The second cycle of the river basin management planning is completed, and the Government has published the River Basin Management Plan for Ireland 2018 – 2021 which merges the Eastern, South Eastern, South Western, Western and Shannon River Basin Districts to form one national River Basin District. As outlined in the RBMP this "Irish River Basin District" is "...broken down into 46 catchment management units. These units are, in the main, based on the hydrometric areas in use by authorities– with, for example, the Shannon District being sub-divided on the basis of the catchments of its major tributaries. The 46 catchment management units have been broken down further into 583 subcatchments". The Derrybrien Wind Farm location in relation to adjacent Water Management Units (WMU) as defined by the EPA (Environmental Protection Agency) is shown in Figure 9-1. The third cycle of the River Basin Management Plan for the period of 2022-2027 is currently being prepared.
- Individual catchment assessments for each of the 46 WMUs have been developed and published by the EPA's Catchment Science and Management Unit. The area encompassing Derrybrien Wind Farm is captured entirely in the Galway Bay South East Catchment Assessment 2016-2021 (HA 29) with the exception of a small area at the northeast corner of the wind farm which lies in the neighbouring Lower Shannon Catchment (HA 25C) (EPA, 2021).

# 9.2 Methodology

## 9.2.1 Impact Assessment Methodology

Figure 2-1 of the EPA EIAR Guidelines (EPA, 2022) demonstrates how the identification of impacts leads to effects which should be classified and addressed accordingly. The significance of effects of the Prospective Development has been assessed in accordance with the EPA Guidelines (EPA, 2022).

## 9.2.2 Flood Risk Assessment Methodology

The methodology used to assess the flood risk associated with the Project is based on The Planning System and Flood Risk Management - Guidelines for Planning Authorities (OPW, 2009). The site-specific Flood Risk assessment is presented in Appendix 9-1 and the findings summarised later in this document.

The Guidelines set out a staged approach for the consideration of flood risk in relation to developments as follows: -

> *"Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;"*
>
> *"Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the stage 2 assessment scopes the requirements of the detailed assessment;" and*
>
> *"Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed*

*or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. The stage 3 should also address the residual risks and impacts, flood risk management plan and future climate change implications."*

The flood risk assessment considers the flood risk of the Prospective Development works in relation to stage 1 of the staged approach outlined above.

### 9.2.3 Zone of Influence

The boundaries of the EIAR Study Area on a regional scale lie almost entirely in the Galway Bay South-East WFD Catchment (hydrometric area 29). A small area (<0.02 $km^2$, representing only 0.6% of the overall wind farm site area) to the northeast corner of the wind farm site lies within the neighbouring Lower Shannon WFD Catchment (hydrometric area 25C) (Figure 9-1).

The Derrybrien Wind Farm site lies on Cashlaundrumlahan Mountain in south County Galway, 12.7 km east-northeast of Gort, 11 km due south of Loughrea and 25 km west of Portumna. The overall area of the wind farm site is approximately 344.5 ha (3.44 $km^2$). The lands within the wind farm site comprise disturbed peat bog, all of which was formerly used either for commercial Coillte forestry plantation (263 ha) or turbary and other bog lands (81 ha). The wind farm infrastructure only comprises approximately 9% of the site area in terms of tracks, turbine bases and access areas. Site elevations range from 320–365 mOD on the upper slopes forming the wind farm, which form a gently sloping plateau aligned on a northeast / southwest axis.

Slopes range from less than 3 degrees up to 7.5 degrees locally, increasing up to 10 degrees in places ( Figure 9-2). There is a broad zone that runs across the full width of the site for a distance of approximately 250 – 300 m to the north and south of the peak of the mountain where the ground surface slopes gently away from the peak at slope angles of less than 3 degrees. This is within the central three rows of turbines. To the south of this zone the slope is convex in profile with slopes generally increasing up to 4 – 5 degrees and locally 5.0 – 7.5 degrees within the site boundary, particularly between Turbines T21 and T41 along the southern boundary.

Downslope from the site in this area the slopes increase up to 7.5 degrees more consistently and locally up to 10.0 degrees.

The northern upper slopes of the mountain within the site boundary are characterised by a terraced profile with broad flat areas where the slope angles are less than 3 degrees, separated by benches where the slopes are locally steeper at up to 5.0 – 7.5 degrees, locally up to 10 degrees. In general, the depth of peat is inversely proportional to the slope angles, i.e. peat is deeper across the middle of the site and shallower around the boundaries.

The elevation of the OHL route falls from Derrybrien Substation on the southern end of the wind farm site at an elevation of 330 mOD to a flat-bottomed valley where it crosses the R353 road and the tributaries of the Owendalulleegh River at an elevation of approximately 130 mOD. From here, the route skirts around the Slieve Aughty Bog Natural Heritage Area (NHA – site number 001229) before gaining elevation again as it passes Lough Agannygal, at about 195 mOD. The route ends at the Agannygal Substation, just to the north of Lough Atorick, at an elevation of approximately 190 mOD.

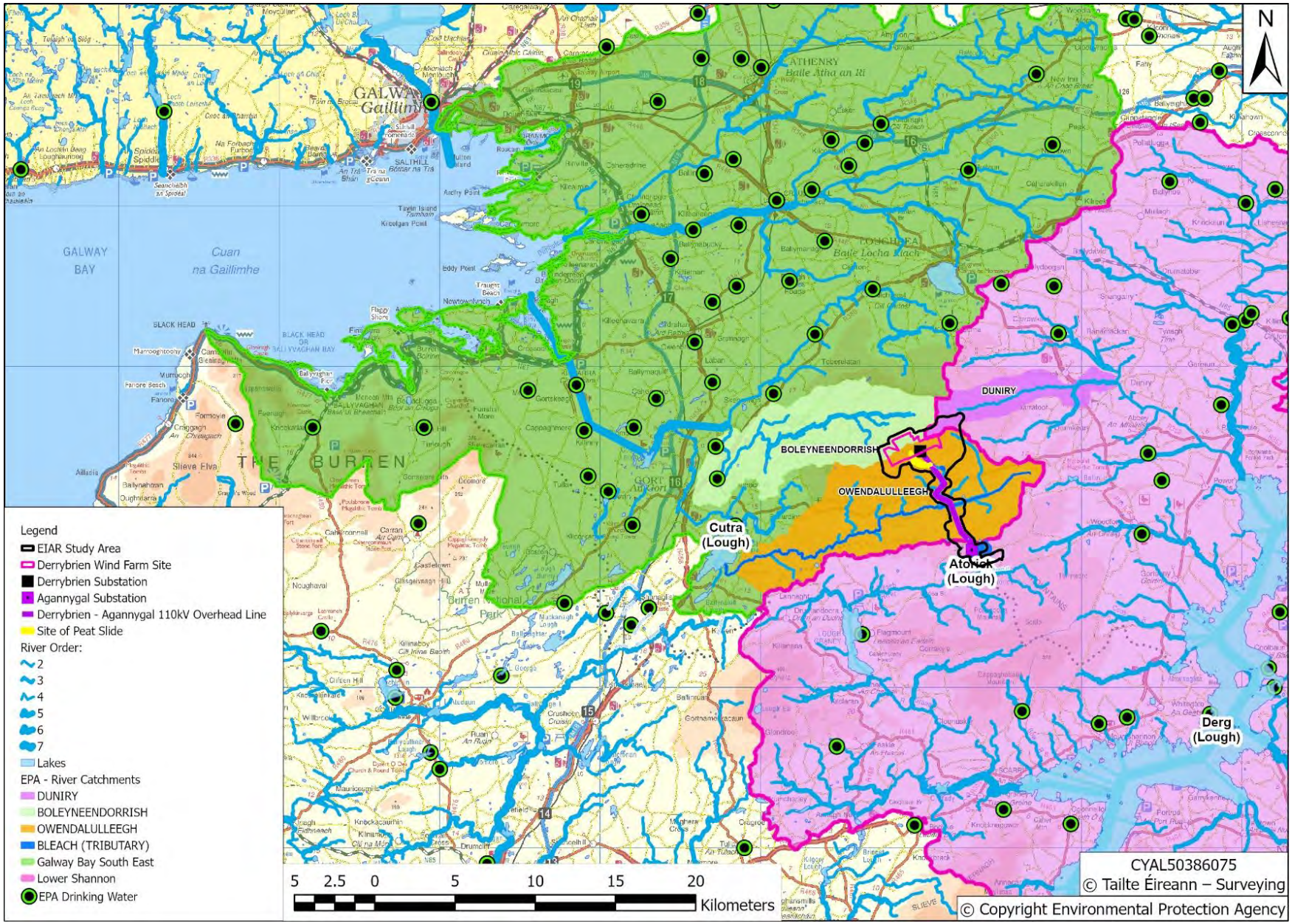



*Figure 9-1 Catchments in relation to Derrybrien Wind Farm Development*

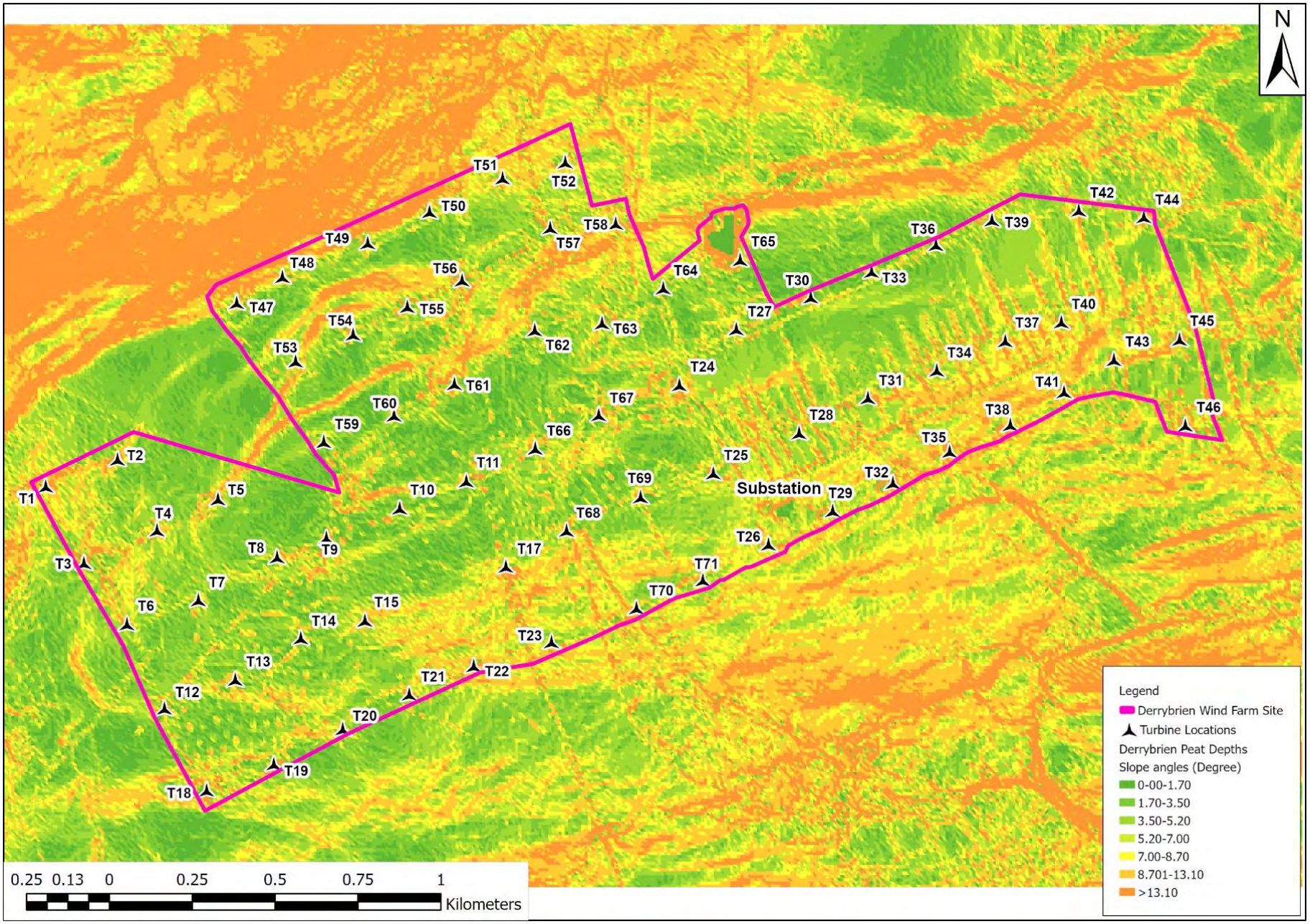



*Figure 9-2 Ground surface slope angles based on post construction LIDAR survey*

### 9.2.4 Baseline Data Gathering

A desk study was carried out to collate the available information on the surface water and groundwater environments of the study area with the following data sources referenced:

- Periodic (predominantly performed annually) Geotechnical Inspection Reports from the beginning of operational stage onward (2006 to 2024).
- Ordnance Survey of Ireland (OSI) - current and historical mapping.
- Aerial photography.
- LIDAR survey carried out by Fugro in 2012. This data remains valid based on subsequent spot checks.
- Met Éireann ((www.met.ie) for local and regional rainfall data and climatological data including evapotranspiration, soil moisture deficits).
- Office of Public Works (OPW) Flood Studies Update (FSU) portal (opw.hydronet.com) for catchment analyses and flood risk assessment including catchment mapping.
- OPW floodinfo.ie for predictive and historical flood mapping, reports, press archives and photographs.
- EPA Water map viewer (https://gis.epa.ie/EPAMaps/Water).
- Water Framework Directive Ireland Database (www.wfdireland.ie).
- The Western River Basin Management Plan (WRBMP) 2016-2022.
- Geological Survey of Ireland (GSI) Groundwater Mapping and records for the Project location.
- OPW floodinfo.ie predictive and historical flood mapping.
- The River Basin Management Plan for Ireland 2018-2021 (Department Housing, Planning, Community and Local Government (DHCLG), (2018).
- The Western River Basin District Catchment Flood Risk Assessment and Management Study (CFRAMS).
- Catchments.ie provides EPA Water quality data, etc.
- Site investigation reports prepared by AGL Consulting.
- Peat stability reports prepared by AGL Consulting.
- Piezometer measurements.
- Topographical survey.

### 9.2.5 Site Walkover

Substantial field work in the form of geotechnical investigations throughout the life of the Derrybrien Wind Fam Development have informed the establishment of baseline data for this chapter.

Field work carried out between 2018 and 2024 for the purpose of assessing the current state of the Project site specifically involved a series of walkover surveys of the wind farm site, the peat slide area, the overhead line (OHL) route and two electrical substations that comprised the Project. These were carried out in tandem with topographical and drone surveys. Detailed surveys were carried out on the wind farm site of the drainage channels and on the in-stream structures. A Light Detection and Ranging (LIDAR) survey of the entire wind farm site was carried out in 2012 and informed the flood risk assessment for the site including the 110 kV Derrybrien Substation compound (See **Appendix 9-1** – Flood Risk Assessment). Following on from these field surveys, the results were reviewed in ArcGIS software in conjunction with publicly available hydrological and hydrogeological data from the GSI, EPA, and OPW historical records. A site walkover to review the condition of the drainage network was conducted in September 2024.

### 9.2.6 Scoping and Consultation

As detailed in Chapter 2 Scoping and Consultation was undertaken in September 2024. No responses relating to the Hydrology and Hydrogeology were received.

### 9.2.7 Limitations/Difficulties Encountered

No limitations/difficulties that would have prevented a comprehensive assessment from being undertaken, were encountered. Rainfall data for the site is only available up to August 2022 but does not affect ability to carry out the overall assessment.

## 9.3 Receiving Environment

### 9.3.1 Existing Environment

Peatland bogs such as that on which Derrybrien Wind Farm site are wetlands that are fed directly by rainfall to give rise to their characteristic saturated surface conditions and water logging. These are generally characterized as having a living surface peat layer typically 0.1 – 0.3 m thick, the acrotelm, with moisture content up to 90 – 98% and features the peat-forming vegetation, i.e. sphagnum moss, cotton grass and other materials including purple moor grass, heather stems and roots. The acrotelm supplies plant material which then slowly forms peat in the underlying catotelm layer. Typically, active peat bogs grow slowly at 0.5 – 1.0 mm per annum. In active bogs sphagnum mosses form a protective carpet which is a mosaic of sphagnum species growing as dense hummocks, low growing lawns and as hollows that create the characteristically undulating bog surface. In these undrained conditions, the saturated bog promotes increased surface ponding as pools and mires, also generating overland runoff as sheet flow across the surface of the bog. Active blanket bog generally remains close to saturation throughout the year and therefore has limited available storage except in depressions where larger pools can form before spilling overland.

In the case of Derrybrien wind farm, the land use prior to its development was primarily –

i. Turbary bog, and
ii. Commercial forestry.

which both represent a drained bog situation, i.e. where active blanket bog has been degraded. The wind farm site had been extensively drained in the past, prior to any wind farm construction, by a series of parallel open ditches to facilitate commercial forestry and turf cutting under turbary rights. Turf cutting has and continues to take place on the eastern part of the site. Farming is also undertaken in the lower lying areas. The principal economic activity in the immediate area is forestry and farming, the latter being dominated by grazing of cattle.

The ditches and drains in the worked bog and forestry discharge to the natural drainage and watercourses in the area (Plate 9-1 and Plate 9-2).



*Plate 9-1 Typical site land at Derrybrien Wind Farm*



*Plate 9-2 Interceptor Drainage channel at Derrybrien wind farm near Turbine T35*

i) Turbary Bog

In a damaged or degraded bog, the acrotelm has been lost through drainage, burning, trampling / grazing, afforestation or agriculture (which includes fertiliser application as well as drainage). The degradation exposes the unprotected underlying catotelm layer more acutely to atmospheric conditions including the surface water environment. Subsequently, non-wetland vegetation becomes established, accelerating the aeration, drying and shrinkage process (primary consolidation) within the bog.

The loss of moisture and thus buoyancy in the upper layers further squeezes water from the catotelm layer (secondary compression). Drainage of peat bogs is generally focused on lowering the water table through a network of deep connecting drains often for domestic and commercial peat production, for forestry production or for agricultural grassland reclamation to provide an unsaturated soil root zone that enables plant growth to succeed. The construction of drainage ditches in a bog provides shorter pathways for surface water to run off and depending on the density of the drainage network will ultimately reduce waterlogging and over time dry out the surface acrotelm layer and more gradually the upper layers of the catotelm. The acrotelm layer offers relatively low resistance to vertical and lateral water movement and, consequently, drainage tends to empty water reasonably readily from the acrotelm layer. However, given this layer is relatively thin, the drainage effects on the surrounding water table are minor. The drying process should over time alter the surface topography and increase the range in the water table between summer and winter levels.

ii) Commercial Forestry

Forestry plantations such as that which occupied the majority of the wind farm site prior to 2003 cannot tolerate permanently waterlogged conditions such as the saturated conditions found in active blanket bogs. For forestry to flourish it is necessary to drain the peat and remove excess surface water to locally lower the perched water table level. It is also necessary to plough the surface to provide a slightly raised ridge that acts as a micro-habitat for tree seedlings to establish with the ploughed furrow conveying the drainage away from the planted ridge. Tree planting takes place in rows parallel to the ploughed furrow with the areas in between the ridges often an efficient avenue for runoff to collect and migrate downgradient to receiving watercourses. As such, the overall effect of forestry plantations like this is to increase peak winter flood runoff rates from upland areas. It should be noted however that this only applies when antecedent conditions are wet such as during winter. In drier conditions, the soil moisture deficit may be greater where the root zone promotes drying of the underlying peat, thus effectively providing a degree of attenuation.

Given the upland nature and gradients of the area, the site on which the wind farm was developed represented high runoff category land. This classification is further discussed in **Appendix 9-1**.

The pre-existing drainage network on the wind farm site shown in Figure 9-3 overlain on an OSI aerial photograph from 2000, represents the pre-development condition for the wind farm. It shows the extent of pre-existing access roads (2.0 km), the extent of conifer plantations (2.63 $km^2$), the turbary plots in the open blanket bog at the east end of the site (0.81 $km^2$), potential subsurface drainage channels along lines of vegetation and patches of poor tree growth which is generally associated with deep peat and high-water tables.

The roads on site prior to the wind farm development generally follow an east-west axis parallel to contour lines. The road layout of the wind farm also generally followed an east-west orientation with a number of spur roads connecting these from north to south, particularly along the internal boundary of the wind farm site (Figure 9-3). The study area also comprises the 7.8 km overhead line running southward from the wind farm site and the tee-in substation at Agannygal connecting the wind farm to the National Grid (Figure 9-4).

The elevation along the route falls to a flat-bottomed valley where it crosses the R353 road and the tributaries of the Owendalulleegh River at an elevation of approximately 130 mOD. From here, the

route skirts around the Slieve Aughty Bog NHA (site number 001229) before gaining elevation again as it passes Lough Agannygal, at about 195 mOD. The route ends at Agannygal Substation, which is located to the south-east of Cashlaundrumlahan Mountain and north of Lough Atorick, at an elevation of approximately 190 mOD. The substation location prior to construction was in afforested Coillte-owned land. The land is elevated with respect to the surrounding area to the north, west and south.

The peat slide, which occurred during Project construction in October 2003, extended from within the southern end of the wind farm site further south through Coillte land and onto private land between the wind farm site and Flaggy Bridge on the R353. Measures undertaken in response to the peat slide included the rebuilding of short sections of road within the wind farm site and the installation of eight barrages (three temporary earthen barrages, one temporary rockfill barrage and four extant boulder barrages) along and downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge. These barrages were constructed along and downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge of which four (Barrages 1,2 3 and 4) remain in-situ. Peat and soil from the peat slide which had accumulated on adjacent lands, together with material excavated for the construction of barrages and had accumulated behind the barrages was placed in three peat repository areas. Man-made drains constructed within the source area of the slide comprised a series of narrow open drains 1 – 2 m deep with closely spaced furrows. These drains connected to the natural valley drainage in the area and flowed downslope. It is not proposed that any of the elements constructed in response to the slide shall be decommissioned as part of the current Prospective Development.

The OHL route crosses the site of the peat slide between pole sets 5 and 6, and also crosses Barrages 2 and 3, installed as a result of the peat slide. Several watercourses cross the footprint along the OHL route, the largest being the main stream of the Owendalulleegh River which passes beneath the OHL between pole sets 25 and 26. Lough Agannygal passes underneath the section between pole set 37 and angle mast 38.

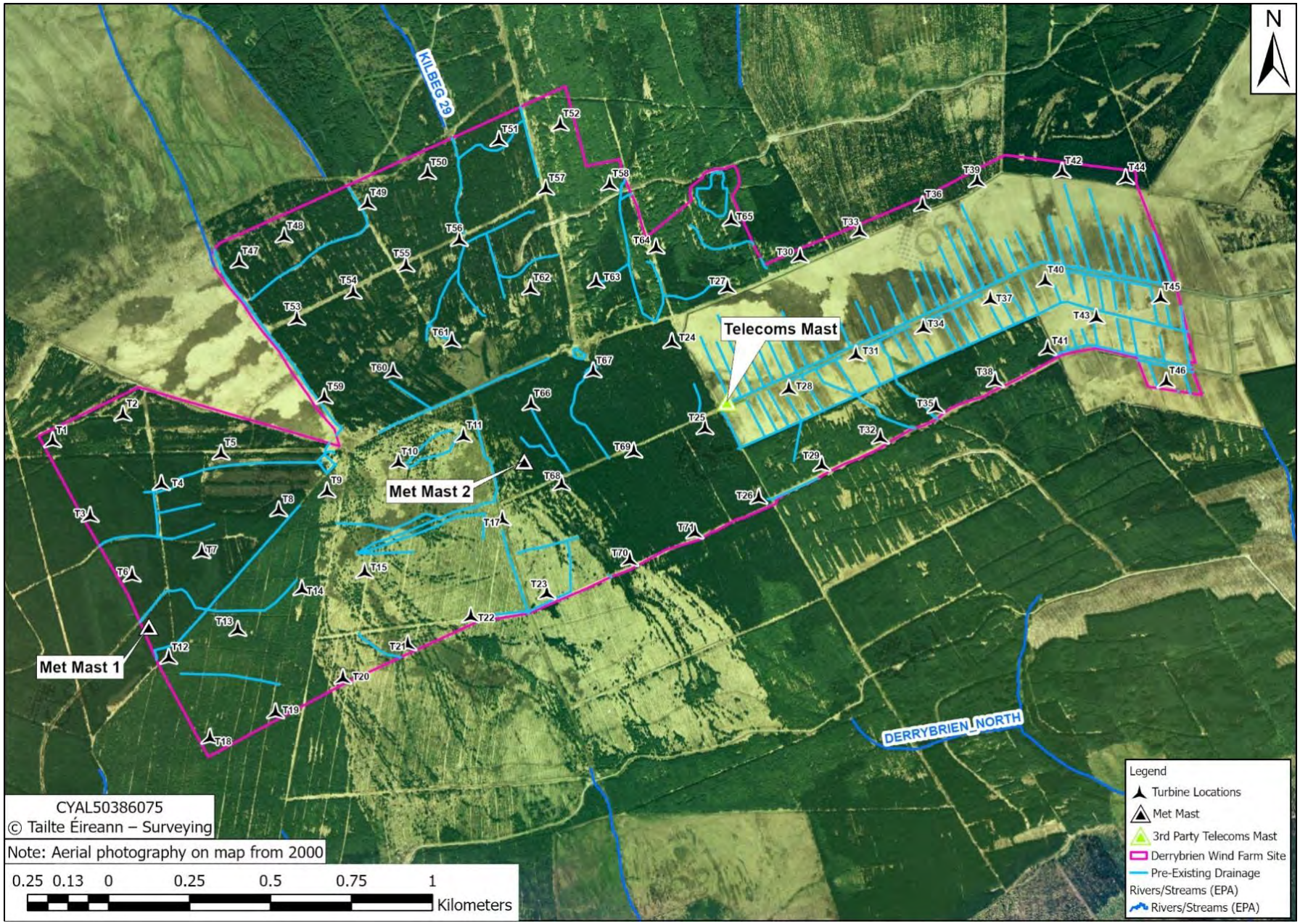



*Figure 9-3 Wind Farm Development - Pre-existing Drainage Only*

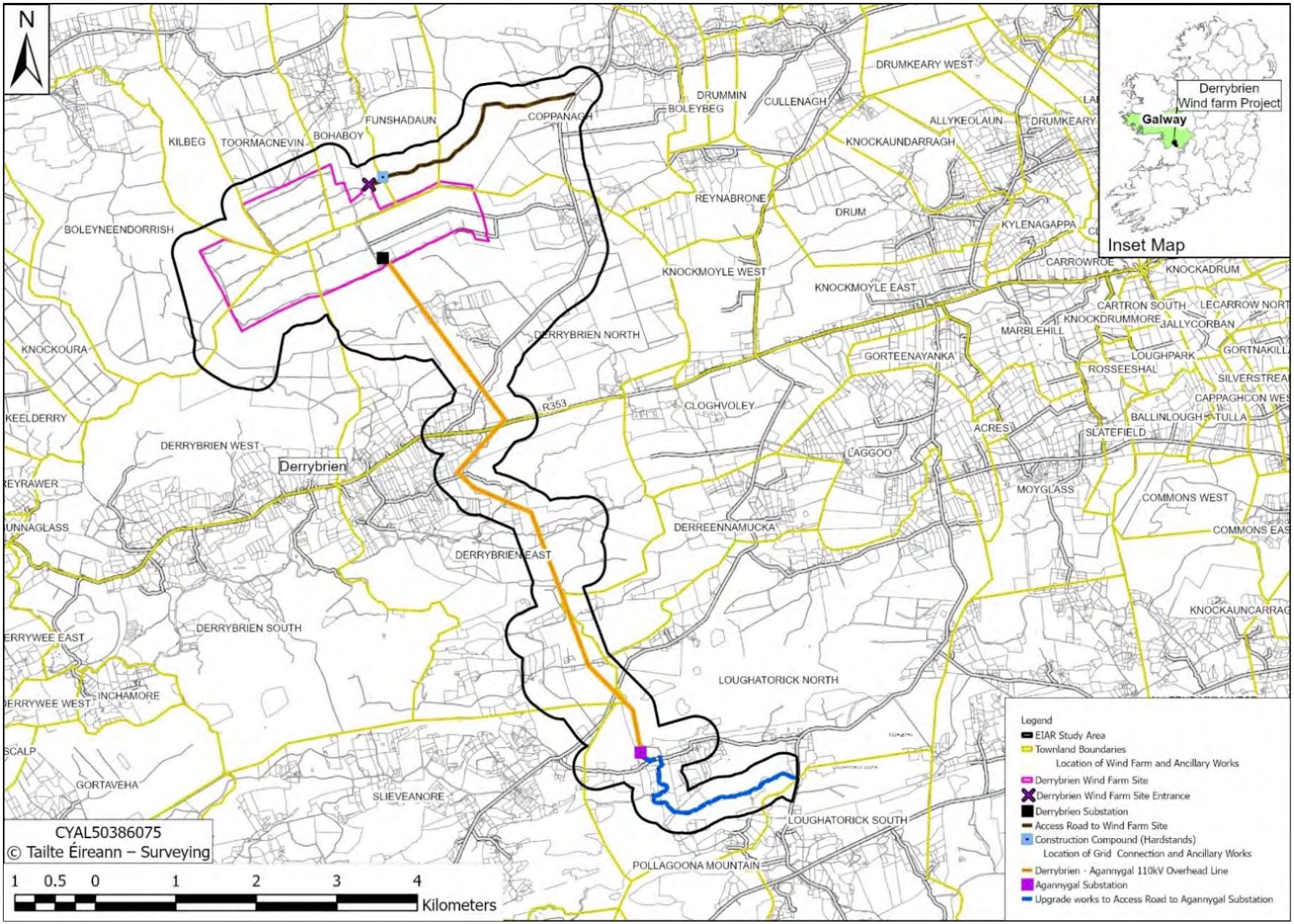



*Figure 9-4 Location of Works*

## 9.3.2 Water Balance

The long-term rainfall and evapotranspiration data relevant to the study area was sourced from Met Éireann. The Standard Annualised Average Rainfall (SAAR, i.e. long-term annual average rainfall) recorded at Gort (Derrybrien II) Met Station 3 km south of the site is 1431 mm. This rain gauge is the closest Met Éireann gauge but is at a lower elevation (155 mOD) than the wind farm (which is at a minimum elevation of 320 mOD). Data for the site is only available up to August 2022 (Table 9-1).

*Table 9-1 Monthly Rainfall (mm) at Gort Derrybrien II Met Station*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2022 | 84 | 208 | 55 | 84 | 69 | 94 | 49 | 43 | | | | | |
| 2021 | 199 | 159 | 117 | 22 | 137 | 31 | 131 | 128 | 102 | 131 | 74 | 133 | 1363 |
| 2020 | 130 | 348 | 128 | 51 | - | 106 | 187 | 205 | 71 | 204 | 166 | 177 | |
| 2019 | 127 | 99 | 224 | 104 | 48 | 89 | 82 | 247 | 174 | 121 | 166 | 172 | 1652 |
| 2018 | 250 | 76 | 76 | 108 | 69 | 16 | 63 | 100 | 138 | 64 | 125 | 174 | 1258 |
| 2017 | 59 | 112 | 179 | 19 | 54 | 119 | 153 | 112 | 153 | 139 | 130 | 207 | 1435 |
| 2016 | 205 | 206 | 98 | 63 | 87 | 125 | 87 | 137 | 136 | 53 | 94 | 91 | 1380 |
| 2015 | 95 | 98 | 128 | 93 | 178 | 46 | 111 | 122 | 75 | 67 | 268 | 384 | 1664 |
| 2014 | 255 | 285 | 106 | 45 | 149 | 52 | 105 | 126 | 20 | 160 | 151 | 205 | 1658 |
| 2013 | 136 | 71 | 58 | 104 | 125 | 81 | - | 79 | 74 | 157 | 111 | 258 | |
| 2012 | 168 | 88 | 38 | 125 | 62 | 224 | 141 | 140 | 106 | 146 | 162 | 179 | 1580 |
| 2011 | 103 | 173 | 65 | 61 | 127 | 158 | 82 | 80 | 184 | 145 | 140 | 234 | 1553 |
| 2010 | 70 | 62 | 115 | 98 | 48 | 52 | 170 | 63 | 174 | 96 | 171 | 37 | 1156 |
| 2009 | 196 | 23 | 96 | 154 | 135 | 97 | 190 | 191 | 58 | 139 | 428 | 113 | 1820 |
| 2008 | 260 | 100 | 149 | 53 | 41 | 149 | 105 | 220 | 124 | 210 | 138 | 114 | 1662 |
| 2007 | 171 | 101 | 99 | 26 | 90 | 121 | 182 | 133 | 77 | 54 | 90 | 199 | 1341 |
| 2006 | 96 | 44 | 142 | 53 | 143 | 30 | 57 | 65 | 220 | 139 | 180 | 230 | 1399 |
| 2005 | 164 | 68 | 62 | 107 | 110 | 54 | 72 | 97 | 92 | 116 | 123 | 81 | 1147 |
| 2004 | 147 | 49 | 93 | 75 | 57 | 108 | 85 | 89 | 139 | 157 | 103 | 149 | 1253 |
| 2003 | 98 | 71 | 64 | 65 | 152 | 116 | 104 | 22 | 47 | 80 | 147 | 110 | 1076 |
| 2002 | 197 | 235 | 96 | 105 | 139 | 134 | 64 | 101 | 44 | 164 | 178 | 112 | 1568 |
| 2001 | 67 | 67 | 109 | 101 | 37 | 85 | 97 | 113 | 59 | 132 | 137 | 77 | 1079 |
| 2000 | 123 | 162 | - | 53 | - | 77 | 92 | 96 | 142 | 220 | 175 | 147 | |
| 1999 | 169 | 99 | 75 | 95 | 102 | 71 | 72 | 85 | 238 | 105 | 169 | 289 | 1570 |
| mean | 151 | 120 | 110 | 76 | 99 | 92 | 110 | 117 | 115 | 130 | 158 | 168 | 1431 |

Met Éireann provides a 2 km x 2 km grid of SAAR nationally, available from Me Eireann Web site. and. The Met Éireann SAAR model gives an annual rainfall estimate for the nearest node points to the summit of the site of 1573 and 1591 mm respectively. These estimates are higher than the gauged estimate which is expected given the higher altitude of the nodal points to the gauge site. The latter is taken as the SAAR figure from hereon.

Met Éireann via the Flood Studies Update (FSU) web portal provides a 2 km x 2 km grid of rainfall Depth Duration Frequency (DDF) data (Table 9-2). The depth duration frequency model allows for the estimation of point rainfall frequencies for a range of durations for any location in Ireland. The model consists of an index (median) rainfall and a log-logistic growth curve which provides a multiplier of the index rainfall.

*Table 9-2 Rainstorm Depth (mm) Duration Return Period Table for wind farm site from FSU Web Portal*

| Duration (hrs) | Return Period (years) | | | | |
|---|---|---|---|---|---|
| | 5 | 10 | 50 | 100 | 250 |
| 1 | 16.0 | 19.1 | 27.5 | 32.1 | 39.1 |
| 3 | 24.2 | 28.4 | 39.7 | 45.5 | 54.7 |
| 6 | 31.4 | 36.5 | 49.8 | 56.7 | 67.2 |
| 9 | 36.5 | 42.2 | 56.9 | 64.4 | 75.9 |
| 12 | 40.6 | 46.7 | 62.4 | 70.5 | 82.6 |
| 18 | 47.2 | 53.9 | 71.2 | 80.0 | 93.1 |
| 24 | 50.6 | 57.6 | 75.5 | 84.4 | 97.9 |
| 48 | 63.5 | 71.4 | 91.2 | 101 | 115.3 |
| 96 | 84.1 | 93.4 | 116.3 | 127.4 | 143.5 |

The closest synoptic weather station where the average Potential Evapotranspiration (PE) is recorded is Mellows College Athenry, approximately 25 km to the north northwest of the wind farm. The next nearest is located at Shannon Airport which is a synoptic weather station site adjacent to the Shannon Estuary located 48 km south southwest of the site. Measurement of Penman PE is only generally available at the 25 Met Éireann synoptic weather stations throughout Ireland and average PE rates across the nation vary from 425 mm to 600 mm per annum. The median PE for this station for the period 2016 to 2024 is 523 mm/year (Table 9-3).

*Table 9-3 Potential Evapotranspiration (mm) at Athenry Synoptic Station*

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 | 11 | 16 | 33 | 54 | 73 | 83 | 78 | 64 | 46 | 26 | 11* | 9* | 545 |
| 2023 | 11 | 19 | 33 | 54 | 84 | 100 | 74 | 66 | 47 | 23 | 11 | 3 | 524 |
| 2022 | 11 | 20 | 42 | 57 | 78 | 79 | 85 | 82 | 45 | 26 | 13 | 6 | 545 |
| 2021 | 7 | 22 | 30 | 63 | 77 | 79 | 81* | 67 | 42* | 25 | 12 | 11 | 515 |
| 2020 | 13 | 20 | 36 | 64 | 92 | 75 | 69 | 67 | 43 | 27 | 13 | 8 | 528 |
| 2019 | 10 | 21 | 34 | 55 | 76 | 84 | 85 | 62 | 42 | 25 | 11 | 10 | 514 |
| 2018 | 11 | 17 | 31 | 52 | 83 | 102 | 93 | 62 | 39 | 25 | 14 | 12 | 540 |
| 2017 | 12 | 18 | 37 | 49 | 85 | 77 | 76 | 61 | 42 | 24 | 10 | 9 | 499 |
| 2016 | 13 | 17 | 35 | 53 | 80 | 84 | 72 | 61 | 40 | 27 | 10 | 10 | 503 |
| Long term mean | 11 | 19 | 35 | 56 | 81 | 85 | 79 | 66 | 43 | 25 | 12 | 9 | 523 |

*Missing – estimated value

This PE value is used as a best estimate of the site PE. Actual Evapotranspiration (AE) at the site is also estimated as 523 mm/year based as there is unlikely to be any soil moisture deficit within the raised bog on the mountain given the generally saturated conditions.

The Effective Rainfall (ER) represents the water available for runoff and groundwater recharge. The annual ER for the site is calculated as follows:

**ER = SAAR – AE = 1591 mm/year – 523 mm/year = 1068 mm/year.**

Based on recharge coefficient estimates from the Geological Survey of Ireland (GSI, www.gsi.ie), a conservative estimate of 10% groundwater recharge is taken for the site as an overall average. This value is for "Peat" with a "Moderate" vulnerability rating. Areas of thinner peat or thin peaty soils, i.e. extreme vulnerability, may have slightly higher recharge rates, but on this site these areas are generally on sloping ground with very poor natural drainage. The lowest value in the available range was chosen to reflect the large coverage of peat and poorly draining soil types, and the high stream drainage density. Therefore, annual recharge and runoff rates for the site are estimated to be 107 mm/year (10% x

ER) and 965 mm/year respectively. Note that according to the GSI Groundwater Data Viewer, annual recharge rates are expected to be very low at approximately 100 mm/year in this area. The baseline hydrology of the site can therefore be expected to be characterised by high surface water runoff rates and a very flashy stream network with limited baseflow contribution.

## 9.3.3 Regional & Local Hydrology

A catchment can be defined as a topographic surface area contributing to a watercourse and its tributaries, with all the water ultimately merging downstream at a single channel outlet point. The catchment boundary (watershed divide) is simply the dividing line either side of which surface drainage flows towards separate streams to separate outlet points though these may merge downstream.

### 9.3.3.1 Wind Farm Site

The 344.5 ha wind farm site partially extends over the catchments of three rivers – Boleyneendorrish and Owendalulleegh in the Galway Bay South East WFD Catchment and Duniry in the Lower Shannon WFD Catchment. These catchments and the associated tributary sub catchments draining to each of the rivers are mapped in Figure 9-5and tabulated in Table 9-4 and Table 9-5.

Each of the subcatchments' boundaries are as defined by the EPA and the OPW Flood Studies Update (FSU) portal with the exception of the boundary between SC7(a) and SC7(b) which has been modified upon examination of OSI 6-inch mapping and up-to-date aerial photography. The FSU methodologies are now recommended by the OPW as being the preferred method for extreme rainfall and flood estimation in Ireland. The land use for all of the small and very small upper tributaries of the catchments that drain the footprint of the wind farm is almost exclusively a combination of coniferous forest in various states of growth or re-growth and open blanket bog moorland which has not been afforested. Details of the three catchments draining from the wind farm site are described below. Within these catchments there are a number of subcatchments (SC) which have been identified for the purposes of this study. See Table 9-5.

*Table 9-4 Summary of rivers draining from Derrybrien wind farm*

| Catchment | River Basin (Area km$^2$) | Drainage Area within wind farm boundary (km$^2$) | % wind farm site draining to each river | No. of Turbines in catchment | Area of Access Track/roads (km$^2$) |
|---|---|---|---|---|---|
| Boleyneendorrish | Kinvarra (490) | 1.15 | 33.3 | 26 | 0.065 |
| Owendalulleegh | Kinvarra (490) | 2.28 | 66.1 | 43 | 0.105 |
| Duniry | Kilcrow / Shannon (11461) | 0.02 | 0.6 | 1 | 0.003 |

*Table 9-5 Summary of river subcatchments draining from Derrybrien wind farm*

| Watercourse Name | Subcatchment Designation | Hardstanding area (km$^2$) | Turbines in Subcatchment | Turbine Numbers | Turbines in Catchment |
|---|---|---|---|---|---|
| Boleyneendorrish | SC1 | 0.012 | 7 | T1, T2, T3, T4, T5, T6, T59 | 26 |
| | SC2 | 0.019 | 10 | T47, T48, T49, T50, T53, T54, T55, T56, T60, T61 | |
| | SC3 | 0.010 | 7 | T51, T52, T57, T58, T62, T63 | |
| | SC4 | 0.007 | 2 | T64, T65 | |
| Owendalulleegh | SC6 | 0.004 | 3 | T39, T42, T44 | 43 |
| | SC7(a) | 0.038 | 19 | T24, T25, T27, T28, T29, T30, T31, T32, T33, T34, T35, T37, T38, T40, T41, T43, T45, T46, T67 | |
| | SC7(b) | 0.008 | 5 | T26, T66, T68, T69, T71 | |
| | SC7(c) | 0.025 | 14 | T8, T9, T10, T11, T13, T14, T15, T17, T18, T19, T20, T21, T22, T23, T70 | |
| | SC7(d) | 0 | 0 | - | |
| | SC8 | 0.001 | 0 | - | |
| | SC9 | 0.003 | 2 | T7, T12 | |
| Duniry | SC5 | 0.001 | 1 | T36 | 1 |

- The Boleyneendorrish River drains approximately 33% of the wind farm site via subcatchments denoted SC1, SC2, SC3 and SC4. It flows 16km downstream, westward through Blackrock Turlough and Lough Coy, having catchment areas of c. 64 km$^2$ upstream of its confluence with the Ballylee River and c. 152 km$^2$ downstream at Ballyloughaun to the east of Kiltartan. It joins up with the Gort River in the Kiltartan Flood Plain area upstream of the Coole Turlough and Special Area of Conservation (SAC) having a combined catchment area of 300 km$^2$. The Lough Coole system discharges north-west as groundwater flow and overland flow through a heavily karstified region before entering the sea at Kinvarra town.
- The Owendalulleegh River System drains approximately two-thirds (66%) of the wind farm site through a number of small hill slope stream tributaries – Cloghvoley (designated as subcatchment SC6), Derrybrien North (SC7, further divided into SC7(a), (b) and (c) owing to the large portion of the wind farm which drains to the respective streams; SC7(d) is the remaining subcatchment area but is not located within the wind farm itself) and Derrybrien South (SC8 and SC9). The Owendalulleegh River rises in the townland of Gorteenayanka and flows westward to the south of the site to Lough Cutra approximately 22 km further downstream. The catchment area of the Owendalulleegh River to Lough Cutra inlet is 90 km2 (area to lake outlet is 124 km$^2$). Downstream of Lough Cutra it flows through a heavily karstified region disappearing underground at the Punch Bowl swallow hole, re-emerging as the Gort river and again disappearing underground at Kiltartan Swallow

holes before re-emerging to enter the Lough Coole System. Downstream of Gort at Kiltartan it joins up with the Ballylee River before entering the Lough Coole system, after which it flows to the northwest through a heavily karstified region where it disappears underground. It reaches Kinvarra town approximately 15 km further downstream, at which point it enters Galway Bay. The entire Kinvarra catchment drains an area of c. 490 km$^2$.

- The Duniry River drains a very small section of the overall site 0.6%) to the northeast, designated as subcatchment SC5 with only one turbine present there. The river is a tributary of the River Kilcrow which flows into Lough Derg on the River Shannon. The Shannon then drains a catchment of 11,641 km$^2$ before entering the sea at the mouth of the Shannon Estuary. The total area of the Kilcrow catchment upstream of Lough Derg is 394 km$^2$.

#### 9.3.3.2 Overhead Line and Agannygal Substation

Several watercourses exist within the footprint of the OHL route, the largest being the Owendalulleegh River, approximately 6.0 m wide, which passes beneath the OHL halfway between pole sets 25 and 26, approximately 150 m from both. The main stream channel drainage features tend to run east to west in the OHL corridor, with minor tributary features aligned approximately north to south to tie into the major drainage features. There are several flat areas where local ponding of surface water occurs. Such a feature – Lough Agannygal (area 0.85 ha), located between pole set 37 and angle mast 38 – prevents access directly beneath the OHL. The land on which Agannygal substation is located (0.5 ha in the Bleach River Catchment) is elevated with respect to the surrounding area to the north, west and south. There is no record of drainage on or in the vicinity of the site prior to construction.

### 9.3.4 Hydrogeology

#### 9.3.4.1 Aquifer Classification

The Ayle River Formation, comprising mudstones, siltstones and conglomerates, underlie most of the wind farm site. This bedrock formation is predominantly classified by the GSI (www.gsi.ie) as a poor bedrock aquifer (Pl), having bedrock that is generally unproductive except for local zones. This bedrock is a muddy impermeable bedrock that is not very conducive to transmitting and storing groundwater flow or karstification due to its higher clay composition. There are no mapped fault lines traversing the site.

The upland areas comprise blanket peat, which underlies all the forestry in the area, with acid brown earths/brown podzolics and acidic peaty gleys underlying most of the agricultural lands farther down the valleys in both the Boleyneendorrish and Owendalulleegh catchments.

The closest karst features to the Project area according to GSI mapping are a number of limestone springs and depressional features near Ballynakill, approximately 5 km to the southeast of the wind farm site at its closest point (Figure 9-6). These springs are at the source of the Owendalulleegh River where the bedrock is a combination of dark muddy limestone / shale and massive unbedded lime-mudstone. They are not hydraulically connected to the wind farm site.

The majority of the OHL route including the grid connection at Agannygal is underlain by rock which is considered a poor aquifer (Pl) (bedrock which is generally unproductive except for local zones).

However, the segment of the route underlain by Visean Limestone (between pole sets 23 and 26 approximately) is considered a locally important aquifer (LM) (bedrock which is moderately productive only in local zones) although there is little evidence for groundwater usage from this aquifer locally that has been discovered in preparing this report.

Groundwater within the wind farm site boundary would be expected to flow downslope through a network of natural open pipes within the peat as well as possibly through an open joint network in the underlying bedrock. Several minor spring risings have been identified on site, particularly within scarp faces on the northern slopes. Receptor sensitivity criteria are set out in Table 9-6.

*Table 9-6 Receptor Sensitivity Criteria (adapted from www.sepa.org.uk)*

| Sensitivity Criteria | |
|---|---|
| Not sensitive | Receptor is of low environmental importance (e.g. surface water quality classified by EPA as A3 waters or seriously polluted, fish sporadically present or restricted). Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability "Low" – "Medium" classification and "Poor" aquifer importance. |
| Sensitive | Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability "High" classification and "Locally" important aquifer. |
| Very sensitive | Receptor of high environmental importance, of national or international value i.e. NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water. GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer |

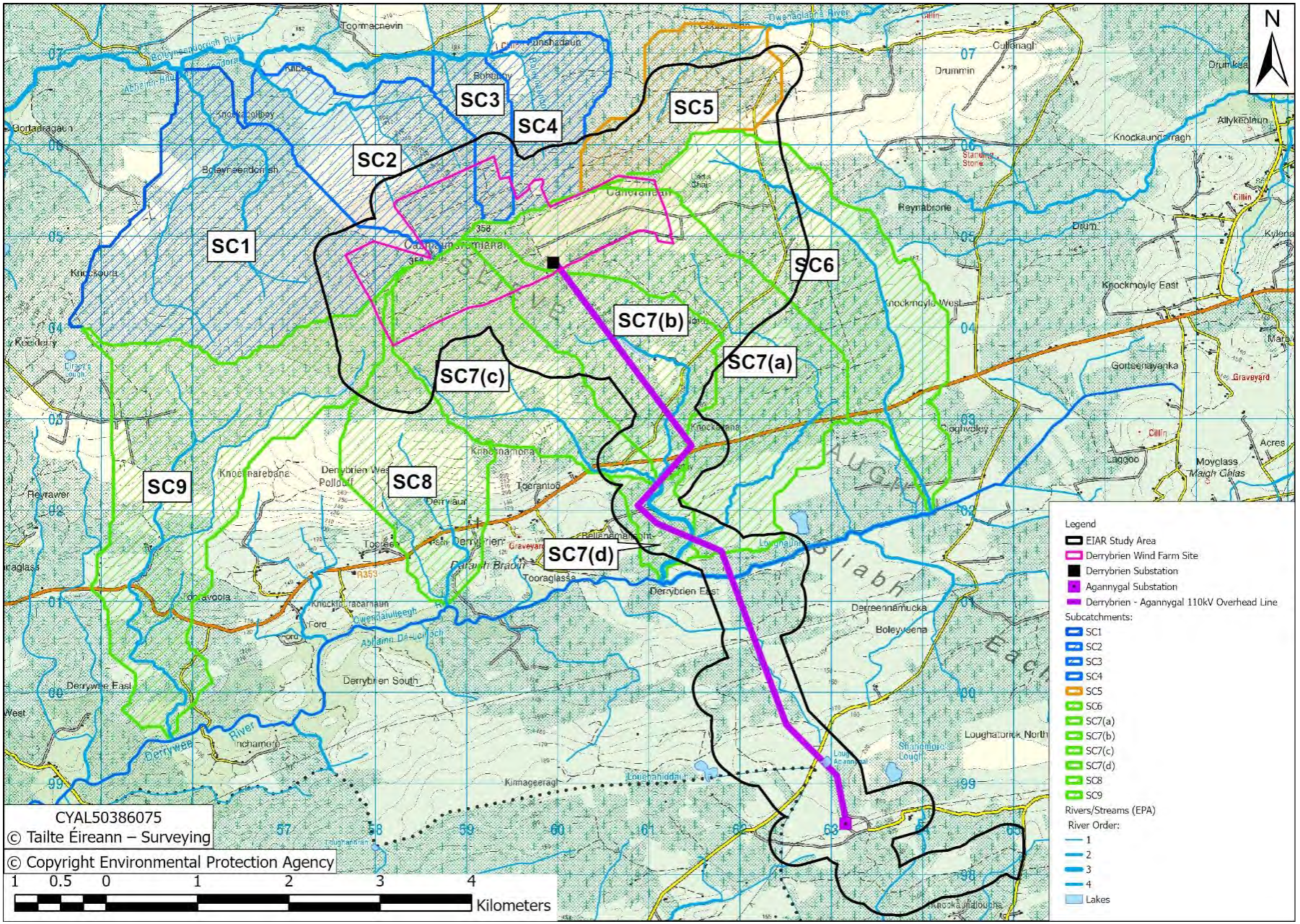



*Figure 9-5 Sub catchments draining from Derrybrien Wind Farm Development site to major rivers*

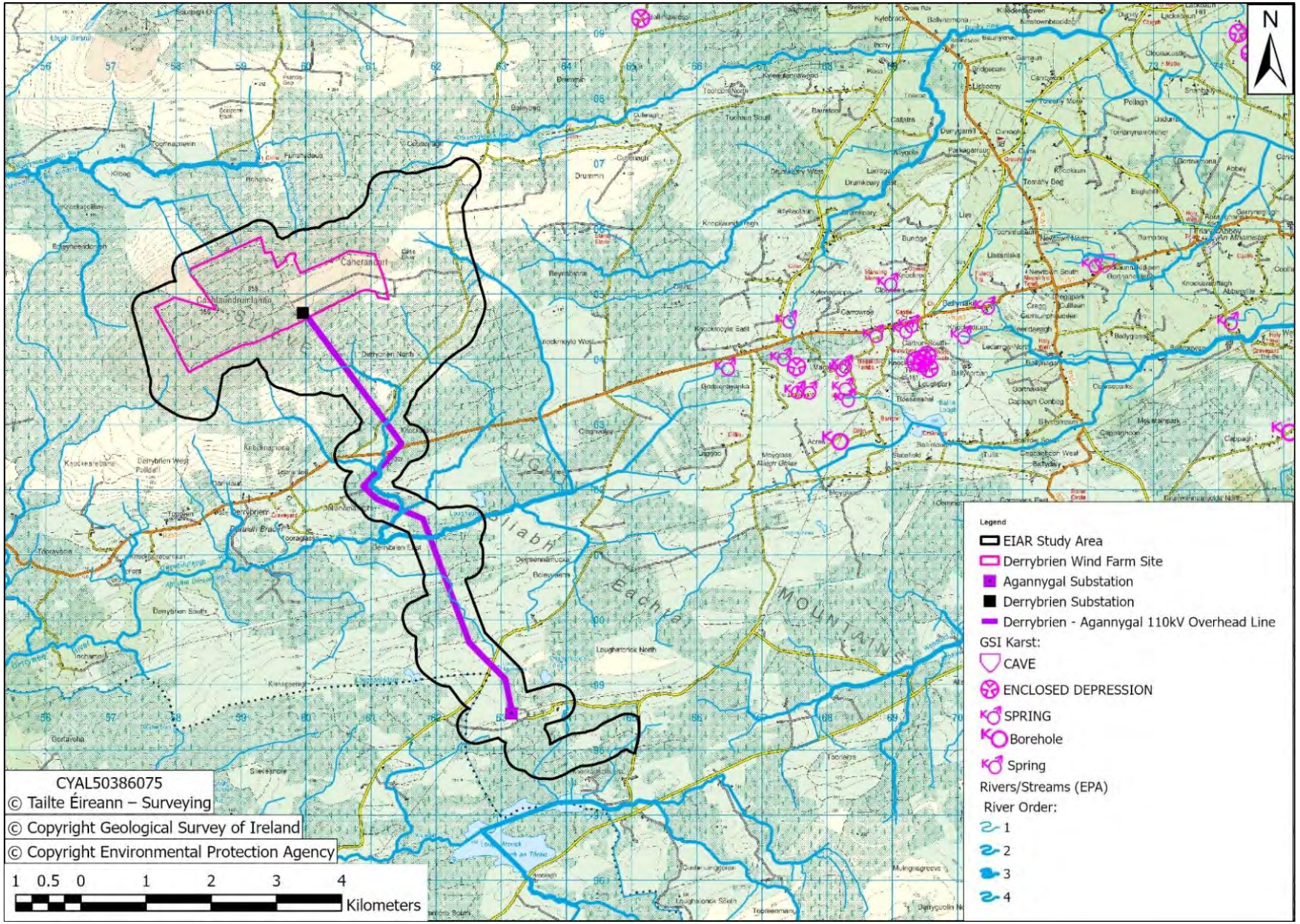



*Figure 9-6 Karst features in relation to Derrybrien Wind Farm Development*

### 9.3.4.2 Groundwater Vulnerability

Groundwater vulnerability represents the intrinsic geological and hydrogeological characteristics that determine how easily groundwater may be contaminated by activities at the surface. Vulnerability depends on the quantity of contaminants that can reach the groundwater, the time taken by water to infiltrate to the water table (itself dependent on infiltration path length and infiltration rate) and the attenuating capacity of the geological deposits through which the water travels. The GSI groundwater vulnerability rating of the aquifer underlying the wind farm ranges from Moderate in the south-west corner of the site to High over most of the site. The High vulnerability rating suggests that the combined thickness of peat and mineral subsoils above bedrock at the site ranges from 3 – 5 m in these areas (Table 9-7). Ground investigation information showed the depth to the top of the rock was variable but typically ranged from 3.5 to 6.2 m, which generally reflects the GSI vulnerability classification of High (3 to 5m overburden depth) and Moderate (5 to 10m overburden depth). However, the rock was shallower (1.3 m to 2.9 m) at the northern part of the site representing extreme vulnerability (i.e. < 3m overburden depth) as per Table 9-7 and there were some locally deeper depths to rock (8 m to 9.1 m) at the north-eastern and central parts of the wind farm site.

*Table 9-7 Groundwater Vulnerability Categories (GSI)*

| Sensitivity | Hydrogeological Conditions | | | | |
|---|---|---|---|---|---|
| | Subsoil Permeability (Type) and Thickness | | | Unsaturated Zone | Karst Features |
| | High Permeability (Sand and Gravel) | Medium Permeability (Sandy Subsoil) | Low Permeability (Clayey Subsoil/Peat) | Sand and Gravel aquifers only | <30 radius |
| Extreme (E) | 0 – 3.0 m | 0 – 3.0 m | 0 – 3.0 m | 0 – 3.0 m | - |
| High (H) | >3.0 m | 3.0 – 10.0 m | 3.0 – 5.0 m | >3.0 m | N/A |
| Moderate (M) | N/A | >10.0 m | 5.0 – 10.0 m | N/A | N/A |
| Low (L) | N/A | N/A | >10.0 m | N/A | N/A |

Based on the receptor sensitivity criteria, groundwater at the wind farm site can be classed as Not Sensitive to pollution, as the underlying bedrock is classified as a Poor Aquifer. In addition, most of the site is covered in peat and poorly draining soils, which act as a protective cover to the underlying aquifer. Any contaminants that may be accidentally released on site are more likely to travel to nearby watercourses within surface runoff. The relatively low permeability of the bedrock means that contaminants in the overburden will not be very mobile and any contaminant that may reach the bedrock would not disperse and would remain localised to the source or would be diluted and removed as part of runoff during wet periods.

Groundwater vulnerability ranges from low generally up to extreme in pockets of the most low-lying areas across the OHL route and grid connection due to the shallow depth to bedrock in these areas. There are no mapped karst features in these areas.

### 9.3.4.3 Groundwater Abstractions

The EPA have launched a register of water abstractions in accordance with the European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018). Abstractions in excess of 25 $m^3$ of water or more per day are required to register their water abstraction. Searches of the GSI well database and the EPA WFD database indicate that there are no known groundwater abstraction wells within 5 km of the wind farm site boundary. The nearest mapped well is located 7 km to the south-west of the site boundary.

However, given the rural location many houses obtain their water supply from private wells. The 2016 census showed the percentage of private water supplies to houses in the surrounding Electoral Divisions (EDs) is in the order of 90%.

Communication with local authorities and the local community has yielded information that Derrybrien village is the only area identified in the vicinity of the wind farm requiring water supply. A number of private dwellings here are part of a group scheme covering 10 houses, while others have their own independent wells and some others harvest rainwater from their roofs. The local church gathers its own water supply from its roof.

#### 9.3.4.4 Groundwater Levels

In January 2005, 12 no. electronic vibrating-wire piezometers were installed to the base of the peat layer in clusters of three located at different depths and at four locations across the site to get continuous readings of piezometric pressure head and the free water level in the peat. The piezometers were situated at points which, due to their proximity to turbine bases and the need to protect the bases from flooding, received substantial new drainage. The piezometers were installed adjacent to turbines T2 and T18 near the western boundary and near T34 in the middle of the turbary land at the eastern end of the site (Figure 9-7). Piezometers installed at the northern end of the site at T49 and T50 malfunctioned and provided no useful measurements. All piezometers indicated that the depth to groundwater generally fluctuated between 0.3 and 1.1 mBGL at the end of construction on the wind farm site, which was consistent with the pre-construction site investigation (Table 9-8).

*Table 9-8 Summary information of piezometers installed on site between 2005 and 2011*

| Piezometers / Turbine No. | Piezo Distance from Nearest Drain (m) | Drain depth (m) | Fall in Groundwater Level (m) | Years of data |
|---|---|---|---|---|
| P1 – P3 / T2 | 4.5 | 0.85 | 0.7 (0.6 – 0.8) | Jan-05 to Nov-11 |
| P4 – P6 / T18 | 13 | 1.4 | 0.4 (0.2 – 0.6) | Jan-05 to Nov-11 |
| P7 – P9 / T34 | 5 | 1.3 | 0.6 (0.4 – 0.85) | Jan-05 to Feb-10 |

In the years following commissioning, groundwater levels in the peat at these monitoring locations gradually reduced by between 0.2 and 0.85 m (Table 9-8). This gradual reduction is consistent with the very low permeability and correspondingly slow reaction time of groundwater levels in peat to newly excavated drainage. The ultimate reduction in groundwater levels was dependent on the depth to which the channels were excavated and the distance of measuring points from the channels. For instance, piezometers 4 – 6 are further away from the nearest excavated drains and therefore have taken longer to reduce towards a final drawdown level. Piezometers 7 – 9, given their relative proximity to a drain, should stabilise at no lower than 0.85 mBGL. Given the baseline level in this area was close to the surface it was already close to stabilising by 2010 At T34 the nearby drain was a pre-existing turbary drain which was cleaned out and most likely deepened as part of the wind farm construction, resulting in a drawdown in groundwater levels.

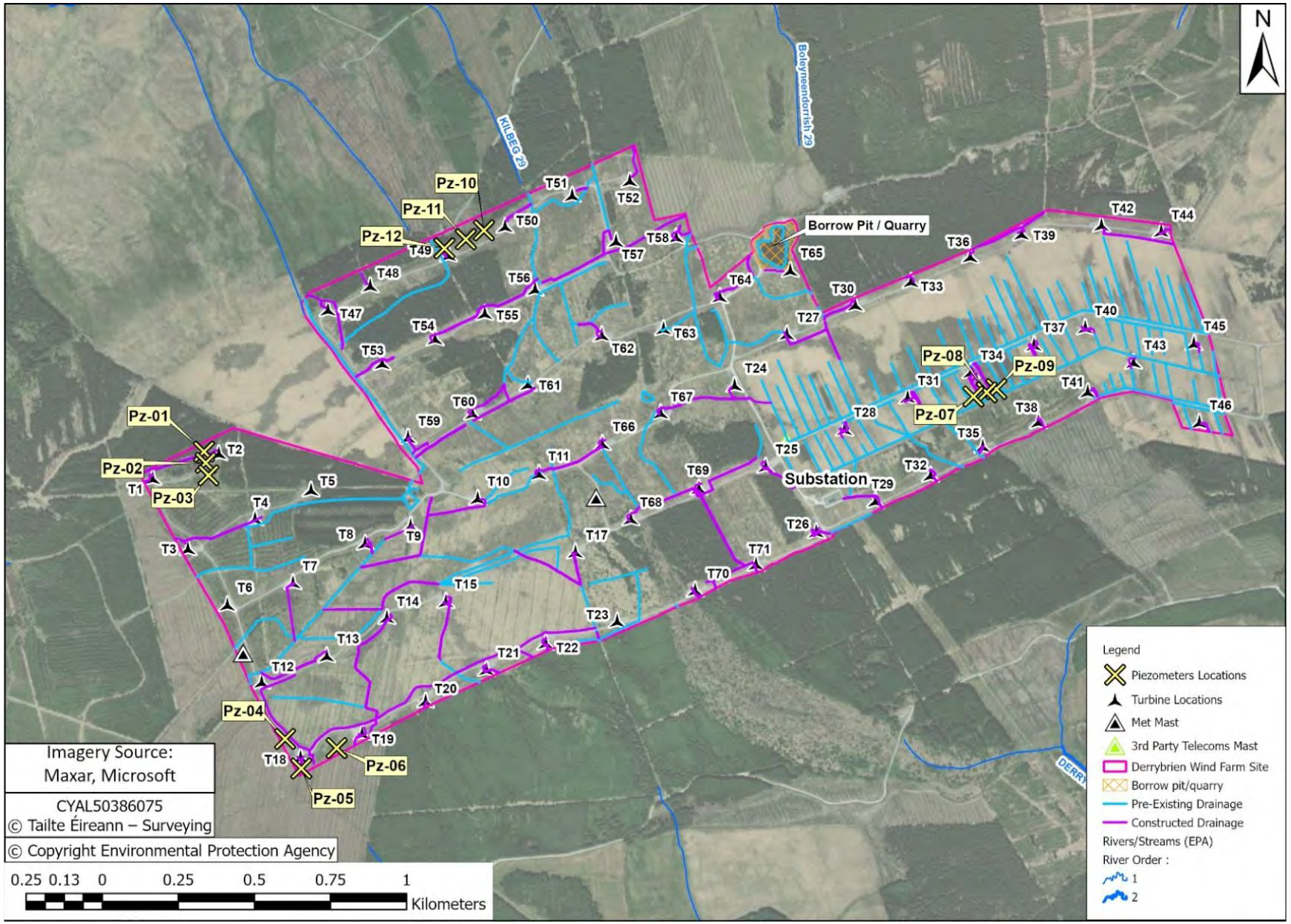



*Figure 9-7 Approximate Locations of Piezometers on site 2005-2011*

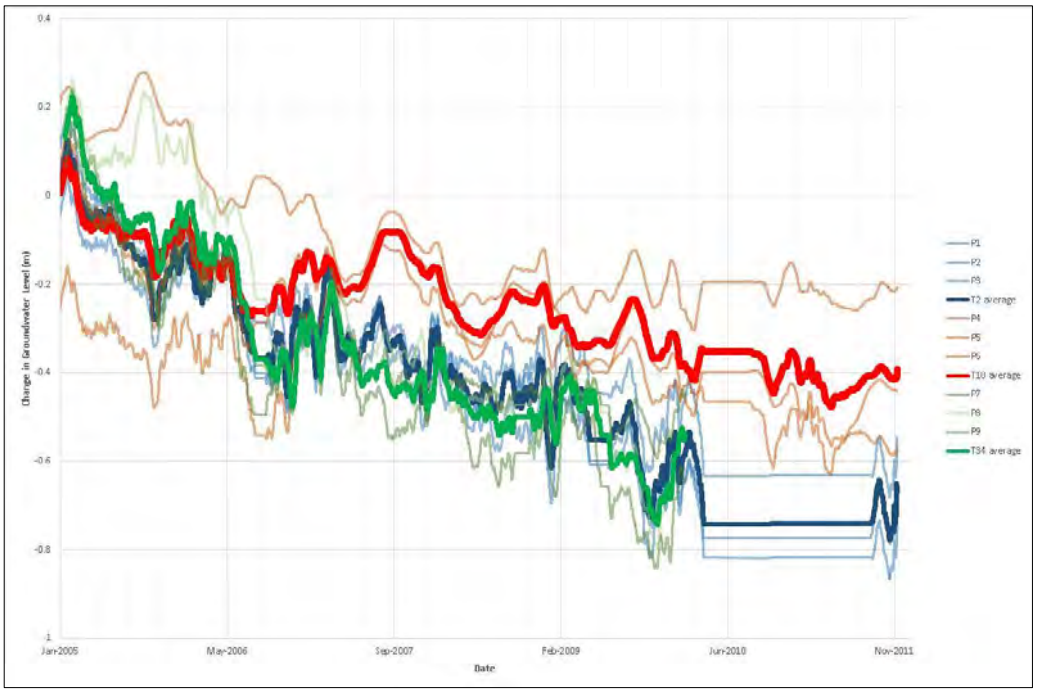



*Figure 9-8 Piezometer Data (2005 - 2011)*

## 9.3.5 Flood Risk Identification

A Flood Risk Assessment (FRA) in line with The Planning System and Flood Risk Management - Guidelines for Planning Authorities (OPW, 2009) has been conducted for the Prospective Development area, including the two substations and OHL corridor route. The FRA was carried out both to provide an overview of the potential flood risks to the works areas and to assess the impact of the Prospective Development works on flood risk downstream (see **Appendix 9-1**).

A desktop review of historic flooding was undertaken primarily using OPW website www.floodinfo.ie. The 'Past Flood Events' dataset forms a record of all available flood records held by the OPW, all local authorities and other relevant state organisations such as the EPA and the Department of Communications, Climate Action and Environment. Despite this, the dataset is not exhaustive particularly in regard to recent floods in remote areas. There were no mapped reports of recurring flooding within the Project areas and there is no significant risk of flooding within the Project area due to the elevated nature of the majority of the Project area relative to the surrounding area. The nearest area downstream affected by flooding in the catchment which drains the north side of the wind farm site is 15 km downstream at Ballylee on the Streamstown River. The nearest area downstream affected by flooding in the catchment draining the south side of the wind farm is over 20 km downstream close to Gort. The National Indicative Fluvial Mapping shows the extents of the indicative 100-year flood zone which relates to fluvial (river) flood. This mapping is based on fluvial sources for catchments in excess of 5km$^2$ and assumes within channel has capacity for 80% of the annual flood and remainder floods its overbanks based on hydraulic modelling using a DTM ground level model. There is no 100-year or 1000-year fluvial flood zone mapped within the Project area, which includes the overhead line (OHL) route and Agannygal substation. Where it is mapped in close proximity to the development, it typically exists in close proximity to the main Owendalulleegh and Boleyneendorrish River channels or its contributing second or third order streams.

With regard to groundwater, it is likely that groundwater levels across the wind farm site have stabilised since piezometers installed during construction stopped measuring in 2012. In general, the vast majority of dewatering of the peat took place in the early years following construction, but the degree and rate of change would have varied significantly with the greatest changes most likely taking place in the

southwest of the site where most of the new drainage channels were introduced while the relatively undisturbed areas such as the peatland between T62 and T67 in the centre of the site undergoing little evident change and remaining largely intact. An empirical Sichardt formula can be used to determine the zone of influence of the channel drains cut across the site –

$R_0 = C*(H-h_w)*\sqrt{K}$ where

$R_0$ = Zone of influence (m)
C = 3000 (constant)
K = hydraulic conductivity in peat (m/s)
$H-h_w$ = drawdown (m). Calculated using drainage channel depth below ground level and highest water level in channel.

Assuming $K = 10^{-6}$ and $H-h_w = 0.6$ m (on average), therefore $R_0 = 1.8$ m.

Given 12 km of drains were excavated for the wind farm and drawdown occurs 1.8m either side of drains, this suggests 0.043 $km^2$ of the site was subject to drawdown in the long-term from their installation. Given these drains were situated across 3.4 $km^2$, this suggest 1.3% of the overall wind farm area was subject to drawdown from the installation of new drainage because of the wind farm construction while the remainder saw groundwater levels unchanged. The fall in groundwater levels was consistent and gradual at a rate of approximately 0.1 m/year (or 0.03 l/s per ha) across the site and would not have a significant impact on the onsite and downstream environment with respect to flood risk. This will not change as a result of the decommissioning works.

The FRA concludes that most of the Project areas are not within floodplains and lie within Flood Zone C (Low risk of flooding) as defined by the guidance document to Planning Authorities in relation to Flood Risk Management. Furthermore, the existing flood risk in the downstream catchment has not been increased by any works over the operational life of the wind farm. Several elements of the wind farm infrastructure are currently vulnerable to pluvial flooding in extreme rainfall events. However, as this infrastructure is due to be removed as part of decommissioning, effects arising from such flooding are eliminated. This flood risk assessment meets the requirements of the planning guidelines in respect to a site-specific FRA as the entire Prospective Development falls under the category of water-compatible type development and therefore suitable in all flood risk zones.

### 9.3.6 Groundwater Quality

The WFD establishes a framework for the protection, improvement and management of groundwater. All groundwater bodies (GWB) are validated by scientists in the Geological Survey of Ireland and the EPA Scientists as meeting the criteria for a WFD GWB. The latest groundwater status assessment was carried out in 2022 for the period 2016-2021. The wind farm site and most of the OHL route is located in the Caherglassaun Turlough GWB. This has a Poor GW status according to the latest round of monitoring. The southern end of the OHL route and Agannygal substation are located in the Lough Graney GWB and has a Good status. The status of these GWBs have not changed over time during the monitoring cycles.

### 9.3.7 Surface Water Quality

Assessment of the surface water quality associated with the Prospective Development is discussed in detail in Chapter 7 Biodiversity – Aquatic Ecology and Fisheries.

## 9.4 Likely, Significant Impacts and Mitigation Measures Implemented

This section addresses the impacts on the hydrological and hydrogeological environment of the Prospective Development as described in Chapter 4. The impacts may comprise the changes in volume and rate of surface water flow and direct or indirect impacts on the quality of surface waters and groundwater. Direct impacts here refer to those which occur at the same time and location as the action itself whereas indirect Impacts are reasonably foreseeable and occur as a result of an action but occur later in time or are removed from the action location. Following the identification of sensitive waterbodies, the extent and severity of decommissioning impacts were evaluated considering all existing and proposed control measures. The sensitivity of surface environmental receptors is discussed in detail in Chapter 7 – Biodiversity – Aquatic Ecology and Fisheries.

Due to the nature of the Prospective Development, which are "at surface" construction activities, there are no impacts on groundwater and surface water is generally the main sensitive receptor.

### 9.4.1 Do-Nothing Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

Since there would be no change from current conditions, there would be no effect on hydrology and hydrogeology in the "do nothing" scenario.

### 9.4.2 Impacts of the Prospective Development

The activities associated with the Prospective Development are described in Chapter 4 of this EIAR. The likely decommissioning works impacts and effects of the Prospective Development and mitigation measures that are proposed (where required) to reduce or eliminate those effects are outlined below.

#### 9.4.2.1 Suspended Solids

##### Pre-Mitigation Impact

The decommissioning works have the potential to result in the release of suspended solids relative to baseline conditions. Identified potential sources of sediment-laden water include but are not limited to:

- Erosion of sediment from on-going maintenance work on existing channels and culverts aimed at removing debris causing blockages to flow.
- sediment runoff from the crushed rock granular fill material transferred from existing hardstand areas or nearby quarriers to deposit for widening of turbary road.
- Loss of stone and / or tarmacadam imported for filling potholes on the wind farm site.
- Disturbance of ground and peaty soils from tracking of machinery across land to remove OHL.

The above activities could result in the release of suspended solids to surface watercourses and increase in the suspended sediment load, resulting in increased turbidity which in turn could give rise to water quality effects in downstream waterbodies. Potential effects would be Slight to Moderate, Adverse and Short-Term throughout the decommissioning works if not adequately mitigated against. The release of

suspended soils does not have significant potential to adversely impact on groundwater due to the natural process of filtration associated with percolation of water through soils.

**Pathway**: onsite surface channels.

**Receptor**: offsite streams, waterbodies and subsoil.

**Pre-Mitigation Potential Effect:** Adverse, direct, slight to moderate, temporary to short-term, unlikely impact on peat, subsoil and bedrock.

## Proposed Mitigation Measures

Having regard to the characteristics of the site and the works necessary to decommission the existing wind farm, all works will be undertaken in line with best environmental management practices such as those set out in CIRIA C741 Environmental good practice on site. Compliance with ESB's ISO 14001 accredited Environmental Management System will be enforced at all stages of site operations.

Provision will be made for a combination of some or more all of the techniques listed below to minimise runoff of suspended solids during decommissioning operations –

- Silt traps – these can be installed on either the inlet or outlet side of culverts and must be robust enough to allow for frequent clearing out of collected sediments.
- Silt fencing – involves installation of some semi-permeable geotextile fabric, vertically held on simple timber posts, and is used primarily as an additional means of filtering out sediments from runoff water. These should be installed alongside any sensitive areas, e.g. watercourses, larges areas of stripped materials, or downstream from outlet ends of culverts, and can usually be arranged in a horse-shoe configuration to contain, and allow settlement of suspended sediments.
- Straw bales – these can be used to filter out sediments from normal flows in drainage ditches, but their installation positions require careful consideration, and should allow for potential overtopping in periods of high flow. They should be pinned securely in position to avoid being washed down into larger watercourses. Bales can become saturated and can become very heavy to manually move, so a means of mechanical recovery and replacement also needs to be considered. As such, periodic replacement – once bales have become silt-laden and ineffective – needs to be considered along with their appropriate disposal.
- Pumping - Where there is a significant build-up of water it may be required to pump this to avoid further build-up, or to allow works to progress in that area. Any required pumping should be planned to ensure that the discharge is either entering a settlement lagoon or that it can discharge directly over an area of suitable vegetation, an appropriate distance away from watercourses and groundwater to filter out any suspended sediments. Proprietary equipment such as "Siltbuster" type tanks can also be used to assist with the reduction of suspended solids. It is important that the flows from the pumping operation do not cause erosion to the vegetation onto which it is discharging. The point of delivery should be alternated to various locations to ensure that potential for scouring is minimised. If the flows need to be redistributed more generally over vegetation, a connection to the hose end can be made to discharge the fluid in a spray over a much greater area.

Monitoring and maintenance will include the following –

Site water suspended solids will be monitored on a continuous basis at a reasonable frequency (e.g. daily), however the frequency of monitoring can gradually reduce thereafter – presuming there are no issues with the quality of discharging water at that point in time.

It is recommended that continuous monitoring systems are put in place, particularly in principal surface water features draining the site, e.g. remote sensing, or telemetric monitoring sensors can be employed in this regard. It is recommended that a handheld turbidity meter is available to accurately measure the quality of water discharging from the Prospective Development site. The meter should be maintained and calibrated frequently and will also be used to check and calibrate remote sensors if they are employed. It is recommended that quality thresholds are established for the purposes of escalating water quality issues as or if they arise (e.g. TSS limit of 25mg/l per S.I. no. 293 of 1988 – Salmonid Regulations).

Surface water runoff control infrastructure will be checked and maintained on a regular basis and stilling ponds and check dams will be maintained (de-sludged/settled solids removed) on a regular basis during decommissioning. It is important to minimise the agitation of solids during these works, otherwise it will likely lead to an acute significant loading of suspended solids in the local drainage network which could settle out downstream in the larger watercourses

As part of the site-specific Outline EMP regular checking and maintenance of pollution control measures are required, with an immediate plan for repair or backup if any breaches of design occur. If established infrastructure and measures are failing to reduce suspended solids to an acceptable level, construction works will cease until remediation or upgrading works are completed.

#### Residual Impact

The implementation of the above mitigation measures will result in a residual **neutral** effect on surface and groundwater hydrology.

#### Significance of Effects

Based on the assessment above and the implementation of mitigation measures as outlined here and in Chapter 7 Biodiversity (Aquatic Ecology and Fisheries), **no Significant Effects** on surface and groundwater hydrology as a result of Suspended Solids during the decommissioning works are expected.

### 9.4.2.2 Hydrocarbon spills

#### Pre-Mitigation Impact

Accidental spillage during refueling of construction plant with petroleum hydrocarbons is a pollution risk, especially to groundwater. The accumulation of small spills of fuels and lubricants during plant use can also be a significant pollution risk. Hydrocarbons have a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects (i.e. contamination of peat, subsoils and pollution of the underlying aquifer) on the geological and water environment. Given the nature of the underlying Aquifer and the low groundwater recharge rates the mobility for accidental spills on the site to enter the local bedrock aquifer is very limited. The main pathway for hydrocarbon spills to enter water bodies is via overland flow to surface drainage system that directly connects to the downstream watercourses of high sensitivity.

The oil separator at Derrybrien Substation will need to be removed as part of the substation decommissioning. Oil filled equipment, such as current and voltage transformers, CT and VT, shall be inspected before and after removing from their support steelwork. It is not necessary to remove the oil for transport and they shall be loaded intact on to a bunded platform/trailer and secured for transport. CTs and VTs can be laid horizontally but must be supported to avoid sudden shear force during transport which could cause damage and leakage (for example providing support to the middle of the unit to avoid porcelain dipping and cracking at this midpoint).

House Transformers can also be loaded without emptying provided the laden weight is not beyond the capability of the transport vehicle and it is secured. The bund being used must also be capable of holding the complete contents of oil from all equipment with an additional margin to avoid spillage. This may require splitting the load for transport.

The diesel generators and tanks at the two substations will be removed from site using appropriate transport.

The 80-tonne step-up transformer will be removed from site using an 800-tonne crane and transported from site on a specialised 30m long multi-axle articulated truck and low-loader transporter. The oil will be drained, and the transformer tank filled with a positive pressure of dry air for transportation of the transformer. The oil can be stored in the oil road tanker, or an external intermediate bulk container, IBC, or other suitable container built for this purpose for later disposal/reuse. If an IBC is used the same requirements for bunding and securing are required for transport as above for oil filled equipment.

**Pathway**: Peat, subsoil and underlying bedrock pore space, onsite surface channels.

**Receptor**: Peat, subsoil, offsite streams, bedrock, aquifers.

**Pre-Mitigation Potential Impact:** Adverse, direct, slight to moderate, short term, unlikely impact on surface and groundwater hydrology.

## Proposed Mitigation Measures

- All plant and machinery to be serviced before being mobilised to site.
- No plant maintenance completed on-site; any broken-down plant removed from site to be fixed.
- Refuelling completed in a controlled manner using drip trays at all times.
- Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas away from open water and drainage features.
- Only designated trained operators authorised to refuel plant on-site.
- Spill mats and clean-up kits will be available on-site and trained personnel.
- Procedures and contingency plans set up to deal with emergency accidents or spills.
- Highest standards of site management maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during works.

These mitigation measures are considered sufficient to reduce risk to ground/peat/soils and subsoils, and to groundwater and surface water quality.

The oil separator will be emptied and flushed out prior to being backfilled with stone. All extracted liquids including that flushed through the separator will be disposed of to a licensed facility. The stone will be sourced from the site.

## Residual Impact

The implementation of the above mitigation measures will result in a residual **Neutral, Imperceptible, direct, short term** impact to surface and groundwater hydrology.

## Significance of Effects

Based on the assessment above **No Significant Effects** on surface and groundwater hydrology as a result of hydrocarbon spills during the decommissioning works.

### 9.4.2.3 Wastewater

#### Pre-Mitigation Impact

Release of effluent from domestic wastewater treatment systems has the potential to impact on groundwater and surface waters if site conditions are not appropriate for an on-site percolation unit. Due to the low permeability of the subsoils associated with the Prospective Development area, surface waters are more likely to be susceptible to impact than groundwater.

The main toilet facilities on site during decommissioning will be at the site compound on existing hardstanding in the north-eastern corner of the site. The toilet facilities will comprise a self-contained toilet block with a temporary holding tank for managing sewage and wastewater. There will also be a requirement for approximately 5 no. self-contained portaloos purpose designed for temporary use located around the wind farm site. These facilities will be removed upon completion of the decommissioning works.

The existing welfare facilities and sewage treatment plant at Derrybrien and Agannygal substations will be decommissioned as part of the prospective works. The sewage treatment plant will be emptied and flushed out prior to being backfilled with stone. The stone will be sourced from the site

**Pathway**: Peat, subsoil and underlying bedrock pore space, onsite surface channels.

**Receptor**: Peat, subsoil and bedrock, offsite streams.

**Pre-Mitigation Potential Impact:** Adverse, direct, slight to moderate, brief, unlikely impact on peat, subsoil and bedrock.

#### Proposed Mitigation Measures

The toilet block and temporary holding tank and Portaloos will be serviced and maintained on a regular basis during the decommissioning activities. All toilet facilities shall be sealed with no discharge to the surface water or groundwater environment adjacent to the site.

The onsite toilet facilities and sewage treatment plants at Derrybrien and Agannygal will be emptied and flushed by licenced contractor and all out prior to being backfilled with stone. All extracted effluent and water flushed through the treatment plant will be disposed of to a licensed facility.

#### Residual Impact

The implementation of the above mitigation measures will result in a residual **Neutral, effect** on surface waters, topsoil, subsoils or bedrock.

#### Significance of Effects

Based on the assessment above **No Significant Effects** on surface waters, topsoil, subsoils or bedrock as a result of wastewater during the decommissioning works are expected

## 9.4.2.4 Flood Risk / Flow Rates

### Pre-Mitigation Impact

All of the c.39 km of drainage channels on the wind farm site are regular open drains (Plate 9-3), typically 0.5 to 1.5 m deep, with culverts under the site access tracks. Where the peat is shallow the drains penetrate into the underlying glacial till. However, in deeper peat (greater than 1 – 2 m deep) the drains are only excavated into the peat and more easily eroded by streamflow. At the east end of the site the drainage network reflects the outline of the turbary plots in that area of the site. Over the rest of the site the pre-wind farm development drains / watercourses have been retained and additional drains constructed to connect the turbine foundation drainage to the watercourses.



*Plate 9-3 Typical drainage channels flowing across Derrybrien wind farm*

The use of floating roads, which account for .18.8 km of the c.19.7 km of on-site access tracks (the 2.0 km of tracks existing on site which pre-existed the Project were of floating road construction), facilitate rainwater infiltration into the peat layer beneath and as such generally do not require additional roadside drainage with rainwater falling onto the road allowed to spill over the edge into the undisturbed peat. Floating roads are sympathetic to the natural drainage as they act neither as a barrier nor as a deep wide permeable drain that would dewater the adjacent saturated peat into its formation layer and convey elsewhere with the gradient of the road. As such, the limited road widening activities proposed as part of the decommissioning stage will not adversely impact the drainage regime. However, depending on local topography, some concentration of flows and preferential pathways are unavoidable unless suitable drainage is put in place. The 4.5 m wide roads are comprised of 0.6 – 1.0 m of crushed rock granular fill with 1-2 layers of geogrid reinforcement and a basal reinforcing layer of small trees and branches placed directly on the vegetated surface of the peat.

Culverts were constructed at various wind farm access road crossings to maintain the conveyance path of the pre-existing and constructed drains crossed and thus prevent excessive ponding of water on the uphill sides of these roads (Plate 9-4). The culverts installed are necessary to maintain the drainage runs and avoid unnecessary diversion of drainage on the site. The culverts are mainly located under tracks

on the edge of the site, as indicated on Figure 9-9. The outlet drains exiting the wind farm site are all pre-existing drainage channels with the exception of the drainage channels formed following the October 2003 slide.



*Plate 9-4 Typical culverts installed under roadways and turbine hardstanding areas*

During the operational phase of the wind farm, the drainage network has experienced a variety of large storm events from 2009 to present. These have ranged from intense short-duration events in which approximately 60 mm of rain fell in 24 hours (as measured at Gort Derrybrien II Met Station) (7th June 2012, Storm Desmond on 5th December 2015) to long-duration winter rainfall events which saturated the wider area (November 2009, December 2015 to January 2016, February 2020).

The drainage network on the wind farm has demonstrated sufficient capacity to convey heavy flows without excessive flooding of access tracks and turbine bases or erosion of drainage channels. Similarly, the drainage network associated with both substations have no record of flooding issues since commissioning (14 years). The drainage channel network constructed for wind farm development are well established being in situ well over 18 years and therefore relatively stable in respect to their morphology and their drainage capacities.

As most roads on site are floating, they can remain in place post-decommissioning without the need i to maintain associated drainage because they allow for natural infiltration, interflow and saturated groundwater flow. There will be no requirement for additional drainage associated with the decommissioning of the Derrybrien wind farm. Over time the drains are likely to slowly fill in and re-vegetate naturally and become less effective over time. Drains gradually filling in will lead to very minor localised effects onsite post-decommissioning with more surface ponding following rainfall and possible concentrations of flow in some locations. However, this will have an imperceptible impact on the downstream catchments and the areas currently at risk of flooding surrounding Lough Cutra and the Gort Lowlands.

The crane hardstand areas adjacent to turbines, the hardstand areas for the substation, contractor's compound and control building and the reinforced concrete turbine bases will all be left in-situ after decommissioning. It is not proposed to replant the wind farm site with trees although natural regrowth of previously felled areas will likely continue.

