Planning and Environmental Consultants

Environmental Impact Assessment Report Remedial

Derrybrien Wind Farm Development Decommissioning Project – Retained Development

Volume 1a: Non-Technical Summary & Main Report Chapters 1-7

Remedial Environmental Impact Assessment Report

Derrybrien Wind Farm Development Decommissioning Project – Retained Development

Table of Contents

TABLE OF CONTENTS.....i

TABLE OF TABLES.....xiv

TABLE OF FIGURES.....xxi

TABLE OF PLATES.....xxvii

TABLE OF APPENDICES.....xxix

NON-TECHNICAL SUMMARY.....xxxv

1. INTRODUCTION.....1-1

1.1 Introduction.....1-1
1.2 The Applicant.....1-1
1.3 Brief Description of the Retained 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.....1-4
1.5.3 EIAR Guidance.....1-5
1.6 Purpose and Scope of the rEIAR.....1-6
1.7 Structure and Content of the rEIAR.....1-7
1.7.1 General Structure.....1-7
1.7.2 Content of the rEIAR / Environmental Baseline.....1-7
1.7.3 Description of Likely Significant Effects and Impacts.....1-8
1.8 Project Team.....1-9
1.8.1 Project Team Responsibilities.....1-9
1.8.2 Project Team Members.....1-11
1.9 Difficulties Encountered.....1-17
1.10 Viewing and Purchasing of the rEIAR.....1-17

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

2.1 Introduction.....2-1
2.2 Informal Scoping.....2-1
2.2.1 Scoping Responses.....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 PROJECT 4-1

4.1 Introduction 4-1
4.2 Existing Derrybrien Wind Farm Development 4-2
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
4.2.5 Summary of Project Features 4-13
4.2.6 Construction Phase (2003 – 2006) 4-15
4.2.7 Operation and Maintenance Phase (2006 -2022) 4-17
4.2.8 Ceased Operation Phase (2022 -2025) 4-17
4.2.9 Decommissioning Phase (Prospective Development) 4-17
4.3 Derrybrien Wind Farm Development Decommissioning Project (Retained Development) 4-20
4.4 Cumulative Impact Assessment 4-20
4.4.1 Projects Considered in Cumulative Assessment 4-21
4.4.2 Adjacent Land Uses 4-25

5. POPULATION AND HUMAN HEALTH 5-1

5.1 Introduction 5-1
5.1.1 Chapter Scope 5-1
5.1.2 Statement of Authority 5-1
5.1.3 Relevant Legislation 5-1
5.1.4 Relevant Guidance 5-2
5.2 Methodology 5-3
5.2.1 Population and Human Health Study Area 5-3
5.2.2 Scoping and Consultation 5-3
5.2.3 Impact Assessment Methodology 5-3
5.2.4 Limitations/Difficulties Encountered 5-4
5.3 Receiving Environment 5-4
5.3.1 Population 5-5
5.3.1.1 Population Trends 5-5
5.3.2 Summary of Baseline Information 5-8
5.3.2.1 Population Density 5-8
5.3.2.2 Household Statistics 5-8
5.3.2.3 Age Structure 5-9
5.3.2.4 Employment and Economic Activity 5-12
5.3.3 Land-Use 5-17
5.3.4 Services 5-19
5.3.5 Education 5-20
5.3.6 Access and Public Transport 5-20
5.3.7 Amenities and Community Facilities 5-20
5.3.8 Tourism 5-20

5.3.8.1 Tourism Numbers and Revenue 5-20
5.3.9 Tourist Attractions 5-23
5.4 Assessment of Effects on Human Health 5-23
5.4.1 Vulnerability of the Project to Natural Disasters and Major Accidents 5-23
5.5 Residential Amenity 5-24
5.6 Likely Significant Effects and Mitigation Measures Implemented 5-24
5.6.1 "Do-Nothing" Scenario 5-25
5.6.2 Construction Phase Impacts (2003-2006) 5-25
5.6.2.1 Population Levels 5-25
5.6.2.2 Employment and Investment 5-25
5.6.2.3 Land Use Patterns & Activities 5-25
5.6.2.4 Tourism 5-26
5.6.2.5 Residential Amenity 5-26
5.6.2.6 Health and Safety 5-26
5.6.2.7 Air Quality 5-28
5.6.2.8 Noise 5-28
5.6.2.9 Traffic and Transport 5-29
5.6.2.10 Pollution of Water Supply 5-30
5.6.3 Operational and Maintenance Phase Impacts (2006-2022) 5-32
5.6.3.1 Population 5-32
5.6.3.1 Employment and Investment 5-32
5.6.3.2 Health and Safety 5-32
5.6.3.3 Accidents and Natural Disasters 5-33
5.6.4 Ceased Operation Phase Impacts (2022 - Present) 5-35
5.6.4.1 Health and Safety 5-35
5.6.4.2 Accidents and Natural Disasters 5-35
5.6.4.3 Water Quality Impacts 5-36
5.6.5 Impacts of the Retained Development 5-36
5.6.6 Cumulative and In-Combination Effects 5-36
5.6.6.1 Employment and Economic Activity 5-37
5.6.6.2 Tourism and Amenity 5-37
5.6.6.3 Health and Safety 5-37
5.7 Conclusion 5-37

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 6-4
6.2 Methodology 6-5
6.2.1 Overview 6-5
6.2.2 Desk Study 6-5
6.2.3 Zone of Influence 6-7
6.2.4 Field Surveys 6-8
6.2.4.1 Terrestrial habitats 6-8
6.2.4.2 Birds 6-9
6.2.4.3 Bats 6-15
6.2.4.4 Other fauna 6-24
6.2.5 Scoping and Consultation 6-24
6.2.6 Impact Assessment Methodology 6-24
6.2.6.1 Important Ecological Features 6-25
6.2.6.2 Evaluation: Determining Importance 6-25
6.2.6.3 Characterising and Qualifying Impacts and Assessing the Significance of Effects 6-25
6.2.7 Article 12 of the Habitats Directive 6-26

6.2.8 Limitations/Difficulties Encountered 6-28
6.3 Receiving Environment 6-29
6.3.1 Designated Nature Conservation Sites 6-29
6.3.1.1 European sites 6-29
6.3.1.2 Natural Heritage Areas and Proposed Natural Heritage Areas 6-37
6.3.1.3 Nature Reserves 6-41
6.3.2 Protected and/or Rare Species 6-41
6.3.3 Terrestrial Habitats 6-41
6.3.3.1 Terrestrial Habitats within Project Area 6-41
6.3.3.2 Conifer plantation (WD4) 6-42
6.3.3.3 Cutover bog (PB4) 6-42
6.3.3.4 Upland blanket bog (PB2) 6-43
6.3.3.5 Dystrophic lake (FL1) 6-44
6.3.3.6 Recently felled woodland (WS5) 6-45
6.3.4 Terrestrial Habitats in Peat Slide Area 6-50
6.3.4.1 Conifer Forestry (WD4) 6-50
6.3.4.2 Wet Heath (HH3) 6-50
6.3.4.3 Wet grassland (GS4) 6-50
6.3.4.4 Eroding / upland streams (FW1) 6-51
6.3.5 Invasive Species 6-51
6.3.6 Birds 6-52
6.3.6.1 Review of status of breeding birds in study area, 1998-2024 6-52
6.3.6.2 Wintering birds in study area, 1998-2024 6-66
6.3.6.3 Review of hen harrier population in Slieve Aughty Mountains SPA 6-68
6.3.7 Bats 6-71
6.3.7.1 Pre-construction baseline data: 1998-2001 6-72
6.3.7.2 Construction phase: circa June 2003-March 2006 6-72
6.3.7.3 Operation Phase: 2006 -Oct 2022 data 6-72
6.3.7.4 Ceased Operation Phase Impacts (2022-Present) 6-87
6.3.7.5 Evaluation of vulnerability of baseline bat assemblage 6-89
6.3.8 Mammals (other than Bats) 6-98
6.3.8.1 European Otter 6-98
6.3.8.2 Other mammals 6-99
6.3.9 Other Fauna 6-100
6.4 Likely, Significant Impacts and Mitigation Measures Implemented 6-101
6.4.1.1 Do-Nothing Scenario 6-101
6.4.1.2 Designated Nature Conservation Sites 6-101
6.4.2 Construction Phase Impacts (2003-2006) 6-103
6.4.2.1 Terrestrial Habitats 6-103
6.4.2.2 Birds 6-107
6.4.2.3 Bats 6-111
6.4.2.4 Mammals (other than bats) 6-114
6.4.3 Offsite peat slide works: Oct 2003-end 2005 6-116
6.4.3.1 Terrestrial Habitats 6-116
6.4.3.2 Birds 6-127
6.4.3.3 Bats 6-128
6.4.3.4 Mammals (other than bats) 6-133
6.4.4 Operation and Maintenance Phase Impacts (2006 – 2022) 6-136
6.4.4.1 Terrestrial Habitats 6-136
6.4.4.2 Birds 6-139
6.4.4.3 Bats 6-144
6.4.4.4 Mammals (other than bats) 6-148
6.4.5 Ceased Operation Phase Impacts (2022-Present) 6-149
6.4.5.1 Terrestrial Habitats 6-149
6.4.5.2 Birds 6-150
6.4.5.3 Bats 6-151

6.4.5.4 Mammals (other than bats) 6-152
6.4.6 Impacts of Retained Development – Decommissioned Phase 6-153
6.4.6.1 Terrestrial Habitats 6-153
6.4.6.2 Birds 6-154
6.4.6.3 Bats 6-156
6.4.6.4 Mammals (other than bats) 6-156
6.4.7 Cumulative and In-Combination Effects 6-157
6.4.7.1 Terrestrial Habitats 6-157
6.4.7.2 Birds 6-158
6.4.7.3 Bats 6-159
6.4.7.4 Mammals (other than bats) 6-159
6.5 Conclusion 6-160
6.5.1 Terrestrial Habitats 6-160
6.5.2 Birds 6-160
6.5.3 Bats 6-161
6.5.4 Mammals (other than bats) 6-161
6.5.4.1 Otter 6-161
6.5.4.2 Other mammals 6-161

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

7.1 Introduction 7-1
7.1.1 Chapter Scope 7-1
7.1.2 Statement of Authority 7-1
7.1.3 Relevant Legislation 7-2
7.1.4 Relevant Guidance 7-2
7.2 Methodology 7-3
7.2.1 Approach to Establishing the Baseline 7-3
7.2.2 Overview of Methods for the Aquatic Study 7-3
7.2.3 Zone of Influence 7-4
7.2.4 Desktop Study 7-4
7.2.5 Field Studies 7-5
7.2.6 Scoping and Consultation 7-12
7.2.7 Impact Assessment Methodology 7-12
7.2.8 Ecological Valuation of Watercourses 7-13
7.2.9 Impact Assessment Criteria 7-14
7.2.10 Limitations/Difficulties Encountered 7-15
7.3 Receiving Environment 7-16
7.3.1 River Catchments Overview 7-16
7.3.2 Hard Geology and Soils 7-19
7.3.3 Sub catchments and Land use 7-19
7.3.4 Biological Water Quality (Q-values) 7-21
7.3.5 Water Chemistry 7-30
7.3.6 Fisheries Data 7-36
7.3.7 Ecological Valuation Summary 7-47
7.4 Likely, Significant Effects and Mitigation Measures Implemented 7-51
7.4.1 Relevant Characteristics of the Proposal 7-51
7.4.2 Construction Phase Effects (2003-2006) 7-52
7.4.3 Operation and Maintenance Phase Effects (2006 – 2022) 7-81
7.4.4 Ceased Operation Phase Effects (2022-Present) 7-83
7.4.5 Effects of Retained Development 7-84
7.4.6 Water Framework Directive Implications 7-93
7.4.7 Cumulative and In-Combination Effects 7-93
7.5 Monitoring 7-105
7.6 Conclusion 7-105
7.7 References 7-108

8. SOILS, GEOLOGY AND LAND 8-1

8.1 Introduction 8-1
8.1.1 Chapter Scope 8-1
8.1.2 Statement of Authority 8-3
8.1.3 Relevant Legislation 8-3
8.1.4 Relevant Guidance 8-4
8.1.5 Peat Slide of 16th October 2003 8-4
8.1.5.1 Overview of the Peat Slide, Likely Cause and Possible Failure Mechanism 8-5
8.1.5.2 Treatment of the October 2003 Peat Slide in the rEIAR 8-6
8.2 Methodology 8-8
8.2.1 Impact Assessment Methodology 8-8
8.2.2 Limitations/Difficulties Encountered 8-15
8.2.2.1 Wind Farm Site 8-15
8.2.2.2 Peat Slide: Temporary Barrages and Run-Out Distance of Slide Material 8-17
8.3 Receiving Environment 8-17
8.3.1 Baseline Environment – Wind Farm Site 8-17
8.3.1.1 Introduction 8-17
8.3.1.2 Geotechnical Investigations 8-18
8.3.1.3 Baseline Conditions (1998) – Soils, Geology & Land Use 8-20
8.3.1.4 Baseline Sensitivity of the Receiving Environment (Soils, Geology & Land Use) for the Wind Farm Site 8-41
8.3.2 Baseline Environment (1998) – Grid Connection 8-43
8.3.2.1 Introduction 8-43
8.3.2.2 Geotechnical Investigations 8-43
8.3.2.3 Baseline Conditions (1998) – Soils, Geology & Land Use 8-45
8.3.2.4 Baseline Sensitivity of the Receiving Environment (Soils, Geology & Land Use) for the Grid Connection 8-57
8.3.3 Baseline Environment – Peat Slide and Associated Works 8-58
8.3.3.1 Introduction 8-58
8.3.3.2 Geotechnical Investigations 8-59
8.3.3.3 Baseline Conditions (1998) – Soils, Geology & Land Use 8-61
8.3.3.4 Baseline Sensitivity of the Receiving Environment (Soils, Geology & Land Use) for the Peat Slide and Associated Works 8-79
8.3.4 Baseline Peat Stability Risk Assessment & Likelihood of a Peat Slide Based on Site Conditions in 1998 8-80
8.3.4.1 Baseline Peat Stability Risk Assessment – Wind farm Site 8-80
8.3.4.2 Baseline Peat Stability Risk Assessment – Grid Connection 8-83
8.3.4.3 Baseline Stability Risk Assessment – Peat Slide and Associated Works 8-85
8.3.4.4 Changes in the Likelihood of a Peat Slide over the Project Life Cycle. 8-89
8.4 Likely, Significant Impacts of the Project 8-99
8.4.1 Derrybrien Wind Farm Site 8-100
8.4.1.1 Derrybrien Wind Farm Site - Construction Phase Impacts (2003 – 2006) 8-100
8.4.1.2 Derrybrien Wind Farm Site - Operation and Maintenance Phase Impacts (2006 – 2022) 8-123
8.4.1.3 Derrybrien Wind Farm Site - Ceased Operation Phase 2022 to 2024 (Impacts which are Occurring) 8-134
8.4.1.4 Derrybrien Wind Farm Site – Prospective Development (Impacts which are Likely to Occur) 8-140
8.4.1.5 Derrybrien Wind Farm Site – Likely Impacts of the Retained Development Post-Decommissioning 8-146
8.4.2 Grid Connection Impact Assessment 8-152
8.4.2.1 Grid Connection - Construction Phase Impacts (2003 – 2006) 8-152

8.4.2.2 Grid Connection - Operation and Maintenance Phase Impacts (2006 – 2022) 8-160
8.4.2.3 Grid Connection - Ceased Operation Phase 2022 to 2024 (Effects which are Occurring) 8-163
8.4.2.4 Grid Connection – Likely Impacts of the Retained Development (Post-Decommissioning Phase) 8-164
8.4.3 Peat Slide & Response Works - Impact Assessment 8-165
8.4.3.1 Peat Slide & Response Works - Construction Phase Impacts (2003 – 2006) 8-165
8.4.3.2 Peat Slide & Response Works - Operation and Maintenance Phase Impacts (2006 – 2022) 8-171
8.4.3.3 Peat Slide & Response Works - Ceased Operation Phase 2022 to 2024 (Impacts which are Occurring) 8-176
8.4.3.4 Peat Slide & Response Works – Likely Impacts of the Retained Development (Post-Decommissioning Phase) 8-177
8.5 Cumulative Impacts 8-178
8.5.1 Introduction 8-178
8.5.2 Cumulative Impacts from Other Wind Farm Projects in the Slieve Aughty Mountains 8-178
8.5.2.1 Sonnagh Old Wind Farm. 8-178
8.5.2.2 Keelderry Wind Farm 8-179
8.5.3 Cumulative Impacts from Adjacent Coniferous Forestry Plantations (Not Part of Project) 8-186
8.5.4 Cumulative Impacts from Peat Extraction or Turf Cutting outside the Project Area 8-187
8.5.5 Cumulative Impacts from Mechanical Peat Harvesting in Turbary Plots Within and Immediately Adjacent to the Wind Farm Site 8-189
8.5.5.1 Baseline Conditions 8-189
8.5.5.2 Turbary Activities – Peat Harvesting 8-189
8.5.5.3 Cumulative Direct Impacts of Mechanical Peat Harvesting from the Turbary Plots 8-195
8.5.5.4 Baseline Peat Stability Risk Assessment for Mechanical Peat Harvesting in the Turbary Area and Interpreted Likelihood of a Peat Slide prior to Mitigation 8-196
8.5.5.5 Mechanical Peat Harvesting in Turbary Plots On the Wind Farm Site – Assessment of Stability Impacts Prior to Mitigation 8-199
8.5.5.6 Mitigation Measures for Mechanical Peat Harvesting and Assessment of Stability Impacts after Mitigation 8-208
8.5.5.7 Cumulative Stability Impacts due to Mechanical Peat Harvesting in the Turbary Plots Within and Immediately Adjacent to the Wind Farm Site 8-209
8.5.6 Summary – Cumulative Impacts 8-214
8.6 Remedial (Mitigation) Measures and Monitoring 8-216
8.6.1 Introduction 8-216
8.6.2 Remedial (Mitigation) Measures & Monitoring - Wind Farm Site 8-216
8.6.2.1 Wind Farm Site: Construction Phase – Prior to October 2003 Peat Slide 8-216
8.6.2.2 Wind Farm Site: Construction Phase (2003-2006) – After the October 2003 Peat Slide 8-219
8.6.2.3 Wind Farm Site: Operation & Maintenance Phase (2006-2022) 8-227
8.6.2.4 Wind Farm Site: Ceased Operation Phase (2022-2024) 8-233
8.6.2.5 Wind Farm Site: Decommissioning Phase 8-233
8.6.2.6 Wind Farm Site: Post-Decommissioning (The Retained Development) 8-235
8.6.3 Remedial (Mitigation) Measures & Monitoring – Grid Connection 8-236
8.6.3.1 Grid Connection: Construction Phase (2003-2006) 8-236

8.6.3.2 Grid Connection: Operation & Maintenance Phase (2006-2022) 8-238
8.6.3.3 Grid Connection: Ceased Operation Phase (2022-2024) 8-239
8.6.3.4 Grid Connection: Decommissioning Phase 8-239
8.6.3.5 Grid Connection Site: Post-Decommissioning (The Retained Development) 8-239
8.6.4 Remedial (Mitigation) Measures & Monitoring – Peat Slide and Response Works 8-240
8.6.4.1 Peat Slide and Response Works: Construction Phase (2003-2006) – After the October 2003 Peat Slide 8-240
8.6.4.2 Peat Slide and Response Works: Operation & Maintenance Phase (2006-2022) 8-242
8.6.4.3 Peat Slide and Response Works: Ceased Operation Phase (2022-2024) . 8-242
8.6.4.4 Peat Slide and Response Works: Decommissioning Phase 8-242
8.6.4.5 Peat Slide and Response Works: Post-Decommissioning (The Retained Development) 8-242
8.7 Residual Impacts of the Retained Development 8-243
8.7.1 Derrybrien Wind Farm - Residual Impacts of the Retained Development 8-243
8.7.2 Grid Connection - Residual Impacts (Retained Development) 8-245
8.7.3 Peat Slide & Response Works - Residual Impacts (Retained Development) 8-246
8.8 Summary 8-246

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 Study Area Location 9-8
9.3.2 Baseline Drainage Network 9-9
9.3.3 Water Balance 9-15
9.3.4 Regional & Local Hydrology 9-17
9.3.5 Hydrogeology 9-21
9.3.6 Flood Risk Identification 9-28
9.3.7 Groundwater Quality 9-29
9.3.8 Surface Water Quality 9-30
9.4 Likely, Significant Impacts and Mitigation Measures Implemented 9-30
9.4.1 Construction Phase Impacts (2003-2006) 9-30
9.4.2 Operation and Maintenance Phase Impacts (2006 – 2022) 9-40
9.4.3 Ceased Operation Phase Impacts (2022- Present) 9-49
9.4.4 Impacts of Retained Development 9-50
9.4.5 Cumulative and In-Combination Effects 9-50
9.5 Conclusion 9-55

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

10.1 Air 10-1
10.1.1 Introduction 10-1
10.1.2 Methodology 10-6
10.1.3 Receiving Environment 10-8
10.1.4 Likely, Significant Impacts and Mitigation Measures Implemented 10-20
10.1.1 Cumulative and In-Combination Effects 10-25
10.1.2 Conclusion 10-25
10.2 Climate 10-26
10.2.1 Introduction 10-26
10.2.2 Methodology 10-26
10.2.3 Climate Change and Greenhouse Gases 10-26
10.2.4 Climate and Weather in the Environment 10-33
10.2.5 Calculating Carbon Losses and Savings from the Project 10-37
10.2.6 Likely Significant Effects and Mitigation Measures Implemented 10-42
10.2.7 Cumulative and In-Combination Effects 10-45
10.2.8 Conclusion 10-45

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 Fundamentals of Acoustics 11-1
11.1.4 Relevant Guidance 11-2
11.2 Methodology 11-3
11.2.1 Construction Phase (2003-2006) 11-4
11.2.2 Operation and Maintenance Phase (2006-2022) 11-6
11.2.3 Ceased Operation Phase (2022 – Present) 11-8
11.2.4 Retained Development 11-8
11.3 Receiving Environment 11-8
11.3.1 Derrybrien Wind Farm Development Noise Surveys (2018) 11-8
11.3.2 Derrybrien Wind Farm Development Noise surveys (2019). 11-20
11.4 Likely Significant Impacts 11-24
11.4.1 Do Nothing Scenario 11-24
11.4.2 Construction Phase Impacts (2003-2006) 11-24
11.4.3 Operation and Maintenance Phase Impacts (2006 – 2022) 11-34
11.4.4 Ceased Operation Phase Impacts (2022-Present) 11-34
11.4.5 Impacts of Retained Development 11-34
11.4.6 Cumulative and In-Combination Effects 11-35
11.5 Conclusion 11-35
11.6 Reference 11-36

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 Designated Architectural Heritage 12-21
12.3.3 Undesignated and Intangible Cultural Heritage 12-21
12.3.4 Site Inspections 12-23
12.3.5 Summary of Baseline Information 12-25
12.4 Likely, Significant Impacts and Mitigation Measures Implemented 12-26
12.4.1 Do-Nothing Scenario 12-26
12.4.2 Construction Phase Impacts (2003-2006) 12-26
12.4.3 Operation and Maintenance Phase Impacts (2006 – 2022) 12-27
12.4.4 Ceased Operation Phase Impacts (2022-Present) 12-28
12.4.5 Impacts of Retained Development 12-28
12.4.6 Cumulative and In-Combination Effects 12-28
12.5 Conclusion 12-29
12.6 Reference 12-30

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 Relevant Guidance 13-1
13.2.2 Other Guidance 13-3
13.2.3 Assessment Methodology 13-3
13.2.4 Assessment of Landscape Effects 13-5
13.2.5 Significance of Effects 13-7
13.2.6 Assessment of Visual Effects 13-7
13.2.7 Quality and Timescale of Effects 13-9
13.2.8 Assessing Landscape and Effects in Remedial Environmental Impact Assessment Reports (rEIAR) 13-11
13.2.9 Limitations/Difficulties Encountered 13-15
13.3 Receiving Environment 13-16
13.3.1 Landscape Character and Visual Amenity 13-16
13.3.2 Site and Immediate Vicinity 13-18
13.3.3 Land Use and Landcover 13-19
13.3.4 Transport and Settlement 13-25
13.3.5 Landscape, Visual Amenity and Wind Energy Policy 13-26
13.3.6 Visual Receptors 13-41
13.3.7 Summary of Baseline Information 13-48
13.4 Likely, Significant Impacts and Mitigation Measures Implemented 13-51
13.4.1 Do-Nothing Scenario 13-51
13.4.2 Construction Phase Effects (2003-2006) 13-51
13.4.3 Operation and Maintenance Phase Effects (2006 – 2022) 13-56
13.4.4 Ceased Operation Phase Effects (2022-Present) 13-70
13.4.5 Effects of Retained Development 13-70
13.4.6 Cumulative and In-Combination Effects 13-72
13.5 Mitigation 13-77
13.6 Conclusion 13-77
13.7 Reference 13-79

14. **MATERIAL ASSETS 14-1**

14.1 Traffic & Transportation 14-1
14.1.1 Introduction 14-1
14.1.1.1 Chapter Scope 14-1
14.1.1.2 Statement of Authority 14-1
14.1.1.3 Assessment Timeframes 14-1

14.1.1.4 Assessment Area 14-2
14.1.1.5 Relevant Guidance 14-4
14.1.2 Methodology 14-4
14.1.2.1 Scoping and Consultation 14-4
14.1.2.2 Impact Assessment Methodology 14-4
14.1.2.3 Categorisation of Impact & Effect 14-5
14.1.2.4 Difficulties Encountered 14-5
14.1.3 Receiving Environment 14-6
14.1.3.1 Coillte Track – Primary Wind Farm Access Road 14-6
14.1.3.2 Coillte Track – Turbary Lands Access Road 14-7
14.1.3.3 Black Road 14-8
14.1.3.4 R353 Regional Road 14-9
14.1.3.5 R476 Regional Road 14-9
14.1.3.6 R460 Regional Road 14-10
14.1.3.7 N18 National Primary Road (Now R458) 14-10
14.1.3.8 Upgrades to the N18 14-11
14.1.3.9 M18 Motorway 14-12
14.1.3.10 Unnamed Local Road A 14-14
14.1.3.11 Coillte Track – Agannygal Substation Access 14-14
14.1.4 Likely, Significant Impacts and Mitigation Measures Implemented 14-15
14.1.4.1 Construction Phase Impacts (2003 –2006) 14-15
14.1.4.2 Operation and Maintenance Phase Impacts –2006 –2022 14-36
14.1.4.3 Ceased Operation Phase Impacts (2022-Present) 14-38
14.1.4.4 Impacts of Retained Development 14-38
14.1.5 Cumulative and In-Combination Effects 14-39
14.1.5.2 Cumulative effects which are occurring 14-43
14.1.5.3 Cumulative effects which are likely to occur 14-43
14.1.6 Conclusion 14-43
14.2 Telecommunications, Aviation, and Other Material Assets 14-45
14.2.1 Introduction 14-45
14.2.1.1 Chapter Scope 14-45
14.2.1.2 Statement of Authority 14-45
14.2.1.3 Relevant Guidance and Legislation 14-45
14.2.2 Methodology 14-45
14.2.2.1 Site Walkover 14-46
14.2.2.2 Scoping and Consultation 14-46
14.2.2.3 Impact Assessment Methodology 14-46
14.2.2.4 Limitations/Difficulties Encountered 14-46
14.2.3 Receiving Environment 14-47
14.2.3.1 Aviation 14-47
14.2.3.2 Telecommunications 14-47
14.2.3.3 Water Supply 14-47
14.2.4 Likely, Significant Effects and Mitigation Measures Implemented 14-49
14.2.4.1 Construction Phase Impacts (2003-2006) 14-49
14.2.4.2 Operation Phase Impacts (2006 – 2022) 14-51
14.2.4.3 Ceased Operation Phase Impacts (2022-Present) 14-52
14.2.4.4 Impacts of Retained Development 14-53
14.2.4.5 Cumulative and In-Combination Effects 14-53
14.2.5 Conclusion 14-53
14.3 Resource and Waste Management 14-54
14.3.1 Introduction 14-54
14.3.1.1 Relevant Legislation 14-54
14.3.1.2 Waste Management Policy Context 14-55
14.3.1.3 Relevant Guidance 14-58
14.3.2 Methodology 14-58
14.3.2.1 Scoping and Consultation 14-58

14.3.2.2 Limitations/Difficulties Encountered 14-59
14.3.3 Receiving Environment 14-59
14.3.4 Likely, Significant Impacts and Mitigation Measures Implemented 14-59
14.3.4.1 Construction Phase Impacts (2003-2006) 14-59
14.3.4.2 Operation Phase Impacts (2006 – 2022) 14-60
14.3.4.3 Ceased Operation Phase Impacts (2022-Present) 14-61
14.3.4.4 Impacts of Retained Development 14-61
14.3.4.5 Cumulative and In-Combination Effects 14-61
14.3.5 Conclusion 14-62

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 15-2
15.1.3 Relevant Legislation 15-2
15.1.3.1 Relevant Guidance Documents 15-3
15.2 Assessment Methodology 15-3
15.2.1 Categorisation of the Baseline Environment 15-3
15.2.2 Impact Assessment Methodology 15-4
15.2.2.1 Introduction 15-4
15.2.2.2 Site-Specific Risk Assessment Methodology 15-5
15.3 Project Hazard Analysis 15-8
15.3.2 Meteorological 15-11
15.3.3 Hydrological 15-12
15.3.4 Peat Stability 15-12
15.3.5 Traffic 15-14
15.3.6 Industrial Accident 15-14
15.3.7 Critical Infrastructure 15-14
15.3.8 Contamination 15-15
15.3.9 Health and Safety 15-15
15.4 Risk Assessment 15-16
15.4.1 Likely Significant Effects 15-16
15.4.1.1 Do-Nothing Scenario 15-16
15.4.1.2 Assessment of Effects During Construction 15-16
15.4.1.3 Assessment of Effects During Operation 15-17
15.4.1.4 Assessment of Effects During Ceased-Operation 15-18
15.4.1.5 Assessment of Effects from Retained Development 15-19
15.4.1.6 Assessment of Effect – Summary 15-20
15.4.2 Mitigation Measures 15-35
15.4.2.1 Construction Phase Mitigation 15-35
15.4.2.2 Operational Phase Mitigation 15-36
15.4.2.3 Ceased Operational Phase Mitigation 15-37
15.4.2.4 Retained Development Mitigation 15-38
15.4.3 Residual Effects 15-38
15.4.3.1 Construction Phase 15-38
15.4.3.2 Operational Phase 15-39
15.4.3.3 Ceased Operational Phase 15-39
15.4.3.4 Retained Development 15-39
15.4.4 Assessment of Cumulative Effects 15-39
15.4.4.1 Cumulative Impacts with the Retained Development 15-39
15.4.4.2 Turbary Activities 15-41
15.5 Conclusion 15-41

16. INTERACTION OF THE FOREGOING 16-1

16.1 Introduction 16-1
16.1.1 Chapter Scope 16-1
16.1.2 Statement of Authority 16-6
16.1.3 Relevant Legislation 16-6
16.1.4 Relevant Guidance 16-6
16.2 Methodology 16-6
16.2.1 Limitations/Difficulties Encountered 16-7
16.3 Receiving Environment 16-7
16.3.1 Impact Interactions of Project During the Construction Period (2003 to 2006) 16-7
16.3.2 Impact Interactions of Project During the Operational Period (2006 to 2022) 16-13
16.3.3 Impact Interactions of Project During the Ceased Operational Phase (2022 to present) 16-14
16.3.4 Impact Interactions of Project During the Retained Development 16-15
16.4 Conclusion 16-15

17. SCHEDULE OF MITIGATION AND CONCLUSION 17-1

17.1 Introduction 17-1
17.1.1 Chapter Scope 17-1
17.2 Mitigation Measures 17-2
17.3 Conclusion 17-39

GLOSSARY

BIBLIOGRAPHY

TABLE OF TABLES

Table 1-1 EPA Description of Effects (EPA, 2022) 1-8
Table 1-2 Project Team 1-10
Table 2-1 Scoping Responses 2-2
Table 2-2 Review of Scoping Responses 2-3
Table 3-1 Description of Environmental Effect 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) 3-39
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). 3-44
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) 3-48
Table 3-16 Summary of Predicted Effects of Alternative 1 (Work Area C). 3-49
Table 3-17 Alternative 2 - Estimated tonnages of material to be removed from Work Area C during decommissioning. 3-52
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). 3-57
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 4-1 Summary description of main features associated with the existing Derrybrien Wind Farm Development and associated works 4-13
Table 4-2 Summary of the sequencing of the construction activities/works associated with the existing Derrybrien Wind Farm Development 4-16
Table 4-3 Summary of maintenance activities undertaken at Derrybrien Wind Farm Development (2006-2024) .. 4-17
Table 4-4 Summary of Decommissioning activities associated with the Derrybrien Wind Farm Development Decommissioning Project (Prospective Development) 4-18
Table 5-1 Population 2002 – 2016 (Source: CSO) 5-5
Table 5-2 Population Density in 2002 and 2016 (Source: CSO) 5-8