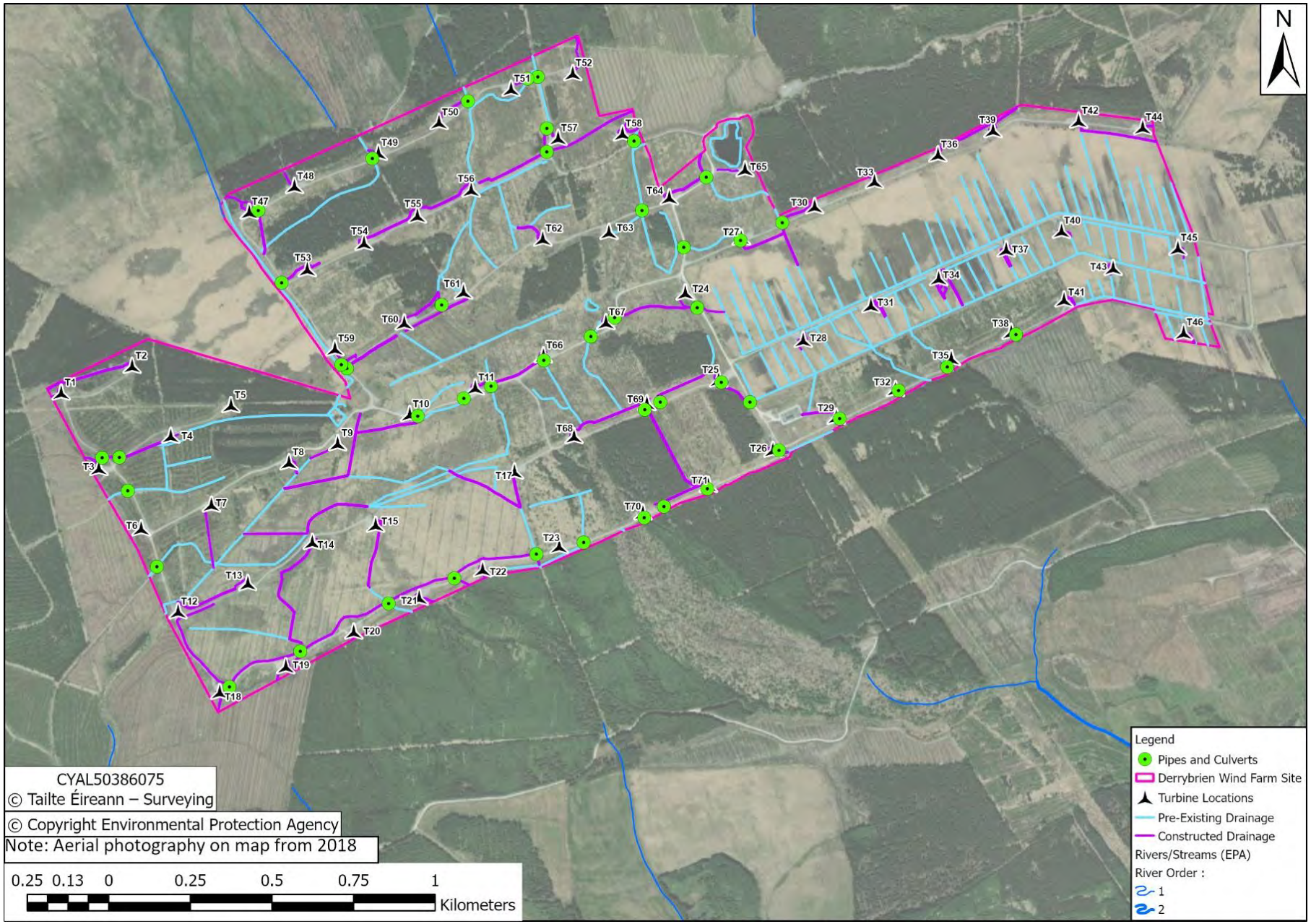



*Figure 9-9 Derrybrien Wind Farm Development - Pre-existing and construction drainage*

As there will be no change in land use (e.g. from hardstanding to greenfield) associated with the Prospective Development and no upgrades to the drainage network, there will be no increase in surface and subsurface flood flows from the wind farm and therefore no effects on downstream flooding and flows during decommissioning. Overall, it is considered that the decommissioning will have a neutral effect on the local hydrological and hydrogeological environment. The Flood Risk associated with the Project is discussed in more detail in **Appendix 9-1**. Similarly, at a broader regional scale, where downstream floodplains would be more sensitive to any increased flood risk, it has been concluded in **Appendix 9-1** that any changes in flood peaks and volumes arising from the decommissioning would be imperceptible.

**Pathway**: overland, onsite surface channels, topsoil, subsoil.

**Receptor**: offsite streams and rivers.

**Potential Impact:** Neutral.

#### 9.4.2.5 OHL Decommissioning

The only likely, significant effects associated with the OHL decommissioning relate to water quality. These are discussed in Chapter 7 – Biodiversity - Aquatic Ecology and Fisheries.

### 9.4.3 Cumulative and In-Combination Effects

The projects considered in relation to the potential for cumulative impacts arising during all phases of the Prospective Development and for which all relevant data was reviewed include those listed below:

- Cumulative Effects with the retained development
- Cumulative Effects with other applications developments/activities

#### 9.4.3.1 Cumulative Effects with the Retained Development

The medium to long-term hydrological and hydrogeological environment at the Derrybrien W is expected to remain stable. The site maintenance records prior to 2022 indicated that maintenance requirements on the drainage network was at a low level from about 2011 onwards, once the drainage network had fully established and stabilised, – with only minor local works required to maintain the efficiency and capacity of the existing system. The records also indicate that the drainage network has sufficient capacity to handle exceptionally high and sustained levels of rainfall without any occurrences of peat instability related to the windfarm. Past experience and monitoring during the operational phase of the wind farm therefore suggests - given the amount of maintenance of drainage channels and culverts has reduced significantly over time – that provided the drains on site are thoroughly inspected and cleared at decommissioning, any long-term effects on the hydrological and hydrogeological environment will be neutral or imperceptible.

Over time the drains will likely fill in and revegetate naturally and become less effective. The Derrybrien wind farm development site will likely revert over time to a more natural drainage regime similar to its pre-wind farm Project environment. As the efficiency of the drains reduces in the long term a gradual partial restoration of groundwater levels on the site will occur. The impact of this more natural regime at the decommissioned wind farm site on the larger downstream river watercourses will not be significant in terms of runoff reduction and flood risk.

During operation of the Derrybrien Wind Farm Development, the drainage network requirement was to maintain control groundwater levels and low flood risk at each individual turbine base so as to avoid potential flotation stability problems for the operating turbine tower. This requirement no longer applies for the retained development and therefore reduced drainage capacity over time in the drainage

network and increased groundwater levels is acceptable at the decommissioned site. For peat stability purposes, controlled transition from a maintained drainage to a more natural drainage is recommended over a number of years so as to manage the transition and avoid peat stability issues.

## 9.4.3.2 Cumulative Impacts with other developments / activities

### 9.4.3.2.1 *Applications within the Vicinity of the Wind Farm*

A review was undertaken of the Galway County Council planning register documents in respect of the relevant general development planning applications in the vicinity of the existing wind farm.

Refer to Section 4.7.1.2 of Chapter 4. Unlikely to be a cumulative effect but worth including just to rule it out

### 9.4.3.2.2 *Turbary within and immediately adjacent to wind farm site*

An area of approximately 67 ha of drained turbary land occupies the eastern part of the wind farm site. Turbary lands also extend immediately beyond the site to the east covering an area of approximately 15 ha. Up until 2012, the extent of turf cutting carried out mechanically is not known but based on observations by wind farm staff on site, turf cutting by hand was carried out on a number of plots, normally in late Spring / early Summer. Since 2012, a contractor has been retained by some plot owners to mechanically cut turf and there has been an increase in the number of plots where mechanical turf cutting has been carried out. The mechanical turf cutting has been carried out using a Difco Bogmiser hopper machine, which cuts 8 sods wide and approximately 72 m in length. Turf cutting using a sausage machine is still being carried out on a single plot.

The existence of turbary rights provides no indication of the amount of peat extraction practised. In addition, the overall intensity of extraction in any given year is likely to vary due to a range of factors including for example the price of other domestic heating fuels. It should also be noted that depending on the drainage of individually active plots within a larger block of cutover bog, their connectivity to surface water drainage and therefore the peat silt generated during peat extraction reaching watercourses is likely to vary from area to area. Nonetheless, the nature of the land use itself will not materially change as a result of further turbary activity in areas that have already been drained and the hydrological / hydrogeological effects are therefore considered imperceptible.

### 9.4.3.2.3 *Adjacent coniferous forestry plantations*

The Slieve Aughty Mountains has some of the largest concentrations of coniferous forest plantation in the country, most of which was originally planted in the 1960s and 1970s.

The extent of forestry compartments has not changed appreciably since prior to the wind farm project construction with forestry representing over 50% of land usage in the immediate vicinity of the wind farm. Due to its age profile, much of the forestry estate is mature and has over the last number of years and will over the next decade require felling. For example, between 2016 and 2018 a total of 2.57 $km^2$ of forestry was earmarked for felling on Coillte land in the catchments within which Derrybrien Wind Farm is located, similar to the amount felled for the Project between 2003 and 2005. This felling requirement is ongoing and will be followed by replanting of the felled plots.

Across a literature review of peer-reviewed scientific studies, forests are generally found to be associated with reducing peak and low flows. However, the results of studies conducted under realistic forest management procedures have shown that the potential for forest clearance to increase peak and low flows is much less than has often been widely claimed. The OPW (2015) recommend, as an allowance in assessing flood risk, reduction in the time to peak to allow for potential accelerated runoff that may arise as a result of drainage of afforested land. For the mid-range future scenario (MRFS) and high-end

future scenario (HEFS) this amounts to a reduction by one-sixth and one-third respectively in the time to peak, e.g. 60-minute time to peak effectively reduced to 50 minutes for MRFS and 40 minutes for HEFS. Conversely, it is recommended to increase the runoff rate by a factor of up to 10% in the HEFS for the temporary period following felling of forestry. Application of a temporary runoff rate factor is considered when assessing the impact of felling in the subcatchments not related to the wind farm Project around the time of construction

Felling and re-planting of forestry has been and will continue to be a feature of the Slieve Aughty Mountains area and the grant of felling licences have and will continue to need to be considered for each application with the impact on the environment duly considered. Felling licenses issued by the Forestry Service include an obligation on the applicant to ensure that all felling (and planting) operations are carried out in accordance with guidelines in respect to water quality, the environment and the 'Code of Best Forest Practice – Ireland'. The guidelines set out measures based on Sustainable Forest Management principles to cover all situations relating to forestry and water quality. For these reasons, no measurable cumulative impact is expected to arise due to forestry activities.

#### 9.4.3.2.4 *Proposed Gort Lowlands Flood Relief Scheme*

The proposed Gort Lowlands Flood Relief Scheme is currently completing the preliminary engineering design and feasibility stage. This stage is well advanced and is expected to be completed by Autumn 2023 after which the proposed scheme will be subject to a planning application to An Bord Pleanála including an NIS and EIAR. This Gort Lowland Flood Relief Scheme is examining options of providing flood overflow pathways from a number of turloughs including Ballylee, Lough Coole to Caherglassaun to Cahermore and an overland spill to the Galway Bay near Dungory Castle at Kinvarra, including the upgrade of a number of culverts and bridges along its route.

It is most probable that this Prospective Development application will be submitted well in advance of any application for the Gort Lowland flood relief scheme. In any case consideration of in-combination impacts are addressed below.

Large scale land management changes of the entire Slieve Aughty Mountains in terms of returning the hill slopes and plateau (watershed) areas, which are predominantly commercial forestry, to undrained peatlands will not produce the desired effect of achieving flood reduction in the downstream Gort Lowlands area. The blocking of drains and generation of more saturated conditions on the bog surface will only, at most, slow the rapid runoff of surface water but will have minimal effect on altering the flood volume generated, particularly for the prolonged winter flood events that cause the flooding in the downstream Gort Lowlands basin.

Attenuation and land management measures (i.e. restoring undrained peatlands and reducing drainage affects in forestry) can be effective in reducing the flood runoff rates for short duration flood events. Such measures are not very effective for prolonged winter rainfall events where the flood volume as opposed to the flood rate is critical, and this applies in particular to the case of the Gort Lowlands turlough flooding situation. These attenuation and land management measures do not provide a sink or longer-term store for rainfall with the volume of rainfall becoming the runoff volume particularly on these elevated winter-saturated catchments which have low permeability sub-soils overlying a low permeability argillaceous limestone bedrock.

It is important to note that the Derrybrien wind farm site of 3.44 $km^2$ is a relatively small section of the overall Slieve Aughty Mountain catchment and therefore land use changes there have had no perceptible effect on flooding in the downstream Gort Lowlands catchment. Even if wind farm decommissioning and construction of the flood relief scheme take place at the same time no significant in combination impact will occur.

## 9.5 Conclusion

Based on the assessment undertaken, it can be concluded that the Prospective Development is not anticipated to give rise to any significant adverse effects related to the drainage flow regime and flood risk classification or result in any significant adverse hydrological or hydrogeological impacts both on-site or off-site.

During the post-construction phase of the wind farm from 2006 to the present day, the drainage network has experienced a variety of large storm events ranging from intense short-duration events to long-duration winter floods which saturated the wider area. The drainage network has to date demonstrated sufficient capacity to convey floodwaters without causing excessive flooding of access tracks and turbine bases and not requiring any significant drainage maintenance works. The Prospective Development is in overall compliance with the objectives of the Planning and Flood Risk Management Guidelines.

Water quality impacts potentially arising during the Prospective Development are likely to be limited to minor siltation or pollution incidents as a result of decommissioning works. Such local incidents will not give rise to significant impacts on water quality in downstream receiving streams and rivers. Appropriate precautions will be taken to ensure the protection of watercourses from silting during the decommissioning.

The Derrybrien operational Wind Farm Development therefore has not given rise to and its decommissioning is not anticipated to give rise to any significant impacts related to flood risk locally or downstream of the site.

There are no significant cumulative impacts on drainage and flooding arising from the Prospective Development works when considered cumulatively and in-combination with the Retained Development and any other relevant projects in the locality.

The Prospective Development will not give rise to any significant residual hydrogeological and hydrogeological impacts.

# 10. AIR AND CLIMATE

## 10.1 Introduction

### 10.1.1 Chapter Scope

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the Prospective Development associated with the Derrybrien Wind Farm Development Decommissioning Project. The project description is detailed in Chapter 4.

### 10.1.2 Statement of Authority

This section of the EIAR has been prepared by Edward Ryan, Malena Thren and Thomas Blackwell, and reviewed by Michael Watson, all of MKO. Edward is an Environmental Scientist with a B.Sc. (Hons) in Environmental Science from the University of Limerick and a M.Sc. (hons) in Environmental Systems from Atlantic Technological University (ATU) (previously known as GMIT). Edward is an Environmental Scientist with over 3 years of consultancy experience has over three years' experience in the environmental sector. Malena Thren is a Graduate Environmental Scientist with a B.Sc. (Hons) in Environmental Science from the University of Galway (previously known as NUIG). Thomas Blackwell is a Senior Environmentalist with MKO with over 17 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Thomas has extensive experience with private consulting firms in both the USA and Ireland. Michael Watson is a Project Director with MKO; with over 20 years' experience in the environmental sector. His project experience includes the management and productions of Environmental Impact Statements (EISs)/EIARs, particularly within the wind energy sector.

### 10.1.3 Relevant Guidance

The air quality and climate section of this EIAR is carried out in accordance with the 'EIA Directive' as mended by Directive 2014/52/EU and having regard, where relevant, to guidance listed below.

- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports – June 2022' (EPA, 2022).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (EC, 2017).
- Environmental Protection Agency (2024) Air Quality in Ireland Report 2023.
- Environmental Protection Agency (2021) Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects.
- Environmental Protection Agency
- Guidance on the Assessment of Dust from Demolition and Construction V1.1 (IAQM 2016).
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII 2011).
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes (TII 2009).
- Rialtas na Éireann Clean Air Strategy for Ireland (April 2023).
- UK Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG (16) (DEFRA 2018).

- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (UKHA 2019).
- World Health Organization (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005 (WHO 2005).
- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (TII 2022a).
- Climate Assessment of Proposed National Roads – Standard and Overarching technical Documentation (TII 2022b/c).

### 10.1.4 Limitations /Difficulties Encountered

No significant difficulties were encountered in the preparation of the Air and Climate chapter of this EIAR.

## 10.2 Air Quality

### 10.2.1 Methodology

#### 10.2.1.1 Assessment of Significance

The effects associated with the Prospective Development are described with respect to the EPA Guidelines on the information to be contained in Environmental Impact Report (EIAR), May 2022.

#### 10.2.1.2 Relevant Legislation

In 1996, the Air Quality Framework Directive (on ambient air quality assessment and management) (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) addresses sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- The third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive (2004/107/EC), published in 2004, relates to polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air and was transposed into Irish law by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2009 (S.I. No. 58 of 2009) (amended by SI 659/2016 - Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016.)

The Air Quality Framework Directive and the first three Daughter Directives were replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality and cleaner air for Europe) (as amended by Directive EU 2015/1480) which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.

- New air quality objectives for $PM_{2.5}$ (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter $PM_{10}$) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 10-1 to 10-4 below set out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre ($\mu g/m^3$) and parts per billion (ppb). The notation $PM_{10}$ is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) as amended by the Air Quality Standards (Amendments) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2016 (S.I. 659 2016). The 2011 Regulations superseded the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999). The Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) was revoked on 31 December 2022 and has been replaced by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022).

#### 10.2.1.3 Air Quality Standards

The recently implemented Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022) remains aligned to the CAFÉ Directive and defers to the CAFÉ Directive for the Limit values outlined in Table 10-1, the Assessment Thresholds in Table 10 2, the Ozone limits and Assessment Thresholds in Table 10-4.

*Table 10-1 Limit values of the CAFE Directive 2008/50.EC, Source: https://airquality.ie/information/air-quality-standards)*

| Pollutant | Limit Value Objective | Averaging Period | Limit Value (µg/m3) | Basis of Application of Limit Value | Attainment Date |
|---|---|---|---|---|---|
| Sulphur dioxide ($SO_2$) | Protection of Human Health | 1 hour | 350 | Not to be exceeded more than 24 times in a calendar year | 1st Jan 2005 |
| Sulphur dioxide ($SO_2$) | Protection of human health | 24 hours | 125 | Not to be exceeded more than 3 times in a calendar year | 1st Jan 2005 |
| Sulphur dioxide ($SO_2$) | Protection of vegetation | Calendar year | 20 | Annual mean | 19th Jul 2001 |
| Sulphur dioxide ($SO_2$) | Protection of vegetation | 1st Oct to 31st Mar | 20 | Winter mean | 19th Jul 2001 |

| Pollutant | Limit Value Objective | Averaging Period | Limit Value (µg/m3) | Basis of Application of Limit Value | Attainment Date |
|---|---|---|---|---|---|
| Nitrogen dioxide ($NO_2$) | Protection of human health | 1 hour | 200 | Not to be exceeded more than 18 times in a calendar year | 1st Jan 2010 |
| Nitrogen dioxide ($NO_2$) | Protection of human health | Calendar year | 40 | Annual mean | 1st Jan 2010 |
| Nitrogen monoxide (NO) and nitrogen dioxide ($NO_2$) | Protection of vegetation | Calendar year | 30 | Annual mean | 19th Jul 2001 |
| Particulate matter 10 ($PM_{10}$) | Protection of human health | 24 hours | 50 | Not to be exceeded more than 35 times in a calendar year | 1st Jan 2005 |
| Particulate matter 10 ($PM_{10}$) | Protection of human health | Calendar year | 40 | Annual mean | 1st Jan 2005 |
| Particulate matter 2.5 ($PM_{2.5}$) | Protection of human health | Calendar year | 25 | Annual mean | 1st Jan 2015 |
| Particulate matter 2.5 ($PM_{2.5}$) Stage 2 | Protection of human health | Calendar year | 20 | Annual mean | 1st Jan 2020 |
| Lead (Pb) | Protection of human health | Calendar year | 0.5 | Annual mean | 1st Jan 2005 |
| Carbon Monoxide (CO) | Protection of human health | 8 hours | 10,000 | - | 1st Jan 2005 |
| Benzene ($C_6H_6$) | Protection of human health | Calendar Year | 5 | - | 1st Jan 2010 |

* AOT40 is a measure of the overall exposure of plants to ozone. It is the sum of the differences between hourly ozone concentration and 40 ppb for each hour when the concentration exceeds 40 ppb during a relevant growing season, e.g. for forest and crops.

*Table 10-2 Assessment Thresholds from CAFE Directive 2008/50/EC*

| Pollutant | Limit Value Objective | Averaging Period | Limit Value (µg/m3) | Basis of Application of Limit Value |
|---|---|---|---|---|
| Sulphur dioxide ($SO_2$) | Upper assessment threshold for the protection of Human Health | 24 hours | 75 | Not to be exceeded more than 3 times in a calendar year |
| Sulphur dioxide ($SO_2$) | Lower assessment threshold for the protection of human health | 24 hours | 50 | Not to be exceeded more than 3 times in a calendar year |
| Nitrogen dioxide ($NO_2$) | Upper assessment threshold for the protection of human health | 1 hour | 140 | Not to be exceeded more than 18 times in a calendar year |
| Nitrogen dioxide ($NO_2$) | Lower assessment threshold for the protection of human health | 1 hour | 100 | Not to be exceeded more than 18 times in a calendar year |
| Particulate matter 10 ($PM_{10}$) | Upper assessment threshold | 24 hours | 35 | Not to be exceeded more than 35 times in a calendar year |
| Particulate matter 10 ($PM_{10}$) | Lower assessment threshold | 24 hours | 25 | Not to be exceeded more than 35 times in a calendar year |
| Lead (Pb) | Upper assessment threshold | Calendar Year | 0.35 | n/a |
| Lead (Pb) | Lower assessment threshold | Calendar Year | 0.25 | n/a |
| Carbon Monoxide (CO) | Upper assessment threshold | 8 hours | 7000 | n/a |
| Carbon Monoxide (CO) | Lower assessment threshold | 8 hours | 5000 | n/a |
| Benzene ($C_6H_6$) | Upper assessment threshold | Calendar Year | 3.5 | n/a |
| Benzene ($C_6H_6$) | Lower assessment threshold | Calendar Year | 2 | n/a |

*Table 10-3 Thresholds Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)*

| Pollutant | Averaging Period | Threshold |
|---|---|---|
| Sulphur Dioxide | To be measured over three consecutive hours at locations representative of air quality over at least 100 km2 or an entire zone or agglomeration, whichever is the smaller. | 500 µg/m$^3$ |
| Nitrogen Dioxide | To be measured over three consecutive hours at locations representative of air quality over at least 100 km2 or an entire zone or agglomeration, whichever is the smaller. | 400 µg/m$^3$ |
| Ozone Information Threshold | 1 hour average | 180 µg/m$^3$ |
| Ozone Alert Threshold | 1 hour average | 240 µg/m$^3$ |

Ozone is set out differently in the CAFE Directive in that it sets target values and long-term objectives for ozone rather than limit values. Table 10-4 presents the target values and long-term target value for ozone.

*Table 10-4 Target values for Ozone Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards)*

| Objective | Parameter | Target Value for 2010 | Long term Target Value |
|---|---|---|---|
| Protection of human health | Maximum daily 8 hour mean | 120 µg/m$^3$ not to be exceeded more than 25 days per calendar year averaged over 3 years | 120 µg/m$^3$ |
| Protection of vegetation | $AOT_{40}$ calculated from 1-hour values from May to July | 18,000 µg/m$^3$-h averaged over 5 years | 6,000 µg/m$^3$-h |

$AOT_{40}$ is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 g/m$^3$ and is expressed as g/m$^3$ hours.

### 10.2.1.4 Air Quality and Health

The Environmental Protection Agency (EPA) noted that in Ireland, the premature deaths attributable to poor air quality are estimated at 1,300 people per annum[1]. The European Environmental Agency (EEA) Report, 'Air Quality in Europe – 2022 Report' highlights the negative effects of air pollution on human health. The report assessed that poor air quality accounted for premature deaths of approximately 238,000 people in Europe in 2020, with regards to deaths relating to $PM_{2.5}$. The estimated effects on the population in Europe of exposure to $NO_2$ and $O_3$ concentrations in 2020 were around 49,000 and 24,000 premature deaths, respectively. From this, 490 Irish deaths were attributable to fine particulate matter ($PM_{2.5}$), 50 Irish deaths were attributable to nitrogen oxides ($NO_2$) and 70 Irish deaths were attributable to Ozone ($O_3$) (Source: *'Air Quality in Europe – 2022 Report',* EEA, 2022).

[1] https://www.epa.ie/our-services/monitoring–assessment/assessment/irelands-environment/air/

These emissions, along with others including sulphur oxides (SOx) are produced during fossil fuel-based electricity generation and traffic in various amounts, depending on the fuel and technology used. Whilst there is the potential of such emissions to be generated from the Prospective Development, a number of mitigation measures will be implemented at this site to reduce the effects from dust and vehicle emissions, which are discussed in Section 10.2.3 below.

## 10.2.2 Receiving Environment

### 10.2.2.1 Air Quality Zones

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs.
- Zone B: Cork City and environs.
- Zone C: 16 urban areas with population greater than 15,000.
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive. The site of the Prospective Development lies within Zone D, which represents rural areas located away from large population centres.

### 10.2.2.2 Existing Air Quality

The air quality in the vicinity of the Prospective Development area is typical of that of rural areas in the West of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. No commercial forestry activities have taken place on the wind farm site since the development of the wind farm. There are areas of blanket bog currently used for turf cutting. Land-use in the wider landscape of the Site include forestry, peat cutting, agriculture and low-density rural residential areas. Due to the non-industrial nature and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR, based on professional judgment. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the site.

The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, Air Quality in Ireland 2023' was published by the EPA in September 2024. The EPA reports provide $SO_2$, $PM_{10}$, $NO_2$ and $O_3$ concentrations for areas in Zone D. Values for each of these elements recorded within the Zone D monitoring stations listed in the report, have been averaged to give representative values for Zone D. Similar measurement values for all air quality parameters would be expected for the Prospective Development site as it lies in a rural location, within Zone D.

#### 10.2.2.2.1 *Sulphur Dioxide ($SO_2$)*

Sulphur dioxide data for Edenderry, Kilkitt, Cork Harbour, Shannon Estuary/Askeaton and Letterkenny (Zone D monitoring sites) in 2023 is presented in Table 10-5.

*Table 10-5 Average Sulphur Dioxide Data for Zone D Sites in 2023*

| Parameter | Measurement |
|---|---|
| Annual Mean | 4.3 µg/m$^3$ |
| Hourly values > 350 | 0 |

| Parameter | Measurement |
|---|---|
| Hourly max (Average) | 80.9 µg/m$^3$ |
| Daily values > 125 | 0 |
| Daily max (Average) | 23.2 µg/m$^3$ |

During the monitoring period there were no exceedances of the daily limit values for the protection of human health. As can be observed from Table 10-5, the average maximum hourly value recorded during the assessment period was 80.9 µg/m$^3$. In addition, there were no exceedances of the annual mean limit for the protection of ecosystems. It would be expected, based on professional judgment and the remote location of the site that existing $SO_2$ values at the Prospective Development site would be similar or lower than those recorded for the Zone D sites above.

#### 10.2.2.2.2 Particulate Matter ($PM_{10}$)

Sources of particulate matter include vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. The EPA report[2] provides annual mean $PM_{10}$ concentration for sixteen Zone D towns, Tipperary Town, Carrick-on-Shannon/ Askeaton, Enniscorthy, Birr, Macroom, Castlebar, Cobh Carrignafoy, Claremorris, Kilkitt, Cavan, Roscommon Town, Edenderry, Mallow, Longford, Killarney and Cobh Cork Harbour. Particulate matter ($PM_{10}$) data for 2023 is presented in Table 10-6.

*Table 10-6 Average Particulate Matter ($PM_{10}$) Data for Zone D Sites in 2023*

| Parameter | Measurement |
|---|---|
| Annual Mean | 11.0 µg/m$^3$ |
| % Data Capture (Average) | 90.8% |
| Values > 50 ug/m$^3$ | Max 6 |
| Daily Max (Average) | 45.4 µg/m$^3$ |

Notes: [1.] $PM_{10}$ daily limit for the protection of human health: No more than 35 days >50 µg/m$^3$

The daily limit of 50 µg/m$^3$ for the protection of human health was exceeded on 13 days, which is greater than the $PM_{10}$ daily limit for the protection of human health of a max 35 days >50 µg/m$^3$ applicable from 2005. The greatest number of exceedances occurred at Edenderry where the $PM_{10}$ daily limit was exceeded on 6 no. occasions. In the EPA 2023 report, it notes that there were breaches in the levels of particulate matter (PM), which in Ireland, mainly comes from the burning of solid fuel, such as coal, peat, and wood to heat our homes. It is expected based on the remote location of the site that $PM_{10}$ values at the Prospective Development is similar or lower than those recorded for the Zone D sites above.

#### 10.2.2.2.3 Nitrogen Dioxide ($NO_2$)

Nitrogen dioxide data for Emo Court, Birr, Castlebar, Carrick-on-Shannon, Edenderry and Kilkitt in 2023 is presented in Table 10-7.

[2] *Environmental Protection Agency: Air Quality in Ireland 2023. Available at: https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2023.php#:~:text=Summary%3A%20Air%20quality%20in%20Ireland,based%20WHO%20guidelines%20in%202023*

*Table 10-7 Average Nitrogen Dioxide Data for Zone D Sites in 2023*

| Parameter | Measurement |
|---|---|
| Annual Mean (Average) | 8.1 µg/m$^3$ |
| $NO_2$ Values >200 | 0 |
| Values > 140 (UAT) | 0 |
| Values >100 (LAT) | 4 |
| Hourly Max. (Average) | 67.6 µg/m$^3$ |

The annual $NO_2$ value was below the annual mean limit value for the protection of human health of 40 µg/m$^3$. Furthermore, the lower assessment threshold of 100 µg/m$^3$ was exceeded 4 no. times during the monitoring period in Briarhill and the upper assessment threshold of 140 µg/m$^3$ was not exceeded during the monitoring period. Both did not exceed the 18 days limit during the monitoring period. In 2023, no other monitoring locations in Zone D had exceedances in the lower and upper assessment thresholds of 100 and 140 µg/m3. The average hourly max. $NO_2$ value of 67.6 µg/m$^3$ measured during the monitoring period was below the hourly max threshold of 200 µg/m$^3$. It would be expected that $NO_2$ values at the Prospective Development site would be similar or lower than those recorded for the Zone D sites above.

#### 10.2.2.2.4 Carbon Monoxide (CO)

The EPA Report[2] provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2023 is presented in Table 10-8 below.

*Table 10-8 Carbon Monoxide Data for Birr - Zone D Site in 2023*

| Parameter | Measurement |
|---|---|
| Annual Mean | 0.6 mg/m$^3$ |
| Median | 0.6 mg/m$^3$ |
| % Data Capture | 99.8% |
| Values > 10 | 0 |
| Max | 2.2 mg/m$^3$ |

The average annual mean concentration of carbon monoxide was 0.6 mg/m$^3$. The carbon monoxide limit value for the protection of human health is 10,000 µg/m$^3$ (or 10mg/m$^3$). On no occasions were values in excess of the 10 mg/m$^3$ limit value set out in Directive 2008/69/EC. It would be expected that CO values at the Prospective Development site would be similar or lower than those recorded for the Zone D sites above.

#### 10.2.2.2.5 Ozone ($O_3$)

The EPA report[2] provide rolling 8-hour ozone concentrations for seven Zone D sites, Emo Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia and Malin Head. Ozone ($O_3$) data for 2023 is presented in Table 10-9. As can be observed from Table 10-9, there were 10 no. exceedances of the maximum daily eight-hour mean limit of 120 µg/m$^3$. The legislation stipulates that this limit should not be exceeded on more than 25 no. days. It would be expected based on professional judgement that $O_3$ values at the Prospective Development would be similar or lower than those recorded for the Zone D sites below.

*Table 10-9 Ozone Data for Zone D Sites in 2023*

| Parameter | Measurement |
|---|---|
| Annual Mean | 61.5 µg/m$^3$ |
| Median | 72.8 µg/m$^3$ |
| % Data Capture | 95.5% |
| No. of days > 120 µg/m$^3$ | 10 days |

#### 10.2.2.2.6 Dust

There are no statutory limits for dust deposition in Ireland. However, EPA guidance suggests that a deposition of 10 mg/m$^2$/hour can generally be considered as posing a soiling nuisance. This equates to 240 mg/m$^2$/day. The EPA recommends a maximum daily deposition level of 350 mg/m$^2$/day when measured according to the TA Luft Standard 2002.

The extent of dust generation at any site depends on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, etc., and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Dust has the potential to be generated during the decommissioning activities of the Prospective Development from on-site activities such as improvement of hard stands, existing access road improvements, and demolition of structures. Traffic movements also have the potential to generate dust as they travel along the Prospective Development site roads and public roads.

The potential dust-related effects on local air quality and the relevant associated mitigation measures are presented in Sections 10.2.4.3. below.

## 10.2.3 Likely and Significant Impacts and Mitigation Measures Implemented

### 10.2.3.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

If the Prospective Development were not to proceed, no changes would be made to the current land-use practice of agriculture and coniferous forestry. Since the Derrybrien Wind Farm Development is not currently operational it is not currently contributing to a reduction in Ireland's emissions of carbon

dioxide, oxides of nitrogen ($NO_x$), and sulphur dioxide ($SO_2$). Under the "Do-Nothing" scenario this would not change. The effect on air quality would therefore be neutral.

## 10.2.3.2 Impacts of Prospective Development

### 10.2.3.2.1 *Exhaust Emissions*

1. Enabling Works (Temporary site compounds, vegetation and scrub clearance, minor levelling works at hardstands, minor improvements to existing access tracks,)

The construction of temporary site compounds, vegetation and scrub clearance and minor improvements to existing hardstands and access tracks (as outlined in Chapter 4) will require construction materials (such as crushed stone) to be brought to the site, and the operation of construction vehicles and plant on the Prospective Development Site. Exhaust emissions associated with the operation of vehicles and plant will arise as a result of the construction activities.

This potential effect will not be significant and will be restricted to the duration of the Prospective Development and localised to works locations. Therefore, this is considered a short-term, slight, direct, negative effect. Mitigation measures to reduce this impact are presented below.

2. Decommissioning Derrybrien Wind Farm and Associated Auxiliary Components (removal of above ground structures including 70 no. turbines and 2 no. anemometer masts, removal of electrical equipment within the Derrybrien Substation and demolition of substation building.

The decommissioning of the Derrybrien Wind Farm, including the controlled dismantling of turbines, anemometer masts and the demolition of the Derrybrien Substation (as outlined in Chapter 4) will require the operation of construction vehicles and plant on the Prospective Development Site. Exhaust emissions associated with vehicles and plant will arise as a result of decommissioning activities. This potential effect will not be significant and will be restricted to the duration of the Prospective Development and localised to works locations. Therefore, this is considered a short-term, slight, direct, negative effect. Mitigation measures to reduce this impact are presented below.

3. Decommissioning Derrybrien Wind Farm Grid Connection (Destringing of the overhead line conductors, Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts), Controlled removal of Agannygal Substation and demolition of control building, Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast, Removal of palisade fencing, and Reinstatement of the Ennis-Shannonbridge 110kV Line.)

The decommissioning of the Derrybrien Wind Farm grid connection, including the decommissioning and demolition of the Agannygal Substation (as outlined in Chapter 4) will require the operation of construction vehicles and plant along the grid route and at the Agannygal Substation giving rise to exhaust emissions. This potential effect will be significant and will be restricted to the duration of the Prospective Development and localised to works locations. Therefore, this is considered a short-term, direct, slight negative effect. Mitigation measures to reduce this impact are presented below.

4. Transport to Site

The transport of construction materials to the site, and the removal of turbines and other electrical equipment as well as demolition waste from the site will occur on specified routes only (see Chapter 14 - Traffic), will also give rise to exhaust emissions associated with the transport vehicles. This constitutes a slight, indirect negative effect in terms of air quality. Mitigation measures in relation to exhaust emissions are presented below.

5. Waste Disposal

Demolition waste will arise on the Prospective Development mainly from the demolition of the substations and control buildings. Waste management will be carried out in accordance with *Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects* (2021) produced by the EPA. Waste can impact on air quality, if not recycled, through anaerobic process or the controlled burning of non-recyclable waste in waste facilities.

### Mitigation

- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.
- Turbines and construction materials will be transported from the site on specified routes only, unless otherwise agreed with the Planning Authority.
- When stationary, delivery and on-site vehicles will be required to turn off engines.
- Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum.
- Aggregate materials required for enabling works will be obtained from local quarries. This will significantly reduce the length of journeys for delivery vehicles, thereby reducing the amount of emissions associated with vehicle movements.
- The Materials Recovery Facility (MRF) will be local to the Prospective Development site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the site is City Bin Co. recycling centre which is located approximately 28.6km to the northwest of the Prospective Development. A Waste Management Plan will be prepared to reduce waste from the site.

### Residual Effect

Following implementation of the mitigation measures above, residual effects of exhaust emissions for the Prospective Development will have a short-term, imperceptible, direct, negative effect.

### Significance of Effects

Based on the assessment above there will be no significant effects.

## 10.2.3.2.2 Dust Emissions

Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source. Dust emissions can lead to elevated $PM_{10}$ and $PM_{2.5}$ concentrations and may also cause dust soiling.

1. Enabling Works (Temporary site compounds, vegetation and scrub clearance, minor levelling works at hardstands, minor improvements to existing access tracks,)

The construction of temporary site compounds, vegetation and scrub clearance and minor improvements to existing hardstands and access tracks (as outlined in Chapter 4) will give rise to dust emissions. This potential effect will not be significant and will be restricted to the duration of the Prospective Development. Therefore, this is a short-term, direct, slight negative effect. Dust suppression mitigation measures to reduce this impact are presented below.

2. Decommissioning Derrybrien Wind Farm (removal of above ground structures including 70 no. turbines and 2 no. anemometer masts, removal of electrical equipment from Derrybrien Substation and demolition of substation building.

The decommissioning of the Derrybrien Wind Farm, including the controlled dismantling of turbines, anemometer masts and the demolition of the Derrybrien Substation, (as outlined in Chapter 4) will give rise to localised dust emissions. This potential effect will not be significant and will be restricted to the duration of the Prospective Development. Therefore, this is a short-term, direct, slight negative effect. Dust suppression mitigation measures to reduce this impact are presented below.

3. Decommissioning Derrybrien Wind Farm Grid Connection (Destringing of the overhead line conductors, Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts), Controlled removal of Agannygal Substation and demolition of control building, Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast, Removal of palisade fencing, and Reinstatement of the Ennis-Shannonbridge 110kV Line.)

The decommissioning of the Derrybrien Wind Farm grid connection, including the decommissioning and demolition of the Agannygal Substation (as outlined in Chapter 4) will give rise to localised dust emissions. This potential effect will not be significant and will be restricted to the duration of the Prospective Development. Therefore, this is a short-term, direct, slight negative effect. Dust suppression mitigation measures to reduce this impact are presented below.

4. Transport to and from Site

The transport of construction materials to the site, and the removal of turbines and other electrical equipment as well as demolition waste from the site will also give rise to some localised dust emissions during periods of dry weather. This is a short-term, direct, slight negative effect. Mitigation measures to reduce the significance of this impact are presented below.

## Mitigation

- A wheel wash facility will be installed on site and will be used by vehicles before leaving site.
- Dust suppression measures will be implemented on site to minimise the potential nuisance caused by dust at the nearest sensitive receptors and on sensitive eco systems. Water misting shall be used as required if particularly dusty activities are necessary on site during dry and/or windy conditions.
- All site related traffic will have speed restrictions on un-surfaced roads to 30 kph.
- Regular inspection of the site to examine dust measures and their effectiveness.
- All plant and materials vehicles shall be stored in dedicated areas (on site).
- Turbines and construction materials will be transported away from the site on specified haul routes only.
- The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.
- The Site access roads will be checked weekly for damage/potholes and repaired as necessary.
- The transport of construction materials which may have the potential to generate dust will be undertaken with tarpaulin cover or similar, where necessary.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the Prospective Development (see outline CEMP under separate cover). The CEMP includes these dust suppression measures.

#### Residual Effect

Following implementation of mitigation measures as outlined above, residual effects of dust generation from the Prospective Development will have a Short-term, direct, Imperceptible Negative Effect.

#### Significance of Effects

Based on the assessment above there will be no significant effects.

### 10.2.3.2.3 *Effects on Human Health*

As discussed above, potential dust and exhaust emission sources from the Prospective Development during the decommissioning works include the use of heavy machinery, travel on existing access tracks, removal of above ground element of turbine and meteorological mast foundations, regrading of hardstands, demolition works on the substations, and temporary construction compound.

An increase in dust and exhaust emissions has the potential to cause a nuisance to sensitive receptors in the immediate vicinity of the Prospective Development site. The entry and exit of construction vehicles from the Prospective Development site may result in the transfer of mud to the public road, particularly if the weather is wet. This may cause nuisance to residents and other road users. However, these effects will be limited, as abnormal load vehicles will only travel along the proposed route shown on Figure 14-8 in Chapter 14 of this EIAR and will be limited to the duration of the decommissioning works. Therefore, these impacts have the potential to have a direct, short-term, slight, negative effect on air quality.

#### Proposed Mitigation Measures

Mitigation measures to limit exhaust and dust emissions are discussed in detail in Sections 10.2.3.2.1 and 10.2.3.2.2 above.

#### Residual Effects

The implementation of the mitigation measures discussed above will effectively minimise exhaust and dust emissions resulting from the Prospective Development. This will ensure that none of the statutory maximum daily limits or concentrations for these pollutants are exceeded. Therefore the residual effects on human health will, at worst, be indirect, short-term, imperceptible, and negative.

#### Significance of Effects

Based on the assessment above there will be no significant effects on Human Health.

## 10.2.3.3 Cumulative and In-Combination Effects

There is potential for cumulative effect from the construction phase of Prospective Development in combination with other permitted or proposed projects and plans in the area as set out in Section 4.7 in Chapter 4 of this EIAR.There will be minor emissions from plant and machinery and potential dust emissions associated with the decommissioning activities. However, once the mitigation proposals, as outlined in Section 10.2.3, are implemented during the Prospective Development, and considering the imperceptible effect of those emissions and the distance from other proposed projects, there will be no cumulative negative effect on air quality.

There will be no significant cumulative effects on air resulting from the Prospective Development in-combination with the Retained Development.

### 10.2.4 Conclusion

This Chapter of the EIAR followed relevant guidance and best practice to provide an assessment of potential effects from the Prospective Development on air quality, either alone or cumulatively considered with other relevant activities in the vicinity of the site. It is concluded that effects on Air from this Prospective Development will be, at worst, short-term, imperceptible and negative.

# 10.3 Climate

## 10.3.1 Relevant Guidance

The climate chapter of this EIAR is carried out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and has been prepared in accordance with guidance listed in Section 1.5.3 of Chapter 1: Introduction.

Consideration has also been given to the 'Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022 (2022a)), Climate Assessment of Proposed National Roads – Standard and Overarching technical Documentation (Transport Infrastructure Ireland December 2022b/c).

## 10.3.2 Methodology

### 10.3.2.1 Assessment of Significance

The effects associated with the development are described with respect to the EPA Guidelines on the information to be contained in Environmental Impact Report (EIAR), May 2022.

## 10.3.3 Climate Change and Greenhouse Gases

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing the world today and is primarily the result of increased levels of greenhouse gases in the atmosphere. Greenhouse gases, when emitted, create a 'greenhouse effect' in the atmosphere, effectively trapping heat near the earth surface, resulting in higher temperatures and a warming planet. Greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are thought to increase the frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

### 10.3.3.1 International Greenhouse Gas Emission and Climate Targets

Globally, governance relating to climate change has changed significantly since 1994 when the United Nations Framework Convention on Climate Change (UNFCCC) entered into force. Greenhouse Gas emissions have been a primary focus of climate related international agreements for almost two decades.

International greenhouse gas emission and climate targets play an important role in stimulating and enabling action for developed and developing nations. The following sections provide an overview of the international agreements that have played key roles in establishing climate governance.

#### 10.3.3.1.1 *Kyoto Protocol*

The Kyoto Protocol was adopted on 11 December 1997; this Protocol operationalised the UNFCCC and was the first international agreement that committed countries to reduce their greenhouse gas emissions. It set limitations and reduction targets for greenhouse gases for developed countries (Annex I countries) and set a special obligation for certain countries to provide financial resources and facilitate

technology transfer to developing countries (Annex II countries). The EU, and therefore Ireland, was both an Annex I and Annex II country.

The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, became binding for the first time.

Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions in the period 2008 to 2012. These EU emission targets are legally binding in Ireland. Ireland's contribution to the EU commitment for the period 2008 – 2012 (the first commitment period) was to limit its greenhouse gas emissions to no more than 13% above 1990 levels. Ireland achieved its Kyoto Protocol targets under the EU burden-sharing agreement.

#### Doha Amendment to the Kyoto Protocol

In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from starting in 2013 and lasting until 2020.
  - The amendment entered into force on 31 December 2020.
- A revised list of greenhouse gases to be reported on by Parties in the second commitment period.
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37 industrialised countries and the European Community committed to reduce greenhouse gas emissions to an average of 5% below 1990 levels. During the second commitment period, Parties committed to reduce greenhouse gas emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020. The composition of Parties in the second commitment period is different from the first; however, Ireland and the EU signed up to both the first and second commitment periods. Under the protocol, countries must meet their targets primarily through national measures, although market-based mechanisms (such as international emissions trading) can also be utilised.

Although the 1997 Kyoto Protocol and 2012 Doha Amendment were in force in 2020, the 2015 Paris Agreement superseded the Kyoto Protocol as the principle regulatory instrument governing the global response to climate change.

### 10.3.3.1.2 *Conference of the Parties*

Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments, and is the supreme decision-making body of the UNFCCC.

The following details the most significant COPs in terms of impact on climate action as well as a summary of the recent COP – COP29 which took place in Azerbaijan.

#### COP21 Paris Agreement

COP21 was the 21st session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015.

COP21 closed on 12th December 2015 with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The twelve-page text, made up of a preamble and 29 articles, provides for a limitation of the temperature rise to below 2°C above pre-industrial levels and even to tend towards 1.5°C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

### COP25 Climate Change Conference - Madrid

The 25th United Nations Climate Change conference COP25 was held in Madrid and ran from December 2nd to December 13th, 2019. While largely regarded as an unsuccessful conference, the European Union launched its most ambitious plan, 'The European Green Deal' which aims to lower $CO_2$ emissions to zero by 2050. The deal includes proposals to reduce emissions from the transport, agriculture and energy sectors and will affect the technology chemicals, textiles, cement, and steel industries. Measures such as fines and pay-outs by member states who rely on coal power will be in place to encourage the switch to renewable clean energies such as wind. On the 4th of March 2020, the European Commission put forward the proposal for a European climate law. This aims to establish the framework for achieving EU climate neutrality. It aims to provide a direction by setting a pathway to climate neutrality and to this end, aims to set in legislation the EU's 2050 climate-neutrality objective.

### COP28 Climate Change Conference – Dubai

The 28th Conference of the Parties for the United Nations Framework Convention on Climate Change (COP28) took place in Dubai from the 30th of November 2023 to the 13th of December 2023.

COP28 resulted in a landmark deal to 'transition away' from fossil fuels, the UAE Consensus. The agreement calls for 'transitioning away from fossil fuels in energy systems, in a just, orderly, and equitable manner.' This is the first time in 28 years that fossil fuels have been mentioned in a COP outcome. However, it is noted that the text of 'phase out as soon as possible inefficient fossil fuel subsidies' does not address energy poverty or the just transition. The UAE Consensus also calls for more explicit near-term goals in the lead up to 2050, calling for the world to cut greenhouse gas emissions by 43% by 2030 as compared to 2019 levels. However, many island states have criticised that despite the text being an improvement over previous agreements, there is a litany of loopholes that will enable destructive environmental practices to continue and do not assuage their concerns over rising sea levels and other climate change impacts.

COP28 concluded the first ever Global Stocktake under the Paris Agreement. The Global Stocktake recognises that the world is not on track to meet 1.5°C and will require Parties to align their national targets and measures with the Paris Agreement. Parties have two years to submit their Nationally Determined Contributions for 2035, these need to be aligned with the best available science and the outcomes of the Global Stocktake.

An unusual aspect that came out of COP28 in the final hours of discussion was the quantity of decisions and documents which remain unfinished and not signed off. Notably, discussions on carbon markets collapsed in the final days of COP28 as no consensus could be reached on the country-to-country trading regimes or rules for the market in relation to Article 6 of the Paris Agreement.

### COP29 Climate Change Conference – Azerbaijan

The 29th Conference of the Parties for the United Nations Framework Convention on Climate Change (COP29) took place in Azerbaijan from the 11th to the 22nd of November 2024.

COP29 resulted in developed nations agreeing to help channel a minimum of $300bn a year into developing countries by 2035 to support their efforts to deal with climate change. There was also

agreement on a new climate-finance goal for developed countries to raise $1.3tn each year from a wide range of sources, including private investment, by 2035.

Countries failed to reach an agreement on how the outcomes of last year's "global stocktake", including a key pledge to transition away from fossil fuels, should be taken forward. However, there was agreement on the remaining sections of Article 6 on carbon markets, meaning all elements of the Paris Agreement have been finalised nearly 10 years after it was signed.

The next climate summit, COP30, will take place in Belém, Brazil from 10-21 November 2025.

#### 10.3.3.1.3 United Nations Sustainable Development Goals Report 2023

*Transforming our World: the 2030 Agenda for Sustainable Development* which includes 17 Sustainable Development Goals (SDGs), and 169 targets was adopted by all UN Member States at a UN summit held in New York in 2015. The agenda is universally applicable with all countries having a shared responsibility to achieve the goals and targets which came into effect on January 1st, 2016. The goals and targets are to be actions over the 15-year period, are integrated and indivisible i.e., all must be implemented together by each Member State. On 10th July 2023, the United Nations published '*The Sustainable Development Goals Report 2023*'[3], highlighting that the lasting impacts of the COVID-19 pandemic, the war in Ukraine and subsequent refugee crisis, and the increasing consequences of the climate crisis have hindered the achievement of the SDGs. The report stipulates that due to these unprecedented events, the world is falling short of meeting most of the SDGs by 2030, especially in terms of climate action. An assessment of the around 140 targets for which trend data is available shows that about half of these targets are moderately or severely off track; and over 30% have either seen no movement or regressed below the 2015 baseline.

In October 2022 the Department of Communications, Climate Action & Environment in partnerships with all Government Departments, key stakeholders, and based on input from two public consultation processes published the Sustainable Development Goals National Implementation Plan 2022-2024 ('the SDG Plan').[4] The SDG Plan identifies that, overall, the world is not on track to achieve the global Goals by 2030. The SDG Plan sets out how Ireland will work to achieve the goals and targets of the Agenda for Sustainable Development both domestically and internationally. Irelands first National Implementation Plan provided a framework for Ireland to work towards the implementation of the SDGs; the SDG Plan aims to build on the structures and mechanisms from the first National Implementation Plan and to develop and integrate additional approaches in areas identified as requiring further action.

In September 2023, the UN Summit on the SDGs took place in New York and was co-facilitated by Ireland and Qatar. Representing the halfway mark to achieving the SDGs by 2030, it marked the beginning of a new phase of accelerated progress towards the SDGs with high-level political guidance on transformative and accelerated actions. The Global Sustainable Development Report 2023[5] was published in September 2023. The previous Global Sustainable Development Report (2019[6]) found that for some targets the global community was on track, but for many others the world would need to quicken the pace. In 2023, the situation is much more worrisome owing to slow implementation and a confluence of crises. The 2023 Report goes on to highlight the current standing of each SDG and its relevant indicators. A 2023 UN Special Report[7] found that over 30% of the SDGs have seen either no

[3] https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf
[4] *National Implementation Plan for the Sustainable Development Goals 2022-2024. Available at:* <https://www.gov.ie/en/publication/e950f-national-implementation-plan-for-the-sustainable-development-goals-2022-2024/>
[5] *Global Sustainable Development Report 2023* <https://sdgs.un.org/sites/default/files/2023-09/FINAL%20GSDR%202023-Digital%20-110923_1.pdf>
[6] *Global Sustainable Development Report 2019* <https://sdgs.un.org/sites/default/files/2020-07/24797GSDR_report_2019.pdf>
[7] *The Sustainable Development Goals Report 2023: Special Edition* <https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf>

improvement or reverse trends in progress. The push for transformation to achieve the SDGs will come through shifts in six key entry points:

1. *Human Well Being and Capabilities,*
2. *Sustainable and Just Economies,*
3. *Food Systems and Healthy Nutrition,*
4. *Energy Decarbonisation with Universal Access,*
5. *Urban and Peri-Urban Development,*
6. *Global Environmental Commons.*

The Derrybrien Wind Farm contributed to Entry Point 4 due to the clean and renewable energy it provided over its operational life. The phase out of fossil fuels in a manner that is globally and domestically just, while strengthening the transition to renewables by increasing energy efficiency and encouraging behavioural change will be key to achieving the SDGs.

Relevant SDGs to the Prospective Development and how they are implemented into Irish National plans and policies can be found in Table 10-10.

*Table 10-10 Sustainable Development Goals Report 2023, Relevant SDGs to the Prospective Development and Implementation into Irish National Plans*

| SDG | Targets | International Progress/Downfalls to Date (2023)[8] | National Relevant Policy |
|---|---|---|---|
| **SDG 7 Affordable and Clean Energy:** *Ensure access to affordable, reliable, sustainable and modern energy for all* | › By 2030, ensure universal access to affordable, reliable and modern energy services<br>› By 2030, increase substantially the share of renewable energy in the global energy mix<br>› By 2030, double the global rate of improvement in energy efficiency<br>› By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology<br>› By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support | The war in Ukraine and global economic uncertainty continue to cause significant volatility in energy prices, leading some countries to raise investments in renewables and others to increase reliance on coal, putting the green transition at risk.<br><br>The share of renewable sources in total final energy consumption amounted to 19.1% globally in 2020, or 2.4 percentage points higher than in 2015. Part of this progression is due to lower final energy demand in 2020, as the pandemic disrupted social and economic activities worldwide. The electricity sector shows the largest share of renewables in total final energy consumption (28.2% in 2020) and has driven most of the growth in renewable energy use, while the heat and transport sectors have seen limited progress over the past decade.<br>The rate of improvement in primary energy intensity, which had already slowed in recent years, dropped to 0.6% in 2020. This makes it the worst year for energy intensity improvement since the global financial crisis. This slowdown was influenced by a shift in the economic structure during Covid towards more energy-intensive industrial production, combined with only modest rates of technical efficiency improvements, in the context of low energy prices. | *Ireland's Transition to a Low Carbon Energy Future 2015-2030;*<br>*Energy Poverty Action Plan;*<br>*Ireland's Transition to a Low Carbon Energy Future 2015-2030;*<br>*National Mitigation Plan;*<br>*National Energy Efficiency Action Plan;*<br>*One World, One Future;*<br>*The Global Island*<br>*Economic Recovery Plan*<br>*Project Ireland 2040: National Planning Framework;*<br>*Project 2040;*<br>*National Development Plan 2021-2030;*<br>*Climate Action Plan 2024* |
| **SDG 9: Industry,** | › Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development | The manufacturing industry's recovery from COVID-19 remains incomplete and uneven: some high-income regions achieved record-high manufacturing value added per capita in | *National Development Plan 2021-2030;* |

[8] *United Nations, the 17 Goals – Sustainable Development <https://sdgs.un.org/goals>*

| SDG | Targets | International Progress/Downfalls to Date (2023)[8] | National Relevant Policy |
|---|---|---|---|
| **Innovation, and Infrastructure** *Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation* | and human well-being, with a focus on affordable and equitable access for all.<br>› Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries<br>› Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities | 2022 but levels in least developed countries were not much higher than the 2015 baseline.<br>Global carbon dioxide (CO2) emissions from energy combustion and industrial processes grew by 0.9% in 2022 to a new all-time high of 36.8 billion tonnes. Emissions shrank by more than 5% in 2020, but rebounded past pre – pandemic levels in 2021, growing more than 6% in tandem with economic stimulus and a surge in coal demand even as renewables capacity additions scaled record heights. CO2 growth in 2022 was well below GDP growth of 3.2%. | *National Economic Recovery Plan;*<br>*Climate Action Plan 2024;*<br>*National Implementation Plan on Persistent Organic Pollutants;*<br>*Waste Action Plan for a Circular Economy;*<br>*National Waste Prevention Programme;*<br>*A Better World* |
| **SDG 11: Sustainable Cities and Communities** *Make cities and human settlements inclusive, safe, resilient and sustainable* | › By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums<br>› By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons<br>› Strengthen efforts to protect and safeguard the world's cultural and natural heritage<br>› By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management | Climate change, the pandemic, and conflicts tend to have a disproportionate impact on cities. These factors mean that the world is far from achieving the goal of sustainable cities. In many developing countries, slum populations have been growing, putting at risk the target of adequate housing for all by 2030. Since 2015, the number of countries with national disaster risk reduction strategies has more than doubled.<br><br>According to 2022 data from 1,507 cities in 126 countries, only 51.6% of the world's urban population has convenient access to public transport, with considerable variations across regions.<br><br>Data for 2020 from 1,072 cities in 120 countries indicate that more than three-quarters of these cities have less than 20% of their area dedicated to open public spaces and streets, about half of the proportion recommended. | *Rebuilding Ireland Action Plan for Housing and Homelessness;*<br>*Housing for All;*<br>*EU Regulation 1370/2007 on Public Passenger Transport Services by Rail and by Road;*<br>*Project Ireland 2040 National Planning Framework;*<br>*National Clean Air Strategy;*<br>*Rural Development Programme 2014-2022;*<br>*National Implementation Plan on Persistent Organic Pollutants;*<br>*Waste Action Plan for a Circular Economy;*<br>*National Waste Prevention Programme;* |

| SDG | Targets | International Progress/Downfalls to Date (2023)[8] | National Relevant Policy |
|---|---|---|---|
| | | By the end of 2022, 102 countries reported having local governments with disaster risk reduction strategies, an increase from 51 countries in 2015. | *A Better World* |
| **SDG 12 Responsible Consumption and production:** *Ensure sustainable consumption and production patterns.* | › By 2030, achieve the sustainable management and efficient use of natural resources.<br>› By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment<br>› Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle<br>› Promote public procurement practices that are sustainable, in accordance with national policies and priorities.<br>› Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products | Unsustainable patterns of consumption and production are the root cause of the triple planetary crisis:<br>1. *Climate Change*<br>2. *Biodiversity Loss*<br>3. *Pollution*<br>The world is seriously off track in its effort to halve per-capita food waste and losses by 2030.The COVID-19 pandemic has had significant impacts on consumption and production patterns, with disruptions to global supply chains and changes in consumer behaviour. Responsible consumption and production must be an integral part of the recovery from the pandemic. But the global economy also needs to speed up the decoupling of economic growth from resource use by maximizing the socio-economic benefits of resources while minimizing their negative impacts. Reporting on corporate sustainability has tripled since the beginning of the SDG period, but the private sector will need to significantly improve reporting on activities that contribute to the SDGs.<br>Global data showed a rise in fossil fuel subsidies in 2021, after a brief fall in 2020 which was largely caused by a drop in energy prices. In 2021, Governments spent an estimated $732 billion on subsidies to coal, oil, and gas, against $375 billion in 2020. This brings the subsidies back to pre-2015 levels. High | *National Implementation Plan on Persistent Organic Pollutants;*<br>*Waste Action Plan for a Circular Economy;*<br>*National Waste Prevention Programme;*<br>*Climate Action Plan 2024*<br>*Tourism Action Plan;*<br>*National Clean Air Strategy;*<br>*Towards Responsible Business: Ireland's Second National Plan on Corporate Social Responsibility (CSR) 2017-2020;*<br>*Sustainable, Inclusive and Empowered Communities 2019-2024;* |

| SDG | Targets | International Progress/Downfalls to Date (2023)[8] | National Relevant Policy |
|---|---|---|---|
| | | oil and gas prices in 2022 will likely bring a new increase, as subsidies are often linked to the price of energy. | |
| **SDG 13 Climate Action:** *Take urgent action to combat climate change and its impacts**<br><br>**Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.* | › Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries<br>› Integrate climate change measures into national policies, strategies and planning<br>› Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning | The world is on the brink of a climate catastrophe and current actions and plans to address the crisis are insufficient. Without transformative action starting now and within this decade to reduce greenhouse gas emissions deeply and rapidly in all sectors, the 1.5°C target will be at risk and with it the lives of more than 3 billion people. Failure to act leads to intensifying heatwaves, droughts, flooding, wildfires, sea-level rise, and famines. Emissions should already be decreasing now and will need to be cut almost by half by 2030 - a mere seven years from now.<br><br>Global temperatures have already hit 1.1°C, rising due to increasing global greenhouse gas emissions, which reached record highs in 2021. Real-time data from 2022 show emissions continuing an upward trajectory. Instead of decreasing emissions as required by the target to limit warming, carbon dioxide levels increased from 2020 to 2021 at a rate higher than the average annual growth rate of the last decade and is already 149% higher than pre-industrial levels. Projected cumulative future CO2 emissions over the lifetime of existing and currently planned fossil fuel infrastructure exceed the total cumulative net CO2 emissions in pathways that limit warming to 1.5°C (>50%) with no or limited overshoot. | *National Adaptation Framework;*<br>*Building on Recovery: Infrastructure and Capital Investment 2016-2021;*<br>*National Mitigation Plan;*<br>*National Biodiversity Action Plan 2017-2021;*<br>*National Policy Position on Climate Action and Low Carbon Development;*<br>*Project 2040: National Development Plan 2021-2030;*<br>*Climate Action Plan 2024;*<br>*National Dialogue on Climate Action;*<br>*Agriculture, Forest, and Seafood Climate Change Sectoral Adaptation Plan;*<br>*The National Strategy on Education for Sustainable Development in Ireland* |

#### 10.3.3.1.4 Climate Change Performance Index 2024

Established in 2005, the Climate Change Performance Index (CCPI)[9] is an independent monitoring tool which tracks countries climate protection performance. It assesses individual countries based on climate policies, energy usage per capita, renewable energy implementation and greenhouse gas emissions and ranks their performance in each category and overall. The 2025 CCPI was published in December 2024. While the CCPI 2025 indicates signs of potential reductions in global emissions, no country achieved its Paris Climate targets and therefore the first three places of the ranking system remain unoccupied.

Ireland, ranked 43rd in 2024, has risen 14 places to 29th for 2025, and is now considered a 'medium' performer in international performance. The CCPI states that Ireland's policies are missing a long-term strategy for phasing out fossil fuel infrastructure and shifting investments from natural gas towards an emissions-neutral energy supply. The CCPI flag an urgent need for port infrastructure and grid strengthening to ensure medium-to-long-term offshore wind expansion and heating and transport electrification can be achieved in Ireland. Coupled with low levels of battery storage and ongoing gas connections, the state is set to remain greatly dependent on fossil fuel generation. However, in the electricity sector, the experts report Ireland's solar capacity has almost doubled in one year because of the country's surge in utility-scale solar projects and a significant rise in small and domestic rooftop solar.

Ireland has remained in the 'low' category in 2025 on the Greenhouse Gas Emissions ratings. Ireland remains in the 'Medium' category in the Renewable Energy rating table; however, Ireland has risen from 31st in 2024 to 21st in 2025.

### 10.3.3.2 National Greenhouse Gas Emission and Climate Targets

#### 10.3.3.2.1 Programme for Government

The Programme for Government was published in October 2020 and last updated July 2021. In relation to climate change the programme recognises that the next ten years are a critical period in addressing the climate crisis. It is an ambition of the programme to more than halve carbon emissions over the course of the decade (2020-2030). The programme notes that the government are committed to reducing greenhouse gas emissions by an average 7% per annum over the next decade in a push to achieve a net zero emissions by the year 2050. The programme also recognises the severity of the climate challenge as it clarifies that:

> *"Climate change is the single greatest threat facing humanity".*

#### 10.3.3.2.2 Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon (Amendment) Act 2021 is a piece of legislation which commits the country to move to a climate resilient and climate neutral economy by 2050. This was signed into law in 7th September 2021.

The Programme for Government has committed to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieve net zero emissions by 2050. This Act will manage the implementation of a suite of policies to assist in achieving these annual targets.

The Act includes the following key elements, among others:

[9] *Climate Change Performance Index 2024* <https://ccpi.org/>

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy.
- Embeds the process of carbon budgeting into law, the Government are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021.
- Actions for each sector will be detailed in the Climate Action Plan, updated annually.
- A National Long Term Climate Action Strategy will be prepared every five years.
- Government Ministers will be responsible for achieving the legally binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year.
- Strengthens the role of the Climate Change Advisory Council, tasking it with proposing carbon budgets to the Minister.

Provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% emissions over the period to 2030, in line with the Programme for Government commitment.

#### 10.3.3.2.3 Climate Change Advisory Council 2023

The Climate Change Advisory Council (CCAC) was established on 18th January 2016 under the Climate Action and Low Carbon Development Act 2015. The CCAC aims to provide independent evidence-based advice and recommendations on policy to support Ireland's Just Transition to a biodiversity-rich, environmentally sustainable, climate-neutral, and resilient society.

In July 2023, the CCAC published the 2023 Annual Review[10], which is the seventh annual review carried out by CCAC and details the CCAC concerns that the necessary national actions are not taking place or being enabled at the required speed, going on to state that 'at the current rate of policy implementation, Ireland will not meet the targets set in the first and second carbon budget periods unless urgent action is taken immediately, and emissions begin to fall much more rapidly.'

#### 10.3.3.2.4 Carbon Budgets

The first national carbon budget programme proposed by the CCAC, approved by Government and adopted by both Houses of the Oireachtas in April 2022 comprises three successive 5-year carbon budgets. The total emissions allowed under each budget are shown in Table 10-11.

*Table 10-11 Proposed Carbon Budgets of the Climate Change Advisory Council*

| | 2021 – 2025 Carbon Budget 1 | 2026 – 2030 Carbon Budget 2 | 2031 – 2035 Provisional Carbon Budget 3 |
|---|---|---|---|
| | All Gases | | |
| Carbon Budget (Mt $CO_2$eq) | 295 | 200 | 151 |
| Annual Average Percentage Change in Emissions | -4.8% | -8.3% | -3.5% |

[10] *Climate Change Advisory Council 2023 Review* <https://www.climatecouncil.ie/councilpublications/annualreviewandreport/CCAC-AR-2023-FINAL%20Compressed%20web.pdf>

| | 2021 – 2025 Carbon Budget 1 | 2026 – 2030 Carbon Budget 2 | 2031 – 2035 Provisional Carbon Budget 3 |
|---|---|---|---|
| | All Gases | | |
| The figures are consistent with emissions in 2018 of 68.3 Mt $CO_2$eq reducing to 33.5 Mt $CO_2$eq in 2030 thus allowing compliance with the 51% emissions reduction target by 2030 | | | |

#### 10.3.3.2.5 Sectoral Emissions Ceilings

The Sectoral Emissions Ceilings were launched in September 2022. The objective of the initiative is to inform on the total amount of permitted greenhouse gas emissions that each sector of the Irish economy can produce during a specific time period. The Sectoral Emissions Ceilings alongside the annual published Climate Action Plan provide a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030.

Section C of the Climate Action and Low Carbon Development (Amendment) Act 2021 provides the minister with a method of preparing the Sectoral Emissions Ceiling within the bounds of the carbon budget. The Sectoral Emission Ceilings for each 5-year carbon budget period was approved by the government on the 28th of July 2022 and are shown in Table 10-12 below.

*Table 10-12 Sectoral Emission Ceilings 2022*

| Sector | Sectoral Emission Ceilings for each 5-year carbon budget period (MtCO2eq.) | |
|---|---|---|
| | 2021 – 2025 Carbon Budget 1 | 2026 – 2030 Carbon Budget 2 |
| Electricity | 40 | 20 |
| Transport | 54 | 37 |
| Built Environment- Residential | 29 | 23 |
| Built Environment- Commercial | 7 | 5 |
| Industry | 30 | 24 |
| Agriculture | 106 | 96 |
| LULUCF[1] | Yet to be determined | Yet to be determined |
| Other (F-Gases, Waste & Petroleum refining) | 9 | 8 |
| *Unallocated Savings* | | *-26* |
| Total[2] | Yet to be determined | Yet to be determined |
| Legally binding Carbon budgets and 2030 Emission Reduction Targets | 295 | 200 |

*[1] Finalising the Sectoral Emissions Ceiling for the land-use, Land-use Change and Forestry (LULUCF) sector has been deferred for up to 18 months to allow for the completion of the Land-use Strategy*
*[2] Once LULUCF sector figures are finalised, total figures will be available.*

The electricity sector is the third largest emitting sector in Ireland and the successful decarbonisation of this sector could lead to decarbonisation in other sectors, such as the electrification of transport and heating. The CCAC 2023 Annual Review states that the electricity sector has been set one of the smallest sectoral emission ceilings and the steepest decline in emissions of all sectors with emission ceilings of 40Mt$CO_2$eq for the first carbon budget period (2021–2025) and 20Mt$CO_2$eq for the second carbon budget period (2026–2030). This equates to a headline target of a 75% reduction in emissions in the sector from 2018 levels by 2030, which will be achieved by increasing the share of renewable electricity to 80%, encompassing 9GW of onshore wind capacity, at least 5GW of offshore wind capacity, with 2 GW earmarked for green hydrogen production, and 8GW of solar photovoltaic capacity, supported by a range of actions set out in the Climate Action Plan 2025.

#### 10.3.3.2.6 Climate Action Plan 2025

The National Climate Action Plan 2025 (CAP 2025)[11] was launched in April 2025. CAP 2025 marks the fourth update to the Climate Action Plan 2019, and the third to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, and the introduction of the 2022 Sectoral Emissions Ceilings (SEC) and the establishment of economy-wide carbon budgets.

CAP 2025 seeks to build on the progress made under Climate Action Plan 2024 by delivering policies, measurements and actions that will support the achievement of Irelands carbon budgets, sectoral emission ceilings, and 2030 and 2050 climate targets; while further enabling the closure of identified emissions gaps and the allocation of unallocated emission savings associated with each carbon budget period.

Building on previous iterations, CAP25 offers a detailed sector-by-sector roadmap outlining the key actions required to transition Ireland to a low-carbon society and reaffirms the goals of a 51% reduction in greenhouse gas emissions by 2030 and reaching climate neutrality no later than 2050. Major measures include a significant scale-up of renewable energy, especially wind and solar power, extensive retrofitting of homes to improve energy efficiency, support for nearly one million electric vehicles by 2030, and reforms in agriculture and land use aimed at promoting sustainability. CAP25 also emphasises public engagement, a just transition, and effective carbon pricing to ensure that the costs and benefits of climate action are distributed equitably across society. As with Climate Action Plan 2024, CAP 2025 provides an Annex of Actions[12], which only contain new, high-impact actions for delivery in 2025. The full set of measures for CAP 2025 (i.e., proposed new actions and existing actions) are still located within CAP 2025.

Six Vital High Impact Sectors were identified within Climate Action Plan 2023[13] relating to the sectoral emission ceilings. CAP 2025 has reaffirmed the following sectors and targets with no proposed changes:

##### Powering Renewables – 75% Reduction in emissions by 2030

*We will facilitate a large-scale deployment of renewables that will be critical to decarbonising the power sector as well as enabling the electrification of other technologies.*

- Accelerate the delivery of onshore wind, offshore wind, and solar.
- Dial up to 9 GW onshore wind, 8 GW solar, and at least 7 GW of offshore wind by 2030 (with 2 GW earmarked for green hydrogen production).

[11] *Department of the Environment, Climate and Communications (2025) Climate Action Plan 2025. Available at:* https://www.gov.ie/en/department-of-the-environment-climate-and-communications/publications/climate-action-plan-2025/
[12] https://assets.gov.ie/static/documents/Climate_Action_Plan_2025_-_Annex_of_Actions.pdf
[13] *Department of the Environment, Climate and Communications (2022) Climate Action Plan 2023 – Summary Document*

- Support at least 500 MW of local community-based renewable energy projects and increased levels of new micro-generation and small-scale generation.
- Phase out and end the use of coal and peat in electricity generation.

Achievement of the 75% reduction in emissions by 2030 and the decarbonisation of the grid in Ireland would assist in the achievement of the Electricity sectoral emission ceiling.

### Building Better – 45% (Commercial/Public) and 40% (Residential) Reduction in Emissions by 2030

*We will increase the energy efficiency of existing buildings, put in place policies to deliver zero-emissions new builds, and continue to ramp up our retrofitting programme.*

- Ramp up retrofitting to 120,000 dwellings to BER B2 by 2025, jumping to 500,000 by 2030.
- Generation up to 0.8 TWh of district heating by 2025 and up to 2.5 TWh by 2030.

Achievement of the 45% (Commercial/Public) and 40% (Residential) reduction in emissions by 2030 would assist in the achievement of the Built Environment (Commercial/Residential) sectoral emission ceiling.

### Turning Transport Around – 50% Reduction in Emissions by 2030

*We will drive policies to reduce transport emissions by improving our town, cities, and rural planning, and by adopting the Avoid-Shift-Improve approach: reducing or avoiding the need for travel, shifting to public transport, walking, and cycling and improving the energy efficiency of vehicles.*

- Change the way we use our road space.
- Reduce the total distance driven across all car journeys by 20%.
- Walking, cycling and public transport to account for 50% of our journeys.
- Nearly 1 in 3 private cars will be an Electric Vehicle.
- Increase walking and cycling networks.
- 70% of people in rural Ireland will have buses that provide at least 3 trips to the nearby town daily by 2030.

Achievement of the 50% reduction in emissions relating to transport by 2030 would assist in the achievement of the Transport sectoral emission ceiling.

### Making Family Farms More Sustainable – 25% Reduction in Emissions by 2030

*We will support farmers to continue to produce world class, safe and nutritious food while also seeking to diversify income through tillage, energy generation and forestry.*

- Significantly reduce our use of chemical nitrogen as a fertilizer.
- Increase uptake of protected urea on grassland farms to 90-100%.
- Increase organic farming to up to 450,000 hectares, the area of tillage to up to 400,000 ha.
- Expand the indigenous biomethane sector through anaerobic digestion, reaching up to 5.7TWh of biomethane.
- Contribute to delivery of the land use targets for afforestation and reduced management intensity of organic soils.

Achievement of a 25% reduction in emissions by 2030 in agriculture and farming practices would assist in the achievement of the agriculture sectoral emission ceiling.

## Greening Business and Enterprise – 35% Reduction in Emissions by 2030

*We're changing how we produce, consume, and design our goods and services by breaking the link between fossil fuels and economic progress. Decarbonising industry and enterprise are key to Ireland's economy and future competitiveness.*

- Reduce clinker content in cement and substitute products with lower carbon content for construction materials, ensuring 35% reduction in emissions by 2030 (against 2018).
- Reduce fossil fuel use from 64% of final consumption (2021) to 45% by 2025 and further by 2030.
- Increase total share of heating to carbon neutral to 50-55% by 2025, up to 70-75% by 2030.
- Significantly grow the circular economy and bioeconomy.

Achievement of a 35% reduction in emissions by 2030 in relation to Irish production and consumption would enable a more circular economy and assist in the achievement of the Industry and Other sectoral emission ceilings.

## Changing our land use

*The first phase of the land use review will tell us how we are using our land now. Then, we can map, with evidence, how it can be used most effectively to capture and store carbon and to produce better, greener food and energy.*

- Increase our annual afforestation rates to 8,000 hectares per annum from 2023 onwards.
- Promote forest management initiatives in both public and private forests to increase carbon sinks and stores.
- Improve carbon sequestration of 450,000 ha of grasslands on mineral soils and reduce the management intensity of grasslands on 80,000 ha of drained organic soils.
- Rehabilitate 77,600 hectares of peatlands.

Exact reduction target for this sector is yet to be determined. By improving the manner in which Ireland utilises its land use, Ireland can achieve emission reductions and mitigate the ongoing climate and biodiversity crisis's. The LULUCF sectoral emission ceiling will be set after completion of the Land-use Strategy.

## Adaptation

CAP 2025 highlights the need for adaptation to climate change. Adaptation is the process of adjustment to actual or expected climate change and its effects. Observations show that Irelands climate is changing in terms of coastline, sea level rise, seasonal temperatures, and changes in typical weather patterns. Climate change is expected to have diverse and wide-ranging impacts on Ireland's environment, society, and economic development, including managed and natural ecosystems, water resources, agriculture and food security, the built environment, human health, and coastal zones.

Climate Sectoral Adaptation Planning[14] includes for 12 sectoral adaptation plans that describe and assess the extent of the risks presented by climate change to a sector, and present contingency plans to address these risks and ensure climate resilience. They include actions to mainstream adaptation into policy and administration at sectoral level to improve the resilience of existing and planned critical

[14] *Department of the Environment, Climate and Communications (2020) Sectoral Adaptation Planning.* https://www.gov.ie/en/collection/51df3-sectoral-adaptation-planning/

infrastructure, systems, and procedures, to the effects and variability of climate change, as well as to improve cooperation and coherence within and across sectors, as well as on a local and national level. CAP 2025 acknowledges the current shortfalls towards interim (2025) targets and underscores the need for faster implementation, stronger governance, and more coordinated cross-sectoral action to close the gap between ambition and delivery.

#### 10.3.3.2.7 Greenhouse Gas Emissions Projections

In its approach to decarbonisation, the EU has split greenhouse gas emissions into two categories, the Emissions Trading System (ETS) and the non-ETS. Emissions from electricity generation and large industry in the ETS are subject to EU-wide targets which require that emissions from these sectors be reduced by 43% by 2030, relative to 2005 levels. Within the ETS, participants are required to purchase allowances for every tonne of emissions, with the amount of these allowances declining over time to ensure the required reduction of 43% in greenhouse gas emissions is achieved at EU-level[15].

Emissions from all other sectors, including agriculture, transport, buildings, and light industry are covered by the EU Effort Sharing Regulation (ESR[16]). This established binding annual greenhouse gas emission targets for Member States for the period 2021–2030. Ireland is required to reduce its emissions from these sectors by 30% by 2030, relative to 2005 levels. Under the EU Green Deal, the targets for the ETS and non-ETS sectors will be revised upwards in order to achieve the commitment, at EU level, to reach an economy-wide 2030 reduction in emissions of at least 55%, compared to 1990 levels.

The Environmental Protection Agency (EPA) publish Ireland's Greenhouse Gas Emission Projections and at the time of writing, the most recent report, *'Ireland's Greenhouse Gas Emissions Projections 2022–2040'* was published in June 2023. The report includes an assessment of Ireland's progress towards achieving its emission reduction targets out to 2030 set under the ESR.

The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario assumes that no additional policies and measures, beyond those already in place by the end of 2020. This is the cut off point for which the latest national greenhouse gas emission inventory data is available, known as the 'base year' for projections. The WAM scenario has a higher level of ambition and includes government policies and measures to reduce emissions such as those in Ireland's Climate Action Plan 2024.

The EPA Emission Projections Update notes the following key trends:

- Ireland is not on track to meet the 51% emissions reduction target by 2030 (as compared to 2018 levels) – expected to achieve a total reduction of 29% under a WEM scenario.
    - Will only achieve an 11% reduction under a WEM scenario.
- Almost all sectors are projected to breach their sectoral emission ceiling (SEC) for 2025 and 2023 in both WAM and WEM scenarios.
    - Only the residential sector will achieve their SEC.
- Projected that Ireland could meet the original EU Effort Sharing Regulation target of 30% emissions reductions by 2030 (compared to 2005) – this goal has since been updated to a 42% reduction which will require full and rapid implementation of CAP 2024 measures and further measures to be implemented.
- Energy sector emissions are projected to decrease by 50-60% between 2021-2030.

[15] *Department of the Environment, Climate and Communications (2023) - Climate Action Plan 2024* https://www.gov.ie/en/publication/79659-climate-action-plan-2024/

[16] *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (Text with EEA relevance)*

- Achievement of the 80% renewable energy target is expected.
- Transport emissions are expected to decrease between 1-35% between 2021-2030.
- Emissions from LULUCF are projected to increase over the period 2021-2030 as forestry reaches harvesting age.
  - Planned policies for the sector are expected to reduce the extent of emissions increase.

### 10.3.3.3 Local Greenhouse Gas Emission and Climate Targets

#### 10.3.3.3.1 *Galway Local Authority Climate Action Plan 2024-2029*

The Galway County Council Local Authority Climate Action Plan 2024-2029[17] (Galway LACAP) highlights the current state of climate action in Ireland, and how Galway County Council intends to deliver and enable climate action for a just transition to a low carbon and climate resilient future within County Galway. The Galway LACAP will help address the mitigation of greenhouse gases, the implementation of climate change adaption measures, and will strengthen the alignment between national climate policy and the delivery of effective local climate action.

Overall, the greenhouse gas emissions generated from County Galway equated to 1,950,000 tCO2eq in 2018. The top emitting sectors within County Galway in terms of total greenhouse gas emissions in the baseline year were Agriculture, Transport, Land use, Land Use Change and Forestry (LULUCF) and Residential producing 44%, 16%, 16% and 15% respectively of the total greenhouse gas emissions in the county. In 2019, Irelands national emissions totalled 65,152,000tCO2eq, with County Galway being responsible for approximately 5% of this (i.e., 3,009,000 tCO2eq).

The Galway LACAP for Galway assesses climate risk relevant to Ireland and to County Galway, this, plus the evidence baseline, inform the climate objectives and actions that will be undertaken by Galway County Council to assist in the achievement of national and international climate targets.

The Galway County Development Plan 2022-2028[18] sets out the overall strategy for the proper planning and sustainable development of the County over a 6-year period. The Development Plan includes numerous objectives on sustainability and climate within, as well as a Renewable Energy Strategy.

### 10.3.3.4 Contribution of the Prospective Development to Meeting Greenhouse Gas Emission Targets

The Prospective Development will not contribute to meeting any of Ireland's greenhouse gas emission targets. However, since the Derrybrien Wind Farm has been determined to be unauthorised development by An Bord Pleanála and following receipt of an enforcement notice from Galway County Council, Gort WFL is obligated to decommission the wind farm and associated grid connection.

## 10.3.4 Receiving Environment: Climate and Weather in the Existing Environment

County Galway has a temperate oceanic climate, resulting in mild winters and cool summers. The prevailing wind direction is between south and west which bring moist air and frequent rain.

[17] *Galway Local Authority Climate Action Plan 2024-2029. < https://consult.galway.ie/en/consultation/galway-county-council-local-authority-climate-action-plan-2024-2029 >*
[18] *Adopted Galway County Development Plan 2022-2028 <https://consult.galway.ie/en/consultation/adopted-galway-county-development-plan-2022-2028>*

The Met Eireann weather station at Shannon Airport, Co. Clare is the nearest weather and climate monitoring station to the Prospective Development site that has long-term meteorological data recorded for the 30-year period from 1991-2020 (the most recent long-term data available). The monitoring station located approximately 50km kilometres south of the site. Meteorological data recorded at Shannon Airport over the 30-year period from 1991 - 2020 is shown in Table 10-13 overleaf and rain data from the Gort (Derrybrien II) station is shown in table 10-14. Gort (Derrybrien II) station is located approximately 3km south of the site. This weather station measures rainfall and is more representative of the site location due to the topological characteristics of the Prospective Development location at a higher altitude. The wettest months are November and December, and April is usually the driest. July is the warmest month with a mean daily temperature of 16° Celsius.

#### 10.3.4.1 Wind

The wind field characteristics of the area are important climatological elements in examining the potential for the generation of fugitive dust emissions from the site. Fugitive dust emissions from a surface occur if the winds are sufficiently strong and turbulent and the surface is dry and loose, together causing re-suspension of particulate matter from the ground. A wind speed at ground level in excess of about five metres per second is considered to be the threshold above which re-suspension of fine sized material from an exposed surface may occur. The surface needs to have a relatively low moisture content for this type of dust emission to take place and any wetting either by rainfall or sprayers, will greatly reduce the potential of fugitive dust emissions. The mean annual wind speed at the station, at Shannon Airport, is 9.1 metres per second.

#### 10.3.4.2 Rainfall

Long term rainfall data was obtained from the monitoring station at Gort (Derrybrien II), approximately 3km south of the site. This weather station measures rainfall and is more representative of the site location due to the topological characteristics of the Prospective Development location at a higher altitude. The 30-year annual average rainfall for Gort (Derrybrien II) is 1430.1 mm/yr. This is considered to be high when compared to the annual average rainfall for Dublin (Dublin Airport) which recorded annual average rainfall of 772.5mm/year over the same period. Rainfall levels are higher here due to the Prospective Development site being located at a higher altitude than the surrounding lands.

*Table 10-13 Data from Met Éireann Weather Station at Shannon Airport, 1990-2020: Monthly and Annual Mean and Extreme Values*

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TEMPERATURE (degrees Celsius)** | | | | | | | | | | | | | |
| Mean daily max | 8.9 | 9.4 | 10.9 | 13.4 | 16 | 18.3 | 19.5 | 19.1 | 17.5 | 14.2 | 11.1 | 9.2 | 14 |
| Mean daily min | 3.3 | 3.3 | 4 | 5.8 | 8.1 | 10.8 | 12.6 | 12.4 | 10.7 | 8.1 | 5.5 | 3.7 | 7.4 |
| Mean temperature | 6.1 | 6.3 | 7.5 | 9.6 | 12 | 14.5 | 16 | 15.8 | 14.1 | 11.2 | 8.3 | 6.4 | 10.7 |
| Absolute max. | 14.7 | 15.5 | 19.6 | 23 | 27.8 | 32 | 30.2 | 29.2 | 25.6 | 21.9 | 17.2 | 15.4 | 32 |
| Absolute Min. | -11.2 | -5.1 | -5.8 | -2.9 | 0.1 | 3.1 | 6.2 | 4.4 | 1.7 | -2.3 | -6.6 | -11.4 | -11.4 |
| Mean No. of Days with Air Frost | 5.2 | 4.6 | 3.2 | 0.6 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1.9 | 4.4 | 20.3 |
| Mean No. of Days with Ground Frost | 13 | 11.8 | 11.9 | 7.7 | 2.9 | 0.2 | 0 | 0 | 0.8 | 3.3 | 8 | 11.3 | 70.9 |
| **RELATIVE HUMIDITY (%)** | | | | | | | | | | | | | |
| Mean at 0900UTC | 87.8 | 87.9 | 85 | 79.3 | 76.2 | 76.6 | 80 | 82.3 | 85.1 | 87.4 | 89.9 | 88.9 | 83.9 |
| Mean at 1500UTC | 81.2 | 75.4 | 69.8 | 64.1 | 63.5 | 64.6 | 69.3 | 69.1 | 70 | 75 | 81 | 83.5 | 72.2 |
| **SUNSHINE (Hours)** | | | | | | | | | | | | | |
| Mean daily duration | 1.7 | 2.4 | 3.6 | 5.4 | 5.9 | 5.5 | 4.4 | 4.6 | 3.9 | 3 | 2.1 | 1.5 | 3.7 |
| Greatest daily duration | 8.1 | 10.2 | 11.5 | 13.6 | 15.6 | 15.8 | 15.7 | 14.4 | 12.2 | 10.1 | 8.3 | 7.1 | 15.8 |
| Mean num. of days with no sun | 9.1 | 5.9 | 5.3 | 2.3 | 1.9 | 1.8 | 2.1 | 2.1 | 2.6 | 5.1 | 7.7 | 10.1 | 56 |

| WIND (knots) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean monthly speed | 10 | 10.1 | 9.6 | 9.2 | 9 | 8.5 | 8.4 | 8.3 | 8.4 | 8.9 | 9.1 | 9.7 | 9.1 |
| Max. gust | 75 | 86 | 63 | 66 | 52 | 51 | 52 | 61 | 58 | 66 | 69 | 83 | 86 |
| Max. mean 10-minute speed | 47 | 61 | 44 | 45 | 37 | 37 | 38 | 44 | 44 | 47 | 50 | 57 | 61 |
| Mean num. of days with gales | 1.8 | 1.2 | 0.9 | 0.4 | 0.2 | 0.2 | 0 | 0.1 | 0.1 | 0.5 | 0.8 | 1.3 | 7.5 |
| **WEATHER (Mean No. of Days With:)** | | | | | | | | | | | | | |
| Snow or sleet | 1.5 | 1.8 | 1.2 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | 5.9 |
| Snow lying at 0900UTC | 0.2 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.5 |
| Hail | 3.1 | 3.4 | 2.8 | 2 | 0.7 | 0 | 0 | 0.1 | 0.1 | 0.5 | 1 | 2.3 | 16 |
| Thunder | 0.9 | 0.4 | 0.3 | 0.3 | 0.5 | 0.4 | 0.7 | 0.5 | 0.2 | 0.3 | 0.3 | 0.4 | 5.2 |
| Fog | 3.4 | 2.2 | 2.4 | 1.8 | 1.3 | 1 | 0.9 | 1.6 | 2.8 | 3.1 | 4 | 3.8 | 28.3 |

*Table 10-14 Data from Met Éireann Weather Station at Gort (Derrybrien II) 1990-2020: Rainfall mean and extreme values*

| RAINFALL (mm) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
| Mean monthly total | 149.8 | 117.9 | 107.4 | 90.5 | 90.1 | 96.3 | 105.5 | 116.6 | 105.24 | 130.9 | 153.0 | 166.9 | 1430.1 |
| Greatest daily total | 70.6 | 56.9 | 44.1 | 39 | 31.1 | 61.4 | 38.3 | 48 | 63.4 | 57.3 | 48.3 | 59.4 | 70.6 |
| Mean num. of days with >= 0.2mm | 23.2 | 20.3 | 20.5 | 18.4 | 19 | 17.8 | 21.6 | 22.1 | 19 | 21.4 | 23.6 | 22.7 | 249.6 |
| Mean num. of days with >= 1.0mm | 19.3 | 16.6 | 16.4 | 14.3 | 15.3 | 14.4 | 17.8 | 17.5 | 15.8 | 17.7 | 19.8 | 19.1 | 204 |

## 10.3.5 Likely Significant Effects and Mitigation Measures Implemented

### 10.3.5.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022.

If the Prospective Development were not to proceed, greenhouse gas emissions, e.g. carbon dioxide ($CO_2$), carbon monoxide and nitrogen oxides associated with construction vehicles and plant would not arise. Since the Derrybrien Wind Farm is not currently operational it is not currently contributing to a reduction in Ireland's greenhouse gas emissions. Under the "Do-Nothing" scenario this would not change. The effect on climate would therefore be neutral.