Table 5-3 Number of Household and Average Household Size 1996 – 2016 (Source: CSO) 5-8
Table 5-4 Population per Age Category in 2002 (Source: CSO) 5-9
Table 5-5 Population per Age Category in 2006 (Source: CSO) 5-9
Table 5-6 Population per Age Category in 2011 (Source: CSO) 5-9
Table 5-7 Population per Age Category in 2016 (Source: CSO) 5-10
Table 5-8 Population per Age Category in 2022 (Source: CSO) 5-10
Table 5-9 Economic Status of the Total Population Aged 15+ in the State (Source: CSO) 5-12
Table 5-10 Economic Status of the Total Population Aged 15+ in the County (Source: CSO) 5-13
Table 5-11 Economic Status of the Total Population Aged 15+ in the Study Area (Source: CSO) 5-14
Table 5-12 Farm Size and Classification within the Study Area in 2000 (Source: CSO) 5-18
Table 5-13 Farm Size and Classification within the Study Area in 2010 (Source: CSO) 5-18
Table 5-14 Farm Size and Classification within the Study Area in 2020 (Source: CSO) 5-19
Table 5-15 Overseas Tourists Revenue and Numbers 2018 (Source: Fáilte Ireland) 5-21
Table 5-16 Overseas Tourism to Border Region during 2017 (Source: Fáilte Ireland) 5-22
Table 5-17 Domestic Tourism Revenue by Region 5-22
Table 6-1 SACs and SPAs within the Zone of Influence of the Project 6-30
Table 6-2 NHAs and pNHAs within the wider environment of the Derrybrien Wind Farm Development Decommissioning Project. 6-37
Table 6-3 Overview of terrestrial habitats present within the project area prior to project development. 6-46
Table 6-4 Overview of terrestrial habitats within the peat slide area. 6-51
Table 6-5 Summary of hen harrier observations from Vantage Point watches for 2004 survey. 6-53
Table 6-6 Summary of Hen Harrier observations from Vantage Point watches for surveys since 2006. 6-56
Table 6-7 Summary of the number of territories occupied in various years from 2004 to 2018 within a 5 km radius of the wind farm. 6-61
Table 6-8 Status of birds recorded within 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). 6-62
Table 6-9 Comparative population data from the national hen harrier surveys in 1998-2000, 2005, 2010, 2015 and 2022 for the Slieve Aughty Mountains, and from Hen Harrier project for 2020 and 2021. Figures are total estimated pairs. 6-68
Table 6-10 Details of driven bat transect (Lead: Rachel Taylor (RT) and Caroline Lalor (CL). Non-technical second: Tom Lalor (TL)) 6-73
Table 6-11 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2016. 6-74
Table 6-12 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2016. 6-76
Table 6-13 Activity (P/h) of bat species at each detector location 2016. 6-77
Table 6-14 Number of days the mouse corpses were present in photographs. 6-80
Table 6-15 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2019. 6-80
Table 6-16 Activity (P/h) of bat species at each detector location 2019. 6-83
Table 6-17 Bat species which are potentially most vulnerable to collision base on physical and behavioural characteristics. Taken from SNH et al., 2019. 6-90
Table 6-18 Summary of direct habitat loss in footprint of project. 6-106
Table 6-19 Summary of impacts of peat slide on terrestrial habitats. 6-124
Table 7-1 Survey Site names and locations (ITM) 2011-2024 7-5

Table 7-2 Q-value relationship to water quality and WFD status 7-7
Table 7-3 Water chemistry analysis methods 7-9
Table 7-4 Physico-chemical boundary values for Irish rivers (S.I. 77 of 2019) 7-10
Table 7-5 Ecological evaluation criteria (Adapted from NRA, 2003, 2009) 7-13
Table 7-6 Ecological Impact Significance Criteria (from EPA, 2022) 7-14
Table 7-7 Ecological Impact Duration Criteria (from EPA, 2022 and CIEEM, 2018) 7-14
Table 7-8 Forestry (ha) in sub catchments draining the wind farm in 2000 (pre-construction) and 2018 (late operation phase) 7-20
Table 7-9 Area (ha) of forestry felled - wind farm and OHL during construction phase apportioned to each sub catchment 7-21
Table 7-10 EPA River Monitoring Station Locations 7-22
Table 7-11 EPA Q-value results for the three major rivers draining the Project (1996- 2023) 7-22
Table 7-12 Project Specific Q-value Summary 7-27
Table 7-13 Sediment Sample – Grain Size Analysis (31/10/2019) 7-29
Table 7-14 Lough Cutra – Macroinvertebrate Taxa 7-30
Table 7-15 Annual average water chemistry values for Lough Cutra 2001-2019 (EPA data). 7-34
Table 7-16 Results of electrofishing surveys in Owendalulleegh, Boleyneendorrish and Duniry Catchments - Numbers of fish per m² (total numbers) 7-38
Table 7-17 IFI Barriers Report in relation to Derrybrien Electrofishing Results 7-43
Table 7-18 Ecological Valuation Summary 7-47
Table 7-19 SS measured by GCCl in the SC7(b) tributary and main channel of Owendalulleegh (01/11/2003) 7-67
Table 7-20 Predicted impacts of wind farm and OHL clearfelling, on-site construction activities and the 2003 peat slide and emergency measures (2003- 2006) on water quality (Q-value) in receiving streams between 2003 and 2006 7-79
Table 7-22 Turbulence felling areas by sub catchment 2016-2018 7-82
Table 7-22 Peat stability and corresponding Aquatic Ecology Effects of Retained Development Elements 7-84
Table 7-24 Coillte Compensation Planting Areas Roscommon and Tipperary - associated SAC, water quality and potential impact evaluation 7-100
Table 8-1: Aquifer vulnerability criteria (DELG/EPA/GSI, 1999) 8-37
Table 8-2: Temporary Containment Barrages (A to D) 8-64
Table 8-3: Peat Slide Likelihood - Grid Connection 8-84
Table 8-4: Peat Slide Source Area - Stability FoS 8-86
Table 8-5: Associated Works – Stability of Barrages 1 to 4 8-88
Table 8-6: Associated Works – Stability of Repositories at Barrage 2 and 3, and Black Road Bridge 8-89
Table 8-7: Extent of site impacted by peat excavation and estimated volume of peat excavated 8-101
Table 8-8: Assessment of Stability Impacts – Construction Stage 2003 to 2006 8-108
Table 8-9: Assessment of Stability Impacts – Operation & Maintenance Phase (2006-2022) 8-130
Table 8-10: Assessment of Stability Impacts: Decommissioning Phase 8-142
Table 8-11 Grid Connection and Related Effects 8-153
Table 8-12: Assessment of Stability Impacts – Construction Phase (2003-2006) 8-159
Table 8-13: Assessment of Stability Impacts – Operation & Maintenance Phase (2006-2022) 8-162
Table 8-14: Containment Barrages 8-166
Table 8-15: Peat Repositories 8-168
Table 8-17: Assessment of Stability Impacts – Construction Phase (2003-2006) 8-172
Table 8-18: Assessment of Stability Impacts – Operation & Maintenance Phase (2006-2022) 8-175

Table 8-18 - Total Hazard Rating and Likelihood (L) of a Peat Slide for Turbary Plots on Derrybrien Wind Farm site 8-196

Table 8-20: Summary of impacts of Wind Farm site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts) 8-261

Table 8-21: Summary of impacts of Grid Connection site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts) 8-263

Table 8-22: Summary of impacts of Peat Slide Response Measures site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts) 8-264

Table 9-1 Monthly Rainfall (mm) at Gort Derrybrien II Met Station 9-15

Table 9-2 Rainstorm Depth (mm) Duration Return Period Table for wind farm site from FSU Web Portal 9-16

Table 9-3 Potential Evapotranspiration (mm) at Athenry Synoptic Station 9-16

Table 9-4 Summary of rivers draining from Derrybrien wind farm 9-19

Table 9-5 Summary of river subcatchments draining from Derrybrien wind farm 9-19

Table 9-6 Receptor Sensitivity Criteria (adapted from www.sepa.org.uk) 9-21

Table 9-7 Groundwater Vulnerability Categories (GSI) 9-24

Table 9-8 Summary information of piezometers installed on site between 2005 and 2011 9-27

Table 9-9 Areas felled in subcatchments influenced by Project 9-34

Table 9-10 Details of containment barrages 9-39

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 10-4

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 Sulphur Dioxide Data for Zone D Sites 10-9

Table 10-6 Historical Particulate Matter (PM_{10}) Data for Zone D Sites 10-10

Table 10-7 Historical Nitrogen Dioxide Data for Zone D Sites 10-10

Table 10-8 Historical Carbon Monoxide Data for Mountrath and Ferbane - Zone D Sites 10-11

Table 10-9 Ozone Data for Zone D Sites in 2022 10-12

Table 10-10 Average Sulphur Dioxide Data for Zone D Sites in 2022 10-14

Table 10-11 Average Particulate Matter (PM_{10}) Data for Zone D Sites in 2022 10-15

Table 10-12 Average Nitrogen Dioxide Data for Zone D Sites in 2022 10-15

Table 10-13 Carbon Monoxide Data for Birr - Zone D Site in 2022 10-16

Table 10-14 Average Ozone Data for Zone D Sites in 2022 10-16

Table 10-15 Average Sulphur Dioxide Data for Zone D Sites in 2023 10-17

Table 10-16 Average Particulate Matter (PM_{10}) Data for Zone D Sites in 2023 10-18

Table 10-17 Average Nitrogen Dioxide Data for Zone D Sites in 2023 10-18

Table 10-18 Carbon Monoxide Data for Birr - Zone D Site in 2023 10-19

Table 10-9 Ozone Data for Zone D Sites in 2023 10-19

Table 10-20 International Instruments Relating to Greenhouse Gases and Climate Change 10-27

Table 10-21 National Legislation and Reports relating to Greenhouse Gas Emission and Climate Targets 10-30

Table 10-22 Data from Met Éireann Weather Station at Shannon Airport, 1990-2020: Monthly and Annual Mean and Extreme Values 10-35

Table 10-23 CO_2 Losses from the Project 10-39

Table 11-1 Example Threshold of Potential Significant Effect at Dwellings 11-4
Table 11-2 Allowable Vibration at Properties 11-5
Table 11-3 Measurement Location Coordinates 11-12
Table 11-4 Noise Measurement Periods 11-13
Table 11-5 Instrumentation 11-14
Table 11-6 Derived Levels of $L_{A90,10\,min}$ for Various Wind Speeds (Upwind) for 2019 with turbines 11-18
Table 11-7 Location R21 Corrected $L_{A90,10\,min}$ Baseline Noise Levels: Daytime under Upwind Condition 11-19
Table 11-8 Location R21 Corrected $L_{A90,10\,min}$ Baseline Noise Levels: Night-time under Upwind Conditions 11-19
Table 11-9 Location R36 Corrected $L_{A90,10\,min}$ Baseline Noise Levels: Daytime under Upwind Conditions 11-19
Table 11-10 Location R36 Corrected $L_{A90,10\,min}$ Baseline Noise Levels: Night-time under Upwind Conditions 11-20
Table 11-11 Review of Noise Monitoring at Locations NML1 11-22
Table 11-12 Review of Noise Monitoring at Locations NML2 11-22
Table 11-13 Review of Noise Monitoring at Locations NML3 11-23
Table 11-14 Review of Noise Monitoring at Locations NML4 11-23
Table 11-15 Review of Noise Monitoring at Locations NML5 11-24
Table 11-16 Typical Wind Farm Turbine Construction Noise Emission Levels 11-25
Table 11-17 Indicative Noise Levels from Construction Plant at Various Distances from the Road Works 11-26
Table 11-18 Typical Borrow Pit Plant Noise Emissions 11-28
Table 11-19 Indicative Noise Levels from Construction Plant at Nearest NSL from the Grid Connection Works 11-30
Table 11-20 Indicative Noise Levels from Construction Plant at Various Distances from the Road Works 11-30
Table 11-21 Summary of Noise assessment of Construction Phase 1 11-34
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) 12-9
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 12-18
Table 12-8 Designated architectural heritage structures with 3km study area 12-21
Table 12-9 Translations of townland names 12-22
Table 13-1 Categories of Landscape Sensitivity 13-6
Table 13-2 Magnitude of Landscape Change 13-6
Table 13-3 Guide to Classification of Significance of Effects 13-7
Table 13-4 Categories of Visual Receptor Sensitivity 13-8
Table 13-5 Magnitude of Visual Change 13-9
Table 13-6 Quality of Effects 13-11
Table 13-7 Timescale of Effects 13-11
Table 13-8: Galway County Development Plan 1997: Policies on Development in Scenic Amenity Areas 13-28
Table 13-9 Viewpoints at Construction Stage 13-55
Table 13-10: Viewpoints 1-17 13-58

Table 13-11: Summary of visual effects at Viewpoints 1-17 13-69
Table 14-1. NRA Gort N18-06 Traffic Data 14-11
Table 14-2. TII TMU N18 024.0 N Traffic Data 14-12
Table 14-3. Construction Personnel – General 14-16
Table 14-4. Typical Plant – Civil & Electrical 14-19
Table 14-5. Total Material Movements – Civil & Electrical (Including Wind farm, OHL, Substation components) 14-21
Table 14-6. Approximate Material Volumes 14-33
Table 16-1 Waste Management Policy Objectives from Galway County Development Plan 2022 – 2028 14-56
Table 14-7 Typical waste arisings-operational phase 14-60
Table 15-1 Classification of Likelihood (Source: Department of Environment, Heritage and Local Government, 2010) 15-6
Table 15-2 Classification of Impact (Source: DoEHLG, 2010) 15-6
Table 15-3 Classification of Impact (Source: DoEHLG, 2010) 15-8
Table 15-4 HSE Emergency Plan hazard types (HSE Area 2 Crisis Management Team Major Emergency Plan May 2022) 15-8
Table 15-5 Risk Register – Construction Phase 15-16
Table 15-6 Risk Register – Operational Phase 15-17
Table 15-7 Risk Register – Ceased-Operation Phase 15-19
Table 15-8 Risk Assessment 15-20
Table 15-9 Risk Scores 15-28
Table 15-10 Risk Matrix – Construction 15-29
Table 15-11 Risk Matrix – Operation 15-29
Table 15-12 Risk Matrix – Ceased Operation 15-29
Table 16-1 Construction Interaction Matrix 16-2
Table 16-2 Operation Phase Interaction Matrix 16-3
Table 16-3 Ceased-Operation Phase Interaction Matrix 16-4
Table 16-4 Retained Development Interaction Matrix 16-5
Table 17-1 Mitigation Measures – Implemented to Date 17-2
Table 17-2 Proposed Mitigation Measures 17-35

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 3-41
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 3-46
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 Derrybrien Wind Farm Development – rEIAR Study Area 4-3
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 4-4 Location of Turbary within and immediately adjacent to wind farm 4-27
Figure 4-5 Location of Projects/Activities considered 4-28
Figure 5-1 Population Study Area 5-6
Figure 5-2 Dwellings within 500m of development site 5-7
Figure 5-3 Population per Age Category in 2002 (Source: CSO) 5-11
Figure 5-4 Population per Age Category in 2006 (Source: CSO) 5-11
Figure 5-5 Population per Age Category in 2011 (Source: CSO) 5-11
Figure 5-6 Population per Age Category in 2016 (Source: CSO) 5-12
Figure 5-2 Population per Age Category in 2022 (Source: CSO) 5-12
Figure 5-8 Employment by Socio-Economic Group in 2002 (Source: CSO) 5-15
Figure 5-9 Employment by Socio-Economic Group in 2006 (Source: CSO) 5-15
Figure 5-10 Employment by Socio-Economic Group in 2011 (Source: CSO) 5-16
Figure 5-11 Employment by Socio-Economic Group in 2016 (Source: CSO) 5-16
Figure 5-12 Employment by Socio-Economic Group in 2022 (Source: CSO) 5-16
Figure 6-1 Survey transects used on Derrybrien Wind Farm site, 2022 and 2024. 6-12
Figure 6-2 Survey transects used along overhead line grid connection between Derrybrien Wind Farm and Agannygal Substation, 2022 and 2024. 6-13

Figure 6-3 Driven transect results 6-17
Figure 6-4 Turbine and bat detector locations (2016) 6-19
Figure 6-5 Turbine and bat detector locations (2019) 6-22
Figure 6-6 SACs and SPAs within the wider environment of the Derrybrien Wind Farm Development Decommissioning Project 6-36
Figure 6-7 NHAs and pNHAs within the wider area of the Derrybrien Wind Farm Development Decommissioning Project 6-40
Figure 6-8 Pre-construction habitat map of Derrybrien Wind Farm site overlain on aerial photography (2000) 6-48
Figure 6-9 Aerial photograph (OSI dated 2005) showing the pre-existing habitats present along the OHL Route and at the Agannygal Substation site (southern extent) 6-49
Figure 6-10 Derrybrien Wind Farm - Hen Harrier Flight Lines 2004 Survey 6-54
Figure 6-11 Derrybrien Wind Farm - Hen Harrier Flight Lines 2006 Survey 6-59
Figure 6-12 Derrybrien Wind Farm - Hen Harrier Flightlines 2007-2018 Surveys 6-60
Figure 6-13 Total Static Bat Detector Results 2016 6-75
Figure 6-14 Total Static Bat Detector Results 2019 6-82
Figure 6-15 Location of bridges 6-129
Figure 6-16 Habitats extent and distribution within the wind farm site (dated 2022). 6-138
Figure 7-1 Sample Site Code and Location Map (Project Specific, EPA and IFI) 7-8
Figure 7-2 Lough Cutra Sediment Sample Location Map 7-12
Figure 7-3 Sub catchments draining the wind farm to Owendalulleegh, Boleyneendoorish and Duniry Rivers 7-16
Figure 7-4 Correlation of annual average colour and annual average Total-P in Lough Cutra 7-35
Figure 7-5 Correlation of annual average colour and annual average transparency in Lough Cutra 7-36
Figure 7-6 Location of Fish Migration Barriers on Derrybrien North Tributary (SC7(d) and SC7(b)) 7-44
Figure 7-7 SRP (ortho-phosphate) levels 2019 expressed as WFD status 7-58
Figure 7-8 Suspended solids in the Owendalulleegh and SC7 (01/11/2003) 7-68
Figure 7-9 Annual average chlorophyll a and Total-P in Lough Cutra 7-69
Figure 7-10 Correlation between suspended solids and turbidity (all data) 7-71
Figure 7-11 Correlation between suspended solids and turbidity (low concentrations only) 7-71
Figure 7-12 Turbidity (Hazen) measured at selected sites upstream and downstream of Lough Cutra between November 3rd, 2003 and January 22nd, 2004. 7-72
Figure 7-13 Colour measured at sites downstream of Lough Cutra between November 3rd and November 10th, 2003 7-73
Figure 7-14 Crooked Bridge (R353) road widening (2006 Google Earth Image) and 2022 (Google Maps image) .. 7-89
Figure 7-15 Peat Disturbance in Turbary Plot in Wind Farm Site 7-97
Figure 8-1: Schematic of likely failure mechanism of 16th October peat slide 8-6
Figure 8-2: Flow chart for assessment of direct impacts on soils & geology and impacts on site stability 8-11
Figure 8-3: Significance of Effect on Receiving Soils, Geology & Land 8-12
Figure 8-4: Aerial Photograph of the project area prior to construction (2000) 8-22
Figure 8-5: LiDAR Survey of the Site (Post-Construction) 8-23
Figure 8-6: Ground surface slope angles based on post-construction LiDAR survey 8-24
Figure 8-7: GSI Landslide Susceptibility Map for Project Area (Geological Survey of Ireland – online mapping, 2020) 8-26
Figure 8-8: Quaternary Geology Map (Geological Survey of Ireland) 8-28
Figure 8-9: Peat depths across the site 8-29

Figure 8-10: Water content of peat 8-30
Figure 8-11: Organic content of peat by Mass Loss on Ignition 8-30
Figure 8-12: Bulk Density of Peat 8-31
Figure 8-13: Profile of undrained shear strength (c_u) with depth in peat recorded with the Geonor H-10 in-site vane. 8-31
Figure 8-14: Undrained shear strengths recorded on undisturbed samples of peat by hand vane, triaxial tests and direct simple shear tests 8-32
Figure 8-15: 1:100,000 Bedrock Geology Map – Geological Survey of Ireland 8-35
Figure 8-16: Layout of existing (pre-construction) and constructed drainage on the wind farm site 8-38
Figure 8-17: Bedrock Aquifer Classification (www.gsi.ie) 8-39
Figure 8-18: Bedrock Aquifer Vulnerability (www.gsi.ie) 8-40
Figure 8-19: Aerial photograph of grid connection prior to construction in 2000 8-47
Figure 8-20: General topography along grid connection 8-48
Figure 8-21: Quaternary geology map - grid connection. 8-50
Figure 8-22: Peat depths along grid connection (1 of 2) (FT, 2023) 8-51
Figure 8-23: Peat depths along grid connection (2 of 2) (FT, 2023) 8-52
Figure 8-24: Profile of undrained shear strength with depth in peat recorded with Geonor H-60 – grid connection (FT, 2023) 8-53
Figure 8-25: Bedrock geology map - Grid connection site 8-56
Figure 8-26: Geomorphological map - Grid connection Site 8-57
Figure 8-27: Aerial photograph of peat slide and associated works (c. 2000) (1 of 3) 8-66
Figure 8-28: Aerial photograph of peat slide and associated works (c. 2000) (2 of 3) 8-67
Figure 8-29: Aerial photograph of peat slide and associated works (c. 2000) (3 of 3) 8-68
Figure 8-30: General topography – peat slide and associated works 8-69
Figure 8-31: Quaternary geology map – peat slide and associated works 8-72
Figure 8-32: Profile of undrained shear strength with depth in peat recorded with Geonor H-60 – peat slide source area (FT, 2020) 8-73
Figure 8-33: Bedrock geology map – peat slide and associated works 8-77
Figure 8-34: Geomorphological map – peat slide and associated works 8-78
Figure 8-35: Peat slide source area factor of safety for short and long-term conditions 8-86
Figure 8-36: Likelihood (L) of a peat slide across the wind farm site for Baseline Peat Stability Risk Assessment based on site conditions in 1998 8-91
Figure 8-37: Likelihood (L) of a peat slide for mitigated site activities and improved site conditions at the end of construction in 2006 8-92
Figure 8-38: Likelihood (L) of a peat slide for mitigated site activities and improved site conditions in 2020 8-93
Figure 8-39: Likelihood (in terms of FoS) of a peat slide in source area with improved site conditions from 2003 to 2040 (decommissioning) 8-96
Figure 8-40: Likelihood (in terms of FoS) of a peat slide source area in 2020 8-97
Figure 8-41: Likelihood (in terms of FoS) of a peat slide source area with improved site conditions 2040 (decommissioning) 8-98
Figure 8-42: Bearing capacity failure below sidecast materials 8-115
Figure 8-43: Location and extent of tree felling on the west side of the wind farm site in 2018 (including peat depth probes) 8-126
Figure 8-44: Water level readings from vibrating wire piezometers (January 2005 to November 2012) 8-137
Figure 8-45 Temporary road widening detail (floating roads) 8-144

Figure 8-46: Sonnagh Old Wind Farm – Location, Topography and Quaternary Geology (GSI Online Portal, 2020) *8-181*

Figure 8-47: Regional hydrology for other wind farms in the Slieve Aughty Mountains *8-182*

Figure 8-48: Characteristics of peat slide at Sonnagh Old Wind Farm (2005 Aerial Photo (OSI - Geohive Online Portal, 2020) & Geomorphological Map of Slide Area (Dykes, 2009) *8-183*

Figure 8-49: Keelderry Wind Farm – Location, Topography and Quaternary Geology (GSI Online Portal, 2020) ... *8-184*

Figure 8-50: Keelderry Wind Farm – Recent Aerial Photograph [c 2015] (OSI Geohive Online Portal, 2020).... *8-185*

Figure 8-51 - Quaternary Geology for the Coniferous Forest Plantations in the Project Area (GSI Online Portal, 2020)..... *8-188*

Figure 8-52 - Turbary plots at east end of wind farm site (ESBI Drawing No. QS-000280-01-0460-011-020-000) *8-192*

Figure 8-53 - Turbary plots where mechanical peat harvesting has been carried out by a local contractor since 2012 *8-193*

Figure 8-54 – 2020 Aerial photo of turbary plots illustrating recent mechanical peat harvesting activity & areas of local peat instability..... *8-194*

Figure 8-55 – Likelihood of a peat failure due to mechanical peat harvesting in the turbary plots prior to mitigation. *8-198*

Figure 8-56 – Drainage works carried out in early August 2020 to relieve water pressures in zone of peat failure in Turbary Plot 161..... *8-205*

Figure 8-57 – Survey monitoring points on the surface of the peat in and around the zone of peat failure in Turbary Plot 161 ..... *8-206*

Figure 8-58 – Surveyed movement of monitoring points in zone of peat failure in Turbary Plot 161 in 2020/2021 (Day 0 = 21/5/2020)..... *8-207*

Figure 8-59 – Likelihood of a peat failure due to mechanical peat extraction in the turbary plots after mitigation measures have been implemented. *8-210*

Figure 9-1Catchments in relation to wind farm project area.....*9-5*

Figure 9-2 Ground slope angles on wind farm *9-6*

Figure 9-3 Pre-existing (baseline) wind farm drainage.....*9-13*

Figure 9-4 Location of Project Works *9-14*

Figure 9-5 Subcatchments draining from wind farm site to major rivers.....*9-18*

Figure 9-6 Karst features in relation to wind farm study area.....*9-23*

Figure 9-7 Locations of piezometers and tiltmeters.....*9-26*

Figure 9-8 Piezometer Data (2005-2011).....*9-27*

Figure 9-10 Emergency Works in aftermath of Peat Slide 2003-2004.....*9-38*

Figure 9-10 Pre-existing (baseline) and constructed drainage on wind farm *9-41*

Figure 9-11 Derrybrien 110kV substation layout plan *9-47*

Figure 9-12 Agannygal 110kV Substation Layout Plan *9-48*

Figure 11-1 The level of typical common sounds on the dB(A) scale (National Roads Authority (NRA) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (NRA, 2014)..... *11-2*

Figure 11-2 Derrybrien Wind Farm – Noise-sensitive Locations..... *11-9*

Figure 11-3 Derrybrien Wind Farm - Unattended Noise Monitoring Locations *11-10*

Figure 11-4 Preliminary 35dB Noise Contour, ≥8m-s Wind Speed, Omni-directional (i.e. downwind to all dwellings) *11-11*

Figure 11-5 35dB Noise Contour, ≥8m/s Wind Speed, Upwind to R21 and R35 (i.e., Southerly Winds) *11-11*

Figure 11-6 Location R21..... *11-12*

Figure 11-7 Location R26..... *11-13*

Figure 11-8 Distributions of Wind Speeds & Direction during the Survey..... *11-14*

Figure 11-9 Baseline Noise Levels $L_{A90,10\,min}$ dB – Location R21 – Daytime Period 11-16
Figure 11-10 Baseline Noise Levels $L_{A90,10\,min}$ dB – Location R21 – Night-time Period 11-17
Figure 11-11 Baseline Noise Levels $L_{A90,10\,min}$ dB – Location R36 – Daytime Period 11-17
Figure 11-12 Baseline Noise Levels $L_{A90,10\,min}$ dB – Location R36 – Night-time Period 11-18
Figure 11-13 Attended Noise Monitoring Locations 11-21
Figure 11-14 Borrow Pit Locations 11-28
Figure 11-15 Borrow Pit – Construction Noise Contour 11-29
Figure 11-16 Peat Slide Barrage Locations 11-32
Figure 11-17 Peat Slide Works – Construction Noise Contour 11-33
Figure 12-1 Locations of recorded archaeological sites and designated architectural heritage structures within study area 12-13
Figure 12-2 Extract from 17th century Down Survey map with general location of study area highlighted in red 12-20
Figure 12-3 Extract from 1st edition 6-inch OS map (1841) showing location of wind farm 12-20
Figure 12-4 Extract from 2nd edition 6-inch OS map (1920) showing location of wind farm 12-21
Figure 13-1 Study area and topography of wider landscape 13-17
Figure 13-2: Topographical context of Derrybrien site and immediate vicinity. 13-18
Figure 13-3 EPA CORINE Landcover Map (2018) of study area 13-19
Figure 13-4: CORINE Landcover map of immediate vicinity. 13-21
Figure 13-5 High Scenic Amenity Area (Source: 1997-2003 Galway County Development Plan) 13-28
Figure 13-6 Enclosure by Forestry form the 2003 Landscape Character Assessment 13-31
Figure 13-7 Areas of Wind Farm Potential (Source Galway County Development Plan 2003-2009) 13-32
Figure 13-8 Protected Views (Source Galway County Development Plan 2003-2009) 13-32
Figure 13-9 Map IS1 showing site as Strategic Area for Wind Energy (Source Galway County Development Plan 2009-2015). 13-34
Figure 13-10 Slieve Aughty Landscape Character Type 13-37
Figure 13-11 Extract from LCA showing site and landscape units 13-38
Figure 13-12 Site Location and Landscape Sensitivity 13-39
Figure 13-13 Landscape and Visual designations in Co. Galway and Co. Clare 13-40
Figure 13-14 ZTV Map of existing Derrybrien turbines 13-41
Figure 13-15 Viewpoints 1-17 13-58
Figure 13-1 Study area and topography of wider landscape 13-17
Figure 13-2: Topographical context of Derrybrien site and immediate vicinity. 13-18
Figure 13-3 EPA CORINE Landcover Map (2018) of study area 13-19
Figure 13-4: CORINE Landcover map of immediate vicinity. 13-21
Figure 13-5 High Scenic Amenity Area 13-28
Figure 13-6 Enclosure by Forestry form the 2003 Landscape Character Assessment 13-31
Figure 13-7 Areas of Wind Farm Potential 13-32
Figure 13-8 Protected Views 13-32
Figure 13-9 Map IS1 showing site as Strategic Area for Wind Energy (Source Galway County Development Plan 2009-2015). 13-34
Figure 13-10 Slieve Aughty Landscape Character Type 13-37
Figure 13-11 Extract from LCA showing site and landscape units 13-38
Figure 13-12 Site Location and Landscape Sensitivity 13-39

Figure 13-13 Landscape and Visual designations in Co. Galway and Co. Clare 13-40
Figure 13-14 ZTV Map of existing Derrybrien turbines 13-41
Figure 13-15 Viewpoints 1-17 13-58
Figure 14-1 Site Context (Source rEIAR July 2020) 14-3
Figure 14-2 N18 & M18 Alignment (Source rEIAR July 2020) 14-13
Figure 14-3 Haul Routes – General (Source rEIAR July 2020) 14-17
Figure 14-4 Haul Routes – Turbines (Source rEIAR July 2020) 14-18
Figure 14-5 Road Upgrades (Source rEIAR July 2020) 14-25
Figure 14-6 Bridge Upgrades (Source rEIAR July 2020) 14-27
Figure 14-7 OHL Access Locations Sheet 1 (Source rEIAR July 2020) 14-29
Figure 14-8 OHL Access Locations Sheet 2 (Source rEIAR July 2020) 14-30
Figure 14-9 Roads Used & Tracks Built to Undertake the Response of the Peat Slip Works 14-32

TABLE OF PLATES

Plate 6-1 Survey transect No. 1 through bog in eastern sector of site, May 2022. 6-14

Plate 6-2 Survey transect No. 3 through regenerating bog in western sector of site, May 2022. 6-14

Plate 6-3 Survey transect No. 5 along the overhead line corridor, May 2022. 6-15

Plate 6-4 Cutover bog in the eastern parts of the site (photo during operational phase). 6-43

Plate 6-5 Upland blanket bog within the wind farm site. Same area photographed in 2004 (LHS) and 2018 (RHS) (Grid Reference (ITM): E 558938 N 705040). 6-44

Plate 6-6 Small dystrophic lake located within the central part of the wind farm site. Same area photographed in 2004 (LHS) and 2018 (RHS) (Grid Reference (ITM): E559305 N705073). 6-45

Plate 6-7 Regeneration of peatland vegetation across felled woodland areas in southern part of wind farm site. 6-46

Plate 6-8 Regenerating bog and heath in areas of previously felled conifer. Areas of former open canopy forestry (LHS) and former closed canopy forestry (RHS) are regenerating at different rates. 6-105

Plate 6-9 Artificial lake located in footprint of a borrow pit that was used during the construction phase of the wind farm. 6-106

Plate 6-10 Recovery of peat slide area upslope of Barrage 1 in February 2004 (LHS) and October 2005 (RHS). 6-117

Plate 6-11 Recovery of peat slide area downslope of Barrage 1 between February 2004 (LHS) and October 2005 (RHS). 6-118

Plate 6-12 Recovery of peat slide area upslope of Black Road Bridge between February 2004 (LHS) and October 2005 (RHS). 6-120

Plate 6-13 Area between Black Road Bridge and Barrage 3 is dominated by mature conifer plantation. Deep peat deposits observed in this area in February 2004 (LHS) were removed by October 2005 (RHS). 6-121

Plate 6-14 North and upstream of Flaggy Bridge. Good recovery was noted here between October 2004 (LHS) and October 2005 (RHS). 6-121

Plate 6-15 Stream just south of Flaggy Bridge, immediately after peat slide (November 2003) and two years later (October 2005). 6-122

Plate 6-16 Ford crossings downstream of Flaggy Bridge (October 2005). Little evidence of disturbance from peat slide. 6-123

Plate 6-17 Discrete clumps of peat was the only evidence of past peat slide amongst the riparian habitat downstream of Flaggy Bridge in October 2005. 6-123

Plate 6-18 Series of photos showing recovery of habitat along peat slide area between 2005 (LHS) and 2018 (RHS). Following locations are illustrated: (a) peat slide area at wind farm site at Access Track / Barrage at T23-T70 (Grid Ref. E559396, N704396); (b) downslope of wind farm at Access Track / Barrage at T23-T70 (Grid Ref: E559433; N704355); (c) downslope of Barrage 1) (Grid Ref. E560277, 703918); (d) upslope of Barrage 2 (E560562, N703920); (e) upstream of Flaggy Bridge (Grid Ref. E561150, N702623). 6-126

Plate 6-19 Spread of self-seeded conifers in occurring in parts of site, including along road edges where slightly drier conditions exist – view is along southern road between T32 and T35, looking eastwards. April 2024. 6-151

Plate 7-1 Single (only) trout (1++) taken at O5A (SC7c) in September 2019 7-45

Plate 7-2 Waterfall [IFI Natural Bedrock Outcrop 2] ~300m downstream from Flaggy Bridge (Site O5, SC7b) – August 2018 7-45

Plate 7-3 View downstream though Forestry Culvert, downstream of Flaggy Bridge (30 August 2024) 7-46

Plate 7-4 OHL corridor – lowered ground under Moneypoint-Oldstreet 400kV OHL. View south from Poleset 28A 7-61

Plate 7-5 Fording Point (Site O7C) Owendalulleegh River 7-62

Plate 7-6 View downstream from Site OHL2A – heavily drained, depositing reach upstream of Lough Atorick 7-63

Plate 7-7 Stepping Stones (Tooraglassa Ford/ Site O7) - 30 August 2024 7-88

Plate 7-8 Site O5, Derrybrien North stream (SC7(b)) upstream of Flaggy Bridge (24 August 2024) 7-91

Plate 7-9 Site OHL2A – existing (collapsed) culvert viewed upstream with drained stream flowing to Lough Atorick in foreground 7-92

Plate 8-1: Excavation at Turbine T68 at the time of the slide 8-116

Plate 8-2: Aerial view of the head of the slide at Turbine T68 (October 2003) 8-116
Plate 8-3: Felled timber from an adjacent plantation stockpiled on the peat within the wind farm site near Turbine T6 in May 2017 (ESBI, 2017) 8-133
Plate 8-4: Typical peat repository during construction in 2004 8-135
Plate 8-5: Peat Repository near turbine T48 at the end of 2018 8-136
Plate 8-6: Peat Repository near turbine T48 at the end of 2024 8-136
Plate 8-7: Re-vegetated surface of peat repository site opposite Turbine T50 in January 2024 8-151
Plate 8-8 – Difco Bogmiser Peat Hopper extruding rows of peat sods 8-191
Plate 8-9 – Typical saw cutting attachment for mechanical peat harvesting 8-191
Plate 8-10 – Peat Failure in Turbary Plot #161 (Site Photo May 2020) 8-201
Plate 8-11 – Peat Movement in Turbary Plot #30 c2015-2018 (OSI Geohive Portal, 2020) 8-202
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 9-11
Plate 9-3 Typical drain installed during wind farm construction 9-42
Plate 9-4 Twin 600 mm pipes at crossing near T35 9-45
Plate 9-5 Location of T35 in relation to crossing point 9-46
Plate 14-1 Coillte Track to Wind Farm: Northbound (Captured November 2019 - Source: rEIAR July 2020) 14-6
Plate 14-2 Coillte Track to Turbary Lands: Eastbound (Captured September 2003 - Source: rEIAR July 2020) ... 14-7
Plate 14-3 Coillte Track to Turbary Lands: Eastbound (Captured November 2019 - Source: rEIAR July 2020) 14-7
Plate 14-4 Black Road circa (Captured August 2003 - Source: rEIAR July 2020) 14-8
Plate 14-5 Black Road: Northbound (Captured November 2019 - Source: rEIAR July 2020) 14-8
Plate 14-6 R353: Westbound (Captured November 2019 - Source: rEIAR July 2020) 14-9
Plate 14-7 R476: Northbound (Captured February 2020 - Source: rEIAR July 2020) 14-10
Plate 14-8 R460: Westbound (Captured February 2020 - Source: rEIAR July 2020) 14-10
Plate 14-9 N18 (now R458): Southbound (Captured November 2019 - Source: rEIAR July 2020) 14-11
Plate 14-10 M18: Southbound (Captured November 2019 - Source: rEIAR July 2020) 14-12
Plate 14-11 Unnamed Local Road A (Captured November 2019 - Source: rEIAR July 2020) 14-14
Plate 14-12 Coillte Track to Substation (Captured November 2019 - Source: rEIAR July 2020) 14-15
Plate 14-13 R353 Repair Works post Peat Slide (Source: rEIAR July 2020) 14-35

TABLE OF APPENDICES

Appendix 2-1: EIA Scoping Responses

Appendix 2-2: Leaflef Drop

Appendix 2-3: Information Boards from Public Consultation Event

Appendix 3-1: Assessment of Decommissioning Alternatives Report

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

Appendix 4-2: Project Lifecycle Report

Appendix 6-1: Historical Ecological Reports

Appendix 6-2: Details of Bat Detector Deployments and total number of Bat passes for 2016 and 2019.