### 10.3.5.2 Impacts of Prospective Development

#### 10.3.5.2.1 *Greenhouse Gas Emissions*

1. Enabling Works (Temporary site compounds, vegetation and scrub clearance, minor levelling works at hardstands, minor improvements to existing access tracks,)

The construction of temporary site compounds, vegetation and scrub clearance and minor improvements to existing hardstands and access tracks (as outlined in Chapter 4) will require construction materials (such as crushed stone) to be imported to site, and the operation of construction vehicles and plant on the Prospective Development Site. Greenhouse gas emissions, e.g. carbon dioxide ($CO_2$), carbon monoxide and nitrogen oxides associated with production of construction materials, and operation of vehicles and plant will arise as a result of the construction activities. This potential effect will be short-term, direct and slight negative only, given the insignificant quantity of greenhouse gases that will be emitted to the atmosphere and will be restricted to the duration of the Prospective Development. Mitigation measures to reduce this impact are presented below.

2. Decommissioning Derrybrien Wind Farm (removal of above ground structures including 70 no. turbines and 2 no. anemometer masts, removal of electrical equipment from Derrybrien Substation and demolition of substation building).

The decommissioning of the Derrybrien Wind Farm, including the controlled dismantling of turbines and anemometer masts, the demolition of the Derrybrien Substation, (as outlined in Chapter 4) will require the operation of construction vehicles and plant on the Prospective Development Site. Greenhouse gas emissions, e.g. carbon dioxide ($CO_2$), carbon monoxide and nitrogen oxides associated with the operation of vehicles and plant will arise as a result of the decommissioning activities. This potential effect will be short-term, direct and slight negative only, given the insignificant quantity of greenhouse gases that will be emitted to the atmosphere and will be restricted to the duration of the Prospective Development. Mitigation measures to reduce this impact are presented below.

3. Decommissioning Derrybrien Wind Farm Grid Connection (Destringing of the overhead line conductors, Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts), Controlled removal of Agannygal Substation and demolition of control building, Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast, Removal of palisade fencing, and Reinstatement of the Ennis-Shannonbridge 110kV Line.)

The decommissioning of the Derrybrien Wind Farm grid connection, including the decommissioning and demolition of the Agannygal Substation (as outlined in Chapter 4) will require the operation of construction vehicles and plant along the grid route and at the Agannygal Substation, thereby giving rise to emissions. This potential effect will be short-term, direct and slight negative only, given the insignificant quantity of greenhouse gases that will be emitted, and will be restricted to the duration of Prospective Development. Mitigation measures to reduce this impact are presented below.

4. Transport to Site

The transport of construction materials to the site, and the removal of turbines and associated electrical equipment as well as demolition waste from the site will also give rise to greenhouse gas emissions associated with the transport vehicles and exhaust emissions. This potential effect will be short-term, indirect and slight negative only, given the insignificant quantity of greenhouse gases that will be emitted, and will be restricted to the duration of the Prospective Development. Mitigation measures to reduce this impact are presented below.

## Mitigation

- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.
- Turbines and demolition waste will be transported from the Site on specified routes only unless otherwise agreed with the Planning Authority.
- When stationary, delivery and on-site vehicles will be required to turn off engines.
- Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum.
- Decommissioned turbines, electrical equipment, and materials will be re-used and recycled to the greatest extent practicable.
- Aggregate materials required for enabling works will be obtained from local quarries. This will significantly reduce the length of journeys for delivery vehicles, thereby reducing the amount of emissions associated with vehicle movements.
- The Materials Recovery Facility (MRF) will be local to the Prospective Development site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the site is City Bin Co. recycling centre which is located approximately 28.6km to the northwest of the Prospective Development.

## Residual Effects

Following implementation of the mitigation measures above, residual effects of greenhouse gas emissions arising from the Prospective Development will have a short-term, indirect imperceptible negative effect.

However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from Prospective Development will have a permanent imperceptible negative effect on Climate.

## Significance of Effects

Based on the assessment above there will be no significant effects.

#### 10.3.5.3 Cumulative and In-Combination Effects

Potential cumulative effects on climate between the Prospective Development and other permitted or proposed projects and plans in the area, (wind energy or otherwise), as set out in Section 4.7 in Chapter 4 of this EIAR, were also considered as part of this assessment. The developments considered as part of the cumulative effect assessment are described in Section 4.7 of this EIAR. The Prospective Development and other permitted or proposed projects and plans in the area as set out in Section 4.7 in Chapter 4 of this EIAR will likelyresult in greenhouse gas emissions arising from production of construction materials (such as cement), and the operation of construction vehicles and plant. Emissions from the Prospective Development will be restricted to the duration of the decommissioning works, and as such will give rise to emission over a short-term duration. However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from decommissioning activities will have a permanent imperceptible negative effect on Climate. Given the limited emissions of greenhouse gasses that will result from the Prospective Development there will be no significant cumulative effects on climate resulting from the Prospective Development in-combination with the other projects set out the Chapter 4 of this EIAR.

There will be no significant cumulative effects on climate resulting from the Prospective Development in-combination with the Retained Development.

### 10.3.6 Conclusion

This Chapter of the EIAR followed relevant guidance and best practice to provide an assessment of potential effects from the Prospective Development on climate, either alone or cumulatively. It is concluded that effects on climate from this Prospective Development will be, at worst, short-term, imperceptible and negative.

# 11. NOISE AND VIBRATION

## 11.1 Introduction

### 11.1.1 Chapter Scope

This chapter describes potential noise and vibration impacts associated with the Derrybrien Wind Farm Development Decommissioning Project Prospective Development as described in Chapter 4 Project Description to this EIAR.

Given the relatively short duration of decommissioning projects, and the use of similar plant and equipment, such projects are typically assessed similarly to construction works. Thus, this chapter makes reference to noise criteria relevant to construction works and applies a similar assessment methodology.

### 11.1.2 Statement of Authority

The noise assessment was undertaken by Damian Brosnan of MKO (formerly of Damian Brosnan Acoustics) who has over 30 years' experience in scoping and carrying out such impact assessments. His qualifications are as follows:

- BSc (Honours) 1993 (University College Cork).
- Diploma in Acoustics & Noise Control 2009 (Institute of Acoustics).
- MSc (Distinction) in Applied Acoustics 2015 (University of Derby).
- Member of Institute of Acoustics (MIOA) & secretary of Irish branch.
- Founding member of Association of Acoustic Consultants of Ireland (AACI).
- Member of Engineers Ireland (MIEI).
- Lead author of Environmental Noise Guidance For Local Authority Planning & Enforcement Departments (AACI, 2019).
- 1996-2001: Noise Officer with Cork County Council.
- 2001-2014: Partner with DixonBrosnan Environmental Consultants, specialising in EIA.
- 2015-2023: Principal at Damian Brosnan Acoustics.
- 2023–Present: Project Director, Acoustics at MKO.

EIAR projects on which Damian has worked previously include the following:

- Boliden Tara Mines solar farm, Co. Meath.
- Glenveagh large residential development, Cork Docklands.
- Glanway waste management facility, Co. Waterford.
- Dexcom pharmaceutical facility, Co. Galway.
- Huntsown circular economy hub, Co. Dublin.
- Nenagh wastewater treatment facility, Co. Tipperary.
- FSL quarry, Co. Galway.
- Lower Lee flood relief scheme, Cork City.

rEIAR projects on which Damian has worked previously include the following:

- Meenbog wind farm, Co. Donegal.
- Corcoran's Quarry, Co. Tipperary.
- Tipperary Natural Stone, Co. Tipperary.
- McTigue Quarries, Co. Galway.

- Redmond Lee Quarries, Co. Galway.
- Killola Quarries, Co. Galway.
- MCG Quarries, Co. Kerry (2 sites).
- Kelly Bros. Quarries, Co. Kerry.
- Birrane Quarries, Co. Mayo.
- Allman Quarries, Co. Kerry.
- Ballymoe Quarries, Co. Galway.
- BP Mitchell Sand & Gravel, Co. Mayo.
- J Dunleavy Sand, Tuam, Co. Galway – rEIA.

### 11.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 – 2018.
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999; S.I. No. 450 of 2000; S.I No. 538 of 2001); S.I. No. 30 of 2000 the Planning and Development Act, 2000; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment.
- Planning and Development Act, 2000, as amended.
- S.I. No 296 of 2018: S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law.
- The Heritage Act 1995, as amended.

There is no noise-specific legislation in force in relation to construction or decommissioning phase noise emissions.

### 11.1.4 Relevant Guidance

This chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Guidelines On Community Noise (World Health Organisation, 1999).
- British Standard BS 5228-1:2009+A1:2014 Code Of Practice For Noise And Vibration Control On Construction And Open Sites – Part 1: Noise (2014).
- NG4 Guidance Note For Noise: Licence Applications, Surveys And Assessments In Relation To Scheduled Activities (Environmental Protection Agency, 2016).
- Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Environmental Protection Agency, 2022).
- International Organization for Standardization (ISO) (1996-2:2017). Acoustics – Description, Measurement And Assessment Of Environmental Noise, Part 2: Determination Of Environmental Noise Levels (2017).

There are no national mandatory noise limits or guidance documents relating to the construction or decommissioning phase of a project. In granting planning permission, local authorities typically do not specify noise limits applicable to decommissioning works. However, some authorities may stipulate construction phase noise limits applicable to daytime, evening, night-time and weekend hours. There are no national guidelines available regarding the selection of such limits. Many local authorities chose to apply a 65 dB $L_{Aeq\ T}$ limit to all construction works, and such a criterion is equally relevant to decommissioning works.

The chief noise guidance document applied in Ireland and the UK in construction phase noise assessments is British Standard BS 5228:2009+A1:2014 Code Of Practice For Noise And Vibration Control On Construction And Open Sites Part 1: Noise (2014). The document scope states that the document is relevant to:

> *'...construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work activities/operations generate significant noise levels...'*

BS 5228:2009 is therefore the most relevant standard available with respect to decommissioning projects involving plant used in open areas. Annex E of the document sets out several methods to draw up suitable noise criteria applicable to a project. The most appropriate method here is the 'ABC method', which provides for the selection of criteria based on existing ambient noise data. On the basis of noise data recorded locally, as discussed below, a daytime $L_{Aeq\ 1\ h}$ criterion of 65 dB is identified. This criterion is identical to that typically applied by local authorities to construction works, and is thus applied in this assessment. The $L_{Aeq\ 1\ h}$ parameter describes the total noise emissions from all works occurring during any 1 h period, averaged over that hour.

BS 5228:2009 states that the 65 dB criterion is applicable to the periods Monday-Friday 07:00-19:00 h and Saturday 07:00-13:00 h. Decommissioning works are unlikely to be undertaken outside of these hours. This assessment therefore applies the 65 dB criterion in respect of all proposed works.

The 65 dB criterion is considered applicable to surrounding noise sensitive receptors, in their immediate curtilage. In this regard, the Environmental Protection Agency document NG4 Guidance Note For Noise: Licence Applications, Surveys And Assessments In Relation To Scheduled Activities (2016) defines a noise sensitive location as:

> *'Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires absence of noise at nuisance levels.'*

As construction and decommissioning projects tend to be relatively short, and as works areas are usually localised and mobile, the 65 dB limit is usually not subject to any additional criteria such as tone and impulse restrictions.

The assessment of impacts on human health is typically undertaken by reference to World Health Organisation guidance, which has been revised over the last four decades according as noise and health studies have been published. Most environmental noise guidance documents issued across Europe ultimately derive limits from guidance issued by the WHO. The WHO document Guidelines On Community Noise (1999) sets out guideline values considered necessary to protect communities from environmental noise. With respect to residential settings, the document notes that an outdoor $L_{Aeq\ 16\ h}$ level of 55 dB is an indicator of serious annoyance during daytime and evening hours, with 50 dB being an indicator of moderate annoyance. The 55 dB criterion was first suggested by the WHO in their 1980 document Environmental Health Criteria 12.

Since 1980, the 55 dB criterion has become the de facto daytime limit applied by most Irish regulatory authorities to commercial and industrial operators. Although the WHO criterion applies to daytime periods of 16 hours, authorities typically specify shorter periods, and thus limits as $L_{Aeq\ 15\ min}$, $L_{Aeq\ 30\ min}$

and $L_{Aeq\ 1\ h}$ are variously applied. In issuing licences to industrial facilities, the EPA typically specifies a daytime $L_{Aeq\ T}$ limit of 55 dB at receptors.

On this basis, compliance with a daytime $L_{Aeq\ 1\ h}$ criterion of 55 dB at receptors is considered to indicate that impacts on human health are unlikely to occur.

# 11.2 Methodology

## 11.2.1 Zone of Influence

The zone of influence extends to include all receptors within 500 m of the Prospective Works site boundary. MKO experience with sites across Ireland indicates that construction noise is generally inaudible beyond 500 m, as construction plant sound power levels are typically lower than the threshold required for audibility beyond this distance. It is therefore expected that construction works will be faintly audible at worst, or inaudible, beyond 500 m. Receptors within 500 m are shown in Figure 11-1.

## 11.2.2 Document review

The project description and Decommissioning Management Plan prepared by the ESB on behalf of Gort Windfarms Ltd were reviewed prior to devising the noise assessment methodology. In addition, the Remedial Environmental Impact Assessment Report submitted with the previous application for substitute consent was reviewed in order to obtain relevant information regarding noise levels in the vicinity of the wind farm site.

## 11.2.3 Scoping and Consultation

Following a preliminary scoping exercise, it was concluded that the proposed works will not give rise to perceptible or measurable groundborne vibration at any receptor. MKO experience with vibration measurements at construction sites indicates that peak particle velocity levels (the conventionally measured parameter) tend towards 0 mm/s beyond 50 m, and most construction plant are undetectable at 30 m. There are no sensitive receptors within 50 m of the Prospective Development works. Vibration has therefore been scoped out of this assessment.

Following completion of the Prospective Development works , there will be no above-ground infrastructure/buildings associated with the Derrybrien Wind Farm Development left onsite, and no operational noise emissions. This chapter therefore focuses solely on noise emissions associated with the decommissioning works.

As outlined in Chapter 2, Noise and vibration issues were not specifically raised during the scoping and consultation phase.

## 11.2.4 Impact Assessment Methodology

Noise levels across the local area were obtained from the 2020 remedial EIAR. This noise data was used to determine noise criteria relevant to the Prospective Development, following guidance set out in BS 5228:2009. Plant likely to be required during the decommissioning works were identified, and their noise emissions data used to determine the likely audibility radius of each works zone. Levels expected at surrounding receptors were assessed in the context of identified criteria, and mitigation measures identified where required.

Noise impacts were assessed with reference to the assessment methodology described in Guidelines on The Information To Be Contained In Environmental Impact Assessment Reports (EPA, 2022). The EPA procedure assesses effects with reference to criteria listed in Table 11-1. Each of the impact types listed is defined in the EPA document.

*Table 11-1 EPA EIAR impact assessment criteria.*

| Category | Impact description |
|---|---|
| Quality of effects | Positive, neutral, or adverse |
| Significance of effects | Imperceptible, not significant, slight, moderate, significant, very significant, profound |
| Duration of effects | Momentary, brief, temporary, short-term, medium-term, long-term, permanent |

In addition to the effect types listed above, the EPA guidance document sets out advice in relation to the assessment of potential indirect effects, cumulative effects, and other categories. These are assessed in this chapter where relevant.

### 11.2.5 Limitations/Difficulties Encountered

No difficulties were encountered in preparing this chapter.

## 11.3 Receiving Environment

### 11.3.1 Receptors

There are no receptors in immediate proximity to the wind farm development. As shown in Figures 11-1, the nearest receptors within the study area lie along the R353 at Derrybrien, where several dwellings are located approximately 2100-2200 m from the nearest turbines (dwellings in the vicinity of receptor R16 in Figure 11-8). There are no occupied dwellings to the east, west or north within 3 km, apart from scattered dwellings to the northeast. Here, the closest dwelling lies 2260 m from the nearest turbine (dwelling D1 in Figure 11-2).

The Derrybrien to Agannygal 110 kV overhead line (OHL) runs through a sparsely populated area. The nearest dwelling to the OHL lies at the R353-L-4214 junction (dwelling D2 in Figure 11-3). The line passes within 380 m of this dwelling. Further southwest, a loose cluster of dwellings at Derrybrien East lies 400-500 m from the line, with the closest located at 390 m (dwelling D3 in Figure 11-4) The line runs through an entirely uninhabited area as it continues southeast to Agannygal Substation.

At Agannygal Substation, a dwelling to the southwest lies 540 m from the substation (dwelling D6 in Figure 11-5). The nearer of two dwellings to the east also lies at 540 m (dwelling D7 in Figure 11-5). Following the proposed decommissioning and removal of the Agannygal substation, it will be necessary to reinstate the Ennis-Shannonbridge 110 kV line which was diverted through the substation when originally commissioning the wind farm. The reinstatement works will extend several hundred metres east and west of the substation, thus shortening the separation distance to these dwellings. At dwelling D6 to the southwest of the substation, works at an existing pylon will occur within 50 m of the dwelling. Works at a second pylon to the east will occur within 120 m and 180 m of the two dwellings here (D7 and D8). These separation distances are the shortest which will occur throughout the Prospective Development works.

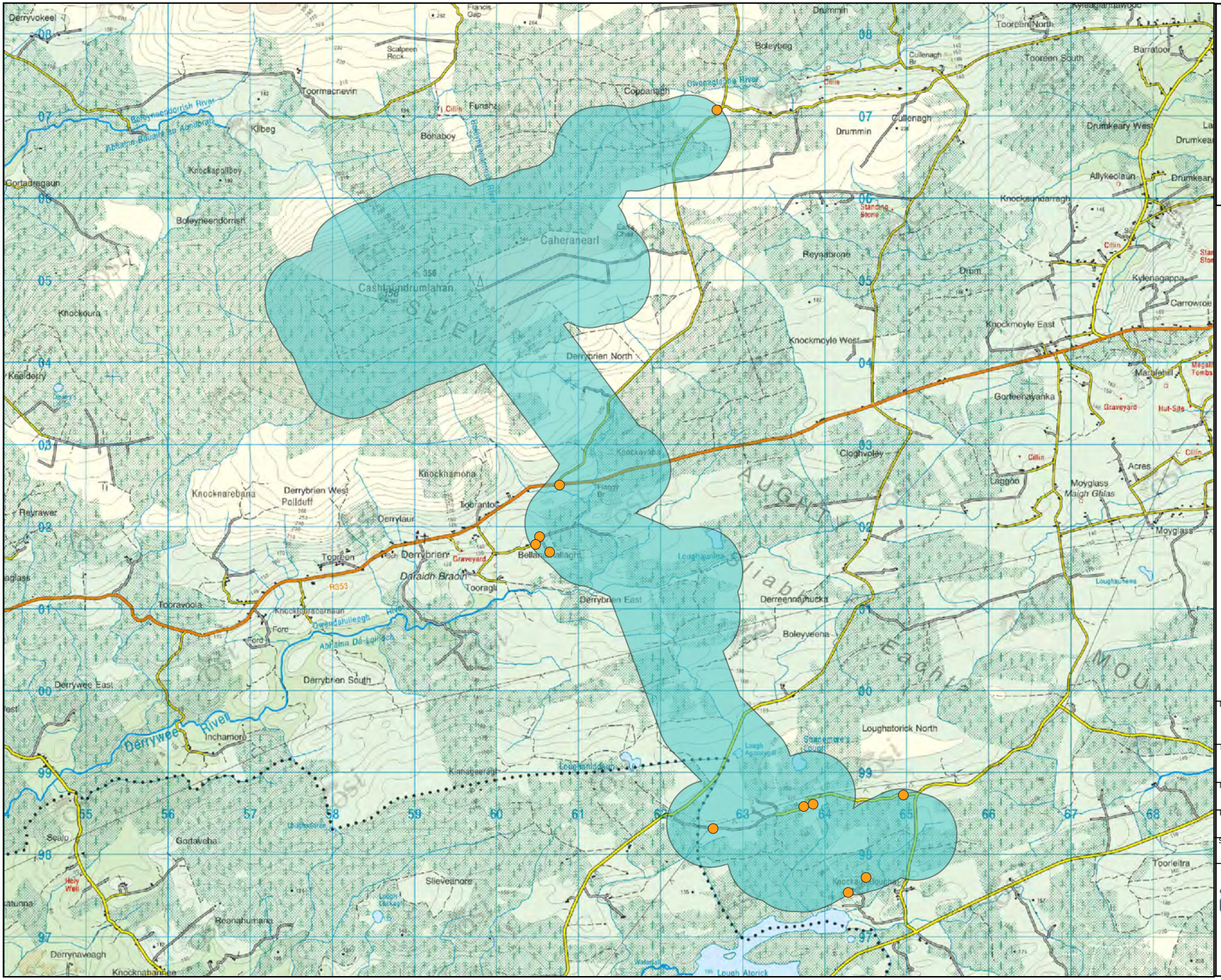
It is proposed to access the Agannygal substation, and Ennis-Shannonbridge 110 kV line reinstatement works via a local road to the southeast. This road marks the southern-most extent of the Prospective

Works. Two dwellings further south lie 330 m and 450 m from the road (dwellings D10 and D11 in Figure 11-7), while a dwelling to the north lies at 430 m (dwelling D9 in Figure 11-6).

Dwellings within 500 m of the proposed works are shown in Figures 11-1 to 11-7. There are 11 dwellings inside the 500 m offset, as follows:

- The most northerly dwelling (dwelling D1 in Figure 11-2) is located 500 m from the wind farm access on L-4214.
- Four dwellings (dwellings D2 in Figure 11-2 and dwellings D3, D4 and D5 in Figure 11-4) lie near the R353, 380-400 m from the overhead 110 kV line. One of these (dwelling D4) appears to be derelict.
- Three dwellings at Agannygal (dwellings D6, D7 and D8 in Figure 11-5) lie over 500 m from the substation. However, 110 kV line reinstatement works will be undertaken 50-180 m from these.
- Three more dwellings further east and southeast (dwelling D9 in Figure 11-6 and dwellings D10 and D11 in Figure 11-7) lie 330-450 m from a local road which will be used to provide access to the substation.

The 11 receptors are designated dwellings D1 to D11 for the purposes of this assessment, and to differentiate them from receptors R1 to R42 shown in Figure 11-8). All 11 consist of residential dwellings. There are no vulnerable receptors such as hospitals or care homes within 500 m of the Prospective Development, or indeed in the wider surrounding area. The nearest non-residential receptors are a school and church at Derrybrien, approximately 2,200 m from the nearest turbines. These and other receptors outside 500 m are expected to be well outside audible range of the proposed works.




## Map Legend

- Noise Sensitive Receptors (Dwellings within 500m of Site)
- Derrybrien 500m Buffer

Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

N

Drawing Title
**Existing Noise Sensitive Locations**

Project Title
Derrybrien Wind Farm Decommissioning Project

| Drawn By | Checked By |
|---|---|
| MV | TB |
| Project No. | Drawing No. |
| 220437 | Figure 11-1 |
| Scale | Date |
| 1:60,000 | 10/03/2025 |

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie




*Figure 11-2 Dwelling D1.*




*Figure 11-3 Dwelling D2, with 110 kV line to be removed shown yellow.*

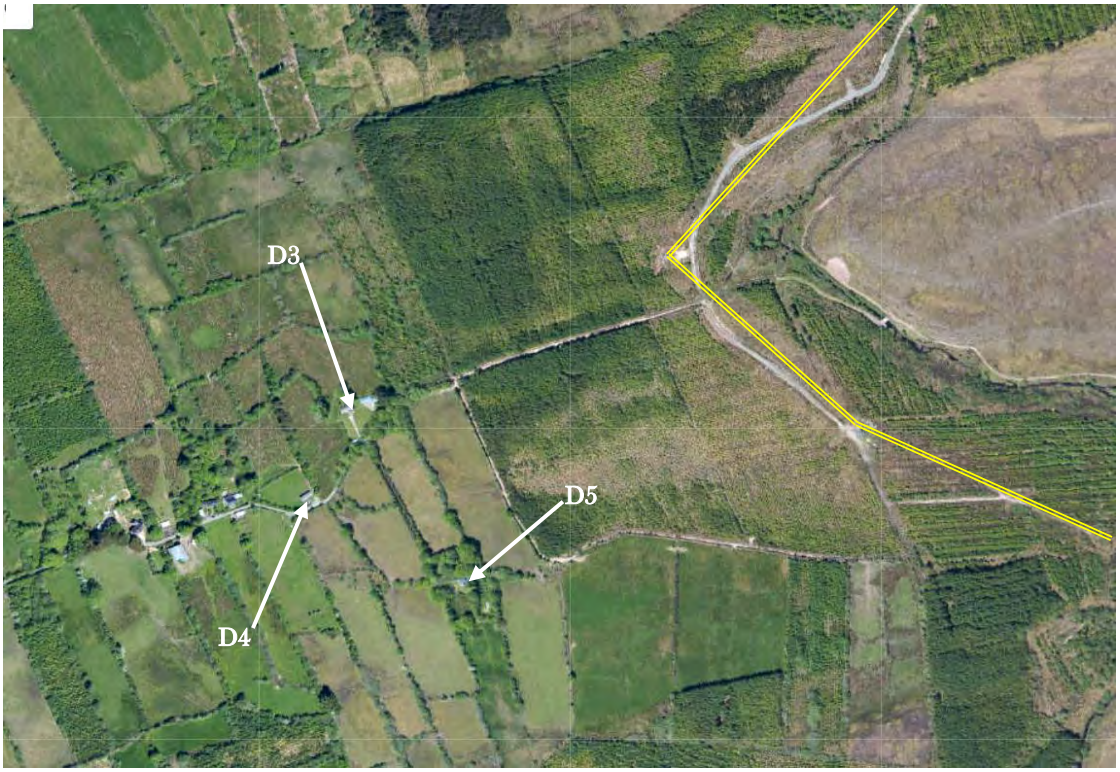



*Figure 11-4 Dwellings D3 to D5, with 110 kV line to be removed shown yellow. D4 appears to be derelict.*




*Figure 11-5 Dwellings D6 to DR8, with 110 kV line to be removed shown yellow. The eastern and western extents of the Ennis-Shannonbridge 110 kV line reinstatement works are marked red.*




*Figure 11-6 Dwelling D9.*




*Figure 11-7 Dwellings D10 and D11.*

## 11.3.2 Noise levels (2018 and 2019)

### 2018 Noise Survey

Unattended noise monitoring was undertaken at two stations (R21 and R35 in Figure 11-8) over the period 10/09/18 to 02/11/18 to inform the previous 2020 substitute consent rEIAR. The soundscape at these locations was influenced by local and distant road traffic, agricultural activity, and breeze movement. These sources continue to dominate the local soundscape, and thus data measured in 2018 are expected to be reasonably representative of the current soundscape. Measured noise data were correlated with wind speed data measured by the wind farm meteorological mast. The dataset was subsequently filtered and analysed in accordance with relevant wind farm noise guidance documents.

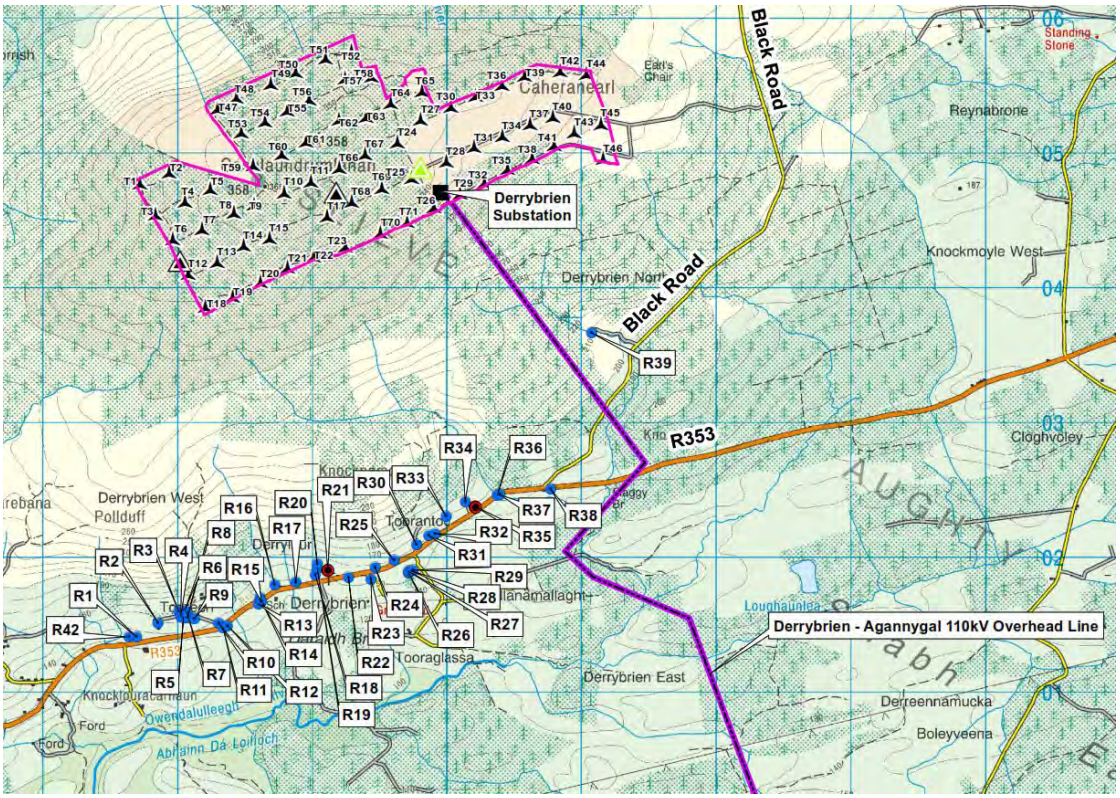



*Figure 11-8 Noise stations used for 2020 substitute consent rEIAR at R21 and R35.*

The measured noise levels were captures while the Derrybrien Windfarm Development was operational. A correction procedure was applied to remove the influence of turbine noise emissions, thus providing an indication of baseline noise levels in the absence of turbine emissions. Given that the turbines are no longer in operation, and the Perspective Development seeks to decommission and remove the turbines, baseline noise data which exclude turbine emissions are most relevant to this assessment. The baseline noise levels were derived across a range of wind speeds, from 4 m/s upwards, as is standard practice in wind farm noise assessments.

Noise surveys for construction and decommissioning projects are typically undertaken in accordance with International Standard ISO 1996-2:2017 Acoustics – Description, Measurement And Assessment Of Environmental Noise, Part 2: Determination Of Environmental Noise Levels (2017). The standard notes that favourable wind conditions prevail where wind speeds do not exceed 6 m/s. The EPA document NG4 Guidance Note For Noise: Licence Applications, Surveys And Assessments In Relation To Scheduled Activities (2016) recommends that data should be measured where average wind speeds do not exceed 5 m/s. Therefore, based on the relevant guidance, for the purposes of this assessment, noise data measured above 5 m/s are not relevant. Baseline noise levels measured at 4 m/s and 5 m/s at R21 and R35, with turbine influence removed, are presented in Table 11-2.

Daytime levels relate to quieter daytime periods, defined in relevant wind farm guidance as 18:00-23:00 h Monday-Friday, 13:00-23:00 h Saturday, and 07:00-23:00 h Sunday. Daytime data therefore exclude weekdays 07:00-18:00 h and Saturday mornings, thus adopting a worst-case scenario by excluding busier periods from the dataset. Night-time data relate to the period 23:00-07:00 h measured across all seven nights.

Levels presented in Table 11-2 are $L_{AF90\ 10\ min}$ levels, defined as the background noise level with turbines absent, measured over an interval of 10 minutes. Although intervals of 15 minutes, 30 minutes or 60 minutes are typically used to describe background levels in construction and decommissioning projects, background levels over a 10-minute interval are highly likely to be similar to levels measured over longer intervals. It follows that data presented in Table 11-2 are likely to be reasonably representative of baseline noise levels in the vicinity of R21 and R35 in the absence of turbine emissions.

*Table 11-2 2018 Noise Survey $L_{AF90\ 10\ min}$ (dB) levels measured at R21 and R35 (with turbine noise removed).*

| Period | Daytime | Night-time |
|---|---|---|
| R21 | 32-33 | 31-32 |
| R35 | 24-27 | 19-22 |

### 2019 Noise Survey

In 2019, attended noise monitoring was also carried out at five locations shown in Figure 11-9, designated NML1 to NML5. Monitoring was carried out on 30/10/19 to 31/10/19. Measured levels, presented in Table 11-3, were recorded while wind speeds were lower than 5 m/s. Derrybrien Wind Farm was not in operation during the survey, and there were no emissions from the turbines or substations.

*Table 11-3 2019 Noise Survey levels (dB) measured at NML1-NML5.*

| Station | Daytime | | Night-time | |
|---|---|---|---|---|
| | $L_{Aeq\ 15\ min}$ | $L_{AF90\ 15\ min}$ | $L_{Aeq\ 15\ min}$ | $L_{AF90\ 15\ min}$ |
| NML1 | 36-49 | 31 | 35-45 | 34 |
| NML2 | 35-53 | 28-35 | 36 | 35 |
| NML3 | 47-55 | 27 | 33-34 | 31 |
| NML4 | 30-48 | 21 | 38 | 28 |
| NML5 | 33-37 | 25-28 | 40 | 36 |

The soundscape at all five locations was influenced by road traffic, birdsong and wind generated noise. Increased background noise levels during the night-time were a result of higher wind speeds during the night-time survey.

Daytime noise levels are most relevant to the current project, as proposed decommissioning works will be undertaken during daytime hours. Noise data measured at R21, R35, NML1, NML2, NML3, NML4 and NML5 indicate that daytime background $L_{AF90\ T}$ values were lowest at NML4 (21 dB). Levels at the remaining stations were 24-35 dB. Although measured in 2018 and 2019, noise levels are highly likely to be representative of current levels, given the consistency of the local soundscape.

Measured data may be used to identify the relent noise criterion applicable to the decommissioning project. Based on guidance set out in BS 5228:2009, as discussed in Section 11.1.4, a daytime $L_{Aeq\ 1\ h}$ criterion of 65 dB is identified, applicable externally at receptors.

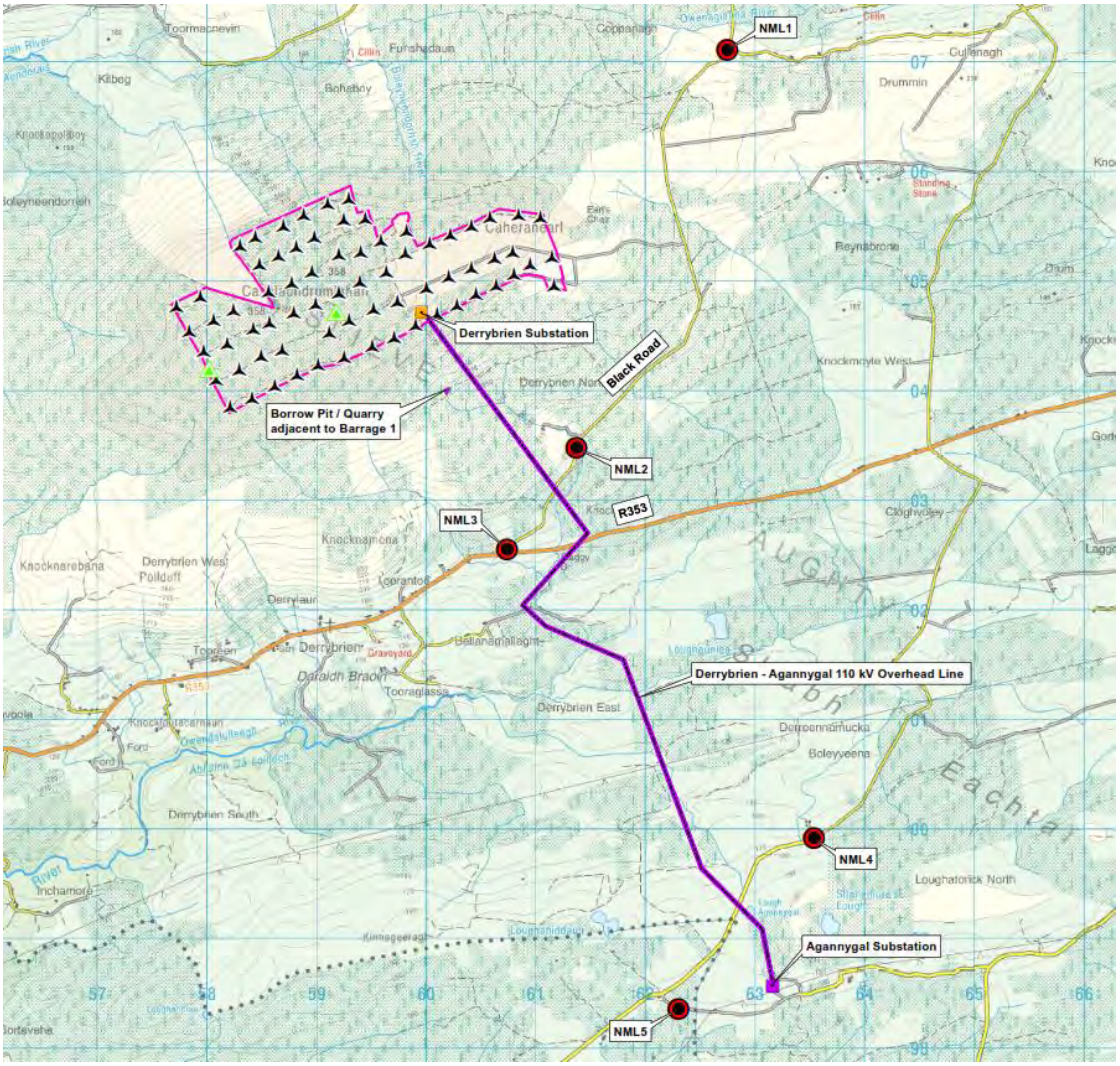



*Figure 11-9 Baseline stations NML1-NML5 used for Derrybrien Wind Farm remedial EIAR.*

# 11.4 Likely Significant Impacts and Mitigation Measures Implements

## 11.4.1 Do-Nothing Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

Derrybrien Wind Farm and Substation: Under the Do-nothing scenario, no noise emissions are likely to arise other than those from land management practices, depending on how the site is used into the future.

Agannygal Substation: Agannygal Substation is partly operational in order to maintain connectivity on the Ennis-Shannonbridge 110 kV line. Under the do-nothing scenario, the existing soundscape at Agannygal substation is unlikely to alter significantly. The soundscape is influenced chiefly by traffic and wind movement, and noise levels associated with these are unlikely to change significantly. While engine noise emissions will reduce due to increasing take-up of electric vehicles, it is noted that traffic

noise above 40-50 km/h arises chiefly from tyre noise, and tyre noise is independent of vehicle power type.

## 11.4.2 Impacts of Prospective Development

The Prospective Development will require various works over a wide area. The Prospective Development works will consist of the following:

- Enabling works to facilitate the decommissioning of the Derrybrien Wind Farm.
- Decommissioning and removal of the Derrybrien Wind Farm and their associated ancillary components.
- Decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line. Reinstatement of the Ennis-Shannonbridge 110kV Line.

### 11.4.2.1 Impacts Associated With Onsite Works

Potential noise impacts and effects associated with onsite works are assessed in Tables 11-4 to 11-17. Plant noise levels are taken from BS 5228:2009.

*Table 11-4 Impacts associated with wind farm compound set up.*

| Category | Description |
|---|---|
| Works | Site compound installation at the wind farm site |
| Location | Wind farm NE corner and substation |
| Duration | 3 weeks |
| Plant required | Tracked excavator, telescopic handler |
| Noise output at 10 m | Excavator: 75-80 dB; Handler: 71 dB m |
| Distance to <65 dB | 50 m |
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-5 Impacts associated with wind farm compound use.*

| Category | Description |
|---|---|
| Works | Wind farm site compound ongoing use |
| Location | Wind farm NE corner and substation |
| Duration | 24 months |
| Plant required | Generator |
| Noise output at 10 m | 60-70 dB |
| Distance to <65 dB | <50 m |
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |

| Category | Description |
|---|---|
| Residual effects | Neutral, imperceptible, direct, short term |
| Significance of effects | No significant effects are expected |

*Table 11-6 Impacts associated with Agannygal compound set up.*

| Category | Description |
|---|---|
| Works | Site compound installation at Agannygal Substation |
| Location | Adjacent to the substation |
| Duration | 3 weeks |
| Plant required | Tracked excavator, telescopic handler |
| Noise output at 10 m | Excavator: 75-80 dB; Handler: 71 dB m |
| Distance to <65 dB | 50 m |
| Distance to dwellings | 540 m |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-7 Impacts associated with Agannygal compound use.*

| Category | Description |
|---|---|
| Works | Agannygal site compound ongoing use |
| Location | Adjacent to the substation |
| Duration | 24 months |
| Plant required | Generator |
| Noise output at 10 m | 60-70 dB |
| Distance to <65 dB | <50 m |
| Distance to dwellings | 540 m |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, short term |
| Significance of effects | No significant effects are expected |

*Table 11-8 Impacts associated with clearance works.*

| Category | Description |
|---|---|
| Works | Vegetation, scrub clearance and minor levelling works at hardstand areas |
| Location | Wind farm |
| Duration | 8 weeks |
| Plant required | Tracked excavator, dumper |
| Noise output at 10 m | Excavator: 75-80 dB; Dumper: 75-77 dB m |
| Distance to <65 dB | 100 m |

| Category | Description |
|---|---|
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-9 Impacts associated with access road works.*

| Category | Description |
|---|---|
| Works | Access track improvement works |
| Location | Wind farm |
| Duration | 3 weeks |
| Plant required | Tracked excavator x2, dumper x2, roller |
| Noise output at 10 m | Excavator: 75-80 dB; Dumper: 75-77 dB m; Roller: 73-79 dB |
| Distance to <65 dB | 100 m at each works zone |
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-10 Impacts associated with turbine removal.*

| Category | Description |
|---|---|
| Works | Wind turbine removal (70 no.) and met mast removal (2 no.) |
| Location | Wind farm |
| Duration | Up to 74 weeks |
| Plant required | Tracked excavator, tractor, backhoe loader, pump, bowser, mobile crane x4, platform x2, telescopic handler x2, cherry picker x2 |
| Noise output at 10 m | Excavator: 75-80 dB; Tractor: 79 dB; Backhoe: 68 dB; Pump: 62-65 dB; Bowser: 79 dB; Crane: 67-71 dB; Platform: 78 dB; Handler: 71 dB; Cherry picker: 67 dB |
| Distance to <65 dB | 100 m at each works zone |
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, short term |
| Significance of effects | No significant effects are expected |

*Table 11-11 Impacts associated with wind farm substation works.*

| Category | Description |
|---|---|
| Works | Derrybrien Substation equipment removal |
| Location | Wind farm |
| Duration | 12 weeks |
| Plant required | Tracked excavator, backhoe loader, mobile crane, platform, telescopic handler, cherry picker, generator |
| Noise output at 10 m | Excavator: 75-80 dB; Backhoe: 68 dB; Crane: 67-71 dB; Platform: 78 dB; Handler: 71 dB; Cherry picker: 67 dB; Generator: 60-70 dB |
| Distance to <65 dB | 150 m |
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-12 Impacts associated with wind farm substation works.*

| Category | Description |
|---|---|
| Works | Derrybrien Substation demolition |
| Location | Wind farm |
| Duration | 2 weeks |
| Plant required | Tracked excavator, excavator with breaker, backhoe loader, telescopic handler |
| Noise output at 10 m | Excavator: 75-80 dB; Excavator with breaker: 80-92 dB; Backhoe: 68 dB; Handler: 71 dB |
| Distance to <65 dB | 200 m |
| Distance to dwellings | >2 km |
| Pre-mitigation impacts | Emissions will be generally inaudible at receptors, although breaker emissions may be faintly discernible in the distance |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be generally inaudible at receptors, although breaker emissions may be faintly discernible in the distance |
| Residual effects | Neutral to slight negative, generally imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-13 Impacts associated with Agannygal Substation works.*

| Category | Description |
|---|---|
| Works | Agannygal Substation equipment removal |
| Location | Agannygal |
| Duration | 12 weeks |
| Plant required | Tracked excavator, backhoe loader, mobile crane, platform, telescopic |
| Noise output at 10 m | Excavator: 75-80 dB; Backhoe: 68 dB; Crane: 67-71 dB; Platform: 78 dB; |
| Distance to <65 dB | 150 m |
| Distance to dwellings | 540 m |

| Category | Description |
|---|---|
| Pre-mitigation impacts | Emissions will be inaudible at receptors |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at receptors |
| Residual effects | Neutral, imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-14 Impacts associated with Agannygal Substation works.*

| Category | Description |
|---|---|
| Works | Agannygal Substation demolition |
| Location | Agannygal |
| Duration | 2 weeks |
| Plant required | Tracked excavator, excavator with breaker, backhoe loader, telescopic |
| Noise output at 10 m | Excavator: 75-80 dB; Excavator with breaker: 80-92 dB; Backhoe: 68 dB; |
| Distance to <65 dB | 200 m |
| Distance to dwellings | 540 m |
| Pre-mitigation impacts | Emissions will be generally inaudible at receptors, although breaker emissions are likely to be audible at a low level |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be generally inaudible at receptors, although breaker emissions are likely to be audible at a low level |
| Residual effects | Neutral to slight negative, generally imperceptible, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-15 Impacts associated with overhead line removal.*

| Category | Description |
|---|---|
| Works | 110 kV line removal, including 34 no. double wood poles and 8 no. pylons |
| Location | 7.8 km corridor between Derrybrien and Agannygal Substations |
| Duration | 9 weeks |
| Plant required | Tracked excavator, all terrain crane, telescopic handler, chainsaw, power tools |
| Noise output at 10 m | Excavator: 75-80 dB; Crane: 71-75 dB; Chainsaw: 80-85 dB; Smaller equipment: <80 dB |
| Distance to <65 dB | 200 m |
| Distance to dwellings | Varies along route; Shortest separation distance = 380 m |
| Pre-mitigation impacts | Loudest emissions may be faintly audible at receptors at several dwellings at Derrybrien East, and 3 receptors at Agannygal |
| Mitigation | No specific mitigation required |
| Residual impacts | Loudest emissions may be faintly audible at receptors at several dwellings at Derrybrien East, and 3 receptors at Agannygal |
| Residual effects | Neutral to slight negative, imperceptible to not significant, direct, temporary |
| Significance of effects | No significant effects are expected |

*Table 11-16 Impacts associated with line reinstatement.*

| Category | Description |
|---|---|
| Works | Ennis-Shannonbridge 110 kV line reinstatement |
| Location | 1300 m corridor to E and W of Agannygal Substation |
| Duration | 1 week |
| Plant required | Tracked excavator, all terrain crane, telescopic handler, stringing equipment, power tools |
| Noise output at 10 m | Excavator: 75-80 dB; Crane: 71-75 dB; Smaller equipment: <70 dB |
| Distance to <65 dB | 70 m |
| Distance to dwellings | 60-70 m at W end; 100-110 m at E end |
| Pre-mitigation impacts | Emissions will be clearly audible at 3 dwellings at Agannygal; At the W dwelling (R6), emissions from the loudest operations may approach the 65 dB criterion |
| Mitigation | It is proposed that R6 residents will be contacted by site representative in advance of these works in order to identify suitable working times so as to minimise disruption to the residents. |
| Residual impacts | Emissions will be clearly audible at 3 dwellings at Agannygal; At the W dwelling (R6), emissions from the loudest operations may approach the 65 dB criterion – however, works will be timed to minimize impacts |
| Residual effects | Negative, slight, direct, temporary. Any potential significant effects will be avoided through liaising with R6 residents |
| Significance of effects | There will be no significant effects. |

*Table 11-17 Impacts associated with onsite works traffic.*

| Category | Description |
|---|---|
| Works | Works traffic |
| Location | Onsite roadways and access routes |
| Duration | 24 months |
| Plant required | Tipper trucks during enabling works and waste removal; Articulated trucks during turbine removal and substation component removal; 4x4 crew vehicles and vans; Personnel cars |
| Noise output at 10 m | Highly variable; Trucks typically 75-80 dB when driving |
| Distance to <65 dB | 60-70 m |
| Distance to dwellings | >400 m at wind farm; >300 m along 110 kV line route; 50 m at W end of Agannygal zone; 100 m at E end of Agannygal zone |
| Pre-mitigation impacts | Emissions will be inaudible at all receptors apart from 3 dwellings at Agannygal, where individual vehicle movements underneath the line will be audible, although will not exceed the 65 dB criterion due to the short duration of each pass |
| Mitigation | No specific mitigation required |
| Residual impacts | Emissions will be inaudible at all receptors apart from 3 dwellings at Agannygal, where individual vehicle movements underneath the line will be audible, although will not exceed the 65 dB criterion due to the short duration of each pass |
| Residual effects | Most receptors: Neutral, imperceptible, short term, direct.<br>3 Agannygal receptors: Negative, not significant, short term, direct. |

| Category | Description |
|---|---|
| Significance of effects | No significant effects are expected |

#### 11.4.2.1.1 Assessment of effects of works carried out simultaneously

A number of onsite activities assessed in Tables 11-4 to 11-17 are likely to occur simultaneously. For instance, works may be undertaken concurrently at several turbines within the wind farm site. The overhead line between the substations may be removed at several locations along the route simultaneously. Thus, impacts may arise due to concurrent works undertaken at more than one onsite zone.

From the tables above, it is evident that most works will be inaudible at offsite receptors, and resulting $L_{Aeq\ 1\ h}$ levels will be considerably lower than the identified 65 dB criterion. The chief potential for simultaneous impacts arises with respect to the three dwellings near the eastern and western ends of the Ennis-Shannonbridge 110 kV line reinstatement works corridor. Emissions from this activity are expected to be clearly audible at the dwellings over a one-week period. However, simultaneous impacts will not arise as the line reinstatement works will occur towards the end of the decommissioning project, when all other onsite works have been largely complete. Thus, simultaneous noise impacts will not arise, and no significant effects are expected due to onsite works.

### 11.4.2.2 Impacts Associated With Offsite Traffic

The site will be accessed by vehicles throughout the project, with personnel based at three contractor compounds (two on the wind farm site, and one at Agannygal Substation). The number of personnel expected to work onsite at the peak of the project (turbine dismantling and removal) is approximately 40. These will access the compounds and overhead line removal route via the local road network. These movements will consist chiefly of cars, vans and 4x4 vehicles.

The number of truck movements will vary throughout the project. As a worst case scenario, enabling works and roadway improvement works early in the project may require up to 10 loads per week, equivalent to approximately two movement per hour. It may be necessary to import additional stone to improve the turbary road between turbines T25 and T45, resulting in up to 25 loads per day, equivalent to approximately five movements per hour. Later, turbine removal is expected to require up to four abnormal loads per week, resulting in a likely maximum of two movements per day.

Wind farm traffic will access the site via the R353 and L-4214, while Agannygal traffic will access the site via a local road to the southeast.

Noise impacts at receptors due to road traffic are assessed as follows:

- Traffic movements, particularly truck movements between the wind farm entrance on L-4214, and the L-4214-R353 junction, will not pass any dwellings. Thus no impacts will arise here.
- Traffic movements on the R353 will be negligible in the context of existing R353 traffic, and will be short-term.
- Traffic accessing Aganngal will use a local road to the southeast. There are no receptors along this road. The nearest dwelling lies 330 m to the south. In addition, there are few receptors along the road which provides onwards access to the R353.
- Car, van and 4x4 vehicle movements will be sporadic.

Given the temporary nature of the Prospective Development, the paucity of receptors, and the relatively low number of truck movements expected, noise impacts associated with offsite project traffic will be neutral to adverse, imperceptible to not significant, and short-term.

### 11.4.2.3 Effects on Population & Human Health

The assessment of impacts on human health is typically undertaken by reference to WHO guidance as discussed above, which has been revised over the last four decades according as noise and health studies have been published. In residential settings, the WHO currently recommends a daytime/evening $L_{Aeq\ 16\ h}$ level of 55 dB to protect health. Noise levels associated with the decommissioning project will be considerably lower than this criterion at all receptors, apart from a single dwelling to the west of Agannygal Substation (R6) where levels may temporarily exceed this level over several days. Given the short duration of these works, it is considered that there will be no negative noise impact on the local population or on human health.

### 11.4.2.4 Proposed Mitigation Measures

Apart from one potential exception, $L_{Aeq\ 1\ h}$ levels at offsite receptors during the construction phase will not exceed the identified 65 dB criterion, and indeed will be markedly lower than this criterion throughout the project. It follows that noise mitigation measures are not specifically warranted in relation to these receptors. However, a number of general measures are proposed in order to follow good construction practice:

- Construction operations will in general be confined to the period Monday-Friday 07:00-19:00 and Saturday 08:00-13:00.
- Hooting will be discouraged onsite, unless necessary. Drivers of plant and vehicles will be instructed to avoid hooting at all times.
- Plant used onsite during the construction phase will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.
- Queuing of trucks near offsite receptors will be prohibited.
- Machinery not in active use will be shut down.
- Complaints of noise received during the construction phase will be logged in a register, and investigated immediately. Details of follow-up action will be included in the register.
- Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance.
- Guidance set out in British Standard BS 5228-1:2009 with respect to noise control will be applied throughout the decommissioning works.

The exception identified above consists of a single dwelling (R6) located at the western end of the 110 kV line reinstatement corridor. Works here will arise within approximately 50 m of the dwelling over several days, approaching one week. While activities are unlikely to be sufficiently continuous to result in an exceedance of the 65 dB $L_{Aeq\ 1\ h}$ criterion, short-term events from time to time during this stage may result in sporadic increases of $L_{Aeq\ 1\ h}$ levels above 65 dB. It is proposed here that the dwelling residents will be contacted by the site representative in advance of these works in order to identify suitable working times so as to minimise disruption to the residents. Given the short duration of the works at this location, it is expected that minimal disruption will arise.

### 11.4.2.5 Residual Impact

Following the implementation of the above mitigation measures, there will be a localised, temporary to short-term imperceptible, negative, residual effect due to an increase in noise levels during the decommissioning works associated with the Prospective Development. There will be no negative impacts on human health.

#### 11.4.2.6 Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects due to noise on local residents or on human health.

### 11.4.3 Cumulative and In-Combination Effects

Section 4.7 of this EIAR identifies describes a review of permitted developments in the surrounding area which may contribute to potential cumulative and in-combination effects, as well as adjacent land uses. No permitted developments have been identified with c. 2 km of the existing turbine infrastructure in the last 5 years. It follows that cumulative impacts with offsite projects are not expected.

Turf cutting and forestry felling is undertaken at intervals across the surrounding area. Noise emissions may arise from these activities. Experience at other sites indicates that such emissions are typically slightly audible at worst at 300-500 m. Where such activities occur within 500 m of three receptors located close to the Agannygal Substation, cumulative effects may arise where these activities coincide with the one week period during which the Ennis-Shannonbridge 110 kV line reinstatement element is underway. As noted above, impacts at these receptors due to the line reinstatement element will be negative, slight and temporary, and will be minimsed through liaising with residents at R6 in particular. Where these works coincide with forestry or turf cutting within 500 m, impacts may be negative, slight to moderate, and temporary. Significant effects may potentially arise over this one week period.

## 11.5 Summary Of Effects

Following consideration of the residual effects (post-mitigation) it is noted that the Prospective Development will not result in any significant effects from Noise

Effects will be considerably minimised by three features:

- The local area is sparsely populated. There are no receptors in proximity to the wind farm, and no receptors directly adjacent to the overhead line route.
- The Prospective Development will benefit from large separation distances to receptors. The nearest receptors to the wind farm are located over 2 km distant. Along the overhead line route, a small number of receptors at Derrybrien East lie over 380 m from line. The closest receptors to the Agannygal Substation are situated at 540 m.
- Turbine decommissioning and removal works will take up to 24 months. However, all other works will be of short duration. Substation removal will be completed in 14 weeks. Overhead line removal will take several weeks. Reinstatement of the Ennis-Shannonbridge 110 kV line, the only works which will be undertaken within 100 m of a receptor, will be completed within one week.

As a result, effects at receptors will be neutral and temporary, or neutral and short-term, in most cases. Exceptions are as follows:

- Demolition of Derrybrien Substation will require use of an excavator-mounted breaker for up to two weeks. The breaker may be faintly audible at the nearest receptors, over 2 km away, resulting in a neutral to slight adverse effect on a temporary basis.
- Effects at three receptors will be temporary and slight adverse during similar works at Agannygal Substation, again due to breaker operations.
- During overhead line removal works, certain activities may be faintly audible at a small number of receptors at Derrybrien East and Agannygal on a temporary basis, resulting in neutral to slight adverse effects.

- Reinstatement of the Ennis-Shannonbridge line is likely to result in slight adverse temporary effects at two dwellings at the eastern end of the works corridor, and moderate adverse effects at a dwelling at the western end. These effects will be temporary, lasting up to one week, and will represent the most intrusive stage of the project.

## 11.6 Conclusion

Effects at receptors will be neutral and temporary, or neutral and short-term with exceptions stated in Section 1.5.

Overall, the Prospective Development will result in minimal impacts, confined to a short period. None of the residual effects are considered to be significant. Provided that the Project is decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant effects from Noise are not anticipated. No cumulative or indirect effects have been identified, apart from potential significant cumulative effects over a one-week period if Ennis-Shannonbridge 110 kV line reinstatement works are undertaken simultaneously with tree felling or turf cutting within 500 m of three dwellings at Agannygal.

# 12. CULTURAL HERITAGE

## 12.1 Introduction

### 12.1.1 Chapter Scope

This chapter assesses potential impacts of the Prospective Development on the known and potential cultural heritage resource at the Prospective Development site. The tangible elements of the cultural heritage resource can be divided into the archaeological resource comprising sites and monuments dating from the prehistoric period to the post-medieval period and the architectural heritage resource, encompassing standing structures and sites of cultural importance often dating to the post-medieval and modern periods. The intangible elements of the cultural heritage resource include assets such as local placenames, language, folklore, traditions and historical associations. The study area reviewed as part of this assessment is detailed in Section 12.2.1.

### 12.1.2 Statement of Authority

This chapter was prepared by Tony Cummins, Senior Archaeologist with John Cronin and Associates. Mr Cummins holds B.A. and M.A. degrees in archaeology (University College Cork (UCC) 1992/1994) and has accumulated twenty-nine years industry experience. He has been approved as a licence eligible archaeologist by the National Monuments Service and has extensive experience in the preparation of archaeological, architectural and cultural heritage assessments for renewable energy projects.

### 12.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment.
- Planning and Development Act, 2000 (as amended).
- S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law.
- Heritage Act 1995 (as amended).
- National Monuments Act 1930 (as amended).
- National Cultural Institutions Act (1997).
- Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023.

The management and protection of the cultural heritage resource in Ireland is achieved through a framework of international conventions and national laws and policies. This framework was established in accordance with the provisions of the 'European Convention on the Protection of the Archaeological

Heritage' (the Valletta Convention) and the 'European Convention on the Protection of Architectural Heritage' (Grenada Convention). Both of these conventions were ratified by the Republic of Ireland in 1997. While there is no current national legislation providing legal protection for the Irish intangible heritage resource it is noted that the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, which seeks to safeguard and promote awareness of this element of cultural heritage, was ratified by Ireland in 2015.

The administration of national policy in relation to archaeological heritage management is the responsibility of the National Monuments Service (NMS) which is currently based in the Department of Housing, Local Government and Heritage.

The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law on October 13th, 2023. The Department of Housing, Local Government and Heritage circulated a guidance document[1] in relation to this Act in November 2023 which provides an overview of its current status, and this is summarised hereafter. While the Act is now law most of its provisions will not enter into force until the Minister has made one or more "Commencement Orders". This means that section 7 of the Act (which provides for the repeal of the National Monuments Acts 1930 to 2014 and related legislation) has not commenced. Accordingly, the National Monuments Acts 1930 to 2014 and other legislation which section 7 of the Act will, when it comes into force, repeal, remain fully in force as they stood on 13th October and will continue to do so for the time being. The Act contains transitional provisions which will, if necessary, enable certain aspects of the existing National Monuments Acts 1930 to 2014 to continue in operation notwithstanding their repeal post-commencement of the Act while successor provisions are being brought fully into operation. This includes provisions enabling the Record of Monuments and Places to continue to have effect pending the establishment of the new Register of Monuments (see section 48 of the Act). A commencement order made on 31st May 2024, insofar as it relates to the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 (other than section 5), has come into operation. On 12th December 2024, further provisions of the Act came into operation, and these relate to historic wrecks and underwater archaeological objects, and also for Irish citizens (and a range of specified other persons), and vessels operating in international waters if they intend to engage in activities directed at underwater cultural heritage.

The National Monuments Act of 1930, and its amendments, therefore, currently remain the primary means of ensuring the satisfactory protection of the archaeological resource. They include a number of provisions that are applied to secure the protection of archaeological monuments. These include the designations of nationally significant sites as National Monuments, the Register of Historic Monuments, the Record of Monuments and Places, the Sites and Monuments Record, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Section 2 of the National Monuments Act, 1930 defines a National Monument as 'a monument or the remains of a monument the preservation of which is a matter of national importance'. The State may acquire or assume guardianship of examples through agreement with landowners or under compulsory orders. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument in the ownership or guardianship of the State, the Minister or a local authority, or those which are subject to a Preservation Order. There are no National Monuments or archaeological sites with Preservation Orders located within the study area.

The National Monuments (Amendment) Act, 1994 made provision for the establishment of the Record of Monuments and Places (RMP) which comprises the known archaeological sites within the State. The RMP, which is based on the earlier Register of Historic Monuments (RHM) and Sites and Monuments Record (SMR), provides county-based lists of all recorded archaeological sites with accompanying maps. All RMP sites receive statutory protection under the National Monuments Act 1994 and the

[1] *https://www.archaeology.ie/news/enactment-of-historic-and-archaeological-heritage-and-miscellaneous-provisions-act-2023-and*

National Monuments Service (NMS) must be given two months' notice in advance of any work proposed at their locations. There is one recorded, levelled archaeological site located within the wind farm site and there are eleven examples within the surrounding study area. The recorded and potential cultural heritage resource within a study area encompassing the wind farm site, including the peat slide remedial works, and the surrounding lands extending for 3km in all directions from its boundary, was reviewed. These recorded archaeological sites are listed in Table 12-5 and their inventory descriptions, as published by the Archaeological Survey of Ireland, are provided in Appendix 12-1.

The conservation principles of care and protection of architectural heritage and the facilitation of the listing of significant buildings of architectural heritage merit are set out in Part IV of the Planning and Development Act (2000). This requires planning authorities to maintain a Record of Protected Structures (RPS) of structures with special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, to be included in their Development Plans. Any changes that materially affect the character of a protected structure require planning permission. A protected structure also includes the land and other structures within its curtilage. While the notion of curtilage is not defined by legislation, the Architectural Heritage Protection Guidelines for Local Authorities (Department of Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. There are no Protected Structures located within the planning application boundary. There are two Protected Structures located within the surrounding study area and these are identified in Section 12.3.3 of this chapter. In addition, local authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance within their administrative areas through the designation of Architectural Conservation Areas (ACAs). There are no ACAs located within the study area.

The National Inventory of Architectural Heritage (NIAH) was established under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, to record architectural heritage structures within the State. While inclusion in the NIAH does not provide statutory protection to a structure it is intended to advise local authorities on compilation of their Record of Protected Structures. The NIAH also includes a Designed Landscapes and Historic Gardens Survey which comprises a non-statutory, desk-based survey of such features. There are no NIAH-listed structures or lands located within the planning application boundary. There are three NIAH-listed structures within the surrounding study area, and these are identified in Section 12.3.3 of this chapter.

The County Galway Development Plan 2022-2028 includes a number of policy objectives in relation to the protection of the cultural heritage resource within the county. In relation to the archaeological resource, these include policy objectives such as the protection of recorded archaeological sites and their settings and visual amenity (Policy Objective ARC 4). The Plan also includes an objective that developments in the immediate vicinity of Recorded Monuments should be sensitively designed and sited in order to not detract from the monument or its visual amenity (Policy Objective ARC 9).

The Development Plan includes a number of policy objectives in relation to the protection of the architectural heritage resource, and its associated attributes, within the county including the protection of Protected Structures (Policy Objective AH 2), structures listed in the National Inventory of Architectural Heritage (Policy Objective AH 3), Architectural Conservation Areas (Policy Objective AH 4) and vernacular heritage (Policy Objective AH 6), local names (Policy Objective AH 7), designed landscapes (Policy Objective AH 10) and traditional building skills (Policy AH 13).

The Development Plan also contains a number of policy objectives in relation to the protection of the cultural heritage resource within the county including the protection and promotion of cultural heritage assets and the intangible cultural heritage resource (Policy Objective CUH 1), special places of historical interest (Policy Objective CUH 2) and the promotion and protection of local placenames (Policy Objective CUH 3). While the Site is not located within the County Galway Gaeltacht area, sections of the grid connection and turbine transportation routes do extend into the boundary of this area. The

Development Plan includes a policy objective to protect the linguistic and cultural heritage of the Gaeltacht and to promote the Irish language (Policy Objective CUH 4).

### 12.1.4 Relevant Guidance

This chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- Department of Arts, Heritage and Gaeltacht (2011) Architectural Heritage Protection: Guidelines for Planning Authorities.
- Department of Arts, Heritage, Gaeltacht and the Islands (1999) Framework and Principles for the Protection of Archaeological Heritage.
- Office of the Public Regulator (2022) A Guide to Architectural Heritage.
- Office of the Public Regulator (2021) Archaeology in the Planning Process.
- International Council on Monuments and Sites (ICOMOS) (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.

## 12.2 Methodology

### 12.2.1 Zone of Influence

The recorded and potential cultural heritage resource within a study area encompassing the wind farm site, including the peat slide remedial works, and the surrounding lands extending for 3km in all directions from its boundary, was reviewed. The extent of this study area was chosen in order to compile a comprehensive cultural heritage baseline for the location of the wind farm in order to inform the assessment of potential direct or indirect decommissioning impacts on any cultural heritage assets within its environs. A study area extending for 100m from either side of the Derrybrien-Agannygal 110kV Overhead line, Agannygal substation and reinstatement works for the Ennis- Shannonbridge 110kV Overhead line was also reviewed to determine if the decommissioning of the grid connection has the potential to result in any direct or indirect impacts on the locations and settings of any nearby cultural heritage assets. Given the current absence of published guidance on the identification and/or assessment application of 'Zone of Influence' relevant to the cultural heritage resource, a rationale has been adopted, based on professional judgement, that aimed to address the assessment of potential sensitivities of known assets within the study area that may extend beyond their immediate settings or interact with assets within the wider landscape, e.g., monuments with ritual astronomical alignments or which rely on intervisibility with other monuments as part of their setting.

### 12.2.2 Desktop Study

The assessment presents the results of a desktop study of relevant published sources and datasets undertaken in order to identify all recorded and potential archaeological, architectural and other cultural heritage sites/features/areas within the study area. The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record and the Record of Monuments and Places. The relevant Records of Protected Structures and the National Inventory of Architectural Heritage were consulted for assessing the locations of designated elements of the architectural heritage resource.

Other sources consulted as part of the desktop study included the following:

Archaeological Inventory of County Galway, Vol. 1: West Galway: This publication presents summary descriptions of the recorded archaeological sites within this area of the county and relevant entries are included within the chapter. In addition, the current national online database resources pertaining to recorded sites were reviewed on the National Monuments Service's Historical Environment Viewer.

Heritage Council of Ireland Map Viewer: This online mapping source collates various cultural heritage datasets provided by, among others, the National Monuments Service, the National Museum of Ireland, local authorities, the Royal Irish Academy and the Office of Public Works.

Topographical Files of the National Museum of Ireland: These files comprise paper and digital records of known information on Irish artefacts, including their discovery locations. The file archive is stored in the museum premises in Kildare Street, Dublin and was inspected as part of the assessment.

Database of Irish Excavation Reports: This online database contains summary accounts of archaeological site investigations carried out in Ireland (North and South) from 1970 to present.

Literary Sources: Various published sources were consulted in order to assess the archaeological, historical, architectural heritage and folklore record of the study area.

Cartographic Sources: A review of available historic cartographic sources was undertaken, and these included the 17th-century Down Survey and various map editions published by the Ordnance Survey from the mid-19th century onward. Relevant extracts from the reviewed cartographic sources are provided in Appendix 12-1.

Aerial and Satellite imagery: A review of available imagery of the study area was undertaken in order to review the extent of modern interventions and to ascertain if any traces of unrecorded archaeological sites were visible.

Irish National Folklore Collection: A review was undertaken of transcribed material from the National Folklore Collection archive which has been digitised and published online at www.duchas.ie.

UNESCO World Heritage Sites and Tentative List: There are two designated World Heritage sites in Ireland (Brú na Bóinne, Co. Meath and Sceilg Mhichíl, Co. Kerry) and a number of other significant examples have been included in a Tentative List (2022) that has been put forward by Ireland for inclusion. None of these designated or tentative sites are located within County Galway.

### 12.2.3 Site Walkover

The study area was inspected in August 2018, October 2019 and February 2024 and was assessed in terms of historic landscape, land use, vegetation cover, presence and potential for undetected archaeological and architectural heritage sites/features. No difficulties were encountered during the inspections, and all areas were accessible. The results of the site inspections are detailed in Section 12.3.5 and extracts from the photographic record are presented in Appendix 12-2.

### 12.2.4 Scoping and Consultation

A response to a scoping request was received from the Department of Housing, Local Government and Heritage on 6th November 2024. The Department noted that the information provided was not sufficiently detailed to allow for a full assessment of the archaeological implications of this proposal, however the Department notes that an Archaeological Impact Assessment (AIA) is scoped into the proposed Environmental Impact Assessment (EIA) process as part of the overall Cultural Heritage Impact Assessment of the proposed development and will be carried out by John Cronin & Associates. The supplied methodology indicates that this will incorporate a detailed desktop study and field inspection. In this regard, this Department awaits the results of the Cultural Heritage Impact Assessment

(CHIA) and full Environmental Impact Assessment Report (EIAR) for the scheme before commenting further.

## 12.2.5 Impact Assessment Methodology

Please refer to Chapter 1 of the EIAR for details on the impact assessment methodology (EPA, 2002, 2003, 2015, 2017 and 2022). In addition to the above methodology the following summaries the methodological approach applied to the assessment of impacts on the cultural heritage resource.

The quality of an effect on the cultural heritage resource can be positive, neutral or negative:

- Positive: a change which improves the quality of the cultural heritage environment, (e.g., increasing amenity value of a site in terms of managed access, signage, presentation or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).
- Neutral: no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- Negative Effect: a change which reduces the quality of the cultural heritage resource, (e.g., visual intrusion on the setting of an asset, physical intrusion on features/setting of a site).

The type of effect on the cultural heritage resource can be direct, indirect or none predicted.

- Direct Effect: where a cultural heritage site is physically located within the footprint of a proposed development, which will result in its complete or partial removal.
- Indirect Effect: Effects on the cultural heritage environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
- None predicted: where the proposed development will not adversely or positively affect a cultural heritage site.
- Cumulative: The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
- 'Do-nothing Effects' - The cultural heritage environment as it would be in the future should the Project not be carried out.
- 'Worst-case' Effects - The effects arising from a Project in the case where mitigation measures substantially fail.
- Indeterminable Effects - When the full consequences of a change in the environment cannot be described.
- Irreversible Effects - When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
- Residual Effects - The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
- No predicted Effects: where the proposed development will not adversely or positively affect a cultural heritage site.

The magnitude of effect is based on the degree of change, incorporating any mitigation measures, on a cultural heritage asset and can be negative or positive. The magnitude is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible and Unknown and has been informed by criteria published in the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011) (Table 12-1).

The evaluation of the values of cultural heritage assets used for the purposes of assessment is not intended as definitive, but rather an indicator which contributes to a wider judgment based the

individual circumstances of each asset. The value of all known or potential assets that may be affected by development are ranked according to the following scale: Very High; High; Medium; Low and Negligible. The factors for assessing the value of cultural heritage assets provided in Table 13-2 have regard to the ICOMOS *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 14-17). This guidance is intended as indicative and is used in combination with a consideration of the condition/preservation; documentary/historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value of the cultural heritage assets on a case-by-case basis. The significance of effects is then assigned based on the combined evaluation of effect magnitude and asset significance can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Tables 12-3 and Table 12-4).

*Table 12-1. Criteria for Assessment of Magnitude of Impact (PER ICOMOS 2011)*

| Level | Description |
|---|---|
| High | › Most or all key archaeological or architectural materials affected such that the resource is totally altered<br>› Comprehensive changes to setting<br>› Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character<br>› Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation |
| Medium | › Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified<br>› Considerable changes to setting that affect the character of the archaeological asset.<br>› Changes to the setting of a historic building, such that it is significantly modified<br>› Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character<br>› Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation. |
| Low | › Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different<br>› Slight changes to setting of an archaeological monument<br>› Change to setting of a historic building, such that it is noticeably changed<br>› Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character<br>› Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation |

| Level | Description |
|---|---|
| Negligible | › Very minor changes to key archaeological materials or setting<br>› Slight changes to historic building elements or setting that hardly affect it<br>› Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; resulting in very small change to historic landscape character<br>› Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation |

*Table 12-2. Guidance Criteria for Assessment of Values of Cultural Heritage Assets*

| Level | Description |
|---|---|
| Very High | › World Heritage Sites (including Tentative List properties)<br>› Sites, buildings or landscapes of acknowledged international importance<br>› Intangible associations with individuals or innovations of global significance |
| High | › Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance<br>› Undesignated assets of the quality and importance to be designated<br>› Assets that can contribute significantly to acknowledged national research objectives<br>› Archaeological Landscapes with significant group value<br>› Intangible associations with individuals or innovations of national significance |
| Medium | › Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations<br>› Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character<br>› Intangible associations with individuals or innovations of regional significance |
| Low | › Assets compromised by poor preservation and/or poor survival of contextual associations<br>› Assets of limited value, but with potential to contribute to local research objectives<br>› Historic Townscape or built-up areas of limited historic integrity in their buildings and settings<br>› Intangible associations with individuals or innovations of local significance |
| Negligible | › Assets with very little or no surviving archaeological interest<br>› Landscapes with little or no significant historical interest<br>› Buildings or urban areas of no architectural or historical note; buildings of an intrusive character |

| Level | Description |
|---|---|
| Unknown | › Assets whose importance has not been ascertained<br>› Buildings with some hidden (i.e., inaccessible) potential for historic significance |

*Table 12-3. Description of Impact Significance (PER EPA 2022)*

| Level | Description |
|---|---|
| Imperceptible | › An effect capable of measurement but without significant consequences |
| Not Significant | › An effect which causes noticeable changes in the character of the environment but without significant consequences |
| Slight | › An effect which causes noticeable changes in the character of the environment but without affecting its sensitivities |
| Moderate | › An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends |
| Significant | › An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment |
| Very Significant | › An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment |
| Profound | › An effect which obliterates sensitive characteristics |

*Table 12-4. Significance of Impacts Matrix (PER EPA 2022)*

| Magnitude of Impact | | | | | |
|---|---|---|---|---|---|
| | **High** | Not Significant/ Slight | Moderate/ Significant | Significant/ Very Significant | Very Significant/ Profound |
| | **Medium** | Not Significant | Slight | Moderate/ Significant | Significant/ Very significant |
| | **Low** | Not Significant/ Imperceptible | Slight/ Not Significant | Slight | Moderate |
| | **Negligible** | Imperceptible | Not Significant/ Imperceptible | Not Significant/ Slight | Slight |
| | | **Negligible** | **Low** | **Medium** | **High** |
| | | **Value/Sensitivity of the Asset** | | | |

### 12.2.6 Limitations/Difficulties Encountered

No difficulties were encountered during the compilation of this chapter.

## 12.3 Receiving Environment

### 12.3.1 Archaeological and Historical Context

#### 12.3.1.1 Introduction

The following section presents summary details of the main periods within the Irish archaeological record with references to the recorded archaeological sites located within the study area. Datasets have been interrogated and retrieved from State Body organisations and are considered accurate and current per publicly available information, including the National Monuments Service's online Historic Environment Viewer[2] and the Database of Irish Excavations Reports[3]. The dating framework used for each period of the archaeological record is based on the Guidelines for Authors of Reports on Archaeological Excavations published by the National Monuments Service[4].

In summary, there are eleven recorded archaeological sites located within the 3km study area around the wind farm (Figure12-1). These are listed below (Table 12-5) and their published Archaeological Survey of Ireland descriptions are presented in Appendix 12-1. There are no Preservation Orders assigned to any of these sites and none have been designated as National Monuments. The nearest National Monument to the wind farm site is Isert Kelly Castle (Nat. Mon. ref. 272) which is located approximately 9.7km to the northwest. There are no recorded archaeological sites with visual alignment attributes, such as megalithic tombs or stone circles, located within the study area. The locations of

[2] www.archaeology.ie
[3] www.archaeology.ie
[4] https://www.archaeology.ie/sites/default/files/media/publications/excavation-reports-guidelines-for-authors.pdf

World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were also reviewed and none are located within the environs of the study area.

The recorded archaeological sites located within the study area comprise the recorded location of a levelled cashel (GA124-001—), which is within the wind farm site, a children's burial ground (GA115-007—), an enclosure (GA124-004—), a monumental structure (GA124-006—), two boundary mounds (GA124-009— and GA124-010—), a church site (GA124-013—) and a burial ground (GA124-005—) with an associated bullaun stone (GA124-005001-). Two other recorded sites within the study area have been reclassified as 'redundant records' by the Archaeological Survey of Ireland having been found upon inspection to be non-archaeological in origin (see Table 12-5 and Appendix 12-1). There is a notable paucity of recorded archaeological sites within the upland areas of Slieve Aughty when compared with the surrounding lowlands and this may reflect the poorer agricultural quality of this upland area combined with the development of peats that has the potential to obscure unrecorded, sub-surface archaeological sites.

The recorded location of the cashel site (GA124-001—) within the wind farm is adjacent to an access road in the northwest quadrant of the property. There are no surface remains of this site and the Archaeological Survey of Ireland records that it may have been destroyed by the forestry plantation that occupied its location prior to the construction of the wind farm. This site was not included in the RMP for Co. Galway published in 1997 and is not indicated as an archaeological site on the SMR map dated to the same year. The site is also not included in the archaeological assessment reports associated with the wind farm development in the late 1990s and the 2000s. The current online description of the site was uploaded to the National Monument Service's online Historic Environment Viewer in 2015 indicating that it was added to the SMR following construction of the wind farm. There are no other recorded archaeological sites located within 300m of the planning boundary.

There are no recorded archaeological sites located within the study area extending for 100m from either side of the grid connection route to Agannygal substation. The nearest recorded archaeological monument to this route is an enclosure (GA124-004—) located approx. 1.2km to the west of the overhead line. There are also no recorded archaeological sites located within the section of the study area extending 100m from either side of the Ennis- Shannonbridge 110kV Overhead line reinstatement works. There are no recorded archaeological sites located within 1km of the footprint of the peat slide, barrages and other remediation measures. The nearest example is a burial ground (GA124-005—) which is located approx. 1.9km to the southwest of Barrage 4 and 2.1km south of the peat slide area.

*Table 12-5. Recorded Archaeological Sites with 3km of Wind Farm Site*

| Monument No. | Classification | Townland | ITM E | ITM N | Distance from planning boundary |
|---|---|---|---|---|---|
| GA115-007— | Children's burial ground | BOHABOY | 559265 | 707027 | 1,200m |
| GA124-001— | Cashel | KILBEG, BOLEYNEENDORRISH, DERRYBRIEN WEST, TOORMACNEVIN | 558604 | 704783 | Adjacent |
| GA124-003— | Redundant record | DERRYBRIEN EAST | 560664 | 702452 | 350m |
| GA124-004— | Enclosure | DERRYBRIEN EAST | 559959 | 701558 | 1,110m |

| Monument No. | Classification | Townland | ITM E | ITM N | Distance from planning boundary |
|---|---|---|---|---|---|
| GA124-005--- | Burial ground | DERRYBRIEN EAST | 559523 | 701748 | 1,340m |
| GA124-005001- | Bullaun stone | DERRYBRIEN EAST | 559523 | 701748 | 1,340m |
| GA124-006--- | Monumental structure | DERRYBRIEN NORTH | 561505 | 705505 | 310m |
| GA124-008--- | Redundant record | DERRYBRIEN WEST | 558078 | 701714 | 2,220m |
| GA124-009--- | Boundary mound | BOLEYNEENDORRISH, GORTADRAGAUN | 555320 | 705676 | 2,424m |
| GA124-010--- | Boundary mound | GORTADRAGAUN, KNOCKOURA | 555276 | 704791 | 2,330m |
| GA124-013--- | Church | DERRYBRIEN WEST | 559131 | 701888 | 1,680m |
| GA115-021--- | Field boundary | DRUMMIN | 564007 | 707618 | 1,890m |




*Figure 12-1 Locations of recorded archaeological sites and designated architectural heritage structures within study area*

### 12.3.1.2 Prehistoric Periods

Until recent years the earliest recorded evidence for human settlement in Ireland dated to the Mesolithic period (7000–4000 BC) although recently discovered evidence of a butchery marks on c.12,500-year-old bear bone recovered from a cave site in Co. Clare suggests that humans were present on the island during the earlier Palaeolithic period. While the Mesolithic period hunter-gatherers did not construct any settlements or monuments that leave any above ground traces, their presence in an area can often be identified by scatters of worked flints in ploughed fields, shoreline shell middens and traces of temporary occupation sites occasionally uncovered during ground works. The archaeological record indicates that these nomadic groups tended to favour coastal, lake and river shorelines which provided a transport resource as well as a source for elements of their varied diet. The Neolithic period (4000-2400 BC) in Ireland began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlements within farmlands created within areas of cleared forestry. As a consequence of the more settled nature of agrarian life, new site-types, such as substantial rectangular timber houses and various types of megalithic tombs, as well as new artefacts, including pottery, begin to appear in the archaeological record during this period.

Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC) and saw the introduction of a new artefactual assemblage, including metal and ceramic objects, to the island. This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and burnt mounds/fulachta fia. The development of new burial practices during this period also saw the construction of funerary monuments such as cairns, barrows, boulder

burials and cists. The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). This period has traditionally been associated with a Celtic 'invasion' but recent archaeological evidence points instead to a gradual acculturation of the Irish Bronze Age communities following centuries of contacts with Celtic-type cultures in Europe. Relatively little was known about Iron Age settlement and ritual practices in Ireland until recent decades when the corpus of evidence has been greatly increased by the discovery of sub-surface sites dating to this period during archaeological investigations in advance of development projects. While there are no positively identified prehistoric sites located within the study area it does contain two boundary mounds (GA124-009— & GA124-010—) which may conceivably date from any period from prehistory onward.

The topographical files of the National Museum of Ireland (NMI) record the discovery of a number of potential prehistoric artefacts, including the notable six stranded amber necklace recovered from the Derrybrien area (NMI ref. 1954:11:1-448), within townlands in the study area which attest to human activity in the area during prehistory. A partial NMI dataset published on the Heritage Council of Ireland online mapping service[5] indicates the find location of the necklace within a now forested area located c.400m to the east of the planning boundary, but the potential exists that this is an indicative location.

*Table 12-6. Recorded Archaeological Artifacts Discovered in Study Area*

| Monument No. | Classification | Townland |
|---|---|---|
| 1954:11:1-448 | Derrybrien North | During turf-cutting on his bog in June 1954, Mr. Joseph McHugo of Derrybrien discovered a large number of amber beads and a gold clasp which he considered to be ancient because of their position at the bottom of the bog which had not been cut. (Td. Derrybrien North, par, Killeenadeema, bar. Loughrea, Co. Galway, OS 6", 124, 23.5cm. N 39.5 cm W) The find was made in an upland bog covering the slope of a hill in the Slieve Aughty mountain region near the 600-foot contour, the highest point registered in the vicinity being 1,207 feet. At the find spot the depth of the part was 30 to 35 cm, overlying bedrock with some loose gravel stones in between. The gold fragment and all the beads were collected and acquired by the National Museum |
| 1968:0017-18 | Derrybrien South | Two polished stone axe heads. The first example was a flat triangular stone measuring 13cm long by 7.84cm in maximum width at the cutting edge, 3cm at the butt and 2.1cm at the |

[5] https://www.heritagemaps.ie/WebApps/HeritageMaps/index.html

| Monument No. | Classification | Townland |
|---|---|---|
| | | centre. A fragment of the butt of a second example was also recovered and measured 7.3cm long, 4.3cm wide and 1.6cm thick. |
| 1965:81 | Doonally | A bronze leaf sword with a dark green patina which is described in the file as being in fair condition although missing the tang and butt. The blade measured 41cm long with a maximum width of 2.7cm and had a pointed, oval section. The possible location of a rivet hole was indicated by an indentation on one side. This object was sourced from the Grierson Museum in Dumfries, Scotland with a recorded provenance in Doonally townland. |

#### 12.3.1.3 Early Medieval Period

This period began with the introduction of Christianity in Ireland and continued up to the arrival of the Anglo-Normans during the 12th century (c. 400–1169 AD). The establishment of the Irish church was to have profound implications for political, social and economic life and is attested to in the archaeological record by the presence of church sites, associated places for burial and holy wells. The early medieval church sites were morphologically similar to ringforts but are often differentiated by the presence of features such as church buildings, graves, stone crosses and shrines. This period saw the emergence of the first phases of urbanisation around the large monasteries and the Hiberno-Norse ports. However, the dominant settlement pattern of the period continued to be rural-based in sites such as ringforts, which comprise roughly circular enclosures delimited by roughly circular earthen banks formed of material thrown up from a concentric external ditch, and stone-built equivalents known as cashels which are concentrated in western counties. These monuments comprise one of the most numerous site-types in the Irish landscape and their early medieval names – rath/lios/dun - still form some of the most common place-name elements in the country. Archaeological excavations indicate that the majority comprised enclosed farmsteads with internal buildings and may potentially have associated external field systems, stockades, barns, mills and drying kilns. The study area is located within the Slieve Aughtry region which according to tradition was named after Eachtra of the Tuath De Danann who was granted lands in the area by Fergus of Connacht as a wedding gift. The region around Gort was associated with Guaire Aidne Mac Colmáin, a 6th-century king of Connacht, and then with the 7th-century kingdom of the Uí Fiacrach Aidhne.

The study area contains the recorded location of a levelled cashel site (GA124-001—) which is located within the planning boundary. The Archaeological Survey of Ireland description of this site, which was uploaded to the Historic Environment Viewer in 2015, records that there were no surface traces of this monument visible when the area was inspected and that it may have been levelled during the creation of the forestry plantation (Appendix 12-1). The recorded location of this site is named 'Cashlaundrumlahan' on historic OS maps, which may refer to the summit of the hill of the same name which is at the labelled location and no trace of an enclosure is depicted on these cartographic sources. The description also records that, according to local information, a 'double wall' once existed here but

it was destroyed when the area was forested and that, while no visible surface trace survives, a curving trackway in this area may respect the circuit of the monument. As previously noted, this site was not included in the RMP for Co. Galway published in 1997 and is not indicated as an archaeological site on the SMR mapping dated to the same year. The site is also not included in the lists of archaeological monuments within the environs of the development presented in the archaeological assessment reports prepared as part of the planning applications for the wind farm in the late 1990s and the 2000s. The curving trackway referred to in the ASI description was created during the construction phase of the wind farm and it appears that this location was added to the SMR following the construction phase. The archaeological monitoring of ground works during the construction phases of the wind farm did not reveal any archaeological features at its recorded location, which comprised the location of a borrow pit, and there are also no references to the location in the Database of Irish Excavation Reports.

The surrounding 3km study area outside the planning boundary contains an enclosure site (GA124-004-–), which may potentially form the remains of an unclassified ringfort or cashel, and this is located c.2.78km to the south of the wind farm. The study area also contains a church site (GA124-013—) located approx. 2km to the south of the wind farm which is now occupied by the 19th-century St Patrick's Church. The presence of a bullaun stone (GA124-005001-) within a graveyard (GA124-005—) located approx. 400m to the southeast of this church is indicative of the presence of early ecclesiastical activity within that area.

#### 12.3.1.4 Late Medieval, Post Medieval and Early Modern Periods

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th century broadly marks the advent of the Irish high medieval period which continued to c.1400 and was followed by the late medieval period which extended to c.1550. These periods saw the continuing expansion of Irish urbanisation as many of the Viking port towns developed into international trading centres.. By the 15th century the native Irish chieftains and lords began to construct tower houses as fortified residences within their landholdings and many towns and villages began to develop as local trading centres. The study area is located 12.7km north north east of Gort town, which was the principal residence of Sir Roger O'Shaughnessy, Lord of Kineal Aedh, during the 16$^{th}$ century. There are no recorded archaeological sites definitively dated to these periods located within the study area.