Appendix 6-3: Bat Mitigation Report of The Bat Derogation Licence

Appendix 6-4: National Biodiversity Ireland Database Records for Rare, Protected and Invasive Flora and Fauna Species

Appendix 6-5: Photographs relating to Hen Harriers

Appendix 6-6: Hen Harrier Definition of Habitat and Behaviour Codes

Appendix 6-7: Derrybrien Wind Farm Vantage Point Watches (2022 and 2024)

Appendix 6-8: Transect Survey Results 2022-2024

Appendix 7-1: - Macroinvertebrate Data

Appendix 7-2: Lough Curtra Sediment Samples

Appendix 7-3: Water Chemistry Data

Appendix 7-4: Fisheries Data

Appendix 7-5: GCC Water Monitoring Data

Appendix 7-6: - WFD Assessment

Appendix 8-1: AGEC 2004 Reports on 2003 Landslide and Post-Landslide Appraisal[1]

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 OHL Route

Appendix 8-4: Peat Stability Risk Assessment (PSRA) for Turbary Plots on the wind farm site

Appendix 8-5: Geotechnical Stability Report 2– Peat slide and associated works

Appendix 8-6: Geotechnical Stability Report 3– Overhead line and substation impact assessment

[1] *A more detailed breakdown related to the Land, Soil, and Geology appendices is included on page no. xxxi below.*

Appendix 8-7: Geotechnical & Peat Stability Report – Derrybrien Wind Farm – Grid Connection and Ancillary Works

Appendix 9-1: Flood Risk Assessment

Appendix 9-2: Flooding Assessment of Derrybrien Windfarm Decommissioning on Turlough Flooding in Gort Lowlands Catchment

Appendix 10-1: Climate Legislation and Policy

Appendix 10-2: Carbon Calculations

Appendix 11-1: Calibration Certificate for Noise Monitor

Appendix 12-1: Archeological Survey of Ireland Records

Appendix 12-2: Site Photographs

Appendix 13-1: Photomantage Booklet

Appendix 13-2: Site Location Map

Appendix 13-3: Topographic Map (A3)

Appendix 13-4: EPA Corine Landcover Map - Study Area

Appendix 13-5: EPA Corine Landcover Map 2018 & Agannygal Substation

Appendix 13-6: Landscape Character Areas

Appendix 13-7: Landscape and Visual Designations

Appendix 13-8: Existing ZTV Map (A1)

Appendix 13-9: Viewpoint Map

Appendix 13-10: Cumulative ZTV

Appendix 14-1: June 2003 – March 2006 Activity Timeframes

NON-TECHNICAL SUMMARY

1. INTRODUCTION

This remedial Environmental Impact Assessment Report (rEIAR) has been prepared by MKO on behalf of Gort Windfarms Ltd (Gort WFL), as part of an application for substitute consent to retain in situ specific features of the existing Derrybrien Wind Farm Development as part of the proposed 'Derrybrien Windfarm Development Decommissioning Project'.

The proposed 'Derrybrien Windfarm 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**").

The rEIAR assesses the environmental impacts that have occurred and are likely to occur from the "Retained Development". This rEIAR accompanies the application made to An Bord Pleanála (ABP), under section 177E of the Planning and Development Act 2000, as amended ("the 2000 Act") for substitute consent in respect of the Retained Development. In addition, an application has also been made simultaneously, under section 37L for permission in respect of the Prospective Development (which application is accompanied by, *inter alia*, an Environmental Impact Assessment Report [EIAR]).

As stated above, this rEIAR accompanies the application for the Retained Development; planning permission for the Prospective Development will be applied for separately under section 37L of the 2000 Act. However, the potential significant effects of the Prospective Development have been assessed cumulatively with those of the Retained Development as part of this rEIAR. The Retained 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 Retained 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; in 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 substitute consent under section 177E, and the Board's consideration of this rEIAR (and the remedial Natura Impact Statement [rNIS] also submitted with that application), the Retained Development comprises the following:

- At-ground and below-ground structures, such as:
  - 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.
- 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.

- Offsite features constructed in response to the peat slide in 2003, including:

  - Barrage 1 and Coillte Access Track.
  - Barrage 2 and associated floating access track and Repository Area Barrage 3 and Repository Area/.
  - Barrage 4.
  - Repository Area at the Black Road Bridge.
  - Drainage Diversion Works.
  - Repair works to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C.

The area of the Retained Development, for which substitute consent is sought under section 177E is defined by the "red line" application boundary as illustrated on the drawings accompanying the section 177E application.

All elements of the Retained Development have been assessed as part of this rEIAR. The Retained Development is described in Chapter 4 of this rEIAR.

For the purposes of this rEIAR, 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

In 2019, the Court of Justice of the European Union found Ireland had not met its obligations under the Environmental Impact Assessment (EIA) Directive with regard to the Derrybrien Wind Farm. As a result, Galway County Council directed Gort Windfarms Ltd. to seek substitute consent for the Derrybrien Wind Farm development in July 2020.

An application for substitute consent was submitted in August 2020, but it was refused in February 2022 by An Bord Pleanála. Consequently, commercial electricity generation at the site ceased, and the project was set for decommissioning. The turbines have been maintained to ensure safety, but no further development or use of the Wind Farm has occurred.

In August 2024, Galway County Council issued an enforcement notice requiring the decommissioning of the wind farm. The decommissioning project is necessary to comply with this notice, regularize the planning status, and safely dismantle the unauthorized development. If not decommissioned, the site could become unsafe and pose risks to human health and the environment.

1.4 Environmental Impact Assessment

This rEIAR addresses the construction, operation and post decommissioning phases which forms the subject-matter of the substitute consent application for development, namely:

- At-ground and below-ground structures.
- Offsite features constructed in response to the peat slide in 2003.

The description of the works and activities carried out in the past is based on contemporaneous records. Where information is not available (for instance baseline information) or difficulties have been encountered these are recorded in individual rEIAR chapters under the heading "Difficulties Encountered". However, it is noted that information gaps identified in the rEIAR are not considered to be such as to affect the robust assessment of the environmental impacts of the Project.

As appropriate, the cumulative impact of the Project together with identified projects are addressed.

The vulnerability of the Project to risks of major accidents and/or disasters is considered in relation to effects on these factors.

1.4.1 Purpose and Scope of the EIAR

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

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

1.4.2 Structure and Content of the EIAR

1.4.2.1 General Structure

This rEIAR uses the grouped structure method to describe the existing environment, the potential effects of the Retained Development thereon and the proposed mitigation measures. Background information relating to the Retained Development, scoping and consultation undertaken and a description of the Retained Development are presented in separate sections. The grouped format sections describe the impacts of the Retained 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 rEIAR are as follows:

1. Introduction.
2. Context for the Retained Development.
3. Consideration of Reasonable Alternatives.
4. Description of the Retained 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. Interactions of the Foregoing.
17. Schedule of Mitigation Measures.

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

1.4.2.2 Content of the EIAR / Environmental Baseline

This rEIAR assesses the impacts on the environment resulting from the Retained Development as described in Chapter 4. The rEIAR assesses the construction, operation and retention of certain structures in situ post decommissioning.

For the purpose of assessments undertaken for the remedial EIAR, the baseline environment against which impacts have been assessed has been taken as that which existed prior to the original planning process. The baseline date for assessment of environmental effects in the rEIAR is the date when the environmental impact assessment should originally have been carried out and considered by the decision-maker.

The planning consents were granted in the period 1998-2001. Therefore, for the purposes of this rEIAR, the baseline environment against which assessment of environmental effects is made is that which existed in 1998, referred hereafter as the "baseline date". Where there are information gaps related to the baseline environment these are highlighted in the "Difficulties Encountered" section within individual topic chapters.

1.4.2.3 Description of Likely Significant Effects and Impacts

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).

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.

1.5 Difficulties Encountered

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

2. SCOPING AND CONSULTATION

Chapter 2 of the rEIAR 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 rEIAR 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 rEIAR.

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 rEIAR.

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 rEIAR.

3. 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

The alternatives for the Derrybrien Wind Farm Development Decommissioning Project focus on decommissioning the site, as electricity generation has ceased. The main objective is to remove structures and restore the site while minimizing environmental risks.

The assessment considered engineering feasibility, environmental impact, and land ownership, evaluating alternatives based on EIA topics like human health, biodiversity, and air quality. The alternatives were:

1. **Do-Nothing**: Leave all structures as they are.
2. **Remove All Development**: Remove all structures, including those from emergency works during the 2003 peat slide.
3. **Partial Removal**: Remove all structures except those from the 2003 emergency works.
4. **Practicable Restoration**: Remove above-ground structures, leaving foundations and underground features in place.

For Work Areas A (Derrybrien Wind Farm) and B (Derrybrien to Agannygal OHL), Alternative 4 was chosen to minimise environmental impact and risks. For Work Area C (offsite works from the peat slide), Alternative 1 was selected to avoid environmental disturbance.

4. DESCRIPTION OF THE PROJECT

This section of the remedial Environmental Impact Assessment Report (rEIAR) 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 177E of the Planning and Development Act 2000, as amended ("the 2000 Act") for substitute consent to retain certain at and below ground elements of the existing Derrybrien Wind Farm Development in situ ("the Retained Development").

In addition, the Project also comprises the development which is the subject of the application made to ABP for permission to decommission the Derrybrien Wind Farm Development, under section 37L of the 2000 Act ("the Prospective Development") (which application is accompanied by, inter alia, and Environmental Impact Assessment Report [EIAR]).

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 Development Decommissioning Project, including the "Prospective Development" and "Retained Development".

For the purposes of the application for substitute consent under section 177E, and the Board's consideration of this rEIAR (and the remedial Natura Impact Statement [rNIS] also submitted with that application), the Retained Development comprises the following:

- Derrybrien Windfarm including the Derrybrien 110kV Substation:
  - Reinforced concrete foundations for 70no. wind turbines.

- Reinforced concrete foundations of structures and buildings within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approx. 17.5km of access tracks and 70no. hardstand areas
- Underground Electrical and communications cabling.
- 3no. Borrow Pits / Quarries.
- Naturalised Peat Repository areas.
- Onsite Drainage Infrastructure.

- Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation:
  - Below ground element of 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.
- Off-site Features constructed in response to the peat slide:
  - Barrage 1 and Coillte Access Track.
  - Barrage 2, Access Track and Repository Area.
  - Barrage 3 and Repository Area.
  - Barrage 4.
  - Repository Area at the Black Road Bridge.
  - Minor repairs work to instream structures/bridges – at Black Road Bridge, Flaggy Bridge, Unnamed Bridge C and Crooked Bridge.
  - Minor borrow pits used to source material.
  - Drainage works.

Detailed descriptions of all elements of the Retained Development are provided in Chapter 4.

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.

The main components associated with the existing Derrybrien Wind Farm Development are described in the sections below, and include:

- Existing Derrybrien Wind Farm Development
- Existing Derrybrien-Agannygal 110kV Overhead Line

- Existing Agannygal Substation connecting into the Ennis-Shannonbridge 110kV Overhead Line and associated ancillary works
- Works undertaken in response to peat slide which occurred during construction of wind farm and associated ancillary works

4.1.1 The Existing Development at the Derrybrien Wind Farm

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: The site has 70 Vestas V52-850 kW turbines, each with a rotor diameter of 52m, a hub height of 49m, and an overall height of up to 75m. These turbines are smaller compared to modern ones. They are painted light grey with a matt finish and spaced 150m to 260m apart.

Derrybrien 110kV Substation: Underground cables converge at the Derrybrien 110kV Substation, transforming electricity from 20kV to 110kV for the national grid. The substation includes a fenced compound with outdoor electrical equipment and a single-storey control building with various facilities. It features remote monitoring equipment, a standby generator, external lighting, and a wastewater treatment system.

Anemometer Masts: There are two 49m high anemometer masts on site, monitoring wind speeds and turbine performance. These masts are supported by reinforced concrete foundations and equipped with anemometers, wind direction vanes, and other sensors. One mast also supports a mobile phone cell to improve site signal.

Third Party Mast: An existing telecoms mast, owned by Line Partnership, is located east of the site. It predates the wind farm and supports broadband, emergency services, and radio transmission. It is powered through the wind farm's electricity network.

Access Roads: Access to the site is via an upgraded 3.1 km Coillte forestry road, widened and strengthened for development. The site has a network of access tracks, including pre-existing forestry tracks and new tracks developed during construction.

Borrow Pits / Quarries: Three borrow pits were excavated for construction materials. Borrow Pit 1 provided rock, Borrow Pit 2 provided clay, and Borrow Pit 3 was the main source of rock fill. These pits are now closed, with BP3 flooded and BP2 and BP3 fenced off for safety.

Peat Excavation and Storage: Peat was excavated for turbine foundations and other areas, stored in repositories across the site. Recent surveys show these areas have naturally re-vegetated with blanket bog vegetation.

On-site Storage/Drainage and Signage: Spare turbine parts are stored in modular containers on site. A network of drainage channels manages surface water discharge. Information and directional signs are present, including emergency contact details and operational warnings.

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 began in June 2003 and continued until 2006. During this period, a significant incident occurred on October 16, 2003, when a peat slide happened during excavation for Turbine 68 near the southern boundary of the wind farm. This slide displaced peat and forest debris over an area of approximately 25 hectares, extending 1.65 km downslope to Black Road Bridge.

The debris from the slide moved down a stream valley and settled upstream of Black Road Bridge, with some peat being transported further down the Owendalulleegh River and deposited along the riverbanks. The peat slide area contained an estimated 450,000m^3 of peat, with 50-70% of the debris leaving the slide area. The remaining material included isolated rafts of peat and debris.

Over time, the bulk of the debris settled in Lough Cutra, with finer material eventually reaching Galway Bay. A site walkover by geotechnical specialists in 2019 showed little evidence of remaining peat debris along the banks, as it had eroded over time.

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 1,100m downslope from the peat slide head, with the closest turbine (T71) 770m away. Constructed of coarse fill on mineral soil, it reinstated forestry access across the peat slide area. A minor borrow pit was opened nearby for rock used in the barrage. The barrage is 94m long and 8m wide, with a 3m deep sump for drainage. An 830m access track was built from an existing Coillte forest track, with the western section constructed as a floating track on peat. Recent inspections show the barrage is stable, with no new debris accumulation.

Barrage 2 and Repository Area: Located 468m from Barrage 1, Barrage 2 was built shortly after the peat slide using boulders in an incised stream. It is 17m long and 20m wide. The adjacent repository area has two storage sections, with the southern section bunded. The total area is 3,700m², containing peat, silt, and sand removed post-slide. An overgrown 300m floating access track connects to Barrage 2. Recent inspections show stability and no signs of instability.

Barrage 3 and Repository Area: Barrage 3, over 1 km downstream from the source area, was constructed with boulders in an incised stream. It is 41m long and 9m wide, heavily vegetated, and founded on bedrock. The adjacent repository area is 600m², containing silt and sand removed post-slide. It is re-vegetated and stable.

Barrage 4: Located 300m downstream from Barrage 3, Barrage 4 was built with boulders in an incised stream. It is 25m long and 10m wide, founded on bedrock. Recent inspections show stability, with no new peat debris accumulation.

Repository Area at Black Road Bridge: The repository areas at Black Road Bridge contain stored peat and soil/rock debris from the peat slide, up to 2m high. The total area is 11,900m², heavily vegetated and partially bunded. Recent inspections show stability.

Drainage Diversion Works: Drains were constructed to stabilize peat debris and allow excess water to drain away. Natural flow paths have formed since the peat slide.

Repairs to Bridges: The peat slide damaged several bridges downstream. Repairs included replacing parapets at Black Road Bridge, repairing Flaggy Bridge on the R353, and reconstructing Unnamed Bridge C.

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 rEIAR) 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.

4.2.1 Components of the Derrybrien Wind Farm Development Decommissioning Project (Retained Development)

This section of the rEIAR describes the "Retained Development" associated with the Derrybrien Wind Farm Decommissioning Project that is the subject of this rEIAR. The features of the Retained Development, to remain *in situ in* perpetuity after the Prospective Development has been completed are listed below:

- **At-ground and below-ground structures/features associated with the Derrybrien Wind Farm Development, including**:

  Derrybrien Windfarm including the Derrybrien 110kV Substation
  - 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.

  Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation
  - 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.

- **Offsite development constructed in response to the peat slide in 2003, including**:
  - Barrage 1 and Coillte Access Track.
  - Barrage 2, Access Track and and Repository Area.
  - Barrage 3 and Repository Area.
  - Barrage 4.
  - Repository Area at the Black Road Bridge.
  - Drainage Diversion Works.
  - Repairs to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C andCrooked Bridge.

4.3 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 rEIAR includes a cumulative impact assessment where appropriate. The potential cumulative impact of the retained development and other relevant developments has been carried out with the purpose of identifying what likely significant effect the retained development has had, and will have on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed, and constructed projects in the vicinity of the Retained 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 Retained 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 Retained 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 Retained 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.

4.3.1 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts arising all phases of the Retained Development and for which all relevant data was reviewed include those listed below.

4.3.1.1 Derrybrien Windfarm Development Decommissioning Project Decommissioning Works (Prospective Development)

The proposed **'Derrybrien Windfarm 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").
- 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 rEIAR accompanies the application made to An Bord Pleanála, under section 177E of the Planning and Development Act 2000, as amended ("the 2000 Act") for substitute consent for the Retained Development. In addition, an application has been made simultaneously, under section 37L of the 2000 Act, for planning permission in respect of the Prospective Development (which application is accompanied by, *inter alia*, an Environmental Impact Assessment Report [EIAR]).

Thus, this rEIAR assesses the potential cumulative effects associated with the Prospective Development (which forms the subject-matter of the Section 37L planning application).

4.3.1.2 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 laithrein 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 laithrein 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.

4.3.1.3 Wind Farms in Slieve Aughty Mountains

Sonnagh Old Wind Farm: There is a second wind farm (Sonnagh Old Wind Farm) within the Slieve Aughty Mountains to the north of the Derrybrien Wind Farm site which was commissioned a year before Derrybrien Wind Farm (2004). This wind farm comprises 9 no. Vestas V52-850KW turbines (same turbine model as at Derrybrien Wind Farm) situated on high ground about 3.4 km north west of the Derrybrien wind farm.

The original permission for the wind farm was granted to Corr Na Gaoithe Teo on 16th October 2000 (GCC Reg. Ref. 00/3234) for a 10-turbine wind farm.

The main construction activity for Sonnagh Old Wind Farm Project coincided with construction activity for Derrybrien Wind Farm in 2003-2005.

Planning permission was granted to ESB for the 38kV overhead line grid connection from Loughrea 38kV Substation at Caherlavin to Sonnagh Old Wind Farm on 29th October 2001.

Keeldeery Wind Farm: Planning permission was granted by Galway County Council (Reg. Ref. 00/5248) and on appeal by An Bórd Pleanála (ABP -PL 07 125978) to Keelderry Windfarm Ltd. in July 2002 for a 48 x 1MW wind farm and associated works at Keeldeery approximately 3 km to the west of the Derrybrien wind farm site (in an unforested area of the Slieve Aughty Mountains). An extension of duration of planning permission until September 2011 was granted in September 2007 (Reg. Ref. 07/3345). Internal access roads were constructed circa 2007 but the rest of the development was never built.

4.3.1.4 Thermal Generation

Tynagh 400MW Power Station in the townland of Derryfrench County Galway at the site of Tynagh Mines was granted planning permission in 2003 (GCC Reg. Ref. 03/2943). The main construction activity for the Power Station took place in 2004-2006.

The Tynagh 220kV grid connection to the ESB Oldstreet to Cashla Line was granted planning permission in 2003 (GCC Reg. Ref. 04/1974). The main construction activity for the Power Station grid connection took place in 2004-2006.

4.3.1.5 Overhead Transmission Lines

Moneypoint - Oldstreet 400 kV Overhead Line (OHL): The OHL was developed prior to the development of the Derrybrien Wind Farm Project. The line was commissioned in 1984, is 102.5 km long, and runs from the Moneypoint substation in Kilrush, Co. Clare to the Oldstreet substation in Portumna, Co. Galway.

Planning permission for refurbishment works on the overhead line was granted by Clare County Council (CCC) (Reference 16/1011) in September 2017 and Galway County Council (GCC) (Reference 16/1747) in October 2017.

All structures on the OHL will be refurbished. The scheduled outage for this project was in February 2020. The works will continue periodically into 2021.

The Derrybrien-Agannygal 110kV line passes under the Moneypoint – Oldstreet 400kV line at co-ordinates Easting - 562119, Northing -700626.

Ennis - Shannonbridge 110kV Line: The Ennis - Shannonbridge line was installed in 1952 with some further structures installed in 1968.

The Derrybrien Wind Farm Project connected into this line. Specifically, the construction of Agannygal Substation for the Derrybrien Wind Farm Project resulted in the line being split into two circuits: Agannygal - Shannonbridge (Galway West) and Agannygal - Ennis (Galway West).

4.3.1.6 Gort Regional Water Supply Scheme

Prior to construction of the Derrybrien Wind Farm Project up to the present time, the public water supply for the Gort region was supplied from the Gort Regional Water Supply Scheme which is sourced from the Gort/Cannahowna River within the Owendaluleegh River System. The water treatment plant is located in the townland of Rindifin to the east of Gort. It is envisaged that the Gort/Cannahowna River water supply source will continue to be used for the foreseeable future.[1]

4.3.1.7 Flood Relief Schemes

Local OPW Flood Relief Scheme Gort: In 1997, prior to the development of the Derrybrien Wind Farm Project, the OPW completed a local flood relief scheme in Gort to combat potential serious winter flooding events (such as had occurred in 1994).

Local Flood Relief Works at Kiltartan: Permanent remedial works constructed at Kiltartan in 2011-2012 by Galway County Council to combat potential serious winter flooding events (such as had occurred in November 2009).

Flood Relief Works at Kinvarra: Temporary flood relief works were undertaken at Kinvarra in December 2015 during flood event.

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.

4.3.1.8 M18 Motorway Project

The M18 motorway project was planned and constructed after the Derrybrien Wind Farm Project was developed. Construction of the motorway between Oranmore and Gort as part of the overall Gort to Tuam scheme was carried out between January 2015 and September 2017. This resulted in the N18 being retained as the R458 regional road while the newly constructed M18 became the primary route between Galway and Limerick.

4.3.1.9 Quarries/Sand extraction

Sand extraction at Cloghvoley: Planning permission was granted for a sand extraction site (GCC Ref. Ref. 08/1664) located at Cloghvoley to the south-east of the Project in May 2008 after the Derrybrien Wind Farm Project was developed.

Coillte Quarry: There is a Coillte quarry just east of the junction between the R353 and the Black Road, to the south-east of the Derrybrien wind farm site. The quarry is registered under Section 261 of the Planning and Development Act 2000 (as amended) ((ref QRY62).Documents in relation to quarry registration were submitted to GCC in April 2005 by Coillte. It's a relatively small (1.8 ha aggregate quarry with an extraction area of 1.3 Ha), the aggregate being used for forest road repairs.

Ballynakill Quarry: Ballinakill Quarry is operated by Ballinakill Quarries Ltd at Cregg on the R353. The quarry is registered under Section 261 of the Planning and Development Act 2000 (as amended) ((ref QY 6). In October 2013, An Bórd Pleanála granted a substitute consent for works and operations undertaken prior to August 2012 (Ref. 07.SU0038). Planning permission was granted in December 2018 for the quarry extension (GCC Ref:18/687).

[1] *Galway County Development Plan 2015 – 2021*

4.3.1.10 Works to Beagh Bridge

The privately owned four-span Beagh Bridge at the outlet of Lough Cutra which provides access to a private house and farm was structurally assessed by ESBI in August 2004. This followed on from the temporary installation of straw filter barriers on the upstream face of the bridge in the aftermath of the peat slide to capture and filter any suspended sediment that may have transported from the landslide area. Deterioration of the bridge identified comprised corrosion of deck slab reinforcement bars, some cracks in pier wall and some scouring at base of two of the three intermediate piers. It was noted by ESBI engineers at the time that the installation of straw filter barriers could not have caused or contributed to the corrosion in deck or cracks in pier wall. ESBI recommended in their assessment report that river flow be diverted away from these piers during the repair works to the pier bases. The recommended works were undertaken in January 2005.

4.3.2 Adjacent Land Uses

4.3.2.1 Forestry and Turf Cutting

Forestry: 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 4-4.

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 4-5 shows considerable areas of cutover bog but a considerable distance from the project and largely separated from the site by forestry.

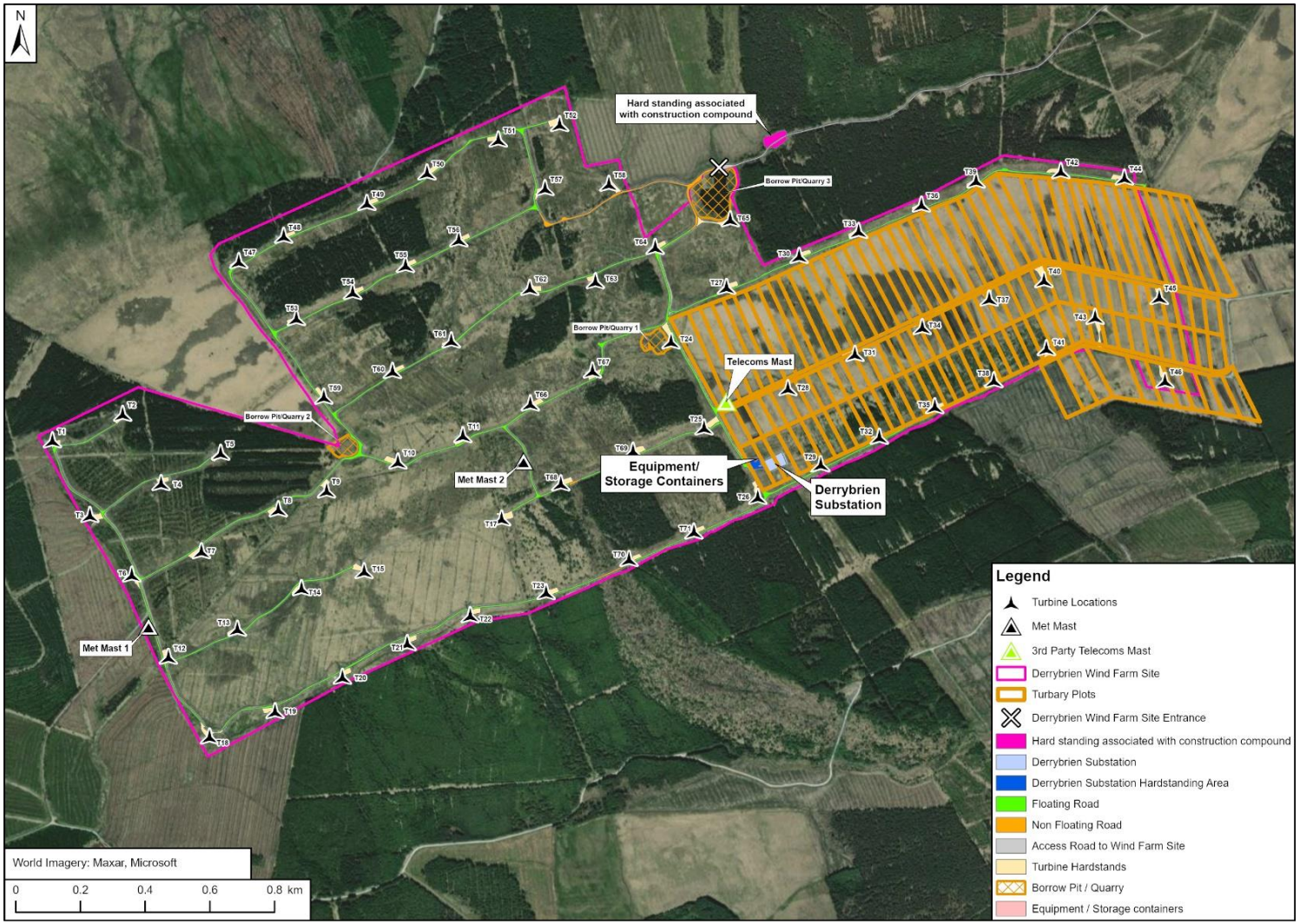


Figure 4-1 Location of Turbary within and immediately adjacent to wind farm

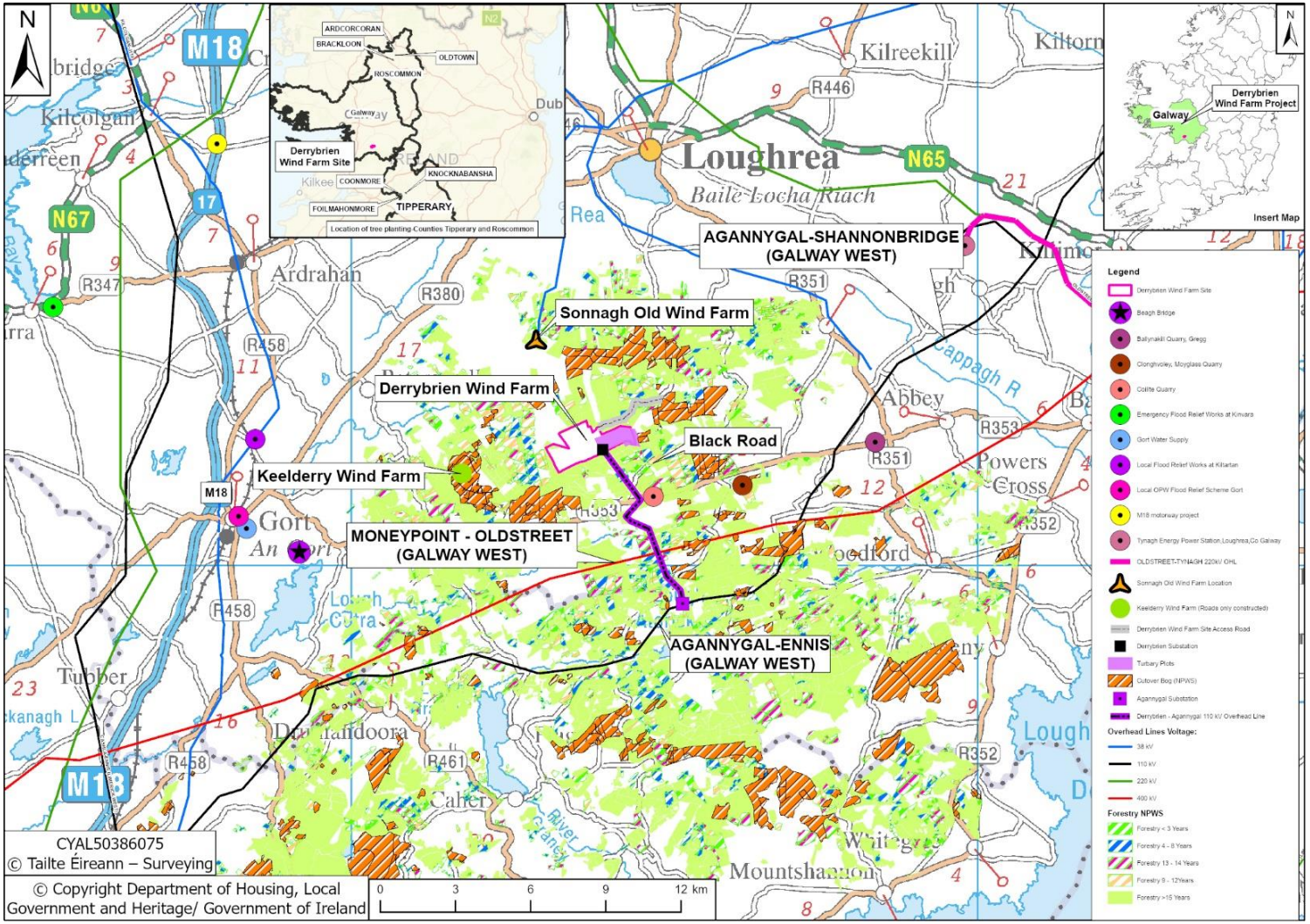


Figure 4-2 Location of Projects/Activities considered

4.3.2.2 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 proposed development is presented and assessed in Chapter 6 of this rEIAR and, in the case of European sites, in the Appropriate Assessment Screening Report (AASR) and Remedial Natura Impact Statement (rNIS) submitted with the application for substitute consent.