The centuries following 1550 are referred to as the post-medieval period, which is generally considered to continue into the middle of the 19th century and the period thereafter is described as early modern. The 16th and 17th centuries were a turbulent time in Irish history with periods of war-shed between the 1560s-1603 and then during the Cromwellian Wars 1649–53 which resulted in the extensive dispossession of forfeited Gaelic lands. The Down Survey was compiled during the 17th century as part of the Cromwellian Plantation and records that in 1641 the majority of the lands in what was then referred to as the 'Derybrine Mountain' area were classified as unprofitable. An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for both tillage and dairy produce which resulted in landlords investing in extensive land improvement works within their holdings to increase land productivity. This included extensive enclosure of open lands into bounded field systems many of which survive to the present-day. The settlement pattern throughout much of the Irish rural landscape was greatly affected by de-population during the famine period in the middle of the 19th century.

The post-medieval period saw the development of high and low status stone houses throughout the Irish countryside and rural settlement clusters at this time typically consisted of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common during the 19th century. Remote uplands areas, including landscapes similar to that occupied by the wind farm, may also contain the remains of post-medieval features such as booley huts and small fields or stockade enclosures associated with seasonal agricultural practices that may not always be depicted on historical maps. It is likely that the extensive 20th century forestry plantation within the study area would have removed traces of any such features on the Derrybrien hillsides. The Tithe Applotment Books of 1825 list thirteen families in the Derrybrien area indicating that the general area was sparsely populated at

that time. Further details on the context of the study area during the post-medieval and early modern periods are presented in the review of historical cartographic sources (Section 12.3.2).

The study area contains a monumental feature known locally as the 'Earl's Chair' (GA124-006—) which was an early 19th-century folly feature associated with the Earl of Clanrickarde. Its recorded location is within an area of commercial forestry located at a distance of 310m outside the east end of the planning boundary. It has also been recorded that the remains of the feature now survive as a cluster of flat slabs with only one set upright and its location marked the convergence of five separate landholdings[6]. Local tradition records that the feature was used by the Earl as a vantage point for surveying his lands in the area and that a popular fiddle tune entitled 'The Earls Chair' was composed by a local musician, Packie Moloney, as he rested on the rock[7]. A children's burial ground (GA115-007—) of potential post-medieval date is located in Bohaboy townland at a distance of approx. 1.2km to the north of the planning boundary. While these types of burial ground are often associated with the 19th-century Famine period this example is present on the 1st edition 6-inch map, which labels it as 'Knockalaghta Graveyard', demonstrating that it pre-dated the 1840s famine and may potentially indicate the presence of an earlier ecclesiastical site at this location. The following descriptions of the Derrybrien area and the Parish of Killeenadeema were published in the 1830s[8]::

> *DERRYBRIEN, an extra-parochial place, in the barony of LOUGHREA, county of GALWAY, and province of CONNAUGHT, about 9 miles (S.) of Loughrea ; containing 907 inhabitants. It consists of a range of mountains of the same name, extending from Gort to Woodford, and partly separating the southern part of the county from Clare : there is a good road over them from Woodford to Gort. Here is a R. C. chapel, dependent on that of Killeenadeema.*
>
> *KILLEENADEEMA, or KILNADEEMA, a parish, in the barony of LOUGHREA, county of GALWAY, and province of CONNAUGHT, 3 miles (S. by W.) from Loughrea ; containing 3554 inhabitants, This parish comprises a considerable portion of the Derrybrian mountains, and contains 1854 statute acres applotted under the tithe act. It is a vicarage, in the diocese of Clonfert, with the greater portion of the rectory united, together forming part of the union of Loughrea ; the remainder of the rectory is appropriate to the deanery of Clonfert ; .... In the R. C. divisions it is the head of a union or district, comprising also the parish of Kilteskill, and containing chapels at Kildeema, Derrybrian, and Ayle, About 210 children are educated in three public schools, to each of which the Earl of Clancarty contributes £(?)5 annually, and about 120 are taught in two private schools.*

#### 12.3.1.5 Previous Archaeological Assessments

An EIS prepared for the wind farm development contains an archaeological assessment which was prepared by Matt Hodd[9]. This noted that a cairn indicated within the wind farm site on historic OS maps appeared to have been removed by forestry works. The assessment concluded that while no extant traces of archaeological sites or features were identified within the forestry that occupied the proposed wind farm site, ground works during the construction phase would have the potential to impact on any unrecorded, sub-surface archaeological sites that may exist within the landholding. The assessment, therefore, recommended that an archaeologist be employed to monitor the construction phase of the wind farm. The grants of planning permission for the wind farm development issued by Galway County Council and An Bord Pleanála included conditions requiring archaeological monitoring of ground works during the construction phase.

[6] *Fitzpatrick, E. 2004. Royal Inauguration in Gaelic Ireland C. 1100-1600: A Cultural Landscape Study. The Boydell Press.*
[7] *Fuller, J. 2014. Heritage Corridors in the Slieve Aughty Mountains. Heritage Council of Ireland*
[8] *Lewis, S. 1837. A Topographical Dictionary of Ireland. London*
[9] http://gccapps.galwaycoco.ie/ViewPlanningDocuments/ViewPDF?ref=781951

The Database of Irish Excavation Reports contains an entry describing licensed monitoring of the excavation of geotechnical pits within the wind farm in 2001 which states that nothing of archaeological significance was identified within the investigated areas (see Table 12-7: Licence 01E0763).

While the Database does not contain any entries for the construction phase of the wind farm, consultation with the National Monuments Service's Archive Unit revealed a 2005 archaeological report prepared by Eoghan Kieran of the Moore Group does describe the results of the constant supervision of ground works required for the turbine bases, hardstands and internal cables between 2004-5 (Excavation Licence 03E1069). This report provides a summary archaeological baseline context for the development area followed by a written and photographic record of the monitoring works and concludes by stating that no archaeological material, finds or features were identified within the site. The report also states that an earlier programme of archaeological monitoring associated with the initial phase of the wind farm construction was carried out. While the report on the first phase of archaeological monitoring could not be sourced, the archaeologist (Christopher Read) who undertook this work was consulted and provided a written confirmation that nothing of archaeological significance was identified in any area of the site. A report submitted by ESB International to Galway County Council as part of an extension application for the wind farm (planning ref. 05/317) lists a site archaeologist among the staff attending site works during this phase[10]. The report also states that archaeological monitoring of the construction of roads and turbine bases would continue during the proposed extension period. The National Monuments Service Archives Unit also provided a copy of a second Moore Group report which presents an archaeological assessment of the location of the peat slide and proposed remedial works at the peat depository at Black Road bridge (NMS ref. 05N0467). This assessment report concludes that no recorded archaeological sites or any potential unrecorded examples were identified within the assessed lands.

Archaeological monitoring of the construction of a wind farm development in Sonnagh Old townland, approx. 4.5km to the north of Derrybrien wind farm, as well as roadways within the proposed Kilderry wind farm approx. 3km to the west revealed nothing of archaeological significance (Table 12-7).

[10] http://gccapps.galwaycoco.ie/ViewPlanningDocuments/ViewPDF?ref=789379

*Table 12-7. Database of Irish Excavation Reports Entries*

| Townland | Excavation Licence No. | Database Entry |
|---|---|---|
| Derrybrien North | 01E0763 | The digging of eight site investigation pits in advance of a wind turbine plant across the top of Cashlaundrumlahan in the Slieve Aughty Mountains, c. 13km east of Gort, was monitored in September 2001. The pits revealed the extent and nature of the blanket bog on the mountain, but no archaeological features or artefacts were exposed. All further groundwork on site relating to the construction of the wind turbines is to be monitored.<br><br>Archaeologist: Kenneth Wiggins |
| Sonnagh Old | 02E1264 | The proposed development, which consists of a substantial wind farm involving the construction of ten wind turbines and several kilometres of new access roads, is situated 8km south-west of Loughrea, Co. Galway, along a ridge of low hills that forms the northern limit of the Slieve Aughty Mountains. The site is in a large state-owned forestry planted on blanket bog 1–2m deep. There are no known monuments in the vicinity. A strategy of testing and monitoring was used to investigate the site. No archaeological features, finds or deposits were uncovered.<br><br>Archaeologist: Christopher Read |
| Keelderry | 11E0289 | Planning permission was granted by An Bord Pleanála, subject to compliance with the relevant planning conditions, for a 48-turbine wind farm at Keelderry. Construction works commenced on the site in 2007 and consisted of topsoil-stripping of the road network (monitoring was undertaken by another archaeological firm). Monitoring of site investigations was undertaken over one day in 2011. No monitoring of the remainder of the groundworks took place in 2011, as an extension to the planning lifetime of the site was granted to the client.<br><br>Archaeologist: Annette Quinn |

### 12.3.2 Cartographic Sources

The detail on historic cartographic sources can demonstrate the nature of past settlements and land use patterns within a study area in recent centuries and may also highlight the impact of modern developments. This information can aid in the identification of the location and extent of unrecorded or partially levelled features of archaeological or architectural heritage interest. The cartographic sources examined for the study areas comprised the available 17th century Down Survey mapping (Figure 12.2), the 1st edition 6-inch OS map (published 1841) (Figure 12.3) and the 2nd edition 6-inch map (published 1920) (Figure 12.4). The area containing the wind farm is not covered by the 25-inch OS map series (surveyed 1888-1913) although a section of the lands containing the overhead line is depicted and was reviewed as part of the assessment.

The study area is located in the Barony of Loughreagh and, while the 17th-century Down Survey map of this territory does not survive, it is shown as a vacant upland area on the larger scale mapping compiled as part of the survey (Figure 12-2). There were no features of archaeological or architectural

heritage significance identified within the wind farm or its close environs during the inspection of the available historic OS maps. The 1st edition 6-inch map published in 1841 depicts the wind farm site and its environs as vacant upland heath with enclosed field systems located in the surrounding lowlands (Figure 12-3). The approximate recorded location of the cashel site (GA124-001—) in the northeast corner of the wind farm is indicated as 'Cashlaundrumlahan', but no enclosure indicating the presence of an archaeological site at this location is illustrated and it is possible that the label may indicate the adjacent marked summit of the hill bearing the same name. The historic OS maps of the locations of the peat slide, remedial works, overhead line to Agannygal substation and the Ennis- Shannonbridge 110kV Overhead line reinstatement works were also reviewed and no potential unrecorded archaeological or architectural heritage features were noted on the footprints of these areas or within their close environs. The consulted 2nd edition OS map of the published in 1920 indicates that the wind farm site remained as vacant heathland during the first half of the 20th century although some field enclosures are shown extending up the hillslopes and encroach into the north end of the site (Figure 12-4).




*Figure 12-2 Extract from 17th century Down Survey map with general location of study area highlighted in red*

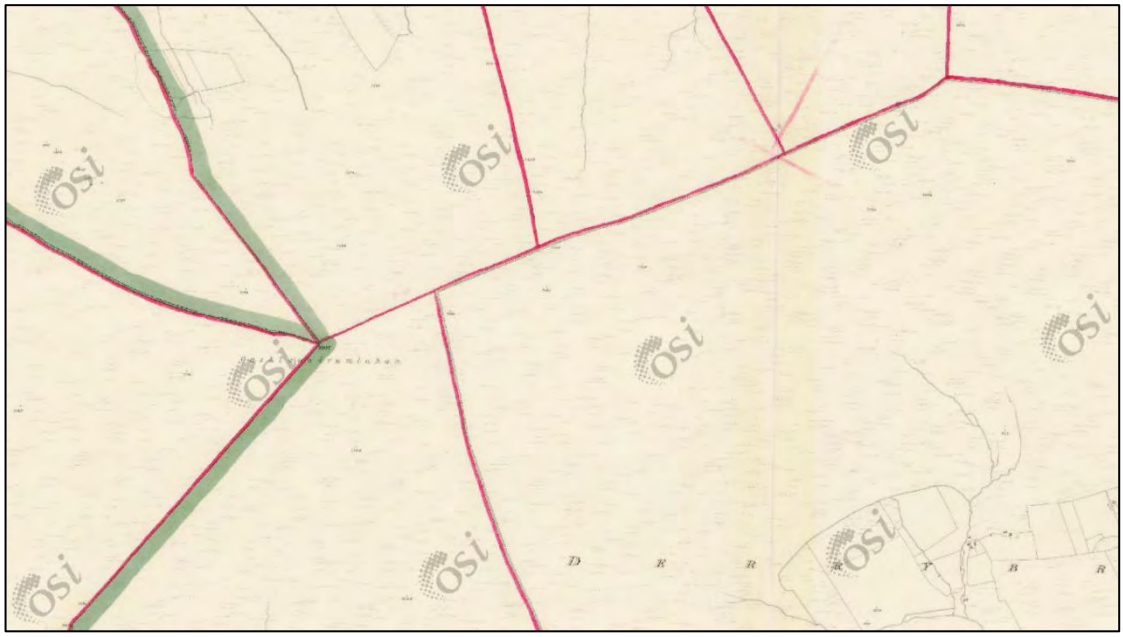


*Figure 12-3 Extract from 1st edition 6-inch OS map (1841) showing location of wind farm*

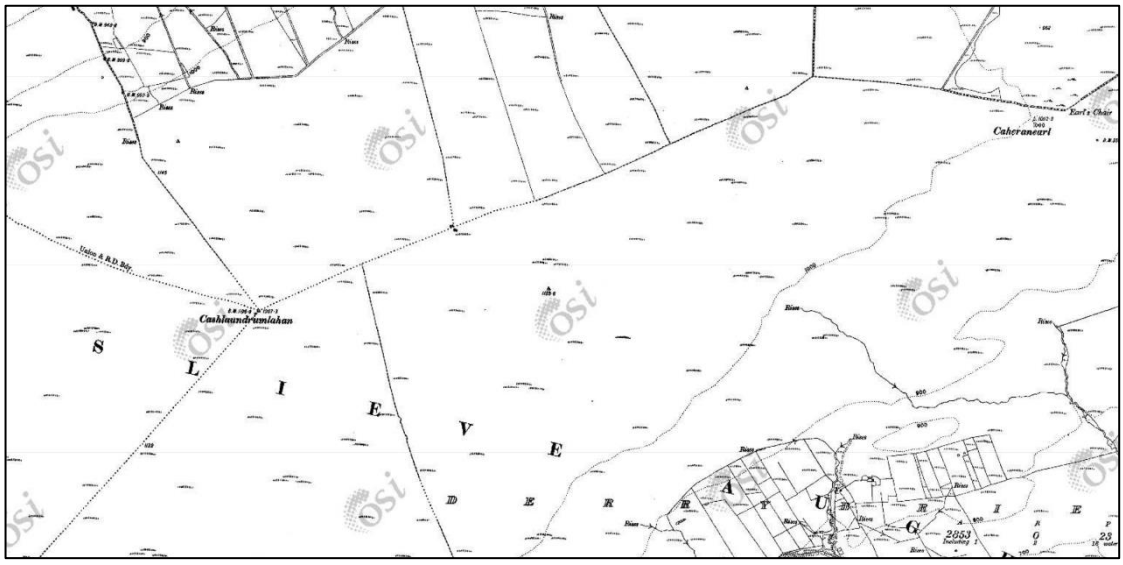

Caheraneari
Cnoc Mhaoil
Cnoc Mhaoil
Cnoc Mhaoil

*Table 12-8. Designated Architectural Heritage Structures with 3km Study Area*

| RPS ref. | NIAH ref. | Name/Type | ITM E | ITM N | Distance from planning boundary |
|---|---|---|---|---|---|
| - | 30412403 | House | 599233 | 701867 | 1,580m |
| 452 | 30212401 | St. Patrick's Church | 559084 | 701924 | 1,720m |
| 3594 | 30412402 | St. Patrick's Church Gates/railings/walls | 559084 | 701881 | 1,720m |

## 12.3.4 Undesignated and Intangible Cultural Heritage

### 12.3.4.1 Placename Evidence

Townlands are the smallest unit of land division in the Irish landscape, and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and nomenclature of the Irish townlands was recorded and standardised by the work of the Ordnance Survey in the 19th century. The Irish translations of the townland names often refer to natural topographical features, but name elements may also give an indication of the presence of past human activity within the townland. The translations of the townland names within the study area were sourced from www.logainm.ie and mainly record topographical features and associations with past landowners.

The wind farm is located within the Civil Parishes of Killeenadeema and Killinan and is in the Barony of Loughrea. Parishes comprise ecclesiastical administrative divisions originally introduced to Ireland in the 13th century and were adapted as the basis of civil divisions during 17th century land surveys. Townlands comprise the smallest unit of land division in the Irish landscape, with over 61,000 examples existing, and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and nomenclature of the Irish townlands was recorded and standardised by the work of the Ordnance Survey of Ireland (OSI) during the 19th century. The Irish roots of townland names often refer to natural topographical features but some may also indicate an association with archaeological sites, e.g. lios and rath are early Irish names for ringforts while kill and temple were used to refer to church sites.

The wind farm and grid connection route extend into the townlands of Derrybrien North, Derrybrien West, Derrybrien East, Boleyneendorrish, Toormacnevin, Bohaboy and Loughatorick North and the Irish origins and translations of these were sourced from the Placenames Database[11] (Table 12-9). While none of the townland names refer to archaeological sites, a number suggest the presence of native woodlands within the study area prior to the compilation of the OS maps in the 19th and 20th centuries which show the area dominated by open heathland and dispersed small field systems. The name of the hill in the west end of the wind farm, Cashlaundrumlahan ('castle of the broad ridge'), has been interpreted by the Archaeological Survey of Ireland as an indication of the former presence of a cashel site (GA124-001—) at this location.

[11] www.logainm.ie

*Table 12-9. Translations of Townland Names*

| Townland | Irish Origin | Translation |
|---|---|---|
| Derrybrien North/West/East | Daraidh Braoin | 'Breen's oak wood' |
| Boleyneendorrish | Buaile an Aon Dorais | 'dairy of the one door' |
| Toormacnevin | Tuar Mhic Cnáimhín | 'MacNevin's bleach or field' |
| Bohaboy | Botha Buí | 'yellow road' |
| Loughatorick North | Loch an Tóraic Thuaidh | 'lake of the ?' |

#### 12.3.4.2 Folklore

The School's Collection forms part of the National Folklore Collection and has been published online as part of the National Folklore Collection UCD Digitization Project[12]. It contains a number of records of stories and traditions associated with the Derrybrien area including an account of two locals encountering a group of men playing a midnight hurley match on the mountain between Derrybrien village and Toormacnevin, which generally correlates to the general location of the wind farm site, who disappeared as they approached the match. The Collection also records stories relating to the famine period within the general area but no contains no examples that relate to the potential presence of unrecorded cultural heritage sites such as holy wells or other potential archaeological features.

#### 12.3.4.3 Undesignated Architectural/Vernacular Heritage

The review of historical mapping sources indicates that there were no built structures at the locations of the wind farm, peat slide, remedial measures, grid connection route and Annyagal substation in the 19th century and no structures pre-dating the wind farm were noted during the site inspections of these areas. An undesignated bridge on the R353 road to the south of the wind farm, known as the Flaggy Bridge, was noted during the site inspection and is interpreted as being of local architectural heritage interest. This structure is described in the following section detailing the results of the site inspections (Section 12.3.2).

### 12.3.5 Site Inspections

The wind farm and the locations of associated off-site grid connection, peat slide and remedial works were inspected in August 2018 and October 2019. The wind farm is sited on a broad upland ridge, which prior to the construction of the wind farm consisted of open area of upland bog land in the eastern end and a commercial forestry plantation elsewhere. The environs of all internal elements of the wind farm development were inspected, i.e. turbines, road system, sub-station, masts and former borrow pits. A visual inspection of the grid connection and the locations of the peat slide and remedial works was also carried out during the site inspections.

[12] www.duchas.ie

The wind farm is located on the upper slopes of Cashlaundrumlahan Mountain within the Slieve Aughty range and comprises 70 wind turbines, an internal substation, three borrow pits (two infilled), two anemometers and a network of access tracks. It occupies a gently sloping plateau aligned on a northeast to southwest axis with a summit elevation of 365mOD with a general gentle slope down towards the south. The site which commands extensive views of the landscape in all directions, especially over the lowlands to the south. The wind farm and its surrounds are characterised by upland blanket bog which in recent decades has been used for commercial forestry within the central and western parts of the site, with ongoing peat harvesting in unplanted turbary plots in the east side of the site.

It is noted that much of the wind farm, as well as the peat slide footprint and overhead line, were previously occupied by commercial forestry. The construction of the wind farm entailed the felling of approximately 222a of trees, including the removal of root networks, which was carried out by Coillte in advance of construction works. Much of the landscape around the wind farm still remain under extensive forestry plantations. A Heritage Council of Ireland archaeological study[13] of the impact of forestry plantations on known and sub-surface archaeological sites has noted that any archaeological sites, including sub-surface remains, that may have existed within modern forestry plantations are often removed or damaged by a combination of site preparation mounding works as well as the growth and subsequent removal of root networks. The study also noted the potential for greater levels of disturbance within plantations in upland peaty soils as the roots spread over a wider area in order to secure anchorage against the wind.

The location of a partially levelled 19th century folly structure known as the Earl's Chair, which is a recorded archaeological site (GA124-006—), is within an area of forestry located 310m outside the planning boundary. There are no visible traces of this feature from the nearest access road located 200m to the south of its location.

The location of Cashel GA124-001— exists as a level, soil-covered area flanked by an access track to the south and east which curves around its recorded location in the northwest corner of the wind farm (Appendix 12-2; Plate 12-10). This area was previously inspected by the Archaeological Survey of Ireland and was also inspected during the pre-development archaeological assessments of the proposed wind farm. No traces of potential archaeological features were noted in this area during any of these site inspections. No surface traces of stone spreads originating from a levelled enclosing wall or artefacts were identified during a walkover of this location undertaken as part of this assessment. The consulted site drawings of the wind farm indicate the location of Borrow Pit 2 within the environs of this area which was subsequently infilled. There was no clear surface trace of this infilled pit feature noted during the site inspection and it is noted that nothing of archaeological significance was identified in this area during the monitoring of the wind farm construction.

The footprint of the wind farm turbines, roads, substation, overhead grid connection and ancillary works remains confined within the area of their original construction and, other than the remedial peat slide works, no areas of additional ground works, which may have had the potential to impact on unrecorded, sub-surface archaeological features, were noted during the inspection of the wind farm. Access roads/tracks within the site for the construction, operation and maintenance of the wind farm comprised approximately 14.6km of new floating access tracks, 0.9km of new non-floating access tracks (including access tracks rebuilt within the wind farm site at T68 and between T23 and T70 to replace sections of on-site floating roads damaged by the 2003 peat slide) and the upgrade of 2km of pre-existing floating roads. The extensive use of floating tracks across the peat surface would have likely avoided direct impacts on any potential archaeological sites or features buried beneath the peat deposits. There were localised surface repairs to some sections of tracks observed during the site inspection and these were typically confined to their existing footprint and no traces of excavations below their surfaces were noted in these areas. The wind farm contains approximately 39km open

[13] *Johnson, G. 1998. Archaeology and Forestry in Ireland. The Heritage Council of Ireland*

drainage channels, 27km of which were pre-existing and subject to improvement works while 12km new drains were constructed as part of the wind farm development. A visual inspection of a number of the earth-cut drain sections was carried out during the site inspection and no traces of potential buried archaeological features or deposits were noted. Localised clearance of tree regrowth within the vicinity of elements of the development has not resulted in any evident ground reduction works. The maintenance of the turbines and other elements of the wind farm development have not resulted in any evident ground works that have the potential to impact on sub-surface archaeological features. The south-facing hillslope on the footprint of the peat slide is now occupied by forestry regrowth and no traces of recent ground excavations works were noted in its vicinity (Appendix 12-2; Plate 12-13).

Access to the wind farm site continues to be gained via the pre-existing forestry track extending from the public road to the east, which is known locally as the Black Road, and section of this public road were upgraded during the construction of the wind farm. There are no recorded archaeological sites or architectural heritage structures located along the road margins and no unrecorded examples were noted during the site inspection of this area. The small bridges on this road are of modern concrete construction with sections of recently constructed rubble masonry walling attached to the concrete slab parapets. The peat slide remedial work locations on the east and west sides of the road were inspected in advance of the works during the archaeological assessment prepared by the Moore Group and nothing of significance was identified. These locations and their environs were also inspected as part of the current assessment. The barrages comprise rock boulders set on existing ground and no potential unrecorded archaeological or architectural heritage features were noted at their locations or along their approaches from the road (Appendix 12-2; Plate 12-13). There are no recorded archaeological sites or designated architectural heritage structures located within the sections of the Coillte landholding impacted by access, drainage and barrage works undertaken within the vicinity of the peat slide, including a small borrow pit adjacent to Barrage 1, and the area remained under forestry at the time of inspection. A two-arch masonry road bridge, known as the Flaggy Bridge, over a stream flowing under a section of the R353 road to the southeast of the wind farm and to the south of the peat slide remedial works was also inspected (Appendix 12-2; Plate 12-18). While this bridge is not a Protected Structure and is not listed in the National Inventory of Architectural Heritage, it is of potential 18th/19th century date and is of local architectural heritage significance. The structure contains round arches with tooled voussoirs, a central u-cutwater and low random rubble parapet walls. Repairs to the roadside parapet of this structure have not impacted on the underlying arches, which remain well-preserved, and have been undertaken with appropriate random rubble limestone material.

The locations of the overhead line and Agannygal substation were also visually appraised during the site inspections. The overhead line measures c.7.8km in length and consists of 43 structures in total comprising 34 double wood pole sets and 6 angle masts, 1 intermediate mast and 2 end masts. It extends through felled sections of the forestry plantation (c. 33.1ha of felled forestry) that occupies the hillslopes extending down from the wind farm site and then continues southwards through cleared corridors within the modern forestry planted in a slightly undulating area of blanket bog land until it reaches the substation which is also within a cleared area of forestry. Apart from the footprint of the overhead structures and regrading under the 400kV line for clearance purposes, the ground levels within the felled corridor appear to have otherwise remained undisturbed during the construction of the overhead line and periodic cutting of regrowth which has not entailed root extractions. While the line extends over the Owendalulleegh River, no in-channel works were undertaken during its construction. The historic OS maps indicate that the section of the overhead line within lowlands to the south of Derrybrien were primarily composed of vacant bog land during the middle of the 19th century while small, dispersed field systems within reclaimed areas had begun to be developed by the end of that century and continued to expand into the 20th century until the area was extensively planted with the existing forestry. There are no farmyards or other built features shown on the footprint of the overhead line and substation on any of the historic OS maps and no unrecorded features were noted during the inspections. As previously noted, there are no recorded archaeological sites or designated architectural heritage structures located within the 100m wide study area centred on the overhead line and the nearest example is an enclosure site (GA124-004—) located approx. 1.2km to the west. The nearest

recorded archaeological site to the substation is a chapel site (GA124-004—) which is located 1.8km to the east.

In conclusion, were no surface traces of any potential unrecorded archaeological sites identified within the proximity of any construction areas within the wind farm site, including along the overhead line forming the grid connection to Agannygal substation, or within the peat slide area and the locations of subsequent remedial works.

## 12.3.6 Summary of Baseline Information

### 12.3.6.1 Wind farm, peat slide and remedial works

There are no extant archaeological sites or architectural heritage structures located within the wind farm site or the locations of the peat slide and remedial measures. The Archaeological Survey of Ireland records that a potential cashel site (GA124-001—) formerly located in the northwest corner of the wind farm was likely destroyed by the commercial forestry plantation prior to the commencement of the wind farm development. There were no visible traces of this monument noted during the site inspection carried out as part of the pre-development archaeological assessments of the proposed wind farm undertaken as part of the planning applications. Its recorded former location was inspected as part of the site inspections carried out as part of the current assessment and no surface traces of any potential archaeological features were noted. The Database of Irish Excavation Reports does not list any entries detailing a licensed excavation of any newly discovered archaeological features at this location or in other areas of the site during the archaeological monitoring of the construction of the wind farm. The archaeologist (Christopher Read) who undertook the monitoring of the first construction phase has provided written confirmation that nothing of archaeological significance was identified in any area of the site during that phase. The report on the archaeological monitoring of the wind farm construction phase in 2004-5 by the Moore Group also states that no archaeological materials or features were identified within any area of the site during that phase of works.

There are no other recorded archaeological sites within 300m of the planning boundary and there are no National Monuments or archaeological sites subject to Preservation Orders located within the 3km study area. There are also no monuments with potential visual alignment attributes, such as megalithic tombs or stone circles, located within the 3km study area.

There are no designated architectural heritage structures located within the planning boundary and the nearest example is located at a distance of 1.58km from its boundary. There were no potential architectural heritage structures (whether designated or not) identified within the site during the pre-development assessments of the wind farm. No potential negative impacts on architectural heritage, folklore or traditions were predicted during the pre-development cultural heritage assessment of the wind farm.

There are no recorded archaeological sites within 1.9km of the locations of the peat slide and the various mitigation measures subsequently enacted at its location. In addition, there are no designated architectural heritage structures within 2km of the locations of the peat slide and the mitigation measures subsequently enacted. The remedial works in the peat slide area were subject to an advance archaeological assessment and nothing of archaeological significance was noted at their locations.

Apart from the peat slide mitigation measures and localised track/drain repairs, no traces of additional ground works associated with the operational phase of the wind farm and grid connection were noted during the site inspections carried out as part of this assessment.

#### 12.3.6.2 Overhead Line and Agannygal substation

There are no recorded archaeological sites or architectural heritage structures located within the study area extending for 100m from either side of the overhead line grid connection route and Agannygal substation. In addition, there are no recorded archaeological sites within 1.2km of the grid connection route or within 1.8km of the location of Agannygal substation. Much of the route of the overhead line and the location of the substation were occupied by forestry plantations prior to their construction which would have had a likely negative impact on any potential unrecorded archaeological sites or features that may have existed on their footprints.

## 12.4 Likely, Significant Impacts and Mitigation Measures Implemented

### 12.4.1 Do-Nothing Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

Given the baseline factors outlined in Section 12.3.6, a Do-Nothing Scenario will result in no predicted impacts on the known cultural heritage resource.

### 12.4.2 Impacts of the Prospective Development

As described in Chapter 4 of the EIAR, the decommissioning phase activities associated with the Prospective Development will be limited to the removal of above ground elements of the Derrybrien wind farm development and will not require ground excavation works within areas of undisturbed ground that have the potential to contain unrecorded, subsurface archaeological remains. During decommissioning all of the above ground elements of the windfarm will be dismantled or demolished, with dismantling works carried out from existing crane hardstanding areas adjacent to the turbine. and taken off site, including:

- The turbine rotors, blades, nacelles and masts.
- The substation electrical transmission and transformer components, concrete plinths, control building and concrete foundations.
- The steel lattice tower and timber twin polesets for the 110kv Overhead Line (OHL) on and immediately adjacent to the site.
- The steel lattice towers for the anemometers.

The Proposed Development will also include the removal of the above ground elements of the grid connection overhead line infrastructure and Agannygal substation as well as reinstatement works for the Ennis- Shannonbridge 110kV Overhead line. These removal and reinstatement works will not require ground excavation works within areas of undisturbed ground that have the potential to contain unrecorded, subsurface archaeological remains.

The following elements will be left in place on the site after decommissioning:

- The site access tracks.

- The hardstanding areas adjacent to the turbines and at the substation.
- The turbine foundations.
- The underground cables
- The existing network of open drains and culverts across the site.
- The peat repository sites with re-generated surface vegetation.
- The closed borrow pits including the main borrow pit near the site entrance.

#### 12.4.2.1 Impacts associated with Prospective Development Works

The Prospective Development works will not require ground excavations within areas of undisturbed ground and given the baseline cultural heritage context outlined in Section 12.3.6, it is concluded that the decommissioning works will result in a neutral effect on the cultural heritage resource and that no mitigation measures for this resource are required.

##### Residual Impact

The Prospective Development will result in a residual neutral effect on the cultural heritage resource.

##### Significance of Effects

Based on the assessment above, **No Significant Effects** on the cultural heritage resource are predicted to arise as a result of the Prospective Development.

## 12.4.3 Cumulative and In-Combination Effects

#### 12.4.3.1 Cumulative Impacts with the "Retained Development".

The Prospective Development will comprise the decommissioning and demolition of an existing wind farm. Once the decommissioning is complete there will be no further impacts associated with the project and, therefore, no potential for cumulative impacts on the cultural heritage resource when considered cumulatively and in-combination with the "Retained Development".

#### 12.4.3.2 Cumulative Impacts with other developments.

The potential cumulative impact of the Prospective Development and other relevant developments has been carried out with the purpose of identifying what influence the Prospective Development will have on the surrounding environment when considered cumulatively and in combination with relevant approved, and existing projects in the vicinity of the proposed site. Further information on projects considered as part of the cumulative assessment are given in Chapter 2: Background to the Prospective Development. The impacts with the potential to have cumulative effects on cultural heritage are discussed below.

- Commercial forestry
- Turbary activity
- The Sonnagh Old wind farm

The forestry in the area was mainly planted in the 1960s and 1970s and its extent has not changed significantly since the wind farm was constructed. Much of the forestry has required felling and replanting as part of the normal life cycle of such commercial operations and it is likely that felling and replanting of the forests in the area will continue and could occur during the Prospective Development. There is one recorded archaeological site located within the surrounding forestry and this comprises a partially levelled 19$^{th}$ century monumental feature (GA124-006—) located 310m outside the east end of

the planning boundary. Given the distance of this feature from the planning boundary, the potential continuation of forestry works within its environs will not act in combination with the Prospective Development to result in any likely cumulative effects.

The turbary plots within and immediately adjacent to the wind farm site have been used for low-volume seasonal peat extraction (turf cutting) for individual use as fuel with no intensive commercial peat harvesting occurring. There are no recorded archaeological sites or architectural heritage structures located within the turbary plots. The continuation of peat extraction within these plots in combination with the Prospective Development will, therefore, not result in any likely cumulative effects on the known cultural heritage resource.

Programmes of advance archaeological testing and monitoring of construction works were carried out as part of the Sonnagh Old wind farm development, and these revealed nothing of archaeological significance (see Table 12-7). The continued operation of the Sonnagh Old wind farm, in combination with the Prospective Development, is not likely to result in any cumulative effects on the cultural heritage resource.

## 12.5 Conclusion

The locations of the wind farm development and peat slide remedial works were subject to pre-construction archaeological assessments and no features of cultural heritage significance were identified in any locations. The only archaeological site recorded within the close environs of the wind farm comprises a cashel site (GA124-001—) in the northwest end of the wind farm and the Archaeological Survey of Ireland description of this site indicates that it was added to the Sites and Monuments Record after the construction of the wind farm. The description also records that no remains of the cashel site existed at the location which may have been previously impacted by forestry planting (see Appendix 12-1). The pre-development archaeological assessments of the wind farm included inspections of this area and no traces a cashel site were identified prior to the construction of the wind farm. In addition, nothing of archaeological significance was identified at the recorded location of this archaeological site or within in any other areas of the wind farm site during continuous archaeological monitoring of ground works during the construction phase. No ground works are proposed within the environs of the recorded location of Cashel GA124-001—during the Prospective Development. There are no other recorded archaeological sites or designated architectural heritage structures located within 300m of the planning boundary.

As described in Chapter 4 of the EIAR, the Prospective Development will be limited to the removal of above ground elements of the Derrybrien wind farm and will not require ground excavation works within areas of undisturbed ground that may have the potential to contain subsurface archaeological remains.

Based on the assessment above, No Significant Effects on the cultural heritage resource are predicted to arise from the Prospective Development.

# 13. LANDSCAPE AND VISUAL

## 13.1 Introduction

### 13.1.1 Chapter Scope

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of the effects resulting from development on both the landscape as a resource in its own right and on people's views and visual amenity. This chapter provides an assessment of the landscape and visual effects of the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development as described in Chapter 4 Project Description.

### 13.1.2 Statement of Authority

The assessment of landscape and visual effects has been carried out Evelyn Sikora, BA MPlan, MILI. Evelyn has eleven years' experience in preparing Landscape and Visual Impact Assessment Reports (LVIA) for various types of development including wind energy, solar, flood relief works, quarries, roads, greenways and other infrastructure, as well as residential and commercial and recreational developments, in both rural and urban contexts.

Declan O' Leary, MLI, MILI, Managing Director of Cunnane Stratton Reynolds also provided inputs and review/oversight of the report content. Declan O'Leary has over 30 years' experience in local development, landscape design, urban and environmental renewal. This includes master planning and design to implementation of a broad range of strategic environmental improvement schemes to industrial, highway and urban regeneration sites as well as reclamation, amenity, rural/countryside, educational and housing projects. He is experienced in working closely with community organisations and statutory agencies to deliver local environmental, social and economic development.

Declan has worked in the area of Landscape and Visual Impact Assessment (LVIA) and Landscape Planning in Ireland since 2000. He has experience of addressing landscape issues in sensitive and heritage landscapes, the development of policy to guide appropriate development in those landscapes, and the preparation of LVIA for developments in the rural and urban context including wind energy and renewables projects, roads, bridges and similar linear infrastructure. He is a Corporate Member of the Irish Landscape Institute and a Chartered member of the Landscape Institute (UK).

## 13.2 Methodology

### 13.2.1 Key Guidance Documents

This chapter of this EIAR was prepared using the assessment methodology outlined in the *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition, LI/IEMA 2013) which is the industry standard for LVIA (hereafter referred to as GLVIA 3RD Edition). Reference is also made to guidance contained in the following documents which has been reviewed, considered and applied where relevant:

- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, EPA, 2022).
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015)
- Wind Energy Guidelines for Planning Authorities, (Department of Environment, Heritage and Local Government, 2006).

- Draft Revised Wind Energy Development Guidelines, (Department of Housing, Planning and Local Government, 2019).
- Guide to Visual Representation of Wind Farms (Scottish Natural Heritage, 2017).
- Assessing the Cumulative Impact of Onshore Wind Energy Developments, (Scottish Natural Heritage, 2012).

The GLVIA (3rd Edition) outlines the assessment process, which combines judgements on the sensitivity of the resource and the magnitude of the change which it will undergo as a result of the proposed development. These are then combined to reach an assessment of the importance (or significance) of the effect. This guidance is authored by the Landscape Institute in the UK and the IEMA which contains a network of members in UK and Ireland and internationally. The guidance was prepared within the parameters of relevant EU directives at the time and is updated where necessary by Landscape Institute bulletins online. The GLIVA 3rd edition is used internationally and is the industry standard for LVIA in Ireland.

Chapter 1 of the EIAR includes details on the impact assessment methodology (EPA 2022). However as noted in the EPA (2022) Guidelines, Section 3.7.3, while the use of the Definitions of Significance is widely used, they are general and should more specific definitions exist for a particular discipline, then these should be used:

> *When more specific definitions exist within a specialised factor or topic, e.g. biodiversity, these should be used in preference to these generalised definitions. (ref. Advice Notes68.)*

The EPA guidance (2022) refers to the use of topic specific guidance and specifically references the GLVIA 3 in relation to professional judgement. It also recognises (at para 3.72) that:

> *"Some uncertainty is unavoidable in EIA, especially about matters that involve an element of judgement, such as assigning a level of significance to an effect. Such judgements should be explicit and substantiated rather than presented as objective fact. This is best done using agreed referable approaches, e.g. the Guidelines on Landscape and Visual Impacts Assessment provide guidance on what constitutes a severe visual effect".*

Based on the above guidance and in particular the GLVIA guidance, the following assessment criteria is used. It should be noted that the approach advocated in the GLVIA is that landscape consultants should prepare the assessment criteria suitable to the project, and the Guidelines themselves contain suggestions on how to prepare criteria.

Definitions and descriptions of sensitivity, magnitude of change and quality and longevity of effects are derived from the GLVIA. The GLVIA does not set out specific definitions of descriptions used but contains key widely used principles and case studies / examples that are intended to inform a professional's methodology, supported by their experience and judgements in relation to landscape and landscape change. These descriptions expand and complement the EPA guidelines as intended in relation to topic specific guidance.

It should, however, be noted that there is no specific guidance on decommissioning of wind energy projects, and in particular, the depiction of such in terms of visualisations. We have therefore used professional judgement and followed the same principles for producing photomontages for a proposed wind energy development (SNH, 2017).

### 13.2.2 Other Guidance

The current Development Plan for Co. Galway 2022-2028 was reviewed.

Though the wind farm site and Agannygal Substation are both in Co. Galway, the study area extends into the northern uplands of County Clare. Certain parts of the uplands to the south of Derrybrien and Agannygal are designated as areas of Heritage Landscape, including Lough Graney, Lough Atorick itself, and the peaks of Maghera, Pollaguna and Knockbeha mountains. Therefore the Clare Couty Development Plan 2023-2029 was reviewed with reference to the relevant designations for this part of the LVIA study area.

## 13.2.3 Key Principles of GLVIA

In addition to the references in terms of the assessment of significance above, some of the key principles of the GLVIA are as follows:

***Use of the Term 'Effect' vs 'Impact'***

The GLVIA advises that the terms 'impact' and effect' should be clearly distinguished and consistently used in the preparation of an LVIA.

'Impact' is defined as the action being taken. In the case of the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development, the impact would be the removal of the 70 no. turbines and associated infrastructure. 'Effect' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

***Assessment of Both 'Landscape' and 'Visual' Effects***

Another key distinction to make in LVIA is that between landscape effects and the visual effects of development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Visual effects refer to the interrelationship between people and the landscape and refer to effects on views and visual amenity as experienced by people or groups of people. The GLVIA prescribes that visual effects should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity. These are usually views which are accessible to the general public.

# 13.3 Assessment Methodology- overall process

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity. The methodology followed for LVIA is that set out in the Guidelines for Landscape and Visual Impact Assessment by the Landscape Institute and the Institute of Environmental Management and Assessment (2013), 3rd Edition (hereafter referred to as the GLVIA).

Ireland is a signatory to the European Landscape Convention (ELC) since 2002. The ELC defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction

of natural and/or human factors'. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental, and economic benefits to individuals and society.

*The Guidelines for Landscape and Visual Impact Assessment* 2013 (GLVIA) notes that as a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys, and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs. It should be noted that the Prospective Development, as it involves decommissioning of a wind energy development, is a demonstration of this as the removal of turbines and substations can reverse the main landscape and visual effects.

### Baseline Study

The process set out in the GLVIA (2013) and in EPA (2022) involves the preparation of the baseline or receiving environment characteristics. This includes two stages, which are a desk-based study and site visit/field study. These allow the assessor to establish the existing receiving environment and key landscape and visual characteristics and their sensitivities.

The assessment includes the review of the Prospective Development, desktop study, and several site visits both to the site and the wider landscape. This approach emphasises the distinction between the assessment of Landscape effects and Visual effects, which, though related, area assessed separately. The methodology employed in this assessment is as follows:

Baseline Study: A desk-based study and site visit were carried out, with site visits completed in November 2022 and January 2023 and November 2024. to establish the existing receiving environment and key landscape and visual characteristics, and to identify relevant national and local designations and polices. Protected views and other landscape designations were reviewed. Aerial imagery, OSI Discovery series mapping, CORINE Landcover Maps (2018) were also reviewed to gather accurate information on the study area. While a wind energy development would typically use (ZTV) Maps to show proposed theoretical visibility of turbines, the removal of a wind energy development will result in a removal of visibility of all 70 existing turbines. Therefore, an existing ZTV map representing the theoretical visibility as it now exists, is included as part of the baseline study.

### Assessment of Effects:

Once the baseline is established, and the proposed development drawings and descriptions reviewed, the assessment process is commenced, as per the GLVIA (2013) and as outlined in Sections 13.3.2-13.3.9. A number of tools are used to assist in the assessment of visual effects. These are further described below.

## 13.3.2 Sensitivity of the Landscape Resource

The sensitivity of the landscape is a function of its land use, landscape patterns and scale, and the value placed on the landscape. The nature and scale of the development in question is also taken into

account. For the purpose of assessment five categories are used to classify the landscape sensitivity of the receiving environment.

*Table 13-1 Categories of Landscape Sensitivity*

| Sensitivity | Description |
|---|---|
| **Very High** | Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principal management objective for the area is protection of the existing character from change |
| **High** | Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character |
| **Medium** | Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change |
| **Low** | Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principal management objective is to facilitate change through development, repair, restoration or enhancement. |
| **Negligible** | Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principal management objective for the area is to facilitate change in the landscape through development, repair or restoration |

### 13.3.3 Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories are used to classify magnitude of landscape change.

*Table 13-2 Magnitude of Landscape Change*

| Magnitude | Description |
|---|---|
| **Very High** | Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape. |
| **High** | Change that is moderate to large in extent, resulting in alteration or compromise to key elements, features or characteristics, and/or introduction of large elements considered uncharacteristic in the context. Such development results in a moderate to large change to the character of the landscape. |

| Magnitude | Description |
|---|---|
| **Medium** | Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily uncharacteristic in the context. Such development results in moderate change to the character of the landscape. |
| **Low** | Change that is limited in extent, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape. |
| **Negligible** | Change that is very limited in extent, resulting in no alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are characteristic in the context. Such development results in minimal change to the character of the landscape. |

# Significance of Effects

In order to classify the significance of effects (landscape and visual – refer to Table 13-3 below), the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide. There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound. The Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (EPA, 2022) is followed in respect of terminology relating to significance of effects.

*Table 13-3 Guide to Classification of Significance of Effects*

| | | Sensitivity of the Receptor | | | | |
|---|---|---|---|---|---|---|
| Magnitude of Change | | **Very High** | **High** | **Medium** | **Low** | **Negligible** |
| | **Very High** | Profound | Profound-Very Significant | Very Significant-Significant | Moderate | Slight |
| | **High** | Profound-Very Significant | Very Significant | Significant | Moderate-Slight | Slight-Not Significant |
| | **Medium** | Very Significant-Significant | Significant | Moderate | Slight | Not Significant |
| | **Low** | Moderate | Moderate-Slight | Slight | Not significant | Imperceptible |
| | **Negligible** | Slight | Slight-Not Significant | Not significant | Imperceptible | Imperceptible |

The matrix above is used as a guide only and to illustrate the process of the assessment of landscape effects. As the GLVIA (2013) guidelines note, there is no standard approach to defining what constitutes a significant effect, and notes the relationship between the two axes, Sensitivity and Magnitude, is not linear, and the axes are likely to have different weightings. The GLVIA notes that assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

The GLVIA 3rd Edition recognises (at para 2.23) that:

> *"Professional judgement is a very important part of LVIA. While there is scope for quantitative measurement of some relatively objective matters, much of the assessment must rely on qualitative judgements."*

Landscape effects are also classified as positive/beneficial, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it.

Methodology for Visual Assessment

In Section 13.5 of this report the visual effects of the wind farm are assessed. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the viewpoint sensitivity against the magnitude of change to the view resulting from the development.

### 13.3.4 Sensitivity of the Visual Receptor

Viewpoint sensitivity is a function of two main considerations- susceptibility to change and value of the view.

- **Susceptibility of the visual receptor to change**. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.
    - Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.
    - Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

- **Value attached to the view**. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

For the purpose of assessment five categories are used to classify a viewpoint's sensitivity.

*Table 13-4 Categories of Visual Receptor Sensitivity*

| Sensitivity | Description |
|---|---|
| **Very High** | Viewers at iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise regarded as being of very high value or national value. This may also include residential viewers whose primary view is of very high value. |
| **High** | Viewers at viewpoints that are recognised in policy or otherwise designated as being of high value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and are valued by the local community. This would include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes. |
| **Medium** | Viewers at viewpoints representing people travelling at slow or moderate speed through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquility or some rare element in the view. |
| **Low** | Viewers at viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, etc. The view may present an attractive backdrop to these activities but there is no evidence that the view is valued, or that it is regarded as an important element of these activities. Viewers travelling at high speeds (e.g. motorways) may also be considered of low susceptibility. |
| **Negligible** | Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality and not valued |

### 13.3.5 Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also takes into account the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view:

*Table 13-5 Magnitude of Visual Change*

| Magnitude | Description |
|---|---|
| **Very High** | Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity |
| **High** | Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity. |
| **Medium** | Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity |

| Magnitude | Description |
|---|---|
| **Low** | Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity |
| **Negligible** | Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity. |

***Significance of Visual Effects***

As for landscape effects, in order to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint.

Visual effects are also classified as beneficial/positive, neutral or negative/adverse. This is an inherently subjective exercise. Visual receptors' attitudes to development of various types varies and this affects their perception of the visual effects of wind farm, and indeed the removal of wind turbines from the landscape. This is acknowledged by the GLVIA (2013) as noted in Section 13.1.4 above. However, as noted in the GLVIA Paragraph 6.45, an 'informed professional judgement' should be made about whether the visual effects should be categorised as positive or negative (or neutral) with the criteria used in reaching this judgement clearly stated. These are listed in Section 13.2.6 below.

Several tools are used to assist the assessment of visual effects, including Zone of Theoretical Visibility (ZTV) maps, and Photomontages.

#### 13.3.5.1 Tools

Several tools are typically used to assist in the Landscape and Visual Assessment. These include ZTV Maps (Zone of Theoretical Visibility) Maps and Visualisations (Photomontages).

However, when assessing a proposal for Decommissioning, that is, the removal of existing structures in the landscape, as opposed to the placing of objects in the landscape, the existing ZTV Map will form part of the baseline environment. Photomontages are of less relevance here than in the case of a proposed wind farm, nevertheless a selected number of photomontage views showing the removal of turbines and other infrastructure, are included. The same process outlined by SNH (2017) is followed.

##### 13.3.5.1.1 *ZTV (Zone of Theoretical Visibility) Maps*

ZTV Maps are produced to indicate theoretical visibility and are based on topographical information (the data supplied uses contours at 10 metres intervals) to indicate areas which may have views of the turbines. It is important to note that these maps, though useful, have limitations as they are based on topography alone, and represent a bare-earth scenario, that is, a landscape without any structures, buildings, or vegetation. In reality, many of these elements combine to screen our views of the landscape, so the ZTV maps usually represent a greater extent of visibility than in reality. This is particularly relevant in a landscape with considerable forestry planting.

It is important to note the limitations of ZTV maps which include those identified by Scottish Natural Heritage (SNH):

- ZTV maps do not include any vegetation, buildings or other structures in the landscape so are different to actual visibility.
- ZTV maps give information on the likely extent and pattern of visibility but not the nature or magnitude - and what the visual effect is likely to be.

- It is not easy to test the accuracy of a ZTV in the field, though some verification will occur during the assessment from viewpoints.

It should be noted that the last point, while usually relevant to a proposed development, is not relevant as the existence of the Derrybrien Wind Farm means that actual visibility can be clarified on the ground.

ZTV maps are also useful to determine potential visual receptors and viewpoints, as they show areas which will not have any visibility of the proposed development. They also show the numbers of turbines likely to be visible, and how much of each turbine is potentially visible. However, as they do not take into account the presence of vegetation of structures in the landscape, and therefore areas showing theoretical visibility on the ZTV maps will not always have visibility in reality.

As the wind farm is already existing, the description of the actual visibility of the windfarm project, and the areas covered by the ZTV, are included in the baseline, in Section 13-3. The ZTV map, in this case, is helpful as it indicates areas where there is no theoretical visibility due to landform.

#### 13.3.5.1.2 *Visualisations and Viewpoint Selection*

Visualisations, (in this case photomontages), are used as a tool to assist in the assessment of visual effects. Photomontages of 17 viewpoint locations have been included to assist in the assessment of visual effects. These photomontages were produced by Innovision and are included in the Photomontage Booklet in Appendix 13-9.

Since the Derrybrien Wind Farm Development Decommissioning Project- Prospective Development involves the removal of wind turbines and associated at and above ground infrastructure, rather than the addition of these elements, this does not require the same approach. Therefore, the removal of the turbines and associated overground infrastructure will return the majority of the views to what they were prior to construction, notwithstanding any other landscape changes. Therefore, in this case the visual effects will be assessed using a number of baseline views (as the wind farm is seen today) with a small sample number of views showing the removal of the turbines, as well as the removal of the overhead line and the Agannygal Substation.

These viewpoints were selected following guidance from the GLVIA 3rd Edition guidance and the Scottish Natural Heritage (2017) guidance, and include viewpoints at a range of elevations, directions, and both viewpoints in close proximity and further away from the existing Derrybrien Wind Farm Development are included, and incl. A range of visual receptors, including from the vicinity of residences, local roads, amenity areas, towns and villages in the area were included.

To produce a photomontage, the proposed development is usually “placed” into the existing baseline photography using professional GIS and 3D modelling software. Once placement has been achieved, a photo-realistic render is output depicting what the proposed development will look like if built. The resulting output is a highly accurate, verifiable photomontage. Wind farm developments may follow particular guidance on this, for example Scottish Natural Heritage (SNH) guidance.

While photomontages are extremely useful in giving an impression of a proposed development, the SNH guidance notes the uses and limitations of visualisations. These include:

- Visualisations provide a tool for assessment but should never be considered as a substitute for visiting a viewpoint in the field.
- It must be noted that photographs cannot replicate a view as seen by the human eye. They also only represent a view from a single location, at a particular time and in particular weather conditions.)
- Static visualisations cannot convey the effect of turbine blade movement.

However, the fact that the Derrybrien Wind Farm Development is in existence means that the turbines seen in their setting in reality. These represent the baseline views, while the 'proposed' view will in most cases, be the same as the baseline view, without the turbines, and in some views, the overhead line and the Agannygal substation

Therefore, for certain viewpoints (2,3,4,5,11,12) an additional view showing the proposed decommissioning scenario are included – showing the turbines removed to illustrate cumulative effects- at an angle of view at 53.5 degrees. This follows the Scottish Natural Heritage (2017) guidance for showing proposed windfarm photomontages, which is the industry standard for windfarm visualisations. These represent both distant views and closer views. A viewpoint (11) was included showing the decommissioning of the Agannygal Substation.

## 13.3.6 Quality and Timescale of Effects

The predicted impacts are also classified as beneficial, neutral or adverse. As noted above, this is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

*Table 13-6.Quality of Effects.*

| Definition of quality of effects | |
|---|---|
| Adverse | Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished; |
| Neutral | Scheme complements (or does not detract from) the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality; |
| Beneficial | Improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses. |

Impacts/effects are also categorised according to their longevity or timescale:

*Table 13-7: Timescale of Effects*

| Timescale | |
|---|---|
| Temporary | Lasting for one year or less |
| Short Term | Lasting one to seven years |
| Medium Term | Lasting seven to fifteen years |
| Long Term | Lasting fifteen years to sixty years; |
| Permanent | Lasting over sixty years. |

A statement is made as to the appropriateness of the Prospective Development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the Prospective Development based on objective assessment of its likely landscape and visual impacts.

## 13.3.7 Study Area

The LVIA study area is a 20-kilometre buffer surrounding the Derrybrien Wind Farm Development Turbines. This is compatible with the current Wind Energy Development Guidelines (DoEHLG 2006) as well as the Draft Wind Energy Development Guidelines draft DoHLG (2019) and the . It is noted that although these Guidelines relate to *proposed* wind energy developments, however for consistency and comparability the study area extent is the same as for a proposed wind energy development.

The study area is indicated on Figure 13-1 and is also defined on the ZTV (Zone of Theoretical visibility) mapping of the existing Derrybrien Wind Farm Development turbines. Figure 13-1 is included in a reduced format here in Section 13.3.3 and at full size in **Appendix 13-1**.

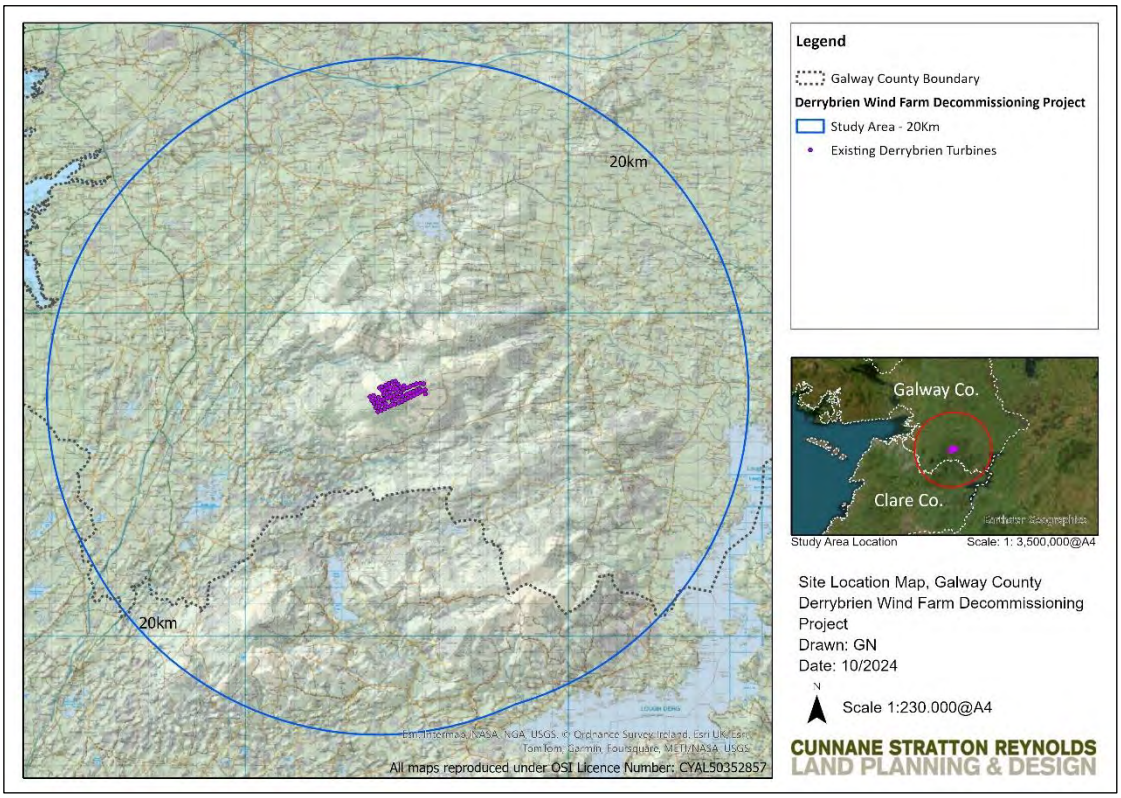



*Figure 13-1 LVIA Study Area*

## 13.3.8 Limitations/Difficulties Encountered

It should be noted that there is no specific guidance in terms of LVIA or visualisations for decommissioning.

# 13.4 Receiving Environment

## 13.4.1 Landscape Character

Landscape Character is described under a series of headings. Under each heading, the 'Site (the existing Derrybrien Wind Farm Development site, the overhead line and the vicinity of the Agannygal Substation are described, with the 'Wider Landscape' also described in a broader sense.

### 13.4.1.1 Landform – Topography and Drainage

#### 13.4.1.1.1 *Wider Landscape*

Derrybrien Wind Farm Development is located in the Slieve Aughty Mountains in southeast Galway.

The eastern part of Co. Galway has a simple underlying geology. This area is mostly underlain by more recently deposited Carboniferous limestone, which erodes more evenly forming the typical lowland topography of the midlands. The only significant variation in this part of the county is the Slieve Aughty Mountains in the southeast (extending into Co. Clare), where an inlier of Devonian sandstones and

conglomerates projects through the limestone, forming an upland landscape. As a result of the bedrock geology, the Slieve Aughty Mountains are lower and less dramatic in landform than the uplands of Connemara which are typified by the Twelve Bens. The highest peak in the Slieve Aughty's (in Co. Galway) is Cushlaundrumlahan at 365m which is within the wind farm site. The Slieve Aughty peaks are rounded, and the slopes are shallow compared to the steep-sided and pointed profiles of the Connemara mountains.



*Plate 13-1 Slieve Aughty mountains viewed from the north: A lower rounded profile is visible*

In the wider landscape, to the west of the Slieve Aughties, and east of the more sparsely covered Karst Burrren landscape, the Burren Lowlands is the name given to the low-lying lands around Gort which are more open in nature with fewer areas of tree cover and where rivers mainly flow underground. South of this area, the low rounded limestone form of the Burren Hills are found approximately 20 kilometres to the west.

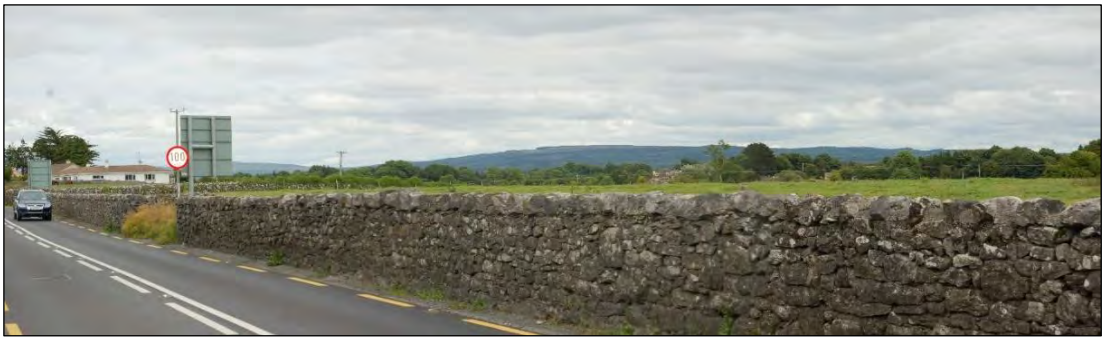


*Plate 13-2 Slieve Aughty mountains and Derrybrien wind farm from R458 north of Gort*

Several lakes lie within the wider study area, Lough Rea and Lough Cutra and Lough Graney approximately 10 kilometres to the north, southwest and south (of the existing turbines) respectively, with Lough Atorick approximately 9 kilometres to the southeast. Lough Derg lies approximately 20 kilometres to the east of the existing wind farm.

#### 13.4.1.1.2 Site and immediate vicinity

Derrybrien Wind Farm Development is in the northern part of the Slieve Aughty range east of the peak of Cushlaundrumlahan. This is a linear mountain, aligned approximately SW-NE, with a relatively flat, rounded top and gently sloping sides. It is a monolithic landform feature, with no outlying ridges or peaks. Due to its limited height and undramatic landform, as an upland feature it is unremarkable in appearance. Figure 13-2 (in reduced format below and full size in **Appendix 13-2**) shows the topography within close proximity of the existing Derrybrien Wind Farm:

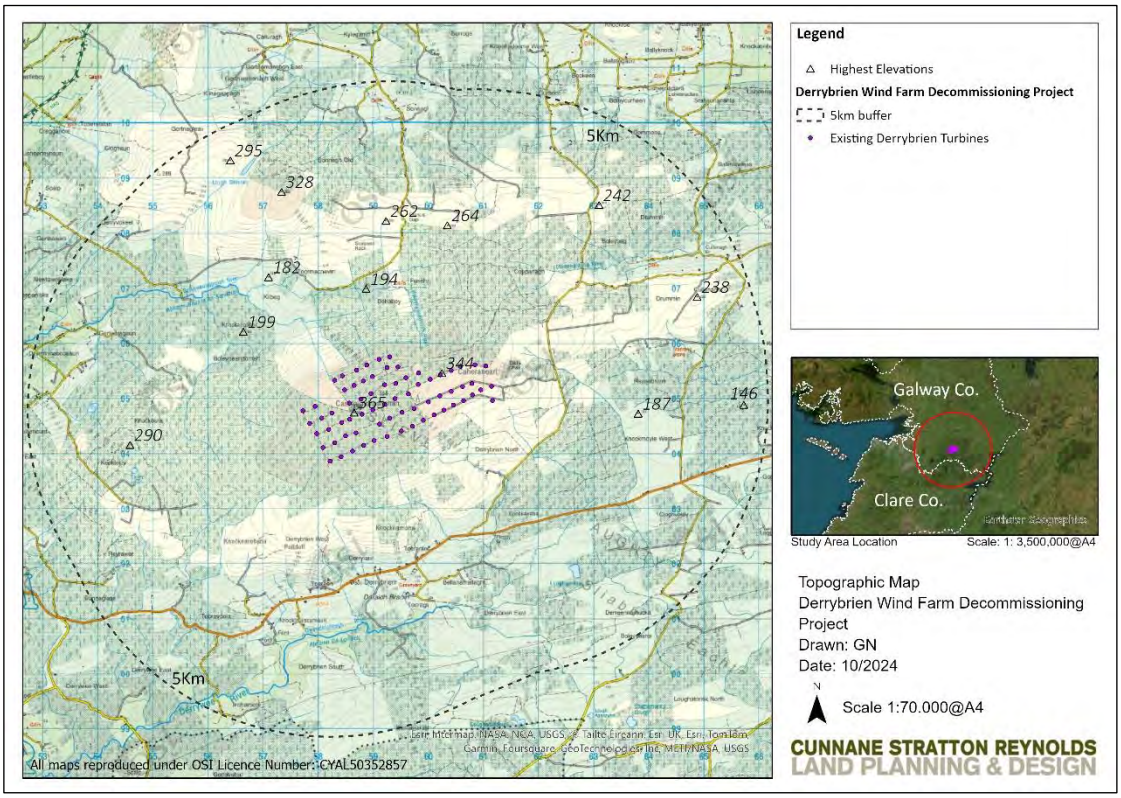



*Figure 13-2 Topographical context of Derrybrien site and immediate vicinity*

Just over 3 kilometres to in the northwest, there is a similar but smaller landform lying parallel, where Sonnagh Old Wind Farm is located, with a peak of 328 metres, separated from Casheldrumlahan by river valley in which the Boleyneendorish River flows.

To the south there is a broad, flat upland valley through which the Owendallleegh and Bleach Rivers flow, and beyond that the Slieve Aughty range extends into Co. Clare. These features, the Sonnagh Old peak and the upland valley and peaks to the south further diminish the presence of Cushlaudrumlahan in the landscape as they buffer the mountain from the surrounding lowlands.

As noted above the highest peak in the Slieve Aughtys (in Co. Galway) is Cushlaundrumlahan at 365m which lies within the Derrybrien wind farm site itself, where the turbines are oriented SW-NE, in rows along the landform. As noted above, the landcover is a mosaic of coniferous forestry and open peatland, the juxtaposition of these evident on the aerial images and landcover mapping.

## 13.4.1.2 Land Use and Land Cover

### 13.4.1.2.1 *Wider Landscape*

Landcover – Vegetation

The variations in geology and topography between the uplands of Co. Galway translate into variations in land use capability. The CORINE Land cover map (the most recent version is the 2018 update) below shows the major variations in land use across the county. The Connemara uplands have very limited potential for both agriculture and forestry; they are predominantly covered by peat bog. In contrast, the Slieve Aughty Mountains have one of the largest concentrations of coniferous forest in the country (ref. Atlas of the Irish Rural Landscape, p.125) with areas of peatland interspersed as seen in Figure 13-3, the CORINE Landcover Map for the site and surrounds. Purple shading indicates peat bog. Dark green indicates coniferous forest. Light green indicates transitional woodland scrub. Yellow indicates pastureland. This map is included in reduced format here and at A4 in **Appendix 13-3**.

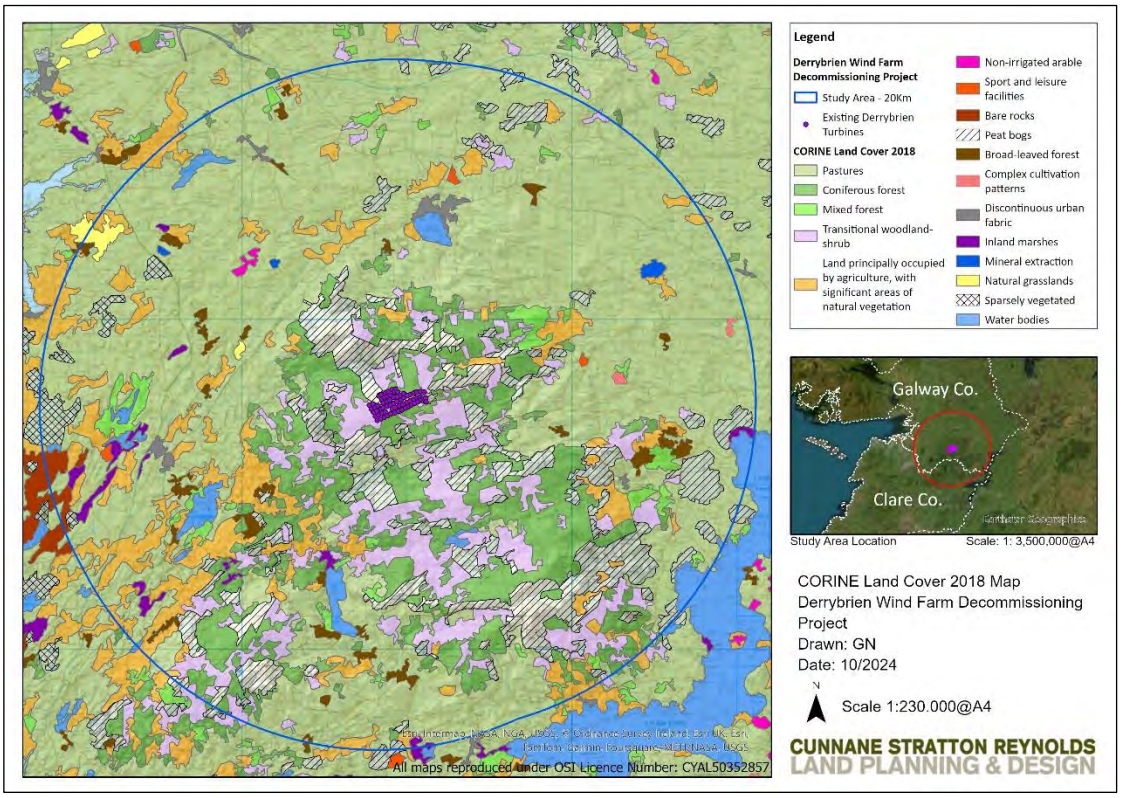



*Figure 13-3 EPA CORINE Landcover Map (2018) of study area*

In the wider landscape, the undulating plains surrounding the Slieve Aughty Mountains are today largely covered by grassland. The fields which today are of various size and shapes are divided by a wide variety of boundary features including fences, stone walls, hedgerows, treelines and belts of deciduous woodland.

### 13.4.1.2.2 Site and immediate vicinity



*Plate 13-3 View towards coniferous forestry from R353 southwest of Derrybrien*

The forest cover is one of the defining characteristics of the Derrybrien area and the Slieve Aughty Mountains generally. The plantations are interspersed with areas of peat bog - indicating limited land use capability - but the relatively low elevation of the Slieve Aughty Mountains allows for forestry to be practiced, and the landscape is productive. Figure 13-4 below shows for CORINE (2018) land cover in the vicinity of the site in reduced format. A full-size version is included in **Appendix 13-4**.

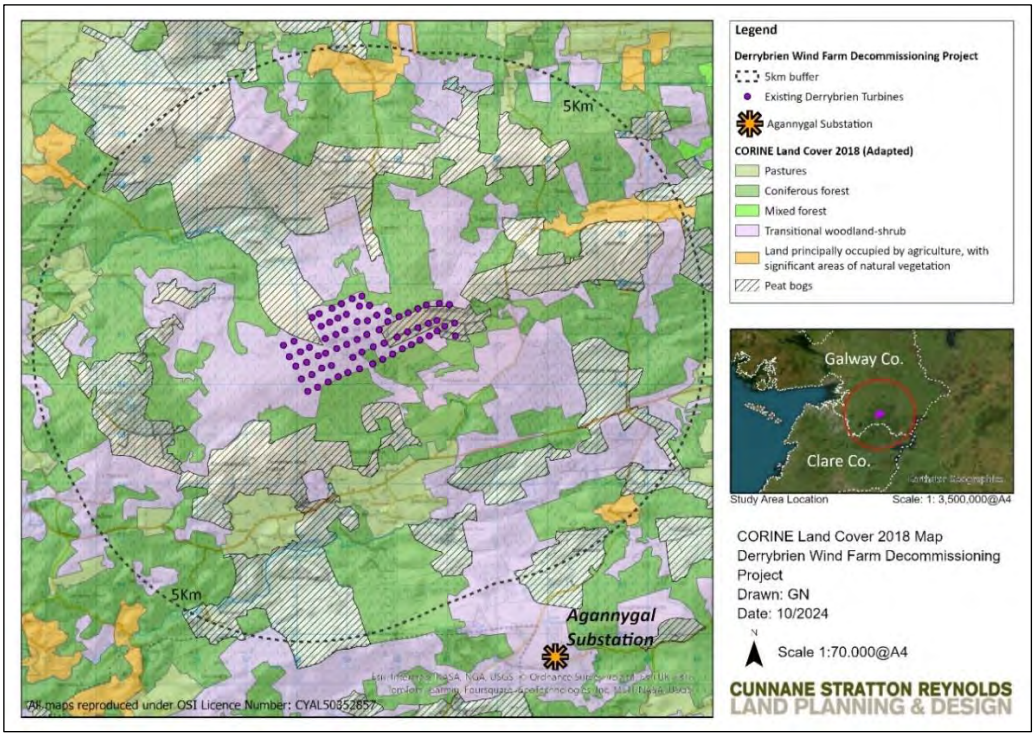



*Figure 13-4 CORINE Landcover map of immediate vicinity*

Turf cutting within and immediately adjacent to the site is evident today and signs of turf cutting contribute further to the impression of a 'working landscape'. On the site of the windfarm, turf cutting occupies an area of approximately 67ha on the east of the site, though only a small area of this may be visible from the public (Black) road.

At an elevation of approximately 100m above sea level around the flanks of the mountains, land use transitions from predominantly pastoral agriculture to predominantly forestry. In views towards the mountains from the surrounding roads, the large, angular, dark coloured plantations are prominent, often blanketing the landscape and giving the horizon line a jagged profile. In views from within the uplands, the plantations often block lateral views from the roads, generating a high degree of visual enclosure as shown in the Plates below.



*Plate 13-4 Views of coniferous forestry from the R353 near of the Flaggy Bridge south of the Derrybrien turbines*



*Plate 13-5 View from Black Road where blocks of plantations screen views*

Along the Black Road, however, which increases in elevation as one travels northeast, the road rises in elevation and contrasting open views of the surrounding bogland, coniferous forestry and wind turbines are available.



*Plate 13-6 Mosaic of Bogland, forestry and wind turbines from the Black Road*

Aerial photography clearly shows areas of coniferous plantation, in geometric forms, and areas of bog on the site and immediate surrounds. The immediate surrounds of the site are covered by a mosaic of coniferous forestry and open bogland. The nearest areas of agricultural lands with small scale field patterns, appear to be to the south and southeast near Derrybrien village.

A 60-metre-high mast is present on the Derrybrien Wind Farm Development site, and the (higher) mast at Maghera is noted to the south of the site and appears as a landmark for the surrounding area.

The route of the overhead line which connects to the Agannygal Substation, both of which are part of the project to be assessed, lies to the south of the existing wind farm. The land cover along the route of the overhead line is similar to that of the site, with a contrast between the mosaic of open bogland and large areas of coniferous plantation. Consequently, views vary between a high degree of enclosure and open areas with views of the wider landscape.





*Plate 13-7 Derrybrien-Agannygal overhead line crossing the Black Road and Loughatorick North*

The existing Moneypoint-Woodland 400kV overhead line with its steel pylons is a prominent feature which crosses the local road south of the R353 between Derrybrien Wind Farm and the Agannygal Substation.



*Plate 13-8 Ennis-Shannonbridge overhead line crosses the local road at Loughatorick North*

The location of the substation at Agannygal (seen in Plate 7 below) was previously a dense block of coniferous forestry with a large area of open bog or moorland to the east. While some felling of the forestry was carried out during construction of the substation, the land to the west remains open moorland and open views are now available.



*Plate 13-9 View of Agannygal Substation and overhead line at Loughatorick North*

### 13.4.1.3 Transport and Settlement Patterns

At an elevation of approximately 100m above sea level around the flanks of the Slieve Aughty Mountains the landscape transitions from one dominated by pastoral agriculture, with a typical dispersed rural settlement pattern, to an upland landscape dominated by forestry and peatland. The upland above 100m is generally very sparsely populated, except for local pockets of agricultural land where there may be clusters of farmhouses. The area has a remote character.

As the Derrybrien Wind Farm Development is located on the upper slopes of Cashlaundrumlahan at an elevation of around 300m and above, it is well removed from the settled agricultural landscape of the surrounding plains and is separated from areas of concentrated settlement and transport routes by a buffer of forest and peatland.

The nearest village is Derrybrien, over 2km from the site while the town of Gort lies 12.8km to the west.

The Black Road, from which the wind farm is currently accessed, in a narrow, remote local road, and can be accessed via minor public roads from Loughrea, a distance of approximately 10 km.

The Regional Route R353 (also a scenic route) connecting Gort to Ballynakill and on to Portumna runs approximately 3.1km south of the windfarm where it joins the Black Road. This road runs through extensive tracts of forestry in particular to the east of Derrybrien and is also remote in character with few scattered houses west of the village of Derrybrien. The route is similarly remote to the east of Derrybrien as far as the village of Ballinakill.

### 13.4.1.4 Summary of Landscape Character

The landscape characteristics and values can be summarised as follows:

The Sieve Aughty mountains have one of the largest concentrations of coniferous forest in Ireland. On the upper slopes the plantations are interspersed with large areas of peat bog (exploited in places for turf cutting) and transitional woodland scrub. On the mid slopes of the mountains there is near blanket forest cover, transitioning to marginal grassland lower down the slope. This is a typical marginal mountain mosaic landscape type – a 'working' upland landscape.

The northern part of the Slieve Aughty Mountains (that part of the range in Co. Galway, comprising Cashlaundrumlahan and the parallel unnamed ridge in the townland of Sonnagh Old) is an upland landscape of relatively small scale and undramatic landform compared to other mountain ranges in Co. Galway and across Ireland. The uplands are visible from a very wide area of the surrounding plains (where local variations in topography and vegetation do not block the view in places) but are unremarkable in form and scale. They generally feature as a broad, low, round-topped landform on the horizon, with limited visual presence.

The settlement and transport patterns in the vicinity of the site are sparse. There are no occupied houses within 2km of the wind farm. The nearest village is Derrybrien, some 2km from the site, and the majority of the houses in and around the village have no view of the wind farm due to the local topography and vegetation cover. There are no dwellings along the route of the overhead line. The nearest dwellings to the Agannygal substation are just over 500 metres to the west and to the east of the substation, with intervening vegetation evident between the properties and the substation.

## 13.4.2 Landscape Policy

### 13.4.2.1 Galway County Development Plan 2022-2028

The Galway County Development Plan contains a number of landscape related policies and objectives, and also includes a Landscape Character Assessment. The Landscape Character Assessment which is part of (Appendix 4) 2022-2028 Development Plan, has been updated.

A summary of the main points of the LCA is included in Chapter 8 Tourism and Landscape. Section 13.8.3.2 With regard to landscape policies, the following policies currently apply:

- ***LCM 1 Preservation of Landscape Character:*** *Preserve and enhance the character of the landscape where, and to the extent that, in the opinion of the Planning Authority, the proper planning and sustainable development of the area requires it, including the preservation and enhancement, where possible of views and prospects and the amenities of places and features of natural beauty or interest.*

- ***LCM 2 Landscape Sensitivity Classification****: The Planning Authority shall have regard to the landscape sensitivity classification of sites in the consideration of any significant development proposals and, where necessary, require a Landscape/Visual Impact Assessment to accompany such proposals. This shall be balanced against the need to develop key strategic infrastructure to meet the strategic aims of the plan.*

- ***LCM 3 Landscape Sensitivity Ratings:*** *Consideration of landscape sensitivity ratings shall be an important factor in determining development uses in areas of the County. In areas of high landscape sensitivity, the design and the choice of location of proposed development in the landscape will also be critical considerations.*

- ***LCM 4 Open/Unfenced Landscape:*** *Preserve the status of traditionally open/unfenced landscape. The merits of each case will be considered in light of landscape sensitivity ratings and views of amenity importance.*

A policy relating to protected views is also included, however these are detailed in the Landscape Character Assessment. The policy states:

- ***Policy PVSR1 Protected Views and Scenic Routes****: Preserve the protected views and scenic routes as detailed in Maps 8.3 and 8.4 from development that in the view of the Planning Authority would negatively impact on said protected views and scenic routes. This shall be balanced against the need to develop key infrastructure to meet the strategic aims of the plan.*

#### 13.4.2.1.1 *Landscape Character Assessment*

**Landscape Character**

From review of the updated LCA, contained in Appendix 4 of the Development Plan, the methodology, the identification of the Landscape Character Areas, the categories of Landscape Sensitivity and the identification of scenic routes and protected views, have also been updated.

The LCA identifies Landscape Regions, which divided the County into 4 main areas, of which the subject site is include in the South Galway Region. These Regions are then sub-divided into Landscape Types, which describes the landscape of the Slieve Aughties as a distinctive landscape type as follows:

*Slieve Aughty Landscape - distinctive uplands of the Slieve Aughty Mountains define the much of Galway's southern boundary with County Clare.*

Figure 13-5 is an extract from the LCA showing the extent of the Landscape Type which extends from Woodford in the east to a little south of Loughrea to the north, and to the Clare County Boundary to the south, extending to the higher ground west of Gort.

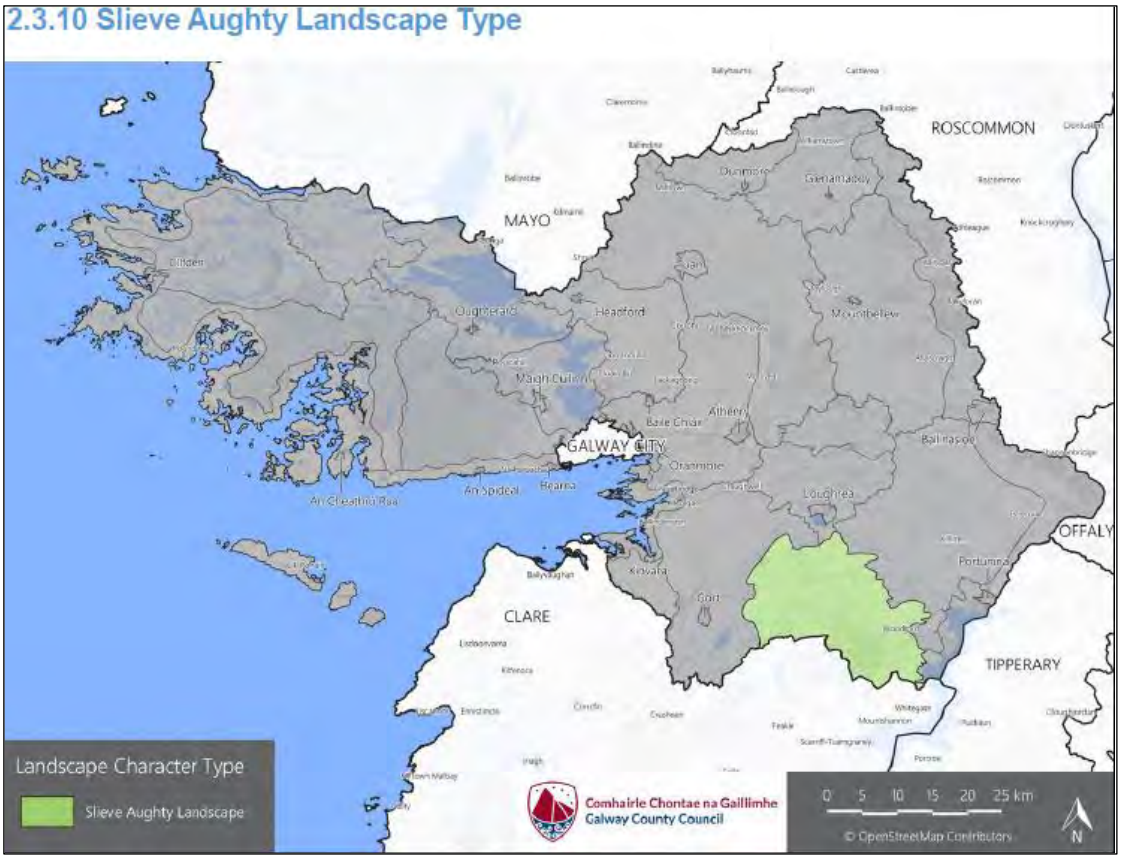



*Figure 13-5 Slieve Aughty Landscape Character Type* *Source: Galway County Landscape Character Assessment 2022*

Text which accompanies the above Figure notes the following description:

*Sandstone geology creates the distinctive uplands of the Slieve Aughty Mountains that define much of Galway's south east boundary with County Clare. Agriculture and settlement are less intensive in this landscape and the higher elevations are largely used for coniferous forestry interspersed with remnants of the area's original blanket bogs. The latter contains a concentration of wind farms that have a locally dominant visual effect on these landscapes. There are expansive views from unenclosed elevations which are regionally valued as a recreational resource.*

The above description complements the findings of the site visit in terms of landcover, however the description of the pattern of and visual effects of the windfarms is not accurate in our view. This Is discussed further in Sections 13.2.1.5 above and in Section 13.4. Assessment of Effects. There are two wind farms in the area, Derrybrien and Sonnagh Old.

The text goes on to state that under the heading 'Sensitivity', this area has:

*Low sensitivity to change.*

In Section 3 of the LCA, Landscape Types are sub-divided into Landscape Units. However, the entire Slieve Aughty LCA is the same as the Slieve Aughty Landscape Unit.

A more detailed description is included (p40 of the LCA) as follows:

> *This is a distinctive landscape that occur along the upland southern boundary with County Clare. Much of this landscape is sparsely populated, with few roads. It contains extensive areas of coniferous forestry interspersed with residual areas of unplanted blanket bog. These areas extend from south of Lough Rea, Co.Galway to Scarriff in Co.Clare. There are many small and medium sized lakes in the area, most notably Lough Graney and Lough Atorick, and many important rivers rise in this area, including the Owendalulleegh and Graney. The Slieve Aughty Mountains are mainly comprised of Old Red Sandstone.*
>
> *Large windfarms have recently been developed in this area - which creates a locally distinctive appearance and character. The elevation of these landscapes offers many panoramic views across the plains to the north and east. This scenery coupled with the low levels of settlement and extensive areas of semi-natural landcover creates conditions that are increasingly valued for tourism and recreation.*

Figure 13-6 below (reduced format) shows the Slieve Aughty Landscape Unit along with the surrounding Landscape Units of Kilchreest basin unit (purple, to the west), South Lough Rea to the north, Kilcrow Basin Unit to the east, with the Clare County boundary to the west. A full-size version of this Figure is included in **Appendix 13-5**.

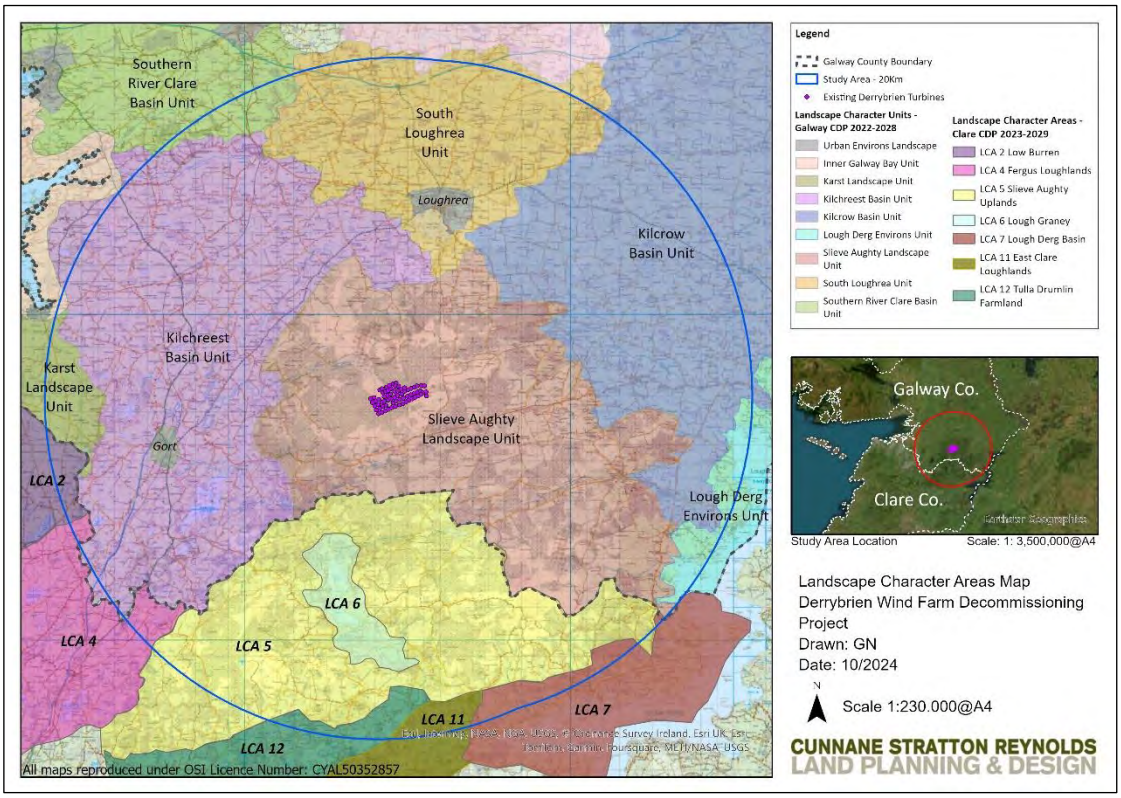



*Figure 13-6 Extract from LCA showing site and landscape units*

In the above Figure, the Slieve Aughty Landscape Character is identified, and is described as:

> *Largely un-occupied and un-enclosed. Mosaic of large forestry plantations and residual blanket bog areas. Large windfarms are visually dominant in places.*

As noted above the Derrybien and Sonnagh Old are the two windfarms in existence, Derrybrien with 70 turbines and Sonnagh Old with 8 turbines.