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 Retained Development is presented and assessed in Chapter 12 of this rEIAR.

5. POPULATION AND HUMAN HEALTH

5.1 The baseline

Chapter 5 of this remedial Environmental Impact Assessment Report (rEIAR) identifies, describes, and assesses the potential effects of the Retained Development associated with the "Derrybrien Windfarm Development Decommissioning Project" on population and human health. The assessment has been completed in accordance with the EIA guidance and legislation set out in Chapter 1: Introduction.

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 (as varied), 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 historic reports, records and Census data which cover the relevant time periods relating to the baseline year (1998), the construction period 2003 to 2006, the operational period 2007 to 2022 to varying degrees, and the non-operational period 2022 to 2024; the Census of Agriculture 2020; and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town and District Electoral Division (ED) level (where possible).

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 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). The existing Derrybrien Wind Farm site is located within the townlands of Coppanagh, Boleyneendorrish, Kilbeg, Toormacnevin, Funshadaun, Bohaboy, Derrybrien North and Derrybrien West. Please refer to Figure 1-1 of Chapter 1: Introduction, for the site location.

In order to assess the population in the vicinity of the Retained Development, the Population Study Area for the Population section of this rEIAR was defined in terms of the Electoral Divisions (EDs) where the Retained Development is located, and where relevant, nearby EDs which may be affected by the Retained Development. The Retained Development lies predominantly within Derrylaur and Aille EDs, while also lying partly in the adjacent EDs of Kilthomas, Castleboy, Mountain and Loughatorick

/Marblehill. It should be noted that the population of Loughatorick is so low that it is combined with Marblehill for statistical purposes. These six EDs therefore comprise the Study Area for the Population section of this rEIAR. The Study Area had a population of 1,655 persons, as of 1996 and comprised a total land area of 232km^2 (Source: CSO Census of the Population 2022). In 2016, the Study Area had a population of 1,866 persons. The study area is shown in Figure 5-1.

There are 11 no. private residential dwellings within 500m of the Retained Development. 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 rEIAR.

5.2 Impacts of the Development

Effects on human beings during the construction, operational, and ceased operational phases of the Project, as well as the effects of the Retained Development are described in Chapter 5 in terms of population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, noise and health and safety. Where a negative impact has been identified, appropriate mitigation measures have been put in place to ensure that there was no significant health effects on sensitive receptors in the surrounding area.

The features of the Retained Development, to remain *in situ in* perpetuity after the Prospective Development has been completed will not result in any impacts on population and human health.

5.3 Conclusion

Following consideration of the Residual Impact (post-mitigation), overall, it is noted that the Project has not resulted in any significant, long-term effects on Human Beings. The features of the Retained Development, to remain in situ in perpetuity after the Prospective Development has been completed will not result in any effects on population and human health.

6. BIODIVERSITY

6.1 The baseline

The baseline environment of the Project area was determined following a desk study and extensive field surveys undertaken between 2003 and 2024. The approach to the work has taken account of industry standard guidance for the survey and assessment of impacts of wind farms.

6.1.1 Terrestrial Habitats

Habitat surveys have been on-going in the Project area since 2003. Terrestrial habitats occurring within the Project area are described and evaluated based on standard guidelines. The dominant habitats present include conifer plantation (representing different stages of forest cycle) and a variety of upland peatland habitats including remnant blanket bog and cutover bog. Terrestrial habitats range in importance from 'local importance, lower value' to 'local importance, higher value'. No rare or protected plant species were recorded from the habitats within the area.

6.1.2 Birds

Surveys for hen harriers and other bird species have been carried out in the years 2004, 2006, 2007, 2009, 2011, 2015, 2018, 2019, 2020 and 2024/25 and comprised vantage point surveys within the wind farm and hinterland surveys (to circa 5 km of the wind farm site). At no time since monitoring commenced in 2004 have hen harriers been 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 the wind farm in each of the survey years.

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 was recorded on or over the site on four occasions between October 2019 and February 2020.

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.

6.1.3 Bats

Bat survey work was undertaken in 2011, 2016, 2020 and 2021. Survey has included the deployment of static detectors at turbine locations, driven bat transects, (dog) searches for bat carcasses beneath turbines and emergence/re-entry surveys at the substation buildings and Barrage No. 3. In 2020 and 2021, the highest activity was recorded for common pipistrelle, Leisler's bat and soprano pipistrelle. No bat fatalities were recorded. In 2022 and 2023, bat inspections at the 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.

6.1.4 Mammals (other than bats)

6.1.4.1 European Otter

During the survey of the Owendalulleegh River undertaken by the SRFB and Inis Environmental Services (2004b) in December 2003, following the peat slide which occurred in October 2003, otter signs were recorded at a number of locations along the Owendalulleegh River. The survey commenced at Flaggy Bridge and continued along the length of the river to Lough Cutra. Otter tracks were recorded on the tributary below Flaggy Bridge (within sub-catchment SC7(d) as shown on Figure 7.3 Chapter 7). Within the SC7(d) tributary, signs were noted within a 600 m stretch upstream of the confluence with the main channel of the Owendalulleegh River. Downstream of the confluence otter tracks were noted at several locations over the next 6.6 km along the main channel of the river.

No signs of otter were recorded during the survey of the wind farm site undertaken on 20th July 2018. In August 2018 four sprainting sites were noted on the Flaggy Bridge tributary, the most upstream 300 m downstream of Flaggy Bridge and the most downstream 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 at the wind farm site. While the latter observations were mainly incidental, it is clear that otter use all of the main channels of the 3 main catchments and likely also use substantial proportions of all of the side tributaries for feeding and marking.

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.

Otter likely use the main river channels of the three river catchments within the Zone of Influence of the project (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

6.1.4.2 Other mammals

According to the NBDC database, there are records of the following protected mammal species within the 10 km squares M50, M60 and R69 occupied by the project: badger (*Meles meles*), hedgehog (*Erinaceus europaeus*), pine marten (*Martes martes*), pygmy shrew (*Sorex minutus*) and red squirrel (*Sciurus vulgaris*).

Pine marten was recorded at the wind farm site in July 2020 and August 2022. 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).

6.2 Impacts of the Development

Construction phase impacts (2003-2006) included habitat loss in the footprint of the development, this is considered a minor negative effect that has had no significant effect. This conclusion takes account of the overall extent of habitat loss and the relatively low value of the affected habitats. Potential indirect impacts associated with construction were considered to relate to the hydrological alteration of habitats. Those habitats of most sensitivity to hydrological change remained unaffected as they were avoided and sufficiently removed from site infrastructure. Localised drainage effects are considered to have had a minor long-term impact (no significant effect) on the cutover bog habitat. Disturbance of low value habitat in the path of the peat slide area lead to a direct moderate negative impact ranging from short term to medium term duration.

Operational phase impacts (2006-2022) were associated with maintaining site infrastructure and tree management in previously felled areas. Occasional cutting back of re-growth of trees within the felled forestry was deemed a minor positive impact of long-term duration as the resultant open habitat is of

higher biodiversity value than a closed canopy conifer plantation that would otherwise have established in the area. This is considered a significant positive effect.

There are no residual negative significant effects on terrestrial habitats following the ceased operation phase of the of the wind farm project (2022-Present).

There are no residual negative significant effects on terrestrial biodiversity following the retained development.

6.3 Conclusion

6.3.1 Terrestrial Habitats

No residual significant adverse effects on terrestrial habitats have been identified from construction, operation and decommissioning of the Derrybrien Wind Farm Development.

6.3.2 Birds

The residual impact on birds by the retention of the various features (as discussed) compared to the baseline situation in 1998 varies from negative slight effect and of permanent duration to positive moderate effect of and of permanent duration, with most of the effects rated as neutral. However, none of the effects are rated as significant (according to EPA Guidelines 2022).

While, the retention of the various features is expected to contribute to a cumulative effect on birds as a result of loss of peatland habitat of value for birds when considered with forestry and peat cutting activities within and around the site, this has not been identified as significant.

6.3.3 Bats

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on any bat species in the project area. Therefore, no mitigation is proposed and there is no cumulative effect. The Retained Development will result in no significant effects on any bat species in the project area.

6.3.4 Mammals (other than bats)

6.3.4.1 European Otter

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on otter in the project area. Therefore, no mitigation is proposed and there is no cumulative effect.

The Retained Development will result in no significant effects on otter in the project area.

6.3.4.2 Other mammals

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on any other mammal population in the project area. Therefore, no mitigation is proposed and there is no cumulative effect.

The Retained Development will result in no significant effects on any other mammal population in the project area.

7. AQUATIC ECOLOGY AND FISHERIES

This chapter contains the environmental impact assessment for the Retained Development as relates to aquatic ecology and fisheries. It provides statements of the likely significant effects (if any) on the aquatic environment that: (i) have occurred, (ii) are occurring, or (iii) could reasonably be expected to occur, by reason of the development having already been carried out, as well as likely significant effects (if any) of the proposed Prospective Development with the Retained Development.

7.1 The baseline

The baseline period for the Retained Development is 1998-2001, i.e., prior to the original wind farm construction. Owing to a lack of substantial baseline information in the original EIS, data from this period was compiled to set benchmarks for retrospective and future assessments. This data, primarily from the EPA, included biological water quality monitoring for principal river catchments and limited water chemistry data for Lough Cutra and the Owendalulleegh River. Repeated project-specific field surveys from 2011 to 2024, including electrofishing, macroinvertebrate sampling (Q-value), water chemistry sampling and surveys in Lough Cutra, along with ongoing EPA and IFI WFD river monitoring data, helped define probable pre-construction baseline conditions.

7.1.1 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.

7.1.2 Biological Water Quality Baseline (1998-2001)

The EPA have river monitoring stations with data reported in 1996, 1997, 1999 and 2000 from main channel sites on the three main receiving river systems (Owendalulleegh, Boleyneendorrish, Duniry) and one small tributary of the Owendalulleegh in proximity to the wind farm site. The latter site was useful to infer baseline conditions of the numerous small headwater tributaries that drain the wind farm. These sites have been sampled regularly up until recent times as part of Water Framework Directive (WFD) reporting obligations. In the pre-construction period (1996-2000), each of the monitored main channel sites downstream of the wind farm and the OHL returned high status results (Q4-5 or Q5), i.e., “unpolluted”, virtually pristine biological water quality conditions indicative of low levels of nutrient. Further afield, the first site downstream of Lough Cutra was at good status (Q4), noting that this site is also influenced by the wider catchment area surrounding the lake.

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. Project-specific water chemistry sampling conducted at numerous sites, repeatedly at some 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 which was apparently linked to, e.g., antecedent forestry activity disturbance upstream. What this points to is that the upper tributary sites were likely to be predominantly high status in the baseline period, with some localised departures from high status depending on the extent of (at that stage well established) forestry activity and potentially turbary activity (i.e., both unrelated to the wind farm development) either during or 1-2 years prior to the baseline period.

The small tributary draining to Lough Atorick at the southern end of the OHL including Agannygal Substation had no 1998-2001 baseline EPA data available, but for the purposes of this assessment, based on field sampling conducted in 2019 and 2022, it is assumed to also have been at high status in the baseline period.

For the purposes of this rEIAR, therefore, all main channel sites draining the wind farm and the majority of the OHL were proven by historical EPA data to be at high status, and it was further assumed that the smaller headwater streams in question (i.e., not monitored by the EPA), including the OHL and Agannygal Substation drainage tributary, were also primarily at high status (Q4-5, Q5) at the outset of the construction of the wind farm, which may not have been the case for some of the upper tributary sites, for reasons explained above.

7.1.3 Fisheries Baseline (1998 – 2001)

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.

There were no 1998-2001 baseline fisheries data available for the three catchments draining the wind farm site. 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. Electrofishing surveys between 1992 and 1996 on the Bleach River draining from Lough Atorick returned trout densities very much within the range typical of sites electrofished in the Owendalulleegh and Boleyneendorrish for the present study. In addition, project-specific electrofishing (2011-2022) showed densities of fish encountered at sites upstream of the wind farm drainage influence, including the tributary impacted by the peat slide (SC7), were at least as high as those at sites downstream of the SC7 confluence. Given the high-quality habitat and excellent water quality in the Owendalulleegh, this suggests that the currently recorded fish diversity and densities are likely to reflect those that were present at baseline.

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 at very low densities. Given the long-standing high status water quality record on the Boleyneendoorish and very good salmonid habitats, it is reasonable to say that the pre-construction fish population (1998-2001) was similarly brown trout dominated, likely at similarly low densities to those recorded in project-specific surveys, indicative of naturally low productivity. Electrofishing in the Duniry (2011-2022) showed moderate juvenile trout density about 4km downstream of the wind farm, but only minnow nearest to the wind farm (2.4km downstream). Habitat observations in the upper Duniry, with extensive bedrock substrates, would tend to preclude salmonid spawning. Thus, at baseline the upper Duniry headwaters would not have been sensitive fisheries habitat, but with gradual downstream increase in sensitivity as gradient and substrates become more conducive to trout recruitment.

7.1.4 Lough Cutra Baseline

Very little baseline water quality or fisheries data was available for Lough Cutra. One EPA water sample taken in 2001, showing the lake was pH neutral to slightly alkaline and the water highly coloured. Chlorophyll a and Total P levels in 2001 placed the lake in the oligotrophic category based on maximum chlorophyll a, however, a single result is insufficient on which to gauge trophic status. The EPA began to systematically monitor the WFD status of Lough Cutra including biological and physico-chemical elements in 2010 and have continued annually each year since. Annual average data examined for 2010-2019 shows a similar picture to 2001, although the lake would tend to be in the mesotrophic category going by maximum chlorophyll a concentration and based on more regular annual sampling. WFD ecological status in Lough Cutra is assessed by the EPA and to date four periods have been reported i.e. 2010-2012 (Good Status), 2010-2015 (Moderate Status), 2013 – 2018 (Good Status) and 2016-2021 (Good Status). It is reasonable to assume that baseline status was within the good status classification. No fisheries data is available for Lough Cutra, but anecdotal evidence suggests that trout, pike, and eel were present in the baseline situation.

7.2 Impacts of the Development

Impacts on aquatic ecology and fisheries were assessed for the following phases of the project:

- Impacts that have occurred:
  - Construction Phase (2003-2006).
  - Operation and Maintenance Phase (2006-2022).
- Impacts that are occurring:
  - Ceased Operations Phase (2022-Present).
- Impacts that are likely to occur:
  - Decommissioning Phase ('Prospective Development').
  - Post-Decommissioning Phase ('Retained Development').

7.2.1 Construction Phase Impacts (2003-2006)

This section summarises the two main components of the construction phase impact assessment: (1) Impacts relating to the 2003 peat slide and its mitigation between 2003 and 2005, and (2) Impacts relating to all other construction phase activity for the wind farm, OHL and Agannygal Substation between 2003 and 2006.

7.2.1.1 Impact of Peat Slide:

The peat slide originated on the wind farm site on 16th October 2003 during construction of turbine T68 foundations at the head of the SC7(b) sub-catchment. Compounded by subsequent heavy rainfall, peat mass flowed down the SC7(b) via SC7(d) sub-catchment (past Black Road Bridge and Flaggy Bridge) to meet the main channel of the Owendalulleegh River which then flows approximately 19 km to Lough Cutra.

The impact of the peat slide on any fish population in the immediately affected tributary basins SC7(b) and SC7(d), was very severe with the resident population eliminated by the sheer mechanical force of the peat slurry, noting that the best habitat for fish would always have been in the lower half of this tributary (i.e., sub catchment SC7(d)) from a point about halfway between Flaggy Bridge and the Owendalulleegh confluence. This is because the natural channel gradient flattens out, improving gravel deposition for spawning compared to the steeper, more bedrock dominated reaches higher in the catchment, certainly from Flaggy Bridge upstream. It is likely that a full recovery in these lower reaches of the SC7(d) tributary took at least 3 to 5 years (for trout and stone loach) and perhaps up to 6-7 years for brook lamprey to recover. The overall effect can be classified as **profound, negative and short-term** locally in the Derrybrien North tributary affecting SC7(b) and SC7(d). It is important to note, however, that without pre-construction fish surveys, and given the presence of natural fish passage barriers (rock outcrops and a forestry culvert) in the SC7 sub catchment, it is not known the extent to which trout were present prior to the peat slide within the SC7(b) sub catchment upstream of Flaggy Bridge.

The large influx of peat and woody debris also resulted in a large fish kill on the main channel of the Owendalulleegh River with trout, stone loach, lamprey, eel, gudgeon and perch included in the mortalities, the two latter species only known from the lower reaches of the river. The impact of the peat slide on fish in the Owendalulleegh River, downstream of the confluence of the SC7 sub catchment, is classified as **significant to very significant, negative and short-term**, likely taking at least 3-5 years to fully reverse for trout and stone loach, and up to 6-7 years for brook lamprey. The range of possible impact levels suggested here for the fisheries impact stems from the paucity of quantitative information on the extent of the original fish kill on the main channel and the possibility that more fish survived in the lower reaches than was believed at the time.

In terms of ecological status and biological water quality of streams and rivers, the peat slide wiped out macroinvertebrate fauna of the entire channel of sub catchments SC7(b) and SC7(d) and the first 1-2 km downstream from the confluence of SC7(d) with the main channel of the Owendalulleegh at least as far as Tooraglassa Ford, with the effects then diminishing in severity with downstream distance, as reported by the EPA in surveys following the event. Macroinvertebrate faunal assemblage underpins the Q-value and WFD ecological status classification, and the effect was therefore a drop from high status (Q4-5) down to bad status (Q2) as recorded by the EPA on the Owendalulleegh main channel at Tooraglassa Ford one month after the peat slide event. This represents a **profound negative** effect along the Derrybrien North tributary (SC7(b) and SC7(d)) and at least the first 1 km of the Owendalulleegh downstream of the SC7 confluence. Over the adjoining 5.7 km downstream on the Owendalulleegh, EPA assigned Q-value dropped from high status (Q5) to moderate status (Q3-4) which can be described as a **very significant negative** effect. In the next 7.2km downstream (to a point 1.5km upstream of Lough Cutra), the Q-rating fell from high status (Q5 and Q4-5) to good status (Q4), which can be described as a **significant to moderate negative** effect. These impacts occurred along a ~19 km stretch of a large 4th order river which had previously always been rated as high status (Q4-5 / Q5). However, we know that these impacts were of **short-term** duration and therefore **reversible** because EPA monitoring in 2006 showed all Owendalulleegh main channel sites were back up to high status (Q4-5) except for Tooraglassa Ford (nearest to SC7 confluence) which remained at good status (Q4) in 2006, retuning to high status by 2009 and thereafter. The EPA record shows high status (Q4-5 / Q5) has been maintained at all sites on the Owendalulleegh River main channel from 2009 through until most recent survey in 2022.

Various remedial works to control peat mobilisation down the Derrybrien North tributary occurred immediately after the event through until autumn 2005, including installation of barrages, remedial drainage, peat excavation, peat repository formation and bridge works. The likelihood is that these activities would have mobilised appreciable amounts of peat solids at the time, which would have washed down into the system at SC7(b) after heavy rainfall. The early measures would have had no impact over the profound impact of the peat slide itself. In 2005, removal of temporary barrages, peat excavation and repository formation is likely to have remobilised some peat silt which may have delayed recovery in the SC7(b) and SC7(d) sub catchments which can be described as a temporary moderate negative impact. Effects on fisheries would have been expected to have been very slight to moderate, negative and temporary, if peat silt lodged in spawning gravels in the lower reaches of SC7(d) and in the upper sections of the main channel of the Owendalulleegh downstream of the confluence of SC7, thereby reducing hatching success or fry swim-up. If such an effect occurred, and it may not have owing to measures employed to reduce peat washout during the remedial works, it's likely to have only affected a small number of redds as the volumes of escaped peat would have been relatively minor and much lower than that mobilised at the time of the main slide in 2003.

The flux of the finer fractions of the peat slide would have deposited in littoral and open water areas within Lough Cutra following the event with the main pulse arriving in the first few floods, thereafter, diminishing with time. Straw bales were placed across the lake outlet shortly after the peat slide confirming silt reached the outflow river early in the event. Much of the material was probably delivered to the lake within a short timescale, with residual amounts taking longer to flush out of the Owendalulleegh. There appeared to be some evidence of an effect of the peat slide in the lake chemistry data for Total-P and to a lesser extent for chlorophyll a for up to three years after the slide. This may have caused localised reductions in diversity and biomass of benthic macroinvertebrates in both littoral and open water areas wherever deposits were thick. The fact that the event occurred late in the year, just before the main winter rains, potentially meant much of the peat would have flushed out of the lake by the following spring and early summer when macroinvertebrates would begin to reproduce and when annual macrophyte, phytoplankton and zooplankton growth/blooms would help drive biological activity within the system again. It wasn't possible to measure the level of these impacts on the fish population via food-chain effects, as very little fish population density data is available from before or after the event from Lough Cutra. However, given the late seasonal occurrence of the event, it is likely that impacts on benthic invertebrate biomass were minor, and that subsequent (2004) annual spring/summer coarse fish spawning season would not have been disrupted. This suggests that the impact on Lough Cutra fisheries can be classified as **neutral or slight negative** of **short-term** duration at worst.

7.2.1.2 Impact of Construction Phase other than Peat Slide affected areas:

The combined effect of forestry felling, road construction, cable trenching, drain digging, peat repositories and all other on-site construction activities between 2003 and 2006 is likely to have resulted in a **moderate negative but temporary to short-term reversible** impact on water quality and biological water quality –evident in the small streams draining from the wind farm, the OHL and Agannygal Substation. This impact would have taken the form of increases in nutrients (phosphorus, ammonia), suspended solids wash out and consequent reduction in the Q-rating from High (Q4-5) to Good (Q4) or Moderate (Q3- 4), mainly, and occasionally to Moderate bordering on Poor, (Q3-4/Q3), the latter in those small upper catchments in which most clearfelling took place, i.e., associated with harvesting related nutrient and suspended solids release. Despite these predicted localised impacts in the smaller tributaries, there was demonstrably **neutral** impact on main channel sites of Boleyneendoorish River, with the EPA record demonstrating maintenance of high status (Q4-5, Q5) following construction and thereafter.

The EPA Q-value record for Duniry River showed a decline from high status (Q4-5) in 2003, down to good status (Q4) by 2006, generally continuing at good status thereafter. It would seem to be extremely

unlikely that the wind farm gave rise to the decline given the very small proportion of the wind farm site draining to the Duniry catchment, in comparison to the large area of intervening, highly afforested catchment and the length of channel (6 km) between the survey site and the wind farm boundary.

The primary source of impact on water quality and aquatic ecology for installation of 7.8 km OHL and Agannygal Substation is considered to have been forestry felling. The vast majority of the OHL drainage is to the Owendalulleegh catchment, while a tiny fraction drains towards Lough Atorick in the Bleach River catchment to the south. The effect of felling and installation of the OHL route in the SC7 catchment cannot be separated from the effects of the peat slide. Felling of the section of the OHL corridor draining to a small tributary of the Owendalulleegh south of the main channel could have given rise to a slight negative but temporary, reversible impact on water quality, i.e. temporary decline from Q4-5 to Q4, but this channel only comes close to the corridor in a few limited places, and it is probable that this effect might not have occurred. No negative effect would have occurred in the main channel of the Owendalulleegh below the confluence of this small stream.

Impacts in the small stream draining towards Lough Atorick would have included temporary increases in suspended solids concentrations, at worst resulting in a reduction in biomass of macroinvertebrates possibly causing temporary reduction from High to Good water quality status, although this may not have occurred. Had it occurred, this can be described as a localised, slight negative effect of temporary/short-term duration. Overall, the construction of the substation and its associated access track are thought to have had at most a slight negative effect on fisheries in the small channel draining south towards Liugh Atorick, which had it occurred would have taken the form of a slight reduction in egg and or fry survival and not persisted for more than one or two seasons.

Overall, outside of the sub catchments affected by the peat slide (SC7(b) and SC7(d) plus Owendalulleegh main channel downstream of SC7 confluence), the impact of the construction phase of the wind farm site on water quality, macroinvertebrates and fish can be categorised and between **neutral and (at worst) slight-to-moderate negative of temporary to short term** duration, locally within headwater tributaries. The impact on the main channels of Boleyneendoorish and Duniry was **neutral**.

7.2.2 Operation and Maintenance Phase Impacts (2006-2022)

At the outset, it is important to note that the EPA river monitoring record shows no change in ecological status in the downstream main channel receiving waters of Owendaluleegh, Bolyneendoorish and Duniry during the operation phase. Following the construction phase, the Owendaluleegh and Bolyneendoorish attained and have maintained high status waters (Q4-5/Q5). The Duniry has maintained good status (Q4) throughout the operation phase. Each of these river water bodies meets its WFD objective throughout the wind farm operation phase.

The following activities occurred during the operation phase: Onsite road upgrade and maintenance (2014); Onsite drain cleaning (periodic); Onsite tree growth cut back onsite and along the OHL (mainly 2018); Turbulence felling (2016, 2017, 2018). These activities occurred in the presence of silt loss control measures, and in the case of turbulence felling, with the implementation of water protection measures required during harvesting operations. Project specific surveys (2011 to 2022) showed occasional records of drops in Q-value and elevated nutrient in small streams draining the wind farm and OHL but there was no clear evidence that these occurrences were related specifically to the wind farm maintenance activities. The only exception to this was turbulence felling (2016-2018) which occurred across four sub catchments draining western and southern parts of the wind farm site (SC1, SC7(c), SC8 and SC9).The field survey record (2011-2022) showed that turbulence felling probably did give rise to an increase in nutrient runoff (as SRP primarily) from the felling plots to small tributaries, but had at worst only slight negative and temporary effects on macroinvertebrate diversity i.e., causing temporary decline in ecological status and hence Q-rating at sites within the small sub catchments in question,

though having no negative impact effect on main channel ecological status or river water body status, which remained high status (Owendalulleegh and Boleyneendoorish).

Overall, the operation phase impact on water quality and fisheries can be described as between neutral and slight to moderate, negative and temporary or short-term in small tributaries. However, this did not translate to any declines in Q-value or ecological status in the downstream main channel receiving waters of Owendaluleegh, Bolyneendoorish and Duniry.

7.2.3 Ceased Operations Phase Impacts (2022-Present)

Currently no aspect of the ceased operation of the wind farm, the OHL line or the Agannygal Substation is known to be giving rise to, nor has potential to cause, any negative effects on surface water quality, aquatic habitats or fisheries. There have been no changes to recorded high ecological status (Q5/Q4-5) of the main rivers draining the site (Owendalulleegh and Boleyneendoorish) between 2021 (EPA river monitoring data) and 2024 (project specific survey data).

7.2.4 Post-Decommissioning Phase Impacts ('Retained Development')

This section summarises the two main components of the Retained Development impact assessment: (1) Impacts relating retention in-situ, in perpetuity of at and below ground elements of wind farm, substations and OHL, and (2) Impacts relating to retention of off-site elements associated with the response to the 2003 peat slide.

7.2.4.1 Impact of retained elements of wind farm, substations and OHL

Once the Prospective Development is complete (decommissioning of above ground structures) remaining elements of the Project will be the various reinforced concrete foundations of the wind farm, substation and the OHL structures, plus disused crane hard standing areas, borrow pit/quarries and access tracks, the underground cabling and peat repositories. Firstly, it is critical to note that the Project, during its operational phase, with these elements in-situ, has not caused deterioration in the EPA monitored rivers downstream and has, in the case of the two main receiving rivers (Owendalulleegh and Boleyneendoorish), maintained high ecological status (Q4-5/Q5).

The key as to whether the Retained Development elements have potential for likely significant effects on the aquatic environment by remaining in-situ in perpetuity, is the degree to which they represent possible sources of water quality degradation that could impact on downstream aquatic habitats and fish populations into the future. In this respect a key issue for water quality (as demonstrated during the construction phase) is the level of peat stability and the degree to which retention of individual, at and below ground elements, could cause peat failure into the future. In this respect, peat stability assessments following the Prospective Development are presented in the rEIAR Chapter 8 (Land, Soils and Geology) with the finding of low to negligible residual risk of peat failure associated with retained elements. Hence there is low risk of likely significant effects on water quality and downstream fisheries habitats from the Retained Development. Following completion of the Prospective Development (decommissioning) there will be ever diminishing levels of residual suspended solids leaving the areas where ground disturbance occurred owing to consolidation and revegetation of disused, retained features with a corresponding gradual increase in the level of on-site attenuation of peak run-off as drains infill and vegetate. The residual effect on water quality and aquatic habitats downstream will be long term neutral and even slightly positive locally in the smaller tributaries. There will be a neutral impact on the larger main channel receiving waters two main receiving rivers (Owendalulleegh and Boleyneendoorish), with these continuing at maintain high ecological status (Q4-5/Q5) and thus meet their WFD objectives.

7.2.4.2 Impact of off-site elements associated with the response to the 2003 peat slide:

As of 2024, the have been in-situ for at least 19 years (i.e., works completed in November 2005). Impact of retention in-situ, in perpetuity, of individual peat slide response elements are summarised below:

- Barrages 1 and 2, Peat Repositories, Drainage, Borrow pits / quarries: Drains, minor borrow pit / quarries and the three peat repository areas that were utilized in response to the peat slide have stabilized, grown over and largely naturalized into the surrounding landscape. Repeated water sampling and Q-value surveys (2011-2024) demonstrate these are not sources of deleterious emissions to surface waters either currently nor will they be into the future. Their retention in a naturalized state will likely promote greater infiltration and evaporation, intercept suspended solids and reduce peak flows from the site. Barrage 1 (plus the Coillte Access Track that runs over it) and Barrage 2 are very high in the Derrybrien North tributary (SC7(b) sub catchment) where fish are absent with insignificant fisheries habitat; the watercourse being small, and somewhat ephemeral in nature, especially upstream of Barrage 1. The retention of Barrages 1 and 2, so high in the catchment and very close to the on-site drains/runnels of the wind farm which have no fisheries significance, has no material effect on the fish recruitment capacity of this tributary. The impacts of retaining these elements are **long term neutral**.
- Off-site bridge repairs and works: Repairs to parapets of Black Road Bridge and Flaggy Bridge do not affect water quality and instream habitats. These minor, above water elements did not and do not alter existing hydromorphology, have no direct effect on instream habitat, and will have a **neutral** impact on the aquatic environment when left in-situ in perpetuity. The retention in-situ in perpetuity of the replaced Stepping Stone boulders at Tooraglassa Ford on Owendalulleegh River will have a **neutral** impact on water quality, fisheries and hydromorphology. This is supported by electrofishing surveys in 2019 at a similar site on the main channel 1 km upstream, which returned high numbers and density of trout, and a macroinvertebrate sample at the site in August 2024, meriting Q5, equating to high status. The boulders have large gaps between them and create beneficial microhabitats for fish and macroinvertebrates. Unnamed Bridge C is located on the Derrybrien North tributary in SC7(d). It was replaced after the peat slide and electrofishing surveys have since proven that in the intervening 19 years the bridge poses no barrier to fish movement. Its retention will have a neutral residual effect on fish migration and hydromorphology into the future.
- Barrages 3 and 4: Barrages 3 and 4 occur ~550 m and ~350 m upstream of Flaggy Bridge, respectively. Their installation was complete by 4 November 2003 to help arrest the flow of peat down the Derrybrien North SC7(b) tributary. Both are comprised of large, irregularly shaped limestone boulders, placed directly on the natural channel bedrock, with an indistinct flow pathway through each. They are both complete barriers to passage of all fish species (except eels, which can climb). However, repeated project-specific electrofishing surveys (2008-2022) never captured a single fish of any species at or upstream of Flaggy Bridge, despite there being suitable habitat for trout reproduction. This demonstrates that fish are not accessing as far as Flaggy Bridge, let alone upstream as far as Barrages 3 and 4. The evidence shows that retention of Barrages 3 and 4 has no significant effect on fisheries productivity in either the SC7(b) sub catchment nor the Owendalulleegh system as a whole because fish currently fail to access even as far as Flaggy Bridge owing to identified fish migration barriers between Flaggy Bridge and Owendalulleegh main channel, i.e., two natural barriers (rock outcrops forming vertical drops in the bedrock channel) and one artificial (very poor pre-existing forestry culvert). Barrages 3 and 4 have no negative effect on water quality and do not prevent the achievement

of good status (Q4) or better, noting the stream is currently representative high status (Q4-5) at Flaggy Bridge in surveys of 2019, 2022 and 2024. Retention of Barrages 3 and 4 may be causing a slight reduction in finer substrate mobilization downstream, but there are alternative sources of finer substrates (gravels) from numerous small tributaries adjoining both the SC7 sub catchment and the Owendalulleegh main channel, meaning the residual effect of Barrages 3 and 4 on the overall Owendalluleegh waterbody is considered a **permanent or long-term imperceptible negative**.

The main sources of potential cumulative effects on water quality and aquatic ecology in-combination with the Retained Development were identified to be ongoing, non-project related forestry activity and turbary. The latter has continuously occurred over the project lifetime to date in the eastern portion of the wind farm site, with drainage to the Owendalulleegh catchment. Whilst it is evident that these activities have localised effects on water quality and aquatic habitat (primarily nutrient and sediment loss related) the impact, if any, has been confined to the small upper tributaries where these activities occur and are temporary to short term in duration. At the same time, the EPA record shows that the combined activities of ongoing forestry and turbary activity with operational and ceased operational phases of the wind farm project has had no negative impact on biological water quality and ecological status of the main receiving water catchments. High ecological status has been maintained at all sites on the main receiving rivers: Owendalulleegh and Boleyneendoorish (collectively receiving 99% of drainage from the wind farm site) throughout the project operational and ceased operation lifetime. The cumulative impact of the retained elements of the project with other catchment land use activities as identified will therefore continue to be **neutral**.

7.3 Conclusion

If the peat slide had not occurred, the construction of the Derrybrien Wind Farm and associated infrastructure (2003-2006) plus the 7.8 km OHL and Agannygal Substation would have caused slight negative effects in the form of diffuse suspended solid loss owing to ground damage associated with excavations and construction traffic movements and with nutrient loss from tree felling on upland blanket peat. The main impacts from these activities were confined to the small headwater streams draining the wind farm site itself and took the form of a slight negative, temporary to short term, reversible effect on biological water quality locally, all of which was likely to have reversed within 12 to 24 months of the wind farm's commissioning in 2006.

These impacts would not, on their own, have given rise to any decline from high ecological status on the main channels of the rivers draining the site (Owendalulleegh, Boleyneendorrish and Duniry rivers) with no negative impact on the ecological status of Lough Cutra.