### Landscape Sensitivity

Landscape Sensitivity for each Landscape Character Area, or Unit, is also defined in the LCA. There are four categories of landscape sensitivity:

- *Iconic: Unique landscape with high sensitivity to change.*
- *Special: High sensitivity to change.*
- *High: Elevated sensitivity to change.*
- *Low: Unlikely to be adversely affected by change.*

The LCA notes that sensitivity is 'a landscape's capacity to absorb new development, without exhibiting a significant alteration of character or change of appearance is referred to as it's 'sensitivity'. This is similar to the GLVIA (2013) definition of susceptibility, one of the two factors which contribute to sensitivity.

Importantly, the LCA does also note, as stated in the GLVIA, that the sensitivity depends on the type of development, which, it notes, may have 'greater or lesser impacts on the visual quality and character' depending on the details of the project design and the specific characteristics of the site and its context. Figure 13-7 below shows the site location on the Landscape Sensitivity Map, with the site (and the whole of the Slieve Aughty Landscape Character Area considered sensitivity Special sensitivity, as is the coastal landscape at Kinvara and outside the study area, much of the Connemara landscape. The surrounding Landscape within the 20-kilometre study area in Co Galway is all within the Category Low sensitivity.

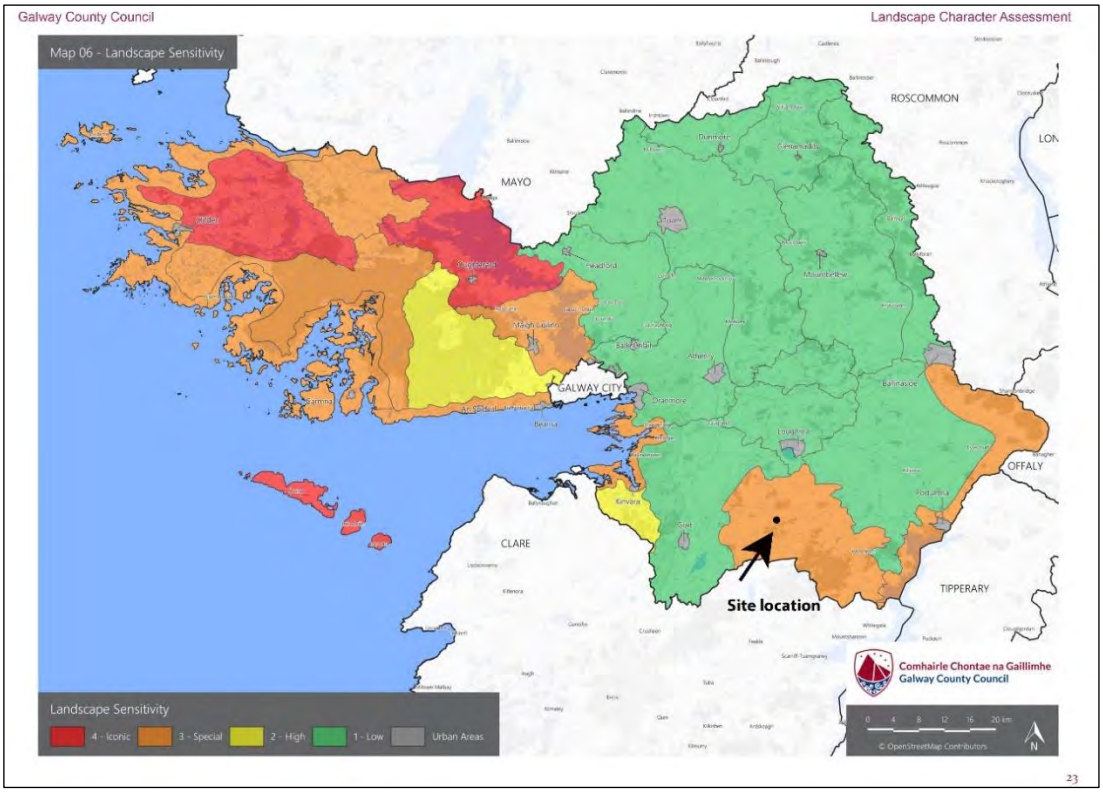



*Figure 13-7 Landscape Sensitivity of LCAs with Site 2022* *Source: Galway County Landscape Character Assessment*

**Scenic Routes and Protected Views**

Sections 6 and 7 of the LCA also contains a map and list of scenic routes and protected views. There are no protected views in the Slieve Aughty landscape unit, but there are some views within the wider study area.

These are illustrated on Figure 13-8 which is included in reduced format below and at full size in **Appendix 13-6**).

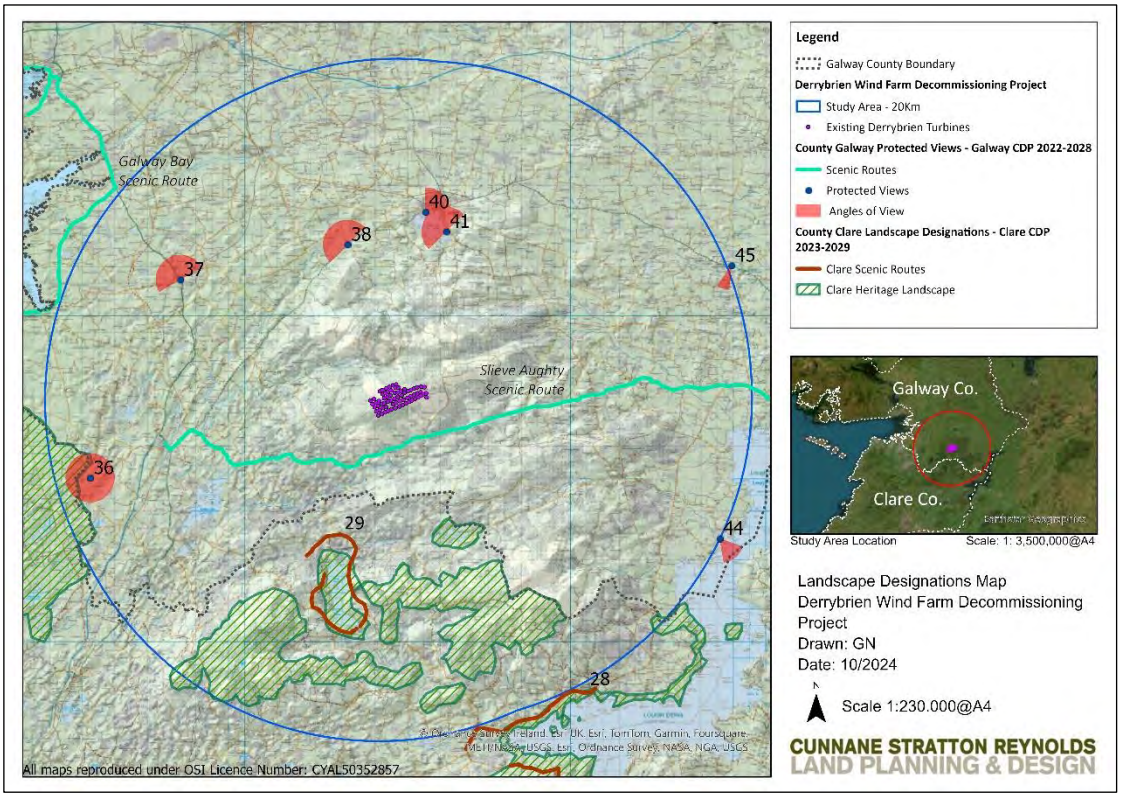



*Figure 13-8 Landscape and Visual designations in Co. Galway and Co. Clare*

There are several protected views in the wider study area, and these are listed as follows:

- *36 Kilmacduagh Ecclesiastical Complex.*
- *37 Ardrahan Church and ruins.*
- *38 Kilchreest Church ruins and graveyard.*
- *40 Corry's Field Walk.*
- *41 Loughrea Swimming Area.*
- *45 Killimor Old Graveyard (although just on the 20km boundary the view is towards the southeast of the study area.*

These views were reviewed and the view direction indicated on the map indicates that none of the views are towards the site of the Derrybrien Wind Farm Development Decommissioning Project apart from View 36 which is illustrated as a panoramic view. However, potential views to the east from View 36 at Kilmacduagh complex are distant and screened by intervening farm and dwelling sand topography to the east of the site, and the ZTV shows only intermittent theoretical visibility (see Section 13.3.3 below). However, the views 40 and 41 from Loughrea, while indicated to the east and north-west respectively, are at the lake shore at Loughrea which has open views to the Slieve Aughty hills and to the site, so this is included in the selection of viewpoints.

The map of scenic routes (see Figure 13-8 above) includes just one scenic route in the Slieve Aughties, the Slieve Aughty Scenic Route, along the R352 between Gort and Portumna, which passes south of the Derrybrien Wind Farm and north of Agannygal Substation. Viewpoint 6 is located along this route. A further scenic route (Galway Bay Scenic Route) passes towards the western edge of the study area but is at a distance from the site.

#### 13.4.2.2 Clare County Development Plan 2023-2029

Though the wind farm site and Agannnygal Substation are both in Co. Galway, the study area extends into the northern uplands of County Clare. Certain parts of the uplands to the south of Derrybrien and Agannygal are designated as areas of Heritage Landscape, including Lough Graney, Lough Atorick itself, and the peaks of Maghera, Pollaguna and Knockbeha mountains.

A section of the R461 and a number of local roads surrounding Lough Graney are designated Scenic Routes. These designations are illustrated on Figure 13-8 above. This area is represented by Viewpoints 11 (towards Agannygal, from the Clare/Galway County boundary), 13 and 14.

### 13.4.3 Visual Receptors

This section discusses visual receptors, with comments on the actual visibility of the wind turbines and including references to the theoretical visibility as depicted on the ZTV map. However, the presence of the Derrybrien Wind Farm Development Project allows us to refer to the actual visibility of the wind turbines which is considerably less than depicted on the ZTV due in part to the high proportion of coniferous forestry cover in the area immediately surrounding the Derrybrien wind farm. The ZTV Map is include here in reduced format and is included at full size (A1 in **Appendix 13-7**).

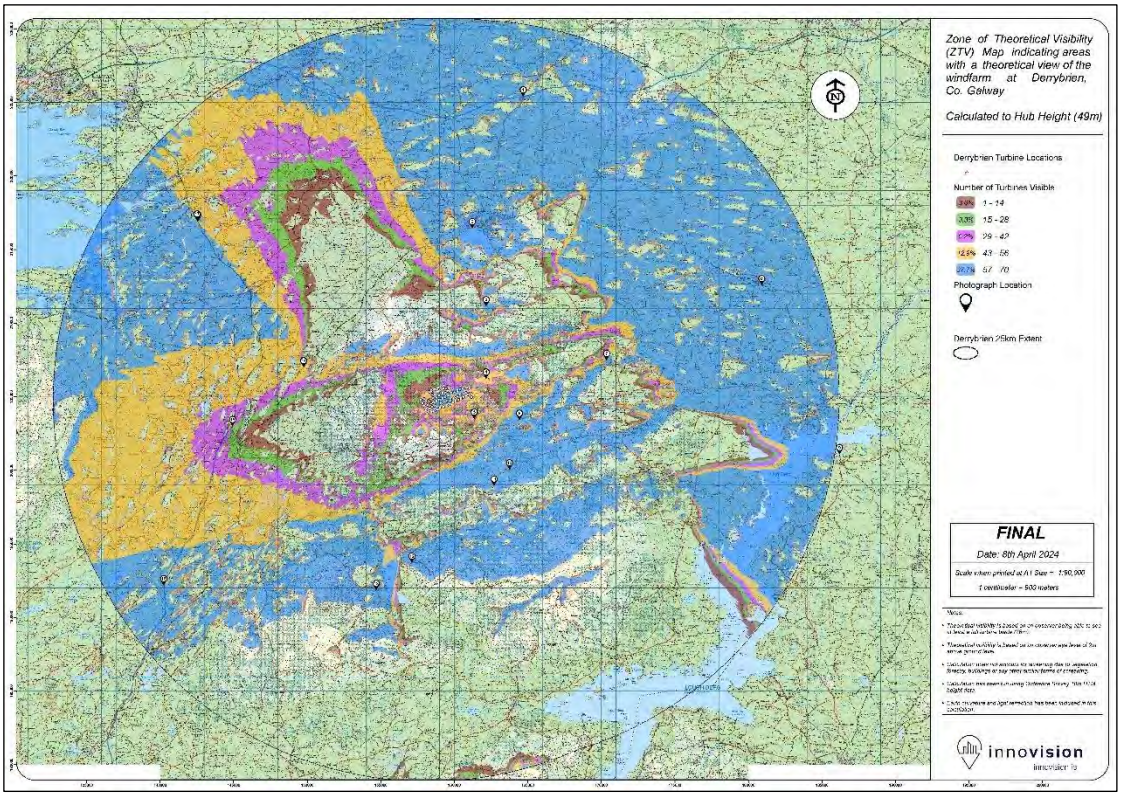



*Figure 13-9 ZTV Map of existing Derrybrien turbines*

*To screen any potential visual effects from the Burren National Park, a ZTV was extended to 25km from the Derrybrien Wind Farm Project, as shown above.*

*South of the Site – Derrybrien, the R353 and the Slieve Aughty Uplands*

The nearest houses to the site are in the village of Derrybrien some 2km to the south. A derelict house is now visible to the southeast of the site (and is visible in Photomontage 10) and it appears that this was not occupied prior to construction of the wind farm.

Derrybrien is a low density, scattered linear settlement along the R353 on the lower slope of Cashlaundrumlahan, where there is a strip of marginal agricultural land on the south-facing slope. Due to the local topography (the convex slope above Derrybrien) the village falls outside of the Zone of Theoretical Visibility (ZTV) of the wind farm, i.e. the turbines are not visible from most of the houses, the former national school and the church that comprise Derrybrien – due to topography rather than due to screening by vegetation or landform. Comparison of aerial imagery shows a very minor increase in dwellings in the vicinity in recent years, with some recent buildings along the road to the west of the church. These would be outside the ZTV and so have no visibility of the turbines. This includes the nearest house to the windfarm, at a distance of just over 2km, at Derrylaur.

The nearest road to the south of the site is the R353. This is the east-west aligned regional road connecting Gort to Portumna across the Slieve Aughty Mountains and passing through Derrybrien. As it passes through the village, the road is outside of the wind farm's ZTV.



*Plate 13-10 Dense coniferous forestry along R353 west of Derrybrien*

To the west of Derrybrien the R353 descends from the uplands to the plains following a winding path through a landscape with near blanket forest coverage as shown in Plate 13-10 above. The road is outside of the wind farm's ZTV for most of its length to the west of Derrybrien. However, travelling east towards Derrybrien, for a short stretch between Bunnaglass and Tooravoola, the wind farm can be glimpsed.

To the east of Derrybrien the R353 follows a straight path across a part-forest, part-peatland covered upland plain. There are some open views to the open bogland and coniferous plantations to the south and some areas enclosed by forestry.



*Plate 13-11 The R353 (scenic route) east of Derrybrien*

The Flaggy Bridge lies on the R353 just east of the junction with the Black Road. The present view is shown in Plate 13-12 below:



*Plate 13-12 Flaggy Bridge on the R353 east of Derrybrien*

Further east, the road then descends towards the village of Ballynakill and the junction of the R353 with the R351. Ballynakill is situated at lower elevation and is therefore mostly outside of the wind farm's ZTV. To the west of Ballynakill travelling towards Derrybrien along the R353 the wind farm is occasionally visible through gaps in roadside vegetation. There are some open views in the vicinity of what is locally known as Wasteland cross, to the east of the site. The presence of forestry between the road and the wind farm indicates the likelihood that these views could change over the forestry cycle (felling and replanting). Some roadside vegetation today provides partial screening to some of the turbines. Photomontage 11 shows the view from this vicinity where there are views to the wind farm but partly screened by roadside vegetation.

Beyond Derrybrien and the R353 the sparsely settled forest and peatland covered Slieve Aughty upland landscape extends for some distance south, into Co. Clare. A local road traverses this landscape (a broad upland plain), aligned roughly NE-SW, connecting the R353 to Lough Graney which lies 11km

to the southwest of the site. Along its route this local road passes through the townlands of Cloghvoley, Derreenamucka and Slievanore. There are a small number of houses dispersed along this road, variously surrounded by conifer plantations and peat bog. The landcover remains similar, with the plantations relatively mature. Views of the wind farm are afforded from the road and some of the houses where forestry does not screen views.

The Agannygal Substation is visible across an area of bog, from a short section of the local road, in the townland of Loughatorick North as shown below in Plate 13-13. Views from the south are also available. Overall, the views of the substation are localised.



*Plate 13-13 Agannygal Substation (visible from the local road to the west) is located in an area which was forested*

The substation is set within an area of bogland interspersed with coniferous forestry landcover. An area of open peatland is located to the west of the substation, while the forestry in the immediate vicinity of the substation has been partly felled.

The Moneypoint-Woodland 400kV line traverses this road, while the Ennis – Shannonbridge 110kV overhead line traverses the road further south, near the Bleach River. The 110kV overhead line connecting the Derrybrien wind farm with the Agannygal Substation also traverses this landscape. The large-scale forestry and 400Kv overhead line have created a somewhat industrial character to parts of this landscape prior to the introduction of the Derrybrien-Agannygal overhead line.

Further south, the long-distance East Clare Way follows the local roads encircling Lough Graney. The wind farm is visible from the most elevated sections of the waymarked way.

*East of the Site – The Black Road, Ballynakill, the R351, Portumna, the N65 and Lough Derg*

The nearest public road to the wind farm site is known locally as 'the Black Road'. This is a single lane, relatively remote local road aligned roughly north-south, crossing the ridge of Cashlaundrumlahan and connecting Derrybrien and the R353 to Loughrea to the north. The Black Road passes some 1km to the east of the wind farm.



*Plate 13-14 View from Black Road Bridge towards location of the peat repository*

There are no occupied houses along the Black Road in the vicinity of the wind farm. Today, the nearest house along this road is an isolated farmhouse near the junction with another local road in the townland of Coppanagh some 2.2 km to the northeast of the nearest turbine. The dwelling faces southeast and glimpses of blade tips are available from the road just south of the dwelling. This is a quiet local road, with potentially open views from the higher ground, an area of open moorland which appears relatively unchanged, and the lower ground, to the east of the wind turbines dominated by forestry, based on review of aerial imagery.



*Plate 13-15 Enclosure by forestry along Black Road*



*Plate 13-16 Open bogland along Black Road*

To the east of the Black Road the largely unpopulated forest and peatland covered upland landscape extends for some 5km, down the slope of the mountains towards the village of Ballynakill and nearby Curra West on the R351. The loose cluster of houses comprising Ballynakill is largely outside of the wind farm's ZTV. Views of the wind farm from the R351 are similarly blocked by the intervening topography except for a short stretch of the road in the area of Curra West.

To the east of the R351 an undulating agricultural landscape extends to the shore of Lough Derg, 18km to the east of the site. Portumna is the nearest large town east of the site. It is some 23km distant on the northern shore of Lough Derg. Due to landcover there are no views of the wind farm from Portumna,

but from the far side of Lough Derg in Co. Tipperary (e.g. Terryglass) the wind farm is visible in the distance. The N65 National Road follows an arcing route northwest from Portumna to Loughrea. It traverses an undulating rural landscape and passes through the village of Killimor.

*North of the Site – Sonnagh Old, Loughrea and Environs,*

To the north of the site the forest and peat covered upland landscape extends for several kilometres, with a local road (over 'Francis Gap') and forest tracks providing access. However, there are no houses in this area. A linear mountain, smaller but similar in shape to Cashlaundrumlahan lies parallel to the north. The Sonnagh Old wind farm is located on this ridge.

Beyond Sonnagh Old, on the outer northern slopes of the Slieve Aughty uplands the topography breaks up into a complex hilly landscape where coniferous forestry has largely replaced the marginal grassland. The village of Killeenadeema is at the centre of this landscape, between the mountains and Lough Rea. The area is accessed by a complex pattern of local roads. There is a relatively dense distribution of houses - including urban-generated housing - along the roads, particularly towards the north around Lough Rea.

The town of Loughrea is located to the north of the lake. The urban area spreads around the northern shoreline behind a corridor of open space which includes parkland with footpaths, a playground, a shoreline parking area and viewpoint. In views across the lake from the houses and open space around the shoreline the Slieve Aughtys form the horizon with the Derrybrien and Sonnagh Old wind farms visible. The town of Loughrea has expanded to the north, along the bypass road

An undulating agricultural landscape extends to the west, north and east of Loughrea. Several national and regional roads follow radial routes from the town through this landscape. There is widespread dispersed rural housing along the road network which is also evident on the aerial photos from 2000. The undulating topography and mature hedgerows, tree lines and patches of forest generate a high degree of visual enclosure in this area.

In the present, from elevated locations where there is no foreground vegetation, views of the distant mountains and the wind farms (Derrybrien and Sonnagh Old) are afforded.

The M6 motorway passes on an east-west alignment some 7km to the north of Loughrea, and 18km north of the site. This is the main transport route from Galway City, carrying a large volume of traffic through the wind farm's ZTV. There are clear views of the Slieve Aughty hills and distant views of the Derrybrien turbines from the M18/M6 interchange at Carraunduff, particularly for motorists travelling south towards Limerick where the road is at a higher elevation.

*West of the Site – Gort, the R380 (and M18)*

The forested upland landscape extends for several kilometres to the west of the site before falling away towards a wet lowland landscape characterised by drumlins and marginal grassland. The R380 passes at the foot of the western slopes of the Slieve Aughty Mountains, linking Loughrea to Gort which lies some 12km to the west of the site. Much of the landscape east of the R380 is outside of the wind farm's ZTV the western convex slopes of the mountains hiding the turbines from view.

Today, much of the section of road from Gort to just south of Peterswell has visibility of the turbines. Also at present, the M18 also passes through Gort linking Galway City and Ennis to the south in Co. Clare.

To the northwest of Gort lies Coole Park, which is a well-known Nature Reserve and the former home of Lady Gregory which is currently managed by the NPWS and is a visitor attraction. Visibility of the Derrybrien turbines is not possible, from within the site, due to the heavily wooded nature of the site. They are, however, visible from the M18 motorway overpass on the access road to Coole Park).

Northeast of Gort, approximately 10 kilometres west of the Derrybrien turbines, lies Thoor Ballylee, known for its connection with WB Yeats, which is just within the ZTV. The Derrybrien turbines are not visible from the base of the tower due to screening, but views are available from the rooftop battlements. At a distance of approximately 9.6 kilometres, the turbines are visible but not a major element in the view, and the panoramic nature of the views also includes views west to the Burren Hills as well as woodlands. The Sonnagh old turbines (a distance of approximately 9.2km) are also visible from the rooftop.



*Plate 13-17 View from Thoor Ballylee battlements –views to Slieve Aughty hills and distant Derrybrien turbines*

(Note: The nearby photomontage 14 from Cuilmore shows a similar view and an additional montage from the tower was not considered necessary to describe and assess the removal of the turbines from this view, which is over 10km from the existing Derrybrien turbines).

Lough Cutra lies approximately 13.7 km to the southwest and lies within the Zone of Theoretical Visibility. Lough Cutra Demesne (a private castle and estate) lies to the west of the lake. While visibility from the public road adjacent to the demesne is blocked by heavy screening, there may be some visibility of the distant turbines from open areas within the demesne.

The lowland rural landscape west of the Slieve Aughty uplands is relatively sparsely populated compared to the plains to the north and east, except along the main road corridors and in Gort. Further west, the ZTV shows visibility in the Burren Lowlands, west of Gort, however the turbines are at some distance from the viewers in this area and are not prominent.

As noted above, Kilmacduagh round tower and ecclesiastical site is a protected view and the ZTV indicated intermittent theoretical visibility. A site visit confirmed that there are no open views towards the site due to screening by topography, and additional screening by buildings to the east of the complex. In addition, the distance (approximately 18 kilometres) would render any views barely discernible.

Summary of Visual Receptors

In summary, the R353 passes through Derrybrien 2km to the south of the site but due to the local topography, and vegetation cover, the wind farm cannot be seen from most of the village and the road.

The site is surrounded on all sides by a belt of almost completely un-populated upland forest and peatland landscape several kilometres in breadth, around the west, north and east of the site, forming a buffer between the wind farm and the agricultural landscape on the surrounding plains and limiting the number of visual receptors.

There are a small number of rural houses on the fringes or outside of Derrybrien (to the south), Ballynakill (to the east) and along the local road to the south of the site, which do have views of the wind farm. There are also views afforded from stretches of the Black Road that passes to the east of the site, where local topography and vegetation does not screen the view.

The wind farm site is visible from a vast area of agricultural plains to the west, north and east of the Slieve Aughtys, where local topography and vegetation does not screen the view. There is a pattern of dispersed rural settlement along the network of local roads throughout this area. The area is also traversed by several regional and national roads carrying large volumes of traffic (including the M6, M18, N65 and R380). Additionally, the uplands (and the wind farm) are visible from parts of Lough Derg (towards the eastern shore) some 20km to the east.

These plains form part of the midlands basin and extend for tens of kilometres to the east and north, as well as to the coast of Galway to the west, with the other main elevated area the Burren Hills which are found some 20 kilometres to the west. There are numerous visual receptors in this vast area, but the Slieve Aughtys (and the wind farm) are a series of low, rounded hills, and not a prominent feature in any views except from close up.

The site is far from any large centres of population, with Loughrea, some 10km to the north. The wind farm appears - and is clearly visible - in views from the public open space and buildings around the shoreline of Lough Rea. The wind farm is not visible from the centre of other large towns in the area - Gort to the west and Portumna to the east. Galway City is some 35km to the northwest.

#### 13.4.3.1 Viewpoint Selection

The first step in selecting viewpoints for a proposed development is the usually the preparation of a Zone of Theoretical Visibility (ZTV) map. This identifies the area (up to a defined distance from the site ) from which the turbines can theoretically be seen based on topography, i.e. all areas where the turbines are not blocked from view by the landform. Though the Derrybrien Wind Farm Development is already in existence, the viewpoints were selected from site visits and also with reference to the wind farm's ZTV (See Figure 13-8 in **Appendix 13-8**). Visibility of the Derrybrien Wind Farm project is described above.

Though the nature of Decommissioning involves the removal rather than the insertion of elements into the landscape, this section briefly outlines the selection of viewpoints and the preparation of some photomontages to illustrate the visual effects of Prospective Development. 17 no. viewpoints were chosen, with six photomontages produced, showing the visual effects of Decommissioning of the turbines, the Derrybrien-Agannygal Overhead line and the Agannygal Substation.

The viewpoints were selected to represent the key categories of visual receptors (e.g. the local community around Derrybrien; the wider rural community around the Slieve Aughty Mountains; settlements in the area; recreation areas, users of affected regional and national transport routes, etc.). The selection of viewpoints also sought to ensure that locations in all directions around the site, and at various distances from the site, were considered.

A selection of viewpoints represents the following viewers, including viewpoints at various elevations, distances and contexts in the landscape of the study area as advised in the Scottish Natural Heritage (2017) guidance. These include:

- *Viewers in the local Derrybrien community and on local roads.*

- *Viewers in the wider Slieve Aughty and Burren Lowlands landscape.*
- *Viewers on Scenic Routes and at Protected Views.*
- *Viewers at amenity and recreational locations.*
- *Viewers in local towns and villages.*
- *Viewers on Regional and National Roads.*

*Table 13-8 Viewpoint Locations*

| Viewpoint | Description | Approximate Distance from Derrybrien wind farm (nearest turbine) |
|---|---|---|
| 1 | View from the R350(at M6 motorway overpass) near Caraunmore | 20.3 kilometres north |
| 2 | View from the shore of Lough Rea | 11 kilometres north |
| 3 | View from the local road at Curhoor, south of Kileenadeema | 5.7 kilometres northwest |
| 4 | View from the Black Road at Coppanagh, | 1.3 kilometres east |
| 5 | View from the Black Road at Derrybrien North, wind farm | 1.5 kilometres southeast of the Derrybrien |
| 6 | View from the R353 (Scenic Route) at Cloghvoley/Knockmoyle west | 3.6 kilometres southeast |
| 7 | View from the Regional Road R351 at Derrygarriff, | 9.5 kilometres east |
| 8 | View from the road at Garryadd, Killimor | 21.2 kilometres northeast |
| 9 | View from the harbour at Terryglass, Co. Tipperary | 25 kilometres east |
| 10 | View from the local road at Loughatorick North | 5.5 kilometres southeast |
| 11 | View from local road at Loughatorick | 6.2 kilometres south |
| 12 | View from the local road (and East Clare Way) at Corlea Beg, | 10.2 kilometres south |
| 13 | View from the R461 (Scenic Route ) at Doorus East, Co. | 12.5 kilometres southwest |
| 14 | View from the N66 in the townland of Cuilmore, near Peterswell | 8.3 kilometres northwest |
| 15 | View from the Regional Road R458 on the northern outskirts of Gort | 12.9 kilometres west |
| 16 | View from M18 motorway overpass) between Gort and Crusheen at Monreagh | 21.4 kilometres southwest |
| 17 | View from the N18 national route at Caherpeak East, south of Kilcolgan, approximately 19.5 kilometres northwest of the Derrybrien wind farm site. | 19.5 kilometres northwest |

For Viewpoints 2,3,4,5,11 and 12, photomontages were produced, with the existing turbines, overhead lines and substation digitally removed from the view.

# 13.5 Likely, Significant Impacts and Mitigation Measures

## 13.5.1 Do-Nothing Scenario

In the Do-Nothing scenario, the Derrybrien Wind Farm Development would remain in situ in its current state – i.e., an unauthorised windfarm development that ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

The trends in the vicinity of the site and in the wider landscape – including commercial forestry, which involves a cycle of felling and re-planting, turbary, and agriculture, are expected to continue.

## 13.5.2 Effects of the Prospective Development

The processes of Enabling Works, and Decommissioning of the Derrybrien Wind Farm and Grid Connection – which involves the removal of the majority of above ground elements – are assessed.

Changes to the landscape as a result of the enabling works and the decommissioning will involve vegetation clearance to facilitate compounds and to allow access, minor levelling works, and the setting up of temporary compounds, both at the Derrybrien Wind Farm site and Agannygal Substation.

The Decommissioning will include the removal of the turbines and anemometer masts, the on-site substation, overhead line and cables to the Agannygal Substation and the demolition of the Agannygal Substation. Following this the Ennis-Shannonbridge 110kV line will be re-instated.

On the wind farm site, the removal of the turbine blades and masts, substation and associated buildings, and the de-energising of the site will occur during the Prospective Development. Turbine bases, crane pads, and access tracks, trackside drainage and rehabilitated borrow pits/quarries will remain on site. The Derrybrien to Agannygal 110kV overhead line will also be removed. Though the long-term uses of the site are not known, it is likely that natural regrowth of previously felled areas will occur. Activities such as turf cutting may continue. It may be necessary to carry out temporary road widening works along the narrow turbary road to provide safe access to the mobile crane that will be used to dismantle the turbines. Machinery will be entering and exiting the site during the Prospective Development which is expected to last approximately 24 months.

The landscape and visual effects which arise at the end of the decommissioning, when the removal of the above ground elements is complete, are also described.

### 13.5.2.1 Landscape Effects

#### 13.5.2.1.1 *Landscape Sensitivity*

The Landscape Character Assessment for County Galway (see Figure 13-5) considers the Landscape Sensitivity of the Slieve Aughty LCA to be High (rated 3 out of 4, with Level 4 the highest). However as illustrated on this Figure that of the surrounding LCAs in County Galway is rated 1 (Low).

As set out in Section 13.1.6, the GLVIA notes that the Landscape Sensitivity is related to the nature of the proposed project – its Susceptibility - as well as the Landscape Value.

The landscape value, though it varies within the LVIA study area, would be considered to range from Low to High – depending on the location.

Areas exhibiting a Low landscape value include the forested areas in the site, its immediate vicinity and the wider landscape, while areas considered Medium would include areas such as extensive tracts of open bogland with a sense of naturalness, remoteness and distinctive character, such as those found to the north, east and south of the site. In the wider landscape, amenity areas such as the vicinity of Lough Rea, and Lough Graney, would be considered areas of higher landscape value.

However, not all these locations would be considered highly susceptible to the type of development – which is the removal of a wind farm from the landscape. As it is the above-ground elements which will be removed, the landscape will have a relatively low susceptibility to this type of development.

In relation to the landscape sensitivity of the receiving environment, to the type of development proposed, this will vary somewhat throughout the study area. In the site and immediate vicinity, the landscape sensitivity can be classified as **Low** to **Medium** as per Table 13-1 in Section 13.1.6.

Medium is defined in Table 13-1 as:

> *'Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change.'*

#### 13.5.2.1.2 Magnitude of Change - Site and Immediate Vicinity

Changes to the windfarm site and immediate vicinity as a result of the enabling works will involve vegetation clearance, and some levelling, in the vicinity of the elements to be removed, as well as to facilitate access and the setting up of temporary compounds. This is likely to be mainly scrub and low vegetation. These activities will involve the location of a temporary site compound and hardstand area will be established to the northeast corner of the Derrybrien Wind Farm site, adjacent to the pre-existing Coillte track and site entrance. A temporary contractors' compound will also be established adjacent to and within the Agannygal Substation site.

During the process of decommissioning (expected to be approximately 24 months), demolition and removal of the above ground elements will necessitate plant and equipment entering and exiting from the site during this period. This will result in a localised change to the landscape character, which is remote, and relatively tranquil. (It is noted however that during certain phases of forestry growing, felling activities would also take place.) This is likely to have a Medium magnitude of change on the landscape character. The effects on the landscape fabric, or physical landscape would be Low as the removal of scrub and low vegetation would be expected to re-grow once the activities have ceased and natural re-generation of vegetation would be expected. Though the hardstands are to remain in situ, it is expected a certain amount of natural re-growth is also possible around the turbine bases, and other areas of hard standing. The process of decommissioning of the Agannygal Substation is likely to require less vegetation clearance, but some limited clearance is likely to take place to facilitate the temporary compound. The magnitude of change is also considered Medium.

The magnitude of landscape change in the aftermath of decommissioning of the turbines and associated elements is considered to be Medium in the site and immediate vicinity. This is described as:

> *'Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors... Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.'*

The most pronounced change will be to the landscape character of the site and immediate surrounds, where the turbines and overhead line will not now be visible. The removal of the turbines and overhead line will be most pronounced in the vicinity of the site, where there are clear views such as to the east of the site along the Black Road, along the R353 where visibility occurs, while the village of Derrybrien will not undergo any changes to its landscape character or setting. Some areas therefore will undergo a Medium magnitude of change to the landscape character.

Some of the proposed changes to the physical landscape on the windfarm site will not result in any changes to the landscape character and will be localised changes to the landscape fabric. The removal of other elements such as the substation and other buildings on site, the 2 anemometer masts, are therefore considered to have a Low magnitude of change.

The removal of the Agannygal Substation and overhead line to the Derrybrien Wind Farm will result in a Low magnitude of change to the surrounding landscape character.

#### 13.5.2.1.3 Magnitude of Change -Wider Landscape

The Prospective Development will result in limited effects on the wider landscape. The main landscape effects are effects on the landscape character, due to the machinery activities, and these will give rise to a Negligible-**Low magnitude of change.**

In the wider landscape, the decommissioning will result in the removal of the 70 wind turbines form the surrounding landscape, resulting in the removal of a landmark in some views. This will vary throughout the study area, but in the areas where the windfarm is visible in relatively close proximity to the extent that it forms part of the local landscape character, the change is considered to be Medium. In areas where the windfarm is visible but not a main feature in the landscape, as in many of the views, the effect on the landscape character will be Negligible to Low.

#### 13.5.2.1.4 Significance of Landscape Effect

All effects in relation to are considered direct effects – that is, effects that result directly from the development itself, as defined in relation to landscape and visual effects by the GLVIA (3rd edition, Section 3.22.)

**Temporary to Short Term Effects**

In the site and immediate vicinity, the process of enabling works and decommissioning will give rise to landscape effects which are considered to be **Temporary to short term, Slight to Moderate, adverse** in nature, arising from the changes to the landscape on the wind farm site, which will temporarily affect the landscape character. The changes to the landscape fabric or the physical landscape are considered to be **Temporary to Short term and Slight, adverse quality.**

In the wider landscape, the changes to the wider landscape during the decommissioning period are considered **Temporary to short term, Imperceptible and adverse.**

**Permanent Effects**

Once decommissioning works have been completed, several Permanent effects will result. The significance of the landscape effects can be classified as **Slight to Moderate** (out of a possible range of Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound).

The removal of the turbines and associated buildings and elements on the site of the wind farm is considered to result in a Slight- Moderate landscape effect on the fabric of the site, as the above-ground elements only are to be removed with access roads and hardstands remaining on site. Underground cabling will also remain. The quality of the effect is considered to be neutral where natural regrowth occurs. This is considered to be Short term in duration.

The removal of the overhead line would be considered Not Significant to Slight, beneficial landscape effect, and the removal of the Agannygal sub-station a Slight, neutral to beneficial landscape effect.

The removal of the wind farm from the landscape will result in a Slight to Moderate change to the character of the wider landscape also, depending on the views. Overall, it is considered that the quality of the effect is neutral. The landscape effect is not considered to be Significant.

### 13.5.2.2 Visual Effects

During the enabling and decommissioning works, the movement of machinery and materials will result in temporary, adverse visual effects in the immediate vicinity of the site.

Visual effects occurring as the process of decommissioning is taking place, including visibility of the larger structures (turbines, overhead line and Agannygal Substation being gradually dismantled,) will vary depending on the viewpoint, proximity to the site, and will be temporary to short term in nature. Some visual effects may also occur as a result of the visibility of plant and equipment on or near the site, depending on visibility – visual effects may be more pronounced in relation to the Agannygal Substation which is more open in nature. The temporary compounds are located on the northeast corner of the Derrybrien wind farm site, and another compound at the Derrybrien substation, which will be screened from view by forestry. A temporary compound is also to be located to the south-west of the Agannygal substation, which may be visible in close proximity.

The magnitude of change during the decommissioning of the above ground elements is considered to range from Medium to High in the immediate vicinity of the site, and Negligible to Low in the wider landscape.

The visual effects which will be apparent in the aftermath of the enabling and decommissioning works are also assessed (views showing the landscape without the turbines and above ground structures) and a number of montages are included to assist in this assessment.

It should be noted that while this chapter is assessing the removal of elements from particular views, a more common scenario for Landscape and Visual Assessment is the introduction of an element into a particular view. It will be noted that the Assessment Methodology set out in Section 13.2, and includes criteria for assessing the Magnitude of Visual Change in Table 13-5, refers to the introduction and the extent of the 'intrusion of the development' into the view. Though the introduction of an element does not apply to these descriptions below (apart from the temporary intrusion of machinery in some views), the resulting effect on the 'composition and character of the view' is the key element which is relevant.

It does not always follow that the removal of an element (in the case of the viewpoints below, turbines, Agannygal Substation and the overhead line) will be the same in terms of visual effects, as the insertion of these elements would have been. The addition of 70 no. wind turbines into certain views, especially where no other turbines were visible, and no comparable element of this scale, would have resulted in a more pronounced magnitude of change, than the removal of these turbines many years later, which are now an established element of the view. However, the same procedure is followed, using the same guidance (SNH 2017) with 17 baseline views representing a range of viewers in the study area, with the windfarm in existence.

Visualisations and photomontage are a tool to assist in the assessment of visual effects. From a review of a sample number of photomontages, and using professional judgement, we concluded that in order to assess the visual Effects resulting from the removal of wind turbines, overhead lines and the Agannygal substation, a proportionate approach was used. While it was considered important to provide photomontages showing the removal of turbines from viewpoints in very close proximity, where they are a main element of the view, it is not necessary for all views, particularly distant views.

From the 17 viewpoint locations, a selection of a certain closer viewpoints (which were within approximately 10 kilometres of the site) and which have open views of the site, were selected to depict photomontage views. Views showing the removal of overhead line as well as the Agannygal substation were also included in the set of photomontages. For the more distant views, the assessment of the visual effects of the removal of turbines is much more straightforward without the need for photomontages.

Therefere,the digital removal of the wind farm and associated elements is depicted in a selected number of views only (2,3,4,5,11 and 12). The viewpoints are listed in Table 13-8. A map showing the viewpoint locations, along with the other landscape designations, is included in Figure 13-10. This is also included in full size (A3) in **Appendix 13.8.**

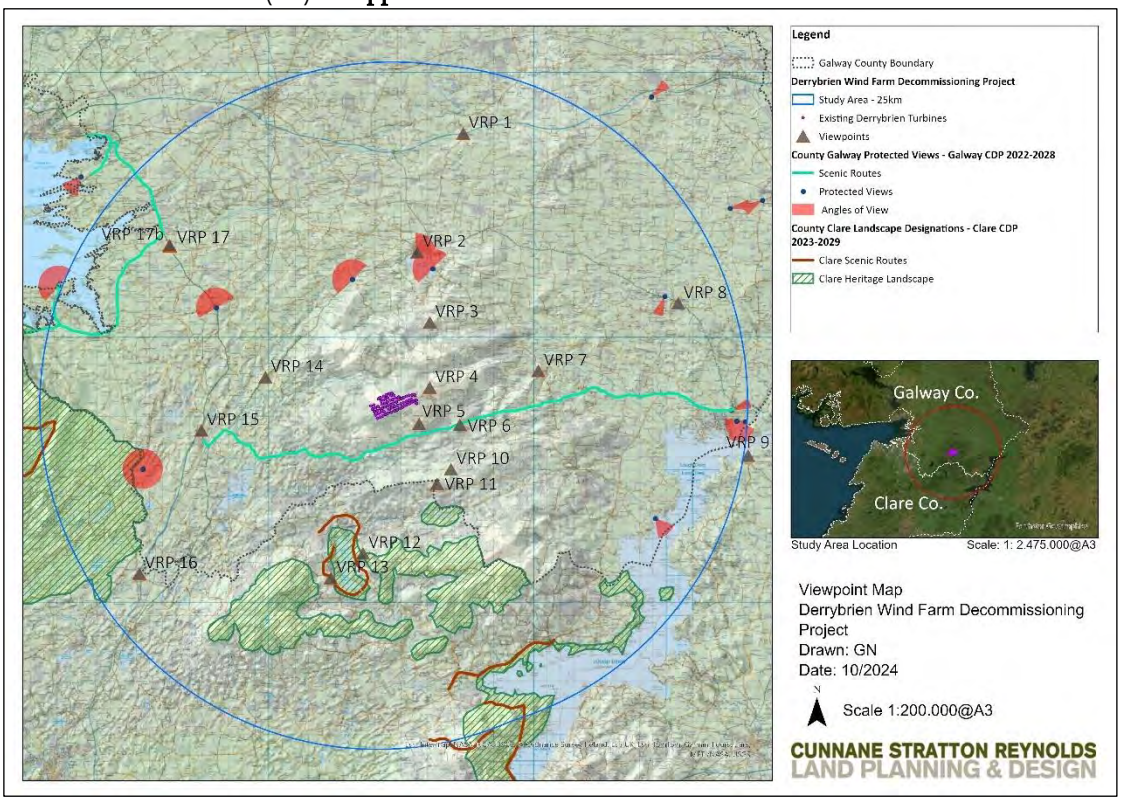



*Figure 13-10 Viewpoint Map with landscape and visual designations*

### *Photomontages*

The photomontage booklet (**Appendix 13-9**) shows the 17 viewpoints as 'Existing Views' based on images captured in 2022, to assist in assessing the post-decommissioning visual effects. Note that the most recent to the immediate vicinity (in November 2024) of the Derrybrien Windfarm Project, and the viewpoints closest to this area showed little or no changes to these baseline views.

For each viewpoint, the existing view is described (this is the 'Baseline Photograph') with an angle of view of 90 degrees. A wireframe or wireline drawing is also shown underneath with the baseline photograph, illustrating theoretical visibility of the turbines. This is consistent with SNH (2017) guidance for visualisation of wind farm developments.

Each viewpoint is described in terms of the 'Existing View', Visual Receptor Sensitivity, Magnitude of Change (which in this case is the removal of the turbines and other above ground elements). The combination of the Receptor Sensitivity and Magnitude of Change informs the judgement of Significance of Effect, as set out in Section 13.3.3. Quality of the effect (whether adverse, neutral or beneficial) is also described as defined in Table 13-6.

For some views which are in close proximity to the existing wind farm, photomontages were produced showing the decommissioning scenario. A selection of 6 images, from both close up and more distant viewpoints, (numbers VP2, VP3, VP4, VP5, VP11 and VP12) were produced as 'photomontages.'

For these viewpoints, a photomontage entitled *"Decommissioning Scenario)* is then described. The photomontage view is shown as 53.5 degrees (two views of this size are necessary for Viewpoint 5). Again, this is consistent with SNH guidance for wind farm visualisations. These views show the turbines

digitally removed to illustrate the visual effects which will result once the enabling and decommissioning works are carried out. The Overhead line was also digitally removed, in this case, as well as the substation at Agannygal. Technical information accompanying the photomontages is contained in this booklet.

| Viewpoint 1: View from the R350(at M6 motorway overpass) near Caraunmore, approximately 20.3 kilometres north of the Derrybrien wind farm site (nearest turbine). |
|---|
| **Existing View**<br>This view shows the motorway overpass in the foreground, with the motorway embankment and several dwellings seen to the right of the view. A stand of mature trees is seen to the left with several fields behind. In the background, the Slieve Aughty uplands form a backdrop to the right, behind the dwellings while they are partly screened to the left of the view. The hills appear as a broad, low, undulating upland landscape in the distance, with the forest cover barely discernible. The uplands are not dramatic in form or scale and do not constitute a key element of the view. The existing Derrybrien turbines are visible in a distant cluster on the distant hill to the centre of the view, with some screened by vegetation. The separate cluster of Sonnagh Old turbines is seen to the right of the view, some also partly screened by the trees. Both are barely discernible. |
| **Visual Receptor Sensitivity**<br>The sensitivity of the viewpoint is Low-Medium as set out in Table 13-4. The view is experienced by those travelling along the motorway overpass at moderate speeds and views from the road have no particular valued feature or characteristic. |
| **Magnitude of Change**<br>During decommissioning, the turbines will gradually be removed, and following these works, the Derrybrien turbines will no longer be visible in the distance. The removal of a distant element in the view will be discernible but will result in very little change to the view. The existing Sonnagh Old turbines will remain to the right of the view. The magnitude of change is considered Negligible. |
| **Significance of Effect**<br>The magnitude of change is considered Negligible. Combined with the Low-Medium visual receptor sensitivity, as outlined in Table 13-3, this results in **an Imperceptible and neutral** visual effect. |

| Viewpoint 2: Lough Rea Shoreline, Loughrea, approximately 11 kilometres north of the Derrybrien wind farm |
|---|
| **Existing View**<br>The view from the northern shoreline of Lough Rea is dominated by the lake. There is a fringe of vegetation around the distant shoreline, interspersed with agricultural fields, beyond which an undulating agricultural landscape rises up to forested hills. These are the Slieve Aughty uplands which form the backdrop to the view and the horizon. The uplands are modest in form and scale, dark coloured, and the horizon line is made uneven by the forest cover. The uplands are less prominent and of lesser value in the view than the broad expanse of the lake, the shoreline and the woodland fringe and farmland on the far side of the lake. The Derrybrien turbines are currently visible in the distance along the ridge. The turbine cluster is broad and densely arranged across a distinct hill within the upland. However, in the context of the panoramic view across the lake they occupy a small part of the overall view. The separate Sonnagh Old turbine cluster is smaller and less dense but slightly more prominent being closer to the viewer and located on a more prominent hill. |
| **Visual Receptor Sensitivity**<br>The sensitivity of the receptor is High as it is a view with high scenic qualities and an area valued for outdoor recreation. (The location is recognised as a protected view in the Galway LCA, though the view is in a slightly different direction) |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed, resulting in a Negligible magnitude of change due to the distance. Following these works, when all turbines are removed, as seen in the photomontage, the removal of the Derrybrien turbines from this view will result in a Low magnitude of change. |

| Viewpoint 2: Lough Rea Shoreline, Loughrea, approximately 11 kilometres north of the Derrybrien wind farm |
|---|
| **Significance of Effect**<br>The magnitude of change is considered Negligible during the process of decommissioning works and following this, when all turbines are removed, Low. The visual effects of the removal of the turbines on views from the Lough Rea shoreline are considered Slight. As outlined in Table 13-3, this results in a **Slight and neutral** visual effect . |

| Viewpoint 3: View from the local road at Curhoor, south of Kileenadeema, approximately 5.7 kilometres northwest of Derrybrien wind farm. |
|---|
| **Existing View**<br>The view is taken from a local road to the north of Derrybrien, which connects the Slieve Aughty uplands with Loughrea. This is a relatively remote landscape of outlying hills between the uplands and the lowland agricultural area to the north.<br>In this view the foreground is occupied by a mixture of scrub and rough grassland, which rises to a considerable belt of coniferous forest in the background which extends across the view. This coniferous forest largely screens the bulk of the uplands to the south as well as the lower parts of the existing Derrybrien turbines, some of which are visible in a cluster among the tree tops, but many others are screened by the forestry (evident when compared with the wireframe drawing). The low, rounded crest of Cushlaundrumlahan is almost completely screened by through the trees. To the right of the view, the Sonnagh Old turbines are visible in a cluster and appear slightly more prominent. |
| **Visual Receptor Sensitivity**<br>The sensitivity of the receptor is considered Low to Medium. Viewers would be travelling at relatively slow speeds along this narrow rural road. The landscape is heavily disturbed by abandonment of agriculture and the transition to forestry. There are no particularly valued features and there is a relative absence of buildings. |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed. The removal of the Derrybrien turbines from this view will result in a Low magnitude of change. The extent of the turbines is largely screened by the forestry, and the turbines which are visible appear among the trees. Therefore, their removal will result in minimal change to this view. |
| **Significance of Effect**<br>The magnitude of change is considered Low, both during the decommissioning works and in the aftermath. The visual receptor sensitivity is Low-Medium., therefore as outlined in Table 13-3, the visual effect is considered **Not Significant**. The quality of the effect is considered neutral. |

| Viewpoint 4: View from the Black Road at Coppanagh, approximately 1.3 kilometres east of the Derrybrien wind farm |
|---|
| **Existing View**<br>This viewpoint is from the Black Road, a local road just east of the windfarm. This represents one of the more open views of the turbines, at a high point of the road from where there are also panoramic views over the lower lying landscape to the east. This view shows a relatively open view with an expanse of heath or bogland in the foreground, and conifer plantations in clumps to the rear of the image. The turbines are clearly visible in rows, and the grid pattern is evident, with clumps of coniferous forestry obscuring the bases of some of the towers. The turbines occupy a considerable proportion of the view. This location is open and elevated. The area has a remote feel with heath and coniferous forestry the main elements. |
| **Visual Receptor Sensitivity**<br>The sensitivity of the visual receptor at this viewpoint is considered Medium. The road is a remote, quiet road, which travels over an elevated position, with open and expansive views over the surrounding low-lying landscape to the east and southeast and has a strong sense of remoteness. The views of the expansive bogland as well as the views in other directions have some scenic value. |

**Viewpoint 4: View from the Black Road at Coppanagh, approximately 1.3 kilometres east of the Derrybrien wind farm**

**Magnitude of Change**
During decommissioning works, the turbines will gradually be removed and as it is a close view, machinery is likely to be visible. The removal of the Derrybrien turbines from this view will result in a simpler composition to the view. The photomontage view illustrates the noticeable difference in the view, where the turbines which are currently visible across much of the photomontage are removed. The turbines, though of limited height even at this close proximity, are of a comparable scale to the surrounds, provide an element of height larger than the conifers, so without them, the conifer plantation will appear more of a dominant element in the view. However, the turbines did not obstruct valued views, and therefore their removal will have no effect on the extensive views in this location are to the east where long distance views are available. The magnitude of change is considered Medium.

**Significance of Effect**
A Medium visual receptor sensitivity and Medium magnitude of changes results in a **Moderate** and adverse short term visual effect (as outlined in Table 13.3) during the decommissioning works, and following their completion, this will be neutral in quality. The removal of the turbines results in a simpler view of just open moorland and coniferous plantation.

**Viewpoint 5: View from the Black Road at Derrybrien North, approximately 1.5 kilometres southeast of the Derrybrien wind farm**

**Existing View**
This viewpoint is from the Black Road, a local road just east of the windfarm, at the most open view of the lower section of this road.
This view shows a relatively open foreground landscape with an expanse of heathland, with some deciduous tree clumps and also some clumps of conifers. A derelict dwelling is seen to the left of the image. A densely planted coniferous plantation is seen to the background of the view. The contrast between the large swathes of coniferous forestry in the background (and recently felled and planted areas) and the simpler texture of the open moorland is evident. The turbines occupy a medium to large extent (approximately half) of the baseline image and are visible against the skyline. The wireframe view however shows that a considerable number of turbines are screened by the forestry. Several poles of the Overhead line are just visible to the left of the image, partly screened by the forestry.

**Visual Receptor Sensitivity**
This is a second view from the Black Road, representing the viewers along the road just north of the junction with the R353. Visual receptor sensitivity is considered to be Low to Medium at this location. It should be noted that the road is a quiet, remote road with few receptors, however the view has some scenic qualities – the contrast of open moorland and forestry.

**Magnitude of Change**
During decommissioning works, the turbines will gradually be removed and as it is a relatively close-up view, some machinery is likely to be visible to remove the turbines and the overhead line. Two photomontages were produced to show the visual effects of the removal of the turbines and the overhead line (the lateral extent of the windfarm from this viewpoint necessitated two Photomontage Views at 53.5 degrees). The first view illustrates that the removal of the Derrybrien turbines will result in a less cluttered view, as the turbines were visible across much of the horizontal extent of this view. The overhead line is also removed which further simplifies the view. The magnitude of change is considered Medium-High here. The second photomontage view shows that the removal of turbines is of a lesser magnitude and is considered Low.
The magnitude of change is considered therefore considered Medium-High in the first view, and Low in the second photomontage and is Medium overall.

**Significance of Effect**
As indicated in Table 13-3, a Low to medium receptor sensitivity combined with a Medium magnitude of change is The visual effect is considered **Moderate** and adverse during the decommissioning works and following their completion, neutral to beneficial.

| Viewpoint 6: View from the R353 (Scenic Route) at Cloghvoley/Knockmoyle west, approximately 3.6 kilometres southeast of the Derrybrien wind farm |
|---|
| **Existing View**<br>This viewpoint is from the road (and scenic route) from Derrybrien to Balllynakill and to Woodford at an elevated location.<br>In this view, which is partially screened by roadside vegetation, a field in the foreground gives way to extensive coniferous plantations, and some moorland. The land begins to rise away from the viewer, and towards the ridge where the wind turbines are located. The turbines are visible against the skyline, though some are obscured from the view by foreground vegetation. They are not a key element of this view. (It should be noted that several images were captured but all views were affected to some extent by intervening foreground vegetation, and this view was the clearest). |
| **Visual Receptor Sensitivity**<br>This is a view from the R353 which is also designated a Scenic Route, and though the view itself is not considered to be of high scenic value, the character of the surrounding landscape and the relative remoteness of the surroundings would result in a Medium-High visual receptor sensitivity. |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed. The magnitude of change as a result of the removal of the turbines is considered Low. Though relatively close to the windfarm, the existing turbines appear in the distance, glimpsed through vegetation, and are noticeable but not major elements in the view. The turbines are partly hidden by the intervening roadside vegetation and thus their removal would be more noticeable in winter but less so in summer when vegetation is in full leaf. |
| **Significance of Effect**<br>As indicated in Table 13-3, A Medium-High visual receptor sensitivity and a Low magnitude of change results in a **Slight, neutral** visual effect both during the decommissioning works and following their completion. |

| Viewpoint 7: View from the Regional Road R351 at Derrygarriff, approximately 9.5 kilometres east of the Derrybrien wind farm. |
|---|
| **Existing View**<br>This view is taken from the R351 between Loughrea and Woodford, east of the Derrybrien wind farm.<br>The view shows a gently undulating landscape, with agricultural fields, deciduous tree clumps and hedges in the foreground, along with a dwelling to the left of the view. Larger swathes of trees – both deciduous and coniferous – are seen in the middle ground.<br>The Slieve Aughty uplands form a long, low backdrop, and are covered in coniferous plantation with areas of open bog land, while scattered buildings are visible on the unforested lands on higher ground to the right of the image. The Derrybrien turbines are visible in a tight cluster along the ridgeline but are a minor overall component in this view. |
| **Visual Receptor Sensitivity**<br>The visual receptor sensitivity at this viewpoint is considered Low to Medium. |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed. The magnitude of change as a result of the removal of the turbines is considered Negligible to Low. Though the turbines are visible, they are not tall and occupy a limited proportion of the view in a dense cluster and are at some distance from the viewer. |
| **Significance of Effect**<br>As indicated in Table 13-3, A Low-Medium receptor sensitivity and a Negligible to Low magnitude of change results in a **Not Significant, neutral** visual effect both during the decommissioning works and following their completion. |

| Viewpoint 8: View from the road at Garryadd, Killimor, approximately 21.1 kilometres northeast of the nearest turbine |
|---|
| **Existing View**<br>In this view, (representing views from in and around the village) a dwelling and rear garden are visible in the foreground. Some outlying houses are prominent in the middle-distance protruding above the hedgerow vegetation.<br>To the rear of the buildings, The Slieve Aughty uplands form the backdrop to this view, a broad, low, undulating upland landscape in the distance. Although forming the horizon in an otherwise low-lying landscape the uplands are not dramatic in form or scale and do not constitute a key element of the view, with views obstructed by the intervening buildings.<br>The Derrybrien turbines, and the Sonnagh Old turbines in a separate cluster, are barely discernible in the distance occupying parts of broad upland. Although numerous turbines are visible, they are distant and of limited extent in the view. The wind farm is discernible but an inconspicuous and element in the view. |
| **Visual Receptor Sensitivity**<br>The visual receptor sensitivity at this viewpoint is considered Low-Medium. Receptors include some residents in the area; however, the site is at some distance from the viewer. |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed. As noted above, the turbines at present are a barely perceptible distant element which occupy a limited proportion of the view at a distance of over 20km. The magnitude of change as a result of the removal of the turbines is considered Negligible. |
| **Significance of Effect**<br>As indicated in Table 13-3, A Low-Medium receptor sensitivity and a Negligible magnitude of change results in an**Imperceptible and neutral visual effect**, both during the decommissioning works and following their completion. |

| Viewpoint 9: View from the harbour at Terryglass, Co. Tipperary, approximately 25 kilometres from the nearest turbine |
|---|
| **Existing View**<br>This view represents the view over Lough Derg from the harbour at Terryglass. Some boats at the mooring, and deciduous trees are visible to the left of the view, but the open expanse of water is the main feature of the view. The lake is defined by a backdrop of the lakeshore vegetation to the right of the view, and the distant and gently sloping Slieve Aughty hills in the centre of the view. The Derrybrien turbines are barely discernible as a distant element in the view, along the ridge in the centre of the image and occupy a very small proportion of the view. The Sonnagh Old turbines are also visible to the right of the Derrybrien turbines and are also difficult to discern. |
| **Visual Receptor Sensitivity**<br>The visual receptor sensitivity at this location is considered to be High due to its scenic qualities and popular location for tourists and those using the marina facilities for leisure. |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed. As noted above, the turbines at present are a barely perceptible distant element which occupy a limited proportion of the view at a distance of over 25km. The magnitude of change as a result of the removal of the turbines is considered Negligible. |
| **Significance of Effect**<br>As indicated in Table 13-3, A High receptor sensitivity and a Negligible magnitude of change results in a The **Not Significant and neutral** visual effect**,** both during the decommissioning works and following their completion. |

| Viewpoint 10: View from the local road at Loughatorick North, approximately 5.5 kilometres southeast of the nearest turbine |
|---|
| **Existing View**<br>The view shows a hedgerow which borders a large tract of open moorland or bog. In the middleground, a swathe of coniferous forestry is visible, along with the steel pylons of the Moneypoint overhead line which extend across the view. The ground falls (to the Owendalulleelagh river valley) before rising away from the viewer towards a ridge of higher ground. This higher ground in the background of the view is covered by extensive coniferous plantations interspersed with some areas of bog land. The Derrybrien turbines are visible along the ridge, occupying almost half of the horizontal extent of the view. They are visible but not a key or dominant element of the view. The clearing in the coniferous forestry near the centre of the view indicates the route of the overhead line connecting the windfarm to the Agannygal Substation. |
| **Visual Receptor Sensitivity**<br>This view represents a local road, which has a remote character, with a strong sense of natural ness in places, which traverses the Slieve Aughty uplands south form the R353 towards the Co. Clare boundary. Viewers would be travelling at slow speeds. The visual receptor sensitivity at this location is considered Medium. |
| **Magnitude of Change**<br>During decommissioning works, the turbines and overhead line will gradually be removed. The magnitude of change as a result of the completed removal of the Derrybrien turbines and overhead line (in the centre of the view) is considered Low- Medium. The turbines do occupy a large horizontal extent of the view but are relatively low in height and appear in the distance. |
| **Significance of Effect**<br>As indicated in Table 13-3, A Medium receptor sensitivity and a Low -Medium magnitude of change results in a Slight-Moderate visual effect. This is considered adverse in quality during the process of decommissioning due to eth likely visibility of machinery against the horizon, and the presence of the turbines and overhead line in the view. The visual effect once the removal of turbines and overhead line is complete is considered **Slight-Moderate** and neutral. |

| Viewpoint 11: View from local road at Loughatorick , approximately 6.2 kilometres south of the Derrybrien wind farm and 0.58 kilometres from the Agannygal Substation |
|---|
| **Existing View**<br>The view shows an expanse of bogland in the foreground with occasional trees or shrubs. In the middle ground, swathes of conifers are visible across the view and a line of timber electrical poles run across the view. These connect to a substation to the centre of the view, with several steel lattice poles and a small building adjacent to the substation structures are evident, set within a clump of coniferous trees. The land slopes gently form left to right in the foreground, while in the distance, a mainly forested ridge of higher ground is visible to the centre right of the view. |
| **Visual Receptor Sensitivity**<br>This view represents a local road, which has a remote character, with a strong sense of natural ness in places, which traverses the Slieve Aughty uplands south from the R353 towards the Co. Clare boundary. Viewers would be travelling at slow speeds. The visual receptor sensitivity at this location is considered Medium. |
| **Magnitude of Change**<br>During decommissioning works, the substation complex and overhead line will gradually be removed and the Ennis-Shannonbridge overhead line reinstated. A temporary compound is likely to be largely screened from this view by intervening trees. The magnitude of change during this process of removal, as well as in the aftermath, is considered Low-Medium. The photomontage view shows the view once these elements have been removed, showing the two sets of timber poles carrying the overhead line to the left of the view are removed, as well as the steel lattice poles and the substation building and other equipment. This results in a simpler, less cluttered view, with the foreground bogland and backdrop of hills remaining key elements in the view and its composition. |

**Significance of Effect**
As indicated in Table 13-3, A Medium receptor sensitivity and a Low-Medium magnitude of change results in a Slight-Moderate and adverse visual effect during the decommissioning works, and **Slight-Moderate** and beneficial once these works are completed.

**Viewpoint 12: View from the local road (and East Clare Way) at Corlea Beg, approximately 10.2 kilometres south of the nearest turbine**

**Existing View**
This is an open, expansive view. The view shows grassland in the foreground, which slopes away from the viewer, towards a valley which is covered in a mixture of coniferous and broadleaf trees but dominated by conifers. Areas of open moorland are also visible, which contrast with the forestry, with stretches of open fields also seen in the middle ground. The land rises towards the long, low ridge in the background where the Derrybrien turbines are visible in the distance. The turbines appear in a staggered linear formation along the ridge, and occupy a limited proportion of the overall view, appearing distant, small in scale, and not as a key element of the view. Being seen on the ridgeline, some turbines are difficult to distinguish from the background sky (note that this would change depending on the weather conditions). The overhead line is not visible in this view.

**Visual Receptor Sensitivity**
This view represents viewers on a local road, just above a track which runs through two fields in the foreground, which is part of the East Clare Way, a waymarked trail. The view is expansive, and the view has some scenic qualities, and visual receptor sensitivity is considered High.

**Magnitude of Change**
During decommissioning works, the turbines will gradually be removed from this view. The magnitude of change both during the decommissioning works to remove the turbines, and once the turbine removal is complete, is considered Low. The turbines occupy less than half of the photomontage view and appear as distant features in the view. Their removal will be noticeable but will not affect the overall character and composition of the view.

**Significance of Effect**
As indicated in Table 13-3, and with professional judgement applied, a High receptor sensitivity and Low magnitude of change results in a **Slight and neutral** visual effect**,** both during the decommissioning works and following their completion.

**Viewpoint 13: View from the R461 (Scenic Route) at Doorus East, Co. Clare,**

**Existing View**
This view represents a view from the road over an undulating landscape. Thie view shows a considerable amount of low lying coniferous and deciduous tree cover in the foreground and middleground, with a glimpse of Lough Graney in the centre of the view. The land rises to the right and left of the image, away from the lake, where a patchwork of small fields and buildings are visible. In the distance, in the centre of the view, the low ridge of the Slieve Aughty mountains is visible, with the uneven profile of the coniferous plantation also evident to the right. The Derrybrien turbines are just visible along the skyline and occupy a relatively limited extent of the view. It is noted that fewer of the turbines appear discernible than those in the wireframe, due to weather conditions.

**Visual Receptor Sensitivity**
The visual receptor sensitivity is considered Medium to High. This is a designated scenic route, and the viewpoint is in a remote location with scenic views over Lough Graney and extensive woodland in the foreground.

**Magnitude of Change**
During decommissioning works, the turbines will gradually be removed from this view. The magnitude of change as a result of the removal of the turbines is considered Negligible to Low. The turbines occupy less than half of the photomontage view and appear as distant elements and low in height.

**Significance of Effect**
As indicated in Table 13-3, A Medium-High receptor sensitivity and a Negligible-Low magnitude of change results in a **Not Significant** visual effect during the decommissioning works, and visual effect and once the turbines are removed from the view.

**Viewpoint 14: View from the N66 in the townland of Cuilmore, near Peterswell approximately 8.3 kilometres northwest of the nearest turbine**

**Existing View**
This view shows a view from the roadside, across relatively a flat, low lying agricultural field bounded by a hedgerow in the foreground. Tree clumps and scattered buildings are visible in the middle ground, while the Slieve Aughty hills are seen in the background. These hills, which have a long and relatively low profile, are clearly seen above the surrounding low-lying land.
The hills are covered with a mosaic of dark coloured coniferous forestry and light-coloured tracts of bogland. The Derrybrien turbines are visible near the centre of the image and are visible as a row against the skyline and conifer plantation is seen the foreground of the turbines. The turbines are low; however, they are less prominent that would be expected at this distance, partly due to the weather and light conditions. To the left of the image, the Sonnagh Old turbines are largely screened by intervening vegetation.

**Visual Receptor Sensitivity**
This view represents the stretch of N66 road between Gort and the Peterswell junction, along a stretch of road which in general has good visibility of the Derrybrien turbines. Viewers would be travelling a moderate speed along this road, which has no scenic designations, or highly scenic qualities. The sensitivity of the visual receptor is considered Low to Medium.

**Decommissioning Scenario Photomontage - Magnitude of Change**
During decommissioning works, the turbines will gradually be removed from this view. Depending on conditions, some machinery may be visible during the decommissioning works. The magnitude of change resulting from the removal of the turbines is considered Low. The turbines are currently visible, (depending on weather conditions) but in no way dominant and do not occupy an extensive proportion of the view. Therefore, their removal will be noticeable but not alter the character of composition of the overall view.

**Significance of Effect**
As indicated in Table 13-3, a Low- Medium receptor sensitivity and a Low magnitude of change results in a be Slight visual effect. The quality of the effect will be adverse during the dismantling of the turbines as machinery may be evident on the horizon, and **Slight and neutral** once turbine removal is complete.

**Viewpoint 15: View from the Regional Road R458 on the northern outskirts of Gort, approximately 12.9 kilometres west of the nearest turbine**

**Existing View**
This view shows an open field adjacent to the R458, with a low stone wall bounding a large, gently sloping field in the foreground. A hedgerow in the middle ground divides the field from another large open field.

Clumps of deciduous trees, hedgerows and scattered buildings are visible in the middle ground, which again is flat or gently undulating. In the background, a long ridge of high ground is visible, which dips slightly and rises again to the left of the image. The Derrybrien turbines are visible in the distance on the ridge in the centre of the image and appear as a distant cluster with relatively limited spatial extent, partly hidden by the topography, as shown in the wireframe. The turbines and appear along a ridge which has both areas of coniferous forestry interspersed with areas of open moorland. The Sonnagh Old turbines should be partly visible on the ridge to the left of the image, however due to weather conditions are difficult to discern.

**Visual Receptor Sensitivity**
This view represents viewers travelling on a Regional road at moderate speeds, which is not designated or particularly scenic. The visual receptor sensitivity is considered Low - Medium.

| |
|---|
| **Decommissioning Scenario Photomontage - Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed from this view. The magnitude of change as a result of the removal of the turbines is considered Low. The removal of what is currently a distant component of the view, low in height, which occupies a very limited extent of the view does not have an effect on the overall character or composition of the view. |
| **Significance of Effect**<br>As indicated in Table 13-3, a Low-Medium receptor sensitivity and a Low magnitude of change results in a **Not Significant neutral** visual effect, both during the decommissioning works and following their completion. |

| **Viewpoint 16: View from M18 motorway overpass between Gort and Crusheen at Monreagh (approximately 21.4 kilometres southwest of the nearest turbine)** |
|---|
| **Existing View**<br>The view shows the M-18 motorway to the left of the view, and a road which passes over this (from where the view is taken) to the right of the view.<br>To the right and left of the motorway, open fields are visible, with well-defined hedgerows, while to the centre and right of the view, the foreground and middle ground are occupied by deciduous trees with few scattered buildings visible. Two steel pylons are visible to the left of the view, carrying overhead wires. The backdrop to the view is formed by the Slieve Aughty hills seen in the centre of the view, and from this view they are only barely higher than the trees in the foreground.<br>The Derrybrien turbines are seen to the centre of the view, on the higher ground, while the Sonnagh Old turbines are visible to the left of the view in a smaller cluster. In these weather conditions, the light allows the turbines to be discerned, though they are very distant elements in the view. The spatial spread as well as the height of the Derrybrien turbines is very limited form this view, and they appear as distant element in the view which may be even less obvious depending on weather conditions. Some screening is provided by intervening vegetation. |
| **Visual Receptor Sensitivity**<br>The sensitivity of the viewpoint is Low to Medium. Viewers are on a motorway overpass and the presence of the motorway in the view lessens the value of the view, while there are some elevated views over the rural landscape. |
| **Magnitude of Change**<br>During decommissioning works, the turbines will gradually be removed from this view. The wind farm is a visible but inconspicuous element in this view with a limited spatial spread as well as very limited height. The removal of the turbines will result in a Negligible magnitude of change, change to the view and the key characteristics remain. |
| **Significance of Effect**<br>As indicated in Table 13-3, a Low- Medium receptor sensitivity and a Negligible magnitude of change results in a . a **Not Significant and neutral visual effect,** both during the decommissioning works and following their completion. |

| **Viewpoint 17: View from the R458 Regional Route at Caherpeak East, south of Kilcolgan.** |
|---|
| **Existing View**<br>The view shows a road in the foreground, with relatively flat open fields to both sides. A stone wall and silage bales are visible to the right of the view. To the left, a building, fields, stone walls and clumps of vegetation are visible. A steel pylon and a shed are visible in the centre of the view.<br>In the distance, the Slieve Aughty hills are visible as a long, low ridge in the centre of the view. The Derrybrien turbines are just barely visible in the distance along the ridge of higher ground, The spatial spread of the turbines is limited, and the turbines are not tall by modern standards and therefore do not dominate the upland, or any other element of the view. To the left of the view, the Sonnagh Old turbines are more easily discerned, but still a distant, albeit smaller cluster of turbines. |

| |
|---|
| **Visual Receptor Sensitivity**<br>The sensitivity of the viewpoint is Low to Medium. Viewers from the road would have some focus on their surroundings, travelling at medium speeds along the Regional Road. The view has no particular valued features, and the view has some pleasant rural elements combined with more industrial aspects. |
| **Magnitude of Change**<br>The removal of the Derrybrien turbines will have a barely perceptible effect on this view, as they are currently distant elements which are not easily discerned. The magnitude of change is considered Negligible. |
| **Significance of Effect**<br>As indicated in Table 13-3, a Low- Medium receptor sensitivity and a Negligible magnitude of change results in a **Not Significant and neutral visual effect** both during the decommissioning works and following their completion.<br>. |

#### 13.5.2.2.1 *Significance Of Effect*

Table 13-9 below summarises the likely visual effects arising from the Prospective Development from the 17 viewpoints described above. The effects are described both in terms of those which are temporary to short term in duration (during the process of Enabling Works and Decommissioning works) as well as the resulting permanent effects (the landscape without the turbines and associated above ground elements, as outlined in Chapter 4).

*Table 13-9 Summary of Visual Effects at Decommissioning*

| Viewpoint | Description | Temporary to Short Term Effects (24 months) | Permanent Effects |
|---|---|---|---|
| 1 | View from the R350(at M6 motorway overpass) near Caraunmore | Imperceptible, neutral | Imperceptible, neutral |
| 2 | View from the shore of Lough Rea | Imperceptible, adverse | Slight, neutral |
| 3 | View from the local road at Curhoor, south of Kileenadeema | Not Significant, adverse | Not Significant, neutral |
| 4 | View from the Black Road at Coppanagh, | Moderate, adverse | Moderate, neutral |
| 5 | View from the Black Road at Derrybrien North, wind farm | Moderate, adverse | Moderate, neutral to beneficial |
| 6 | View from the R353 (Scenic Route) at Cloghvoley/Knockmoyle west | Slight, neutral | Slight, neutral |
| 7 | View from the Regional Road R351 at Derrygarriff, | Not Significant, neutral | Not Significant, neutral |

| Viewpoint | Description | Temporary to Short Term Effects (24 months) | Permanent Effects |
|---|---|---|---|
| 8 | View from the road at Garryadd, Killimor | Imperceptible, neutral. | Imperceptible and neutral. |
| 9 | View from the harbour at Terryglass, Co. Tipperary | Not Significant neutral | Not Significant and neutral. |
| 10 | View from the local road at Loughatorick North | Slight-Moderate, adverse | Slight-Moderate and neutral |
| 11 | View from local road at Loughatorick | Slight-Moderate, adverse | Slight-Moderate and beneficial. |
| 12 | View from the local road (and East Clare Way) at Corlea Beg, | Slight, neutral. | Slight, neutral |
| 13 | View from the R461 (Scenic Route ) at Doorus East, Co. Clare | Not Significant, neutral | Not Significant neutral |
| 14 | View from the N66 in the townland of Cuilmore, near Peterswell | Slight, adverse | Slight, neutral |
| 15 | View from the Regional Road R458 on the northern outskirts of Gort | Not Significant, neutral | Not Significant, neutral. |
| 16 | View from M18 motorway overpass) between Gort and Crusheen at Monreagh | Imperceptible, neutral | Not Significant, neutral. |
| 17 | View from the N18 national route at Caherpeak East, south of Kilcolgan. | Imperceptible, neutral | Not Significant and neutral. |

**Temporary to Short Term Effects**

To summarise, visual effects associated with the Prospective Development include temporary to short term effects as a result of the operation of machinery to facilitate the removal of the wind farm elements referred to above, location of temporary storage compounds and machinery. These are considered to be, at their most pronounced, Moderate adverse effects, and temporary in nature. These will be more pronounced in close proximity to the wind farm site and substation site where there is visibility from the local roads.

**Permanent Effects**

Permanent visual effects are considered to range from Imperceptible to Slight from the majority (13 of the 17) of the viewpoints described above, which are at some distance from the wind farm and where the removal of the turbines will not be noticeable in the view. Viewers closer to the turbines such as Viewpoints 4 and 5 from the Black Road are likely to experience more pronounced visual effects

(Moderate), where the viewer is in a location which was previously in close proximity to the turbines and they are a well-known element of the view. Views 10 and 11 are considered to result in Slight-Moderate effects. None of these are considered significant visual effects.

Viewpoint 6 represents the Scenic Route (R353) and is one of the few relatively close, more open views towards the windfarm, with almost no open views on the road west of the wind farm, and the removal of the turbines here results in a Slight and neutral visual effect.

The quality of the visual effects – whether beneficial, adverse or neutral – varies, and it should be noted that this is somewhat subjective and is also likely to vary depending on the viewer.

The quality of the effect in these views 4 and 5 from the Black Road is considered to be neutral to beneficial as the view will be simplified and less cluttered. As areas re-vegetate, disturbance following decommissioning will reduce over time. Many views from the wider landscape are likely to be Neutral in effect. Viewpoint 11 which depicts the removal of the Agannygal Substation and Derrybrien-Agannygal overhead line is considered to be a Moderate, beneficial visual effect which restores some of the simplicity of the view from the local road, where the view is over an expanse of intact blanket bog (though the coniferous forestry and the restored Ennis-Shannonbridge overhead line still detract somewhat from this simplicity).

The removal of an element from the landscape which has existed for approximately 18 years will cause varying responses in viewers, with some likely to perceive this as a loss of a familiar landscape feature or landmark, and the loss of a source in renewable energy generation, while others may view the removal of turbines and other structures as a return to a more simple landscape composition. The Derrybrien Wind Farm is a relatively inconspicuous but nevertheless recognisable element in the wider landscape views, particularly from the surrounding lowlands. The turbines are a relatively low height by today's standards which lessen the visual effects of their decommissioning. Observation of the turbines from varying distances and locations in differing weather types also changes their relative visibility.

Furthermore, turbines are not the only element of height introduced to the landscape. The presence of extensive coniferous forestry in the vicinity of the site provides an element of considerable height as well as a sense of enclosure and a change in views experienced in parts the landscape. The coniferous forestry operations in the vicinity of the site are likely to continue.

The removal of other elements such as the on-site substation and other buildings on the windfarm site will not be viewed from the public road, and therefore are considered to have an Imperceptible effect/no effect.

The overhead line is quite prominent in the immediate vicinity of the site and in one section of the Black Road and the near the Flaggy Bridge on the R353. Further south, the line traverses through largely remote and heavily forested areas towards Agannygal Substation. The removal of the line would be considered Not Significant to Slight, beneficial effect, where it is in close proximity to the viewer. However, it is not visible in the majority of the views described above. The decommissioning of the Agannygal Substation is one of the views which is accompanied by a photomontage (Viewpoint 11) is considered to be a Slight-Moderate and beneficial visual effect which restores somewhat the simplicity of the view. The existing Ennis-Shannonbridge overhead line is a prominent feature south of the R353 between Derrybrien Wind Farm and the Agannygal Substation.

## 13.5.3 Cumulative and In-Combination Impacts

### 13.5.3.1 Cumulative Impacts with the "Retained Development".

. Landscape and visual effects resulting from the Prospective Development combined with the Retained Development involve the combined landscape effects of the removal of the above-ground elements

(turbines, overhead lines, on site substation and Agannygal substation) combined with the Retained Development (the retention in-situ of underground elements and at-ground elements as well as development associated with historic peat slide events that occurred during construction). Due to the nature of the retained development The full description of both developments is as set out in Chapter 4 of the EIAR and of the rEIAR.

#### 13.5.3.1.1 *Landscape Effects*

##### Landscape Sensitivity

Landscape sensitivity is as set out in Section 13.5.2.1.1 as ranging from Low-Medium.

##### Landscape Effects – Magnitude of Change

As set out in Chapter 13 of the rEIAR, the landscape effects as a result of the Retained Development (the retention in-situ of underground elements and at-ground elements as well as development associated with historic peat slide events that occurred during construction, as set out in Chapter 4) are considered as No effect (for those underground elements) to Imperceptible, where elements continue to be covered by vegetation. The quality of the effect is considered neutral.

When the Prospective Development is carried out, during the decommissioning of the above ground elements, the landscape effects will result mainly from the Prospective Development activities which however are likely to result in some reduction in vegetation cover in the vicinity of the Retained Development in certain areas.

As noted in Section 13.5.2.1.2 above, changes to the windfarm site and immediate vicinity as a result of the enabling works will involve vegetation clearance, and some levelling, in the vicinity of the elements to be removed.

As part of the Retained Development, certain hard stands, as well as foundations for the Overhead Line are to remain in situ, and which are now vegetated, may be temporarily exposed as a result by the Prospective Development. However, in the short term, it is expected a certain amount of natural re-growth is also possible around the turbine bases, and other areas of hard standing and where other vegetation clearance and levelling takes place. Therefore, the Prospective Development combined with the Retained Development will result in a Negligible to Low magnitude of change which is short term in duration.

In relation to the overhead line and Agannygal substation, similarly, while the concrete foundations of the substation will be exposed by the Prospective Development, re-vegetation of the concrete foundations is likely over time with a Negligible magnitude of change, again of short term duration.

##### Significance of Cumulative Landscape Effect

The landscape effect resulting from the combination of the Retained Development (the retention of below ground and other elements) along with the Prospective Development will result varying effects, ranging from to Negligible to Low magnitude of change during the decommissioning (the Prospective Development) and this will result in a Not Significant cumulative landscape effect. The effect is considered temporary to short term, and is mainly as a result of the works associated with the Prospective Development. There are no medium-to long term cumulative effects.

#### 13.5.3.1.2 *Visual Effects*

This section assesses visual effects of the Prospective Development (removal of above ground elements) combined with the Retained Development (retention of below ground, at-ground elements or development the main locations development associated with historic peat slide events that occurred during construction, as set out in Chapter 4 of the rEIAR). The nature of the visual effects of the Retained Development are set out in Chapter 13 of the rEIAR, and the elements of the Retained Development are either below ground, or are screened by vegetation.

##### Visual Receptor Sensitivity

While the assessment of visual effects as a result of the Prospective Development on its own includes a wide variety locations, both close up and distant, in comparison, there are very few locations where the viewers have potential close-up views of elements the Retained Development from the public road, as well as views of the Prospective Development.

Therefore any potential cumulative visibility is concentrated on three main locations- the immediate vicinity of the windfarm on certain locations on the Black Road, near the Flaggy Bridge, the R352 and the Lough Atorick Road, where the elements of the Retained Development relating to the Overhead Line (pole foundations) are presently screened by vegetation, but may be temporarily exposed affected by works associated with the Prospective Development. Visual receptors in these locations are considered Medium sensitivity.

##### Magnitude of Change

The works proposed by the Prospective Development, which are to remove the Overhead line and poles, may result in temporary vegetation clearance the pole bases around these locations, and consequently disturbance around the foundations of the pole sets/masts. Should this arise, it is likely to be temporary to short term in duration, as the concrete foundations are expected to re-vegetate over time and appear similar to what they are today.

The elements associated with the Derrybrien-Agannygal overhead line may be glimpsed from the Black Road – where the overhead line crosses the road in close proximity to a set of wooden poles. As a result of the Prospective Development, the retained concrete foundation may be visible for a short time should vegetation be cleared as a result of the Prospective Development but it likely to re-vegetate. Similarly, where the pole set is close to the R353 west of Flaggy Bridge and along the road at Lough Atorick, the concrete foundations which are now screened with vegetation may be briefly visible as a result of the Prospective Development but again is likely to re-vegete over time. The magnitude of change is considered Negligible.

##### Significance of Effect

The significance of effect resulting from the Retained Development with the Prospective Development are considered to be Temporary to Short -term, Not Significant visual effects at these locations. The visual effects will be extremely localised and in the medium-long term are expected to re-vegetate and result in Imperceptible neutral visual effects.

These effects are not considered Significant.

### 13.5.3.2 Cumulative Effects with other developments.

The potential cumulative effects of the Prospective Development and other relevant developments has been carried out with the purpose of identifying what influence the Proposed Development will have on

the surrounding environment when considered cumulatively and in combination with relevant approved, and existing projects in the vicinity of the proposed site.

- *Commercial forestry.*
- *Turbary.*
- *Gort Lowlands Flood Relief Scheme.*
- *The Sonnagh Old wind farm.*

The data shows that the extent of forestry has not changed appreciably since prior to Project construction and that forestry prior to construction represented and currently represents over 50% of land use in the immediate vicinity of the wind farm. Due to its age profile, much of the forestry estate has over the last number of years,and will over the next decade, require felling and replanting as part of the normal lifecycle of such commercial plantations.

Small scale turf cutting is carried out on the site of the Derrybrien wind farm and is likely to continue in the future however landscape effects are considered Imperceptible, and visual effects Imperceptible also.

The Gort Lowland flood relief scheme is in progress; however, the final proposals have not been submitted for planning permission. The information available to date indicates that the closest works will be more than 9 kilometres from the nearest turbine.

The continued operation of the Sonnagh Old windfarm, in combination with the Prospective Development will not result in cumulative landscape or visual effects. The Sonnagh Old wind farm will likely to be the only wind farm visible in the Slieve Aughty mountains.

## 13.6 Mitigation Measures

No specific Landscape and Visual Mitigation Measures are proposed.

## 13.7 Conclusion

The Derrybrien Wind Farm Development Decommissioning Project - Prospective Development will result in some landscape and visual effects, though these are not considered to be significant.

Visual effects range from Imperceptible to Moderate, and from neutral to beneficial in quality.

The layout of the Derrybrien turbines is in a tight cluster, they are of limited height, and they are set in a remote area with dense forestry, in an area of uplands surrounded by extensive lowlands.

This resulted in very few close-up views of the turbines, with a higher proportion of more distant views from the surrounding lowlands. Therefore, the removal of the turbines are likely to be experienced by greater numbers of people as a landmark from relatively distant views (10km and beyond) where though their removal will be noticeable, the visual effects are much less pronounced.

These changes will be most pronounced in close proximity to the site, particularly along two main areas (represented by Viewpoints 4 and 5) on the Black Road, as these are the main open views in close proximity to the windfarm. The proposed decommissioning of the turbines and above ground elements as assessed in the other 15 Viewpoints were considered to result in effects ranging from Imperceptible to Slight-Moderate, and neutral in effect.

# 14. MATERIAL ASSETS

Material Assets are defined in the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) 'as '*built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure'.*

Material Assets may be either of human or natural origin. This chapter of the EIAR addresses the likely significant effects of the Prospective Development on transportation infrastructure (Section 14.1 Traffic and Transport), and Other Material Assets (Section 14.2 Utilities, Telecommunications and Aviation) , which are economic material assets of human origin.

Waste Management is considered within the EPA 2022 Guidelines as part of Material Assets. Waste Management pertaining to the Prospective Development is addressed in Chapter 16 of this EIAR. A Waste and Resource Management Plan (WMP) is included in the Construction and Environmental Management Plan as Appendix 4-3 of this EIAR. Traffic volumes generated by the removal of waste from the Derrybrien Wind Farm Development – Perspective Development Site to fully authorised waste facilities, are considered in Section 14.1 below.

Cultural assets of Archaeology and Cultural Heritage are addressed in Chapter 12 of this EIAR. Economic assets of natural heritage include non-renewable resources such as minerals or soils, and renewable resources such as wind and water. These assets are addressed in Chapter 8: Land, Soils and Geology, Chapter 9: Hydrology and Hydrogeology, Chapter 10: Air and Climate. Tourism and amenity resources, which are also considered material assets, are addressed in Chapter 5: Population and Human Health.

This chapter of the EIAR has been prepared in accordance with the requirements of the EIA legislation and guidance detailed in Chapter 1: Introduction.

## 14.1 Traffic and Transport

### 14.1.1 Introduction

#### 14.1.1.1 Chapter Scope

This section presents the Traffic and Transport assessment of the potential for impacts arising from the Prospective Development (as described in Chapter 4 to this EIAR and the Decommissioning Management Plan) during works on the existing road network. The assessment identifies the potential effects and proposes the mitigation measures to be put in place to reduce/eliminate those effects. The assessment criteria were scoped with Galway County Council.

A Traffic Management Plan (TMP) has been prepared and is included in Appendix 14-3 of this EIAR.

#### 14.1.1.2 Statement of Authority

This chapter of the EIAR has been prepared by the following staff of TOBIN Consulting Engineers:

Viswas Kutty (Project Engineer Roads and Transportation) holds a B. Tech in Civil Engineering and M.S in Transportation Engineering from Wayne State University, Michigan, USA. He is a Member of Engineers Ireland and has over 15 years' of experience in road and traffic design. He has extensive experience in preparation of EIAR and EIS for environmental projects including Wind Farms.

#### 14.1.1.3 Relevant Guidance

The following relevant standards have been used in the preparation of this chapter:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports.
- Traffic and Transport Assessment Guidelines (TII PE-PDV-02045 May 2014).
- Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (TII PE-PAG-02017, October 2021).