However, the large peat slide on 16th October 2003, triggered high in the Owendalulleegh catchment by the construction of a turbine foundation (T68), exacerbated by subsequent heavy rainfall, had very significant to profound, short-term, negative impacts on riverine habitats and fish. The impact extended along the SC7(b) and SC7(d) channel from the wind farm as far as the confluence with the main channel of the Owendalulleegh and for the first 1-2 km of the main channel. Beyond that point, for most of the remaining 16 to 17 km of the main channel of the Owendalulleegh, the impact on the riverine habitats can be described as moderate, negative, short term because their physical nature was not appreciably altered with the main physical damage caused to instream plants and owing to the build-up of peat silt and woody debris as well as increased levels of sand in slower flowing stretches. These latter effects were reported at the time to clearly diminish with distance downstream, until close to the outlet to Lough Cutra they were barely perceptible.

The effect of the peat slide on biological water quality of the Owendalulleegh River main channel is clearly demonstrated in the EPA river monitoring record. Immediately following the 2003 event, EPA assessed Q-values declined from high ecological status (Q4-5/Q5) down to bad (Q2), moderate (Q3-4)

and good status (Q4) at main channel sites downstream of the peat slide influence. The severity of effect on Owendalulleegh River Q-values diminished with distance downstream. By 2006, all but one of these same sites had returned to high status (Q4-5/Q5) with the final site (Tooraglassa Ford, nearest the peat slide tributary) returning to high status by 2009. All these main channel sites have remained at high status since. Therefore, the impact though severe at the time was reversible as shown in the EPA river monitoring record.

As reported at the time, the peat slide led to a very large fish kill involving six species and was particularly detrimental in terms of numbers of brown trout and stone loach. This impact can be described as very significant to profound, negative and short-term but has proved from repeated electrofishing results for the current study (conducted between 2011 and 2022) to be reversible. The impact is therefore classified as 'short-term' because it is likely that the population would have fully recovered within 6-7 years at most, assisted by immigration of fish from unaffected side tributaries and from the main channel of the Owendalulleegh upstream of the confluence of SC7 where the full range of age classes would have been present in late October 2003. Older trout from Lough Cutra running up the Owendalulleegh in subsequent years to spawn may also have contributed to the recovery. Stone loach are likely to have recovered first, probably within 2-3 years, then trout within 3-5 and probably lamprey last, 6-7 years due to the longer growth period of their larval stages. Eel, which do not reproduce in fresh waters would have been replaced through immigration from the marine environment, which would occur annually.

The ongoing operation of the wind farm and the OHL (2006-2022) followed by the ceased operation phase (2022 to present) has had no significant negative impacts on the surface receiving waters, with any impacts occurring being slightly negative, temporary and not significant and confined, if/where they did occur, to the upper reaches of small tributaries, primarily in relation to small amounts of site maintenance and turbulence felling.

Furthermore, throughout the operation and ceased operation phases, there has been a long-term neutral effect on biological water quality of the main receiving rivers: Owendalulleegh and Boleyneendoorish, with high status (Q5/Q4-5) maintained on both channels throughout these phases of the Project, providing evidence of the benign nature of the presence of the Project between 2009 and 2024 in terms of ecological status of waterbodies.

The effect of the retained elements, including those associated with the windfarm, OHL, substations and off-site features (associated with the 2003 peat slide) will mainly be permanent neutral to slightly positive as they do not represent significant sources of deleterious emissions to surface waters and will (and have) become gradually naturalised into the residual environment further reducing suspended solids export from the site as well as gradually increasing amelioration of peak flows from the Project area as the site revegetates into the future. Regarding Barrages 3 and 4, at worst a permanent or long-term imperceptible negative effect is predicted in terms of slightly reduced sediment supply locally in Derrybrien North tributary SC7(b) and SC7(d) (impoundment effect) with no significant impact arising on fisheries (habitat or numbers) of these sub catchments or the Owendalulleegh catchment. This is because there are existing fish passage barriers that already prevent fish (other than eels) reaching these structures in the first instance, i.e., repeated electrofishing surveys have proven that fish do not access even as far as Flaggy Bridge, which is ~350m downstream of Barrage 4 and ~550m downstream of Barrage 3.

8. LAND, SOILS, GEOLOGY

8.1 Derrybrien Wind Farm

8.1.1 The baseline

The available desktop information and the numerous geotechnical site investigations and walkover surveys undertaken on the wind farm site have been used to interpret the baseline Soils, Geology and Land conditions in 1998, prior to construction

The wind farm is located on Cashlaundrumlahan Mountain at an elevation between +325mAOD and +365mAOD. The topography on the site typically consists of flat, terraced or gently sloping ground (<3-5^0) with steeper slopes closer to the southern and northern boundaries of the site (>5-7^0).

The majority of the wind farm site is characterised by a continuous cover of upland blanket bog over cohesive glacial till (boulder clay), and Sandstone/Siltstone bedrock. The depth of peat on the site ranges from 1-6 m but is generally <3.0m. The deeper peat (>3 m) is located on flat or gently sloping terraces on the site. In-situ testing indicates that the peat is of Extremely Low Strength (Very soft).

The mineral subsoil below the peat is comprised of boulder-clay type deposits of gravelly cohesive glacial till. The till is typically 0.5-3.5m thick, but locally up to 7.6m in places. In-situ testing indicates that the soil would be classified as a Medium to High or Very High Strength material. Some Low Strength (Soft) layers were encountered locally at shallow depths of 3.5-4.5m.

Bedrock on the wind farm site is comprised of Sandstone, Siltstone and Conglomerate of the Ayle River Formation. The depth to rock on the site ranges from 1.3 to 10.3m but was generally between 3.0m and 6.2 m. 0.6 to 3.6m of weathered rock was encountered at rockhead.

There are no audited or unaudited geological heritage sites identified on the wind farm site on the Geological Survey of Ireland (GSI) Spatial Resources interactive map viewer.

The GSI Landslide Susceptibility Map indicates that conditions on the site are suitable for the wind farm with appropriate design and mitigation measures for working in peat. Most of the site is classified as being of **Low** susceptibility to landslides with localised areas of slightly steeper slopes on the south side of the site and between terraces on the north side where the susceptibility is classified as **Moderately Low**. The areas of Moderately High and High susceptibility are generally limited to the steeper slopes outside the site boundary to the north and south of the wind farm, particularly to the north.

Prior to construction of the Project, most of the site and surrounding land downslope had been used by Coillte for commercial coniferous forestry. The open area at the east end of the wind farm site was used for peat harvesting and is sub-divided into turbary plots.

The blanket bog has been degraded due to drainage, forestry and turf cutting and is 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 considered, the overall ecological value of the habitat is of Local Importance (higher value), which would be equivalent to a Medium to Low sensitivity. However, when combined with the additional environmental value of the peat as a carbon store as well as the relatively low commercial value of the land for forestry/agriculture, this is sufficient to raise the combined baseline sensitivity of the peatland habitat to "**MEDIUM**".

For this project, the possible extent of a peat slide and the characteristics of soils, geology and land potentially impacted by a slide have been calibrated by the very large peat slide that occurred on the

site in October 2003, which has reasonably been considered the worst-case scenario. Consideration has also been given to the smaller more localised peat failures that occurred in a few areas on site during construction, which had a significantly lower impact on the soils, geology and land.

8.1.2 Impacts of the Development

Impacts on soils, geology and land have been assessed over the following stages of the project:

- Impacts that have occurred:
  - Construction Phase (2003-2006).
  - Operation and Maintenance Phase (2006-2022).
- Impacts that are occurring:
  - Ceased Operations Phase (2022-Present).
- Impacts that are likely to occur:
  - Decommissioning Phase (2025).
  - Post-Decommissioning Phase (the Retained Development).

Impacts of project activities have been assessed as Direct Impacts and Stability Impacts. Direct Impacts are those that are assessed based on the direct physical impact on the receiving soils, geology and land. Stability Impacts are direct impacts where the effect on the receiving soils, geology and land increases or decreases the risk of instability, typically in the peat, potentially triggering a large peat slide as a worst-case scenario.

The assessment has been carried out in accordance with the 2022 EPA Guidelines on Information to be Contained in Environmental Impact Assessment Reports (EIAR). The assessment of stability impacts has also been assessed in accordance with current best practice guidelines for peat landslide hazard and risk assessments. Specific consideration has been given to the peat failures that occurred on the wind farm site during construction, particularly the large peat slide that occurred in October 2003.

8.1.2.1 Direct Impacts

Nearly all significant direct impacts on soils, geology and land occurred during the construction phase of the project, including:

- The excavation of peat for the turbines, crane hardstandings and substation site.
- The covering/sealing of land with the site access roads and material deposition areas.
- The change in the water table levels within the peat due to improved drainage.

The effects of these impacts are assessed based on a combined level of sensitivity of the peat.

The excavation and disposal of the peat had the most significant direct impact on soils geology and land as the overall volume of peat excavated for the Project was on the order of 185,000 m^3. The majority of this was on the wind farm site. All of the excavated peat was stored in designated material deposition areas, repository sites and bunded storage areas on site. However, the peat was disturbed in the process and would be susceptible to aerobic decomposition and loss of stored Carbon in the form of CO_2. The effect of this on the peat has been assessed as **Moderately Significant**. However, when considered in combination with the peat slide that occurred on the site in October 2003, which resulted in the displacement of 450,000m^3 of peat, much of which was lost in the stream channel downslope from the slide area, the combined effect on the peat was assessed as **Significant**. Approximately 200,000m^3 of peat debris remains in the slide area.

Other direct impacts have resulted in only **Slightly Significant** effects on the receiving soils, geology and land including the covering/sealing of the land with the site access roads, material deposition areas and peat repository sites; the removal of forestry, and the excavation of rock from the main borrow pit that was opened up on the site.

Additional drains were constructed 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. Drainage has a negative effect on peat where the groundwater table is 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. Piezometers on the site indicate that water levels have been lowered by 0.40-0.75m in some parts of the site. However, the impact of the drains would be localised, and the site had already been degraded by drainage for forestry and turbary plots. Therefore, the effect of the direct impact of the improved drainage on the peat has been assessed as **Slightly Significant**.

Most of the maintenance works that were carried out on the site over the operational life of the wind farm between 2006 and 2022 would have had negligible direct impacts on the receiving soils, geology and land. The works that would have had a **Slightly Significant** effect on the peat were limited to the 2017 fibre optic upgrade of the turbine control systems, the ongoing tree felling and tree topping, and further drainage maintenance and improvement works. Remedial works involving peat excavation were also required to right a mobile crane that went off the narrow turbary road near Turbine T40.

At this stage, during the ceased operational phase of the wind farm (2022-2024), the effects of direct impacts from the construction, operation and maintenance phases of the windfarm that are still occurring at the end of 2024 would include ongoing decomposition of excavated peat in the peat storage areas, repository sites and slide area; and the increased rate of peat decomposition due to groundwater lowering caused by drainage improvements on the wind farm site.

At this stage the peat repository sites have settled into the underlying intact peat, and peatlands vegetation has become well established on the surface. Therefore, the net rate of carbon release has significantly reduced so that the effect on the peat in these areas is at a new equilibrium of carbon flux, possibly with peat accumulation and net carbon storage, which will help to mitigate the original impact. However, relative to the original baseline conditions prior to construction the effect on the peat is still **Moderately Significant**.

Similarly, although there is still approximately 200,000m^3 of peat debris in the slide area, and peatlands vegetation has become well established on the surface, which will slow down the rate of decomposition and establish a new net rate of carbon flux, the effect on the peat is still **Significant** relative to the original baseline condition when assessed in combination with the peat excavations for the wind farm.

The works that were carried out on drainage over the operational phase of the wind farm were limited to localised maintenance to improve the efficiency and performance of the existing network and not to increase the capacity. Only minimal maintenance works were required since 2012. Therefore, further drawdown of the groundwater levels on the site should be minimal. However, relative to the original baseline condition in 1998, the effect of the drainage on the peat would still be of **Slight Significance**.

The improved drainage network on the wind farm site will remain in place after decommissioning along with the peat repository sites, deposition areas, and bunded storage areas in the borrow pits. Therefore, the effects of peat decomposition and carbon loss in the excavated peat stored on site and in the peat debris remaining in the slide area will continue as a residual impact post-decommissioning along with the accelerated rate of decomposition in peat above the water table in areas where the groundwater level was lowered by drainage improvements on the wind farm site. However, the residual rate of decomposition will be significantly lower due to ongoing regeneration of the vegetation areas of disturbed peat, possibly assisted by a reduction in the capacity and efficiency of the drainage system without maintenance. It could also reach a point of peat accumulation and net carbon capture in the long-term, particularly in the repository sites.

8.1.2.2 Stability Impacts

All the stability impacts that have significant effects on the receiving soils, geology and land relate to the blanket bog that covers the site and surrounding area. Prior to construction of the wind farm the bog

had been degraded by drainage, forestry plantations and peat harvesting. Therefore, the baseline sensitivity of the soils, geology and land that could be impacted by the project has been assessed as **MEDIUM** based on a combination of the ecological value of the bog, the significance of carbon storage in the peat and the value of the land for forestry, agriculture and turbary rights. There are no recorded Geological Heritage Sites in the area.

Table 8-1 gives a summary of the impacts that had significant effects on the stability of the peat for the different phases of the Project. In accordance with the 2022 EPA Guidelines "Significant" impacts include those that have been qualitatively assessed on a scale from Slight to Profound based on the severity of the interpreted effect on the peat and the sensitivity of the receiving soils, geology and land.

None of the Project activities had impacts that have been assessed as having **Very Significant** or **Profound** effects on the stability of the soils, geology and land in the Project area, which is largely due to the relatively low ecological importance and baseline sensitivity of the receiving environment. This chapter also identifies stability impacts of site activities which had effects that were **Not Significant** or **Imperceptible**.

In general, the stability impacts with the most significant effects occurred during the construction stage of the project when there would have been a higher level of activity on the site, particularly on the wind farm site prior to the large peat slide that occurred at the site in October 2003.

The impact of site activities also reduced significantly over the project life cycle from the second phase of construction after the peat slide (2004-2005), through the operation and maintenance phase of the project (2005-2022), to decommissioning in 2025. This is due to a combination of:

- The reduced level of activity on the site and the less onerous nature of the activities in terms of loading on the peat.
- The implementation of appropriate mitigation measures for site activities; and
- Gradual improvements in site conditions, including:
  - The increase in strength of the peat under the material sidecast areas, peat repository sites and floating roads, which has been verified by site testing.
  - The improved drainage conditions, which have a positive effect on peat stability.

The significance of the effects is still assessed relative to the baseline conditions prior to construction.

During the first phase of construction, prior to the peat slide on the 16th October 2003, the stability impacts with effects that were **Significant** were related to the construction of the site access tracks as "floating roads" directly on the peat; the construction traffic loading on the floating roads; and the sidecasting of excavated materials on the intact peat slopes adjacent to the turbine foundation excavations.

In comparison, the stability impacts from other activities that were being carried out on the wind farm site at the time only had **Slightly Significant** effects on the stability of the peat. These included the live load surcharge from low ground bearing pressure construction and forestry equipment operating directly on the peat, the vibrations induced by rock blasting in the main borrow pit, and the local stability of temporary peat slopes around the perimeter of the turbine foundation excavations.

Prior to the peat slide in 2003, most of the c. 15 km of new floating site access tracks had been constructed on the wind farm site. Excavation to suitable formation on rock had also been completed at 39 No. turbines and the excavated peat and mineral subsoil had been sidecast on the intact peat slopes adjacent to the excavations.

No peat failures occurred under the floating roads. However, at the excavations for the turbine foundations there was a local bearing failure in the peat under the sidecast materials at Turbines T23, T29 and T66, and a small-scale peat slide at Turbine T17. At the time of the very large peat slide on the

16th October 2003 excavation was underway at Turbine T68 and the excavated materials were being sidecast on the slope downslope from the turbine, where the slide is thought to have initiated.

The loading from the sidecast materials has been attributed with triggering the slide, although there were a number of other contributory factors related to the topography, hydrology and peat strength in the area that made the location particularly susceptible to a peat failure at that time. Approximately 450,000m^3 of peat was displaced over an area of approximately 25 Ha on the southern slopes of the wind farm, which resulted in a direct **Significant** effect on soils, geology, and land within the slide area.

Approximately 250,000 m^3 of the displaced peat from the source area of the slide flowed downslope into a stream channel. From here it was routed down the mountain slopes to an elevation of approx.. 200 mAOD, where it spread out on a relatively flat area of agricultural land almost as far as the Black Road Bridge. Following some heavy rainfall, the debris material was forced further downslope along the Owendalluleagh River channel before reaching a phase of dispersion in the river water approximately 5.8 km downstream from the source area. At the time, the peat slide significantly impacted the integrity of the peat from the slide area and the use and characteristics of the land within the slide area and along the debris flow path. This included Coillte forestry lands, agricultural lands and the river channel. Sections of wind farm and forestry access tracks were also damaged as part of the event.

For the second phase of construction after the peat slide there was a significant reduction in the effects of stability impacts, primarily as a result of additional risk mitigation measures that were implemented on the site. In particular this was due to extensive additional site investigations and stability analyses for the wind farm infrastructure and designated repository areas for excavated materials. Other factors included the full scale proof load testing on the existing and new floating roads; the controlled peat and spoil management on site with identification and assessment of suitable repository areas for excavated peat and mineral subsoils; on site geotechnical supervision; and the review and certification of the contractor's method statements. Uncontrolled sidecasting of excavated materials was not permitted, and areas that were considered to have an elevated risk of peat instability were avoided for peat repository sites. Design modifications were also made to the design and layout of the windfarm to avoid areas of elevated risk, i.e.: the floating road between Turbines T47 and T51 was relocated to the south side of the turbines to bring it further away from the steep slopes to the north, and Turbine T16 and the section of floating road between Turbines T15 and T17 were not constructed.

There was also a reduction in risk of peat instability for the material sidecast areas and sections of floating road that were completed during the first phase of construction due to the delay between the first and second phase of works. The highest risk of peat instability for these areas was at the time that the materials were placed on the slopes. Over time the underlying intact peat compressed and increased in strength under the weight of the material so that the effect of the load on the stability of the peat reduced to **Moderately Significant** for the second phase of construction.

However, the stability impact associated with the construction of the remaining lengths of floating roads was assessed as **Significant** and the live load from the construction vehicles and mobile cranes on all the roads for the second phase of construction was **Moderately Significant**.

Other stability impacts that had a **Slightly Significant** effect on the stability of the peat during the second phase of construction included the live load surcharge from low ground bearing pressure construction and forestry equipment operating directly on the peat, the vibrations induced by rock blasting in the main borrow pit, the local stability of temporary peat slopes around the perimeter of the remaining turbine foundation excavations, and miscellaneous localised live loads on the peat slopes from work related to tree felling, drainage and cable-trenching.

The positive impact of drainage was sustained with further improvements during the second phase of construction, which had a **Moderately Significant** effect on the stability of the peat relative to the baseline conditions on the site prior to construction.

No peat failures occurred during the second phase of construction.

The site activities during the operation and maintenance phase of the windfarm between 2005 and 2022 have had a much lower impact on the peat. There are no negative stability impacts that have **Significant** or **Moderately Significant** effects on peat stability. Operation and maintenance traffic loading on the floating roads is less frequent than during construction, and the size of the mobile cranes that were used to service the turbines was kept within the design capacity for the roads, which has been proven by full scale load tests. Also, the performance and capacity of the roads has continued to improve due to the increase in the strength and stiffness of the underlying peat, which has compressed under the weight of the roads. Therefore, the effect of the traffic loading on the stability of the peat was **Slightly Significant**.

Upgrading works to c. 4.5 km of access tracks were undertaken in 2014. However the thickness of the fill material was minimised to reduce the additional dead load on the roads, and all the upgraded roads were proof tested to the design crane load on completion to verify their capacity and performance. Therefore, the effect of the additional dead load on the stability of the peat was **Slightly Significant**.

Other routine operations that were carried out over the operation and maintenance phase of the Project involved machinery operating directly on the peat, e.g. for tree felling and stockpiling, tree topping (re-growth), drainage maintenance works, and the 2017 upgrade of fibre optic control cables, which were direct buried in the peat across the site. All this work was carried out using low ground bearing pressure plant and all-terrain vehicles suitable for working on the peat so that the effect on peat stability was only **Slightly Significant.** Similarly, where a mobile crane overturned onto the peat near Turbine T40, it resulted in a temporary localised live load surcharge that had a Slightly Significant effect on peat stability in the area.

No peat failures occurred during the operation and maintenance phase of the wind farm.

Stability impacts from the construction, operation and maintenance stages of the wind farm that are still occurring during the ceased operation phase at the end of 2024 are related to groundwater lowering due to drainage, and sustained surcharge loading on the peat from the floating roads, material sidecast areas and peat repository sites that were left in place at the end of construction.

Due to the lack of wind-farm related activity on the site and due to the ongoing improvement in the strength and stiffness of the peat under sustained surcharge loads, the effect of the loading on peat stability is no longer significant.

There has been no reduction in the capacity and efficiency of the drainage network on the site. Therefore, the impact of the drainage continues to have a sustained positive effect on peat stability that is **Moderately Significant** relative to the baseline conditions on the site prior to construction.

Decommissioning the Project in 2025 will broadly involve the dismantling and removal of all above ground structures on the wind farm site and grid connection route, including the Agannygal substation.

Most of the work on the wind farm site will be carried out from the granular hardstanding areas at the turbines and at the substation site. These are designed for the loads so the works will not have a significant effect on the stability of the peat. Therefore, the primary stability impact of the decommissioning work will be the live load surcharges on the floating roads on the wind farm site from the construction vehicles, trucks, low-loader transporters and mobile cranes that will be used to dismantle the turbines, and the electrical equipment at the substation, and transport the components off site. The loading will not exceed the design capacity of the roads, which has been verified by full scale proof load testing. Therefore, the effect of the live load surcharge on the stability of the peat will be **Slightly Significant**.

Minor temporary road widening works may be required to provide safe access for the mobile cranes at junctions near Turbines T1, T14 & T68, and along narrow sections of track in the eastern turbary area

between Turbines T35 and T35, and between T43 and T46. This will involve additional surcharge loads on the peat which will have a **Slightly Significant** effect on peat stability in these areas.

When the wind farm is decommissioned the site access tracks, turbine foundations, material deposition areas, and hardstanding areas at the turbines and substations will all be left in place on the site along with all the electrical transmission and control cables that have been direct buried in the peat across the site and in ducts at road crossings. The existing drainage network will also be left in place. It is not proposed to block any of the drains to re-wet the site.

There will be no activity related to the wind farm on the site after decommissioning. Therefore, the sustained surcharge loads on the peat from the floating roads and the material deposition areas will not have a significant effect on the stability of the peat after decommissioning.

The turbine foundations, hardstanding areas and barrages are constructed on the glacial till and rock below the peat so they will not have a significant negative effect on site stability. The turbine foundations and crane hardstanding areas will provide some support to the peat upslope from the turbines, which is a **Slightly Significant *positive*** effect on peat stability. However, the site stability is not dependent on this support. Also, the reinforced concrete turbines would not be expected to deteriorate and disintegrate over time.

The improved drainage network on the wind farm site will continue to have a sustained positive effect on peat stability post decommissioning that is **Moderately Significant** relative to the baseline conditions on the site prior to construction. No maintenance works will be carried out on the drainage after decommissioning. Therefore, the efficiency and capacity of the drains could reduce over time if they become clogged due to vegetation growth. In the long-term this could result in gradual partial restoration of groundwater levels on the site which would reduce the positive effect on the stability of the peat to **Slightly Significant**.

Gort Wind Farms Ltd. will not have any control over the activities that will be carried out on site after decommissioning. However, the long-term effects of residual impacts on peat stability will be the same as the post-decommissioning effects for the Retained Development provided that no work is carried out on the site to alter or modify the Retained Development, and provided that future uses of the site will not exceed the original design criteria for the Retained Development, as set out in the Safety File that will be handed over by GWFL when decommissioning is completed.

8.1.2.3 Cumulative Impacts

The cumulative impacts due to adjacent projects and activities in and around the project area have also been assessed. It was concluded that there are no significant cumulative direct or stability impacts due to other windfarm projects in the area, due to adjacent forestry plantations that are not part of the Project, or from peat extraction or turf cutting outside the project area. Significant cumulative impacts are limited to mechanical peat harvesting in turbary plots within or immediately adjacent to the wind farm site.

In terms of direct impacts, the volume of annual mechanical peat harvesting is low, estimated to be less than 2,500m^3 per annum. Therefore, the effect that this has on the peat is only **Slightly Significant.**

Drainage improvements in the turbary area to facilitate mechanical peat extraction have been minor and no further drainage works are expected during decommissioning of the wind farm. Therefore, there are no significant cumulative effects on the peat due to groundwater lowering for mechanical peat extraction in the turbary areas on the site.

The effect of cumulative stability impacts that have occurred as a consequence of the increase in mechanical peat harvesting activities in the turbary area since 2012 has been assessed as **Moderately Significant** to **Significant**, depending on the interpreted likelihood of a peat slide where the work was

carried out, as summarised in the Peat Stability Risk Assessment that has been prepared for mechanical peat harvesting in the turbary area.

The effects are limited to the small number of turbary plots where mechanical peat harvesting is carried out. The active plots are only cut seasonally once a year and mechanical peat harvesting within any plot only takes a few days. Therefore, the frequency of the stability impact is **Occasional** and the duration of the impact is **Brief** to **Temporary**.

These effects do not arise as a direct result of the wind farm, but from the separate and unrelated activities for mechanical peat harvesting in the turbary areas under established turbary rights, which are outside of the control of Gort Wind Farms Ltd. Furthermore, development of the wind farm has not increased the risk of peat instability in the turbary areas.

Two areas on the site have been identified where localised or small-scale peat slides have occurred on the wind farm site, which are unrelated to the wind farm but possibly caused by mechanical peat harvesting, i.e. in Turbary Plots #161 and #30. These have been assessed as having a **Slightly Significant** effect on the peat in the area.

Warning signs have beeen erected at the site by Gort Wind Farms 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 the cumulative effect on the stability of the peat could be **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 and the cumulative effect on the stability of the peat will be **Slightly Significance**.

There will be no cumulative impacts if no further mechanical peat harvesting is carried out in the area during or after decommissioning.

8.1.2.4 Remedial (Mitigation) Measures and Monitoring

Mitigation of Direct Impacts

The primary mitigation of significant direct impacts on the wind farm site involved constructing the new site access tracks as floating roads which minimised the volume of peat that needed to be excavated and disposed of on site. This approach also minimised the volume of crushed rock that was which was required to construct the roads. Also, the existing network of access tracks (approx. 2.0 km) was upgraded and integrated with the turbine layout.

Mitigation of Stability Impacts

Prior to the slide in 2003, impacts that had an effect on peat stability were primarily mitigated by:

- Minimising the thickness of the floating roads using geogrid reinforcement.
- Generally limiting the depth of sidecasted materials spread out across the surface of the peat to 0.5m - 1.5 m.

- Minimising loading from construction plant on the peat slopes using appropriate LGBP equipment suitable for operating on peat for drainage, tree felling and cable installation.
- Some improvements to the site drainage.

Following the slide in 2003 more extensive remedial measures were adopted to minimise the risk of further site instability on the wind farm site. The primary additional remedial measures included:

- Extensive geotechnical investigations and stability analyses for elements of the project that could have had an impact on the peat stability including the floating roads, material deposition areas, peat repositories, turbine excavations and tree felling.
- Installation and monitoring of 4 No. clusters of electronic piezometers and tiltmeters to monitor groundwater levels and peat movement with an automated alarm system.
- Controlled deposition of excavated peat into designated peat repositories that had been confirmed as suitable by desk study, geotechnical investigation and stability analyses.
- Full-scale monitored serviceability and proof load testing of all floating roads on the site.
- Full time supervision of the works by geotechnical engineers.
- Remedial works to upgrade the floating roads with additional rockfill and geogrid reinforcement, where necessary.
- Specification and implementation of controls on construction methodology for works that could impact peat stability, including construction traffic loading on the floating roads, spoil management, and deposition of peat in designated repository areas.
- The implementation of a geotechnical certification process which controlled site activities that involved working with or on the peat.
- Construction of rockfill embankments to replace two sections of access track removed during the slide which provided a shear key to contain debris upslope from the roads in the slide source area.
- Avoiding or amending elements of the Project where the potential of further peat instability was considered to be excessive e.g. the relocation of the floating road between T47 and T50 to the south side of the turbines to set it back further from the steep slopes to the north; the omission of Turbine T16 and the section of floating road between T15 and T17; avoiding mechanical tree felling in particular areas.
- The design and monitoring of the rock blasting at borrow BP-3.
- Drainage improvement works to assist in the drainage of the peat.

Many of the remedial measures adopted during construction were also adopted for the Operation & Maintenance phase of the Project to minimise the risk of further peat instability e.g.

- Carrying out all of heavy lifting operations for the maintenance of the turbines and substation components from the granular hardstand areas, which are supported on glacial till below the peat and designed to support the loads.
- Limitations and controls on the size and frequency of construction traffic loading on the floating roads.
- Geotechnical analysis and design of the road upgrade works in 2014, including full time geotechnical supervision on site and certification of contractors' method statements.
- Periodic full scale proof load tests to verify the capacity and performance of the floating roads, including after the road upgrade works in 2014.
- Regular drainage maintenance and improvements to maintain the capacity and performance of the improved network on the wind farm site.
- Continuous monitoring of groundwater levels and ground movement in electronic piezometers and tiltmeters on the wind farm site until the instrumentation was decommissioned in 2014.

- Use of appropriate LGBP plant and machinery for minor works on the peat slopes including drainage improvements, tree felling, tree topping and the installation of new fibre optic cable control systems in 2017.
- regular monitoring of the wind farm site and peat slide response measures by ESB geotechnical engineers and other geotechnical consultants familiar with the Project.

The mitigation measures that were established during the second phase of construction and for the O&M phase will be adopted for the relevant activities during decommissioning. e.g. use of hardstanding areas for heavy lifting operations; site controls on construction traffic loading on the floating roads, geotechnical supervision on site; geotechnical analysis and design for temporary widening of floating roads; and minimal activity on peat with access limited to LGBP plant and equipment suitable for working on peat.

The decommission plan has also been devised to minimise the impact of the works on peat stability by leaving the site access tracks, turbine foundations, hardstanding areas and electrical transmission and fibre optic control cables in place to avoid extensive excavation works on the site, which would also involve frequent heavy construction traffic loading on the floating roads, and intrusive material handling and spoil management works on the site. The improved drainage network will also be left in place without blocking any drains to avoid any sudden changes to the groundwater regime on the site, and to allow the site to adapt gradually to changing conditions over time if the efficiency of the system is reduced by vegetation growth.

After decommissioning there will be no more activity or works related to the wind farm on the site. The site will be returned to the landowner and Gort Wind Farms Ltd. will not have any involvement in future land use or site activities. Therefore, for the post-decommissioning phase the primary mitigation measure that will mitigate the impact of the Retained Development on the peat is the compilation and handover of the **Safety File** for the Project to the landowner. This will include detailed construction records for the decommissioning works as well as design and as-built construction details for all the elements of the wind farm, grid connection and ancillary works that will be left in place after decommissioning (the Retained Development), including the Peat Stability Risk Assessments and risk mitigation measures for the Project. This 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.

8.1.3 Conclusion

Nearly all significant direct impacts on soils, geology and land on the wind farm site occurred during the construction phase of the project.

The excavation and disposal of approximately 185,000 m^3 of peat for the wind farm had a **Moderately Significant** effect on the peat. However, when considered in combination with the peat slide that occurred on the site in October 2003, which resulted in the displacement of 450,000m^3 of peat, the combined effect on peat in the area was **Significant**. All of the excavated peat was stored in designated storage areas on site and approximately 200,000m^3 of peat debris remains in the slide area.

Other direct impacts have resulted in **Slightly Significant** effects on the receiving soils, geology and land including covering/sealing of land with the site access roads, material deposition areas and peat repository sites; removal of forestry; and excavation of rock from the main borrow pit on site.

Additional drainage that was required for the design of the turbine foundations and to improve the control of groundwater and surface runoff in areas of poor drainage and high water-table has lowered the groundwater by up to 0.40-0.75m in some parts of the site, which has had a **Slightly Significant** effect on the peat in these areas due to the increased rate of decomposition of the peat above the water table.

Maintenance works that were carried out on the site over the operational life of the wind farm that would have had a **Slightly Significant** effect on the peat were limited to the 2017 fibre optic upgrade of the turbine control systems; the ongoing tree felling and tree topping; and further drainage maintenance and improvement works. Remedial works involving peat excavation were also required to right a mobile crane that went off the narrow turbary road near Turbine T40.

At this stage, during the ceased operational phase of the wind farm (2022-2024), the effects of direct impacts from the construction, operation and maintenance phases of the windfarm that are still occurring at the end of 2024 would include ongoing decomposition of excavated peat in the peat storage areas, repository sites and slide area; and the increased rate of peat decomposition due to groundwater lowering caused by drainage improvements on the wind farm site.

Much of the excavated and displaced peat from the wind farm and slide area is still on site and has significantly regenerated with peatlands vegetation. This will help to mitigate the initial impact on the peat by slowing the rate of erosion and decomposition, possibly resulting in long-term net peat accumulation and carbon capture. However, the combined effect on the peat relative to the original baseline conditions prior to construction is still **Significant**.

Maintenance works that were carried out on drainage over the operational phase of the wind farm were limited to localised maintenance to improve the efficiency and performance of the existing network and not to increase the capacity. Therefore, further drawdown of the groundwater levels on the site should be minimal. However, relative to the original baseline condition in 1998, the effect of the drainage on the peat would still be of **Slight Significance**.

The improved drainage network will remain in place after decommissioning along with the peat repository sites and material deposition areas. The effects of peat decomposition and carbon loss in the excavated peat stored on site and in the peat debris remaining in the slide area will continue as an impact post-decommissioning along with the accelerated rate of decomposition in peat above the water table in areas where the groundwater level was lowered by drainage improvements. However, the residual rate of decomposition will be significantly lower due to ongoing regeneration of the vegetation in areas of disturbed peat, possibly assisted by a gradual rise in groundwater levels if the capacity and efficiency of the drainage system reduces over time without maintenance.

Table 8-1 gives a summary of the **impacts that had significant effects on the stability of the peat** for the different phases of the Project. None of the Project activities had impacts that have been assessed as having **Very Significant** or **Profound** effects on the stability of the soils, geology and land in the Project area, which is largely due to the relatively low ecological importance and baseline sensitivity of the receiving environment. Stability impacts of site activities which had effects that were Not Significant or Imperceptible are also identified.

In general, the stability impacts with the most significant effects occurred during construction when there would have been a higher level of activity on the site, particularly on the wind farm site prior to the large peat slide that occurred at the site in October 2003.

The impact of site activities also reduced significantly over the project life cycle from the second phase of construction after the peat slide (2004-2005), through the operation and maintenance phase of the project (2005-2022), to decommissioning in 2025. This is due to a combination of:

- The reduced level of activity on the site and the less onerous nature of the activities in terms of loading on the peat.
- The implementation of appropriate mitigation measures for site activities.
- Gradual improvements in site conditions, including:
    - The increase in strength of the peat under the material sidecast areas, peat repository sites and floating roads, which has been verified by site testing; and

- The improved drainage conditions, which have a positive effect on peat stability.

The significance of the effects is still assessed relative to the baseline conditions prior to construction.

During decommissioning, most of the work on the wind farm site will be carried out from the granular hardstanding areas at the turbines and substation, which are designed for the loads. Therefore, the primary stability impact will be the live load surcharges on the floating roads from the construction vehicles and mobile cranes that will be used to dismantle the turbines, and the electrical equipment at the substation, and transport the components off site. The loading will not exceed the design capacity of the roads, which has been verified by full scale proof load testing. Therefore, the effect of the live load surcharge on the stability of the peat will be **Slightly Significant**.

Minor temporary road widening works may be required to provide safe access for the mobile cranes at junctions near Turbines T1, T14 & T68, and along narrow sections of track in the eastern turbary area between Turbines T35 and T35, and between T43 and T46. The additional loading will have a **Slightly Significant** effect on peat stability in these areas.

When the wind farm is decommissioned the site access tracks, turbine foundations, material deposition areas, and hardstanding areas at the turbines and substations will all be left in place on the site along with all the electrical transmission and control cables that have been direct buried in the peat across the site and in ducts at road crossings. The existing drainage network will also be left in place. It is not proposed to block any of the drains to re-wet the site.

There will be no activity related to the wind farm on the site after decommissioning. Therefore, the sustained surcharge loads on the peat from the floating roads and the material deposition areas will not have a significant effect on the stability of the peat after decommissioning.

The turbine foundations and hardstanding areas are constructed on glacial till and rock below the peat so they will not have a significant negative effect on site stability. They will provide some permanent support to the peat upslope from the turbines, which is a **Slightly Significant *positive*** effect on peat stability. However, the site stability is not dependent on this support.

The improved drainage network will continue to have a sustained **positive** effect on peat stability post decommissioning that is **Moderately Significant** relative to the baseline conditions on the site prior to construction. No maintenance works will be carried out on the drainage after decommissioning. Therefore, the efficiency and capacity of the drains could reduce gradually over time if they become clogged due to vegetation growth. This would reduce the positive effect on the stability of the peat to **Slightly Significant**.

Gort Wind Farms Ltd. will not have any control over the activities that will be carried out on site after decommissioning. However, the long-term residual effects of impacts on peat stability will be the same as the post-decommissioning effects for the Retained Development provided that no work is carried out on the site to alter or modify the development, and provided that future uses of the site do not exceed the original design criteria, as set out in the Safety File that will be handed over by GWFL when decommissioning is completed.

Cumulative impacts on soils, geology and land on the wind farm site will be limited to areas where mechanical peat extraction is carried out in the turbary areas during decommissioning, which is unrelated to the Prospective Development and outside the control of Gort Wind Farms Ltd.

The annual volume of peat extraction in the turbary area is low so the cumulative direct impact on the peat is only **Slightly Significant**.

The effect that cumulative impacts related to mechanical peat harvesting would have on peat stability would depend on the extent to which mitigation measures recommended by GWFL are implemented

by the turbary rights holders. If the recommended mitigation measures are not adopted, then the effect on the stability of the peat could be **Moderately Significant to Significant**. If the recommended mitigation measures are adopted then the effect on the stability of the peat will be **Slightly Significant**. If no mechanical peat extraction is carried out in the turbary areas during decommissioning, then there will be no significant cumulative impacts.

Table 8-1: Summary of impacts of Wind Farm site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts)

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
Construction Stage – Phase 1 (2003) (prior to peat slide on 16th October 2003) **(Impacts which have occurred)**	› Dead load surcharge from floating roads constructed on the peat slopes with 0.6-1.0m of granular rockfill. › Live load surcharge from construction traffic on the floating roads. › Dead load surcharge from excavated peat, glacial till and occasionally weathered rock placed on the intact peat slopes in material sidecast areas adjacent to turbine foundation excavations.	› **[Positive Impact]** Reduction of groundwater levels and groundwater pressures in peat due to improved drainage. › **[Positive Impact]** Rockfill embankments constructed across slide area at T68 and T70, which act as a barrage with a positive effect on stability of disturbed peat within the slide area upslope from the roads. › No negative impacts.	› Live load surcharge on peat slopes from low ground bearing pressure construction & forestry equipment. › Local stability of temporary peat slopes around the perimeter of turbine foundation & hardstanding excavations. › Dynamic inertial loading on peat from blast-induced vibrations due to rock blasting in Borrow Pit BP-3. › Miscellaneous localised live loads on peat slopes from work related to tree felling and drainage.
Construction Stage – Phase 2 (2004/2005) (after the peat slide) **(Impacts which have occurred)**	› Dead load surcharge from the remaining floating roads constructed on the peat slopes with 0.6-1.0m of granular rockfill. › Live load surcharge on the new floating roads from the construction traffic used to construct the roads.	› **[Positive Impact]** Reduction of groundwater levels and groundwater pressures in peat due to improved drainage. › Dead load surcharge on the intact peat slopes from the excavated peat, glacial till and weathered rock in the material sidecast areas in the medium-term as the peat compressed and gained strength under the loads. › Live load surcharge from the construction traffic on the floating roads after the capacity and performance of the roads had been verified by full-scale proof load tests.	› Dead load surcharge from up to 1.0m of excavated peat placed on the peat slopes in designated repository areas. › Local stability of temporary peat slopes around the perimeter of turbine foundation & hardstanding excavations. › Live load surcharge on peat slopes from low ground bearing pressure construction & forestry equipment. › Dynamic inertial loading on peat from blast-induced vibrations due to rock blasting in Borrow Pit BP-3. › Miscellaneous localised live loads on peat slopes from work related to tree felling, drainage and cable-trenching.
Operation & Maintenance Phase 2005-2022 **(Impacts which have occurred)**	None	› **[Positive Impact]** Sustained long-term reduction of groundwater levels and groundwater pressures in peat due to maintenance of improved drainage network. › No negative impacts	› Increased dead load surcharge on the peat from crushed rock granular fill used to re-surface 4.5km of floating roads in 2014 (150mm capping + 20mm surfacing). › Live load surcharge on the floating roads from maintenance vehicles, trucks and

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
			mobile cranes used to carry out repairs to the access tracks, turbines and substation; › Occasional live loads on the peat slopes from low ground bearing pressure equipment used for the cable installations, drainage improvements, tree felling (west of the windfarm), and topping/felling small trees on the windfarm site. › Localised surcharge load from temporary timber stockpiles at T3, T19 & Coillte forestry track on west side of windfarm. › One-off localised live load surcharge (10kPa) on the peat from a large mobile crane that went off the road and overturned at Turbine T40 in 2007.

**all stability impacts are negative unless otherwise stated*

Table 8-1 (Contd.): Summary of impacts of Wind Farm site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts)

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
Ceased Operation Phase (2022-2024) **(Impacts which are occurring)**	None	› **[Positive Impact]** Sustained long-term reduction of groundwater levels and groundwater pressures in peat due to improved drainage network – relative to baseline condition in 1998, prior to construction. › No negative impacts	› **None** – i.e. effect of dead load surcharge from the floating roads, peat repository sites and material sidecast areas on the peat is **Not Significant** because the underlying peat has compressed and increased in shear strength under the sustained loads to reduce the risk of a peat slide to **Negligible.**

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
Decommissioning Phase (2025) **(Impacts which are likely to occur)**	None	None	› Live load surcharge on the floating roads from construction vehicles, trucks, low-loader transporters and mobile cranes used to dismantle turbines and substation and transport the components offsite for re-use, recycle or disposal in a suitably licensed facility. › The additional dead and live load surcharge where the existing floating roads will be temporarily widened at junctions near T1, T14 and T68, and along narrow sections of the tracks in the turbary area between T35 and T45, and between T43 and T46. › Live load surcharge on the peat from LGBP wide-track excavators and ATV that will be used to take down and remove OHL and timber polesets between PS-1a and PS-4.
Impacts after Decommissioning (the Retained Development) & Residual Impacts (in accordance with Safety File) **(Impacts which are likely to occur)**	None	› **[Positive Impact]** Sustained long-term reduction of groundwater levels and groundwater pressures in peat due to improved drainage network – relative to baseline condition in 1998, prior to construction. Reduces to **Slightly Significant** over time as drains become clogged by vegetation, resulting in partial restoration of groundwater levels on site. › No negative impacts	› **[Positive Impact]** Permanent support provided to the peat slopes by the turbine foundations and crane hardstandings, which are constructed on rock and glacial till below the peat. › **[Note – the stability of the peat slopes does not rely on this effect]** › No negative impacts

**all stability impacts are negative unless otherwise stated*

8.2 Overhead Line

8.2.1 The baseline

The available desktop information and the numerous geotechnical site investigations and walkover surveys undertaken on the wind farm site have been used to interpret the baseline Soils, Geology and Land conditions in 1998, prior to construction.

The grid connection comprises the Derrybrien-Agannygal 110 kV Overhead Line (OHL) and Agannygal Substation and associated ancillary works. The substation connects into the existing Shannonbridge-Ennis 110kV Overhead Line.

The OHL route is 7.8 km long and is aligned essentially north-south. The OHL route extends from the lower slopes of Cashlaundrumlahan Mountain (location of windfarm site) to the Agannygal Substation located about 1 km to the north of Lough Atorick. The OHL is supported on double pole sets and mast structures founded in the underlying competent ground.

The OHL route is covered by blanket peat (BktPt) with locally glacial till (TDSs) present. There are occasional bedrock exposures (Rck), particularly along the banks of the nearby streams and watercourses, together with alluvium (A).

The depth of peat recorded along the route ranged from 0.2 to 5.6 m with an average depth of 1.35 m. The peat is generally shallower along the northern part of the route, where the terrain is relatively steeper on the lower slopes of Cashlaundrumlahan Mountain. The deeper peat, say greater than 2.5 m, is localised in a few flatter areas within the southern part of the route.

Typically, glacial till was encountered below the peat at depths that ranged from 0.2 to 5.6 m, though locally glacial till was at or close to the surface below a layer of peaty topsoil.

Bedrock along the OHL route comprised of Sandstone, Siltstone and Conglomerate of the Ayle River Formation.

There are no audited or unaudited geological heritage sites identified on the along the OHL route on the Geological Survey of Ireland (GSI) Spatial Resources interactive map viewer.

Along the grid line route, the GSI landslide susceptibility ranges from generally 'moderately low' to 'low' with localised areas of 'moderately high'. The path of the 110 kV overhead line crosses zones of Moderately Low and Moderately High susceptibility from the substation on the wind farm site to the crossing of the R353 near Flaggy Bridge which reflects more challenging conditions. However, this is not unusual for overhead transmission lines. To the south of the R353 the topography is varied and there are also broad zones of Low susceptibility along the route of the 110 kV overhead line. The site of the Agannygal substation is in an area of Low susceptibility, which is suitable for the project.

The land use along the OHL route and at the Agannygal Substation prior to construction was essentially managed commercial forestry.

The blanket bog has been degraded due to drainage, forestry and turf cutting and is 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 considered, the overall ecological value of the habitat is of Local Importance (higher value), which would be equivalent to a Medium to Low sensitivity. However, when combined with the additional environmental value of the peat as a carbon store as well as the relatively low commercial value of the land for forestry/agriculture, this is sufficient to raise the combined baseline sensitivity of the peatland habitat to "**MEDIUM**".

8.2.2 Impacts of the Development

Impacts on soils, geology and land have been assessed over the following stages of the project:

- Impacts that have occurred:
  - Construction Phase (2003-2006).
  - Operation and Maintenance Phase (2006-2022).
- Impacts that are occurring:
  - Ceased Operations Phase (2022-Present).
- Impacts that are likely to occur:
  - Decommissioning Phase (2025).
  - Post-Decommissioning Phase (the Retained Development).

Impacts of project activities have been assessed as Direct Impacts and Stability Impacts. Direct Impacts are those that are assessed based on the direct physical impact on the receiving soils, geology and land. Stability Impacts are direct impacts where the effect on the receiving soils, geology and land increases or decreases the risk of instability, typically in the peat, potentially triggering a large peat slide as a worst-case scenario.

The assessment has been carried out in accordance with the 2022 EPA Guidelines on Information to be Contained in Environmental Impact Assessment Reports (EIAR). The assessment of stability impacts has also been assessed in accordance with current best practice guidelines for peat landslide hazard and risk assessments. Specific consideration has been given to the peat failures that occurred on the wind farm site during construction, particularly the large peat slide that occurred in October 2003.

8.2.2.1 Direct Impacts

Nearly all significant direct impacts on soils, geology and land occurred during the construction phase of the project, including:

- Tree felling.
- Construction of temporary access tracks.
- Deposition and storage of surplus excavated materials.
- Construction of the Agannygal substation and control building.
- Construction of the twin polesets and masts for the overhead 110kv line.
- Loading of competent ground at poleset and mast locations.
- Ground lowering below the existing 400kV line.

These direct impacts have resulted in only **Slightly Significant** effects on the receiving soils, geology and land

Most of the maintenance works that were carried out on the site over the operational life of the wind farm between 2006 and 2022 would have had negligible direct impacts on the receiving soils, geology and land.

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 110kV OHL, which have been assessed as **Slightly Significant**.

8.2.2.2 Stability Impacts

All the stability impacts that have significant effects on the receiving soils, geology and land relate to the blanket bog that covers the site and surrounding area. Prior to construction of the wind farm the bog had been degraded by drainage, forestry plantations and peat harvesting. Therefore, the baseline sensitivity of the soils, geology and land that could be impacted by the project has been assessed as

MEDIUM based on a combination of the ecological value of the bog, the significance of carbon storage in the peat and the value of the land for forestry, agriculture and turbary rights. There are no recorded Geological Heritage Sites in the area.

Table 8-2 gives a summary of the impacts that had significant effects on the stability of the peat for the different phases of the Project. In accordance with the 2022 EPA Guidelines "Significant" impacts include those that have been qualitatively assessed on a scale from Slight to Profound based on the severity of the interpreted effect on the peat and the sensitivity of the receiving soils, geology and land.

None of the Project activities had impacts that have been assessed as having **Very Significant** or **Profound** effects on the stability of the soils, geology and land in the Project area, which is largely due to the relatively low ecological importance and baseline sensitivity of the receiving environment. This chapter also identifies stability impacts of site activities which had effects that were **Not Significant** or **Imperceptible**.

The significance of the impact of the following primary work activities with regards to site stability during this period was Slight:

- Tree felling.
- Construction of temporary access tracks.
- Deposition and storage of surplus excavated materials.
- Construction of the Agannygal substation and control building.
- Construction of the twin polesets and masts for the overhead 110kv line.
- Ongoing loading of competent ground at poleset locations.

The following primary effects of the construction stage activities did not have a significant direct impact with regards to site stability use during construction:

- Upgrade of an existing founded Coillte track.
- Construction of a new access road to the Agannygal substation.
- Ground lowering below the existing 400kV line.

Most of the maintenance works that were carried out on the site over the operational life of the wind farm between 2006 and 2022 would have had a **Slightly Significant** stability impact on the receiving soils, geology and land. This would include the felling of forestry regrowth along the OHL.

There are no ongoing impacts on site stability that have changed in significance since the construction phase, and therefore no reassessment of the effect of these impacts on site stability has been included.

Decommissioning the Project in 2025 will broadly involve the dismantling and removal of all above ground structures on the grid connection route, including the Agannygal substation. 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 impact is assessed as Very low. The overall potential significance of these impacts during decommissioning is Slight.

Gort Wind Farms Ltd. will not have any control over the activities that will be carried out on site after decommissioning. However, the long-term effects of residual impacts on peat stability will be the same as the post-decommissioning effects for the Retained Development provided that no work is carried out on the site to alter or modify the Retained Development, and provided that future uses of the site will not exceed the original design criteria for the Retained Development, as set out in the Safety File that will be handed over by GWFL when decommissioning is completed.

8.2.2.3 Cumulative Impacts

The cumulative impacts due to adjacent projects and activities in and around the project area have also been assessed. It was concluded that there are no significant cumulative direct or stability impacts due

to other windfarm projects in the area, due to adjacent forestry plantations that are not part of the Project, or from peat extraction or turf cutting outside the project area.

8.2.2.4 Remedial (Mitigation) Measures and Monitoring

Mitigation of Stability Impacts

None of the impacts of the site activities had a **Significant** or **Moderately Significant** effect on the peat with respect to site stability.

- Tree Felling: Tree felling works were carried out by experienced specialist subcontractors under the management of Coillte. The trees were felled and gathered using specialised forestry equipment comprised of a wide-tracked hydraulic excavator fitted with a harvesting attachment and 8-12 tonne rubber-tyred forwarders that have been widely used in commercial conifer forests on upland blanket bogs in Ireland.
- In areas of soft peat the contractors placed timber brash and trimmed branches along the access routes of the harvesters and forwarders through the forest to spread out the concentrated live load surcharge under the tracks or tyres of the machines.
- Access Track: In a single area of deep peat along the route of the OHL, a temporary floating access was constructed in order to provide access to AM38, around 600m north of the Agannygal substation. In this instance existing trees were felled and placed to form a 'floating road' mat of timber on the OHL corridor for access to the mast location. This mat of timber would spread the dead load of the road evenly over the surface of the intact peat.
- For the remainder of the grid connection, access to the masts was from existing roads and forestry tracks. Construction for access to masts consisted of removal and disposal locally of peat (less than 1m typically) and tree stumps/brash to competent material to allow access for tracked excavators and dumpers and a rough terrain crane.

The impacts of site activities during decommissioning that could have a Slightly Significant effect on the peat with respect to site stability are limited to:

- Forestry – Felling of regrowth.
- Removal of the Grid Connection Polesets (Deep Peat Area).

No additional mitigation measures are proposed for these activities outside of the procedures described in the Decommissioning Management Plan

After decommissioning there will be no more activity or works related to the wind farm on the site. The site will be returned to the landowner and Gort Wind Farms Ltd. will not have any involvement in future land use or site activities. Therefore, for the post-decommissioning phase the primary mitigation measure that will mitigate the impact of the Retained Development on the peat is the compilation and handover of the **Safety File** for the Project to the landowner.

8.2.3 Conclusion

Nearly all significant direct impacts on soils, geology and land on the OHL occurred during the construction phase of the project.

Table 8-2 gives a summary of the **impacts that had significant effects on the stability of the peat** for the different phases of the Project. None of the Project activities had impacts that have been assessed as having **Very Significant** or **Profound** effects on the stability of the soils, geology and land in the Project area, which is largely due to the relatively low ecological importance and baseline sensitivity of the receiving environment. Stability impacts of site activities which had effects that were Not Significant or Imperceptible are also identified.

Most of the maintenance works that were carried out on the site over the operational life of the wind farm between 2006 and 2022 would have had a **Slightly Significant** stability impact on the receiving soils, geology and land. This would include the felling of forestry regrowth along the OHL.

Decommissioning the Project in 2025 will broadly involve the dismantling and removal of all above ground structures on the grid connection route, including the Agannygal substation. 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 impact is assessed as **Very low.** The overall potential significance of these impacts during decommissioning is **Slight.**

There are no significant cumulative direct or stability impacts along the OHL due to other windfarm projects in the area, due to adjacent forestry plantations that are not part of the Project, or from peat extraction or turf cutting outside the project area.

Table 8-2: Summary of impacts of Grid Connection site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts)

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
Construction Stage – (2003 - 2005) **(Impacts which have occurred)**	None	None	› Dead load surcharge from surplus excavated material. › Live load surcharge on peat slopes from low ground bearing pressure construction & forestry equipment. › Surcharge from temporary access track (AM38) › Excavation for construction of twin pole sets and angle masts. › Construction of substation and angle masts and pole sets on competent ground.
Operation & Maintenance Phase 2005-2022 **(Impacts which have occurred)**	None	None	› Live load surcharge on peat slopes from low ground bearing pressure construction & forestry equipment.
Ceased Operation Phase (2022-2024) **(Impacts which are occurring)**	None	None	None
Decommissioning Phase (2025) **(Impacts which are likely to occur)**	None	None	› Live load surcharge on peat slopes from low ground bearing pressure forestry equipment.

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
Residual Impacts after Decommissioning **(Impacts which are likely to occur)**	None	None	None

**all stability impacts are negative unless otherwise stated*

8.3 Peat Slide and Associated Works

8.3.1 The Baseline

The available desktop information and the numerous geotechnical site investigations and walkover surveys undertaken on the wind farm site have been used to interpret the baseline Soils, Geology and Land conditions in 1998, prior to construction.

The peat slide which occurred in 2003 covered about 25 ha (within the source area) and contained an estimated peat volume of about 450,000 m^3. The associated works included the measures undertaken in response to the peat slide, which comprised the rebuilding of short sections of access tracks within the wind farm site at two locations in the vicinity of T68 and between T23 and T70, the rebuilding of a section of access track on Coillte lands outside of the site, and the construction of 8 no. containment barrages (1 to 4 and A to D) and 3 no. repositories. Of the constructed barrages, 4 no. barrages (A to D) were temporary and are no longer present. Stone from a borrow pit nearby to Barrage 1 was used for some local barrage construction. Bridge repair works were undertaken on the Flaggy Bridge and the Black Bridge, Unnamed Bridge C was replaced, and a set of stepping stones were also replaced

In general, the land use prior to the peat slide and the associated works was dominantly managed commercial forestry with some agricultural (pastoral) land.

The topography and land-use for all 8 no. barrages (1 to 4 and A to D) and 3 no. repositories is summarised below.

Barrage 1 and Replaced Access Track
Containment barrage 1 is located within the source area of the peat slide about 1.2 km downslope of the head of the source area. The barrage was constructed to contain peat debris but it also provides part of the replacement access road for the previous forestry access that was destroyed during the peat slide.

Barrage 2 and Repository Area
Containment barrage 2, which is predominantly constructed from large boulders, is located within the downstream end of a narrow steep-sided channel at approximately 245 m AOD. The footprint of the barrage is approximately 17 m long and 20 m wide. The general area comprises level ground, except within the stream channel, which is incised some 3 to 4 m.

There is a repository area adjacent to barrage 2 which comprises 2 no. separate storage areas used for storage of material removed from the upslope face of the barrage. The footprint of the repository is approximately 108 m long and 34 m wide.

Barrage 3 and Repository Area
Containment barrage 3, which is predominantly constructed from large boulders, is located within the stream channel at 180 m AOD. At the barrage site, rock is exposed within the stream channel. The general area comprises level ground. The footprint of the barrage is approximately 41 m long and 9 m wide. There is a sunken repository area adjacent to barrage 3 used for storage of material removed from the upslope face of the barrage. The footprint of the repository is approximately 41.5 m long and 16 m wide.

Barrage 4
Containment barrage 4, which is predominantly constructed from large boulders is located within the stream channel at 170 m AOD. At the barrage site, rock is exposed within the stream channel. The

general area comprises level ground. The footprint of the barrage is approximately 25 m long and 10 m wide.

Repository at Black Road Bridge
The repository at Black Road Bridge is located to the east of the stream on essentially level ground within Coillte land at 200 m AOD. The repository comprises 2 no. separate storage areas used for storage of slide debris that accumulated on the open area of ground above the Black Road Bridge. The north west section is approximately 130 m long and 73 m wide with an estimated area 5322 m2, the south east section is approximately 68 m long and 51 m wide; estimated area 2898 m2.

Temporary Barrages A to D
Temporary containment barrages were constructed after the peat slide event from October to November 2003 and were subsequently eroded or removed sometime after the slide event. Date of removal is not known. The location and dimension of these temporary barrages is estimated.

The peat slide and associated work sites are dominated by blanket peat (BktPt) with locally glacial till (TDSs) present. There are occasional bedrock exposures (Rck), particularly along the banks and bed of the stream, together with alluvium (A).

The peat slide and associated works do not lie on or effect any designated Geological Heritage sites.

Within the peat slide and associated works areas, the GSI landslide susceptibility ranges from generally 'moderately low' to 'low'.

As the soils, geology and land use for the Peat Slide response works site, and those lands which could be impacted by a peat slide, are predominantly consistent with the Wind Farm site, the sensitivity of the soils geology and land is also assessed as **MEDIUM.**

8.3.2 Impacts of the Development

Impacts on soils, geology and land have been assessed over the following stages of the project:

- Impacts that have occurred:
  - Construction Phase (2003-2006).
  - Operation and Maintenance Phase (2006-2022).
- Impacts that are occurring:
  - Ceased Operations Phase (2022-Present).
- Impacts that are likely to occur:
  - Decommissioning Phase (2025).
  - Post-Decommissioning Phase (the Retained Development).

Impacts of project activities have been assessed as Direct Impacts and Stability Impacts. Direct Impacts are those that are assessed based on the direct physical impact on the receiving soils, geology and land. Stability Impacts are direct impacts where the effect on the receiving soils, geology and land increases or decreases the risk of instability, typically in the peat, potentially triggering a large peat slide as a worst-case scenario.

8.3.2.1 Direct Impacts

The significance of the effect of the following primary work activities on soils, geology and land use during the Construction Phase was **Slightly Significant**:

- Construction of barrages to restrict movement of slide debris (peat).
- Construction of peat repositories to store slide debris.
- Construction of borrow pit adjacent to barrage 1.

- Construction traffic on intact peat.
- Construction of floating access tracks to location of barrage 1 and 2.

The maintenance works that were carried out on the site over the operational life of the wind farm between 2006 and 2022 would have had **Slight** direct impact on the receiving soils, geology and land.

There are no primary work activities proposed for the peat slide and response works during the decommissioning phase. As such, there will be no impact on the peat slide and response works.

8.3.2.2 Stability Impacts

All the stability impacts that have significant effects on the receiving soils, geology and land relate to the blanket bog that covers the site and surrounding area. Prior to construction of the wind farm the bog had been degraded by drainage, forestry plantations and peat harvesting. Therefore, the baseline sensitivity of the soils, geology and land that could be impacted by the project has been assessed as **MEDIUM** based on a combination of the ecological value of the bog, the significance of carbon storage in the peat and the value of the land for forestry, agriculture and turbary rights. There are no recorded Geological Heritage Sites in the area.

Table 8-3 gives a summary of the impacts that had significant effects on the stability of the peat for the different phases of the Project. In accordance with the 2022 EPA Guidelines "Significant" impacts include those that have been qualitatively assessed on a scale from Slight to Profound based on the severity of the interpreted effect on the peat and the sensitivity of the receiving soils, geology and land.

The significance of the impact of the following primary work activities with regards to stability during the Construction Phase was **Significant:**

- Peat slide - debris.
- Construction of floating access tracks to location of barrage 1 and 2.

Immediately after the slide event there was a considerable amount of peat debris that moved downslope following an existing natural valley. The highly fluid debris would have been notably unstable and would have caused erosion of the stream channel. As the debris was essentially confined in a stream/river channel, the risk of the load from the debris causing further ground failure was limited, and there was possibly very localised failure/erosion of the stream banks. The impact with regards to stability would have been initially High which over time to the present the impact reduced to Negligible to Very low. The overall significance of the effect of these impacts during the construction phase (2003 - 2006) is **Significant**.

As the floating tracks were constructed on peat there would be an elevated risk of instability. The highest risk for instability is in the short-term undrained condition during construction. Over time, the peat consolidates and increases in strength under the weight of the road, which significantly reduces the risk of peat instability. No failures of floating road resulting in peat slides have occurred on the project. The overall significance of the effect of these impacts during the construction phase (2003 - 2006) is **Significant.**

The significance of the effect of the following primary work activities with regards to stability during this period was **Slight**:

- Construction of barrages to restrict movement of slide debris (peat).
- Construction of peat repositories to store slide debris.
- Construction traffic on intact peat.
- Construction of borrow pit adjacent to barrage 1

The following primary effects of the construction stage activities did not have a significant direct effect with regards to stability during construction:

- Repairs to the Black Road Bridge, Flaggy Bridge and Unnamed Bridge C.
- Replacement of stepping stones.

Repairs to the Black Road Bridge, Flaggy Bridge and Unnamed Bridge C were carried out due to damage as a result of the peat slide debris. These repairs were of structural nature and the effect with respect to stability was **Not Significant**.

The significance of the impact of the following primary effects with regards to stability during the Operation and Maintenance period was **Slight**:

- Maintenance of barrages.

The significance of the impact of the following primary effects on stability during the ceased operation period was **Slight**:

- Peat slide - source area.
- Peat slide - debris.
- Floating access track to location of barrage 1 and 2.

There are no primary work activities proposed for the peat slide and response works during the decommissioning phase. As such, there will be no impact on peat stability in relation to the peat slide and response works.

Gort Wind Farms Ltd. will not have any control over the activities that will be carried out on site after decommissioning. However, the long-term effects of residual impacts on peat stability will be the same as the post-decommissioning effects for the Retained Development provided that no work is carried out on the site to alter or modify the Retained Development, and provided that future uses of the site will not exceed the original design criteria for the Retained Development, as set out in the Safety File that will be handed over by GWFL when decommissioning is completed.

8.3.2.3 Cumulative Impacts

The cumulative impacts due to adjacent projects and activities in and around the project area have also been assessed. It was concluded that there are no significant cumulative direct or stability impacts due to other windfarm projects in the area, due to adjacent forestry plantations that are not part of the Project, or from peat extraction or turf cutting outside the project area.

8.3.2.4 Remedial (Mitigation) Measures and Monitoring

Mitigation of Direct Impacts

The site activities and corresponding direct impacts that had a **Slightly Significant** effect on the soils, geology and land were:

- Construction of barrages to restrict the movement of slide debris.
- Construction of Repositories to Store Slide Debris.
- Construction traffic on intact peat.
- Construction of borrow pit adjacent to Barrage 1.

Each of the above activities were constructed in response to the peat slide.

In order to restrict the movement of the slide debris, which was essentially peat, a series of barrages were constructed. These were constructed between the wind farm project site boundary and downslope of the Flaggy Bridge on the R353 local road. The permanent barrages (1-4) comprised coarse rock fill which was placed onto competent ground.

Mitigation of Stability Impacts

The direct impact of the site activities that had a **Significant** effect on site stability was:

- Construction of floating access tracks to Barrages 1 and 2.

Both access tracks were designed to the appropriate standards and constructed using low pressure bearing pressure excavators when working on peat or were constructed from the existing section of track. Construction of these tracks was closely monitored to ensure that no peat stability issues arose.

The site activities and direct impacts that had a **Slightly Significant** effect were:

- Construction of Barrages 1 to 4.
- Construction of Repositories to Store Slide Debris.
- Construction traffic on intact peat.
- Construction of borrow pit adjacent to Barrage 1.

In order to restrict the movement of the slide debris, which was essentially peat, a series of barrages were constructed. These were constructed between the wind farm project site boundary and downslope of the Flaggy Bridge on the R353 local road. The permanent barrages (1-4) comprised coarse rock fill which was placed onto competent ground, which avoided any loading of peat.

The majority of the peat was stored to a maximum depth of 1.0 m in designated repository areas on the intact peat slopes in suitable areas of flat or gently sloping ground on the site.

Site controls were implemented on site for the use of the peat repository areas, i.e.:

- The boundaries of the approved repository sites were clearly marked out on site with survey tape between probe locations.
- The depth of excavated peat that was placed in the site was strictly limited to 1.0 m and no temporary stockpiling was permitted on the peat slopes.

Construction traffic was required to pass over intact peat during the construction of some of the barrages, peat repositories and other construction activities. In general, construction machines that trafficked over particularly deeper peat would have been light or low ground bearing pressure (LGBP) wide-tracked machines suitable for working on the peat. The risk of a peat slide under such machines loading would be limited.

The following design, construction & operational risk mitigation measures were implemented for the maintenance of barrages 1 and 2:

- All maintenance operations were carried out from the access tracks adjacent to the barrages which were designed to support the loads from the vehicles and equipment on the glacial till below the peat.

There are no site activities proposed relating to the peat slide and response works that will be undertaken during the decommissioning of the wind farm. As such, no mitigation measure are proposed relating to the peat slide and response works.

8.3.3 Conclusion

All significant direct impacts on soils, geology and land from the Peat Slide and Associated Works occurred during the construction phase of the project.

Table 8-3 gives a summary of the **impacts that had significant effects on the stability of the peat** for the different phases of the Project. None of the Project activities had impacts that have been assessed as having **Very Significant** or **Profound** effects on the stability of the soils, geology and land in the Project area, which is largely due to the relatively low ecological importance and baseline sensitivity of the receiving environment. Stability impacts of site activities which had effects that were Not Significant or Imperceptible are also identified.

For the peat slide response works the effects of the construction of the barrages, borrow pits, peat repositories and temporary access roads on the receiving soils, geology and land were considered to be **Slightly Significant**.

In response to the slide a number of temporary and permanent retention barrages were constructed within the slide area and along the debris flow path. These had a **positive** impact in terms of site stability by controlling further peat discharges from the source area and by containing some of the displaced peat that flowed downstream along the river channel.

While there were negative site stability impacts associated with the construction of various temporary floating access tracks and bunded repositories to access and store the displaced peat, the effect that these had on soils, geology and land was considered to be Slightly Significant, primarily based on their site location, ground conditions, topography, loadings and the extent of a potential slide event which could be caused.

The stability impacts associated with the disturbed peat in the source area and the remaining peat debris downslope are currently considered to be **Slightly Significant**. This is mainly due to drainage and revegetation of the peat in the source area, degradation of the deposited peat debris along the flow footprint, and the positive impact that the barrages have on site stability, particularly 1 and 2.

There are no primary work activities proposed for the peat slide and response works during the decommissioning phase. As such, there will be no impact on peat stability in relation to the peat slide and response works.

Gort Wind Farms Ltd. will not have any control over the activities that will be carried out on site after decommissioning. However, the long-term residual effects of impacts on peat stability will be the same as the post-decommissioning effects for the Retained Development provided that no work is carried out on the site to alter or modify the development, and provided that future uses of the site do not exceed the original design criteria, as set out in the Safety File that will be handed over by GWFL when decommissioning is completed.