## 14.1.2 Methodology

### 14.1.2.1 Scoping and Consultation

Scoping is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information.

Scoping with Galway County Council (GCC) Roads Department was undertaken on January 30th, 2023. The following elements of the Derrybrien Wind Farm Decommissioning Project were discussed.

- Site works at the site access junctions.
- Haul route for abnormal load traffic.

The main items identified in the scoping included:

- A need to assess the traffic impact associated with the Prospective Development.
- No Road Safety Audit was required as the site access is existing and is currently operating as an operational access.

### 14.1.2.2 Impact Assessment Methodology

The assessment methodology undertaken for this assessment is summarised as follows:

- Review of appropriate guidance to identify appropriate assessment pathways for Prospective Development.
- Characterize the receiving environment through baseline traffic count survey at locations scoped with the Local Authority.
- Undertake predictive calculations to develop the traffic volumes to quantify and assess the potential effects associated with the Prospective Development.
- Specify mitigation measures to reduce, where necessary, the identified potential outward impacts relating to traffic and transportation for Prospective Development.
- Describe the significance of the residual traffic and transport effects associated with the Prospective Development.

### 14.1.2.3 EPA Description of Effects

The significance of effects of the Prospective Development shall be described in accordance with the EPA guidance document guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR), 2022. Details of the methodology for describing the significance of the effects are provided in Chapter 1 – Introduction.

The effects associated with the Prospective Development are described in the relevant sections of this chapter in accordance with the TII guidance refer to section 14.1.4.

#### 14.1.2.4 Assessment Criteria

The following sections review best practice guidance that is commonly adopted in relation to developments similar to this project.

This EIAR chapter follows the guidelines set out by TII in the document TII PE-PAV-02045 "Traffic and Transportation Assessment Guidelines, May 2014". The Traffic and Transportation Assessment is set out as follows:

- A review of the existing and future transport infrastructure in the vicinity of the Prospective Development, including an assessment of 2023 background traffic flows and traffic forecasts during an assumed decommissioning completion year of 2025.
- A description of the nature of the traffic volumes that it will generate during the Prospective Development.
- A description of the Abnormal Indivisible Loads (AILs).
- Vehicles that will require access to the site and a review of the traffic impacts on the proposed routes.
- A review of the potential impacts of the Prospective Development– Potential Effects.
- An identification of mitigation measures – Cumulative Effects.
- An assessment of residual impacts – Residual Effects.

## 14.1.3 Receiving Environment

### 14.1.3.1 Swept Path Analysis (SPA)

The existing geometry of the road network at the junction of R380 and R458, and site entrance for blade (25m), tower (24m x 3.2m) and transformer (90T) have been assessed using swept path analysis using Autodesk AutoCAD Vehicle Tracking.

The swept paths indicate the tightest locations are: Tooravoola bridge, the site entrance to the Windfarm of the Black Road (see Figure14-3), and the right turn onto George's Street (R458) in Gort but the blade and transformer vehicle pass through ok.

Swept paths for blades and towers at Gort (Junction of R380 at R458) are provided in Figures 14-1 and 14-2 below.

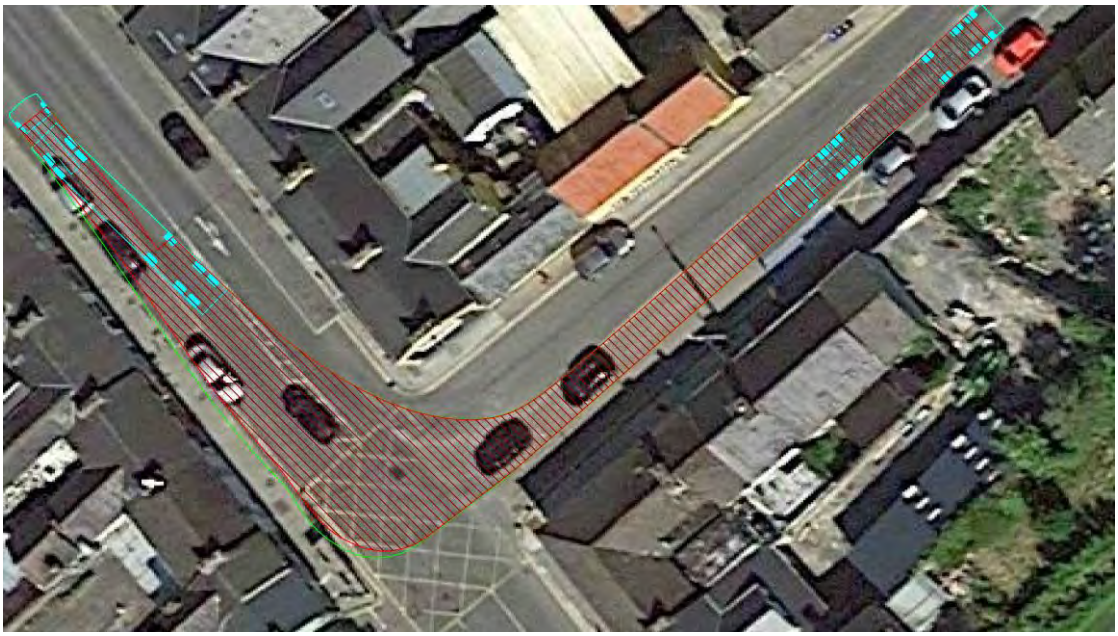


*Figure 14-1 SPA Gort turn blade (Source ESB)*

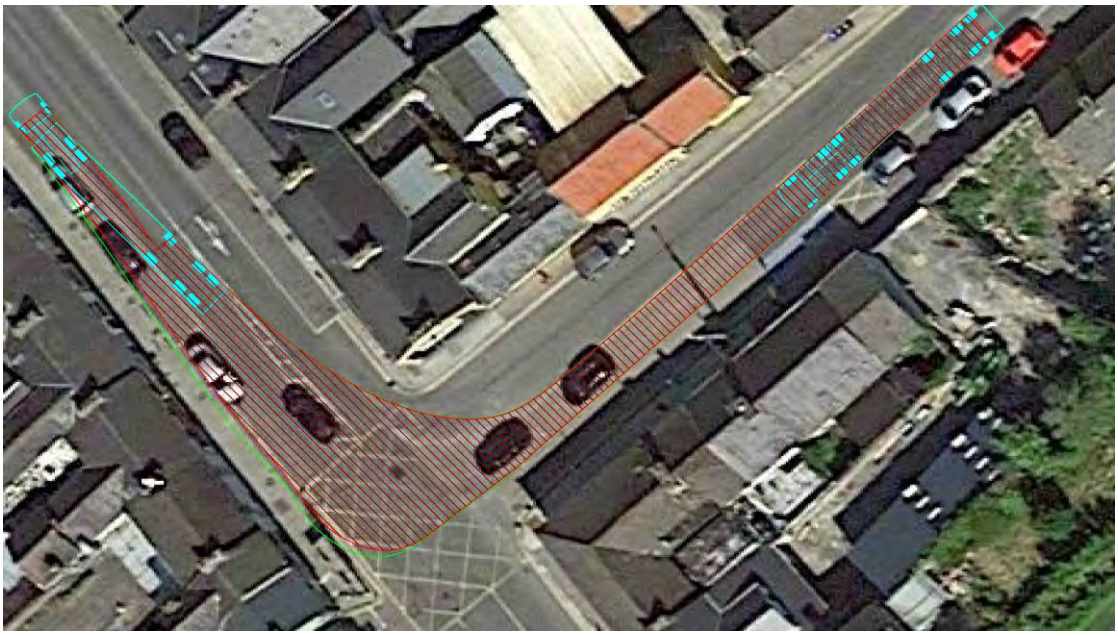


*Figure 14-2 SPA Gort turn tower (Source ESB)*

Swept paths at the site exit for blades and towers are provided in figures 14-3 and 14-4 below.

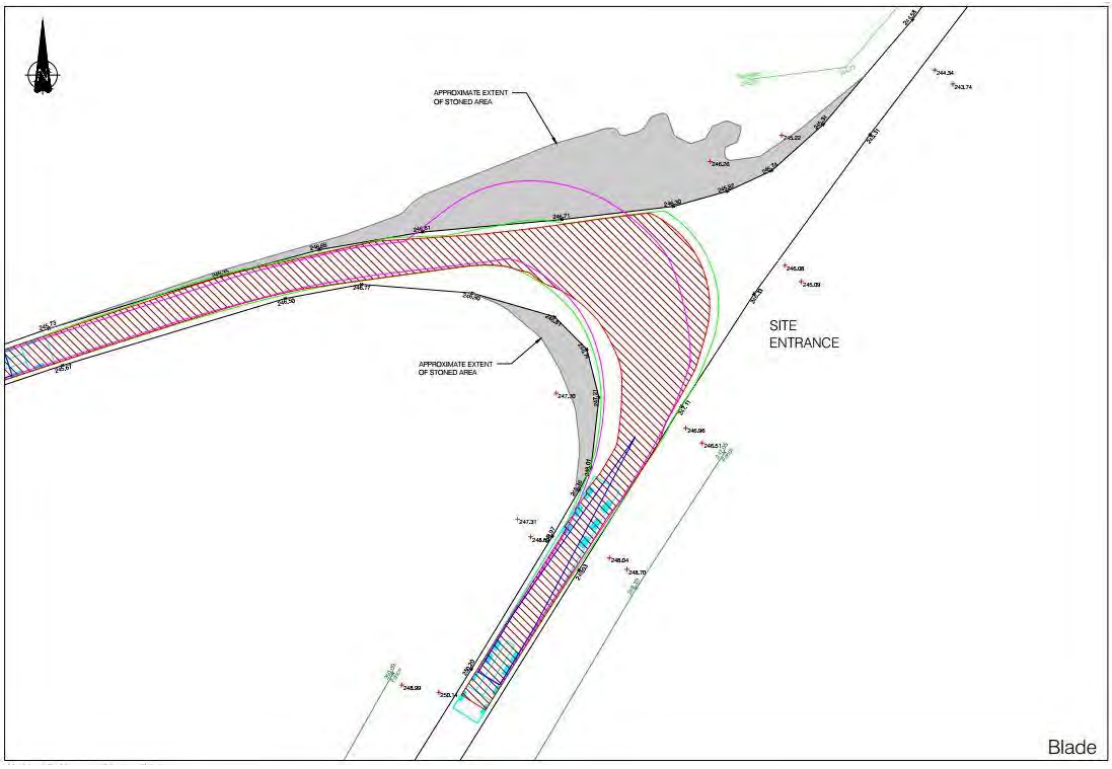



*Figure 14-3 SPA Site exit blade (Source ESB)*

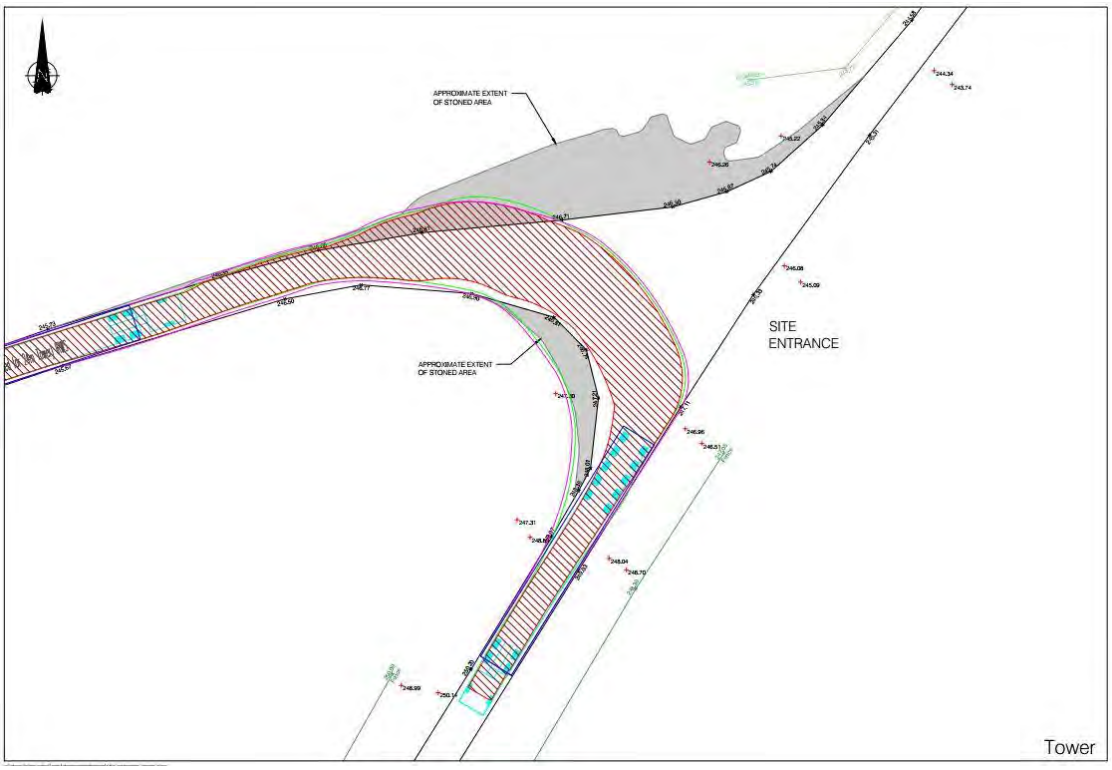



*Figure 14-4 SPA Site exit tower (Source ESB)*

Note: Wheels cross existing hardstand area adjacent the tarmac road as indicated in the SPA figure above. Contractor to ensure level stone on stoned area adjacent tarmac road for safe turn of the vehicle.

A Traffic Management Plan (TMP) has been developed as part of the mitigation measures to address the potential impact of the Prospective Development. Refer to Appendix 14-3 of this EIAR.

### 14.1.3.2 Background Traffic Survey

The TII database did not have background traffic survey data available on R458, R380 and R353 which provides access to the wind farm as indicated in Figures 14-5 to 14-7.

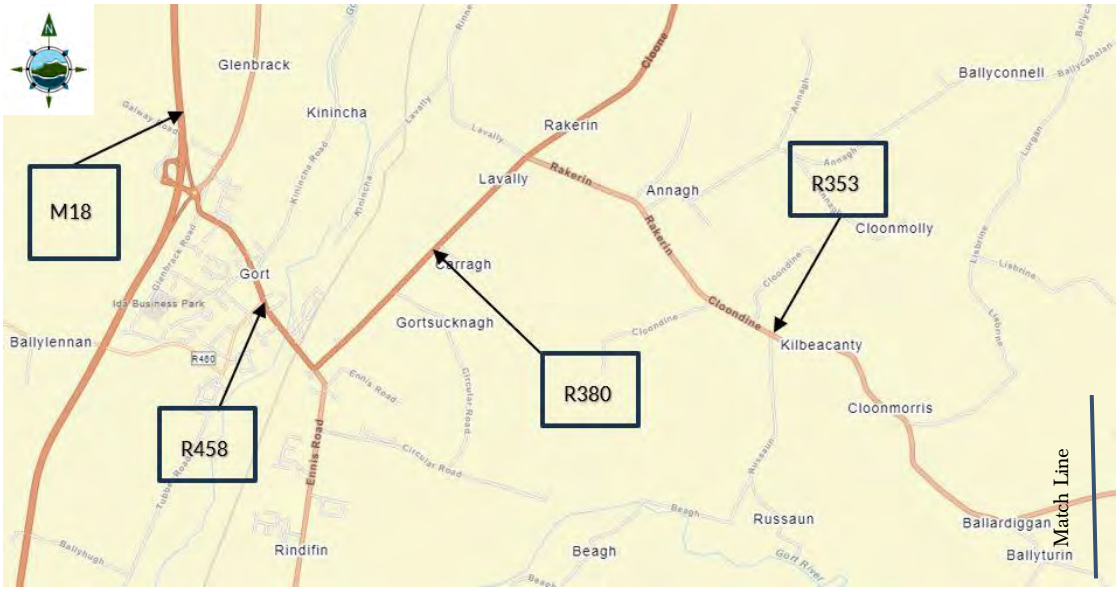



*Figure 14-5 Traffic Count Locations (Source: https://trafficdata.tii.ie/)*




*Figure 14-6 Traffic Count Locations (Source: https://trafficdata.tii.ie/)*

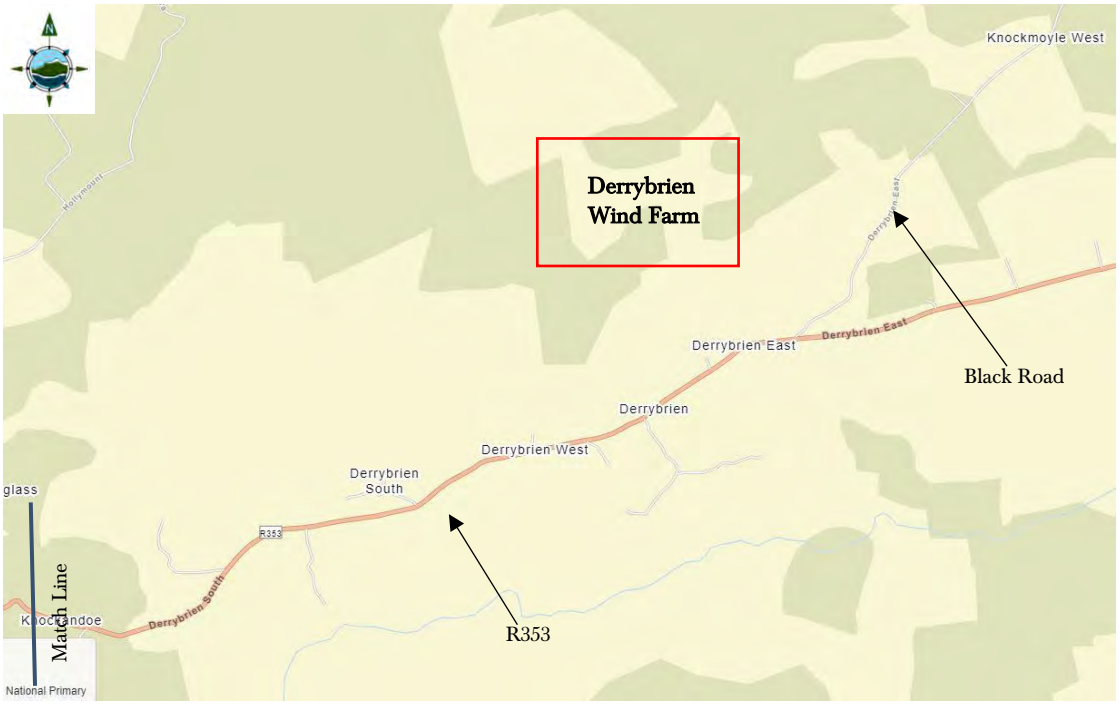



*Figure 14-7 Traffic Count Locations (Source: https://trafficdata.tii.ie/)*

### 14.1.3.3 Traffic Surveys

Turning Movement Counts data was collected on March 28th, 2023 for the R353 regional road at Black Road junction. The traffic surveys were carried out by Tracsis Traffic Data Ltd. The traffic count data file is included in Appendix 14-1 of this report.

### 14.1.3.4 Traffic & Transportation

The existing (year 2023) and decommissioning (year 2025) generated traffic was inputted into the modelling software, Transportation Research Laboratory (TRL) computer program:

- Junction 10 – Picady, used for the analysis of uncontrolled junctions.

The key parameters examined in the results of the analysis are:

- The Ratio of Flow to Capacity Value (RFC) – The desirable RFC values for junctions assessed using PICADY is less than 0.85 Values over 1.00 RFC indicate that the approach arm is over capacity.
- Maximum queue length on all approach to the junctions.
- Average delay for each vehicle passing through the junction during the modelled period.

PICADY requires the following input data:

- Basic modelling parameters (usually peak hour traffic counts synthesized over a 90-minute model period).
- Geometric parameters (including lane numbers and widths, visibility, storage provision etc).
- Traffic demand data (usually peak hour origin/destination table with composition of heavy goods vehicles input).

For the purpose of this report, the varying vehicle types have been segregated into Light Vehicles (LVs) and Heavy Goods Vehicles (HGVs) prior to input. Traffic volumes input into the assessment software were in number of vehicles and accordingly HGV composition was set to the percentage of that arm.

The results of the PICADY analysis are provided in Appendix 14-2 of this report.

### 14.1.3.5 Forecasted Background Traffic Volumes

The existing traffic volumes have been forecasted to the year corresponding to the end of the decommissioning period in the year 2025 (i.e. decommissioning period for 2 years). The 2025 year turning movement counts for R353 at Black Road (L-4214) was obtained by multiplying the growth rates in accordance with TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (October 2021). The forecasted baseflow traffic for the year 2025 is based on Central Growth Rates for the associated county value in accordance with TII Guidelines. The values are provided in Table 14-1.

*Table 14-1. Link-Based Growth Rates: County Annual Growth Rates (excluding Metropolitan Area)*

| PE-PAG-02017 | Growth Rates | County | 2016-2030 | |
|---|---|---|---|---|
| | | | LV | HV |
| Table 6.2 | Central Growth Rates | Galway | 1.0259 | 1.0446 |

### 14.1.3.6 Prospective Development Traffic Generation

**Derrybrien Wind Farm**: During the decommissioning works, a wide range of mechanical plant will be mobilised to the wind farm site. This plant will be generally kept on the site and not removed from the site until it has fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type of activity on site over the period of decommissioning.

The type and number of LV at the Derrybrien Wind Farm Development site during the peak decommissioning works will comprise of the vehicles as identified in table 14.2 below:

*Table 14-2. Type and number of LV vehicles during decommissioning for Derrybrien Wind Farm Development site*

| Type of Vehicle (LV) at Derrybrien Wind Farm Development site | Number of LV during decommissioning at Derrybrien Wind Farm Development site |
|---|---|
| Personnel 4X4 vehicles | 3-40 |
| Total | 40 (per day) |

The type and number of HGV at the Derrybrien Wind Farm site during the peak decommissioning works will comprise of the vehicles as identified in table 14-3 below.

*Table 14-3. Type and number of HGV vehicles during decommissioning for Derrybrien Wind Farm Development site*

| Type of Vehicle (HGV) at Derrybrien Wind Farm Development site | Number of HGV during decommissioning at Derrybrien Wind Farm Development |
|---|---|
| Excavators | 2 |
| Dumpers | 2 |
| Roller | 1 |
| Tractor and diesel bowser | 1 |
| Tractor and trailer | 1 |
| JCB | 1 |
| Mobile task lighting generator | 2 |

| Type of Vehicle (HGV) at Derrybrien Wind Farm Development site | Number of HGV during decommissioning at Derrybrien Wind Farm Development |
|---|---|
| Mobile pumps | 1 |
| Water bowser | 1 |
| Mobile Crane 60 ton for dismantling wind turbines | 2 |
| Mobile Crane (50 ton (2)) and ancillary support vehicles | 3 |
| Mobile Crane (300 ton (2)) and ancillary support vehicles | 5 |
| 3 & 4 axle lorries | 2 |
| HGV vehicles to take waste, containers, skips, materials etc. | 10 |
| HGV with imported stone for potholes | 2 |
| HGV with imported stone to widen the turbary road | 25 |
| Total | 61 (per day) |

HGVs will access to and egress from the wind farm site entrance via Black Road from the R353. Empty HGVs will be permitted to travel either south or north of the wind farm site entrance, to avoid congestion.

During the construction of the wind farm, a number of road and junction improvements were completed to provide access to the site during turbine delivery. All these accommodation areas remain in place for use during decommissioning and turbine component removal. No additional works are required.

**Derrybrien Substation:** During the decommissioning, a range of mechanical plant will be mobilised to the wind farm substation site. This plant will be generally kept on the site and not removed from the site until it has fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type of activity over the period of the Prospective Development works. The type and number of Light Vehicles at the Derrybrien Substation during the peak decommissioning works will comprise of the vehicles as identified in the table 14-4 below:

*Table 14-4. Type and number of LV vehicles during decommissioning for Derrybrien Substation*

| Type of Vehicle (LV) at Derrybrien Substation | Number of LV during decommissioning at Derrybrien Substation |
|---|---|
| Personnel vehicles | 16 |
| Total | 16 (per day) |

The type and number of Heavy Goods Vehicles (HGV) at the Derrybrien Substation during the peak decommissioning works will comprise of the vehicles as identified in table 14.5 below:

*Table 14-5. Type and number of HGV vehicles during decommissioning for Derrybrien Substation*

| Type of Vehicle (HGV) at Derrybrien Substation | Number of HGV during decommissioning at Derrybrien Substation |
|---|---|
| Mobile task lighting generator | 2 |
| MEWPS | 2 |
| Forklifts/Teleporters | 1 |
| Hi ab | 2 |
| Cherry pickers | 2 |

| Type of Vehicle (HGV) at Derrybrien Substation | Number of HGV during decommissioning at Derrybrien Substation |
|---|---|
| HGV vehicles to take waste, containers, skips, | 10 |
| Mobile Crane (800 ton (1)) and ancillary | 5 |
| Mobile Crane (50 ton (1)) and ancillary support | 3 |
| Excavator | 1 |
| Total | 28 (per day) |

**OHL Decommissioning:** During the decommissioning a small range of mechanical plant will be mobilised to the works location when it is required. This plant will be generally kept on the site, moved from location to location and not removed from the site until it had fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type of activity over the period of decommissioning. The type and number of Light Vehicles at the OHL decommissioning site during the peak decommissioning works will comprise of the vehicles as identified in the table 14-6 below:

*Table 14-6. Type and number of LV vehicles during decommissioning for OHL Decommissioning*

| Type of Vehicle (LV) at OHL Decommissioning | Number of LV during decommissioning at OHL |
|---|---|
| Personnel vehicles | 6 |
| Total | 6 (per day) |

The type and number of HGV at the Derrybrien Substation during the peak decommissioning works will comprise of the vehicles as identified in table 14-7 below:

*Table 14-7. Type and number of HGV vehicles during decommissioning for OHL Decommissioning*

| Type of Vehicle (HGV) at OHL Decommissioning | Number of HGV during decommissioning at OHL site |
|---|---|
| Tracked excavator | 2 |
| Tracked dumpers | 2 |
| Tractor and diesel bowser | 1 |
| Tractor and trailer | 1 |
| 3 & 4 axle lorries | 2 |
| Mobile task lighting generator | 2 |
| Total | 10 (per day) |

Access to the overhead line structures is from nearby roads and forestry tracks.

**Agannygal Substation Decommissioning:** During the decommissioning a wide range of mechanical plant will be mobilised to the Agannygal Substation site. This plant will be generally kept on the site and not removed from the site until it has fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type of activity on site over the period of decommissioning. The type and number of Light Vehicles (LV) at the Agannygal Substation during the peak decommissioning works will comprise of the vehicles as identified in table 14-8 below:

*Table 14-8. Type and number of LV vehicles during decommissioning for Agannygal Substation*

| Type of Vehicle (LV) at Agannygal Substation | Number of LV during decommissioning at Agannygal Substation |
|---|---|
| Personnel 4-wheel drive vehicles | 16 |
| Total | 16 (per day) |

The type and number of Heavy Goods Vehicles (HGV) at the Agannygal Substation during the peak decommissioning works will comprise of the vehicles as identified in table 14-9 below:

*Table 14-9. Type and number of HGV vehicles during decommissioning for Agannygal Substation*

| Type of Vehicle (HGV) at Agannygal Substation | Number of HGV during decommissioning at Agannygal Substation |
|---|---|
| Mobile task lighting generator | 2 |
| MEWPS | 2 |
| Forklifts/Teleporters | 1 |
| Hi ab | 2 |
| Cherry pickers | 2 |
| Mobile Crane (60 ton (1)) and ancillary support | 2 |
| HGV vehicles to take waste, containers, skips, | 10 |
| Excavator | 1 |
| Total | 22 (per day) |

The AM and PM peak vehicles (LV and HGV) passing through R353 and Black Road junction to access Derrybrien Wind Farm Development site, Derrybrien Substation, Agannygal Substation and OHL decommissioning site are provided in table 14-10 below:

*Table 14-10. AM & PM Peak Vehicles (LV & HGV) passing through R353 at Black Road Junction*

| Works Zone | Classification | AM Peak | PM Peak |
|---|---|---|---|
| Derrybrien Wind Farm Development site, Derrybrien Substation, Agannygal Substation & | LV | 39 | 39 |
| | HGV | 60 | 60 |

### 14.1.3.7 Working Hours

The duration of the Prospective Development is expected to be approximately 24 months. Decommissioning activities will occur between the hours of 07:00 and 19:00 on Monday to Friday, between 08:00 and 13:00 on Saturdays and there will be no activity on Sundays or Bank Holidays. Due to the nature of the works, there will be occasions during the Prospective Development where extended working hours will be required. In particular, during the transport of the turbine components.

Where additional or alternative working hours are required, these will be agreed in advance with Galway County Council.

### 14.1.3.8 Existing Road Safety

The site access is existing and operational for the Derrybrien Wind Farm and Coillte operations. As no changes or modifications are proposed to the existing access it was agreed that a Road Safety Audit (RSA) is not required.

### 14.1.3.9 Site Access

Overview of abnormal load haul routes for turbine components and transformer is shown in Figure 14-8

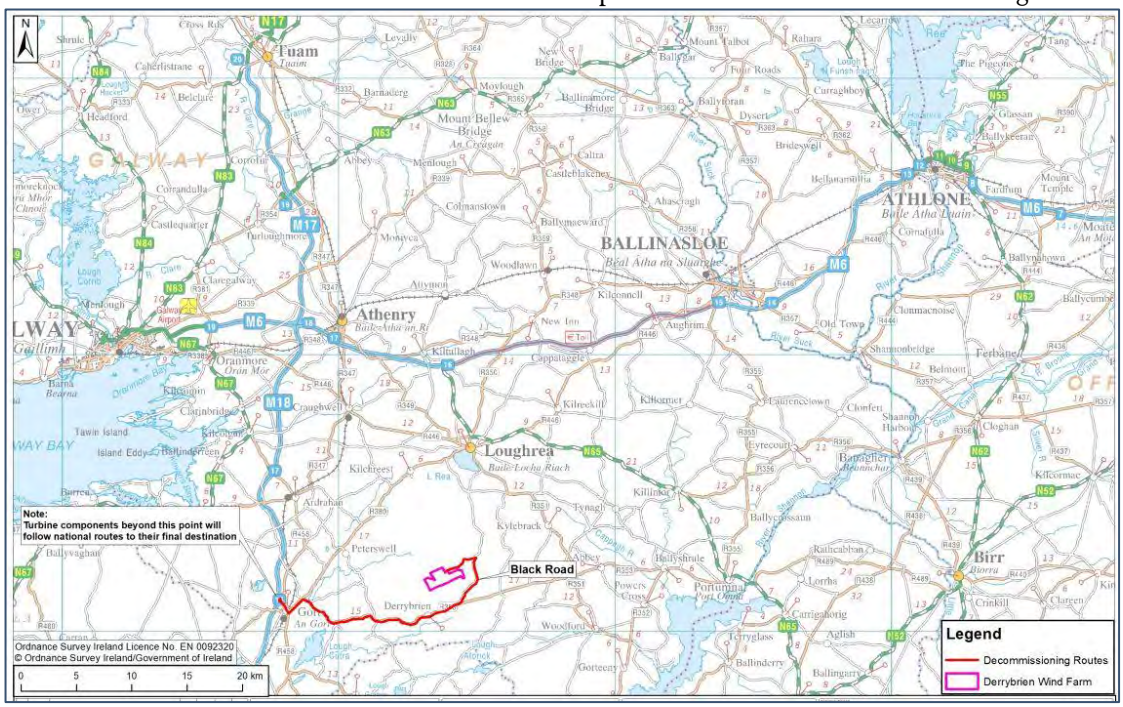



*Figure 14-8 Haul route from M18 (Source: ESB)*

Route details from M18 to site is shown in Plate 14-1. From southbound M18, exit at Junction 16, Loughrea & Gort.




*Plate 14-1 Exit from M18 (Source: ESB)*

Drive down exit ramp to roundabout, take the second exit onto Crowe Street (R458) as shown in Plate 14-2.



*Plate 14-2 Exit from R458 (Source: ESB)*

Continue to approximately 1.3 km to left turn for Loughrea road (R380), Turn left onto Loughrea road as shown in Plate 14-3.



*Plate 14-3 Left turn to R380 (Source: ESB)*

Continue on R380 for approximately 1.8 km to crossroads with R353, turn right onto R353 as shown in Plate 14-4.

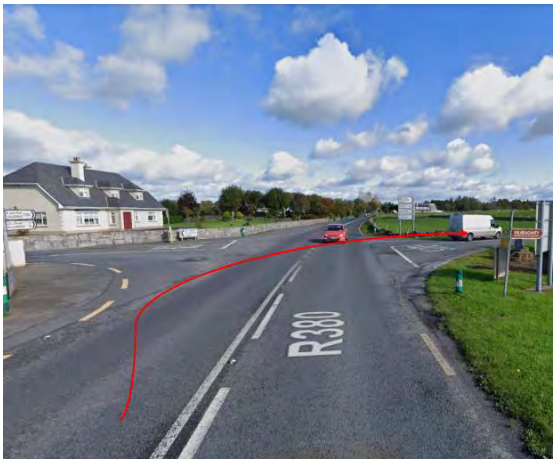



*Plate 14-4 Right turn to R353 (Source: ESB)*

Turn right and drive for 16 km to junction with Black Road, take left turn onto the Black Road as shown in Plate 14-5.



*Plate 14-5 Left turn to Black Road (Source: ESB)*

Site entrance has been reconfigured to restrict parking and mitigate the risk of illegal dumping; this must be restored to suit abnormal load constraints as shown in Plate 14-6.



*Plate 14-6 Status of site entrance (Source: ESB)*

Overview of Wind Farm and Substation HGV haul routes is shown in Figure 14-9.

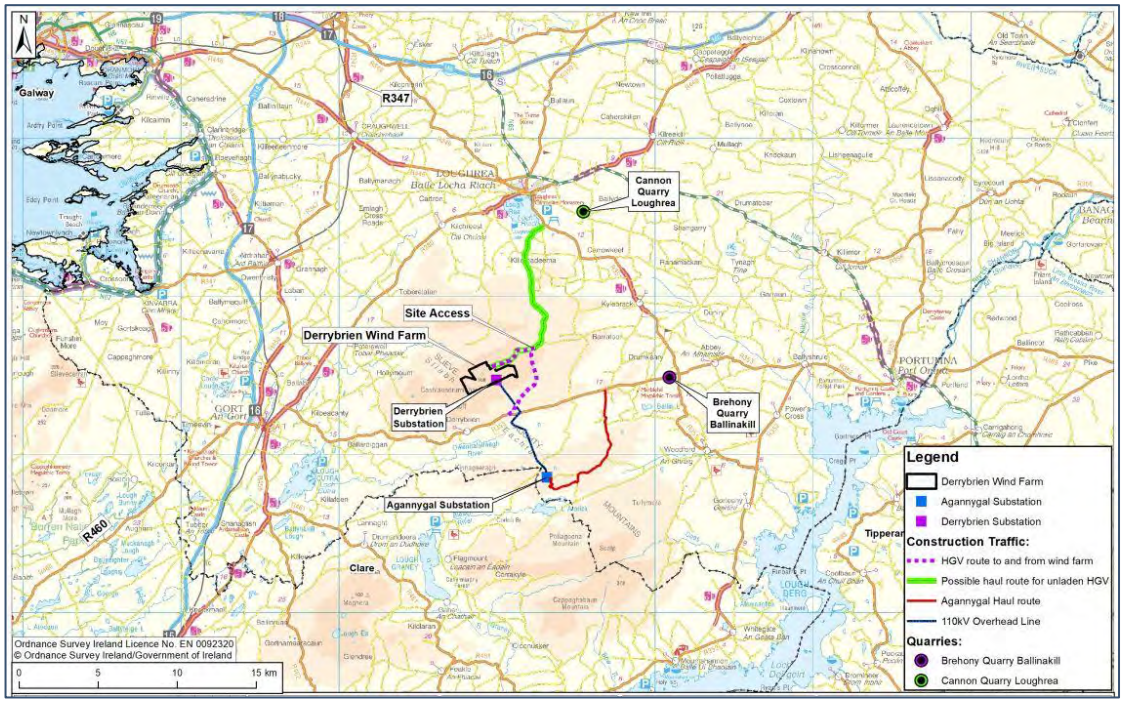



*Figure 14-9 Wind Farm & Substation HGV Haul Route (Source: ESB)*

Overview of Overhead Line HGV Haul Route is shown in Figure 14-10.

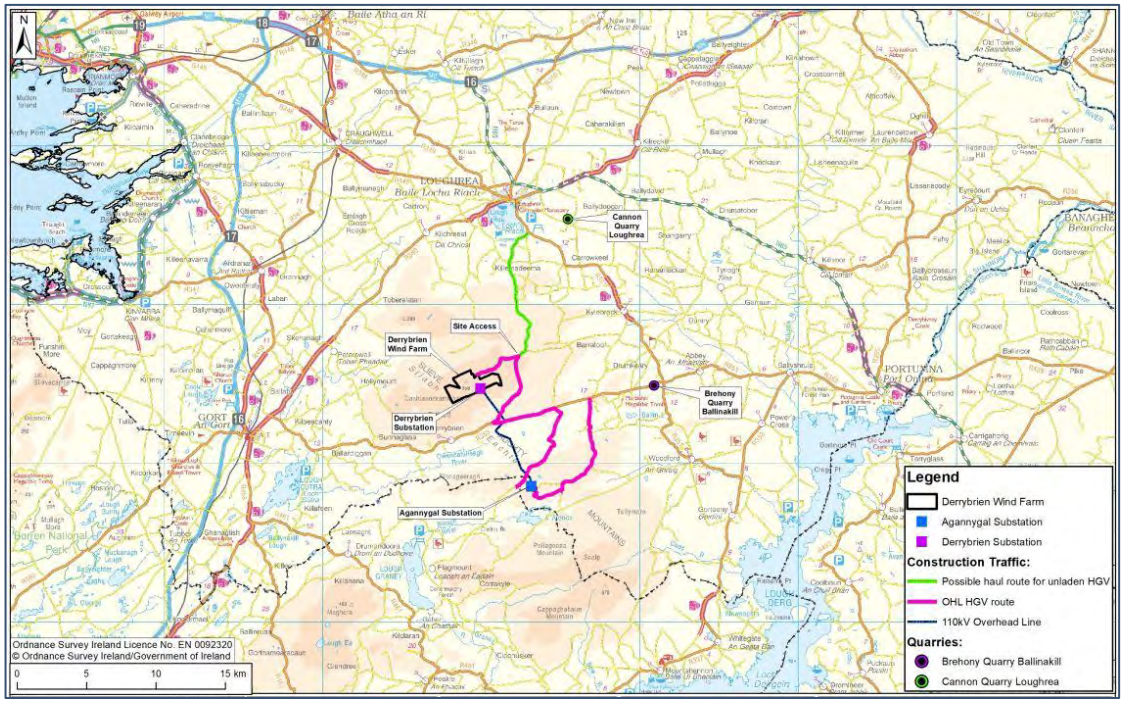



*Figure 14-10 Overhead Line HGV Haul Route (Source: ESB)*

### 14.1.3.10 Existing Bridges

Existing bridges/culverts on the Derrybrien wind farm access route from M18 to site location is provided in Figure 14-11. The details of these bridges/culverts are provided in Table 14-11.

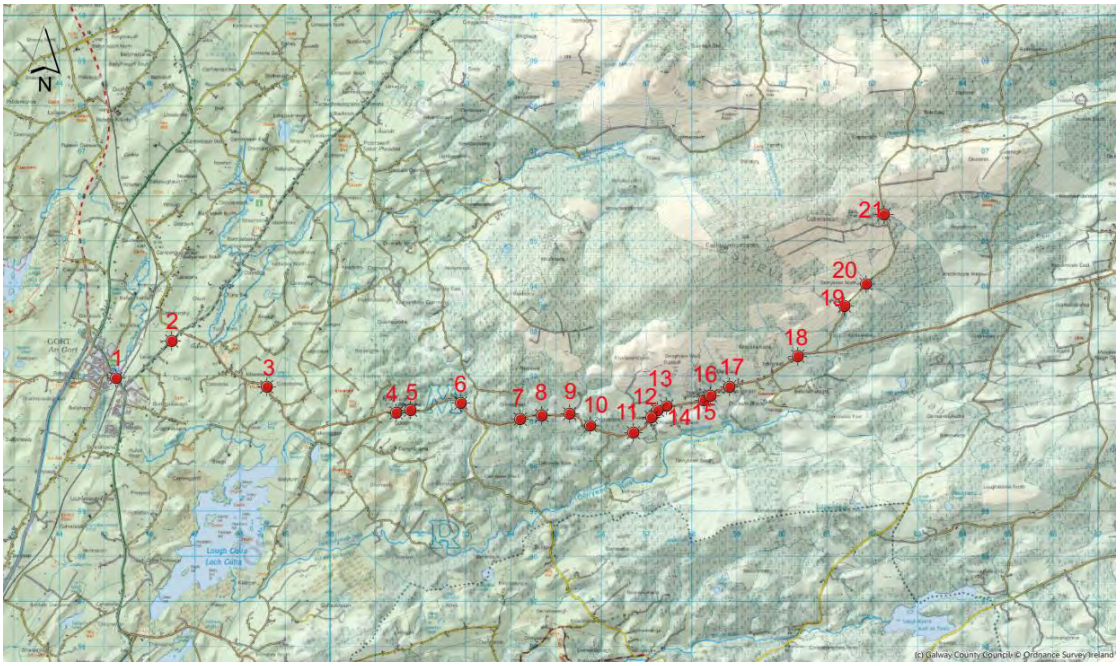



*Figure 14-11 Existing Bridges/Culverts along access route (Source: GCC)*

*Table 14-11. Existing Bridges/Culverts location (Source: GCC)*

| Bridges shown on PMS | Road No. | Note | Number on Map | Co-ordinates |
|---|---|---|---|---|
| Gort River Bridge | R458 | | 1 | E 545219 N 701980 |
| Rakerrin Bridge | R380 | | 2 | E 546475 N 702831 |
| Cloonmorris | R353 | | 3 | E 548576 N 701801 |
| Shaughnessy's Bridge No.2 | R353 | | 4 | E 551433 N 701228 |
| Gorteenboy Bridge 1 | R353 | | 5 | E 551742 N 701277 |
| Bunnaglass Bridge 1 BR 497 | R353 | Difficult to inspect due to vegetation. | 6 | E 552851 N 701450 |
| Bunnaglass Bridge 3 BR 967 | R353 | Difficult to inspect due to vegetation. | 7 | E 554183 N 701091 |
| Bunnaglass Bridge 2 BR 498 | R353 | Difficult to inspect due to vegetation. | 8 | E 554618 N 701168 |
| Tooravoola 1 BR 499 | R353 | Crack on parapet wall. Difficult to access. | 9 | E 555274 N 701200 |
| Tooravoola Bridge 2 | R353 | | 10 | E 555730 N 700947 |
| Tooravoola 3 | R353 | Difficulties locating. | 11 | E 556680 N 700793 |
| Knocklouracarnaun 1 BR 501 | R353 | Difficult to access. | 12 | E 557065 N 701120 |

| Bridges shown on PMS | Road No. | Note | Number on Map | Co-ordinates |
|---|---|---|---|---|
| Knocklouracarnaun 2 BR 502 | R353 | About 2m of parapet wall is knocked. There are 2 sets of Pattress Plates on this Bridge | 13 | E 557225 N 701279 |
| Knocklouracarnaun 3 Bridge No.3 | R353 | Parapet walls covered in growth. | 14 | E 557401 N 701372 |
| Tooreen Bridge 1 | R353 | Too much growth for proper inspection. | 15 | E 558262 N 701504 |
| Derrybrien 1 BR 504 | R353 | One parapet wall is undermined. | 16 | E 558390 N 701597 |
| Derrybrien Bridge 3 BR 969 | R353 | One parapet wall is cracked. | 17 | E 558808 N 701819 |
| Derreen Bridge BR 71 | R353 | One parapet wall covered in growth. | 18 | E 560334 N 702487 |
| Derrybrien North 2 BR 427 | L-4214 | | 19 | E 561365 N 703610 |
| Derrybrien Bridge 1 BR 424 | L-4214 | | 20 | E 561840 N 704086 |
| Coppanagh Bridge 3 BR 868 | L-4214 | Possibly a slipping stone or bulging in abutment. One end of parapet wall knocked. | 21 | E 562230 N 705633 |

## 14.1.4 Traffic Assessment

The assessment for estimated traffic has been developed to account for the anticipated Prospective Development traffic volumes and their impact on the public road network. The traffic calculations have been modelled using Junction 10 PICADY software by Transport Research Laboratory, a reputable modelling software used in the assessment of the priority and crossroad junction capacities.

### 14.1.4.1 Traffic Counts and Peak Hour

Engagement with Galway County Council (Roads Department) determined the location and time periods for traffic counts. The traffic counts were undertaken at the Junction of R353 Regional Road and Black Road from 07:00 to 19:00 (12 hours duration). Assessment of the traffic count data identified the morning peak flows from 07:45 to 08:45. The evening peak occurred between the hours 17:15 to 18:15.

### 14.1.4.2 Baseflow Traffic, Seasonal Adjustment & Assessment Years

In order to undertake an analysis of key junctions, it is sometimes necessary to apply a correction factor to convert the traffic count data into seasonally adjusted traffic flows to take account of the seasonal variation that is experienced with traffic volumes. The traffic counts undertaken include for baseflow traffic.

A review of traffic count information available from Transport Infrastructure Ireland (TII) Live Traffic Counters was undertaken. The traffic counter selection was based on proximity to the site as below:

- TMU N66 020.0 W: N66 between Loughrea and Gort, Gortaloman, Co. Galway.

A comparison was undertaken between the TII traffic count information for the day of the survey on the 28th of March 2023 against the Annual Average Daily Traffic (AADT). The traffic count on the day of the survey was only 61 vehicles more than the average of the year. Therefore, a seasonal adjustment factor of 1.0 was used for this junction.

In accordance with the Traffic and Transportation Guidelines 2014, the junction assessment is to include for the year of operation and the design years plus 5 and 15 years from operation. However, as the Prospective Development pertains to decommissioning works, the analysis was carried for the following scenarios only:

- Base year 2023.
- Opening year 2025 without Prospective Development traffic.
- Opening year 2025 with Prospective Development traffic.

The seasonally adjusted baseflow traffic was forecasted using the Project Appraisal Guidelines (PAG) Unit 5.3, in accordance with Table 6.2 County Galway and Central Growth Rates are applied to the junction for the opening year 2025 with Prospective Development traffic.

#### 14.1.4.3 Peak Hour Traffic Volumes

Junction R353 Regional Road at Black Road schematic with arm designation is provided in Figure 14-12.

Base year 2023 AM peak hour traffic volumes is provided in Figure 14-13. And PM peak hour volumes is provided in Figure 14-16.

Opening year 2025 AM peak hour traffic volumes without Prospective Development is provided in Figure 14-14. And PM peak hour traffic volumes is provided in Figure 14-17.

Opening year 2025 PM peak hour traffic volumes with Prospective Development is provided in Figure 14-18. And PM peak hour traffic volumes is provided in Figure 14-15.

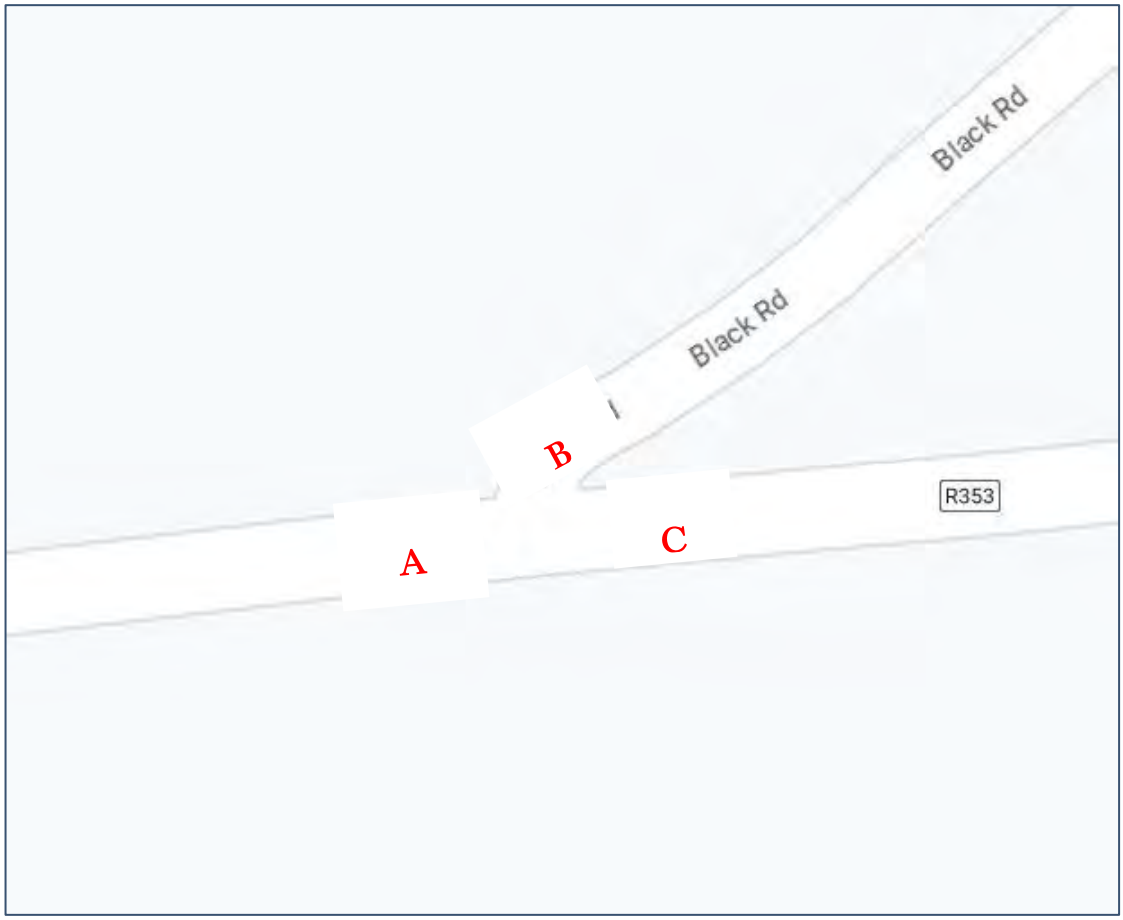



*Figure 14-12 Junction R353 Regional Road at Black Road Schematic with arm designation*

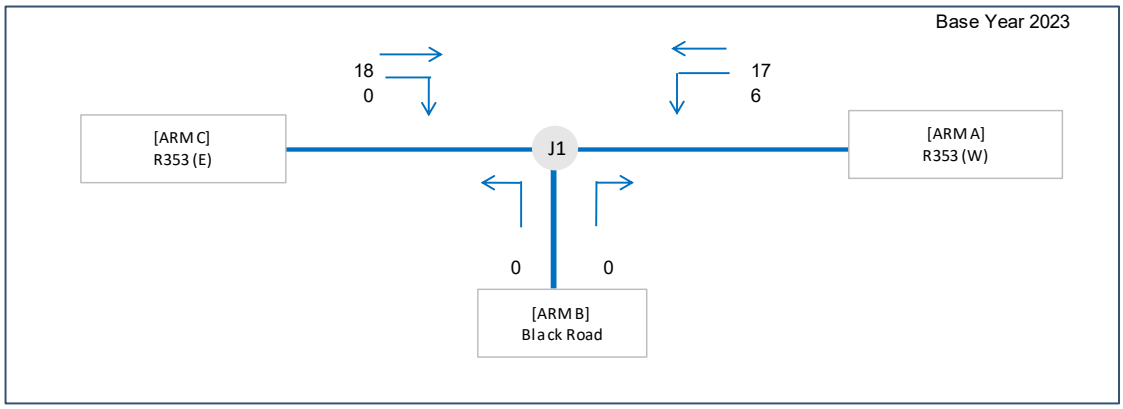



*Figure 14-13 Base year 2023 AM peak hour traffic volumes*

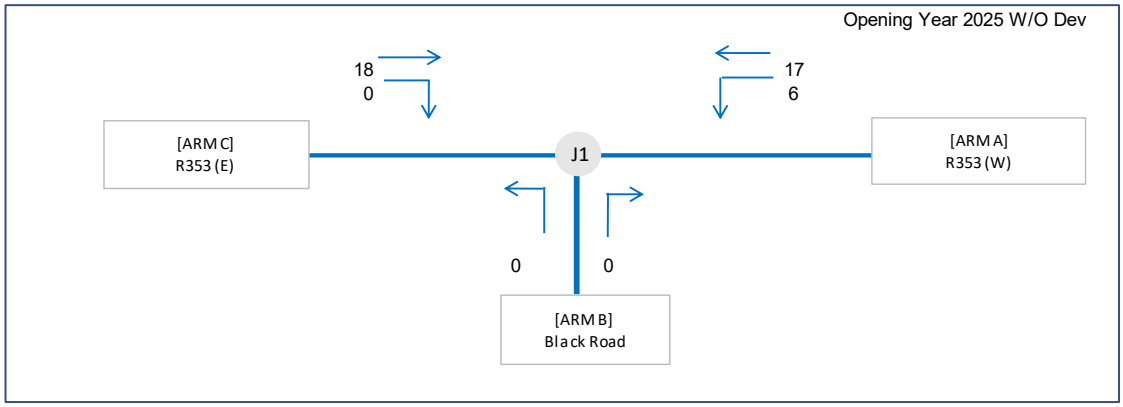



*Figure 14-14 Opening year 2023 AM peak hour traffic volumes without Prospective Development*

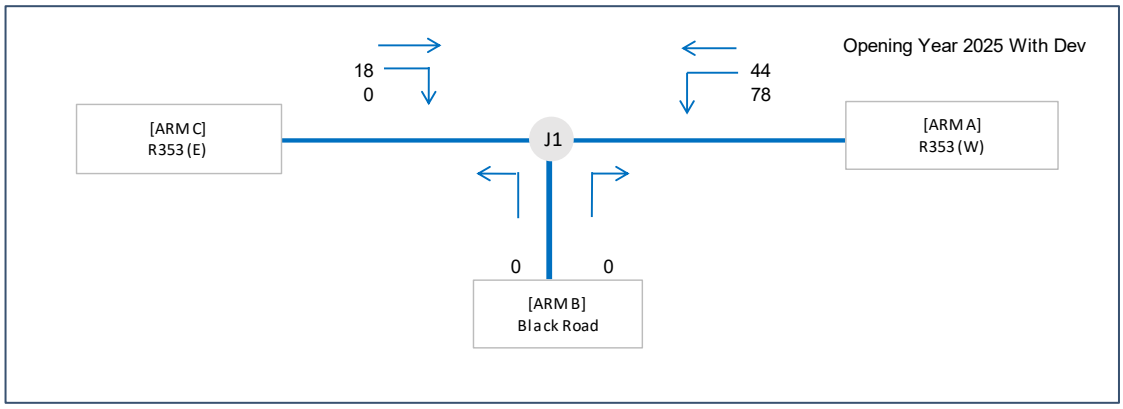



*Figure 14-15 Opening year 2023 AM peak hour traffic volumes with Prospective Development*

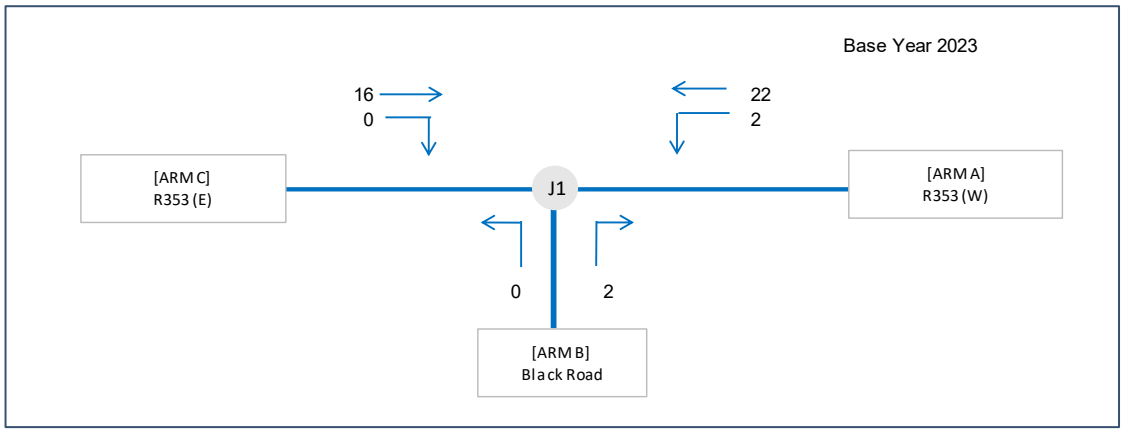



*Figure 14-16 Base year 2023 PM peak hour traffic volumes*

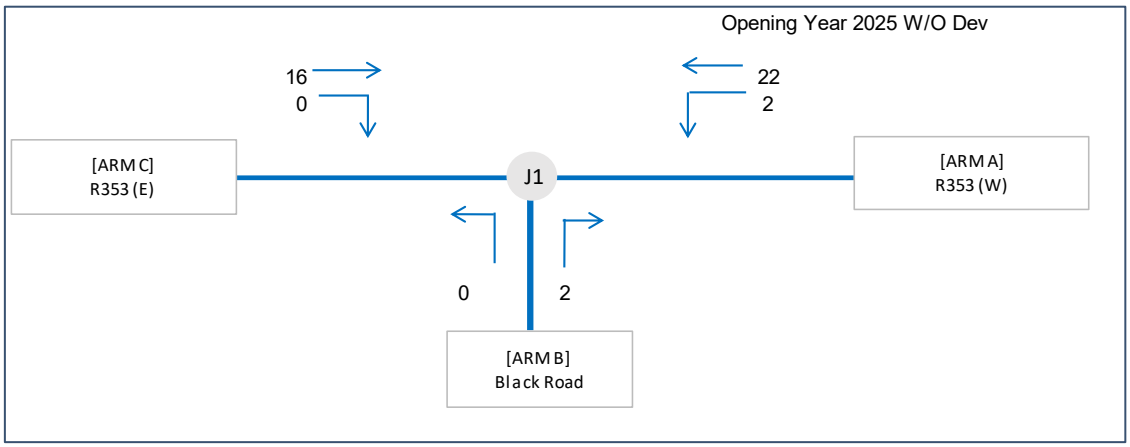



*Figure 14-17 Opening year 2025 PM peak hour traffic volumes without Prospective Development*

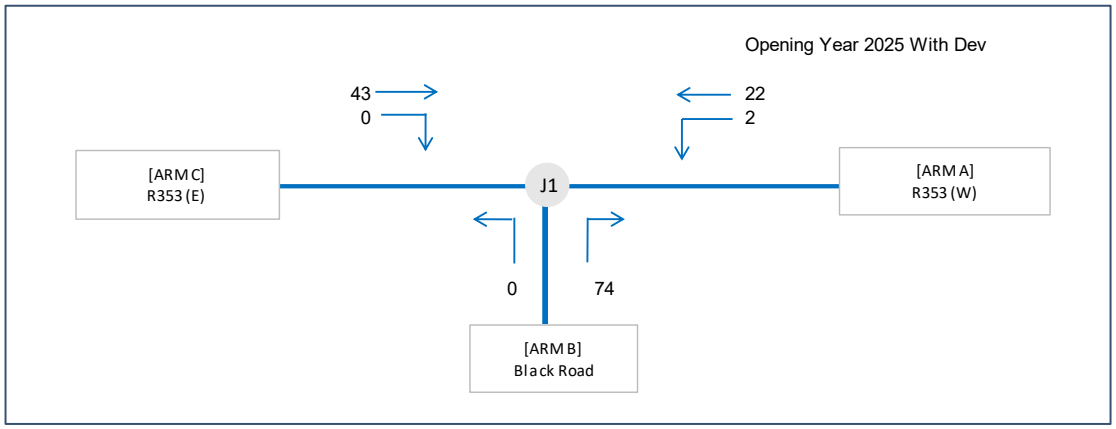



*Figure 14-18 Opening year 2025 PM peak hour traffic volumes with Prospective Development*

### 14.1.4.4 Junction Analysis

The junction R353 at Black Road was assessed using computer program Junction 10 PICADY, a widely accepted tool used for the analysis of uncontrolled junctions. The junction was assessed for the critical AM and PM peak hour for the existing baseflow traffic, no Prospective Development traffic and Prospective Development traffic. The key model parameters examined in the results of the analysis are the Ratio of Flow to Capacity Value (RFC), maximum queue length on any approach to the junctions and the average delay for each vehicle passing through the junction during the modelled period. The desired RFC value is 0.85 or less with values over 1.00 indicating the approach arm is over capacity.

A summary of the junction analysed using Junction 10 PICADY is provided in Table 14-12. with detailed outputs in Appendix 14-2.

*Table 14-12.Picady Summary: Junction R353 @ Black Road*

| | AM | | | PM | | |
|---|---|---|---|---|---|---|
| | Queue (Veh) | Delay (s) | RFC | Queue (Veh) | Delay (s) | RFC |
| | Base Year 2023 | | | | | |
| Stream B-AC | 0 | 0 | 0 | 0 | 0 | 0 |
| Stream C-AB | 0 | 0 | 0 | 0 | 0 | 0 |
| | No Dev - Year of Opening [2025] | | | | | |
| Stream B-AC | 0 | 0 | 0 | 0 | 0 | 0 |
| Stream C-AB | 0 | 0 | 0 | 0 | 0 | 0 |
| | With Dev - Year of Opening [2025] | | | | | |
| Stream B-AC | 0 | 0 | 0 | 0.3 | 14.64 | 0.25 |
| Stream C-AB | 0 | 0 | 0 | 0 | 0 | 0 |

The results of the PICADY analysis are discussed in the following sections.

#### 14.1.4.5 Existing Baseflow Traffic (Year 2023)

The results indicate that the baseflow traffic will operate below the maximum desirable RFC of 0.85 for both the AM and PM peak hours.

#### 14.1.4.6 Opening Year Traffic (Year 2025 without Prospective Development Traffic)

The results indicate that the opening year traffic without Prospective Development traffic will operate below the maximum desirable RFC of 0.85 for both the AM and PM peak hours.

#### 14.1.4.7 Opening Year Traffic (Year 2025 with Prospective Development Traffic)

The summary of the junction performance analysis in Table 14-13 indicates that Junction R353 at Black Road will operate within capacity, with max RFC of 0.25 encountered at the junction well below the maximum desired RFC of 0.85.

The summary indicates that there will be negligible queues and minimal delays during both the peak hours for both the do-nothing (i.e. no Prospective Development) and do-something scenarios (i.e. with Prospective Development).

A comparison of the do-nothing and do-something scenarios indicates a minor impact by the Prospective Development on the junction.

## 14.1.5 Likely Significant Effects and Mitigation Measures Implements

### 14.1.5.1 Do-Nothing Scenario

If the Prospective Development is not progressed, the existing traffic and transportation environment will remain largely unchanged. In the absence of the Prospective Development, increases in traffic volumes on the road network would be expected gradually over time due to annual growth rates in traffic as per the TII PE-PAG-02017.

### 14.1.5.2 Impacts of the Prospective Development

During the Prospective Development, cranes will disassemble each turbine tower and all equipment. All infrastructure including turbine components will be separated and removed off-site for re-use, recycling or disposal in an appropriate manner.

The volume of traffic associated with the Prospective Development is significantly less than the construction stage as the turbine foundation and internal access roads will be retained. The large volume of stone aggregate and concrete brought to site during the construction stage will not be required for decommissioning. The overall traffic associated with the Prospective Development is likely to have a slight adverse temporary effect.

On completion of the prospective works, the adjacent sites will still facilitate turbary, forestry and agriculture. These uses will not have a significant impact on the road network as they are existing operations occurring in the absence of the Wind Farm.

With respect to the EPA's criteria for description of effects, the potential worst-case associated effects of the Prospective Development will be similar to the construction phase effect. Based on the junction assessment output as outlined in Table 14-12, the EPA Criteria effect during the Prospective Development is as outlined in Table 14-13.

*Table 14-13.Decommissioning Traffic – EPA Criteria Effect*

| Extent | Scenario | Significance | Duration |
|---|---|---|---|
| R353 | Prospective Development | Slight Adverse | Short Term |

The above effects should be noted as the worst-case scenario, as a number of deliveries required for the construction of infrastructure will not be required at decommissioning.

#### 14.1.5.2.1 *Proposed Mitigation Measures*

The assessment indicates that the Prospective Development will have a slight adverse effect. To reduce the impact on the environment to negligible the following will be undertaken.

The decommissioning of the Wind Farm will be as per the Traffic Management Plan (TMP) prepared for this project (Appendix 14-3).

The TMP is a live document drafted during the planning stage and will be upgraded as the Prospective Development progresses, taking into account of any road improvements and changes to the network.

When the turbine blades are decommissioned, it is envisaged they will be removed intact.

The large volume of aggregate material and concrete that was imported to site during construction will remain onsite. The principal expected volumes of traffic will be primarily associated with the transportation off-site of turbine components and significantly reduced volume of materials only (i.e. retention of wind farm access tracks , turbine foundations, hard stand areas, etc.).

The number of oversized loads leaving the site will be minimised to the greatest extent practicable by consolidation of loads where safe and feasible.

#### 14.1.5.2.2 *Residual Impact*

As the expected volumes of traffic are low and primarily associated with the transportation off-situ of turbine components and materials only, the residual impact is considered to be not significant and temporary in duration.

#### 14.1.5.2.3 *Significance of Effects*

There will be no significant effects on traffic or transportation as a result of the Prospective Development.

### 14.1.5.3 Cumulative Effects and In-Combination Effects

Cumulative developments are referred to in roads terminology as per the TTA Guidelines as committed developments. A committed development is a development that has been granted planning (typically in the previous 5 years) and is not constructed. Committed developments are considered in the TTA assessment to get a cumulative understanding of the future baseflow traffic volumes on the road network, that have not been captured within the traffic counts as these developments are pending construction. Based on the National Planning Application Database, planning application numbers are not available within the vicinity of the Derrybrien Wind Farm project within the past 5 years.

The Retained Development is also considered cumulatively with the Prospective Development. It is proposed that internal windfarm access tracks, turbine foundations and hard standing areas will be left *in situ*. It is considered that leaving the turbine foundations, access tracks and hard standing areas *in situ* will cause less environmental damage than removing and recycling them. The impact on traffic will be negligible and there is no potential for cumulative traffic and transporation effect with the Prospective Development..

## 14.1.6 Conclusion

The EIAR was undertaken at the junction of R353 regional road and Black Road. The assessment (i.e. Junction 10 PICADY Modelling) was undertaken in accordance with the TII Guidance.

During the Prospective Development, the potential traffic effects at the junction of R353 regional road and Black Road was assessed. The assessment was carried out for both AM and PM peak hours for the Prospective Development traffic to assess the junction capacities on the road network. The scenarios assessed include the existing year 2023, future year 2025 without Prospective Development traffic and year 2025 with Prospective Development traffic. The model results indicate that junction R353 at Black Road will operate within capacity, with the max RFC of 0.25 encountered at the junction well below the maximum desired RFC of 0.85. The summary indicates that there will be negligible queues and minimal delays during both the peak hours.

The effect  of transporting the turbine components from site to M18 via Black Road, R353, R380, R458 is negligible. The transport of the AILs by convoy will be mitigated by traffic management during the Prospective Development.

The Prospective Development will be off temporary duration and have a much lower impact when compared to the construction. The Prospective Development will not result in a significant adverse effect on traffic.

# 14.2 Telecommunications, Aviation, and Other Material Assets

## 14.2.1 Introduction

### 14.2.1.1 Chapter Scope

This section of the EIAR assesses the likely significant effects of the Prospective Development on telecommunications, aviation, and other material assets. Section 14.2.3 describes the receiving environment as it relates to material assets in the vicinity of the site and the potential for effects on those assets. Section 14.2.4 presents an assessment of the likely significant effects (and mitigation measures proposed). This section of the Material Assets chapter considers other utilities or built services in the area such as electricity supply and transmission, water, gas and underground telecommunications. Waste management during the Prospective Development is assessed separately in Chapter 16.

### 14.2.1.2 Statement of Authority

This section of the EIAR has been prepared by Thomas Blackwell, a Senior Environmental Consultant with MKO with over 17 years' of progressive experience in environmental consulting and in the assessment of environmental documents for renewable energy developments, including the assessment of likely significant effects on material assets. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin.

### 14.2.1.3 Relevant Guidance and Legislation

The Material Assets section of this EIAR is carried out in accordance with the 'EIA Directive' (Directive 2011/92/EU as amended by Directive 2014/52/EU and having regard, where relevant, to guidance and policy documents referred to in Chapter 1 of this EIAR. Consideration has also been given to the guidance documents listed below:

- Draft Air Corps Wind Farm/Tall Structures Position Paper (August 2014).
- Irish Wind Energy Association (2012) Best Practice Guidelines for the Irish Wind Energy Industry.
- ESB Networks (2019) Code of Practice for Avoiding Danger from Overhead Electricity Lines.

## 14.2.2 Methodology

The assessment of likely significant effects on material assets telecommunications and aviation uses the standard methodology and classification of impacts as presented in Section 1.7.3 of Chapter 1 of this EIAR. The Prospective Development description is provided in Chapter 4.

A scoping and consultation exercise was conducted with telecommunications operators and aviation authorities, in line with EPA guidelines, and the '*Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2012), which provides a recommended list of telecommunications operators for consultation.

#### 14.2.2.1 Site Visit

A site visit was undertaken on 6th July 2022. The visit included Derrybrien Wind Farm Development site, Agannygal Substation and various locations along the Prospective Development overhead line (OHL).

#### 14.2.2.2 Difficulties Encountered

There were no technical difficulties encountered in relation to material assets when undertaking this assessment.

#### 14.2.2.3 Scoping and Consultation

Chapter 2 Section 2.2.1 of this EIAR describes the scoping and consultation exercise undertaken for the Prospective Development. Scoping responses pertinent to this chapter are discussed below. Relevant copies of scoping responses are provided in Appendix 2-1.

##### Uisce Éireann

Uisce Éireann provided a response to a data request which was received on the 21st of October 2024, specifically seeking information on water distribution and sewer networks at the Project site. The response indicated that there are no underground water or sewerage networks within the footprint of the site.

##### Irish Aviation Authority

The Irish Aviation Authority provided a response to a Scoping request which was received on the 4th of October 2024 which stated that the Authority has no specific requirements for incorporation into the scoping. The response further outlined that:

> *'When the formal planning application is submitted to An Bord Pleanála, the Authority will provide the general observations in relation to notification with at least 30 days of any proposed cranes for the decommissioning of the wind farm.*
>
> *When the process of decommissioning is complete, Irish Aviation Authority would request that the developer advise the Authority which will allow for the steps to be taken to remove the decommissioned wind farm from the aeronautical datasets and charts in due course.'*

### 14.2.3 Receiving Environment

#### 14.2.3.1 Aviation

The Prospective Development is not within any of the zones for which guidelines are laid down by the Irish Aviation Authority (IAA). The airports in closest proximity to the Prospective Development are Galway, approximately 31 km away, and Shannon, approximately 45 km away. However, the Prospective Development location is outside both the aviation exclusion zone for Galway Airport and other airfields in the County. The Prospective Development does not affect the safe operation of these airport / airfield facilities.

As required, on the completion of Derrybrien Wind Farm, the IAA were provided with the as-constructed co-ordinates of turbines and maximum elevation of each turbine. The wind farm is marked

on the relevant Aeronautical chart with low- intensity aviation lights installed on T1, T47, T52, T65, T44, T46, T71, T18 and T62 (9 in total).

The existing aeronautical lighting will remain in-situ during the decommissioning process. The turbines with installed aviation lights will be decommissioned last to ensure that lighting is present as long as there are turbines on the site. Therefore, there will be no impact on Aviation as a result of the Prospective Development

#### 14.2.3.2 Water Supply

There are no known water supplies within the Prospective Development site and no existing water services in the vicinity of the Prospective Development will be altered, reinforced, or relocated as a result of the Prospective Development. No groundwater abstraction will take place as a result of the Prospective Development. There is no anticipated effect on water supply as a result of the Prospective Development.

#### 14.2.3.3 Sewerage Schemes and Wastewater Infrastructure

There are no known main drainage or sewerage schemes within the Prospective Development site. No existing schemes in the vicinity of the Prospective Development will be altered, reinforced or relocated as a result of the Prospective Development. There is no anticipated effect on sewerage schemes and wastewater infrastructure as a result of the Prospective Development.

#### 14.2.3.4 Energy Infrastructure

The following electricity distribution/ transmission lines are within the Prospective Development area.

- The existing 110kV Ennis – Shannonbridge OHL which runs in an east-west direction, located to the south of the wind farm in line with the Agannygal Substation. As described by Chapter 4 this line will be restored following the decommissioning of the Agannygal Substation.
- The existing 400kV Moneypoint – Woodlands OHL which is located to the south of the Prospective Development. The Derrybrien Wind Farm grid connection crosses beneath this OHL.

In addition to the above there are existing Low Voltage (LV) power supplies in the surrounding area, primarily serving residential properties. No existing LV power supply connections in the vicinity of the Prospective Development will be altered, reinforced or relocated as a result of the Prospective Development.

The Prospective Development area does not encompass any other significant energy infrastructure aside from the above. The closest gas pipeline to the Prospective Development is approximately 5.9 km north-east of the site at Loughrea.

#### 14.2.3.5 Telecommunications

There are 2 meteorological masts (anemometer) belonging to Gort Wind Farms Ltd located in the western part of the Derrybrien Wind Farm Development site. Vodafone placed a cell at the central mast to assist with improved phone signal for personnel working at the site. The mast was installed in 2005 with the cell added at a later date to boost signal.

There is also an existing telecoms mast in the east of the site which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter. This mast is unrelated to the Prospective

Development and pre-dates the presence of the wind farm by a significant period. This mast currently receives power from the Derrybrien Wind FarmDevelopment. Prior to the presence of the wind farm a diesel generator was used to provide power to this mast. Following decommissioning of the Derrybrien Wind Farm Development, the mast will no longer be supplied electricity from the wind farm. Line Partnership will likely revert to using a diesel generator or other independent power source.

The Maghera transmission site is located approximately 14.1 km southwest of the Derrybrien site in County Clare at a site elevation of approximately 400 m high. It is one of RTE Transmission Networks Ltd (2RN) network of radio and television transmitters. The Maghera television transmitter was one of the five original Telefís Éireann main transmitters and started operation in 1963. The service area for the Maghera site is the West of Ireland, covering counties Clare and Galway, as well as parts of counties Limerick, Kerry, Cork, Tipperary and Mayo. There are also existing telecommunications services in the surrounding area, primarily serving residential properties. No existing telecommunications services in the vicinity of the Prospective Development will be affected as a result of the Prospective Development.

#### 14.2.3.6 Tourism & Recreational Infrastructure

The Prospective Development is located in a remote area and not in an area of significant tourism importance, near any of the region's major tourism attractions or in an area with existing recreational infrastructure in its own right. There are no designated walking routes within or in the immediate vicinity of the Prospective Development. The Prospective Development will have no effect on tourism or recreational infrastructure.

The Prospective Development will have no effect on tourism or recreational infrastructure.

#### 14.2.3.7 Existing Waste Management Services

There are no EPA-licensed or local authority-authorised waste facilities or activities located within the EIAR Site Boundary. The closest, authorised municipal waste facility (City Bin Co.) is located approximately 28.6km to the northwest of the Proposed works. Potential effects on waste management services are discussed in detail in Chapter 16 of this EIAR. There will be no significant effect on existing waste management services as a result of the Prospective Development.

### 14.2.4 Likely Significant Effects and Mitigation Measures Implemented

#### 14.2.4.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development that ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

Under this scenario there would be no impact on the telecommunications and aviation operations in the area.

## 14.2.4.2 Impacts of Prospective Development

### 14.2.4.2.1 *Telecommunications*

#### Pre-Mitigation Impact

There are 2 meteorological masts (anemometer) belonging to Gort Windfarm Ltd in the western part of the site. Vodafone placed a cell at the central mast to assist with improved phone signal at the site. The mast was installed in 2005 with the cell added at a later date to boost signal at the Derrybrien Windfarm. This cell will be removed as part of the decommissioning of the wind farm, however, since this cell was only placed on the site to provide improved phone signal for site operatives working at the wind farm and does not affect areas beyond the wind farm there will be no effect on telecommunications as a result of the decommissioning of this cell.

There is also an existing telecoms mast in the east of the site which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter. This mast is unrelated to the Prospective Development and pre-dates the presence of the wind farm by a significant period. This mast currently receives power from the Derrybrien Substation. Prior to the presence of the wind farm a diesel generator was used to provide power to this mast. Following decommissioning of the Derrybrien Wind Farm Development, the mast owners will need likely revert to using a diesel generator or another independent power source. There is potential for a short term, slight, adverse effect to broadband and radio services as a result of the Prospective Development.

Since the Prospective Development involves the removal of the existing wind turbines, and other structures on the site there is no potential for interference occurring to telecommunications in the vicinity of the Prospective Development.

#### Mitigation Measures

The owner of the communications mast will be informed in advance of the Prospective Development in order to allow an alternative power source to be provided for the existing mast.

#### Residual Impact

With the implementation of the mitigation measures above, and due to the nature of the Prospective Development there will be no residual effect on telecommunications.

#### Significance of Effects

There will be no effect on telecommunications from the Prospective Development.

### 14.2.4.2.2 *Energy Infrastructure*

#### Pre-Mitigation Impact

There will be no effect on the existing 400kV Moneypoint – Woodlands OHL which is located to the south of the Prospective Development. The Derrybrien Wind Farm grid connection crosses beneath this OHL. Decommissioning of the Derrybrien Wind Farm grid connection will not result in any impact on the 400kV Moneypoint – Woodlands OHL.

The existing 110kV Ennis – Shannonbridge OHL which runs in an east-west direction, located to the south of the wind farm in line with the Agannygal Substation. As described by Chapter 4 this line will be reinstated following the decommissioning of the Agannygal Substation. In the absence of mitigation work on the Agannygal Substation and existing 110kV Ennis – Shannonbridge OHL could result in a temporary, slight, negative effect on energy infrastructure.

### Mitigation Measures

Work on decommissioning the Agannygal Substation and reinstatement of the existing 110kV Ennis – Shannonbridge OHL will take place under a planned outage. Under this circumstance there will be no loss of electricity services to end users.

### Residual Impact

With the application of these mitigation measures there will be no residual effect on energy infrastructure.

### Significance of Effects

There will be no effect on energy infrastructure from the Prospective Development.

## 14.2.5 Cumulative and In-Combination Effects

Chapter 4, Section 4.7 of this EIAR describes the methodology used in compiling the list of projects considered in the assessment of cumulative effects, and provides a description of each project, including its current status. There will be no cumulative effects relating to the Prospective Development and surrounding projects (including the Retained Development) in relation to Material Assets. This is because the Prospective Development will have no effect on Material Assets once mitigation measures are implemented. During the development of any large project that holds the potential to effect telecoms or energy infrastructure the Developer is responsible for engaging with all relevant Telecoms Operators to ensure that the proposal will not interfere with television or radio signals, or other infrastructure. In the event of any potential impact, the Developer for each individual project is responsible for ensuring that the necessary mitigatory measures are in place. Therefore, as each project is designed and built to avoid impacts arising, a cumulative impact cannot arise.

## 14.2.6 Conclusion

Following consideration of the residual effects (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Material Assets within the Prospective Development site or in the surrounding area. Provided that the Prospective Development is decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant effects on Material Assets, including aviation, telecommunications, energy infrastructure, or water supplies are not anticipated.

# 15. VULNERABILITY OF THE PROJECT TO MAJOR ACCIDENTS AND/OR NATURAL DISASTERS

## 15.1 Introduction

### 15.1.1 Scope of Chapter

This section of the Environmental Impact Assessment Report (EIAR) describes the vulnerability of the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development (as detailed in Chapter 4) to risks of major accidents and/or natural disasters. It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in '*Guidelines on Information to be contained in Environmental Impact Statements'* (EPA, 2022) and the European Commission in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU, as amended by 2014/52/EU), namely '*Guidance on the preparation of the Environmental Impact Assessment Report'.*

The assessment of the vulnerability of the Project to major accidents and natural disasters is carried out in compliance with the EIA Directive as amended. Article 3(2) of the Directive states that the:

> *'effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and / or disasters that are relevant to the project concerned.'*

In addition, Annex IV of the EIA Directive states that the EIAR shall contain:

> *"A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned."*

The objective of this assessment, as set out in Recital 15 of the EIAR Directive, is to ensure that appropriate precautionary actions are taken for those projects,

> *"...because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment".*

Based on the requirements of the EIA Directive, this chapter seeks to determine:

- The relevant major accidents and/or natural disasters, if any, that the Project could be vulnerable to.
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s).
- The measures that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

### 15.1.2 Statement of Authority

This section of the EIAR has been prepared by Thomas Blackwell, a Senior Environmental Consultant with MKO with over 17 years' of progressive experience in environmental consulting and in the assessment of environmental documents for renewable energy developments. Thomas holds a BA

(Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin.

## 15.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 – 2018.
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999; S.I. No. 450 of 2000; S.I No. 538 of 2001); S.I. No. 30 of 2000 the Planning and Development Act, 2000; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment.
- Planning and Development Act, 2000, as amended.
- S.I. No 296 of 2018: S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law.
- The Heritage Act 1995, as amended.

An assessment of the following key elements was undertaken in accordance with the EIA Directive as amended:

- The vulnerability of the Prospective Development to potential accidents and/or disasters.
- The Prospective Development's potential to cause major accidents or disasters which pose a risk to the environment.

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in paragraph 8 of Annex IV of the EIA Directive as follows:

> *"(8) A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies".*

### 15.1.3.1 Relevant Guidance Documents

This chapter has been prepared in accordance with the following guidance:

- European Commission. (2017). *Environmental Impact Assessment of Projects – Guidance on the preparation of Environmental Impact Assessment Reports.*
- Environmental Protection Agency. (2022). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*
- Department of Environment, Heritage and Local Government (2010) *A Guide to Risk Assessment in Major Emergency Management.*
- Environmental Protect Agency (2014) *Guidance on Assessing and Costing Environmental Liabilities.*
- Department of Defence (2020) *A National Risk Assessment for Ireland.*
- HSE Emergency Management Area 2 Crisis Management Team Major Emergency Plan: Covering Geographical Areas of Counties Galway, Mayo and Roscommon May 2022).

## 15.2 Assessment Methodology

The following sources of information and literature pertinent to the area were used in the preparation of this section:

- Census of Ireland.
- Regional Spatial and Economic Strategy (RSES) 2020-2032, published by the Northern and Western Regional Assembly on 23 January 2020.
- Galway County Development Plan 2022 – 2028.
- Galway County Council Website.

Major accidents and natural disasters are hazards which have the potential to affect the Project and consequently have potential impacts on the environment. These include accidents during construction caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e., population and human health, biodiversity, land, soil (peat stability), water, air and climate and material assets, cultural heritage and the landscape.

### 15.2.1 Categorisation of the Baseline Environment

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

Further detail on the baseline environment is provided in Section 15.3.

### 15.2.2 Impact Assessment Methodology

#### 15.2.2.1 Introduction

This assessment is focused on an understanding that the Derrybrien Windfarm Development will be decommissioned in line with the methodologies and measures prescribed in this EIAR. Therefore, the overall vulnerability of the Project to risks of major accidents and natural disasters is considered low.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events and peat instability. These are described in detail in the relevant EIAR assessment chapters (Refer to Chapters 8 to 9 for further detail).

## 15.2.2.2 Site-Specific Risk Assessment Methodology

A site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development. The approach to identifying and quantifying risks associated with the Project by means of a site-specific risk assessment is derived from the EPA '*Guidance on Assessing and Costing Environmental Liabilities'* document[1]. The following steps were taken as part of the site-specific risk assessment:

- Risk identification.
- Risk classification, likelihood and consequence.
- Risk evaluation.

### 15.2.2.2.1 *Risk Identification*

Risks have been reviewed through the identification of reasonably foreseeable risks in consultation with relevant contributors to this EIAR (refer to *Statements of Authority* in Chapters 5 to 14 of this EIAR). The identification of risks has focused on non-standard but plausible incidents that could occur at or as a result of the Project during decommissioning.

In accordance with the European Commission EIAR Guidance (EC, 2017), risks are identified in respect of the projects:

1. *Potential to cause accidents and/or disasters.*
2. *Vulnerability to potential disaster/accident.*

### 15.2.2.2.2 *Risk Classification*

#### Classification of Likelihood

After identifying the potential risks, the likelihood of occurrence of each risk has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating likelihood of identified potential risks occurring. Table 15-1 defines the likelihood ratings that have been applied.

The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met.

*Table 15-1 Classification of Likelihood (Source: Department of Environment, Heritage and Local Government, 2010)*

| Ranking | Likelihood | Description |
|---|---|---|
| 1 | Extremely Unlikely | May occur only in exceptional circumstances; once every 500 or more years |
| 2 | Very Unlikely | Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communities; and / or little opportunity, reason or means to occur; may occur once every 100-500 years. |

[1] *EPA (2014) Guidance on assessing and costing environmental liabilities. Available at https://www.epa.ie/publications/compliance--enforcement/licensees/reporting/financial-provisions/EPA_OEE-Guidance-and-Assessing-WEB.pdf*

| Ranking | Likelihood | Description |
|---|---|---|
| 3 | Unlikely | May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisation's worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years. |
| 4 | Likely | Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years |
| 5 | Very Likely | Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year. |

## Classification of Consequence

The consequence rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures have failed to prevent the major accident and/or disaster. The consequence of the impact if the event occurs has been assigned as described in Table 15-2.

The consequence of a risk to/from the Prospective Development has been determined where one or more aspects of the consequence description are met, i.e., risks that have no consequence have been excluded from the assessment.

*Table 15-2 Classification of Impact (Source: DoEHLG, 2010)*

| Ranking | Likelihood | Impact | Description |
|---|---|---|---|
| 1 | Minor | Life, Health, Welfare.<br><br>Environment.<br><br>Infrastructure.<br><br>Social. | Small number of people affected; no fatalities and small number of minor injuries with first aid treatment.<br><br>No contamination, localised effects.<br><br><€0.5M<br><br>Minor localised disruption to community services or infrastructure (<6 hours). |
| 2 | Limited | Life, Health, Welfare.<br><br>Environment.<br><br>Infrastructure.<br><br>Social. | Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required.<br><br>Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements.<br><br>Simple contamination, localised effects of short duration.<br><br>€0.5-3M<br><br>Normal community functioning with some inconvenience. |

| Ranking | Likelihood | Impact | Description |
|---|---|---|---|
| 3 | Serious | Life, Health, Welfare.<br><br>Environment.<br><br>Infrastructure.<br><br>Social. | Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation.<br><br>Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated.<br><br>External resources required for personal support.<br><br>Simple contamination, widespread effects or extended duration.<br><br>€3-10M<br><br>Community only partially functioning, some services available. |
| 4 | Very Serious | Life, Health, Welfare.<br><br>Environment.<br><br>Infrastructure.<br><br>Social. | 5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated.<br><br>Heavy contamination, localised effects or extended duration.<br><br>€10-25M<br><br>Community functioning poorly, minimal services available. |
| 5 | Catastrophic | Life, Health, Welfare.<br><br>Environment.<br><br>Infrastructure.<br><br>Social. | Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.<br><br>Very heavy contamination, widespread effects of extended duration.<br><br>>€25M<br><br>Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support. |

## Risk Evaluation

Once classified, the likelihood and consequence ratings have been multiplied to establish a 'risk score' to support the evaluation of risks by means of a risk matrix.

The risk matrix sourced from the DoEHLG *Guide to Risk Assessment in Major Emergency Management (*and as outlined in Table 15-3) indicates the critical nature of each risk. This risk matrix has therefore been applied to evaluate each of the risks associated with the Project. The risk matrix is colour coded to provide a broad indication of the critical nature of each risk:

- The red zone represents 'high risk scenarios.'
- The amber zone represents 'medium risk scenarios.'
- The green zone represents 'low risk scenarios.'

*Table 15-3 Classification of Impact (Source: DoEHLG, 2010)*

| | | Consequence Rating | | | | |
|---|---|---|---|---|---|---|
| | | 1. Minor | 2. Limited | 3. Serious | 4. Very Serious | 5. Catastrophic |
| Likelihood Rating | 5. Very Likely | | | | | |
| | 4. Likely | | | | | |
| | 3. Unlikely | | | | | |
| | 2. Very Unlikely | | | | | |
| | 1. Extremely Unlikely | | | | | |

## 15.3 Project Hazard Analysis

The HSE *Emergency Management Area 2 Crisis Management Team Major Emergency Plan May 2022* outlines several hazard categories which may have the potential to lead to a major emergency in Area 2- Galway, Roscommon and Mayo. The hazard categories include Natural, Transportation, Technological and Civil. The hazard categories, types and subtypes, and their relevance to the Project, are listed below in Table 15-4.