Table 8 3: Summary of impacts of Peat Slide Response Measures site activities on soils, geology and land that had significant effects with regard to site stability (i.e. Stability Impacts)

	*Stability Impacts with Significant Effects	*Stability Impacts with Moderately Significant Effects	*Stability Impacts with Slightly Significant Effects
Construction Stage – (2003 - 2005) **(Impacts which have occurred)**	› Intrinsic stability of peat in peat slide source area and in peat slide debris	› Construction of floating access tracks at Barrage 1 and Barrage 2.	› Construction of barrages to restrict movement of slide debris (Initially negative impact, positive impact once constructed) › Live load surcharge on peat slopes from low ground bearing pressure construction & forestry equipment. › Loading on peat from peat repositories to store slide debris › Construction of borrow pit adjacent to Barrage 1.
Operation & Maintenance Phase 2005-2022 **(Impacts which have occurred)**	None	None	› Loading of peat from the works associated with maintenance of barrages.
Ceased Operation Phase (2022-2024) **(Impacts which are occurring)**	None	None	› Stability of material in peat slide source area and peat slide debris flow.
Decommissioning Phase (2025) **(Impacts which are likely to occur)**	None	None	None
Residual Impacts after Decommissioning **(Impacts which are likely to occur)**	None	None	None

**all stability impacts are negative unless otherwise stated*

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.

The Retained Development is not anticipated to give rise to any significant impacts related to flood risk locally or downstream of the site. Similarly, on the broader regional scale, any change in flood risk

associated with the Project is deemed imperceptible given the broader extent of the Boleyneendorrish and Owendalulleegh catchments. The Project is therefore in overall compliance with the objectives of the Planning and Flood Risk Management Guidelines.

Water quality effects associated with the Retained Development are discussed in detail in Chapter 7 – Biodiversity – Aquatic Ecology & Fisheries. No mitigation measures are deemed required for these effects.

9.3 Conclusion

It is concluded that the Retained Development is not anticipated to give rise to any significant adverse effects on the drainage flow regime and flood risk classification or result in any significant adverse hydrological or hydrogeological effects both on-site or off-site.

10. AIR AND CLIMATE

10.1 Air

10.1.1 The baseline

In 1999, the third Environmental Protection Agency (EPA) air quality report[2] covering the year 1998, the project baseline year, was published by the EPA. It reported on air quality data for a variety of air pollutants in Ireland assessing them against the air quality standards. Monitoring was undertaken at mainly Local Authority stations and some EPA sites. These monitoring locations were essentially all urban in nature (the major urban areas) with additional Ozone monitoring related rural air quality monitoring stations in operation.

At this time, air quality monitoring remained concentrated mainly on smoke and sulphur dioxide (SO_2) with simultaneous measurement of daily values of the two pollutants at almost 60 monitoring sites throughout the country but mainly in urban areas. Measurement values indicated that the levels of both smoke and SO_2 in 1998/99 were very low and fully in compliance with the Irish air quality standards and the EU Directive on SO_2 and particulates.

The monitoring of particulate matter of ten microns in size or less (PM_{10}) was focused on four stations in Dublin and indicated a continuing trend in high concentrations which were closely associated with heavy traffic (the annual mean PM_{10} level in 1998 was 49 $\mu g/m^3$ and daily values exceeded 50 $\mu g/m^3$ on approximately 40 percent of days for which measurements were made.

Monitoring of Nitrogen oxides, a significant air pollutant, was also carried out in some urban area (Cork and Dublin) with monitoring indicating general compliance with air quality standards. However, in semi urban areas levels of Nitrogen Dioxide (NO_2) were identified as being related to traffic and approaching new target limits set by the European Union (EU).

Ozone levels recorded during 1998 were very low, which was regarded by the EPA as typical of the normal situation in Ireland. There were a few exceedances of the EU thresholds for the protection of human health (eight-hour health protection threshold of 110 $\mu g/m^3$ was exceeded for one or more periods on a total of only 10 days. There were no occasions when hourly mean ozone exceeded 180 $\mu g/m^3$ during 1998).

[2] *http://www.epa.ie/pubs/reports/air/quality/epaairqualityreport1998pdf.html*

In relation to the thresholds for the protection of vegetation, the one-hour value of 200µg/m^3 was not reached but the 24-hour threshold of 65 µg/m^3, which was close to the Northern European background level, was exceeded on as many as 294 days at the Mace Head station on the west coast of Ireland and also regularly at the other monitoring stations.

The1999 Report also identified ambient lead associated with traffic as being very low in line with the phasing out of leaded petrol in motor vehicles with annual mean concentrations recorded being five percent of the limit value of 2 µg/m^3.

Carbon monoxide data collected in Dublin City indicated that levels were well within the World Health Organization (WHO) guidelines for both one-hour and eight-hour averaging periods.

The 1999 Report also identified the clear need to expand the air quality monitoring network in Ireland to meet the requirements of EU and National legislation. This legislation also expanded the parameters to be monitored across the country. This was subsequently implemented through an expanded Network of monitoring stations.

10.1.2 Impacts of the Development

10.1.2.1 Construction Phase Impacts (2003-2006)

10.1.2.1.1 *Air Quality*

The construction of the Derrybrien Wind Farm site occurred at specific locations within the site and involved site preparation, access track and hardstand construction, foundation excavations for the wind turbine generators, substation and control building and materials and turbine deliveries. All of these activities could give rise to airborne dust. The operation of construction equipment gives rise to combustion emissions such as carbon dioxide, nitrogen oxides and sulphur oxides from combustion of fossil fuels. In terms of air quality these could give rise to respiratory effects at high concentrations. The peat slide event and associated remedial works also had the potential to contribute to dust and exhaust emissions. This is further discussed in Chapter 10 Section 10.1.4.

As set out in Chapter 10, the distance between construction activities and the nearest occupied dwellings, ensured that any emissions generated during these activities was unlikely to reach sensitive receptors at concentrations that would result in health effects. Furthermore, the short-term nature of construction activities, along with the implementation of measures outlined in Chapter 10 Section 10.1.4, reduced the potential for emissions.

Therefore, the residual effect on air quality during the construction phase of the Project was negligible, indirect, and short term.

10.1.2.2 Operation and Maintenance Phase Impacts (2006 – 2022)

During the operational phase of the wind farm, the Project did not give rise to significant emissions to atmosphere and thus no adverse impact on general air quality has arisen. None of the air quality parameters for which limits values are set have been affected by the Derrybrien Wind Farm Development.

The Project had a beneficial effect in providing energy without emissions of recognised environmental pollutants through displacement of fossil fuel energy production with clean renewable energy. The positive significant benefit to air quality from a reduction in emissions of NO_x, CO, NMVOC, SO_x and $PM_{2.5}$ through displacement of fossil fuel combustion for electricity generation continued throughout the Project's operational period.

The effect of the Project's operational/maintenance phase was moderately positive, indirect, and long term on transboundary air quality.

10.1.2.3 Ceased Operation Phase Impacts (2022-Present)

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. Minimal movement of vehicles and plant has occurred on the Project site which could give rise to limited airborne dust and vehicle emissions.

Given the minimal works involved in maintaining the non-operational state of the Derrybrien Wind Farm Development, as well as distances to the nearest occupied dwellings the risk of airborne dust or dust deposition on human receptors is direct, imperceptible, neutral, and short term.

No significant effect is occurring during the ceased-operational phase of the wind farm site.

10.1.2.4 Impacts of Retained Development

Once the Prospective Development is complete (decommissioning of above ground structures and buildings) the remaining elements of the Project (the Retained Development) will be the at and below ground structures such as reinforced concrete foundations of the wind turbine and hard stand areas, farm, substation and the OHL structures, borrow pit/quarries and access tracks, the underground cabling and peat repositories etc.

As there will be no ongoing activities (e.g. vehicle/plant operation, material handling, or excavation) associated with the Retained Development, there will be no effect on air quality.

10.1.3 Conclusion

During the construction phase of the Project, including the period when the peat slide event occurred, localised air quality impacts would likely have occurred from dust generation and from vehicle exhaust emissions at the wind farm itself, along the overhead line route, and at the Agannygal Substation site. However, these would have been of short duration and given the distances from construction activity locations to the nearest occupied dwellings no significant impacts occurred. No significant negative air quality impacts occurred during the Operation and Maintenance phase of the Ceased Operation Phase of the Project. It is not anticipated that any air quality impacts will occur as a result of the Retained Development.

10.2 Climate

10.2.1 The baseline

Ireland 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.

The Met Eireann weather station at Shannon Airport, Co. Clare is the nearest weather and climate monitoring station to the Project site that has long-term meteorological data recorded for the 30-year period from 1991-2020. The monitoring station is located approximately 62km kilometres southwest of the site. Meteorological data recorded at Shannon Airport over the 30-year period from 1991 - 2020 is shown in Table 10-22 overleaf. 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.

Recent monthly meteorological data recorded at Shannon Airport, Co Clare, located approximately 62km southwest of the site, from January 2022 to January 2025 is available at: https://www.met.ie/climate/available-data/monthly-data. December 2023 was the wettest month in this time period, with 202.9mm of rainfall recorded, while March 2022 was the driest month with 39mm of rainfall. June 2023 was the warmest month in this time period, with a mean monthly temperature of 16.7° Celsius. December 2022 was the coldest month in this time period with a mean monthly temperature of 3.4° Celsius.

10.2.2 Impacts of the Development

10.2.2.1 Construction Phase Impacts (2003-2006)

The residual effects of greenhouse gas emissions arising from the construction phase of the Project had a short-term moderate negative effect. However, once emitted to the atmosphere, the greenhouse gas emissions that arose from construction phase activities will have a direct permanent moderate negative effect on Climate.

However as stated in Chapter 10 Section 10.2.5.4, after approximately 50 months (4.2 years) of operation, the Derrybrien Wind Farm had fully paid back the carbon cost of constructing the wind farm.

10.2.2.2 Operation and Maintenance Phase Impacts (2006-2022)

The Project displaced carbon dioxide from fossil fuel-based electricity generation, over the proposed 16-year lifespan of the Derrybrien Wind Farm. The wind farm became fully operational in 2006 and would have been displacing circa 55,541 tonnes of carbon dioxide annually from fossil fuel generation plant through the generation of circa 121,800 MWh annually of clean renewable electricity to the grid throughout the duration of its 16-year operational life. When considering these greenhouse gas emissions within the context of the national Electricity Sector Emissions Ceilings detailed in Chapter 10 Section 10.2.3.2 and Section 1.2.4 in **Appendix 10-1**, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO2eq; during the first carbon budget period the Derrybrien Wind Farm contributed a beneficial reduction to the first carbon budget period of approximately +0.03%.

Therefore, while there will be greenhouse gas emissions associated with the operation of the Project, this was offset by the operation of the Project within the 16-year operational life and the Project resulted in a benefit reduction of the first carbon budget period of approximately +0.03%.

Therefore, there will be an indirect long-term moderate positive effect on climate as a result of the operational phase of the Project.

10.2.2.3 Ceased Operation Phase Impacts (2022-Present)

After the cessation of the operational phase of the Project in 2022, the Project has had a direct short-term imperceptible negative effect. However, once emitted to the atmosphere, the greenhouse gas emissions that have arisen after the cessation of the operational phase will have a direct permanent imperceptible negative effect on Climate.

10.2.2.4 Impacts of Retained Development

Once the Prospective Development is complete (decommissioning of above ground structures), the remaining elements of the Project (the Retained Development) will result in greenhouse gas emissions due to the continued emissions of greenhouse gases from the disturbed and drained peatlands. This will have a short-term imperceptible negative effect on climate. However, once emitted to the atmosphere,

the greenhouse gas emissions arising from the disturbed and drained peatlands of the Retained Development will have a permanent imperceptible negative effect on Climate.

10.2.3 Conclusion

The Project resulted in the emission of approximately 232,205 tonnes of CO_2. Based on the annual renewable electricity production of Derrybrien Wind Farm and the estimated annual carbon fossil fuel electricity generation displacement saving the carbon costs required circa 4.2 years of operation to offset. When operational, the Derrybrien Wind Farm produced circa 121,500 MWh of renewable electricity annually, continuing to displace fossil fuel generators on the system – reducing greenhouse gas emissions and avoiding the need to import fossil fuel and its associated costs. Therefore, the overall effect of the Project on climate is long-term moderate and positive.

11. NOISE AND VIBRATION

11.1 The baseline

AWN Consulting Limited has been commissioned to conduct an assessment into the likely environmental noise and vibration impacts of the Derrybrien Wind Farm Development Decommissioning Project - Retained Development. The assessment includes consideration of

- Impacts which have already occurred during construction phase.
- Impacts which have already occurred during the operational phase.
- Impacts which have occurred and are occurring once operations had ceased.
- Impacts which are likely to occur as a result of the Retained Development.

The background noise environment has been established through noise monitoring surveys undertaken at two noise sensitive locations (NSLs), specifically for the assessment of wind turbine noise.

Typical background noise levels for day and night periods at various wind speeds have been measured in accordance with best practice guidance contained in the Institute of Acoustics document 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG). The results of the background noise survey were used to derived appropriate noise criteria for the development in line with the guidance contained in 'Wind Energy Development Guidelines for Planning Authorities 2006.

The characterisation of the receiving environment was supplemented by further noise surveys over a shorter time frame, at five additional locations which represent noise environment of the closest NSLs to the Derrybrien substation and the Borrow Pit/Quarry adjacent to Barrage 1 utilised during works completed following the peat slide on the site.

11.2 Impacts of the Development

The assessment of construction noise and vibration and has been conducted in accordance with best practice guidance contained in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration. It is not considered that there were any significant noise and vibration impacts associated with the construction phase and the likely noise from construction activity at the nearest NSLs was likely to be within recommended threshold values. The associated construction noise and vibration impacts are not expected to have caused any significant effects.

Based on detailed information on the site layout, the likely turbine noise emissions and turbine hub height for the Derrybrien Wind Farm Development, a series of turbine noise prediction models were prepared. The predicted turbine noise levels have been calculated in accordance with the IOA GPG recommendations. The assessment has confirmed that the residual turbine noise levels associated with the Project will be within the best practice noise criteria curves recommended in Irish guidance document 'Wind Energy Development Guidelines for Planning Authorities 2006. Therefore, it is not considered that a significant effect was associated with the Project.

11.3 Conclusion

No significant noise or vibration effects were associated with the construction or operation of the Project.

Following cessation of commercial electricity generation in 2022, there were no further noise or vibration effects due to the Derrybrien Wind Farm Development.

12. CULTURAL HERITAGE

12.1 The baseline

The recorded cultural heritage resource within a study area encompassing the Derrybrien wind farm site, including the peat slide remedial works, and the surrounding lands extending for 3km in all directions from its boundary was reviewed as part of the assessment. 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.

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 or at 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. 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.

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 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.

There are also no recorded archaeological sites or architectural heritage structures located within the environs of the Derrybrien-Agannygal 110kV Overhead line, Agannygal substation or the reinstatement works for the Ennis- Shannonbridge 110kV Overhead line.

12.2 Impacts of the Development

Given the baseline cultural heritage environment described above, it is concluded that the Retained Development will not result in any effects on the cultural heritage resource. Furthermore, it is concluded that the construction, operation and maintenance, and ceased operational phases did not result in any likely residual effects on the cultural heritage resource. No potential cumulative or in combination impacts on the cultural heritage resource are predicted to arise.

12.3 Conclusion

Based on the assessment undertaken in Chapter 12 of this rEIAR, it is concluded that the Retained Development, following decommissioning of Derrybrien Wind Farm Development, is not anticipated to result in any likely significant effects on the cultural heritage resource.

13. LANDSCAPE AND VISUAL

13.1 The baseline

Based on the description (past and present) of the receiving environment and analysis of previous and current landscape and visual amenity policy, the landscape and visual amenity characteristics and values can be summarised as follows:

- 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 (as well as the Derrybrien turbines) 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 Slieve Aughtys 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 Slieve Aughty Mountains, being an upland landscape, were identified as a High Scenic Amenity Area in the GCDP 1997. However, in comparison to the other uplands in the county (the Connemara Mountains), the Slieve Aughtys are not renowned for their scenery or recreation amenity. The Landscape Character Assessment which informed the GCDP post-2003 recognised the relatively limited amenities of the area, categorising the Slieve Aughty Mountains as an area of Class 2 Medium landscape value (from a possible ranking of Low, Medium, High or Outstanding). The landscape sensitivity of the area was categorised as Moderate

(from a possible ranking of Low, Moderate, High, Special or Unique). These ratings were relatively low compared to other upland areas in the county.

- The Slieve Aughty Mountains had a viable wind resource for exploitation (by the technological standards of the 1990s). The only other areas in Co. Galway with a viable resource were the Connemara uplands and the coastal areas, which were generally considered to be of higher landscape value and sensitivity and some areas had poorer access.
- When other factors are considered such as the road access across the Slieve Aughtys, the uncomplicated topography, the 'working landscape' character and the relative lack of scenic amenity and recreational use (compared to the Connemara uplands and the coastal areas), the wind resource in the Slieve Aughtys represented a development value of at least county-level significance (and given national policy at the time, the resource in the Slieve Aughtys could be considered of national importance).

13.1.1.1 Summary of Visibility and Visual Receptors

- 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 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. 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.
- There is a belt of unpopulated, forest-covered landscape several kilometres wide around the west, north and east of the site on the outer slopes of the mountains. This limits the number of visual receptors of the development.
- 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.
- The ZTV was extensively ground-truthed to assess actual visibility and potential visual receptors. Coole Park and Thoor Ballylee were visited to assess visual effects. Views from Coole Park are screened by trees, with a glimpse of turbines only on the motorway overpass east of Coole Park entrance. No views of the turbines are available from the trails or grounds of Thoor Ballylee, or indeed the windows of the cottage or tower, with distant views are available from the battlements. A viewpoint 14 (Cuilmore) is located at a similar distance from the proposed turbines.
- As noted above, a small section of the Burren National Park is within the 25km ZTV (approximately 21 km from the nearest at its closest point and no clear views of the turbines are available from the public roads within the ZTV. Similarly, the protected view 36 at Kilmacduagh was visited, and no views of the development.
- The site is far from any large centres of population. The nearest town is 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 north west.

13.1.1.2 Summary of Baseline Information (Changes in the baseline environment 1998-2020)

In summary, today, due to the upland location of the wind farm, and the surroundings of extensive forestry, there are few houses and roads in its immediate vicinity. This is likely to have been the case in 1998.

From the review of aerial imagery, Development Plans and Planners' reports associated with the Derrybrien Wind Farm project applications, the area in the vicinity of the site appears to have undergone little change. The cyclical nature of forestry and small scale turbary activities are likely to have been ongoing in the vicinity of the site.

Landscapes are constantly changing, and there have been some changes in the receiving environment. Much of the land on the site and in the immediate vicinity is covered in coniferous forestry, and this results in changes over time as there is a continuing cycle of felling and re-planting.

Aerial imagery shows that between 2000 (prior to construction) and 2005, felling occurred outside the site boundary to the west of the site, and some smaller areas to the southeast of the site. Between 2005 and the more recent aerial images, felling is indicated in several areas between the turbines and the Black Road to the east. Felling directly to the west of the site was carried out between 2016 and 2018.

Thus, views can change, in some cases relatively dramatically, when trees are felled, and as forestry grows up, other views may be obscured. This forestry cycle is likely to continue.

Other changes in the wider landscape include the construction of the M6 motorway between Ballinasloe and Oranmore (opened in 2017) and the M18 motorway (constructed between 2015-2017). These motorways and some associated access roads have also opened up new viewing opportunities not available in 1998 (views from both the M6 and M18 are represented in the set of photomontages). It should however be noted that visual receptors on motorways, travelling at high speeds, are not usually regarded as highly sensitive, as they do not tend to be focussed on their surrounds.

There was an increase in dwellings in the wider landscape, but very few in the immediate vicinity of the site – one dwelling noticed in the Derrybrien vicinity which is outside the ZTV. Settlements including Gort, and Loughrea showed an increase in dwellings since 1998 as noted above.

13.2 Impacts of the Development

13.2.1 Landscape Effects

The elements which are to remain on the site of the existing Derrybrien windfarm are likely to result in No Change to a Negligible magnitude of change, consistent with the change that has been observed over time in relation to the gradual re-vegetation of areas such as the borrow pits, peat repository areas and barrages. This is expected to continue.

While there is no change proposed to the elements to be retained in situ themselves, it is likely that natural regrowth will continue, and regrowth of previously felled areas will occur although the long-term uses of the site are not known. Natural regrowth is also likely on the concrete foundations and hardstand, over time. Borrow pits 1 and 2 have re-vegetated and Borrow pit 3 has flooded. The access roads which provide access to the forestry will continue to be used, resulting in no change. Underground elements such as cabling will result in no change to the landscape.

In relation to the works carried out following the peat slide (barrages, access track, peat repository areas), the retention of these in situ will not result in any changes. Over time, and at the present day, the

areas affected by the works have largely re-vegetated and integrated into the landscape. The resulting effects are that, today, some of these areas that have re-vegetated are difficult to distinguish from the surrounding areas and this is expected to continue. The effects are less legible in the landscape than the ongoing forestry operations in the vicinity.

The landscape effects as a result of the Retained Development can be 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.

13.2.2 Visual Effects

The majority of the elements which make up the Retained Development are no longer perceptible from public areas. The only locations where elements of the Retained Development is in close proximity to public areas would be along the Black Road and the R353 at the Flaggy Bridge as well as some on the local road from the R353 which travels close to the Agannygal substation, south to Flagmount.

The elements of the Retained Development on the windfarm site itself are not visible from the public areas. The turbine foundations, hardstands and access roads are hidden from the closest public road, the Black Road. The viewpoints illustrated in the Photomontage Booklet do not show elements of the Retained Development as they are screened from view as by their nature, they are below ground.

Below ground elements associated with the Derrybrien-Agannygal overhead line are currently screened from even locations in close proximity along the Black Road – where the overhead line crosses the road in close proximity to a set of wooden poles – and also where the overhead line pole is located adjacent to the R353 west of Flaggy Bridge and another location on the road towards Lough Atorick.

The elements remaining as a result of the peat slide (barrages, peat repositories etc) are now re-vegetated and are not distinguishable, as noted in the baseline. Overall, the magnitude of change is considered No change to Negligible where vegetation will continue to grow.

The significance of effect is considered Imperceptible, as vegetation growth continues, and neutral in quality.

13.3 Conclusion

The continued presence of the Retained Development by itself is judged to result in No effect to Imperceptible landscape effects, with visual effects considered No effect to Imperceptible, as vegetation growth continues. The effects are considered neutral in quality. This will not give rise to Significant landscape or visual effects.

14. MATERIAL ASSETS

14.1 Traffic and Transportation

14.1.1 The baseline

This section of the Remedial Environmental Impact Assessment Report (rEIAR) has been prepared by TOBIN, as part of the EIA process, for planning application of the proposed Derrybrien Wind Farm Decommissioning Project retained development located in County Galway, to assess the transportation impacts on the surrounding road network as a result of the proposed Derrybrien Wind Farm Decommissioning Project retained development.

14.1.2 Impacts of the Development

The Retained Development strategy considered herein comprises proposed retention in situ (i.e. access tracks, hard stands, concrete foundations, underground cables, barrages, peat repositories and borrow pits). Potential effects on roads, traffic and transport as a result of Retained Development activities are likely to be not significant or negative.

14.1.3 Conclusion

The Retained Development had no significant effects on roads, traffic and transport. The only long-term effects associated with the Retained Development are positive effects associated with infrastructure upgrades.

14.2 Telecommunications, Aviation and Electromagnetic Interference

14.2.1 The baseline

The baseline for assessment of environmental effects that have occurred to date represents the position prior to the commencement of development. The baseline for assessment of environmental of environmental effects that are likely to occur as a result of the retention of the Retained Development represents current conditions at the time of writing of this rEIAR.

The following sections identify the key features of the receiving environment in its baseline condition.

14.2.1.1 Aviation

The Retained 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 Retained Development are Galway, approximately 31 km away, and Shannon, approximately 45 km away.

The Retained Development location is outside both the aviation exclusion zone for Galway Airport and other airfields in the County. Therefore, no existing aviation services in the vicinity of the Retained Development were affected as a result of the Retained Development.

14.2.1.2 Telecommunications

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.

There is also an existing telecoms mast in the east of the site which has been *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 Retained Development and pre-dates the presence of the wind farm by a significant period. No alterations to this mast took place as a result of the Retained Development.

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 Raidió Teilifís Éireann (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 Retained Development had to be altered, reinforced or relocated as a result of the Retained Development.

14.2.1.3 Water Supply

There were no known water supplies within the Retained Development site and no existing water services in the vicinity of the Retained Development had to be altered, reinforced or relocated as a result of the Retained Development.

Derrybrien village is identified as requiring water supply. A number of private dwellings are part of groups schemes, while others are identified as having private well / rainwater harvesting systems. There are a number of schemes in the wider area which include the Gort Water Supply Scheme.

14.2.1.3.1 *Sewerage Schemes and Wastewater Infrastructure*

There were no known main drainage or sewerage schemes within the Retained Development site. No existing schemes in the vicinity of the Retained Development had to be altered, reinforced or relocated as a result of the Retained Development.

14.2.1.3.2 *Energy Infrastructure*

The following electricity distribution/ transmission lines were within the Retained Development area prior to construction:

- 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 now operational Agannygal Substation. As described by Chapter 4, some modifications were made to this OHL in support of the Derrybrien Windfarm Project.
- The existing 400kV Moneypoint – Woodlands OHL which is located to the south of the Retained 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 Retained Development had to be altered, reinforced or relocated as a result of the Retained Development.

In its baseline condition, the Retained Development area did not encompass any other significant energy infrastructure. The closest gas pipeline to the project is approximately 5.9 km north-east of the site at Loughrea.

14.2.1.3.3 *Tourism & Recreational Infrastructure*

The Retained 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 Retained Development.

There are however a number of local tourism and recreational locations of interest in the general region surrounding the site (the general Gort Region), including a number of walking trails, nature reserves and individual amenities such as wellbeing / recreational centres and horse-riding centres.

Additional information is provided in Chapter 4 Population and Human Health, in relation to potential impacts of the Retained Development as they relate to the tourism and socioeconomic aspects on population and trends in tourism numbers/employment in the region.

14.2.1.3.4 *Waste Management Services*

There were no EPA-licensed or local authority-authorised waste facilities or activities located within the rEIAR Site Boundary at the time of the commencement of the Project and there are none located within the rEIAR Site Boundary at the time of writing. The closest, authorised municipal waste facility (City Bin Co.) is located approximately 28.6km to the northwest of the Retained Development.

14.2.1.3.5 *Land Use*

Prior to the construction of Derrybrien Wind Farm, the site had been historically used for commercial conifer forestry over the central and western parts of the site and turf cutting in turbary plots on the eastern side. Land use along the grid connection route and at Agannygal substation was also dominated by commercial forestry.

Prior to the peat slide and response works the upper slopes of Cashlaundrumlahan Mountain, where the slide originated, were used for forestry which extended downslope to above the Black Road Bridge where some agricultural grass land is present. Below the Black Road Bridge there is a mix of forestry and agricultural land. The mix of forestry and agricultural land is typically classed as transitional woodland (scrub) by the Environmental Protection Agency (EPA) Corine mapping dataset.

14.2.2 Impacts of the Development

14.2.2.1 Construction Phase Impacts (2003-2006)

14.2.2.1.1 *Water Supply*

Effects on the ground water resource as a result of the extraction of water from wells during construction are considered to have been short-term, negative, and not significant.

The effect on the water supply throughout the peat slide period would have been slight, negative and temporary. The remedial works (including the construction of barrages along the peat slide course) significantly reduced the potential for longer term effects.

14.2.2.1.2 *Sewerage Schemes and Wastewater Infrastructure*

During construction, temporary toilet facilities were provided at the construction compound in the form of a self-contained toilet block with a temporary holding tank for managing sewage and wastewater discharges. In addition, various temporary portaloo facilities were distributed around the site. These toilet facilities were removed upon completion of the works.

There was no connection to public sewer network during construction and accordingly no impact on public sewer network as a result of the construction of the project.

14.2.2.1.3 *Energy Infrastructure*

During construction, diesel powered electrical power generator(s) were utilised onsite to facilitate construction.

There was no connection to the electricity network during construction and accordingly no impact on the network as a result of the construction of the Retained Development. Additionally, no known significant effects occurred in relation to energy infrastructure, including gas pipelines, as a result of the Retained Development.

The use of natural non-renewable fuel in diesel fuelled generators is considered to have been a short-term, not significant, negative effect.

14.2.2.1.4 *Telecommunications*

Effects associated with the minor increase in telecommunications demand as a result of mobile use during Retained Development construction are considered to be short-term, imperceptible, neutral.

14.2.2.1.5 *Waste Management Services*

There are no EPA-licensed or local authority-authorised waste facilities or activities located within the Site boundary. A small amount of additional waste was generated from construction activities associated with the Retained Development. Waste generated included general construction waste, packaging materials, and mixed municipal waste from site welfare facilities. Construction waste was placed in dedicated skips in the substation compounds and disposed of to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste was sorted into individual waste streams for recycling, recovery or disposal.

The construction phase gave rise to very limited amounts of hazardous wastes such as oil, diesel fuel, chemicals, paints, preservatives etc, as well as mixed municipal waste. Packaging, cables, cardboard.

The residual effect of the construction phase activities for the Retained Development had a Short-term Imperceptible Negative effect on waste management services.

14.2.2.2 Operation Phase Impacts (2006 – 2022)

14.2.2.2.1 *Water Supply*

The extraction of ground water on ground water resource as a result of the operation of the Retained Development was minimal and effects are considered to be long-term, imperceptible, negative.

14.2.2.2.2 *Sewerage Schemes and Wastewater Infrastructure*

The welfare facilities in the control building of Derrybrien Substation consist of one toilet and two sinks. An Envirocare P6 sewage treatment plant unit caters for the wastewater generated in these facilities. Similar facilities are provided at Agannygal Substation.

There was no connection to public sewer services during operation and accordingly no impact or effect on public sewerage and wastewater infrastructure arose.

14.2.2.2.3 *Telecommunication Services*

Communications during operation were primarily by way of mobile phones. However, in addition Agannygal Substation is fitted with an Eir phone line. At Derrybrien Substation services are by way of

wireless broad band connection. Effects associated with the minor increase in telecommunications demand at both substations as a result of Retained Development operation are considered to be long-term, imperceptible, neutral in this regard.

14.2.2.2.4 Energy Infrastructure

During operation electrical power on the wind farm site was provided by way of a house load connection from Derrybrien Substation. A backup supply is provided to both Derrybrien Substation and Agannygal Substation by way of a diesel generator.

There was no connection to electricity network during operation and accordingly no impact on electricity network as a result of project site operations. Effects related to on-site electricity use are considered neutral.

During operation of the wind farm, significant effects did occur in relation to energy infrastructure, as a result of the Project. These effects were associated with the increased level of renewable generation (circa 121,800 MWh of electricity annually) as a direct consequence of the operation of the wind farm and resulted in long-term, significant, positive effects.

14.2.2.2.5 Waste Management Services

As the volume of waste generated was relatively low and the management practices employed were consistent with relevant waste legislation and best practice standards at the time, the residual effect of the operational phase activities for the Retained Development was a Short-term Imperceptible Negative effect on waste management services.

14.2.2.3 Ceased Operation Phase Impacts (2022-Present)

14.2.2.3.1 Water Supply

Personnel attendance at the Retained Development site during the ceased-operational phase is low. Therefore, water demand is accordingly low.

At the Retained Development site, potable water is provided by a commercial supplier in the form of 10 litre drums. At Agannygal Substation potable water is brought by staff attending site at any given time. There is no connection to public services.

As there is no connection to public services and staff presence on the site during the ceased-operational phase is minimal, there is no significant effect on water supply.

14.2.2.3.2 Sewage Schemes and Wastewater Infrastructure

The welfare facilities in the control building of Derrybrien Substation consist of one toilet and two sinks. An Envirocare P6 sewage treatment plant unit caters for the wastewater generated in these facilities. Similar facilities are provided at Agannygal Substation.

There is no connection to public sewer services during the ceased-operational phase and accordingly no effect on public sewerage and wastewater infrastructure.

14.2.2.3.3 Waste Management

As the volume of waste generated is relatively low and the management practices employed are consistent with relevant waste legislation and best practice standards, the residual effect of the ceased-operational phase for the Project is Short-term Imperceptible Negative on waste management services.

14.2.2.4 Impacts of Retained Development

There will be no effects or impacts on material assets as a result of the retention in perpetuity of the Retained Development.

14.2.3 Conclusion

The Retained Development had no significant effects on aviation, telecommunications, utilities, Waste Management Services, or other built infrastructure in the construction, operational, or non-operational phase. In addition, the Retained Development will have no effects on aviation, telecommunications, utilities, Waste Management Services, or other built infrastructure during and after the decommissioning of the Derrybrien Wind Farm Development.

15. RISK OF MAJOR ACCIDENTS AND DISASTERS

15.1 The baseline

Chapter 15 of the rEIAR describes the potential and actual effects on the environment arising from the vulnerability of the Derrybrien Wind Farm Development Decommissioning Project – Retained Development (as detailed in Chapter 4) to risks of major accidents and/or natural disasters, as well as the potential of the Project (or Retained Development) itself to cause potential major accidents and/or natural disasters.

The assessment is focused on an understanding that the construction of the Derrybrien Windfarm Development has been completed. The Project will be decommissioned in line with the methodologies and measures prescribed in the EIAR that accompanies the planning application for the decommissioning of the wind farm (Prospective Development).

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 rEIAR assessment chapters (Refer to Chapters 8 to 9 for further detail).

Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of waste, management of flammable material, etc. were avoided due to mitigation measures as set out in the Environmental Impact Statement prepared as part of the original application (Planning Ref. 97/3470). Therefore, there was an inherently low level of environmental risk associated with major accidents and/or natural disasters impacting the Project and causing environmental damage from environmental pollution due to hydrocarbons or other synthetic materials.

There is low potential for significant natural disasters to occur at the Project locations. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to issues such as landslides, flooding, and fires. These are described in the sections below.

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-site of the accident. The Project 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.

In October 2003, during the construction of the wind farm, a large peat slide occurred. The slide originated within the wind farm site boundary to the south of the site. In the aftermath of the peat slide, engineering measures were implemented. These comprised containment and stabilisation works to minimise effects on lands, receiving watercourses and the local road network. During this period – October 2003 to June 2004, construction works on the wind farm itself were suspended. From June 2004 to March 2006, the construction of the wind farm and the grid connection (comprising both the overhead line and Agannygal substation) were completed. Derrybrien Wind Farm was commissioned between September 2005 and March 2006 and commenced commercial operations in March 2006. The wind farm was in operation until 2022 after An Bord Pleanála refused substitute consent for the Project.