*Table 15-4 HSE Emergency Plan hazard types* (HSE Area 2 Crisis Management Team Major Emergency Plan May 2022)

| Natural Hazards | | | |
|---|---|---|---|
| **Category** | **Type** | **Subtype** | **Relevance to the Project** |
| **Meteorological** | Storm / Gale Both coastal and inland areas can be affected by high winds | Both coastal and inland areas can be affected by high winds | Poor driving conditions<br>Loss of infrastructure<br>Flooding<br>Falling Trees |
| | Heavy Snow | Blizzards- Poor visibility | Poor Driving conditions<br><br>Loss of infrastructure |
| | Severe Cold / Frost extremes of Temperature | Icy Roads /Impassable Roads<br>Hypothermia<br>Freezing of Supply Network | Poor Driving Conditions<br>Public Health Risk |
| | Thunder & Lightening<br>Dense/ Persistent Fog<br>Heat Wave /Drought | Road Traffic collisions | Loss of Infrastructure<br>Poor driving conditions<br>Public Health Risk |

| | | | |
|---|---|---|---|
| Hydrological | Flooding | Coastal / Inland | Potential for flooding |
| | Heavy Rain | | May lead to flooding in Low Lying areas or areas with poor drainage |
| Geological | Landslide | | Peat Instability |
| | Forest / Wilderness fire - Air Pollution | | Majority of Project Site and some of surrounding area is forested. |
| **Transportation Hazards** | | | |
| **Category** | **Type** | **Subtype** | **Project Hazard** |
| Aviation | Aircraft Collision /Loss | Mid Air and Land | Not Applicable |
| Road | Multiple Road Traffic Collision | | Public Roads via which construction staff and materials access the site. |
| | Hazmat | | Fuel Transport to/from site |
| | Bridge | | Not Applicable |
| Water | Inland Water ways | Pleasure Craft/Cruises<br><br>Pollution from above | Not Applicable |
| | Coastal | Car Ferry/ passenger Ferries | Not Applicable |
| **Technological Hazards** | | | |
| **Category** | **Type** | **Subtype** | **Project Hazard** |
| Industrial Accidents | Explosions | | Damage to Infrastructure Personal Injuries/ fatalities |
| | Petrochemical Fires | | Personal Injuries, severe burns/ fatalities<br>Air Pollution |
| | Industrial Fires | LPG Tank Fire | Not Applicable |
| | Fluid/ Fuel Emission | | Refuelling on site |
| Explosions | Domestic | Natural Gas explosion | Not Applicable |
| | Bomb | | Not Applicable |
| | LPG | | Not Applicable |

| | | | |
|---|---|---|---|
| Fires | | | Air Pollution |
| Building Collapse | | | Not Applicable |
| Hazardous substance | | Accident at site | Not Applicable |
| | | Transportation accident | Hazmat on roads |
| | | Weapons | Not Applicable |
| | Biological | Leak/Weapons | Not Applicable |
| | Radiological | "Dirty Bomb" | Not Applicable |
| | | Industrial Accident | Not Applicable |
| | | Health facilities | Not Applicable |
| Pollution/Contamination | Air/Water Pollution | | Fire<br>Sediment-laden Water Run Off<br>Fuel/hydrocarbon spill/leak |
| Civil Hazards | | | |
| Category | Type | Subtype | Project Hazard |
| Major Crowd Safety | (Movement, crushing etc.) | Pop Concerts<br>Sports Events<br>Fireworks displays<br>Air shows | Not Applicable |
| Loss of Critical Infrastructure | Energy and Power Supply | Electricity | Disconnection from the national grid |
| | | Fuel Oil | Not Applicable |
| | | Communications | Telecom operators, mobile phone networks |
| Food Situation Crisis | | Food Contamination<br>Drought | Not Applicable |
| Water Supply | | Shortage/ Contamination<br>Freezing /Flooding | Not Applicable |
| Epidemics and pandemic | | Communicable diseases | Not Applicable |
| Animal Disease | | Foot & Mouth<br>Avian Influenza | Not Applicable |

| | | | |
|---|---|---|---|
| Terrorism | Bombs | Car-bombs | Not Applicable |
| | | Bombs in buildings | Not Applicable |
| | | Fire-bombing | Not Applicable |
| | Chemical, Biological, Radiological, Nuclear, and high yield Explosives (CBRNE) | | Not Applicable |
| | Disruption | Bomb scares | Not Applicable |

The risks which are most relevant to this assessment are described in the sections that follow.

## 15.3.2 Meteorological

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The Project site in southeast Galway, approximately 20 km east of the Atlantic Coastline. The dominant influence on Ireland's climate is the Atlantic Ocean. As a consequence, Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The hills and mountains, many of which are near the coasts, provide shelter from strong winds and from the direct oceanic influence.

The Met Éireann weather station at Shannon Airport, Co. Clare, is the nearest weather and climate monitoring station to the optimised development site that has meteorological data recorded for the 30-year period from 1981-2010. The monitoring station is located approximately 45 kilometres southwest of the site. The wettest months are October and December, and April is usually the driest. July is the warmest month with a mean daily temperature of 16.4° Celsius.

The windier part of the year lasts for 5.5 months, from 11 October to 27 March, with average wind speeds of more than 18 kilometres per hour. The windiest month of the year at Shannon Airport is January, with an average hourly wind speed of 19 kilometres per hour. The calmer time of year lasts for 6.5 months, from 27 March to 11 October. The calmest month of the year at Shannon Airport is August, with an average hourly wind speed of 15.2 kilometres per hour.

Extreme weather events are a risk for any project. The works programme for the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development will take account of weather forecasts and work will be suspended in the case of extreme weather events. .

The following forecasting and weather warning systems are available and will be used on a daily basis at the site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates.
- Weather Warning or Advisories: Met Éireann's main suite of warnings are issued by the duty forecaster between 10am and midday and are updated as necessary as new information becomes available. In general, warnings will not be issued more than 60-hours ahead of the expected adverse weather but advisories on potential hazards are issued up to a week in advance. The three warning categories are:
  - Yellow: Not unusual weather. Localised danger.
  - Orange: Infrequent. Dangerous/disruptive.

- Red: Rare. Extremely dangerous/destructive.

- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale.
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events.
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive.
- Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

### 15.3.3 Hydrological

As discussed in Chapter 9 of the EIAR, a Flood Risk Assessment (FRA) in line with The Planning System and Flood Risk Management - Guidelines for Planning Authorities (OPW, 2009) has been conducted for the Derrybrien Wind Farm Decommissioning Project areas including the two substations and OHL corridor route. The FRA was carried out as part of the assessment of the overall Project to provide an overview of the potential flood risks to the Project areas and to assess the impact of the decommissioning project on flood risk downstream (see **Appendix 9-1**).

A desktop review of historic flooding was undertaken primarily using OPW website www.floodinfo.ie. The 'Past Flood Events' dataset forms a record of all available flood records held by the OPW, all local authorities and other relevant state organisations such as the EPA and the Department of Communications, Climate Action and Environment. There were no mapped reports of recurring flooding within the Project areas and there is no significant risk of flooding within the Project area due to the elevated nature of the majority of the Project area relative to the surrounding area. The nearest area downstream affected by flooding in the catchment which drains the north side of the wind farm site is 15 km downstream at Ballylee on the Streamstown River. The nearest area downstream affected by flooding in the catchment draining the south side of the wind farm is over 20 km downstream close to Gort.

The FRA concludes that most of the Project areas are not within floodplains and lie within Flood Zone C (Low risk of flooding) as defined by the guidance document to Planning Authorities in relation to Flood Risk Management. Furthermore, the existing flood risk in the downstream catchment has not been increased by the existing windfarm infrastructure and is not expected to be increased by any of the decommissioning works proposed as part of the Project. Please refer to the Chapter 9 of this EIAR for further details in relation to the hydrological mitigation measures.

### 15.3.4 Peat Stability

A comprehensive and robust Peat Stability Assessment was undertaken for the Prospective Development and used to inform the Assessment of Alternative Decommissioning Options and subsequent design process for the Derrybrien Wind Farm Development Decommissioning Project. Peat stability risk assessments have been carried out for the following elements of the Prospective Development:

- Derrybrien Wind Farm and associated ancillary works.
- Polesets PS-1 to PS-4 of the 110kV Overhead Line (OHL).
- The turbary areas on the wind farm site.

- The grid connection comprising the rest of the Derrybrien-Agannygal 110kV Overhead Line and the Agannygal Substation connection into the Shannonbridge – Ennis 110kV Overhead Line and associated ancillary works.

The peat stability assessments have been carried out in accordance with the best practice guidelines given in "Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Projects, published by the Scottish Government Energy Consent Unit (2nd Edition, April 2017)". The best practice guidelines identify a number of techniques that can be used to assess peat stability, and a number of these techniques were used in assessing peat stability at the site.

The best practice guidelines give no preferred technique but note that whatever techniques are employed should be clearly explained and incorporate consideration of the likelihood of instability and the consequences should it occur. Details of the techniques employed are provided in Chapter 8 of this EIAR and in **Appendices 8-2 to 8-6**.

The assessment of the current conditions (i.e an unauthorised windfarm that ceased commercial electricity generation in 2022)forms the baseline condition for the decommissioning of the wind farm. It should also be recognised that the peat stability risk assessments for this EIAR specifically assess the risk of peat instability for site activities related to the wind farm project, grid connection and peat slide area and response works.

The majority of the decommissioning works will be carried out from the hardstanding areas adjacent to the turbines and at the substation site, which are designed for the corresponding loads. Therefore, the activities that were assessed as having significant impacts on the stability of the peat in the turbary area were limited to:

- Heavy construction traffic loading on the floating roads from the mobile cranes and low-loader transporters that will be used to dismantle the turbines, substation and anemometers and to transport the components offsite.
- Additional loading on the peat where the crane hardstanding needs to be temporarily extended (T4) or where narrow sections of the existing site access road need to be temporarily widened at the east end of the turbary area, and near Turbines T68, T14 and T1.
- Loading on the peat from the low ground bearing pressurs (LGBP) wide-tracked excavators and ATV that will be used to take down & remove timber polesets PS-1a to PS-4 for the 110kV OHL.

It was assessed that the probability of a peat slide occurring as a result of these activities was very low to low so that the effect on the stability of the peat was **Very Low** to **Low,** which is only of **Slight Significance**.

All the existing floating roads have been successfully proof tested for the maximum design load from the mobile crane that will be used for decommissioning. The impact of the construction traffic loading on the roads will be **occasional** to **regular**, but only **temporary** or **brief** – limited to when the large mobile cranes and low-loader transporters are travelling along the roads.

The impact from the additional load from the widened roads will be **temporary** as the fill will be removed at the end of the decommissioning works. It will also be limited to the section of the existing narrow access track that need to be widened between Turbines T35 and T45 and/or between T43 and T46.

The loading on the peat to dismantle the OHL downslope from the substation will also be **brief** and limited to the area where polesets PS-1a to PS-4 will be dismantled.

In summary, the findings of the peat assessment showed that the Project has an acceptable margin of safety and is considered to be at very low risk of peat failure provided the mitigation measures set out in Section 8.4.4 of this EIAR are implemented.

Please see Chapter 8 Geology and Soils and **Appendix 8-1 to 8-6** for more details.

### 15.3.5 Transportation

The Project will utilise the existing local road network during the construction and decommissioning works. Construction related traffic will originate from the removal of materials from the site and transport of employees to, from and throughout the site. The localised traffic disruptions will be mitigated through the use of industry standard traffic management measures. Please see Chapter 14 Material Assets and **Appendix 14-3** Traffic Management Plan for details.

**Appendix 14-3** Traffic Management Plan (TMP) is provided specifying details relating to traffic management. The TMP is a live document drafted during the planning stage and will be upgraded as the Prospective Development progresses, taking into account of any road improvements and changes to the network. Prior to the commencement of the the Prospective Development, a detailed Traffic Management Plan will be prepared by the Contractor for agreement with the relevant local authorities and An Garda Síochána.

The TMP includes requirements for the following:

- Traffic Management Coordinator.
- Decommissioning Programme.
- Information to locals.
- A Pre and Post Construction Condition Survey.
- Liaison with the relevant local authority.
- Implementation of temporary alterations to road network at critical locations.
- Identification of delivery routes.
- HGV and traffic movement time restrictions.
- Travel plan for construction workers.
- Additional measures.
- Re-instatement works.

Please see Chapter 14 Material Assets and **Appendix 14-3** Outline Traffic Management Plan for details. No aircraft will be used as part of the decommissioning process for the Prospective Development. Therefore, there is no potential for direct affects associated with aviation.

### 15.3.6 Industrial Accident

The Project is not connected to or in close proximity of any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations (SEVESO sites), therefore no significant effects associated with major industrial accidents involving dangerous substances are anticipated. Petrochemical fires and fires from fuel emissions, leakages and spillages could occur causing personal injury, structural damage and forest fires.

### 15.3.7 Loss of Critical Infrastructure

EirGrid operates and develops Ireland's electricity transmission grid. This includes interconnecting to neighbouring grids and running the wholesale electricity market. The grid safely brings power from generators such as wind farms to the ESB network that supplies homes and business in Ireland. It also brings power directly to large energy users. There are two types of electricity generation: synchronous generation and non-synchronous generation. Synchronous generation produces the same amount of

electricity all the time e.g. fossil fuels. Non-synchronous generation produces a varying amounts of electricity depending on the energy available. Eirgrid operate the grid from National Control Centres (NCCs) in Dublin and Belfast, matching electricity production to customer demand, switching from synchronous to non-synchronous where required to ensure no power outages. Since the Derrybrien Wind Farm is not currently operational the proposed decommissioning project would not impact the local or national energy supply.

The Prospective Development will decommission and remove the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation. The Project will also reconnect the existing Ennis-Shannonbridge 110 kV Overhead Line following removal of the Agannygal Substation.

### 15.3.8 Contamination

The Project has the potential to cause contamination and pollution of surface waters and/or groundwater from potential release of hydrocarbons on site. There are no earthworks or excavations proposed. A Construction Environment Management Plan (CEMP) has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS) which accompanies the planning application for the Prospective Development.

Section 3 of the CEMP sets out details of the environmental controls to be implemented on site. The CEMP provided details on site drainage measures, peat stability monitoring measures, waste management and pollution prevention measures for refuelling and managing hazardous materials and cement-based products. The CEMP also sets out the Emergency Response Procedure to be adopted in the event of an emergency including contamination, health and safety and environmental protection. The CEMP provides details on all mitigation and monitoring measures to be actioned prior to construction, during the construction and decommissioning works. The CEMP will be subject to ongoing review through regular environmental auditing and site inspections during the construction works. This will confirm the efficacy and implementation of all mitigation measures and commitments identified in the application documentation. Please see Chapter 4 Description and outline CEMP (under separate cover) for details.

### 15.3.9 Health and Safety

During construction of the Project, all staff will be made aware of and adhere to the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013*'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan. An Emergency Response Plan (ERP) which will be prepared prior to the construction works and implemented and adhered to on site. The ERP provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection. Please see Chapter 4 Project Description and outline CEMP (under separate cover) for details.

## 15.4 Risk Assessment

This section outlines the possible risks associated with the Derrybrien Wind Farm Development Decommissioning Project – Prospective Development.

These risks have been assessed in accordance with the relevant classification as outlined in Table 15-1 and Table 15-2.

As outlined in Section 15.2.3.2.2, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster.

## 15.4.1.1 Likely Significant Effects

### 15.4.1.1.1 *Do-Nothing Scenario*

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

In the do-nothing scenario there is no potential for Major Accidents or Natural Disasters as the site is stable and no works are ongoing.

### 15.4.1.1.2 *Assessment of Effects During Decommissioning*

A risk register has been developed which contains all potentially relevant risks identified during the construction works of the Prospective Development. Six risks specific to the Prospective Development have been identified and are presented in Table 15-5.

*Table 15-5 Risk Register – Prospective Development*

| Risk ID | Potential Risk | Possible Cause |
|---|---|---|
| **Potential vulnerability to disaster risks** | | |
| A | **Severe Weather**<br><br>Risk to construction activity on site. | Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds. |
| B | **Flooding**<br><br>High levels of surface water on site. | Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds. |
| C | **Peat Stability**<br><br>Movement of peat within the site during decommissioning. | Severe weather conditions- storm, flooding.<br><br>Overloading of peat during decommissioning work. |
| **Potential to cause accidents and / or disasters.** | | |
| D | **Traffic Incident**<br><br>Collisions onsite and offsite with vehicles involved in construction of Project. | Driver negligence or failure of vehicular operations on site roads.<br><br>Traffic Management Plan not implemented. |

| Risk ID | Potential Risk | Possible Cause |
|---|---|---|
| E | **Contamination**<br><br>Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater. | Fuel spillage during delivery to site.<br><br>Failure of fuel storage tank or tanks in plant and machinery and vehicles.<br><br>Drainage and seepage water resulting from infrastructure works. |
| F | **Industrial Accident**- Fire, gas explosion | Equipment or infrastructure failure.<br><br>Fuel leaks.<br><br>Employee negligence. |

These risks have been assessed in accordance with the relevant classification (Refer to Table 15-1 and Table 15-2) and the resulting risk analysis is given in Table 15-6.

The risk register is based upon possible risks associated the Project. As outlined in Section 15.2.3.2, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster.

### 15.4.1.1.3 Assessment of Effect – Summary

*Table 15-6 Risk Assessment*

| Risk ID | Potential Risk | Possible Cause | Environmental Effect | Likelihood Rating | Basis of Likelihood | Consequence Rating | Basis of Consequence | Risk Score (Consequence x Likelihood) |
|---|---|---|---|---|---|---|---|---|
| Decommissioning Works | | | | | | | | |
| A | Severe Weather | Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds. | Illness or loss of life.<br><br>Sedimentation of nearby watercourse.<br><br>Damage to, or depletion of aquatic habitats and species. | 3 | The risk of severe weather is unlikely when considering the assessment in **Chapter 10** and weather conditions recorded over the last 30 years within the area. | 1 | The risk of severe weather conditions during the construction works will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'.<br><br>No contamination, localised effects. | 3 |
| B | Flooding | Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds. | Illness or loss of life.<br><br>Sedimentation of nearby watercourse.<br><br>Damage to, or depletion of aquatic habitats and species. | 2 | The risk of flooding is considered very unlikely when taking into account the baseline assessment in **Chapter 9** of the EIAR and due to no recurring or historic flood incidents being recorded within the Wind Farm site or along the Grid Connection route. | 1 | The risk of flooding during the decommissioning works will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment' | 2 |

| Risk ID | Potential Risk | Possible Cause | Environmental Effect | Likelihood Rating | Basis of Likelihood | Consequence Rating | Basis of Consequence | Risk Score (Consequence x Likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | No contamination of environment (e.g. watercourses), is anticipated, | |
| C | Peat Stability | Extreme weather conditions.<br><br>Overloading of peat during decommissioning. | Movement of peat within the site.<br><br>Damage to, or depletion of aquatic habitats and species. | 2 | The Project has been designed to minimise the potential for peat instability and failure. Refer to **Appendix 8-2**: Geotechnical and Peat Stability Assessment Report.<br><br>Based on the analysis of peat conditions at the site, the design of the Prospective Development, and the mitigation measures put in place a peat slide not expected to occur. It is predicted that the risk of peat slide is "Very Unlikely". | 3 | In the very unlikely event of peat instability occurring during the implementation of the Prospective Development there is the potential for "Limited to "Serious" consequences in that there would be 'a limited number of people affected' with 'localised effects of short duration'.<br><br>Simple contamination of environment (e.g. watercourses), could vary from localised effects of short duration to more widespread effects of an extended duration. | 6 |
| D | Traffic Incident | Driver negligence or failure of vehicular operations on site roads. | Injury or loss of life. | 3 | A limited number of vehicles will be permitted on the site as part of the Prospective Development. | 1 | A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a 'small number of people would be affected' should | 3 |

| Risk ID | Potential Risk | Possible Cause | Environmental Effect | Likelihood Rating | Basis of Likelihood | Consequence Rating | Basis of Consequence | Risk Score (Consequence x Likelihood) |
|---|---|---|---|---|---|---|---|---|
| | | Traffic Management not implemented or not adhered. | | | As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on site, 'at some time.' An unlikely risk is therefore predicted. | | a vehicular collision occur, with 'no fatalities and small number of minor injuries with first aid treatment.' | |
| E | Contamination | Fuel spillage during delivery to site.<br><br>Failure of fuel storage tank or tanks in plant and machinery and vehicles.<br><br>Erosion of sediment from emplaced site drainage channels. | Damage to, or depletion of aquatic habitats and species. | 2 | As outlined in **Chapter 4** and the **outline CEMP** fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site.<br><br>Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures as detailed in **Chapter 9 Hydrology & Hydrogeology** | 2 | The risk of a fuel spillage or impact on surround drainage during the decommissioning will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' through the use of bunded containment areas and proposed drainage mitigation measures during construction.<br><br>Simple contamination of environment (e.g. watercourses), localised effects of short duration. | 4 |

| Risk ID | Potential Risk | Possible Cause | Environmental Effect | Likelihood Rating | Basis of Likelihood | Consequence Rating | Basis of Consequence | Risk Score (Consequence x Likelihood) |
|---|---|---|---|---|---|---|---|---|
| F | Industrial Accident - Fire/Gas explosion. | Equipment or infrastructure failure.<br><br>Fuel spillage/storage.<br><br>Electrical problems.<br><br>Employee negligence. | Illness or loss of life.<br><br>Damage to, or depletion of habitats and species.<br><br>Impacts on ambient air quality. | 2 | As outlined in **Chapter 4** Description and **Outline** CEMP (under separate cover), fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel.<br><br>In accordance with Section 19 of the Safety, Health and Welfare at Work Act 2005, as amended (the 2005 Act), the Project shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site. | 2 | Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' due to the nature of the Project and the limited fuel storage at the site that could result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience'.<br><br>Simple contamination of environment (e.g. watercourses), localised effects of short duration. | 4 |

The risk assessment for each of the potential risks identified are consolidated in Table 15-8 which provides their 'risk score.' A corresponding risk matrix is provided in Table 15-9, which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 15.2.3.2, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios and the green zone represents 'low risk scenarios.

*Table 15-7 Risk Scores*

| Risk ID | Potential Risk | Likelihood Rating | Consequence Rating | Risk Score |
|---|---|---|---|---|
| **Decommissioning Works** | | | | |
| A | Severe Weather | 3 | 1 | 3 |
| B | Flooding | 2 | 1 | 2 |
| C | Peat Stability | 2 | 3 | 6 |
| D | Traffic Incident | 3 | 1 | 3 |
| E | Contamination | 2 | 2 | 4 |
| F | Industrial Accident e.g. gas explosion brought about by damage to GNI Infrastructure | 2 | 2 | 4 |

*Table 15-8 Risk Matrix*

| | | Consequence Rating | | | | |
|---|---|---|---|---|---|---|
| | | 1. Minor | 2. Limited | 3. Serious | 4. Very Serious | 5 Catastrophic |
| Likelihood Rating | 5. Very Likely | | | | | |
| | 4. Likely | | | | | |
| | 3. Unlikely | D | | | | |
| | 2. Very Unlikely | A, B | E, F | C | | |
| | 1. Extremely Unlikely | | | | | |

Table 15-9, presents the potential risks identified during the construction and decommissioning of the Project all or which can be classified as 'low risk scenarios.'

The scenario with the highest risk score in terms of a major accident and/or natural disaster during the construction and decommissioning works of the Prospective Development is identified below:

## Peat Stability During Decommissioning Works

There is a potential risk of peat instability during the implementation of the Prospective Development. The risk of peat instability was given a risk score of 6. The risk of peat instability has been minimised

through the careful development of the decommissioning plan for the Project and will be further limited through the implementation of the best practice construction control measures outlined in Section 8.4.4 of this EIAR. It is proposed to leave all site roads, hard stands, and turbine foundations in-situ thus eliminating the necessity for earthworks and excavation.

The risk of peat instability is 'very unlikely' to occur and would have 'Limited' to 'Serious' consequences should it do so, representing a 'low-risk scenario' during the implementation of the Prospective Development.

### Contamination During Decommissioning Works

There is a potential risk of contamination from site activities during the decommissioning works from potential release of hydrocarbons. The risk of contamination was given a risk score of 4. However, as outlined in Chapter 4 Section 4.3.10, measures are proposed and will be implemented to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology.

The risk of contamination is 'very unlikely' to occur and will have 'limited' consequences should it do so, representing a 'low-risk scenario' during the construction and decommissioning works.

### Industrial Accident-Fire/Gas Explosion During Decommissioning Works

There is a potential risk of fire/explosion at the Project site. However, as outlined in Section 15.2.1, the scope of this assessment has been based on the understanding that the Project will be designed in line with current best practice.

Further, in accordance with Section 19 of the Safety, Health and Welfare at Work Acts 2005 (as amended), the Project shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site.

## 15.4.2 Mitigation Measures

As outlined in Section 15.4.1, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster was identified as 'Peat Stability', 'Contamination' of the Project site and risk of 'Industrial Accident- Fire/Gas Explosion' during the implementation of the Prospective Development.

The decommissioning works will be accomplished in accordance with the best practice measures set out in this EIAR and the Decommissioning Management Plan for the Project and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the decommissioning approach.

Informed by the Assessment of Alternatives Chapter, Mitigation by design was an integral part of the Prospective Development. The selection of which parts of the Derrybrien Wind Farm to remove as part and the Prospective Development and which parts to leave in-situ as part of the Retained Development were made with peat stability and other environmental factors as the main concerns. As discussed, the works programme will take account of weather forecasts and work will be suspended in the case of extreme weather events effectively mitigation the risks associated with extreme weather and flooding. Likewise, the traffic management plan for the Prospective Development will mitigate risks associated with traffic incidents.

As discussed, the application for the Project is accompanied by a CEMP which sets out details of the environmental controls to be implemented on site. The CEMP sets out the Emergency Response Procedure to be adopted in the event of an emergency including contamination, health and safety and

environmental protection. The CEMP provides details on all mitigation and monitoring measures to be actioned prior to construction, during the construction and decommissioning works. The CEMP will be subject to ongoing review through regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all mitigation measures and commitments identified in the application documentation.

The CEMP includes an Emergency Response Plan (ERP). It provides details of procedures to be adopted in the event of an emergency relating to health & safety or environmental protection. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. Please see Chapter 4 of the EIAR and Decommissioning Management Plan (**Appendix 4-1**) for details.

## 15.4.3 Residual Effects

The risk of a major accident and/or disaster during the construction of the Project is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management*' (DoEHLG, 2010).

It is considered that when the mitigation and monitoring measures outlined in the CEMP are implemented and adhered to there will not be significant residual effect(s) associated with the construction and decommissioning of the Project.

## 15.4.4 Assessment of Cumulative Effects

A search in relation to projects that may have the potential to result in a cumulative impact with the Prospective Development on the environment was carried out as part of the EIAR. The Project has been considered, cumulatively with the projects set out in Chapter 2, Section 2.8 of the EIAR.

Following a detailed assessment of the potential for any further impact when considered cumulatively with any or all of the projects, the Project, with mitigation measures in place, was found to have no potential for significant cumulative effects and therefore no increase in the vulnerability of the Project to major accidents and/or natural disasters.

### 15.4.4.1 Cumulative Impacts with the Retained Development

There is potential for cumulative impacts to occur from the Prospective Development in combination with the Retained Development with respect to peat stability. The potential cumulative impacts on peat stability are discussed in detail in Chapter 8 of this EIAR and are summarised below.

#### 15.4.4.1.1 *Site Access Tracks*

Site access tracks will remain in-situ as part of the Retained Development. After decommissioning, no further heavy construction traffic loading will be required on the retained floating roads for the wind farm. Therefore, the probability of a failure occurring in the peat due to the residual impact of the roads is negligible so that the effect of the surcharge load on the stability of the peat will be negligible and Not Significant.

The site access tracks across the slide area at T68 and T70 are constructed as rockfill berms supported on the glacial till below the peat. Therefore, the residual impact of the berms and the effect on the stability of the underlying glacial till or rock will be negligible and Not Significant.

The floating roads adjacent to the slide area at Turbines T68 and T70 were inspected by AGL Consulting in January 2024 and there was no evidence of further instability in the peat at the edges of the slide area. Therefore, the residual impact of the slide on the peat in the area and the corresponding

effect on the stability of the floating roads should be negligible and Not Significant. There will therefore be no cumulative impact on Peat Stability with the Retained Development.

#### 15.4.4.1.2 Turbine Foundations & Crane Hardstandings

Turbine foundations and crane hardstandings will remain in-situ as part of the Retained Development. The hardstanding areas adjacent to the turbines and at the substation site are constructed of crushed rock granular rockfill supported on the glacial till or rock below the peat. Therefore, they do not apply any load on the peat and the effect of the residual impact on the stability of the underlying glacial till or rock will be negligible and Not Significant.

Furthermore, the hardstanding areas will act as a shear key preventing shear failure in the peat directly upslope from them, which is a positive residual impact with respect to site stability. The effect of the support they provide will be positive and slight to significant.

Similarly, the reinforced concrete turbine foundations are supported on rock or lean mix fill down to rock below the peat and glacial till so that they do not apply any load on the peat. Also, after the turbines are removed there will be no loading on the foundations. Therefore, the effect of the residual impact on the stability of the underlying glacial till or rock will be negligible and Not Significant.

The turbine foundations will also act as a shear key preventing shear failure in the peat directly upslope from them, which is a positive residual impact with respect to site stability. The effect of the support they provide will be Slightly Significant.

Given the positive effect of the hardstanding and turbine foundation on peat stability, there will be no cumulative impact on Peat Stability with the Prospective Development.

#### 15.4.4.1.3 Peat Repositories

The peat repositories will be left in place after decommissioning. As discussed in detail in Section 8.4.6.2.4 of this EIAR, the residual impact of the repository sites will be permanent and the effect that they will have on the stability of the peat will be Negligible and Not Significant. There will be no cumulative impact on Peat Stability with the Prospective Development.

#### 15.4.4.1.4 Borrow Pits

No work will be carried out in the borrow pits during decommissioning and it is not anticipated that there will be any deterioration or change in the condition of the pits after decommissioning. Therefore, the residual impact that they will have with respect to site stability will be imperceptible. There will be no cumulative impact on Peat Stability with the Prospective Development.

#### 15.4.4.1.5 Concrete Foundations for Polesets

The concrete foundations are supported on lean mix fill down to glacial till below the peat so that they do not apply any load on the peat. Also, after the polesets are removed there will be no loading on the foundations. Therefore, the effect of the residual impact on the stability of the underlying glacial till or rock will be Negligible and Not Significant. There will be no cumulative impact on Peat Stability with the Prospective Development.

#### 15.4.4.1.6 Concrete Foundations for Agannygal Substation

The concrete foundations are supported on a hardstand of granular fill to glacial till below the peat so that they do not apply any load on the peat. Also, after the substation buildings are removed there will be no loading on the foundations. Therefore, the effect of the residual impact on the stability of the

underlying glacial till or rock will be Negligible and Not Significant. There will be no cumulative impact on Peat Stability with the Prospective Development.

### 15.4.4.2 Cumulative Impacts from Adjacent Coniferous Forestry Plantations (Not Part of Project)

This section assesses the potential cumulative impact of forestry operations on lands adjacent to the Project area. The extent and age of forestry in the Slieve Aughty Mountains in the vicinity of the project area is shown on Figure 2-7 in Chapter 2. The majority of these are owned and operated by Coillte. According to their records forestry represents over 50% of land use within the river sub-catchment areas within which the wind farm site is located.

It is likely that felling and replanting of the forests in the project area will continue and could occur during the decommissioning of the wind farm. Previously, some of the felled timber was temporarily stockpiled on the wind farm site for transport off-site via the site road network. However, this will not be carried out during the decommissioning of the wind farm.

Coillte have extensive experience with management, felling and planting of conifer trees in these conditions. Assuming that the work will be carried out by experienced contractors using standard harvesting equipment and forwarders, as on the Derrybrien Wind Farm, then the direct impact that this will have on the degraded blanket bog in the area will be Very Low, which is of Slight Significance.

All of the drainage, tree felling and planting on adjacent forestry plantations has been and will be carried out outside the site of the Derrybrien Wind Farm and downslope or topographically remote from the site (i.e. in different river sub-catchments, or on different slopes within the same river sub-catchment). Furthermore, all the forestry along the Grid Connection route, at the site of the Agannygal substation and in the areas of the Peat Slide and Response Works were cleared for the project during construction and not replanted. Therefore, the impact of the site activities for the forestry on the adjacent plantations will not give rise to any significant cumulative direct or stability impacts on the receiving soils, geology and land in the Project area.

If timber felled from the adjacent plantations is transported up to the Derrybrien Wind Farm site and stockpiled on the peat during decommissioning, then this could result in occasional short-term localised surcharge loads up to about 15.0kN/m$^2$ on the peat adjacent to the floating roads at the stockpile locations. No timber stockpiling will be permitted on the site during decommissioning; therefore, there will be no cumulative peat stability impact on the wind farm site.

### 15.4.4.3 Turbary Activities

A detailed assessment of the potential cumulative impacts of turbary activities in the vicinity of the Prospective Development is provided in Section 8.4.5 of this EIAR. The potential for cumulative impacts on peat stability associated with turbary activities in combination with the Prospective Development is summarised below.

#### 15.4.4.3.1 *Cumulative Impacts from Peat Extraction outside the Project Site*

The cumulative impact of the turbary turf cutting on the Derrybrien Wind Farm site is assessed in Section 8.4.5.4 of this EIAR. With the exception of the turbary plots just outside the site boundary at the east end of the wind farm, all of the areas of cutover bog outside the site are remote to the site and separated from it by conifer plantations. Therefore, the site activities related to the turf cutting will not give rise to significant cumulative direct or stability impacts in terms of peat stability in the Project area during decommissioning.

#### 15.4.4.3.2 *Cumulative Impacts from Peat Extraction in Turbary Plots Within and Immediately Adjacent to the Wind Farm Site*

The potential cumulative impacts on peat stability from peat extraction in turbary plots within and immediately adjacent to the Prospective Development site are discussed in detail in Section 8.4.5.5.8 of this EIAR.

It was assessed that the probability of a peat slide occurring as a result of decommissioning works was very low to low so that the effect on the stability of the peat was Very Low to Low.

Potential cumulative stability impacts due to peat extraction on the wind farm site will not arise as a direct result of the wind farm decommissioning, but from the separate and unrelated activities for peat extraction in the turbary areas under established turbary rights, which are outside of the control of Gort Wind Farms Ltd. The mitigation measures in Section 6 of AGL Report No. 11-147-R06 in **Appendix 8-4** of this EIAR include a recommendation that no peat extraction should be carried out in the turbary areas during decommissioning of the wind farm. With the implementation of the above mitigation measures there will be no significant cumulative impacts due to peat extraction in the turbary plots on and immediately adjacent to the site during decommissioning.

## 15.5 Conclusion

Based on the assessment set out in this chapter the Prospective Development is considered to be at low risk of either causing or being impacted by a major accident or natural disaster. Furthermore, given the nature of the works proposed for the Prospective Development there will likely be no significant cumulative impacts with other projects or land use activities in the vicinity of the Project.

# 16. RESOURCE AND WASTE MANAGEMENT

## 16.1 Introduction

### 16.1.1 Chapter Scope

This section of the Environmental Impact Assessment Report (EIAR) identifies, describes, and assesses the likely significant effects of the Derrybrien Wind Farm Development Decommissioning Project- (as described in Chapter 4) on Resource and Waste Management.

### 16.1.2 Statement of Authority

This Section of the EIAR has been prepared by Thomas Blackwell and reviewed by Eoin O'Sullivan, of MKO. Thomas is a Senior Environmental Consultant with MKO with over 17 years' of progressive experience in environmental consulting and in the assessment of environmental documents for renewable energy developments. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Eoin O'Sullivan is a Senior Environmental Consultant and Project Director at MKO with over 14 years of experience in the assessment of a wide range of energy and infrastructure related projects and working in the fields of environmental and human health risk assessment, waste management, waste policy and permitting. Eoin has wide experience in the project management of large-scale infrastructural projects and brownfield developments which includes all aspects of geo-environmental and geotechnical investigation. Eoin holds a BSc (Hons) in Environmental Science & Technology and a MSc in Environmental Engineering. Eoin is a Chartered Member of the Chartered Institute of Water and Environmental Management (CIWEM) and Chartered Environmentalist (CEnv) with the Society of Environment.

### 16.1.3 Relevant Legislation

Resource and waste management takes place in a policy and legislative framework. A review of relevant legislation, policy and best practice guidance was undertaken to inform the impact assessment and recommended mitigation.

The primary legislative instruments that govern waste management in Ireland and applicable to the Prospective Development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 (as amended).

One of the guiding principles of European waste legislation, which has in turn been incorporated into the Waste Management Act 1996 as amended and subsequent Irish legislation, is the principle of "Duty of Care". This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, appropriately licenced waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of "Polluter Pays" whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments or a Waste or Industrial Emissions Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

## 16.1.4 Waste Management Policy Context

### 16.1.4.1 National Level

#### 'Changing Our Ways', Policy Statement 1998

The Irish Government issued a policy statement in September 1998, '*Changing Our Ways'*, which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for construction and demolition (C&D) waste in this report was to recycle at least 50% of C&D waste within a five-year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the Changing Our Ways report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled *'Recycling of Construction and Demolition Waste*' concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

#### A Waste Action Plan for a Circular Economy, 2020

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, '*A Waste Action Plan for a Circular Economy*' (WAPCE), replaces the previous national waste management plan, '*A Resource Opportunity*' (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 '*Living More, Using Less'* (2021) to set a course for Ireland to transition

across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

#### Circular Economy and Miscellaneous Provisions Act 2022

The Circular Economy and Miscellaneous Provisions Act 2022 was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

### 16.1.4.2 Regional Level - Connacht-Ulster Waste Management Plan 2015 – 2021

The Prospective Development is located in the Local Authority area of Galway County Council (GCC). The Connacht-Ulster Waste Management Plan 2015 – 2021, published in May 2015, is the current regional waste management plan for the GCC area. This plan replaces the previous Connacht region plan due to changing National policy and changes being enacted by the Waste Framework Directive (2008/98/EC).

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The Galway County Development Plan 2022 – 2028 sets out a number of policies for Galway County in line with the objectives of the regional waste management plan. The plan identifies supporting the implementation of the regional waste management plan as one of the Council's policies. Other waste policy which is relevant to the Prospective Development are included in Table 16-1, below.

*Table 16-1 Waste Management Policy Objectives from Galway County Development Plan 2022 – 2028*

| Policy Objectives Waste Management | |
|---|---|
| **WM 1** | **Connacht and Ulster Waste Management Plan 2015-2021** |
| Support the implementation of the Connacht and Ulster Waste Management Plan 2015-2021 or any updated version of this document within the lifetime of the plan. | |
| **WM 2** | **Requirements for Waste Management** |
| Support and promote the circular economy principles, prioritising prevention, reuse, recycling and recovery, and to sustainably manage residual waste. New developments will be expected to take account of the provisions of the Waste Management Plan for the Region and observe those elements of it that relate to waste prevention and minimisation, waste recycling facilities, and the capacity for source segregation. | |
| **WM 3** | **Waste Recovery and Disposal Facilities** |
| Support and facilitate the provision of adequate waste recovery and disposal facilities for the county. | |
| **WM 4** | **Waste Legalisation** |

| Policy Objectives Waste Management |
|---|
| To require that all waste disposal shall be undertaken in compliance with the requirements of the Environmental Protection Agency and relevant Waste Management Legislation. |
| **WM 5 Construction and Environmental Management Plans** |
| Construction Environment Management Plans (CEMP) shall be prepared in advance of the construction of relevant projects and implemented throughout. Such plans shall incorporate relevant mitigation measures which have been integrated into the Plan and any lower tier Environmental Impact Statement or Appropriate Assessment. CEMPs typically provide details of intended construction practice for the proposed development, including:<br><br>(a) location of the sites and materials compound(s) including area(s) identified for the storage of construction refuse;<br><br>(b) location of areas for construction site offices and staff facilities;<br><br>(c) details of site security fencing and hoardings;<br><br>(d) details of on-site car parking facilities for site workers during the course of construction;<br><br>(e) details of the timing and routing of construction traffic to and from the construction site and associated directional signage;<br><br>(f) measures to obviate queuing of construction traffic on the adjoining road network;<br><br>(g) measures to prevent the spillage or deposit of clay, rubble or other debris;<br><br>(h) alternative arrangements to be put in place for pedestrians and vehicles in the case of the closure of any public right of way during the course of site development works;<br><br>(i) details of appropriate mitigation measures for noise, dust and vibration, and monitoring of such levels;<br><br>(j) containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained (such bunds shall be roofed to exclude rainwater);<br><br>(k) disposal of construction/demolition waste and details of how it is proposed to manage excavated soil, including compliance with 2006 Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, Heritage and Local Government;<br><br>(l) a water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains; |
| **WM 6 Waste Management** |
| To continue to meet the duties under the Waste Management (certification of historic unlicensed waste disposal and recovery activity) Regulations 2008, including those in relation to the identification and registration of closed landfills. |
| **WM7 Recycling Infrastructure** |
| To provide for the provision of recycling infrastructure throughout the county where it is considered necessary and support the provision of additional recycling infrastructure throughout the county. |
| **WM 8 Sustainable Waste Management Practices** |

| Policy Objectives Waste Management |
|---|
| Promote and facilitate communities to become involved in environmental awareness activities and community based recycling initiatives or environmental management initiatives that will lead to local sustainable waste management practices. |
| **WM 9 Separate Collection of Waste** |
| Encourage and support the provision of separate collection of waste in accordance with the requirements of the Waste Management (Food Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011 and other relevant legislation. |
| **WM10 Landfill Sites** |
| a) Galway County Council will put in place a plan during the lifetime of the 2022- 2028 Galway County Development Plan for Poolboy Landfill in Ballinasloe to deal with remediation of the Poolboy Landfill site to a standard consistent with the end use of Poolboy Landfill and adjacent lands to open space/ park amenity area for community use including community sustainable energy/ climate action measures.<br><br>b) Galway County Council will put in place a plan during the lifetime of 2022-2028 Galway County Development Plan for Kilconnell Landfill to deal with the remediation of the Kilconnell Landfill site to a standard consistent with the end use of Kilconnell Landfill to open space / park amenity area for community use including community sustainable energy/ climate action measures. |

## 16.1.5 Relevant Guidance

The Environmental Protection Agency (EPA) of Ireland issued *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* (the guidelines) in November 2021. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the decommissioning of a project. These guidelines have been followed in the preparation of the resource and waste management plan (RWMP) for the Prospective Development and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes.
- Design team's roles and approach.
- Relevant EU, national and local waste policy, legislation and guidelines.
- Waste disposal/recycling of C&D wastes at the site.
- Provision of training for Resource Waste Manager (RM) and site crew.
- Details of proposed record keeping system.
- Details of waste audit procedures and plan.
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the guidelines identifies thresholds above which there is a requirement for the preparation of a bespoke RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development, which require a simplified RWMP:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.

- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m$^2$.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m$^2$.
- Demolition projects generating in total less than 100m$^3$ in volume of C&D waste.
- A development which exceeds one or more of these thresholds is classed as Tier-2 projects.
- This development requires a RWMP as a Tier 2 development as it is above following criterion:
    - Demolition projects generating in total less than 100m$^3$ in volume of C&D waste.

The demolition of the Derrybrien and Agannygal substations will likely generate in excess of 100m$^3$ of C&D waste. Therefore, a bespoke RWMP is required for the project. A Resource and Waste Management Plan has been prepared (Under Separate Cover)

Other guidelines followed in the preparation of the RWMP and in the preparation of this Chapter of the EIAR include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'*, published by FÁS and the Construction Industry Federation in 2002 and the previous guidelines, *'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* (2021).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

The Institute for Environmental Management and Assessment (IEMA) published *the "IEMA guide to: Materials and Waste in Environmental Impact Assessment"* in 2020. This document provides guidance on the assessment of the environmental impacts and effects of materials and waste as part of the EIA process. The principals and approaches outlined in the IEMA guide have been applied to the assessments contained in this chapter.

# 16.2 Methodology

## 16.2.1 Introduction

The potential for waste to be generated during the Prospective Development is assessed in this chapter along with the likely effects of that waste on local and national waste management infrastructure. Mitigation measures are identified where necessary to reduce the impact of the waste generated by the Prospective Development.

The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, materials and resources is maintained in the economy for as long as possible and the generation of waste is minimised. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy. Figure 16-1 (below) provides a simplified illustration of the concept of circular economy. Moving to a circular economy greatly reduces the generation of residual waste.




*Figure 16-1 Simplified Model of the Circular Economy (Source: European Environment Agency)*

However, where residual waste is generated, it should be dealt with in a way that follows the waste hierarchy set out in the EU Waste Framework Directive (Directive 2008/98/EC), as amended (see Figure 16-2) and actively contributes to the economic, social and environmental goals of sustainable development.

This chapter examines the potential for significant effects of the generation and management of waste arising from the Prospective Development, in the context of the existing national waste management environment.




*Figure 16-2 Waste Hierarchy (Source: European Commission)*

## 16.2.2 Assessment Methodology

The assessment of the impacts of the Prospective Development arising from the generation of waste materials, was carried out taking into account the methodology outlined in *"IEMA guide to: Materials and Waste in Environmental Impact Assessment"* (2020) along with an extensive document review to assist in identifying current requirements for waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. This Chapter is based on the Prospective Development, as described in Chapter 4 of this EIAR and considers the following aspects:

- Decommissioning Waste.

A desk study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland.
- Description of the typical waste materials that will be generated during the Prospective Development.
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the Prospective Development decommissioning works have been calculated. Mitigation measures are proposed to minimise the effect of the Prospective Development on the environment to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 16.5.

The assessment uses a three-step process to determine the significance of the potential effects of the Prospective Development on Ireland waste management infrastructure. For the purposes of this assessment hazardous and non-hazardous waste are assessed separately as these are typically different waste streams with separate infrastructure for their management. The three-step process is summarised as follows:

1. *Assess Sensitivity of Receptor: In this case the receptor is Ireland's landfill capacity for non-hazardous waste and management facilities for hazardous waste.*

2. *Assess Magnitude of Impacts: Based on the amount of waste that will be generated by the Prospective Development, an assessment is made as the magnitude of the impact of that waste on the available annual landfill capacity in Ireland over the duration of the Prospective Development.*
3. *Determining the Significance of the Effect: The matrix presented in Table 16-6 is used to determine the significance of the effects of the Prospective Development on waste management infrastructure based on the sensitivity of the receptor and the magnitude of the impact as determined steps 1 and 2.*

Steps 1 to 3 of the assessment process are discussed in more detail below

### 16.2.2.1 Step 1 - Assessing Sensitivity

Based on the IEMA (2020) guidance, the sensitivity of waste relates to availability of national landfill capacity in the absence of the Prospective Development. Landfill capacity is recognised as an unsustainable and increasingly scarce option for managing waste. The IEMA guidance notes that infrastructure used to process and recover arisings (and hence divert them from landfill) is a beneficiary of waste feedstock and has the ability to reduce adverse impacts. Therefore, such facilities are an influencing factor in the reduction of the magnitude of waste impacts on landfill capacity, rather than being a sensitive receptor in their own right.

The sensitivity of landfill capacity is assessed by applying the following sensitivity criteria, which should be completed in the absence of a proposed development:

*Table 16-2 Landfill Capacity Sensitivity Criteria*

| Negligible | Low | Medium | High | Very High |
|---|---|---|---|---|
| ...remain unchanged, or is expected to increase through a committed change in capacity. | ...reduce minimally: by <1% as a result of wastes forecast. | ...reduce noticeably: by 1-5% as a result of wastes forecast. | ...reduce considerably: by 6-10% as a result of wastes forecast | ... reduce very considerably (by >10%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand. |

### 16.2.2.2 Step 2 - Assessing Magnitude of Impacts

The magnitude of the potential impacts of the Prospective Development on waste management infrastructure are assessed separately for hazardous and non-hazardous waste.

*Table 16-3 Magnitude of Impacts – Non-Hazardous Waste*

| No Change | Negligible | Minor | Moderate | Major |
|---|---|---|---|---|
| Zero waste generation and disposal from the development. | Waste generated by the development will reduce national landfill capacity baseline by <1%. | Waste generated by the development will reduce national landfill capacity baseline by 1-5%. | Waste generated by the development will reduce national landfill capacity baseline by 6-10%. | Waste generated by the development will reduce national landfill capacity baseline by >10%. |

*Table 16-4 Magnitude of Impacts – Hazardous Waste*

| No Change | Negligible | Minor | Moderate | Major |
|---|---|---|---|---|
| Zero waste generation and disposal from the development. | Waste generated by the development will reduce national landfill capacity baseline by <0.1%. | Waste generated by the development will reduce national landfill capacity baseline by 0.1-0.5%. | Waste generated by the development will reduce national landfill capacity baseline by 0.5-1%. | Waste generated by the development will reduce national landfill capacity baseline by >1%. |

### 16.2.2.3 Step 3 - Determining the Significance of Effect

The EPA *Guidelines on information to be included in Environmental Impact Assessment Reports* (EPA, 2022) and the *IEMA guide to: Materials and Waste in Environmental Impact Assessment*, (IEMA, 2020) were also considered when determining significance and the assessment is in accordance with those guidelines.

The terminology used in the determination of significance follows the suggested language set out in the EPA Guidelines (2022) as shown in Table 16-5.

*Table 16-5 Criteria for determining significance of effect, based on (EPA, 2022) guidelines.*

| Significance | Definition |
|---|---|
| Neutral | No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. |
| Imperceptible effect | An effect capable of measurement but without noticeable consequences. |
| Not Significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| Slight effect | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| Moderate effect | An effect that alters the character of the environment that is consistent with existing and emerging trends. |
| Significant effect | An effect which, by its character, its magnitude, duration or intensity alters a sensitive aspect of the environment. |
| Very Significant | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. |
| Profound effect | An effect which obliterates sensitive characteristics. |

The following matrix (Table 16-5), adapted from the IEMA (2020) guidance is used to determine the significance of the effect on the Prospective Development on Waste Management Infrastructure based on the sensitivity of the receptor (Step 1) and the magnitude of the impact (Step 3).

*Table 16-6 Significance Matrix*

| | Magnitute of Impact | | | | | |
|---|---|---|---|---|---|---|
| Sensitivity of receptor | | No Change | Negligible | Minor | Moderate | Major |
| | Very High | Neutral | Slight | Moderate to Significant | Significant | Very Significant |
| | High | Neutral | Not Significant | Moderate | Moderate to Significant | Significant |
| | Medium | Neutral | Imperceptible | Not Significant | Moderate | Moderate to Significant |
| | Low | Neutral | Imperceptible | Not Significant | Slight | Moderate |
| | Neglible | Neutral | Neutral | Not Significant | Not Significant | Slight |

## 16.2.3 Scoping and Consultation

The scope for this chapter of the EIAR has also been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties. This consultation process is outlined in Section 2.2 of this EIAR. The following consultees made reference to waste matters in their responses:

### Department of Transport

The Department of Transport responded to Scoping on the 24th of October 2024, in which it stated that they consider it important that the examination of the proposal should include consideration of Waste and Turbine Removal. The Department outlined that all abnormal loads associated with the project should be kept to minimal dimensions and weights to minimise the impact on the public road network.

Resource and waste management proposals are considered in Section 16.5.2 of this Chapter of the EIAR.

## 16.2.4 Limitations/Difficulties Encountered

No significant limitations or difficulties were encountered in the preparation of this EIAR.

# 16.3 Receiving Environment

In terms of waste management, the receiving environment is largely defined by Galway County Council (GCC) as the local authority responsible for setting and administering waste management activities in the area. The Connacht-Ulster Waste Management Plan 2015 – 2021 is the current regional waste management plan for the GCC area. This plan replaces the previous Connacht region plan due to changing National policy and changes being enacted by the Waste Framework Directive (2008/98/EC).

The Connacht-Ulster Waste Management Plan 2015 2021 sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan.
- Achieve a recycling rate of 50% of managed municipal waste by 2020.
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.
- "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

Ireland does not have a specific Regulation addressing Construction and Demolition waste (C&D). This stream is managed through a combination of policy documents, planning guidelines, and EU obligations. For example, planning guidelines (such as Department of the Environment, Heritage and Local Government (2006) *Best Practice Guidelines for the Handling of Construction and Demolition Waste*) were issued under the Planning and Development Act and required planning authorities to consider the DECLG Best Practice Guidelines to ensure the proper management of C&D waste. The national policy document, *Changing Our Ways* (1998), set a target of 85% recycling of C&D waste by 2013. More recently the 2008 EU WFD set a target of 70% by weight for C&D waste, excluding natural soils and stones waste and hazardous C&D wastes. The National Waste Statistics update published by the EPA in 2020 identifies that Ireland achieved 78 per cent material recovery of such waste in 2020 surpassing the 70% target.

### 16.3.1 Waste Management Facilities

There are a number of waste permitted and licensed facilities located in the Republic of Ireland for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

A list of licenced waste carriers/ recycling facilities in the Republic of Ireland is provided in Appendix B of the Turbine Recyclability Assessment (**Appendix 16-1** of this EIAR).

### 16.3.2 National Landfill Capacity

According to data published by the EPA there are currently only three landfills accepting municipal waste in Ireland with a total annual capacity of 470,000 tonnes. Current landfill capacity in Ireland is summarised in Table 16-7, below.

*Table 16-7 Operational Municipal Landfills in Ireland (EPA 2020)*

| Facility name and location | Waste for disposal (maximum tonnes per annum) | Waste types for disposal (maximum tonnes per annum)[1] | Waste types for recovery (maximum tonnes per annum)[1] |
|---|---|---|---|
| Knockharley Landfill Co. Meath | 175,000 | 100,000 household 45,000 commercial 30,000 industrial | 25,000 construction & demolition 70,000 inert waste |
| Ballynagran Residual Landfill Co. Wicklow | 175,000 | 62,500 household 67,500 commercial 45,000 industrial | 28,000 construction & demolition |
| Drehid Waste Management Facility Co. Kildare | 120,000 | 120,000 non-hazardous municipal, commercial and industrial wastes | No limit for inert waste were used in landfill engineering |

| Facility name and location | Waste for disposal (maximum tonnes per annum) | Waste types for disposal (maximum tonnes per annum)[1] | Waste types for recovery (maximum tonnes per annum)[1] |
|---|---|---|---|
| **Total** | **470,000** | | |

According to the EPA's website,

> *"National municipal landfills and waste-to-energy facilities are operating at capacity and Ireland has some significant waste infrastructure deficits, as evidenced by its high dependence on export markets for treating municipal, hazardous, packaging and biowastes in 2020.*
>
> *Two of the three operational landfills will approach their maximum lifetime consented capacity by 2027 if additional capacity is not authorised."*

Following the precautionary principle, it is therefore determined that the sensitivity of waste management infrastructure (landfills) is Very High.

### 16.3.3 Hazardous waste treatment in Ireland

According to the EPA Ireland generated 466,941 tonnes of hazardous waste in 2021. The majority (52 per cent) of Ireland's hazardous waste was treated in Ireland either on site of generation or at hazardous waste facilities. However, Ireland does not have the facilities required to treat the full range of hazardous wastes it produces and therefore a further 48 per cent was exported abroad for treatment in 2021.

Irish hazardous waste treatment facilities treated 148,575 tonnes of hazardous waste to non-hazardous status in 2021. Waste types treated included used motor oil, healthcare wastes, sludges, filter cakes, absorbents, laboratory and chemical waste, contaminated soils and household hazardous waste from civic amenity sites. This waste is treated until it is non-hazardous; the non-hazardous wastes that result is then further treated either in Ireland or abroad.

Almost 22,000 tonnes of waste oil was collected in 2020. Of this, over 18,000 tonnes was sent for oil re-refining (R9) in Ireland resulting in almost 17,000 tonnes of fuel oil that went for energy recovery, while over 1,000 tonnes of the waste oils collected was exported for treatment.

## 16.4 Characteristics of the Prospective Development

### 16.4.1 Waste Generation

#### 16.4.1.1 Wind Turbines

##### 16.4.1.1.1 *Sale and Reuse of Turbines – Preferred Option*

There are 70 no. Vestas V52 wind turbines at the Derrybrien Wind Farm. The turbines will be dismantled on-site, and it is expected that the turbines will be sold to a third party and will be transported off site. In the event that the turbines are sold to a third party for reuse, there will be no waste generated from the decommissioning of the wind turbines at the site.

#### 16.4.1.1.2 Scrapping and Recycling of Turbines

If any of the turbines or part of a turbine are unsuitable for re-use, then this will be managed appropriately in accordance with the waste hierarchy. A detailed Turbine Recyclability Assessment has been undertaken and is provided as **Appendix 16-1** of this EIAR. The Turbine Recyclability Assessment estimates an overall turbine recyclability of 88% for the Vestas V52 wind turbines.

*Table 16-8 Estimated Expected Composition of Vestas V52 Turbines.*

| Material | Steel | Cast iron | Copper | Aluminium | Composites | Other |
|---|---|---|---|---|---|---|
| **Percentage by mass** | 69.2% | 21.4% | 1.5% | 0.6% | 6.5% | 0.8% |

##### Blades

The V52 blades are made from pre-impregnated glass fibre reinforced epoxy to make up the blade spar, and steel for the root attachment, with an epoxy gelcoat surface. The exact material composition of the remaining blade is unknown. Blades are difficult to recycle due to the combination of glass fibres with epoxy which cannot be easily separated from the other materials.

A great area of concern is what can be done with materials that are not recyclable or that are not cost effective to manage. When considering non-recyclable materials, the best practice is summarised through the waste hierarchy shown in Figure 16-2. For example, when considering the most sustainable solution is to extend the life of the materials as long as possible which could be done through the refurbishing and sale of components to a second-hand market. If possible, turbine blades will be sold to a third party for reuse either in their entirety or to provide spare parts.

Recycling of glass fibres is a difficult and costly process, but it is possible, and there are a number of technologies which have been trialled and are in development to meet this growing demand. At this point in time, many recycling methods which create new material for the manufacturing of new products are still under development and have not yet been fully commercialised. The recovery of material and energy through cement co-processing is becoming widely used throughout the industry to handle this composite waste. This process involves the mechanical grinding of blade sections such that they can be used as a fuel feedstock replacing coal in the cement kiln. Through this process energy is recovered for the production of cement and can reduce the $CO_2$ emission intensity by as much as 27%. Turbine blades will be removed from the site and processed by specialised companies. A list of potential recycling companies is provided in the Turbine Recyclability Assessment (**Appendix 16-1** of this EIAR).

##### Lubricants and oils

Operating fluids or lubricants are used in wind turbines in the generator, converter, gearbox, hydraulic system, rotor bearings and in the transformer. These liquids are harmful to the environment and must be handled with care during decommissioning. The following specific lubricants are expected to be encountered during the decommissioning process:

- Anti-freeze in the generator to help prevent the cooling system from freezing.
- Gear oil in the gearbox.
- Grease on all bearings.
- Resin cover coating in generator or transformer.
- Various cleaning agents and chemicals for maintenance of the turbine.
- Oil in the transformer.

Oils and lubricants should be handled carefully and where feasible, different fluids should not be mixed to ensure efficient recycling. There exists a significant risk of soil contamination during the decommissioning process if these fluids are not handled properly and it is recommended that specialist contractors are used when extracting these substances. If correctly handled oils and lubricants can be recycled through refining and processing into fuel oils and raw materials in the petrochemicals industry. Mitigation measures to prevent soil contamination are provided in Section 8.4 of this EIAR. A specialist company will be contracted to remove all oils and hydraulic fluids from the turbine prior to dismantling during the decommissioning process.

#### 16.4.1.2 Underground Cables

It is proposed that all sub surface LV cables are to remain in situ. Once turbines have been removed all cables exposed on top of the concrete foundation will be cut at top of foundation level. The cables remaining shall be inserted into the existing unplasticised polyvinyl chloride (uPVC) ducting to a minimum depth of 300mm below the top of the foundation and then grout shall be placed into the duct to encase the remaining cables and seal the foundation ducting off at top of foundation level.

All sections of cables cut will be gathered and transported off-site for disposal and/or recycling in a suitably licensed landfill.

#### 16.4.1.3 Anemometer Masts

The 2 no. anemometer lattice masts will be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland. It is anticipated that the anemometer masts will be sold to a third party for reuse.

#### 16.4.1.4 Derrybrien 110kV Grid Connection OHL

##### 16.4.1.4.1 *Pole Sets*

The existing Derrybrien – Agannygal 110kV OHL includes 34 no. double pole sets. Each wood pole set consists of 2 no. wood poles and a steel crossarm.

The following section outlines the methodology to be followed during decommissioning works of the existing wooden poleset structures:

- A tracked dumper and tirfor® hoist, or suitable alternative, will be used to swing the crossarm and fix to a single pole.
- Each pole will be felled using a chainsaw.
- Ground will be hand dug to 300mm surrounding pole to allow for cutting.
- Each pole will be retired to 300mm below ground level.
- Poles will be removed from site using a tracked excavator where possible or cut into smaller pieces and removed with a tracked dumper to the closest hardstand area where materials will be loaded onto a flatbed trailer.
- Works shall be planned to ensure number of vehicle movements across terrain will be kept to a minimum.

The wooden pole sets have been treated with creosote and they will be disposed of appropriately at a licenced waste management facility. The steel cross arms cannot be reused and will be recycled.

#### 16.4.1.4.2 End Towers and Angle Towers

The Derrybrien – Agannygal 110kV OHL includes 2 no. steel End Towers (EM) 6 no. steel Angle Towers (AM) and 1 no. steel Intermediate Tower (IM). Tower legs will be cut and concrete foundations will be broken to circa 300mm below ground level and removed from the site. The steel angle masts and end masts cannot be reused and will be recycled.

#### 16.4.1.4.3 Insulators

The porcelain insulators are expected to be recycled.

#### 16.4.1.4.4 Conductors

Conductors from the grid connection will be gathered and transported off-site for disposal and/or recycling in a suitably licensed landfill.

### 16.4.1.5 Substation Electrical Equipment

It is expected that the high voltage and medium voltage electrical from both the Derrybrien and Agannygal Substations will be transported off site for reuse. It is therefore expected that there will be little or no waste generated from the decommissioning of the substation high voltage and medium voltage electrical equipment.

If any of the equipment or part of the equipment are unsuitable for re-use, then this will be disposed of appropriately with materials being recycled where possible. A summary of the electrical equipment at the Derrybrien and Agannygal Substations is provided in Tables 16-9 and 16-10 respectively.

*Table 16-9 Derrybrien Substation Electrical Equipment*

| Item | Voltage | Quantity | Reuse / Recycle |
|---|---|---|---|
| End mast | - | 1 | Waste |
| Circuit breaker Siemens 3AP1 | 110kV | 1 | Reuse |
| Current transformer, Arteche | 110kV | 3 | Reuse |
| Voltage transformer, Arteche | 110kV | 3 | Reuse |
| Disconnector, Merlin Gerin | 110kV | 2 | Reuse |
| Power transformer, 70MVA | 110/20kV | 1 | Reuse |
| Post Insulators | 110kV | 6 | Reuse |
| Surge arrestors | 110kV | 3 | Reuse |
| Surge arrestors | 20kV | 3 | Reuse |
| NER (Neutral Earth Resistor) | | 1 | Reuse |
| Capacitor banks | | 2 | Reuse |

| Item | Voltage | Quantity | Reuse / Recycle |
|---|---|---|---|
| Lightening Mast | - | 1 | Recycle |
| House transformer | - | 1 | Reuse |
| Diesel generator | - | 1 | Reuse |
| Busbar, copper | | | Recycle |
| MV switchgear | 20kV | | Reuse |
| Protection relays | - | | Reuse |
| Capacitor banks | - | 2 | Reuse |

*Table 16-10 Agannygal Substation Electrical Equipment*

| Item | Voltage | Quantity | Reuse / Recycle |
|---|---|---|---|
| End mast | - | 3 | Waste |
| Circuit breaker Siemens 3AP1 | 110kV | 3 | Reuse |
| Current transformer, Arteche | 110kV | 9 | Reuse |
| Voltage transformer, Arteche | 110kV | 9 | Reuse |
| Disconnector, Merlin Gerin | 110kV | 6 | Reuse |
| Post Insulators | 110kV | 6 | Reuse |
| Surge arrestors | 110kV | 9 | Reuse |
| Lightening Mast | - | 2 | Recycle |
| House transformer | - | 1 | Reuse |
| Diesel generator | - | 1 | Reuse |
| Busbar, copper | | | Recycle |
| Protection relays | - | | Reuse |

#### 16.4.1.5.1 *Sulphur Hexafluoride Gas*

Sulphur Hexafluoride ($SF_6$ ) is used as insulating material in certain pieces of electrical equipment. Where necessary, $SF_6$ will be removed from electrical equipment prior to decommissioning.

##### Derrybrien Substation

Sulphur Hexafluoride ($SF_6$ ) is used as insulating material in the outdoor Siemens 110 kV circuit breaker (8.10kg $SF_6$) and the two capacitor bank units (2 x0.34kg $SF_6$) at the Derrybrien Substation. $SF_6$ gas filled equipment shall be emptied, i.e. $SF_6$ gas transferred into a suitable cylinder. This requires testing of the $SF_6$ gas quality to ensure the correct cylinder type is used and a review undertaken of the

TUV test date of the cylinder (to ensure it is in date). A gas cart is required for this purpose and a log must be kept of SF6 gas quantities/qualities.

$SF_6$ switchgear from the substation and any oil containing equipment will be carefully removed in compliance with applicable legislation. All waste will be managed in accordance with applicable legislation.

Sulphur Hexafluoride ($SF_6$) is used in the circuit breaker of the ten 20 kV switchgear cubicles within the control building. The circuit breaker containing $SF_6$ is labelled and hermetically sealed. $SF_6$ is not removed during the decommissioning of the switchgear.

#### Agannygal Substation

Sulphur Hexafluoride ($SF_6$ ) is used as insulating material in the outdoor Siemens 110 kV circuit breaker (8.10kg $SF_6$) and the two capacitor bank units (2 x0.34kg $SF_6$) at the Agannygal Substation. SF6 gas filled equipment shall be emptied, i.e. $SF_6$ gas transferred into a suitable cylinder. This requires testing of the $SF_6$ gas quality to ensure the correct cylinder type is used and a review undertaken of the TUV test date of the cylinder (to ensure it is in date). A gas cart is required for this purpose and a log must be kept of $SF_6$ gas quantities/qualities.

### 16.4.1.5.2 *Transformer Oil*

Oil filled equipment, such as current and voltage transformers, CT and VT, will be inspected before and after removing from their support steelwork. In some cases, it is not necessary to remove the oil for transport provided the laden weight is not beyond the capability of the transport vehicle. In this case transformers can be loaded intact on to a bunded platform/trailer and secured for transport. CTs and VTs can be laid horizontally but must be supported to avoid sudden shear force during transport which could cause damage and leakage (for example providing support to the middle of the unit to avoid porcelain dipping and cracking at this midpoint).

#### 110kv Grid Transformer

Prior to removing the 80-tonne step-up transformer at the Derrybrien Substation, the oil will be drained and the transformer tank filled with a positive pressure of dry air for transportation of the transformer. The oil can be stored in an oil road tanker or an external intermediate bulk container (IBC), or other suitable container built for this purpose for later disposal/reuse.

#### House Transformers

House Transformers will be loaded without emptying the insulating oil. The bunded platform/trailer being used will be capable of holding the complete contents of oil from all equipment with an additional margin to avoid spillage. This may require splitting the load for transport.

### 16.4.1.5.3 *Lead Acid Batteries*

The lead acid-based battery system will be discharged, disconnected from each other, removed by hand and segregated as waste as appropriate. Appropriate safety equipment will be worn when the batteries are being handled e.g. acid-resistant goggles/face shield, gloves, an apron.

### 16.4.1.6 Substation Demolition Waste

As discussed in Section 16.4.1.5 (above), it is expected the HV & MV equipment will be sold to a third party and will be transported off site. If any of the equipment or part of the equipment are unsuitable for re-use, then this will be disposed of appropriately with materials being recycled where possible.

Following the removal of electrical equipment, the demolition of the residual elements of the Derrybrien and Agannygal Substations will generate waste. Extensive waste categorisation will be in place to ensure the highest possible quality of reuse or recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle. To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls. The waste that will be generated by the demolition of the Derrybrien and Agannygal Substations is summarised in Table 16-11.

*Table 16-11 Waste Generated from Demolition of Derrybrien and Agannygal Substations*

| Types of Waste Generated | Derrybrien Substation | Agannygal Substation |
|---|---|---|
| Blockwork | Approx. 58 tonne | Approx. 58 tonne |
| Concrete Slabs | Approx. 72 tonne | Approx. 72 tonne |
| Roof Tiles | 1 load | 1 load |
| Wood Trusses | Approx 6m$^3$ of wood | Approx 6m$^3$ of wood |
| Other Building Material Waste | Steel from palisade fences and masts, GRP tiles, Sanitary/kitchen ware, Glass blocks | Steel from palisade fences and masts, GRP tiles, Sanitary/kitchen ware, Glass blocks |
| Other Types of Waste | Oils, Grease, Lead acid batteries, Plastics, Porcelain insulators, Copper, Aluminium, Electrical waste such as copper wires/cables, cabinets etc. | Oils, Grease, Lead acid batteries, Plastics, Porcelain insulators, Copper, Aluminium, Electrical waste such as copper wires/cables, cabinets etc. |

### 16.4.1.7 General Domestic Waste

General domestic waste will be generated at the construction compound during the Prospective Development. This will include waste from the site offices and canteen as well as wastewater and sewage from the self-contained portaloos / portable welfare units.

Extensive waste categorisation will be in place to ensure the highest possible quality of recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle.

To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls.

### 16.4.1.8 Summary of Waste Generation

As discussed above, the majority of the electrical equipment, wind turbines, and grid connection cabling will either be recycled or reused. Table 16-12 below summarises the anticipated waste generated during the Prospective Development that is likely to be disposed of in landfill. This summary assumes that, as a worst-case scenario, the 70 no. turbines at the site cannot be reused and have to be scrapped. In such a scenario, 88% (by mass) of the turbines would be recycled with the residual being disposed of in landfill.

*Table 16-12 Estimated tonnages of material to be removed from Prospective Development during decommissioning.*

| Description | Estimated Volume (Tonne) |
|---|---|
| **Non-Hazardous Waste** | |
| Concrete Bricks | 300.7 |
| Tiles and Ceramics | 7.4 |
| Wood | 22.97 |
| Plastics (Blades) | 700 |
| Plastics | 9.00 |
| Iron and Steel | 5,731.2 |
| Cables | 128 |
| **Total Non-Hazardous** | **6,899.27** |
| **Hazardous Waste** | |
| Creosote Treated Poles | 40.8 |
| Waste Oil | 25.93 |
| **Total Hazardous** | **66.73** |

# 16.5 Likely Significant Impacts and Associated Mitigation Measures

## 16.5.1 "Do-Nothing" Scenario

Under the do-nothing scenario, the Derrybrien Wind Farm Development would remain in-situ in its current state i.e., as an unauthorised windfarm development the ceased commercial electricity generation in February 2022. No decommissioning works would be undertaken. The infrastructure would continue to degrade over time.

There would be no waste generated under the do-nothing scenario and therefore there would be no effect on Waste and Resource management.

## 16.5.2 Impacts of Prospective Development

### 16.5.2.1 Waste Generation

The Prospective Development will have the potential to produce municipal waste (site office, canteen), wastewater (site welfare facility) and demolition waste (wood, rubble, metal, etc.) which will need to be processed at local waste processing facilities. These are largely composed of metal and other recyclable materials which would be brought to specialised facilities for processing/recycling such items. Turbine

blades (fibreglass based) which currently have limited scope for recycling would be removed and processed by specialised companies. Any other wastes (such as oils) would be collected by an appropriately licensed waste collector.

Wind turbines, anemometer masts, and substation electrical equipment will be dismantled and removed from the site preferably for sale or re-use on other projects. If any of the turbines or part of a turbine are unsuitable for re-use, then this will be disposed of appropriately with materials being recycled where possible. The Turbine Recyclability Assessment (**Appendix 16-1**) estimates an overall turbine recyclability of 88% for the Vestas V52 wind turbines. Recycling of the V52 turbines will be undertaken by a specialist wind turbine recycling contractor.

The Prospective Development will generate a range of non-hazardous and hazardous waste materials during decommissioning. The main sources of waste will be generated from the demolition of the two substations. General housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste and sewage from portaloos.

Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. Dedicated areas for waste skips and bins will be identified across the site. These areas will need to be easily accessible to waste collection vehicles. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Prospective Development site.

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

Wastes arising will need to be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate. There are numerous licensed waste facilities in the Connacht-Ulster region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the Prospective Development would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. Where possible, waste will be segregated into reusable, recyclable and recoverable materials. The majority of demolition materials are either recyclable or recoverable. A list of licenced waste management facilities is included in Appendix B of the Turbine Recyclability Assessment (**Appendix 16-1** of this EIAR).

## Mitigation Measures

As previously stated, a project specific Resource and Waste Management Plan has been prepared in line with the requirements of the guidance document issued by the DoEHLG and is included as Appendix 16-2. Adherence to the high-level strategy presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated

during the Prospective Development. Prior to commencement of the Prospective Development, the contractor(s) will be required to refine/update the RWMP or submit an addendum to RWMP to Galway County Council to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

A waste management company will be appointed and will be responsible for the disposal of materials, waste disposal logistics, compliance with requirements to complete removal and issuing a proof of disposal. The waste management company and the dismantling company will be appropriately monitored by the Applicant.

It is expected that wind turbines, anemometer masts, and substation electrical equipment will be dismantled and removed from the site for sale or re-use on other projects and will not enter the waste stream. If any of the turbines or part of a turbine are unsuitable for re-use, then this will be disposed of appropriately with materials being recycled where possible. The Turbine Recyclability Assessment (**Appendix 16-1**) estimates an overall turbine recyclability of 88% for the Vestas V52 wind turbines.

In addition, the following mitigation measures will be implemented:

- Extensive waste categorisation will be in place to ensure the highest possible quality of recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle – it is anticipated that the following waste types, at a minimum, will be segregated:
    - Concrete rubble (including ceramics, tiles and bricks).
    - Lead Acid Batteries.
    - Electrical Waste.
    - Plastics.
    - Oils.
    - Metals.
    - Glass.
    - Timber.
- To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls.
- Waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away.
- Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible.
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site.
- Any hazardous wastes generated (such as chemicals, fuels, oils, and creosote treated poles) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required).
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the decommissioning works.
- All staff will be provided with training regarding the waste management procedures.
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal.
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities.
- All waste leaving the site will be recorded and copies of relevant documentation maintained. As a minimum, the following waste management data will be provided:
    - Quantity of materials and waste removed from site by type in volume and weight.

- Outcome of the materials and waste on and off site.
- Waste transfer notes.
- Hazardous waste consignment notes.

These mitigation measures will ensure that the waste arising from the Prospective Development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the Connacht-Ulster Waste Management Plan (2015 - 2021). It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

## Residual Effect – Non-Hazardous Waste

Since the majority of the equipment at the site (including wind turbines, electrical equipment, and anemometer masts) will be either sold for reuse or recycled there will be relatively little landfill waste generated by the Prospective Development. It is estimated that in the worst-case scenario less than 2,000 tonnes of landfill waste will be generated over the 24-month Prospective Development. This represents approximately 0.2 percent of available annual landfill capacity. This represents a negligible impact on landfill capacity. Assuming a sensitivity rating of "very high" for landfill capacity in Ireland the Prospective Development will result in a Slight negative effect on Waste Management Infrastructure.

*Table 16-13 Significance Matrix for Waste Generated by the Project – Non-Hazardous Waste*

| | **Magnitute of Impact** | | | | | |
|---|---|---|---|---|---|---|
| **Sensitivity of receptor** | | No Change | Negligible | Minor | Moderate | Major |
| | Very High | Neutral | Slight | Moderate to Significant | Significant | Very Significant |
| | High | Neutral | Not Significant | Moderate | Moderate to Significant | Significant |
| | Medium | Neutral | Imperceptible | Not Significant | Moderate | Moderate to Significant |
| | Low | Neutral | Imperceptible | Not Significant | Slight | Moderate |
| | Neglible | Neutral | Neutral | Not Significant | Not Significant | Slight |

Following implementation of the mitigation measures above, residual impacts of non-hazardous waste emissions for the Prospective Development will have a **short-term, direct, slight, adverse effect.**

## Significance of Effects

Based on the assessment above there will be no significant effects.

### Residual Effect –Hazardous Waste

It is estimated that the Prospective Development will generate less than 100 tonnes of hazardous waste. The majority of this waste consists of creosote treated pole sets and oils and grease. This represents less that 0.025 percent of Irelands annual hazardous waste production; however, it is also acknowledged that the potential impact on infrastructure depends on available treatment and disposal capacity, not just overall production. The EPA's National Hazardous Waste Management Plan 2021-2027[1] outlines ongoing efforts to enhance domestic hazardous waste management, such as the national Circular Economy Programme, as discussed in Section 16.1.4.1. Therefore, given the small volume of hazardous waste generated by the Prospective Development and the ongoing initiatives to enhance hazardous waste management in Ireland, it is expected that there will be a negligible impact on hazardous waste management facilities. The sensitivity rating for hazardous waste management capacity in Ireland is "High", therefore the Prospective Development will result in a Not Significant negative effect on Waste Management Infrastructure.

*Table 16-14 Significance Matrix for Waste Generated by the Prospective Development- Hazardous*

| | **Magnitude of Impact** | | | | | |
|---|---|---|---|---|---|---|
| **Sensitivity of receptor** | | No Change | Negligible | Minor | Moderate | Major |
| | Very High | Neutral | Slight | Moderate to Significant | Significant | Very Significant |
| | High | Neutral | Not Significant | Moderate | Moderate to Significant | Significant |
| | Medium | Neutral | Imperceptible | Not Significant | Moderate | Moderate to Significant |
| | Low | Neutral | Imperceptible | Not Significant | Slight | Moderate |
| | Neglible | Neutral | Neutral | Not Significant | Not Significant | Slight |

Following implementation of the mitigation measures above, residual impacts of hazardous waste emissions for the Prospective Development will have a **short-term, direct, not significant, adverse effect** on waste management infrastructure.

### Significance of Effects

Based on the assessment above there will be no significant effects.

## 16.5.3 Cumulative and In-Combination Effects

Potential cumulative effects on Resource and Waste Management resulting from the Prospective Development in combination with other permitted or proposed projects and plans in the area, (wind

[1] *https://www.epa.ie/publications/circular-economy/resources/NationalHazardousWasteManagementPlan_2021_2027.pdf*

energy or otherwise), as set out in Section 4.7 in Chapter 4 of this EIAR, were also considered as part of this assessment. The developments considered as part of the cumulative effect assessment are described in Section 4.7.1 of this EIAR.

There will be waste generated during the Prospective Development and other permitted or proposed projects and plans in the area. In a worst-case scenario, works on the Prospective Development and other proposed developments could occur concurrently or overlap. Given the relatively small quantities of waste that will be generated during the Prospective Development, it is considered that there would be sufficient licensed contractors available in the region to handle waste generated from multiple sites simultaneously.

No additional waste will be generated by the Retained Development beyond that which was generated during the construction of the Project. Given the time that has elapsed since the construction of the Derrybrien Wind Farm Development there is no potential for cumulative effects on waste infrastructure in combination with the Prospective Development. All developments in the locality, including the Retained Development, in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the potential cumulative effect during the Prospective Development will be a direct, **short-term, slight, adverse effect.**

## 16.6 Conclusion

Following consideration of the residual impacts (post-mitigation) it is noted that the Prospective Development will not result in any significant effects on Resource and Waste Management either locally, regionally, or nationally.

The mitigation measures outlined in this chapter will ensure that the waste arising from the Prospective Development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the Connacht-Ulster Waste Management Plan (2015 - 2021). They will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources Provided that the decommissioning works are undertaken in accordance with the best practice and mitigation that is described within this chapter, significant effects on Resources or Waste Management, are not anticipated at any scale.

# 17. INTERACTION OF THE FOREGOING

## 17.1 Introduction

### 17.1.1 Chapter Scope

The preceding Chapters of this Environmental Impact Assessment Report (EIAR) identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna), Aquatic Ecology and Fisheries, Land, Soils and Geology, Hydrology and Hydrogeology, Air and Climate, Noise and Vibration, Cultural Heritage, Landscape and Visual, Material Assets (Roads and Traffic, Telecommunications and Aviation), Risk of Major Accidents and Disasters and Waste, as a result of the Prospective Development as described in Chapter 4 of this EIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or improve them or have a neutral effect.

A matrix is presented in Table 17-1 below to identify potential interactions of impacts between the various aspects of the environment already assessed in this EIAR. The matrix highlights the potential for the occurrence of positive, neutral or negative effects arising from the Derrybrien Wind Farm Development Decommissioning Project - Prospective Development. The matrix is symmetrical, with each environmental component addressed in the chapters of this EIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice. In Section 17.3 below, the potential interactions between each environmental component have been discussed in order of the relevant chapters of the EIAR. Once a potential interaction between two environmental components has been discussed, i.e., Population & Human Health and Hydrology and Hydrogeology, the interaction will not be discussed again in the following relevant section, i.e. Hydrology and Hydrogeology and Population & Human Health in the Hydrology and Hydrogeology section.

*Table 17-1 Interaction Matrix*

| | Population, Human Health | Biodiversity | Aquatic Ecology & Fisheries | Land, Soils & Geology | Hydrology & Hydrogeology | Air & Climate | Noise & Vibration | Landscape & Visual | Cultural Heritage | Material Assets | Major Accidents | Waste |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Population, Human Health | | | | | | | | | | | | |
| Biodiversity | | | | | | | | | | | | |
| Aquatic Ecology & Fisheries . | | | | | | | | | | | | |
| Land, Soils & Geology | | | | | | | | | | | | |
| Hydrology & Hydrogeology | | | | | | | | | | | | |
| Air & Climate | | | | | | | | | | | | |
| Noise & Vibration | | | | | | | | | | | | |
| Landscape & Visual | | | | | | | | | | | | |
| Cultural Heritage | | | | | | | | | | | | |
| Material Assets | | | | | | | | | | | | |
| Major Accidents | | | | | | | | | | | | |
| Waste | | | | | | | | | | | | |

| Legend: | | | | |
|---|---|---|---|---|
| | Potential Positive Effect: | | | |
| | Potential Neutral Effect: | | | |
| | Potential Negative Effect: | | | |
| | No Interacting Effect: | | | |

The potential for interaction of effects has been assessed throughout this EIAR as part of the impact assessment process. While the work on all parts of the EIAR was not carried out by MKO, the entire project and all the work of all sub-consultants was reviewed by the company. This EIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and impacts that potentially interact have been assessed in detail in the individual chapters of the EIAR above and summarised in Section 17.3.1 below.

Where any potential negative effects have been identified during the assessment process, these effects have been avoided or reduced by design and the proposed mitigation measures, as presented throughout the EIAR and highlighted in Section 17.3.1 below.

### 17.1.2 Statement of Authority

This section of the EIAR has been prepared by Morgan Valvik and reviewed by Thomas Blackwell, of MKO. Morgan Valvik (MEnvSc, BSc) joined MKO's Environmental Team in 2023. She holds an MSc in Environmental Science from Trinity College Dublin. Thomas is a Senior Environmental Consultant with MKO with over 17 years' of progressive experience in environmental consulting and in the assessment of environmental documents for renewable energy developments. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin.

### 17.1.3 Relevant Legislation

The Interactions of the Foregoing chapter of this EIAR is carried out in accordance with legislation and guidance referred to in Chapter 1 of this EIAR.

### 17.1.4 Relevant Guidance

The assessment methodology has followed the guidance set out in Section 3.7.6 of the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022) which states as follows:

> *"The interactions between impacts on different environmental factors should be addressed as relevant throughout the EIAR. For example, where it is established in the Hydrology section that there will be an increase in suspended solids in discharged surface waters during construction then the Biodiversity section should assess the effect of that on sensitive aquatic receptors. Close co-ordination and management within the EIA team is needed to ensure that interactions are adequately addressed throughout an EIAR...*
>
> *It is general practice to include a matrix to show where interactions between effects on different factors have been addressed. This is usually done using the actual headings used in the EIAR if these differ from the factors contained in the Directive. This is typically accompanied by brief text describing the interactions. Further coverage of this is provided in the Advice Notes."*

## 17.2 Methodology

The interactions between impacts on different environmental factors have been addressed in the respective chapters as relevant throughout the EIAR with coordination between chapter authors.

A matrix of the interactions of different factors has been prepared and a summary of the significant cross media interactions that were considered as part of the assessment is provided herein.

Where a statement of significance is included within this chapter this statement refers to the conclusions reached on the different impacts in specific chapters. Where reference is made to conclusions reached in other chapters this conclusion is after mitigation measures are implemented.

### 17.2.1 Limitations/Difficulties Encountered

No significant difficulties were encountered in the preparation of the Interaction of the Foregoing chapter of this EIAR.

# 17.3 Receiving Environment

For the purposes of this assessment, the baseline environment against which likely significant effects and impacts have been assessed has been taken as 2024. The baseline environment is a non-operational wind farm development that ceased commercial electricity generation in February 2022.

## 17.3.1 Impact Interactions of Prospective Development

### 17.3.1.1 Population and Human Health

#### Population and Human Health, Air and Climate, Noise

As identified in Chapter 5 (Population and Human Health) of this EIAR, the Prospective Development has the potential to create a short-term, direct, slight, and negative effect on human health, should the mitigation measures outlined in Chapter 10 not be implemented. These impacts may arise due to the potential dust and exhaust emission sources during the decommissioning works which include the use of heavy machinery, upgrading of existing access tracks, travel on existing access tracks, removal of above ground element of turbine and meteorological mast foundations, regrading of hardstands, demolition works on the substations, and temporary construction compound

Following implementation of the mitigation measures as set out in Chapter 10 (Sections 10.2.3.2.1 and 10.2.3.2.2), residual impacts of emissions arising from the Prospective Development will have a short-term, direct, imperceptible negative effect.

The Prospective Development has the potential to generate noise. Decommissioning noise at any given noise sensitive location will be variable throughout the Prospective Development, depending on the activities underway and the distance from the main decommissioning activities to the receiving properties. As identified in Chapter 5, there will be no negative noise effect on the local population or on human health, following the implementation of the best practice measures set out in Chapter 5 Section 5.7.2.5.2.

#### Population and Human Health, and Material Assets

Chapter 14 of this EIAR discusses how the Prospective Development will give rise to traffic movements of abnormal loads and increased traffic volumes on the local road network and, therefore, is likely to create some temporary inconvenience for other road users. As the expected volumes of traffic are low and primarily associated with the transportation off-situ of turbine components and materials only, the residual effect of material assets on population and human health is considered to be not significant, indirect, negative and temporary in duration. A Traffic Management Plan will be in place to minimise all disruption insofar as possible, as outlined in **Appendix 14-3** of this EIAR.

#### Population and Human Health, Land, Soils and Geology, Hydrology & Hydrogeology

There is the potential for negative effects on human health from the Prospective Development related to potential emissions to land and water of hydrocarbons, release of potentially silt-laden runoff into watercourses. The assessments however show that the residual impacts are not significant and will not lead to significant effects on any environmental media with the potential to lead to health effects for humans.

As set out in Chapter 9, potential health effects are associated with negative impacts on public and private water supplies and potential flooding. There are no mapped public or group groundwater scheme protection zones in the area of the Prospective Development. The preliminary Flood Risk

Assessment also conclude that the Prospective Development is not anticipated to give rise to any significant impacts related to flood risk within or downstream of the Prospective Development areas.

The proposed site design and mitigation measures outlined in Chapter 8 and Chapter 9 ensures that the potential for impacts on the water and land environments are not significant.

#### Population and Human Health, Major Accidents and Natural Disasters

The risk of a major accident and/or disaster, which would affect the nearby population and/or human health, during the Prospective Development is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010).

It is considered that when the mitigation and monitoring measures outlined in the Construction and Environmental Management Plan are implemented and adhered to, there will not be significant residual effect(s) associated with the Prospective Development.

#### Population and Human Health, and Landscape and Visual

The Prospective Development will result in the movement of construction machinery and turbine transport vehicles into and out of the site. The landscape and visual impact assessment of the Derrybrien Wind Farm, included as Chapter 13 of this EIAR, concludes that the Prospective Development will result in some landscape and visual effects, though these are not considered to be significant.

As set out in Chapter 13 of this EIAR, the removal of the turbines are likely to be experienced by greater numbers of people as a landmark from relatively distant views (10km and beyond) where though their removal will be noticeable, the visual effects are much less pronounced. These changes will be most pronounced in close proximity to the site, particularly along two main areas on the Black Road, as these are the main open views in close proximity to the windfarm. Visual effects range from Imperceptible to Slight-Moderate, and neutral in effect.

#### Population and Human Health, and Waste

The Prospective Development will have the potential to produce municipal waste (site office, canteen), wastewater (site welfare facility) and demolition waste (wood, rubble, metal, etc.) which will need to be processed at local waste processing facilities.

As set out in Chapter 16 Section 16.5.2.1 of this EIAR, the sensitivity rating for hazardous waste management capacity in Ireland is "High", therefore the Prospective Development will result in a Not Significant negative effect on Waste Management Infrastructure. Provided that the mitigation measures set out in Chapter 16 are implemented, the waste arising from the Prospective Development will be dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the Connacht-Ulster Waste Management Plan (2015 - 2021). It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

### 17.3.1.2 Biodiversity

#### Biodiversity and Land, Soils and Geology

There will be a long term positive residual effect on terrestrial ecology due to the continued establishment of bog and heath habitat across the substantial felled woodland area of the project area (within the wind farm site and the OHL corridor). This will have a significant positive effect at the local

scale. There are no residual negative significant effects on terrestrial habitats due to the Prospective Development.

### Biodiversity and Water

Careful management of all components of the decommissioning operations will be required in order to avoid or at least minimise the generation of fines both mineral and organic, and to prevent the escape of hydrocarbons, into the aquatic environment, and to minimize consequential indirect effects (such as disturbance and deterioration of habitat quality) on flora and fauna that use that water within the same catchment. Mitigation strategies will also require to be adopted which will avoid or at least minimise direct damage to stream habitats and associated invertebrate and fish communities, due to watercourse crossings by works traffic.

The site activities during the Prospective Development will give rise localised and at worst, imperceptible to slight negative, temporary in duration and fully reversible residual effects. These potential impacts have been assessed in Chapter 7 and Chapter 9 of this EIAR, and the relevant mitigation measures outlined in these chapters will be in place to avoid any water pollution and subsequent effect on flora and fauna.

### Biodiversity and Noise and Vibration

Site activity during the Prospective Development could give rise to noise that could be a nuisance for fauna. Best practice mitigation measures are included in Chapter 6 Section 6.4.2.4.3 and Chapter 11 Section 11.4.2.4 to minimise the potential negative effect of noise generated during the decommissioning works on biodiversity.

### Biodiversity and Landscape

Direct loss or degradation of foraging habitat associated with the Prospective Development will be temporary and localised in nature. Where working areas around turbines are required for decommissioning, these will be allowed to revegetate following work being completed. Localised clearance of conifers in a dynamic, commercially managed landscape is typical of what is already occurring on a large scale. Effects will be temporary in nature and are unlikely to be significant at the site level for any species.

## 17.3.1.3 Aquatic Ecology and Fisheries

### Aquatic Ecology and Land, Soils and Geology

The Prospective Development could give rise to solids release to streams due to ground damage caused by tracking of work vehicles, tree felling, ground preparation works, etc. These effects were considered in Chapter 7 Section 7.4.2.4 Aquatic Ecology.

Provided all the recommended mitigation measures are implemented in full with supervision by a suitably qualified and experienced ecologist to frequently assess their effectiveness, the Prospective Development is expected to result in - at most - imperceptible to slight, indirect or direct negative, temporary-to-short-term effects on receiving waters.

### Aquatic Ecology and Water

Careful management of all components of the decommissioning operations will be required in order to avoid or at least minimise the generation of fines both mineral and organic, and to prevent the escape of hydrocarbons, both of which, but in particular the former, are the main contaminants likely to give

rise to adverse impacts on aquatic systems. Mitigation strategies will be adopted which will avoid or at least minimise direct damage to stream habitats and associated invertebrate and fish communities, due to watercourse crossings by works traffic.

The site activities during the Prospective Development will give rise localised and at worst, slightly adverse, reversible and temporary in duration, residual effects. These potential impacts have been assessed in Chapter 7 and Chapter 9 of this EIAR, and the relevant mitigation measures outlined in these chapters will be in place to avoid any water pollution and subsequent effect on flora and fauna.

#### Aquatic Ecology and Major Accidents

Careful management of all components of the decommissioning operations will be required in order to prevent the escape of hydrocarbons from traffic movements associated with the Prospective Development, which is one of the main contaminants likely to give rise to adverse impacts on aquatic systems. There is the potential for slight, indirect negative effects on water quality and fisheries habitat of temporary duration owing to possible trace hydrocarbon escapement. Mitigation strategies will also require to be adopted which will avoid or at least minimise direct damage to stream habitats and associated invertebrate and fish communities, due to watercourse crossings by works traffic. The mitigation measures outlined in Chapter 12 of the EIAR will ensure that the potential for negative effects is reduced or eliminated.

### 17.3.1.4 Hydrology & Hydrogeology

#### Hydrology & Hydrogeology and Land, Soils and Geology

As identified in Chapter 9 of this EIAR, decommissioning activities (such as on-going maintenance work on existing channels and culverts aimed at removing debris causing blockages to flow) could result in the release of suspended solids to surface watercourses and increase in the suspended sediment load, resulting in increased turbidity which in turn could give rise to water quality impacts in downstream waterbodies. Potential impacts would be Slight to Moderate, Adverse and Short-Term throughout the decommissioning works if not adequately mitigated against.

The implementation of the mitigation measures set out in Chapter 9 Section 9.4.2.1 will result in a residual neutral effect on surface and groundwater hydrology.

#### Hydrology & Hydrogeology (Water) and Major Accidents

There is a potential risk of contamination from site activities during the Prospective Development as a result of potential release of hydrocarbons. Any impacts associated with any development on water has the potential to impact on hydrology and hydrogeology. The Prospective Development has limited potential to give rise to water pollution as a result of site activities due to the construction methodologies being used. Mitigation measures are presented in Chapter 9 Section 9.4.2.2 to minimise the risk of any such issues. Residual impacts on hydrology and hydrogeology are predicted to be neutral, imperceptible, direct, and short term.

## Archaeological, Architectural and Cultural Heritage

#### Archaeological, Architectural and Cultural Heritage and Land, Soils and Geology

The onsite decommissioning works will not require ground excavations within areas of undisturbed ground and given the baseline cultural heritage context outlined in Chapter 12, it is concluded that the decommissioning works will result in a neutral effect on the cultural heritage resource and that no mitigation measures for this resource are required.

#### 17.3.1.5 Air and Climate

##### Air and Climate and Material Assets (Traffic & Transport)

The movement of construction vehicles both within and to and from the Prospective Development site has the potential to give rise to dust nuisance effects during decommissioning. This is assessed further in Chapter 10 of this EIAR, and mitigation measures are presented to minimise any potential effects. Following implementation of mitigation measures as outlined in Chapter 10 Section 10.2.3.2.2, residual effects of dust generation from the Prospective Development will have a short-term, direct, imperceptible, negative effect.

Greenhouse gas emissions associated with the operation of vehicles and plant will arise as a result of the decommissioning activities. Following implementation of the mitigation measures set out in Chapter 10 Section 10.3.5.2.1, residual effects of greenhouse gas emissions arising from the Prospective Development will have a short-term, indirect imperceptible negative effect. However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from Prospective Development will have a permanent imperceptible negative effect on Climate.

#### 17.3.1.6 Major Accidents and Natural Disasters

As described in Chapter 15 of the EIAR, major accidents or natural disasters are hazards which have the potential to affect the Proposed Project and lead to environmental effects both directly and indirectly. These include accidents during construction, operation and decommissioning of the Proposed Project caused by operational failure and/or natural hazards. The assessment of the potential for significant accidents or disasters is conducted in connection with the information that must be included in the EIAR. This includes aspects such as population and human health, biodiversity, land and soil, hydrology and hydrogeology, air quality, climate, material assets, cultural heritage, and landscape. The risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low' in accordance with the 'Guide to Risk Assessment in Major Emergency Management' (DoEHLG, 2010).

## 17.4 Conclusion

Where any potential interactive negative impacts have been identified in the above, a full suite of appropriate mitigation measures has already been included in the relevant sections (Chapters 5-16) of the EIAR. The implementation of these mitigation measures will reduce or remove the potential for these effects. Information on potential residual effects, and their significance, is also presented in each relevant chapter. Based on the implementation of the mitigation measures set out in chapter 5-16 there will be no significant residual interactive impacts.

# 18. SCHEDULE OF MITIGATION MEASURES AND CONCLUSION

## 18.1 Introduction

### 18.1.1 Chapter Scope

All mitigation measures relating to the Derrybrien Windfarm Development Decommissioning Project - Prospective Development are set out in the relevant chapters of the EIAR and associated documents submitted as part of this planning application.

All mitigation measures proposed for the Prospective Development are outlined in Table 18-1 below. The mitigation measures have been grouped together according to their environmental field/topic and are presented under the following headings:

- Population and Human Health
- Biodiversity.
- Land, Soils, and Geology.
- Hydrology and Hydrogeology.
- Air Quality and Dust Control.
- Noise and Vibration.
- Cultural Heritage.
- Material Assets.
- Major Accidents and Natural Disasters.
- Resource and Waste Management.

The mitigation proposals in the below format provides an easy to audit list that can be reviewed and reported on during the Prospective Development. The proposal for site inspections and environmental audits are set out in the outline Construction and Environmental Management Plan (oCEMP) which is included as Appendix 4-3 of this EIAR. The tabular format in which the information below is presented, can be further expanded upon during the course of the project to provide a reporting template for site compliance audits.

It is intended that the oCEMP will be updated where required prior to the commencement of construction to include all mitigations and monitoring measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and would be submitted to the Planning Authority for written approval.

## 18.2 Mitigation Measures

*Table 18-1 Mitigation Measures*

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | Prospective Development | | | |
| MM1 | Construction Management | CEMP (Table 6-2 MM1) | All site activities will be provided for in an Environmental Management Plan, prepared prior to the commencement of any operations onsite. The environmental management plan will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies. | | |
| MM2 | Construction Management | CEMP (Table 6-2 MM2) | A designated environmental manager will oversee the site works and implementation of the Environmental Management Plan and provide on-site advice on the mitigation measures as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the environmental manager for the project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project. | | |
| MM3 | Resource and Waste Management | EIAR Chapter 16 (Section 16.1.5) | All waste generated on site during the decommissioning will be dealt with in accordance with the applicable provisions of the Waste Management Act 1996, as amended, and regulations made thereunder.<br><br>A Resource & Waste Management Plan (RWMP) has been prepared to enable a comprehensive assessment of the decommissioning works and forms part of the application for permission. The mitigation measure included in the RWMP will be adhered to during the decommissioning of the Derrybrien Windfarm. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM4 | Construction Management | CEMP (Table 6-2 MM7) | The procedures for the implementation of the mitigation measures outlined in such an EMP and their effectiveness and completion is typically audited by way of an Environmental Management Plan Audit Report. The EMP Audit Report effectively lists all mitigation measures prescribed in any of the planning documentation and any further mitigation measures proposed during the detailed design stage and allows them to be audited on a systematic and regular basis. | | |
| **Population and Human Health** | | | | | |
| MM5 | Human Health | EIAR Chapter 5 (Section 5.7.2.5.1) | The Prospective Development will be decommissioned in accordance with all relevant Health and Safety Legislation, including:<br>› Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);<br>› Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended;<br>› Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended; and<br>› Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).<br><br>During the Prospective Development, all staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'. This will encompass the use of all necessary Personal Protective Equipment, Risk Assessment and Method Statements and adherence to the site Health and Safety Plan. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | Where necessary, fencing will be erected in areas of the Prospective Development site where uncontrolled access is not permitted. Appropriate health and safety signage will also be erected on this fencing and at locations around the Site.<br><br>The Prospective Development comprises the decommissioning of the Derrybrien grid connection and Agannygal substation as well as reconnection of the 110kV Shannonbridge -Ennis transmission line. Health and safety guidelines for working within and around electrical substations and overhead lines will be adhered to on site. | | |
| MM6 | Human Health | EIAR Chapter 5 (Section 5.7.2.5.2) | Best practice measures for noise control will be adhered to onsite during the Prospective Development in order to mitigate the slight short-term negative impact associated with the Prospective Development. The measures include:<br><br>› The hours of activity will be limited to avoid unsociable hours where possible. Operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 14:00hrs on Saturdays.<br>› Drivers of plant and vehicles will be instructed to avoid hooting at all times unless necessary.<br>› Plant used onsite during the decommissioning works will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.<br>› Queuing of trucks near offsite receptors will be prohibited.<br>› Machinery not in active use will be shut down.<br>› A site representative will be appointed as a liaison officer with the local community. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Complaints of noise received during the Prospective Development will be logged in a register and investigated immediately. Details of follow-up action will be included in the register.<br>› Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance.<br>› Guidance set out in British Standard BS 5228-1:2009+A1:2014 Code Of Practice For Noise And Vibration Control On Construction And Open Sites – Part 1: Noise (2014) with respect to noise control will be applied throughout the Prospective Development.<br>› The residents of the dwelling to the west of Agannygal Substation, where there may be noise level exceedances over several days, will be contacted by the site representative in advance of these works in order to identify suitable working times so as to minimise disruption to the residents. | | |
| MM7 | Human Health | EIAR Chapter 5 (Section 5.7.2.5.3) | Truck wheels will be washed to remove mud and dirt before leaving the wind farm site. All plant and materials vehicles shall be stored in the compound area or other dedicated areas. Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. Traffic will be restricted to defined routes and a speed limit will be implemented.<br><br>In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from the site's drainage system, and will be pumped into a bowser or water spreader to dampen down haul roads and the temporary site compound to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM8 | Human Health | EIAR Chapter 5 (Section 5.7.2.5.4) | The decommissioning of the Wind Farm will be as per the Traffic Management Plan (TMP) prepared for this Prospective Development (Appendix 14-3).<br><br>The TMP is a live document drafted during the planning stage and will be upgraded as the project progresses taking into account of any road improvements and changes to the network. | | |
| **Terrestrial Biodiversity** | | | | | |
| MM9 | Dedicated Nature Conservation Sites | EIAR Chapter 6 (section 6.4.2.1.2) | A pre-construction non-native invasive species survey will be carried out prior to decommissioning. If any problematic non-native plant species are recorded, an Invasive Species Management Plan (ISMP) will be prepared. The ISMP will include measures to avoid and/or control any non-native plant species that may be present, in accordance with The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020). In addition, all machinery will be checked and cleaned for non-native invasive species prior to entering site to avoid any potential introduction and/or spread of such species. | | |
| MM10 | Terrestrial Habitats | EIAR Chapter 6 (Section 6.4.2.3.1) | › Cutting back of vegetation during the site enabling works should be done from the hard surfaced areas. Where it is necessary to work on soft terrain away from hard stand areas then manual tools should be used to eliminate any impacts associated with ground compaction and disturbance from plant machinery.<br>› The project ecologist will undertake pre-construction verification surveys of turbine blade and rotor storage sites and advise on micro-siting to ensure minimal ecological impacts. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › All plant machinery required for the works associated with widening the turning heads will operate on existing adjacent road surface.<br>› All plant machinery required for the works associated with widening the turbary road will operate on existing adjacent road surface.<br>› The use of bog mats, geotextile and stone will ensure that the peatland habitat in the footprint of the road widening will be reinstated following completion of decommissioning.<br>› In the event that turves are removed from the turbary area to facilitate widening the following will be implemented:<br>o Turves will be stored in an appropriate location in the wider site. The condition of turves will be monitored regularly and watering will be implemented if deemed necessary.<br>› In advance of works along the OHL route the project ecologist and project contractor will undertake a joint walkover survey to demarcate agreed access routes and agree detailed approach. This walkover will verify ground conditions at the time of work. This will help inform the approach to access to individual structures during decommissioning. The Project ecologist will liaise with the contractor to decide on the most appropriate ground protection measures (bog mats, EPDM, aluminium mats) taking into consideration the following:<br>o Prevailing ground and weather conditions.<br>o Number of journeys required by plant to complete the work.<br>o The type of plant required to complete the work at individual structures. | | |
| MM11 | Birds | EIAR Chapter 6 (Section 6.4.2.4.3) | Best available evidence has been reviewed and it is suggested that these species could be disturbed by works at the following distances:<br>› Hen harrier 1,000 m | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Sparrowhawk 200 m<br>› Merlin 500 m<br>› Red Grouse 500 m<br>› Snipe 400 m<br><br>Should any of these species be recorded breeding within the given distances of the works area (as established through confirmatory surveys before and/or during decommissioning – as described above), a buffer zone (using above distances) shall be established around the expected location of the nest (location will be identified as far as is possible without causing disturbance to the bird) and all works will be restricted within the zone until it can be demonstrated by an ornithologist that the species has completed the breeding cycle in the identified area. Any restricted area on site that is required to be set up will be marked clearly using hazard tape fencing and all site staff will be alerted through toolbox talks.<br><br>The above mitigation, which will apply from March to August (inclusive), will ensure that the works will not have significant negative effects on bird species of conservation importance. | | |
| MM12 | Other Bird Species | EIAR Chapter 6 (Section 6.4.2.4.3) | Clearance of ground vegetation as required will take place outside of the bird breeding season (1st March – 31st August) to minimise the possibility of disturbance and destruction to occupied bird nests during the decommissioning.<br><br>However, it is possible that some ground may still need to be cleared of vegetation during the breeding season or that previously cleared ground will have developed colonising vegetation (such as brambles) which could attract nesting birds such as wren. Such these occurrences arise, the following protocol will be followed: | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › The area will be surveyed by an ornithologist up to 5 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged.<br>› Should an instance arise where the placement of a restriction would have significant implications for the time frame of the project, and where no alternative mitigation is available, the ornithologist will prepare a report (to include species, stage of breeding etc.) on the implications of removal of the nest in the context of the Wildlife Acts. | | |
| MM13 | Bats | EIAR Chapter 6 (Section 6.4.2.5) | It is proposed to construct pole-mounted bat boxes (three at Agannygal and one at Derrybrien) ahead of demolition of the substation buildings. This will be located on land owned by Gort Wind Farm Ltd close to Borrow Pit 3[1] and at the Agannygal substation. The precise locations of these will be informed by a site visit by a bat ecologist, and will be included in the licence application concerning the demolition of the sub-station buildings.<br><br>To ensure legislative compliance during deconstruction there will need to be an initial thorough internal inspection of the substation buildings and bridges. The work with regard to the substations will need to be completed under a bat derogation licence obtained from the Wildlife Licencing Unit at NPWS (which will require a method statement), in which measures to ensure legislative compliance will be detailed. Deconstruction of the bridges is also likely to require an initial inspection but is likely to be completed under a precautionary working method statement. | | |

[1] Latitude / Longitude 53.099861 , -8.6011534

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | If nocturnal task lighting is required the works should take account of industry guidance (Institution of Lighting Professionals & Bat Conservation Trust, 2018). This will include consideration of the location of lighting, the type of lighting used and the design of a lighting scheme to minimise light spillage onto forest edge habitats. | | |
| MM14 | European Otter | EIAR Chapter 6 (Section 6.4.2.6.1) | As there will be no likely significant negative effects on otter at any geographic scale as a result of habitat loss, habitat severance, barrier effect and/or disturbance, no mitigation measures are required. However, it is recommended that a pre-construction otter survey is undertaken prior to the commencement of decommissioning in order to account for any changes that may occur in the baseline environment. The presence of any new holt/couch sites will be managed in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA, 2008). | | |
| MM15 | Other Mammals | EIAR Chapter 6 (Section 6.4.2.6.2) | Although the habitat within the footprint of the Prospective Development is considered to be of low suitability for breeding badger, a precautionary approach has been applied and as such it is recommended that a pre-construction mammal survey is undertaken prior to the commencement of decommissioning in order to account for any changes that may occur in the baseline environment. The presence of any badger setts will be managed in accordance with the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006a). | | |
| MM16 | Other Fauna | EIAR Chapter 6 (Section 6.4.2.7) | Suitable common frog, smooth newt and common lizard breeding and resting habitat (albeit limited in extent) will be directly impacted by the Prospective Development. In consideration of the legal protection afforded to amphibians and common lizard under the Wildlife Acts, mitigation has been provided.<br><br>If works are carried out in suitable amphibian habitat when frogspawn, tadpoles, adult newts, their eggs or larvae may be present (i.e. February to mid-summer in the case of common frog and mid-March to September in the case of smooth newt), a pre- | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | construction survey will be undertaken to confirm if amphibians are present. If they are confirmed to be present, the individuals may be captured by a suitably qualified ecologist immediately prior to the works taking place and translocated to the nearest available suitable habitat. The approach to capture and translocation should be agreed with National Parks and Wildlife Service (NPWS).<br><br>With regards to common lizard, vegetation clearance works will take place outside the breeding bird season (i.e. outside the months of March to August inclusive), thereby avoiding the breeding season for common lizard of March to May. Any potential hibernacula for common lizard (e.g. log, brash, brick and/or rock piles) to be cleared will be removed during the active season under the supervision of a suitably qualified ecologist. | | |
| **Aquatic Ecology** | | | | | |
| MM17 | Windfarm Decommissioning | EIAR Chapter 7 (Section 7.4.2.3.1) | During the enabling works along Black Road wet or dry roadside drains will not be cleared of vegetation and any scraped material will be removed for licensed disposal. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM18 | Windfarm Decommissioning | EIAR Chapter 7 (Section 7.4.2.3.2) | › An ecological clerk of works (ECoW) will be appointed at the outset of the decommissioning to oversee the implementation of mitigation measures and to ensure their continued efficacy.<br>› Roadside drains taking surface run-off from the main entrance area, especially if this requires widening, will be furnished with a silt trap near the entrance and check dams going downhill to prevent solids washing east toward the works compound and into SC4, via the drain/flush referred to above. This latter channel will also be fitted with a silt trap, as it is the main outlet for surface water exiting from the road and the compound towards SC4. In addition, the existing perimeter ringing the northern edge of the compound will be sufficiently banked up (possibly with a low earthen berm) to prevent any surface run-off flowing directly over the edge from the compound into SC4. Regular visual observation of silt control measures, and any required maintenance to same will be undertaken immediately as required, given that the compound will be in operation for 24 months.<br><br>Prevent/avoid hydrocarbons from entering watercourses by placing controls at all sources and pathways including, at a minimum, the following measures:<br><br>› Ensuring all fuels and oils are stored in bunded trays at least 50 m from any watercourses or surface water feature. Trays will be bunded to 110% of the capacity of the fuel volume;<br>› Refuelling activities to be restricted to designated, bunded areas, at least 50 m from any watercourse, drain or surface water feature;<br>› All construction plant to be regularly maintained and checked for oil and fuel leaks;<br>› Provision of spill kits and training of operatives in their use within the compound. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM19 | Windfarm Decommissioning | EIAR Chapter 7 (Section 7.4.2.3.3) | • An ecological clerk of works (ECoW) will be appointed at the outset of the decommissioning to oversee the implementation of mitigation measures and to ensure their continued efficacy.<br>• For Turbary Road Widening:<br>• All vehicular traffic will be confined exclusively to hard stand areas, including tracks.<br>• Where it proves absolutely necessary for vehicles to track onto the adjoining peat, bog mats or other suitable ground protection methods will be used.<br>• Existing track-side drains will be kept free of blocking or damage during the widening works.<br>• Check dams and silt traps will be installed at regular intervals along the track-side drains in order to slow the velocity of flow after heavy rainfall and to intercept any solids being washed into them from the road works.<br>• Should it be necessary, check dams and silt traps will be regularly de-sludged in order to maintain their effectiveness (overseen by the ECoW).<br>• Drains adjoining aggregate stockpiles and peat turve storage areas will be fitted with silt fences to contain any washed-out fines.<br>• Drains adjoining areas where internal stone is sourced will be fitted with silt traps to retain any silt that is subsequently washed out from exposed ground following aggregate extraction. | | |
| MM20 | Windfarm Decommissioning | EIAR Chapter 7 (Section 7.4.2.3.4) | As a precaution, the existing low gradient drains in proximity to the four turning locations shall have silt traps installed within the first 5-10m near the works areas for the duration of the proposed works to capture any sediment escapement (although unlikely to occur).<br><br>The following measures are classified as avoidance rather than mitigation per se: | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Vegetation removal at the 22 turbine sites must be undertaken by hand, i.e. without vehicles in order to avoid ground damage.<br>› The ground layer of herbaceous vegetation must not be removed, i.e. the underlying peat must not be exposed, so that solids erosion can be avoided and the herb layer can continue to act as a natural filter for any solids generated.<br>› Turbine blades will be set down carefully at the 22 sites where drains impinge directly on or immediately adjoin the proposed laydown areas in a manner that avoids damaging the drains and thereby accidently releasing peat solids.<br>› Vehicles used to place the turbine blade must only work from the adjoining hardstand. | | |
| MM21 | Windfarm Decommissioning | EIAR Chapter 7 (Section 7.4.2.3.5) | The following mitigation measures are designed to remove more routine sources of contamination and impact i.e. from solids and trace hydrocarbon escapement.<br>› All decommissioning work on the substation will be undertaken from hardstands with no tracking onto the adjoining heath/bogland without the use of bog mats.<br>› All vehicle or plant refuelling will take place on level, preferably hardstand ground and accompanied with drip trays.<br>› Drainage from the temporary works compound will be directed to the same outlet drain currently draining the substation.<br>› The substation drain will be fitted with 3 silt traps, the first within no more than 5m of the head of the drain.<br>› The ECoW will oversee the implementation of these mitigation measures and will ensure their continued efficacy through regular visual checks. | | |
| MM22 | Decommissioning of the Overhead | EIAR Chapter 7 (Section 7.4.2.4.1) | › Prior to OHL decommissioning, a pre-commencement survey, probably best undertaken using an all-terrain vehicle (ATV) due to the nature of the ground in some stretches of the OHL corridor, will be carried out to identify soft ground, especially in areas where there are steep gradients e.g. between SP1 and SP12, | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | Line (OHL) and Agannygal Substation | | and especially in areas where the ground slopes steeply toward streams e.g. between PS23 and the proposed crossing point on SC7(a) in Alternative No. 2,. The pre-survey would also plot the exact locations of drains impinging on the decommissioning routes. The pre-commencement survey will recommend (i) suitable ground protection for the soft ground areas and (ii) that any drains crossing the path would be traversed using steel plates of log bridges to prevent or at least minimise damage to these and to minimise any associated solids release.<br>› For Alternative No. 1, do a detailed pre-commencement survey of the detour route between PS16 and PS17will be undertaken in order to identify soft and wet ground especially on steeper slopes.<br>› Use bog mats on any soft ground identified especially on the steep ground between the SC7(c) crossing and point B in Figure 7.5).<br>› Insert silt fences parallel to and downslope of the new track, especially if the track is through soft or wet ground e.g. between the SC7(b) stream and the SC7(c) stream crossing.<br>› The track side drains at the points of departure and return to the Coillte track for the detour will be piped and capped in order to allow free drainage while the detour is in place. Check dams will be installed in the drains downslope from these access points to prevent solids reaching SC7(b) downslope.<br>› Following agreement with the project ecologist the method of tree and scrub removal will be chosen to minimise ground damage.<br>› The crossing points of stream SC7(d) at ITM 561421, 701723, which has low banks and is shallow and therefore feasible to be forded, will be protected with heavy steel plates spanning the width of the crossing corridor (7-9m) to protect the stream bed from damage from vehicles. This approach is contrary to IFI advice (IFI, 2016) which stipulates that streams should not be forded. The reasoning for going against this advice is that this stream has low banks, the channel is shallow, and the work will be undertaken between July and September, i.e., outside the trout spawning period. Moreover, the number of vehicle crossings will be small relative to a major construction project for example, and will be designed to | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | minimise the number of crossings required. Finally, steel plates will be used to protect the stream bed from rutting. Given these site attributes and the mitigation measures being recommended, it is suggested that the alternative of constructing a bridging structure here would give rise to greater impacts, because on the width of the stream, which probably rules out a clear span structure or laying large pipes and back filling to place a running track over them. These latter options would potentially introduce more fine sediment into the system than the managed fording approach being suggested.<br>› The upslope approaches to both streams (i.e., from both banks) will be fitted with bog mats or equivalent materials to prevent ground damage, especially during heavy rainfall, thereby reducing to an absolute minimum the amount of solids washing into these two streams.<br>› The stream crossings for Alternative No. 1, and the Owendalulleegh crossing will be undertaken between July and September (inclusive).<br>› On the sloping approach to the Owendalulleegh crossing in advance of the removal of PS23, AM 24 and PS25, if there is evidence of ground damage leading to solids washout during heavy rainfall, a french drain will be set diagonally into the Coillte track 5m north of the crossing point, in order to direct any silt contaminated run-off into the ditch at the side of the track so that it isn't flushed into the river.<br>› In order to minimise the potential for fish mortalities, immediately in advance of crossings on the Owendalulleegh, the channel for 15m upstream and downstream of the centre line of the crossing point, the channel will be electrofished (3 repeats) and the fish obtained will be removed in oxygenated water in a large plastic bin and poured back into the river about 1km downstream i.e. just below the confluence of the SC7(d) stream with the main channel.<br>› In Alternative No. 1, fish rescue is not recommended from stream SC7(b) or SC7(c), (i) because the densities are so low but mainly (ii) because bailey bridge type crossing structures are being installed at these crossings and as such no adverse impact on fisheries is anticipated. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › The narrowest feasible corridor across the Owendalulleegh will be delineated by the project ecologist using red and white tape and all works vehicles instructed to remain within that crossing corridor.<br>› The crossing corridor will be furnished with steel plates to protect the riverbed habitat from damage, and these will be removed after the operation is completed.<br>› This segment of the OHL decommissioning will be designed and managed to minimise the time and the number of vehicle movements required to complete, and will reduce the scale of any residual fish mortalities. | | |
| MM23 | Decommissioning of the Overhead Line (OHL) and Agannygal Substation | EIAR Chapter 7 (Section 7.4.2.4.2) | › Silt traps will be installed on the surface drain emanating from the substation at present to intercept any solids arising from the substation decommissioning.<br>› Refuelling will always be supervised and always undertaken on level hardstand areas.<br>› Mobile plant such as generators will be supplied with drip trays.<br>› Any fuel storage tanks will be provided with a bund capable of containing its full contents with freeboard for rainfall. | | |
| MM24 | Decommissioning of the Overhead Line (OHL) and Agannygal Substation | EIAR Chapter 7 (Section 7.4.2.4.3) | › Undertake a walkover survey of the access route to the poles sets in advance of the works to locate any surface drains along or downslope of the route.<br>› Provide suitable vehicle crossing measures (e.g. bog mats over or equivalent) in order to protect any drains from damage.<br>› Employ low weight-bearing vehicles to undertake the work.<br>› Use bog mats or other suitable protection if the ground is likely to be cut up during the work.<br>› Monitor the works for solids escapement and take corrective measures, e.g. the installation of silt fences immediately downslope and across the full line of ground damage if it occurs. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM25 | Decommissioning of the Overhead Line (OHL) and Agannygal Substation | EIAR Chapter 7 (Section 7.4.2.4.4) | › When upgrading the culvert on the haul road at the crossing of OHL 2A (western stream, the work will be undertaken during the period July to September (inclusive) as it would be considered instream works by Inland Fisheries Ireland (IFI).<br>› Only undertake the work after several days of dry weather when flow in the stream would be low.<br>› Use a pump-over method to keep the work area as dry as possible. This may not allow all the water to be over-pumped depending on the flow but it would reduce the rate of solids washout, nevertheless.<br>› Carefully plan the method in advance and have all the necessary plant and materials to hand such that the culvert can be replaced in the shortest possible time which will reduce the quantity of solids potentially arising.<br>› Provide drip trays for all generators and pumps.<br>› Refuel vehicles off site whenever possible.<br>› Remove any excess fill or other loose substrate arising from the works for licensed offsite disposal. | | |
| MM26 | Decommissioning of the Overhead Line (OHL) and Agannygal Substation | EIAR Chapter 7 (Section 7.4.2.4.5) | › Small tree and scrub removal to access the crossing point should ideally be undertaken by hand, i.e. without heavy machinery if feasible.<br>› The access tracks to the stream crossing should be laid from opposite points first, i.e. from points B and D to the crossing point (near point C) before the crossing is inserted.<br>› If it is feasible to alter the exact position of the crossing point somewhat, this should be considered in order to avoid parts of the embankment which already have a lot of willow or other trees growing on it, as these are currently stabilising the banks.<br>› Any instream works must be confined to the period July to September.<br>› The culvert pipe should be large enough to accommodate large flows to avoid excess velocities. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › If the culvert pipe is to remain in place permanently, its base should be inserted 30cm below the streambed to facilitate the two-way movement of any fish in the stretch. | | |
| **Land, Soils, and Geology** | | | | | |
| MM27 | Geotechnical Monitoring and Mitigation of Site Activities during Decommissioning | EIAR Chapter 8 | › The carriageway requirements for the large mobile crane that will be used to dismantle the of turbary road between Turbines T35 and T45 and between T43 and turbines along the narrow section T46 will be reviewed in advance of the works and the road will be widened, where necessary, to provide safe access to the turbines;<br>› Where it is necessary to widen or extend the existing floating roads then:<br>o Detailed design of the road improvements will be carried out by a suitably qualified geotechnical engineer;<br>o Additional site investigations will be carried out, where necessary, to characterise the depth and strength of the peat and the composition of the existing floating road;<br>o Stability analyses will be carried out in advance of the works on site in accordance to confirm that the stability of the widened road is acceptable in accordance with IS EN 1997-1: Eurocode 7 for Geotechnical Design, Part 1 – General Rules; and<br>o The works on site will be supervised by a suitably qualified geotechnical engineer on behalf of Gort Windfarms Ltd.<br>› The size, weight and axle load of the large mobile crane that is used to dismantle the turbines shall not exceed the design load for the floating roads (i.e. the 300 tonne Grove GMK6300 all-terrain mobile crane with a travelling weight of 72 tonnes on 6 axles – max 12 tonnes/axle); | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › The size, weight and axle load of the low-loader transporter used to transport the transformer off the site shall not exceed the combined design load of the vehicle that was used to bring the transformer to the substation site during construction (i.e. a total combined load of 130 tonnes over 28.5m x 3.0m area with 12 axles and a maximum axle load of 12 tonnes);<br>› The decommissioning works will be supervised by a suitably qualified engineer from ESB Engineering and Major Projects (ESB – E&MP);<br>› A permit to work scheme will be implemented on the site for the works; and<br>› The Contractors method statements will be reviewed and certified by a suitably qualified geotechnical engineer.<br><br>On completion of the decommissioning works, a Safety File will be prepared for the Prospective Development by Gort Windfarms Ltd. and handed over to the landowner to mitigate any residual impacts on soils, geology and land from the elements of the wind farm that will be left in place (the Retained Development).<br><br>Among other information, the Safety File for the wind farm will include:<br><br>› Construction records from the decommissioning works to confirm compliance with the design and specifications for the works.<br>› Design and as-built construction details for all the elements of the windfarm that have been left in place after decommissioning (the Retained Development), including:<br><br>a. The reinforced concrete bases for the turbines and anemometer masts.<br>b. All of the site access tracks including the floating roads on the peat.<br>c. The crane hardstanding areas adjacent to the turbines. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | d. The hardstanding area for the substation and control building.<br>e. All of the de-energised and disconnected LV electrical cables and fibre-optic cables that are direct-buried in the peat between the turbines and in ducts below the roads.<br>f. The construction phase peat repository sites and material sidecast areas.<br>g. The construction phase borrow pits.<br>h. The site drainage network.<br><br>› Records of significant maintenance works that have been carried out on the retained elements of the project, including the 2014 upgrade of the floating roads and the 2017 fibre-optic upgrade of the turbine control systems.<br>› Reports on all the full-scale serviceability and proof load tests that have been carried out on the floating roads across the site, which includes the design criteria for the maximum axle loads and live load surcharges from the mobile cranes that govern the capacity of the roads.<br>› Records of all the site investigation works and in-situ tests that were carried out for the project during construction and over the operational and maintenance phase of the project.<br>› Results of stability analyses that have been carried out for the floating roads and peat repository sites.<br>› Geotechnical stability report for the wind farm site including the Peat Stability Risk Assessment (PSRA) for the site and design/construction mitigation measures that have been implemented to mitigate the risk of peat instability for the wind farm activities.<br>› Peat Stability Risk Assessment for the turbary area on the east side of the site, including mitigation measures that have been recommended to manage the risk of peat instability due to mechanical peat harvesting in that part of the site. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM28 | Peat | EIAR Chapter 8 | The following mitigation measures have been implemented by Gort Wind Farms Ltd to reduce the likelihood of a peat failure occurring:<br>› The peat stability risk assessment and the associated mitigation measures have been shared with the turbary rights holders whose plots have been or are proposed to be harvested by mechanical means, and the turbary rights holders have been made aware of the potential site stability risks associated with mechanical peat harvesting methods in the absence of mitigation;<br>› Warning signs have been erected at the site by Gort Wind Farms Ltd. to raise awareness of the peat stability risks associated with mechanical peat harvesting in the turbary area and to highlight the recommended mitigation measures;<br>› Where possible, communication has been established between the turbary plot owners, turf cutting contractors and the windfarm site manager for Gort Wind Farms Ltd. to give notice of mechanical peat harvesting activities and to report any peat instability on the site;<br>› Gort Wind Farms Ltd. have implemented the recommended remedial drainage works and survey monitoring in the failed area at the south end of Turbary Plot 161 to ensure that the peat there is stable.<br>› Any further maintenance that is required to maintain the existing drainage network will only be carried out during the drier months of May to September; and<br>› Periodic inspections of the mechanical peat harvesting are being carried out by the wind farm site manager for Gort Wind Farms Ltd. | | |
| MM29 | Mitigation Measures for Peat Harvesting | EIAR Chapter 8 | The following is a summary of the mitigation measures that are recommended in the AGL Report No. 11-147-R06 in Appendix 8-4 which specifically relate to mechanical peat harvesting in the turbary area and which are recommended to be implemented by the turbary rights holders: | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › No mechanical peat harvesting should be carried out by saw cutting in any of the turbary plots;<br>› No mechanical peat harvesting should be carried out in the turbary plots where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Very Possible to Likely (L=4.0 to 5.0). Manual turf cutting can be carried out but should be done during the drier months between May and September;<br>› Where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Possible to Very Possible (L=3.0 to 3.5) the limitations recommended in Section 6.0 of AGL Report No. 11-147-R06 on the type and size of equipment that can be used for mechanical peat harvesting in the turbary plots and on the maximum level of surcharge loading on the peat should be implemented;<br>› The operational control measures recommended in Section 6.0 of AGL Report No. 11-147-R06 should be implemented by the turbary plot owners and their turf cutting contractors to manage the stability of peat excavations and to prevent excessive damage to the integrity of the vegetated surface of the peat;<br>› No mechanical peat harvesting should be carried out in the turbary area during Prospective Development works. | | |
| **Hydrology and Hydrology** | | | | | |
| MM30 | Suspended Solids | EIAR Chapter 9 (Section 9.4.2.1) | Provision will be made for a combination of some or more all of the techniques listed below to minimise runoff of suspended solids during decommissioning operations –<br><br>› Silt traps – these can be installed on either the inlet or outlet side of culverts and must be robust enough to allow for frequent clearing out of collected sediments.<br>› Silt fencing – involves installation of some semi-permeable geotextile fabric, vertically held on simple timber posts, and is used primarily as an additional means of filtering out sediments from runoff water. These should be installed | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | alongside any sensitive areas, e.g. watercourses, larges areas of stripped materials, or downstream from outlet ends of culverts, and can usually be arranged in a horse-shoe configuration to contain, and allow settlement of suspended sediments.<br>› Straw bales – these can be used to filter out sediments from normal flows in drainage ditches, but their installation positions require careful consideration, and should allow for potential overtopping in periods of high flow. They should be pinned securely in position to avoid being washed down into larger watercourses. Bales can become saturated and can become very heavy to manually move, so a means of mechanical recovery and replacement also needs to be considered. As such, periodic replacement – once bales have become silt-laden and ineffective – needs to be considered along with their appropriate disposal.<br>› Pumping - Where there is a significant build-up of water it may be required to pump this to avoid further build-up, or to allow works to progress in that area. Any required pumping should be planned to ensure that the discharge is either entering a settlement lagoon or that it can discharge directly over an area of suitable vegetation, an appropriate distance away from watercourses and groundwater to filter out any suspended sediments. Proprietary equipment such as "Siltbuster" type tanks can also be used to assist with the reduction of suspended solids. It is important that the flows from the pumping operation do not cause erosion to the vegetation onto which it is discharging. The point of delivery should be alternated to various locations to ensure that potential for scouring is minimised. If the flows need to be redistributed more generally over vegetation, a connection to the hose end can be made to discharge the fluid in a spray over a much greater area.<br><br>Monitoring and maintenance will include the following –<br><br>Site water suspended solids will be monitored on a continuous basis at a reasonable frequency (e.g. daily), however the frequency of monitoring can gradually reduce | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | thereafter – presuming there are no issues with the quality of discharging water at that point in time.<br><br>It is recommended that continuous monitoring systems are put in place, particularly in principal surface water features draining the site, e.g. remote sensing, or telemetric monitoring sensors can be employed in this regard. It is recommended that a handheld turbidity meter is available to accurately measure the quality of water discharging from the Site. The meter should be maintained and calibrated frequently and will also be used to check and calibrate remote sensors if they are employed. It is recommended that quality thresholds are established for the purposes of escalating water quality issues as or if they arise (e.g. TSS limit of 25mg/l per S.I. no. 293 of 1988 – Salmonid Regulations).<br><br>Surface water runoff control infrastructure will be checked and maintained on a regular basis and stilling ponds and check dams will be maintained (de-sludged/settled solids removed) on a regular basis during decommissioning. It is important to minimise the agitation of solids during these works, otherwise it will likely lead to an acute significant loading of suspended solids in the local drainage network which could settle out downstream in the larger watercourses<br><br>As part of the site-specific Outline EMP regular checking and maintenance of pollution control measures are required, with an immediate plan for repair or backup if any breaches of design occur. If established infrastructure and measures are failing to reduce suspended solids to an acceptable level, construction works will cease until remediation or upgrading works are completed | | |
| MM31 | Hydrocarbon Spills | EIAR Chapter 9 (Section 9.4.2.2) | › All plant and machinery to be serviced before being mobilised to site;<br>› No plant maintenance completed on-site; any broken-down plant removed from site to be fixed;<br>› Refuelling completed in a controlled manner using drip trays at all times; | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas away from open water and drainage features;<br>› Only designated trained operators authorised to refuel plant on-site;<br>› Spill mats and clean-up kits will be available on-site and trained personnel;<br>› Procedures and contingency plans set up to deal with emergency accidents or spills; and,<br>› Highest standards of site management maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during works.<br><br>These mitigation measures are considered sufficient to reduce risk to ground/peat/soils and subsoils, and to groundwater and surface water quality.<br><br>The oil separator will be emptied and flushed out prior to being backfilled with stone. All extracted liquids including that flushed through the separator will be disposed of to a licensed facility. The stone will be sourced from the site. | | |
| MM32 | Wastewater | EIAR Chapter 9 (Section 9.4.2.3) | The toilet block and temporary holding tank and Portaloos will be serviced and maintained on a regular basis during the decommissioning activities. All toilet facilities shall be sealed with no discharge to the surface water or groundwater environment adjacent to the site.<br><br>The onsite toilet facilities and sewage treatment plants at Derrybrien and Agannygal will be emptied and flushed by licenced contractor and all out prior to being backfilled with stone. All extracted effluent and water flushed through the treatment plant will be disposed of to a licensed facility. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | **Air and Climate** | | |
| MM33 | Exhaust Emissions | EIAR Chapter 10 (Section 10.2.3.2.1 and 10.3.5.2.1) | › All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.<br>› Turbines and construction materials will be transported from the site on specified routes only, unless otherwise agreed with the Planning Authority.<br>› When stationary, delivery and on-site vehicles will be required to turn off engines.<br>› Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum.<br>› Aggregate materials required for enabling works will be obtained from local quarries. This will significantly reduce the length of journeys for delivery vehicles, thereby reducing the amount of emissions associated with vehicle movements<br>› The Materials Recovery Facility (MRF) will be local to the Prospective Development site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the site is City Bin Co. recycling centre which is located approximately 28.6km to the northwest of the Prospective Development. A Waste Management Plan will be prepared to reduce waste from the site. | | |
| MM34 | Dust Emissions | EIAR Chapter 10 (Section 10.2.3.2.2) | › A wheel wash facility will be installed on site and will be used by vehicles before leaving site.<br>› Dust suppression measures will be implemented on site to minimise the potential nuisance caused by dust at the nearest sensitive receptors and on sensitive eco systems. Water misting shall be used as required if particularly dusty activities are necessary on site during dry and/or windy conditions.<br>› All site related traffic will have speed restrictions on un-surfaced roads to 30 kph.<br>› Regular inspection of the site to examine dust measures and their effectiveness<br>› All plant and materials vehicles shall be stored in dedicated areas (on site). | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Turbines and construction materials will be transported away from the site on specified haul routes only.<br>› The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.<br>› The Site access roads will be checked weekly for damage/potholes and repaired as necessary.<br>› The transport of construction materials which may have the potential to generate dust will be undertaken with tarpaulin cover or similar, where necessary.<br>› A Construction and Environmental Management Plan (CEMP) will be in place throughout the Prospective Development (see outline CEMP under separate cover). The CEMP includes these dust suppression measures. | | |
| **Noise and Vibration** | | | | | |
| MM35 | Noise | EIAR Chapter 11 (Section 11.4.2.4) | It follows that noise mitigation measures are not specifically warranted in relation to these receptors. However, a number of general measures are proposed in order to follow good construction practice:<br>› Construction operations will in general be confined to the period Monday-Friday 07:00-19:00 and Saturday 08:00-13:00.<br>› Drivers of plant and vehicles will be instructed to avoid hooting at all times unless necessary.<br>› Plant used onsite during the Prospective Development will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.<br>› Queuing of trucks near offsite receptors will be prohibited.<br>› Machinery not in active use will be shut down. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Complaints of noise received during the Prospective Development will be logged in a register and investigated immediately. Details of follow-up action will be included in the register.<br>› Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance.<br>› Guidance set out in British Standard BS 5228-1:2009 with respect to noise control will be applied throughout the decommissioning works. | | |
| **Material Assets** | | | | | |
| MM36 | Traffic and Transport | EIAR Chapter 14 (Section 14.1.5.2.1) | The decommissioning of the Wind Farm will be as per the Traffic Management Plan (TMP) prepared for this project (Appendix 14-3).<br><br>The TMP is a live document drafted during the planning stage and will be upgraded as the Prospective Development progresses, taking into account of any road improvements and changes to the network.<br><br>When the turbine blades are decommissioned, it is envisaged they will be removed intact.<br><br>The large volume of aggregate material and concrete that was imported to site during construction will remain onsite. The principal expected volumes of traffic will be primarily associated with the transportation off-site of turbine components and significantly reduced volume of materials only (i.e. retention of wind farm access tracks, turbine foundations, hard stand areas, etc.). | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| MM37 | Materials assets | EIAR Chapter 14 (Section 14.2.4.2.2) | Work on decommissioning the Agannygal Substation and reinstatement of the existing 110kV Ennis – Shannonbridge OHL will take place under a planned outage. Under this circumstance there will be no loss of electricity services to end users. | | |
| **Major Accidents and Natural Disasters** | | | | | |
| MM38 | Major Accidents and Natural Disasters | EIAR Chapter 15 (Section 15.4.2) | The Prospective Development will be decommissioned in accordance with the best practice measures set out in this EIAR and the Decommissioning Management Plan for the project and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the decommissioning approach.<br><br>Informed by the Assessment of Alternatives Chapter, Mitigation by design was an integral part of the Prospective Development. The selection of which parts of the Derrybrien Wind Farm to remove as part and the Prospective Development and which parts to leave in-situ as part of the Retained Development were made with peat stability and other environmental factors as a the main concerns. As discussed, the works programme will take account of weather forecasts and work will be suspended in the case of extreme weather events effectively mitigation the risks associated with extreme weather and flooding. Likewise, the traffic management plan for the Prospective Development will mitigate risks associated with traffic incidents..<br><br>As discussed, the application for the Prospective Development is accompanied by a CEMP which sets out details of the environmental controls to be implemented on site. The CEMP sets out the Emergency Response Procedure to be adopted in the event of an emergency including contamination, health and safety and environmental protection. The CEMP provides details on all mitigation and monitoring measures to be actioned prior to the Prospective Development works. The CEMP will be subject to | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | ongoing review through regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all mitigation measures and commitments identified in the application documentation.<br><br>The CEMP includes an Emergency Response Plan (ERP). It provides details of procedures to be adopted in the event of an emergency relating to health & safety or environmental protection. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. Please see Chapter 4 of the EIAR and Decommissioning Management Plan (Appendix 4-1) for details. | | |
| **Resource and Waste Management** | | | | | |
| MM39 | Waste Generation | EIAR Chapter 16 Section 16.5.2.1 | › Extensive waste categorisation will be in place to ensure the highest possible quality of recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle – it is anticipated that the following waste types, at a minimum, will be segregated:<br>o Concrete rubble (including ceramics, tiles and bricks);<br>o Lead Acid Batteries;<br>o Electrical Waste<br>o Plastics;<br>o Oils;<br>o Metals;<br>o Glass; and<br>o Timber.<br><br>› To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls. | | |

| Ref. No. | Ref. Heading | Ref. Location | Mitigation Measure | Audit Result | Action Required |
|---|---|---|---|---|---|
| | | | › Waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away.<br>› Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible.<br>› All waste materials will be stored in skips or other suitable receptacles in designated areas of the site.<br>› Any hazardous wastes generated (such as chemicals, fuels, oils, and creosote treated poles) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required).<br>› A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the decommissioning works.<br>› All staff will be provided with training regarding the waste management procedures;<br>› All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal.<br>› All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and<br>› All waste leaving the site will be recorded and copies of relevant documentation maintained. As a minimum, the following waste management data will be provided:<br>o Quantity of materials and waste removed from site by type in volume and weight.<br>o Outcome of the materials and waste on and off site.<br>o Waste transfer notes.<br>o Hazardous waste consignment notes. | | |

## 18.3 Conclusion

Where any potential negative effects have been identified in the relevant sections (Chapters 5-16) of the EIAR, a full suite of appropriate mitigation measures has been included above. The implementation of these mitigation measures will reduce or remove the potential for significant negative effects. Information on potential residual effects, their significance, and respective mitigation measures is also presented in each relevant chapter. Based on the implementation of the mitigation measures set out in chapter 5-16 and above, there will be no significant residual effects.

# GLOSSARY

## Hydrology

**AA**: Appropriate Assessment

**AAR**: Average Annual Rainfall

**ADAS**: Agricultural Development and Advisory Service

**AEP**: Annual Exceedance Probability

**BGL**: Below Ground Level

**CFRAMS**: Catchment Flood Risk Assessment and Management Studies

**DDF**: Depth Duration Frequency

**DECLG**: Department of the Environment, Community and Local Government

**DEM**: Digital Elevation Model

**DEFRA**: Department for Environment, Food and Rural Affairs

**EC**: European Commission

**EEA**: European Environment Agency

**EEC**: European Economic Community

**ED**: Electoral Division

**EIA**: Environmental Impact Assessment

**EIAR**: Environmental Impact Assessment Report

**EMP**: Engineering and Major Projects

**EPA**: Environmental Protection Agency

**ER**: Effective Rainfall

**ESB**: Electricity Supply Board

**EU**: European Union

**FRA**: Flood Risk Assessment

**FSU**: Flood Studies Update

**GCC**: Galway County Council

**GIS**: Geographic Information System

**GPA**: Guidelines for Planning Authorities

**GSI**: Geological Survey of Ireland

**Ha**: Hectares

**HA**: Hydrometric Area

**HEFS**: High-End Future Scenario

**IH**: Institute of Hydrology

**IFI**: Inland Fisheries Ireland

**IPPC**: Integrated Pollution Prevention and Control

**ITM**: Irish Transverse Mercator

**LAP**: Local Area Plan

**LIDAR**: Light Detection and Ranging

**MIEI**: Member of Institute of Engineers Ireland

**MRFS**: Mid-Range Future Scenario

**NHA**: National Heritage Area

**NRA**: National Roads Authority

**OHL**: Overhead Line

**OPW**: Office of Public Works

**OSI**: Ordnance Survey Ireland

**PE**: Potential Evapotranspiration

**Pl**: Poor Aquifer except for Local zones

**PS**: Pole set

**QBAR**: Mean Annual Flood Flow

**QMED**: Median Annual Flood Flow

**RBD**: River Basin District

**RBMP**: River Basin Management Plan

**SAAR**: Standard Average Annual Rainfall

**SAC**: Special Area of Conservation

**SC**: Subcatchment

**SEA**: Strategic Environmental Assessment

**ShRFB**: Shannon Regional Fisheries Board

**TII**: Transport Infrastructure Ireland

**WFD**: Water Framework Directive

**WMU**: Water Management Unit

## Noise and Vibration

**Ambient**: Total noise environment at a location, including all sounds present.

**A-weighting**: Weighting or adjustment applied to sound level to approximate the non-linear frequency response of the human ear. Denoted by the suffix A in parameters such as LAeq T, LAF10 T, etc.

**Background level**: A-weighted sound pressure level of residual noise exceeded for 90% of time interval T. Denoted LAF90 T.

**Decibel (dB)**: Unit of noise measurement scale. Based on a logarithmic scale and cannot be simply added or subtracted. A 3 dB difference is the smallest change perceptible to the human ear; a 10 dB difference is perceived as a doubling or halving of sound level.

**Emissions**: Noise originating from a source under consideration, spreading spherically, hemispherically, or

otherwise into the surrounding environment.

**Fast response**: 0.125 seconds response time of a sound level meter to changing noise levels. Denoted by the suffix F in parameters such as LAF10 T, LAF90 T, etc.

**Interval**: Time period T over which noise parameters are measured. Denoted by T in LAeq T, LAF90 T, etc.

**LAeq T**: Equivalent continuous sound pressure level during interval T, representing the average A-weighted noise level of the ambient noise environment.

**LAF90 T**: Sound pressure level exceeded for 90% of interval T. Often used to quantify background noise or describe continuous/steady sources in fluctuating environments.

**Noise sensitive location**: Any dwelling, hotel, hostel, health facility, educational establishment, place of worship, entertainment venue, or area of high amenity that requires an absence of nuisance noise for its proper

**Residual level**: Noise level remaining when a specific source is absent or does not contribute to the ambient.

**Sound pressure**: Deviation above ambient atmospheric pressure due to a passing sound wave. The human ear detects sound pressure, and thus acoustic parameters are based on it. Sound pressure level is the ratio of measured sound pressure to a reference value.

**Soundscape**: Acoustic environment as perceived, experienced, or understood by listeners, taking context into account.

**Specific level**: LAeq T level produced by a specific noise source under consideration during interval T, measured directly or by estimation or calculation.

# BIBLIOGRAPHY

## Introduction

European Union (2011) *Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment*. Brussels: EU Publications Office.

European Union (2014) *Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment*. Brussels: EU Publications Office.

European Union (2018) *Planning and Development (Environmental Impact Assessment) Regulations 2018*. Dublin: The Stationery Office.

Government of Ireland (2001–2023) *Planning and Development Regulations*. Dublin: The Stationery Office.

Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*. Dublin: Government Publications.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

European Union (2017) *Environmental Impact Assessment of Projects – Guidance on Screening (Directive 2011/92/EU as amended by 2014/52/EU)*. Brussels: EU Publications Office.

European Union (2017) *Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU)*. Brussels: EU Publications Office.

European Union (2017) *Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)*. Brussels: EU Publications Office.

European Commission, Directorate-General for Environment (2013) *Guidance on integrating climate change and biodiversity into environmental impact assessment*. Luxembourg: Publications Office of the European Union. Available at: https://data.europa.eu/doi/10.2779/11735 [Accessed 23 Apr. 2025].

## Background to the Proposed Development

Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Wexford: EPA.

European Union (2020) Article 5(2) of European Union (Environmental Impact Assessment) (Environmental Protection Agency Act 1992) (Amendment) Regulations 2020. Available at:: https://circabc.europa.eu/ui/group/3b48eff1-b955-423f-9086-0d85ad1c5879/library/94b9394e-cc9e-4859-94ca-95ccecb43422?p=1&n=-1&sort=name_ASC

## Reasonable Alternatives

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*. Dublin: Government Publications.

European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report*. Brussels: European Commission.

European Commission (2022) *Guidance on the implementation of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment*. Brussels: European Commission.

## Description of the Proposed Development

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

## Population and Human Health

Central Statistics Office (2016) *Census of Ireland 2016*. Dublin: CSO.

Central Statistics Office (2020) *Census of Agriculture 2020*. Dublin: CSO.

Central Statistics Office (2022) *Census of Ireland 2022*. Dublin: CSO.

Department of Health (2022) *Health in Ireland: Key Trends 2022*. Dublin: Department of Health.

Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*. Dublin: Government Publications.

Department of the Environment, Heritage and Local Government (2006) *Wind Energy Development Guidelines*. Dublin: Government Publications.

Department of the Environment, Heritage and Local Government (2019) *Draft Wind Energy Development Guidelines*. Dublin: Government Publications.

European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report*. Brussels: European Commission.

National Roads Authority / Transport Infrastructure Ireland (2008) *Environmental Impact Assessment of National Road Schemes – A Practical Guide*. Revision 1. Dublin: TII.

Fáilte Ireland (2023) *EIAR Guidelines for the Consideration of Tourism and Tourism-Related Projects*. Dublin: Fáilte Ireland.

United States Environmental Protection Agency (2014) *Framework for Human Health Risk Assessment to Inform Decision Making*. Washington, D.C.: US EPA.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

Institute of Public Health in Ireland (2009) *Health Impact Assessment Guidance*. Dublin: IPH.

United States Environmental Protection Agency (2016) *Health Impact Assessment Resource and Tool Compilation*. Washington, D.C.: US EPA.

Institute for Environmental Management and Assessment (2017) *Health in Environmental Impact Assessment: A Primer for a Proportionate Assessment*. Lincoln: IEMA.

Institute for Environmental Management and Assessment (2022) *Determining Significance for Human Health in Environmental Impact Assessment*. Lincoln: IEMA.

World Health Organization (2022) *Environmental Noise Guidelines for the European Region – 2022 Update*. Geneva: WHO. Available at: https://www.who.int/ [Accessed 23 Apr. 2025].

## Biodiversity

Anon (2004) *Investigation into the effects of Landslide of Peat bog at Derrybrien North into the Owendalullegh River Catchment – Second Report – July 2004*. Shannon Regional Fisheries Board

Arroyo, B., Leckie, F., Amar, A., McCluskie, A. & Redpath, S. (2014) *Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. Bird Study* 61: 48-55.

Atherton, I., Bosanquet, S., Lawley, M. (2010) [Eds.]: *Mosses and liverworts of Britain and Ireland: a field guide. Professionals*. Exeter: Pelagic Publishing.

Aughney, T., Langton, S. and Roche, N. (2012) *All Ireland Daubenton's Bat Waterway Monitoring Scheme 2006-2011*. Irish Wildlife Manuals, No. 61. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Balmer, D., Gilling's, S., Caffrey, B., Swann, B., Downie, I. and Fuller, R. (2013). *Bird Atlas 2007-11: The breeding and wintering birds of Britain & Ireland.* BTO Books, Thetford.

Band, W., Madders, M., & Whitfield, S.P. (2007) 'Developing field and analytical methods to assess avian collision risk at wind farms', In de Lucas, M., Hanss, G. & Ferrer, M (eds) *Birds and Wind Farms: Risk assessment and mitigation.* Quercus.

Barton, C., Pollack, C., Norriss, D.W., Nagle, T.A., Oliver, G.A. & Newton, S. (2006) The second national survey of breeding Hen Harriers Circus cyaneus in Ireland 2005. *Irish Birds* 8: 1-20.

Bat Conservation Ireland. (2012). Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8, December 2012. [online] https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-Wind-Farm-Turbine-Survey-Guidelines-Version-2-8.pdf.

Bevanger, K. (1998) Biological and conservation aspects of bird mortality caused by electricity power lines: a review. *Biological Conservation* 86: 67-76.

Biosphere Environmental Services (2004) *Derrybrien Wind Farm, Hen Harrier Monitoring, 2004 Report.* Prepared for Hibernian Wind Power.

Biosphere Environmental Services (2006) *Derrybrien Wind Farm, Hen Harrier Monitoring, 2006 Report.* Prepared for Hibernian Wind Power.

Biosphere Environmental Services (2007) *Derrybrien Wind Farm, Hen Harrier Monitoring, 2007 Report.* Prepared for Hibernian Wind Power.

Biosphere Environmental Services (2009) *Derrybrien Wind Farm, Hen Harrier Monitoring, 2009 Report.* Prepared for Hibernian Wind Power.

Biosphere Environmental Services (2011) *Derrybrien Wind Farm, Hen Harrier Monitoring, 2011 Report.* Prepared for Hibernian Wind Power.

Biosphere Environmental Services (2015*) Derrybrien Wind Farm, Hen Harrier Monitoring, 2015 Report.* Prepared for Hibernian Wind Power.

Birds Directive (2009/47/EC) – http://ec.europa.eu/environment/nature /legislation/birdsdirective /index _en.htm

BTHK. (2018) *Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals*. Exeter: Pelagic Publishing.

Chanin, P. (2003) *Ecology of the European Otter Lutra Lutra. Conserving Natura 2000 Rivers Ecology Series No. 10.* English Nature, Peterborough.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. (Chartered Institute of Ecology and Environmental Management). Revision 1.2, April 2022.

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.). The Bat Conservation Trust, London.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive 79/409/EEC as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).

Cramp, S. & Simmons, K.E.L. (1980) *Handbook of the Birds of Europe, the Middle East and North Africa. Vol. 2: Hawks to Bustards.* Oxford.

De Lucas, M., Janss, G.F.E. & Ferrer, M. (2007) Birds and Wind Farms. Quercus. 275 pp.

Department of Environment, Heritage and Local Government (2009 (Rev 1 2010)) Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. See www.npws.ie

Department of the Culture, Heritage & the Gaeltacht (2018) Slieve Aughty Mountains SPA. See www.npws.ie

Dietz, C. & Keifer, A. (2016) Bats of Britain and Europe. Bloomsbury. ISBN 978-1-4729-2202-1

Dietz, C., Helversen, O. & Nill, D. (2009). Bats of Britain, Europe and northwest Africa. A&C Black Publishers ltd. ISBN 9781408105313.

Douglas, D.J. Bellamy, P.E. & Pearce-Higgins J.W. (2011) Changes in the abundance and distribution of upland breeding birds at an operational windfarm. *Bird Study* 58: 37-43.

Drewitt, A.L. & Langston, R.H. (2006) Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

Drewitt, A.L. & Langston, R.H. (2008) Collision effects of wind power generators and other obstacles on birds. *Annals of the New York Academy of Sciences* 1134: 233-266.

Environmental Protection Agency (EPA). 2017. Guidelines on the information to be contained in Environmental Impact assessment reports. [Online] https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf Accessed 12/02/2020

Environmental Protection Agency (EPA). 2022. Guidelines on the information to be contained in Environmental Impact assessment reports. [Online] https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

EPA (2015) *Advice notes on current practice (in the preparation of Environmental Impact Statements) Draft September* 2015;

European Commission (2013) Interpretation Manual of European Union Habitats. European Commission, DG Environment.

European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011 [S.I. No. 456 of 2011]

European Union (Environmental Impact Assessment and Habitats) Regulations 2011 [S.I. No. 473 of 2011]

European Union (Environmental Impact Assessment and Habitats) Regulations 2012 [S.I. No. 246 of 2012]

Ferrer, M. & Janss, G.F.E. (1999) Birds and Power Lines. Collision, Electrocution and Breeding. Madrid, Quercus.

Flora (Protection) Order, 2015 S.I. No. 356/2015

Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage Council Ireland.

Frost. D. (2008) The use of 'flight diverters' reduces mute swan collision with power lines at Abberton Reservoir, Essex, England. *Conservation Evidence* 5: 83-91.

Garvin, J. C., Jennelle, C. S., Drake, D. & Grodsky, S. M. 2011. Response of raptors to a windfarm. *Journal of Applied Ecology* 48: 199-209.

Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds*, Volume 43, 1-22.

Goodship, N.M. and Furness, R.W. (2022) *Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species.* A report from MacArthur Green to NatureScot.

Hundt, L. (ed.) (2012). Bat Surveys: Good Practice Guidelines, 2nd Edition. Bat Conservation Trust.

Inis Environmental Services (2004a). Ecological Impact Assessment of Emergency and Stabilisation Work at Derrybrien Bog Slide Area. March 2004.

Inis Environmental Services (2004b). Impact assessment of Derrybrien Peat Slide on habitats, cormorants and Bat fauna of Lough Cutra, County Galway.

Inis Environmental Services (2005). Ecological Recovery of Peat Slip Area at Derrybrien, Monitoring Survey. November 2005.

Jenkins, A.R., Smallie, J.J. & Diamond, M. (2010) Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International* 20: 263-278.

Johnson, G. D., Erickson, W. P., Strickland, M. D., Good, R. E. & Becker, P. 2001. Avian and bat mortality associated with the initial phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming. Technical Report prepared by WEST, Inc. 32pp.

Kennedy, P.G., Ruttledge, R.F. & Scroope, G.F. (1954) *The Birds of Ireland.* Oliver & Boyd, Edinburgh.

King, J., Marnell, F., Kingston, N., Rosell, R., Roche, W.K. & Cassidy, D. (2011) *Ireland Red List No. 5: Fish, Amphibians & Reptiles.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Leddy, K. L., Higgins, K. F. & Naugle, D. E. 1999. Effects of wind turbines on upland nesting birds in conservation reserve program grasslands. Wilson Bulletin 11: 100-104.

Lusby, J., Fernandez-Bellon, NOrriss, D., Lauder, A. (2011) Assessing the effectiveness of monitoring methods for Merlin in Ireland: the Pilot Merlin Survey 2010. *Irish Birds* 9: 143-154.

Madden, B. & Porter, B. (2007) Do wind turbines displace Hen Harriers Circus cyaneus from foraging habitat? Preliminary results of a case study at the Derrybrien wind farm, County Galway. *Irish Birds* 8: 231-2360

Madders, M. & Whitfield, D.P. (2006) Upland raptors and the assessment of wind farm impacts. *Ibis* 148: 43–58.

Madders, M. (2000) Habitat selection and foraging success of Hen Harriers Circus cyaneus in west Scotland. *Bird Study* 47: 32-40.

Marnell, F., Looney, D. & Lawton, C. (2019) *Ireland Red List No. 12: Terrestrial Mammals.* National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Marnell., F., Kingston, N. & Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Masterson, M., Buckley, D., O'Brien, M. & Kelleher, C. (2008) *An investigation into bridge usage by bats within the Sullane & Laney River Catchments, County Cork*. Cork County Bat Group.

Mathews, F., Richardson, S., Lintott, P., & Hosken, D. (2016). Understanding the risk to European Protected Species (bats) at onshore wind turbine sites to inform risk management. Final report. University of Exeter.

McAney, K. (2006) A conservation plan for Irish vesper bats. *Irish Wildlife Manuals, No. 20*. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Meek, E.R., Ribbands, J.B., Christer, W.G., Davy, P.R. & Higginson, I. (1993) The effects of aero-generators on moorland bird populations in the Orkney Islands, Scotland. *Bird Study* 40: 140-143.

Moran, P. and Wilson-Parr R. (2015) Hen Harrier Special Protection Areas Habitat Mapping Project 2014. Irish Wildlife Manual No. 83. NPWS, Department of Arts, Heritage and the Gaeltacht.

Natural England Technical Information Note TIN051. (2014). Bats and onshore wind turbines Interim guidance. (3rd ed). ISBN 978-1-78354-095-2.

NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust. (2021). Bats and onshore wind turbines: survey, assessment and mitigation. SNH, Inverness.

Norriss, D.W., Marsh, J., McMahon, D. and Oliver, G.A. (2002) A national survey of breeding Hen Harriers Circus cyaneus in Ireland 1998-2000. *Irish Birds* 7: 1-10.

National Parks & Wildlife Service (2009a) Cahermurphy Wood pNHA (000022) Site Synopsis.

National Parks & Wildlife Service (2009b) Lough Graney Wood pNHA (001714) Site Synopsis.

National Parks & Wildlife Service (2009c) Pollduagh Cave, Gort pNHA (000320) Site Synopsis.

National Parks & Wildlife Service (2009d) Cloonamirran Wood pNHA (001686) Site Synopsis.

National Parks & Wildlife Service (2009e) Lough O'Grady pNHA (001019) Site Synopsis.

National Parks & Wildlife Service (2015a) Slieve Aughty Mountains SPA Site Synopsis.

National Parks & Wildlife Service (2015b) *Conservation Objectives: Barroughter Bog SAC 000231.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2016) *Conservation Objectives: Cloonmoylan Bog SAC 000248.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2017) *Conservation Objectives: Pollagoona Bog SAC 002126.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

National Parks & Wildlife Service (2022a) *Conservation Objectives: Slieve Aughty Mountains SPA 004168.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2022b) Conservation objectives for Lough Rea SPA [004134]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2022c) *Conservation objectives for Lough Cutra SPA [004056].* First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2022d) *Conservation objectives for Coole-Garryland SPA [004107].* First Order Sitespecific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2022e) *Conservation objectives for Lough Derg (Shannon) SPA [004058].* First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2003) Recommended Methodology for Assessment of Impacts of Proposed Windfarms on Breeding Hen Harrier within the Known Range of the Species in Ireland. NPWS, Unpublished Draft 12/03/03.

National Parks & Wildlife Service (2018a) *Conservation Objectives: Lough Cutra SAC 000299.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2018b) *Conservation Objectives: Pollnaknockaun Wood Nature Reserve SAC 000319.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2018c) *Conservation Objectives: Kiltartan Cave (Coole) SAC 000286.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2018d) *Conservation Objectives: Derrycrag Wood Nature Reserve SAC 000261.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2018e) *Conservation Objectives: Rosturra Wood SAC 001313.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2019a). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.

National Parks & Wildlife Service (2019d). *Conservation Objectives: Sonnagh Bog SAC 001913.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2019e) *Conservation Objectives: Lough Rea SAC 000304.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2019f) *Conservation Objectives: Loughatorick South Bog SAC 000308.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2019g) *Conservation Objectives: Ardrahan Grassland SAC 002244.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2019h) *Conservation Objectives: Glendree Bog SAC 001912.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2019i) *Conservation Objectives: Lough Derg, North-east Shore SAC 002241.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

National Parks & Wildlife Service (2021a) *Conservation Objectives: Drummin Wood SAC 002181.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2021b) *Conservation Objectives: Peterswell Turlough SAC 000318. Version 1.* National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2021c) *Conservation Objectives: Lough Coy SAC 002117.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2021d) *Conservation Objectives: Gortacarnaun Wood SAC 002180.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2021e) *Conservation Objectives: Carrowbaun, Newhall and Ballylee Turloughs SAC 002293.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2021f) *Conservation Objectives: Ballinduff Turlough SAC 002295.* Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Parks & Wildlife Service (2021g) *Conservation Objectives: Coole-Garryland Complex SAC* 000252. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

National Roads Authority (2006a) *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes.*

National Roads Authority (2006b) *Guidelines for the Treatment of Bats during the Construction of National Roads Schemes.*

National Roads Authority (2008) *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes.*

National Roads Authority (2009a) *Ecological Surveying Techniques for Protected flora and Fauna during the Planning of National Road Schemes.* Dublin: National Roads Authority.

National Roads Authority (2009b) Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).

O'Donoghue, B. (2019) *Irish Hen Harrier Winter Survey.* Survey Guide. National Parks and Wildlife Service.

Ó'Néill, L. (2008) *Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning.* PhD thesis. Trinity College Dublin.

Parnell, J. and Curtis, T. Webb's An Irish Flora (8th edition)

Pearce-Higgins, J.W., Stephen, L, Langston, R.H.W., Bainbridge, I.P., & Bullman, R. (2009) The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology* 46: 1323-1331.

Pearce-Higgins, J.W., Stephen, L., Douse, A. & Langston, R.H.W.. 2012. Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology* 49: 386-394.

Percival, S.M. (2005) Birds and wind farms : what are the real issues ? *British Birds:* 98: 194-204.

Prinsen, H.A.M., Smallie, J.J., Boere, G.C. & Pires, N. (eds.) (2011) *Guidelines on how to avoid or mitigate impact of electricity power grids on migratory bird in the African-Eurasian region.* Bonn: AEWA Conservation Guidelines No. 14, CMS Technical Series No. 29, AEWA Technical Series No. 50, CMS Raptors MOU Technical Series No. 3. t.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D. & Wilson, C.J. (2010) *Ireland Red List No 4: Butterflies.* National Parks and Wildlife Service, Department of the Environ[1]ment, Heritage and Local Government, Ireland

Rees, E.C. (2012) Impacts of wind farms on swans and geese: a review. *Wildfowl* 62: 37-72.

Roche, N., Aughney T. and Langton S. (2015) Lesser horseshoe bat: population trends and status of its roosting resource. *Irish Wildlife Manuals, No. 85.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Roche, N., Langton, S., Aughney, T., Russ, J.M., Lynn, D. and Catto, C. (2011) A car-based monitoring method reveals new information on bat populations and distributions in Ireland. *Animal conservation.* 14: 642–651

Rodrigues, Luisa & Bach, Lothar & Dubourg-Savage, Marie-Jo & Karapandža, Branko & Rnjak, Dina & Kervyn, Thierry & Dekker, Jasja & Kepel, Andrzej & Bach, Petra & Collins,, J. & Harbusch,, C. & Park, Kirsty & Micevski, Branko & Minderman, J.. (2015). Guidelines for consideration of bats in wind farm projects Revision 2014. [online] https://bit.ly/Eurobats2014

Rose, Paul & Baillie, Stephen (1989) The Effects of Collisions with Overhead Lines on British Birds: An Analysis of Ringing Recoveries. BTO Research Report no. 42. BTO, Hertfordshire.

Ruddock, M., Wilson-Parr, R., Lusby, J., Connolly, F., Bailey, J. & O'Toole, L. (2024) *The 2022 National Survey of Breeding Hen Harrier in Ireland.* Irish Wildlife Manual No. 147. NPWS, Dublin.

Ruddock, M, Dunlop, B.J., O'Toole, L., Mee, A., & Nagle, T. (2012) *Republic of Ireland National Hen Harrier Survey 2010.* Irish Wildlife Manual No. 59. NPWS, Dublin.

Ruddock, M, Dunlop, B.J., O'Toole, L., Mee, A., & Nagle, T. (2016) *The 2015 National Survey of Breeding Hen Harrier in Ireland.* Irish Wildlife Manual No. 93. NPWS, Dublin.

Ruddock, M. & Whitfield, D. (2007) A review of disturbance distances in selected bird species. A report for Natural Research Ltd. to Scottish Natural Heritage. 182 pp.

Scannell, M.J.P. and Synnott, D. (1987). *Census Catalogue of the Flora of Ireland.* 2nd edn. Stationery Office, Dublin.

Schofield, H. W. and Mitchell-Jones A. J. (2011) *The Bats of Britain and Ireland*. Vincent Wildlife Trust, London.

Scott, D. & McHaffie, P. (2008) Hen Harrier killed at windfarm site in County Antrim. *Irish Birds* 8: 436-437.

Scottish Natural Heritage (2016a) *Assessing Connectivity with Special Protection Areas (SPAs) Guidance*. Version 3. Scottish Natural Heritage.

Scottish Natural Heritage (2016b). *Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds.* Guidance. Version 1.

Scottish Natural Heritage (March 2017). *Recommended bird survey methods to inform impacts assessment of onshore wind farms.* SNH Guidance Note. Version 2.

Scottish Natural Heritage, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust. (2019). Bats and onshore wind turbines: survey, assessment and mitigation. SNH, Inverness.

Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. [online] https://bit.ly/SNH_batsandwindfarms_2019 accessed 29/04/2020

Shiel, C., Shiel, R., & Fairley, J. (1999). Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) in Ireland as revealed by radio-telemetry. Journal of Zoology, 249(3), 347-358. doi:10.1111/j.14697998.1999.tb00770.x

Smallwood, K.S. & Thelander, C.G. (2004) Developing methods to reduce bird mortality in the Altamont Pass Wind Resource Area. Final Report by BioResource Consultants to the California Energy Commission, Public Interest Energy Research Environmental Area. Contract No. 500-01-019.

Smith, G. F., O' Donoghue, P., O' Hora, K. & Delaney, E,. (2011). Best practice guidance for habitat survey and mapping, Heritage Council, Kilkenny.

The European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 411 of 2011].

Transport Infrastructure Ireland (2020) The Management of Invasive Alien Plant Species on National Roads.

Watson, A. & Moss, R. 2008. Grouse. *The Natural History of British and Irish Species.* The New Naturalist Library. Collins, London.

Watson, D. (1977) *The Hen Harrier.* Poyser, Berkhamsted.

Whelan, P. (2011). Lichens of Ireland – an illustrated introduction to over 250 species The Collins Press, Cork, 2011. Illus. 160 pp.

Whitfield, D.P. & Madders, M. (2006b) A review of the impacts of wind farms on Hen Harriers. Natural Research Information Note 1 (revised). Natural Research Ltd., Banchory, UK. 32pp.

Wilson, F. (2012). Derrybrien Wind Farm Bat Assessment. Provided to ESB International Consulting Engineers in draft.

Wilson, M., Fernandez-Bellon, D., Irwin, S., & O'Halloran, J. (2015) The Interactions between Hen Harriers and Wind Turbines. WINHHARRIER. Final Project Report. January 2015. School of Biological, Earth & Environmental Sciences, University College Cork, Ireland.

Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010) Valuing Bats in Ecological Impact Assessment. In Practice, 70: 23-25

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) *Ireland Red List No. 10: Vascular Plants.* National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin

## Biodiversity (Aquatic Ecology and Fisheries)

Bridcut, E.E., and Giller, P. S. (1993) Movement and site fidelity in young brown trout Salmo trutta populations in a southern Irish stream *Journal of Fish Biology*,43, 889-899.

Brown, D.J.A (1983) Effect of calcium and aluminium concentrations on the survival of brown trout (*Salmo trutta*) at low pH. *Bull. Environ. Contam. Toxicol.* 30, 582-587.

CIEEM (2018, Rev 1.2 2022) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.* Chartered Institute of Ecology and Environmental Management, Winchester.

Crane M., Atkinson C., Comber, S. and N. Sorokin (2007) *Proposed EQS for Water Framework Directive Annex VIII substances: aluminium (inorganic monomeric). Science Report: SC040038/SR1, SNIFFER Report WFD52(i).* Environment Agency/SNIFFER.

Cummins, T. and Farrell, E.P (2003) Biogeochemical impacts of clearfelling and reforestation on blanket peatland streams I. phosphorus. *Forest Ecology and Management.* 180, 545-555.

Daniels, S.M., Evans, M.G., Agnew, C.T and T.E.H. Allott (2012) Ammonium release from a blanket peatland into headwater stream systems. *Environmental Pollution* 163, 261-272.

Delanty, K., Feeney, R. Shephard, S. (2022). *Fish Stock Survey of the River Liffey 2021.* Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

EPA, (2021) *Water Quality in 2020 – An Indicators Report* – Environmental Protection Agency, Johnstown Castle, Ireland. https://www.epa.ie/publications/monitoring–assessment/freshwater–marine/water-quality-in-2020.php

EPA, (2020) *Water Quality in 2019 – An Indicators Report* – Environmental Protection Agency, Johnstown Castle, Ireland. https://www.epa.ie/publications/monitoring–assessment/freshwater–marine/water-quality-in-2019–an-indicators-report.php

EPA (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports.* Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, County Wexford, Ireland

Evans, C.D., Harriman, R., Monteith, D.T. and Jenkins, A. (2001) Assessing the Suitability of Acid Neutralising Capacity as a Measure of Long-Term Trends in Acidic Waters Based on Two Parallel Datasets. *Water, Air and Soil Pollution* 130. 1541-1546.

IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters. Inland Fisheries Ireland.

Kelly, F., Champ, T., McDonnell, N., Kelly-Quinn, M., Harrison, S., Arbuthnott, A., Giller, P., Joy, M., McCarthy, K., Cullen, P, Harrod, C., Jordan, P., Griffiths, D., and Rosell, R. (2007) Environmental RTDI Programme 2000–2006 *Investigation of the Relationship between Fish Stocks, Ecological Quality Ratings (Q-Values), Environmental Factors and Degree of Eutrophication* (2000-MS-4-M1) Synthesis Report.

Kelly, F.L., Matson, R., Delanty K., Connor, L., O'Brien, R., Gordon, P., Corcoran, W., McLoone, P., Connor, L., Coyne, J., Morrissey, E., Cierpal, D., Rocks, K., Buckley, S., Kelly, K., McWeeney, D., and Putharee, D. (2017) *Sampling Fish in Rivers 2016*. National Research Survey Programme. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

Laudon, H., Boleo, A.S.B, Vollestad, L.A. and K. Bishop (2005) Survival of brown trout during spring flood in DOC-rich streams in northern Sweden: the effect of present acid deposition and modelled pre-industrial water quality. Environmental Pollution 135, 121-130.

Liu W., Xu X., McGoff N.M., Eaton, J. M., Leahy, P., Foley, N. and Kiely, G. (2014) Spatial and Seasonal Variation of Dissolved Organic Carbon (DOC) Concentrations in Irish Streams: Importance of Soil and Topography Characteristics. Environmental Management 53: 959–967.

NRA (2003) Guidelines for assessment of ecological impacts of national road schemes, Revision 1. National Roads Authority, Dublin (now Transport Infrastructure Ireland).

NRA (2009) Guidelines for assessment of ecological impacts of National road schemes. Revision 2 National Roads Authority, Dublin (now Transport Infrastructure Ireland).

O'Driscoll, C., de Eyto, E, O'Connor, M., Zaki-ul-Zaman, A., Rodgers, M and L. Xiao (2013) Biotic response to forest harvesting in acid blanket peat fed streams: A case study from Ireland.. *Forest Ecology and Management,* 310, 729-739

Rodgers, M, O'Connor, M, Healy, MG C O'Driscoll, C., Zaki-ul-Zaman, A., Nieminen, M., Poole, R, Muller, M and L. Xiao (2010) Phosphorus release from forest harvesting on an upland blanket peat catchment. *Forest Ecology and Management*. 260, 2241-2248.

Rodgers, M, O'Connor, M., Robinson, M., Muller, M., Poole, R and L., Xiao (2011) Suspended solids yield from forest harvesting on upland blanket peat. *Hydrological Processes* 25, 207-216.

Wellnitz, T. A., Grief, K. A. and Sheldon, S. P. (1994) Response of macroinvertebrates to blooms of iron-depositing bacteria. Hydvobiologia 281: 1-17.

## Land, Soils and Geology

British Standard Institute (2015), BS5930:2015 – British Standard Code of practice for site investigations;

Conaghan, J., et al (2000) – Distribution, Ecology and Conservation of Blanket Bog in Ireland, commissioned by the National Parks and Wildlife Service, Dúchas and The Heritage Service, Dublin, Ireland.

Clayton, C.R.I, (2001) Managing Geotechnical Risk: Improving Productivity in UK Building and Construction, Published by the Department of the Environment, Transport and the Regions, and the Institution of Civil Engineers (Great Britain)

CIRIA Report 143 – The Standard Penetration Test (SPT): Methods and Use, Clayton, C.R.I, 1995.

Environmental Protection Agency (EPA), (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency, May 2022

Environmental Protection Agency (EPA), (2024) Data on latest Greenhouse Gas (GHG) and $CO_2$ emissions in Ireland downloaded from EPA website (www.epa.ie) in November, 2024.

Hammond, R.F. (1981) - The Peatlands of Ireland. Soil Survey Bulletin 35 (2nd Ed.), An Foras Talúntas, Dublin.

Holden, N.M., Connolly, J. (2011) "Estimating the carbon stock of a blanket peat region using a peat depth inference model", Catena, Vol.86, Issue 2, August 2011, pp75-85.

Milne, R., Brown, T.A., (1997), "Carbon in the Vegetation and Soils of Great Britain", Journal of Environmental Management, 49, 413-433.

Scottish Government, Energy Consent Unit (2017) - "Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Projects (2nd Edition, April 2017).

## Hydrology and Hydrogeology

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Statements*. Wexford: EPA.

Environmental Protection Agency (2021) *3rd Cycle Draft Galway Bay South East Catchment Report (HA 25C)*. Wexford: EPA.

Environmental Protection Agency (2021) *3rd Cycle Draft Galway Bay South East Catchment Report (HA 29)*. Wexford: EPA.

Geological Survey of Ireland (2020) *Groundwater Data Viewer*. [online] Available at: https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 [Accessed 30 Nov. 2022].

## Air and Climate

Department for Environment, Food and Rural Affairs (2018) *Local Air Quality Management Technical Guidance (LAQM.TG(16))* under Part IV of the Environment Act 1995. London: DEFRA.

Environmental Protection Agency (2021) *Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects*. Wexford: EPA.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – June 2022*. Wexford: EPA.

Environmental Protection Agency (2023) *Air Quality in Ireland Report 2022*. Wexford: EPA.

European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report*. Brussels: European Commission.

Government of Ireland (2023) *Clean Air Strategy for Ireland*. Dublin: Department of Environment, Climate and Communications.

Institute of Air Quality Management (2016) *Guidance on the Assessment of Dust from Demolition and Construction*. Version 1.1. London: IAQM.

Transport Infrastructure Ireland (2009) *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. Dublin: TII.

Transport Infrastructure Ireland (2011) *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*. Dublin: TII.

Transport Infrastructure Ireland (2022) *Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107*. Dublin: TII.

UK Highways Agency (2019) *Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality*. London: UKHA.

World Health Organization (2005) *Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide: Global Update 2005*. Copenhagen: WHO Regional Office for Europe.

## Noise and Vibration

British Standards Institution (2014) *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*. London: BSI.

Environmental Protection Agency (2016) *NG4 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities*. Wexford: EPA.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

World Health Organization (1999) *Guidelines on Community Noise*. Geneva: WHO.

## Archaeological and Cultural Heritage

Department of Arts, Heritage and Gaeltacht (2011) *Architectural Heritage Protection: Guidelines for Planning Authorities*. Dublin: Government Publications.

Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the Protection of Archaeological Heritage*. Dublin: Government Publications.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

International Council on Monuments and Sites (ICOMOS) (2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*. Paris: ICOMOS.

Office of the Public Regulator (2021) *Archaeology in the Planning Process*. Dublin: Office of the Public Regulator.

Office of the Public Regulator (2022) *A Guide to Architectural Heritage*. Dublin: Office of the Public Regulator.

## Landscape and Visual

Department of Environment, Heritage and Local Government (2006) *Wind Energy Guidelines for Planning Authorities*. Dublin: Government Publications.

Department of Housing, Planning and Local Government (2019) *Draft Revised Wind Energy Development Guidelines*. Dublin: Government Publications.

Environmental Protection Agency (2002) *Guidelines on the Information to be Contained in Environmental Impact Statements*. Wexford: EPA.

Environmental Protection Agency (2015) *Draft Advice Notes for Preparing Environmental Impact Statements*. Wexford: EPA.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

Scottish Natural Heritage (2012) *Assessing the Cumulative Impact of Onshore Wind Energy Developments*. Inverness: SNH.

Scottish Natural Heritage (2017) *Guide to Visual Representation of Wind Farms*. Inverness: SNH.

## Material Assets

Air Corps (2014) *Draft Air Corps Wind Farm/Tall Structures Position Paper*. Dublin: Irish Defence Forces.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

ESB Networks (2019) *Code of Practice for Avoiding Danger from Overhead Electricity Lines*. Dublin: ESB Networks.

Irish Wind Energy Association (2012) *Best Practice Guidelines for the Irish Wind Energy Industry*. Naas: IWEA.

Transport Infrastructure Ireland (2021) *Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (PE-PAG-02017)*. Dublin: TII.

Transport Infrastructure Ireland (2014) *Traffic and Transport Assessment Guidelines (PE-PDV-02045)*. Dublin: TII.

## Major Accidents and Natural Disasters

Department of Defence (2020) *A National Risk Assessment for Ireland*. Dublin: Government of Ireland.

Department of Environment, Heritage and Local Government (2010) *A Guide to Risk Assessment in Major Emergency Management*. Dublin: Government Publications.

Environmental Protection Agency (2014) *Guidance on Assessing and Costing Environmental Liabilities*. Wexford: EPA.

Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Wexford: EPA.

European Commission (2017) *Environmental Impact Assessment of Projects – Guidance on the Preparation of Environmental Impact Assessment Reports*. Brussels: European Commission.

Health Service Executive (2022) *Major Emergency Plan: Crisis Management Team – Counties Galway, Mayo and Roscommon*. Dublin: HSE Emergency Management Area 2.

## Resource and Waste Management

Danson, T., Gray, L., Pilkington, N., Smith, D., Pearce, S. and Warhurst, J. (2020) *IEMA Guide to: Materials and Waste in Environmental Impact Assessment – Guidance for a Proportionate Approach*. Lincoln: IEMA.

Department of Environment, Heritage and Local Government (2006) *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*. Dublin: Government Publications.

Environmental Protection Agency (2021) *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects*. Wexford: EPA.

FÁS and Construction Industry Federation (2002) *Construction and Demolition Waste Management – A Handbook for Contractors and Site Managers*. Dublin: FÁS/CIF.

Government of Ireland (1996) *Waste Management Act 1996 (No. 10 of 1996), as amended*. Dublin: Stationery Office.