It is necessary to highlight that the extent of the peat slide which occurred on the Derrybrien Wind Farm in 2003, which would be considered large (c. 25 Ha), was not a consequence of the activity alone that was being undertaken at the time; the combination of local site conditions where the peat was loaded and downslope of that location have been identified as contributory factors to the failure and extent.

No peat failures occurred during the operation and maintenance phase of the wind farm. The Retained Development has low potential to cause natural disasters or major accidents in the form of peat instability. The Site has been subject to several stability assessments. Ground investigations were carried out during the construction stage of the wind farm in 2004/2005, after the peat slide, to supplement the original investigations for the wind farm prior to construction, which were completed in 2001. A summary of these assessment reports are included as in Chapter 8 of this rEIAR.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios, such as pollution incidents to ground and surface-watercourses, as well as assessment of flooding events. These are described in the relevant rEIAR assessment chapters (Refer to Chapters 5 to 13 for further details).

This assessment is focused on an understanding that the Retained Development will include structures to be retained in situ and in perpetuity of part of the existing development once the Prospective Development works have been completed. Therefore, the overall vulnerability of the Retained Development to risks of major accidents and natural disasters is considered low.

15.2 Impacts of the Development

15.2.1 Construction Phase

A peat slide occurred during project construction in 2003. The peat slide resulted in displaced peat affecting land and habitats, water quality and a fish kill.

These have largely recovered as follows:

- Surveys undertaken along the peat slip areas in 2011 and 2018 have shown almost full recovery of vegetation and habitat structure throughout the land affected by the peat slide.
- Macroinvertebrate water quality had effectively fully recovered within 3-years of the peat slide.
- Fish surveys showed that the fish population structure had largely recovered within 6 years of the peat slide.

Not withstanding effects on biodiversity, soils and geology, and water which are assessed in detail elsewhere in this EIAR, no significant effects arose, and therefore there were no residual effects, in terms of life, health and welfare, social or infrastructural.

15.2.2 Operational Phase

Effective and proven risk mitigation measures are in place to reduce the likelihood of a peat slide to a low or negligible level. No residual impacts have arisen or are predicted with respect to major accidents and disasters during the Project operational phase.

15.2.3 Ceased Operational Phase

No residual impacts have arisen or are predicted with respect to major accidents and disasters during the Project's ceased operational phase.

15.2.4 Retained Development

No residual impacts are predicted with respect to major accidents and disasters during the Retained Development.

15.3 Conclusion

During the Construction phase the highest risk rating is ranked as Medium associated with a potential peat slide. During the Operational phase the highest risk rating is ranked as Medium associated both with a potential peat slide or forest/bog/gorse fire. There is not a high risk of any major accidents or natural disasters for the Ceased Operational Phase.

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

16. INTERACTIONS OF THE FOREGOING

Chapters 5 to 15 of this remedial Environmental Impact Assessment Report (rEIAR) identify the potential significant environmental effects that have occurred or 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), and Vulnerability to/from Major Accidents and Natural Disasters, as a result of the Retained Development as described in Chapter 4 of this rEIAR. All of the potential significant effects of the Project (Retained Development) and the measures proposed to mitigate them have been outlined in the preceding chapters of this rEIAR. 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 16 of the rEIAR to identify interactions between the various aspects of the environment already discussed in the rEIAR. The matrix highlights the potential for the occurrence

of positive, neutral or negative effects arising from the Retained Development. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections (Chapters 5–15) of the rEIAR.

17. SCHEDULE OF MITIGATION

All mitigation measures relating to the Project (Retained Development) are set out in the relevant chapters of the rEIAR and associated documents submitted as part of this planning application.

All mitigation measures across all phases of the Project to date are outlined in Table 17-1 in Chapter 17 of this rEIAR. Mitigation measures proposed for the Retained Development are outlined in Table 17-2 in Chapter 17 of this rEIAR. The mitigation measures have been grouped together according to their environmental field/topic and are presented under the following headings:

- Drainage and Water Quality.
- Population and Human Health.
- Land, Soils, and Geology.
- Biodiversity.
- Air Quality and Dust Control.
- Noise and Vibration.
- Cultural Heritage.
- Traffic.

The mitigation proposals for the Retained Development in Table 17-2 in Chapter 17 of this rEIAR provides an easy to audit list that can be reviewed and reported. 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 rEIAR. 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.

1. INTRODUCTION

1.1 Introduction

This remedial Environmental Impact Assessment Report (rEIAR) has been prepared by MKO on behalf of Gort Windfarms Ltd (Gort WFL), as part of an application for substitute consent to retain in situ specific features of the existing Derrybrien Wind Farm Development as part of the proposed 'Derrybrien Windfarm Development Decommissioning Project'.

The proposed 'Derrybrien Windfarm 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**").

The rEIAR assesses the environmental impacts that have occurred and are likely to occur from the "Retained Development". This rEIAR accompanies the application made to An Bord Pleanála (ABP), under section 177E of the Planning and Development Act 2000, as amended ("the 2000 Act") for substitute consent in respect of the Retained Development. In addition, an application has also been made simultaneously, under section 37L for permission in respect of the Prospective Development (which application is accompanied by, *inter alia*, an Environmental Impact Assessment Report [EIAR]).

As stated above, this rEIAR accompanies the application for the Retained Development; planning permission for the Prospective Development will be applied for separately under section 37L of the 2000 Act. However, the potential significant effects of the Prospective Development have been assessed cumulatively with those of the Retained Development as part of this rEIAR. The Retained 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 Retained 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; in 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 substitute consent under section 177E, and the Board's consideration of this rEIAR (and the remedial Natura Impact Statement [rNIS] also submitted with that application), the Retained Development comprises the following:

At-ground and below-ground structures, such as:

- 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.
- 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.

Offsite features constructed in response to the peat slide in 2003, including:

- Barrage 1 and Coillte Access Track.
- Barrage 2 and associated floating access track and Repository Area Barrage 3 and Repository Area/.
- Barrage 4.
- Repository Area at the Black Road Bridge.
- Drainage Diversion Works.
- Repair works to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C.

The area of the Retained Development, for which substitute consent is sought under section 177E is defined by the "red line" application boundary as illustrated on the drawings accompanying the section 177E application.

All elements of the Retained Development have been assessed as part of this rEIAR. The Retained Development is described in Chapter 4 of this rEIAR.

For the purposes of this rEIAR, 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.

1.4 Project Need

In 2019, pursuant to proceedings before the Court of Justice of the European Union (Case C-261-18), Ireland was found to have failed to take measures necessary to fulfil a number of obligations arising from the Environmental Impact Assessment (EIA) Directive.

On foot of that judgment and the legislative provisions set out under section 177B of the 2000 Act, on 23rd July 2020, Galway County Council directed Gort Windfarms Ltd. to seek substitute consent for the development, described in the relevant notice as:

> *'The development of a windfarm, including ancillary development which includes service roadways, control house, transformer compounds and anemometer mast and associated development of a grid connection at Derrybrien West, Derrybrien East, Derrybrien North, Toormacnevin, Bohaboy, Caheranearl and Boleyneendorrish, all in the County of Galway, more particularly described in the grant of planning permission as set out in Schedule 2'*

– with Schedule 2 specifying the relevant Galway County Council planning references as 973470, 973652, 992377, 004581, 023560, 035637, 05317 and 05316.

Accordingly, an application was submitted to An Bord Pleanála in August 2020 for substitute consent (reg. ref. ABP-308019-20) – relating to the retention and continued operation of the subject development, until its eventual decommissioning.

In February 2022, An Bord Pleanála, refused an application for substitute consent made by Gort WFL in relation to the Derrybrien Wind Farm Project. Following the decision, commercial electricity generation at the site was ceased by ESB and it was confirmed that the Project would be decommissioned.

The turbines have been maintained by the turbine supplier to ensure the site remains safe, while in a prolonged non-operational state. Gort Windfarms Ltd have monitored and maintained the site in the interim, having regard to all safety standards. No development or use is on-going.

On 29 August 2024 an enforcement notice was issued by Galway County Council requiring Gort Windfarms Ltd to decommission the existing Derrybrien Wind Farm Development.

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.
- 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 Retained 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 rEIAR has been prepared and submitted with the application for substitute consent permission under section 177E 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.*
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, because of the retrospective element of the assessment and substitute consent sought in respect of aspects of the Project for which development consent was not obtained and an environmental assessment was not carried out, the rEIAR differs from a normal EIAR in that it is required to identify significant environmental impacts which have already occurred together with ongoing impacts as well as future likely impacts as would be required in an EIAR. In other words, the assessment comprised in the rEIAR must be both "backward-looking and forward-looking".

Specifically, as set out in section 177F(1) of the Planning and Development Act 2000 (as amended) the rEIAR is required to provide the following:

'177F.— (1)

(a) a statement of the significant effects, if any, on the environment, which have occurred or which are occurring or which can reasonably be expected to occur because the development the subject of the application for substitute consent was carried out;

(b) details of—

(i) any appropriate remedial measures undertaken or proposed to be undertaken by the applicant for substitute consent to remedy any significant adverse effects on the environment;

(ii) the period of time within which any proposed remedial measures shall be carried out by or on behalf of the applicant;

(c) such information as may be prescribed under section 177N.'

This rEIAR therefore addresses the construction, operation and post decommissioning phases which forms the subject-matter of the substitute consent application for development namely:

- At-ground and below-ground structures.
- Offsite features constructed in response to the peat slide in 2003.

The description of the works and activities carried out in the past is based on contemporaneous records. Where information is not available (for instance baseline information) or difficulties have been encountered these are recorded in individual rEIAR chapters under the heading "Difficulties Encountered". However, it is noted that information gaps identified in the rEIAR are not considered to be such as to affect the robust assessment of the environmental impacts of the Project.

As appropriate, the cumulative impact of the Project together with identified projects are addressed.

The vulnerability of the Project to risks of major accidents and/or disasters is considered in relation to effects on these factors.

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 rEIAR 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 rEIAR 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 rEIAR.

1.6 Purpose and Scope of the rEIAR

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

The remedial Environmental Impact Assessment (rEIA) to be carried out by the Board, as competent authority, is a process consisting of –

(i) the preparation of an rEIAR;
(ii) The carrying out of consultations
(iii) The examination by ABP–
  (I) The information contained in the rEIAR,
  (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 Retained 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 Retained Development.

The rEIA conducted by the Board must include–

(i) an examination, analysis and evaluation, carried out by the Board, 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 Environmental Impact Assessment Directive, the direct and indirect effects of the Retained 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 rEIAR which will be submitted by the applicant/developer provides the prescribed and relevant environmental information to enable the rEIA 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 rEIAR

1.7.1 General Structure

This rEIAR uses the grouped structure method to describe the existing environment, the potential effects of the Retained Development thereon and the proposed mitigation measures. Background information relating to the Retained Development, scoping and consultation undertaken and a description of the Retained Development are presented in separate sections. The grouped format sections describe the impacts of the Retained 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 rEIAR are as follows:

1. Introduction
2. Context for the Retained Development
3. Consideration of Reasonable Alternatives
4. Description of the Retained 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. Interactions of the Foregoing
17. Schedule of Mitigation Measures

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

1.7.2 Content of the rEIAR / Environmental Baseline

This rEIAR assesses the impacts on the environment resulting from the Retained Development as described in Chapter 4. The rEIAR assesses the construction, operation and retention of certain structures in situ post decommissioning.

For the purpose of assessments undertaken for the remedial EIAR, the baseline environment against which impacts have been assessed has been taken as that which existed prior to the original planning process. The baseline date for assessment of environmental effects in the rEIAR is the date when the environmental impact assessment should originally have been carried out and considered by the decision-maker.

The planning consents were granted in the period 1998-2001. Therefore, for the purposes of this rEIAR, the baseline environment against which assessment of environmental effects is made is that which existed in 1998, referred hereafter as the “baseline date”. Where there are information gaps related to

the baseline environment these are highlighted in the "Difficulties Encountered" section within individual topic chapters.

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 Retained 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 rEIAR 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 effect associated with the Retained Development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the rEIA employs a systematic approach, which can be replicated across all disciplines covered in the rEIAR. The consistent application of terminology throughout the rEIAR facilitates the assessment of the Retained 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
	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 rEIAR. 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 rEIAR.

1.8 Project Team

1.8.1 Project Team Responsibilities

The EIA 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 rEIAR are summarised in Section 1.8.2 below. Each chapter of this rEIAR 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 are 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	rEIAR Input
McCarthy Keville O' Sullivan Ltd. (MKO)	Michael Watson Thomas Blackwell Edward Ryan Morgan Valvik	Project Management, Scoping and Consultation, Preparation of the following Report Sections: 1. *Introduction.* 2. *Scoping and Consultation.* 5. *Population & Human Health.* 10. *Air & Climate.* 11. *Noise and Vibration.* 14. *Material Assets.* 15. *Vulnerability to Natural Disaster and Major Accidents.* 16. *Interaction of the Foregoing.* 17. *Schedule of Mitigation.*
ESB (Engineering & Major Projects)	Daniel Hogan Helen O'Keeffe	Preparation of the following Report Sections: 3. *Consideration of Reasonable Alternatives.* 4. *Description of the Proposed Development.*
Wetland Surveys Ireland **BSG Ecology** **Biosphere Environmental Services** **ESB (Engineering & Major Projects)**	Patrick Crushell Owain Gabb Rachel Taylor Brian Madden Kate-Marie O'Connor	Baseline Habitat and Bird Survey, Preparation of Natura Impact Statement (rNIS) and rEIAR Section: 6. *Biodiversity (Terrestrial).*
Lauren Williams Ecology	Lauren Williams	Aquatic surveys. Preparation of Water Framework Directive Compliance Report. Preparation of the following EIAR Section: 7. *Aquatic Ecology and Fisheries.*
Fehily Timoney	Ian Higgins	Preparation of the following Report Section: 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: 8. *Land, Soils & Geology (Derrybrien Windfarm).*
ESB (Engineering & Major Projects) **Hydro Environmental**	Harry Griffin Anthony Cawley	Preparation of the following Report Sections: 9. Water (Hydrology and Hydrogeology).
John Cronin and Associates	Tony Cummins	Preparation of EIAR Section: 12. Archaeological, Architectural and Cultural Heritage.

Consultants	Principal Staff Involved in Project	rEIAR Input
Cunnane, Stratton, Reynolds	Evelyn Sikora	Preparation of the following Report Section: 13. *Landscape & Visual.*
Tobin Consulting Engineers	John O'Flaherty Viswas Kutty	Preparation of the following Report Section: 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 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 (formally 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 (MCIWEM) status.

Helen O'Keeffe

Helen O'Keeffe is Planning Strategy Manager in Generation projects in ESB. Helen is a Graduate of UCD with a Bachelors 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 Lauren Williams Ecology

Lauren Williams

Lauren Williams BSc PGDip MCIEEM, is 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). Laurens specialties are ecological impact assessment, water quality assessment, environmental monitoring and aquatic species/habitat survey including fish and protected aquatic species. Lauren carries out detailed aquatic baseline field studies and reporting in relation to a wide range of large infrastructural developments. Her work has also involved a number of large, catchment-based water quality monitoring projects and sampling for national river monitoring programmes. Clients include state and semi-state bodies (EPA, NPWS, Coillte, Irish Water, OPW, Local Authorities), engineering and planning consultancies.

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 rEIAR.

1.10 Viewing and Purchasing of the rEIAR

The rEIAR 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 remedial Environmental Impact Assessment (rEIA) 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 rEIAR. Consultees were invited to contribute to the rEIAR 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 rEIAR.

2.2.1 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 rEIAR. 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

[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*

recommendations of the consultees have informed the scope of the assessments undertaken and the contents of the rEIAR. Table 2-2 further below presents the key points from the scoping responses and identifies where such points have been addressed in this rEIAR.

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

No.	Consultee	Date of Response
29	Irish Wildlife Trust	01.10.2024
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. The Department also attached general biodiversity and heritage guidelines for the completion of an 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: › 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. 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. 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. 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. 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 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 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/rEIA 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 ABP's 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-321156-24).

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 rEIAR. Consultees were invited to contribute to the rEIAR 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 rEIAR. 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 rEIAR.

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, 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).

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 speaking 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 rEIAR.

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 rEIAR 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 rEIAR 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 Effect 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 rEIAR 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 is provided to support 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.

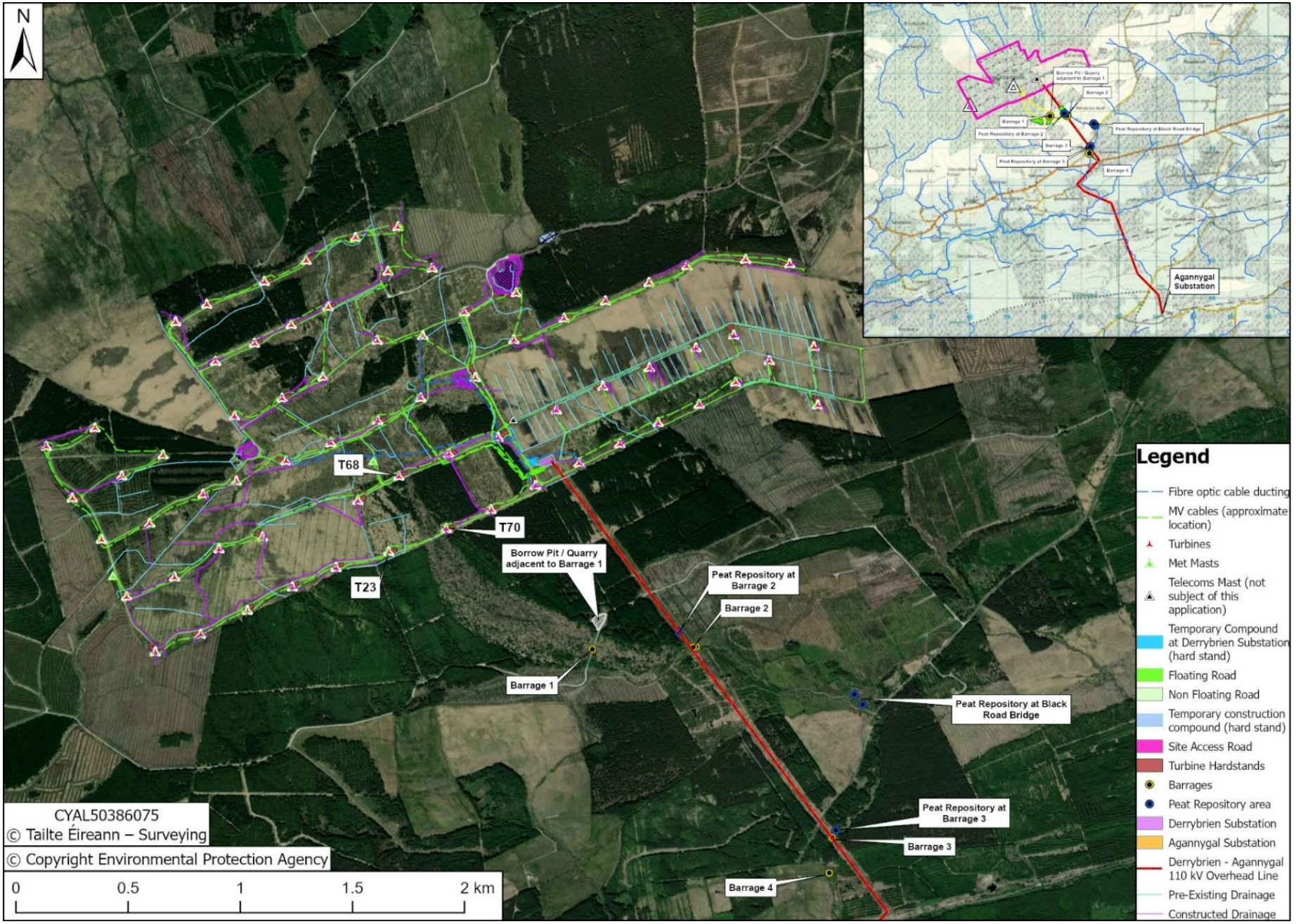


Figure 3-1 Features within the Derrybrien Wind Farm Site

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, storeroom 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.

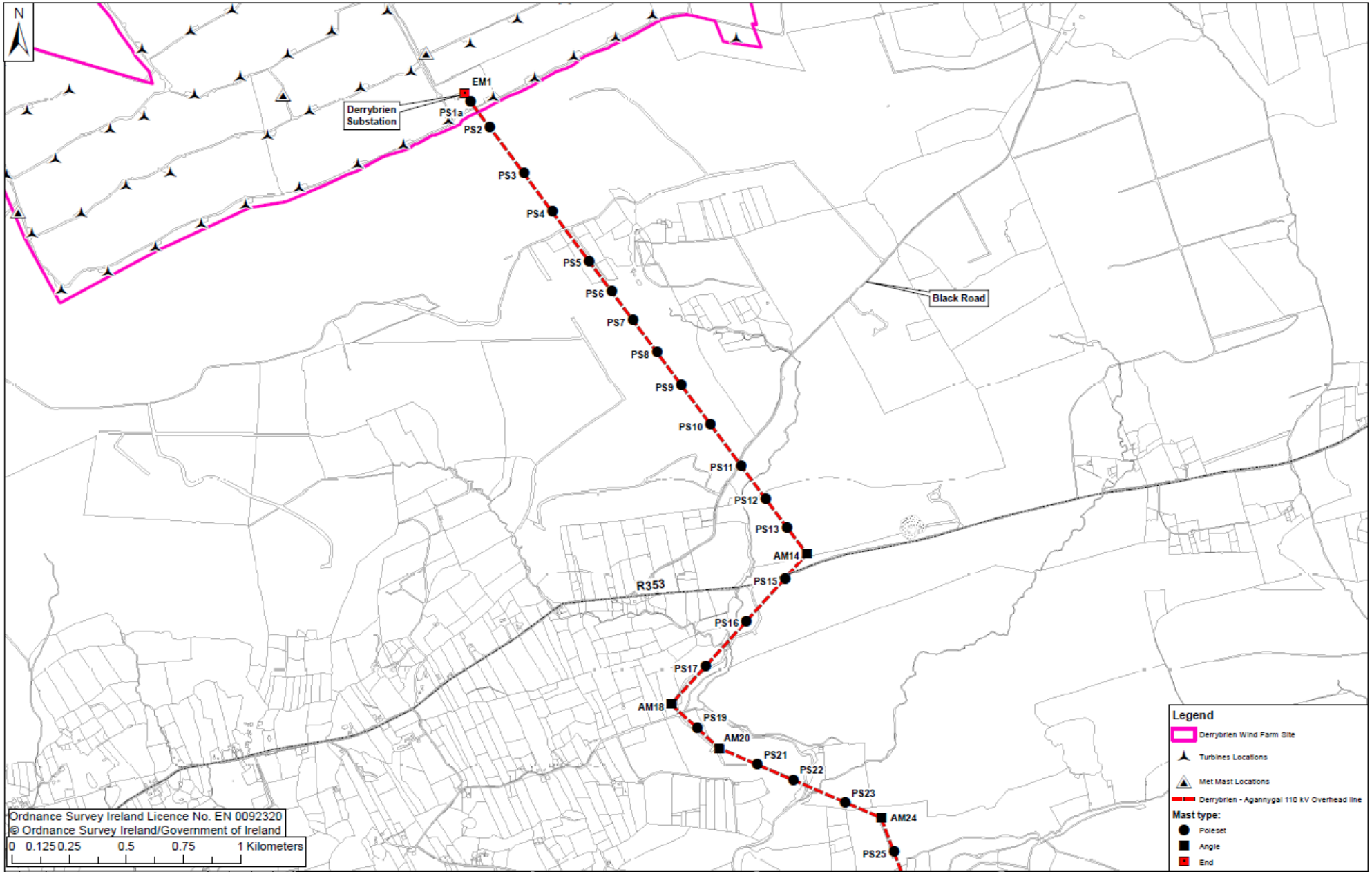


Figure 3-2 Derrybrien - Agannygal 110kV Overhead Line Route (Sheet 1 of 2)

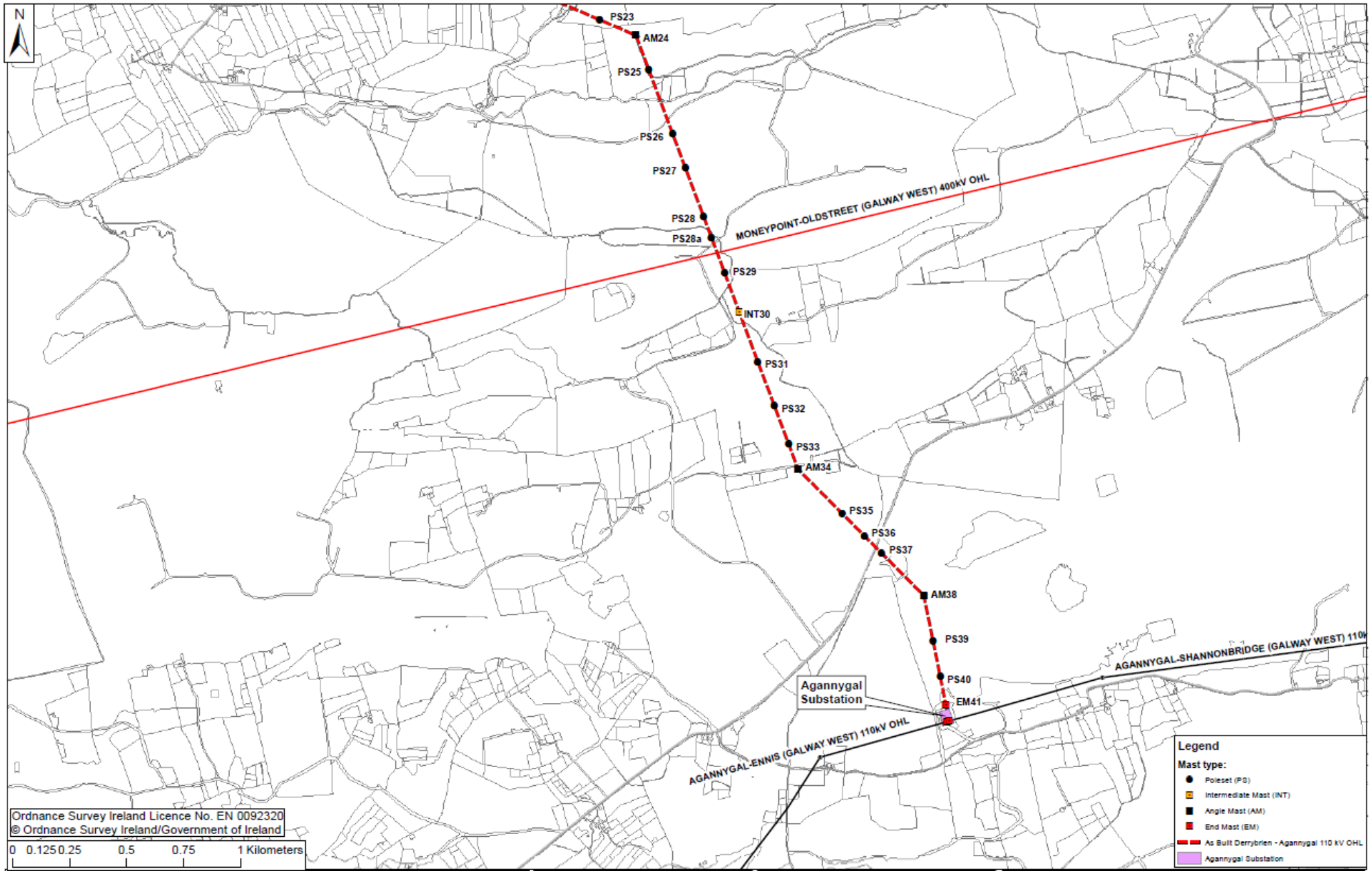


Figure 3-3 Derrybrien - Agannygal 110kV Overhead Line Route (Sheet 2 of 2)

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 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. A 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).

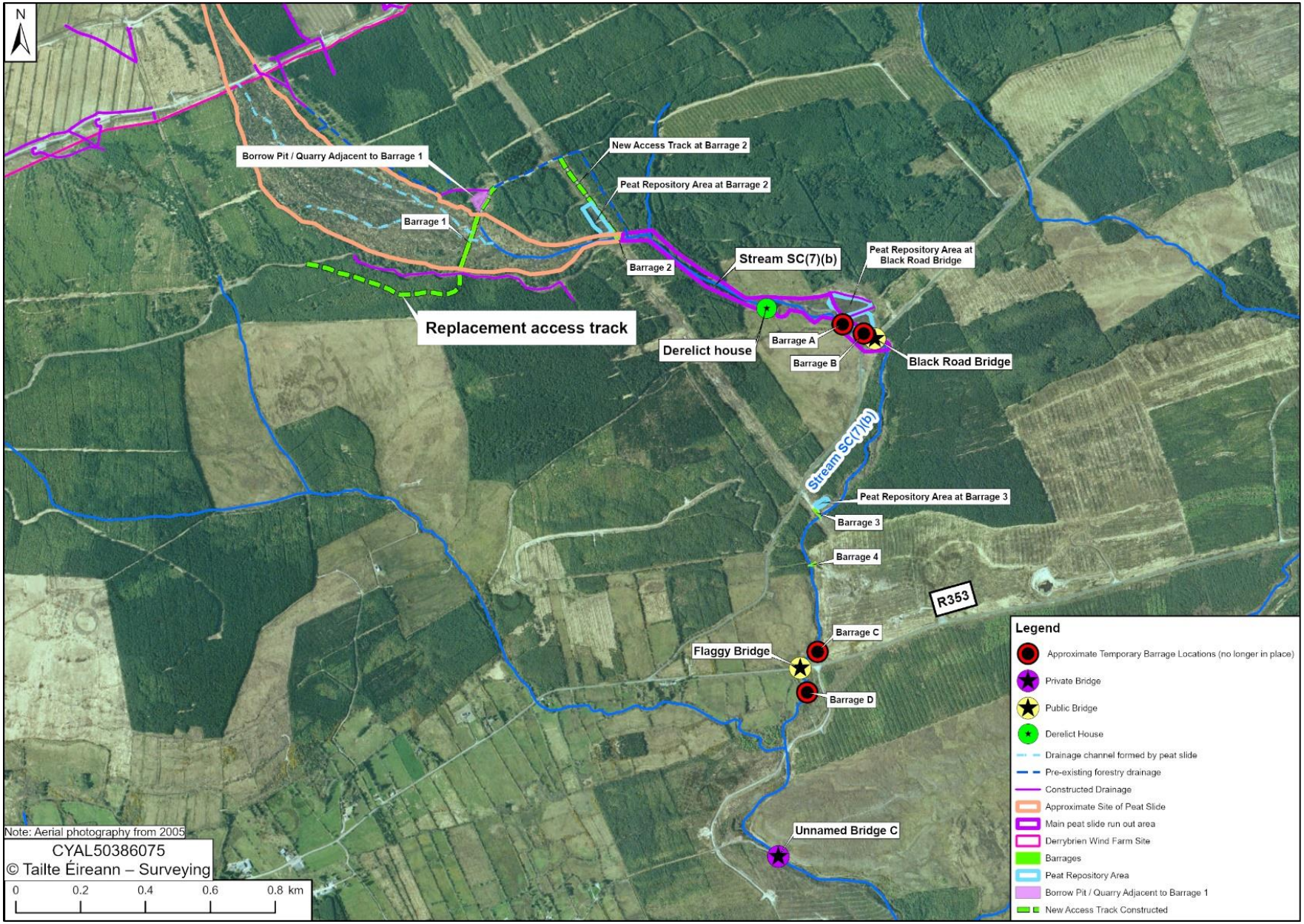


Figure 3-4 Emergency works carried out as part of the peat slide (2003)

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). 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 levels in 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.

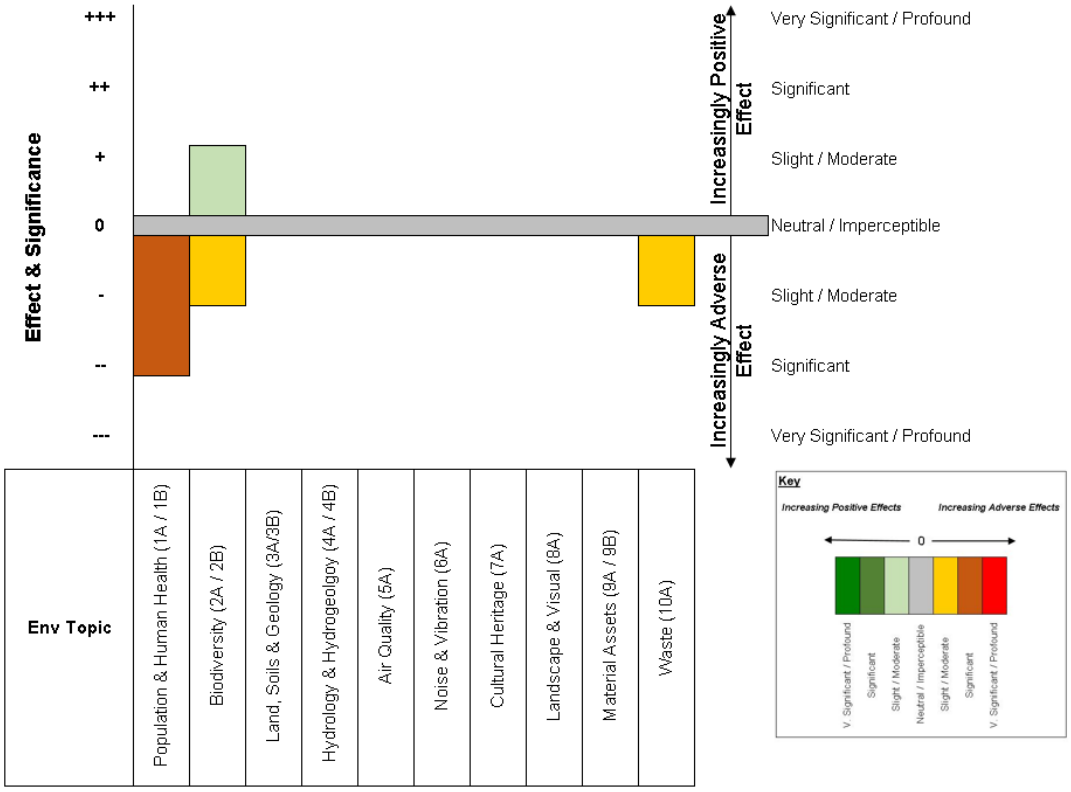


Figure 3-5 Summary chart of Predicted Effects of Alternative 1 (Work Area A)

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 adverse effect on Human Health and a slight to moderate 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 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). 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 degradation of habitat and disturbance and displacement of terrestrial fauna for the duration of the works) (-1).

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		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 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). 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 effect 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). 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). 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). However, when considering in combination, the works to remove at and below ground element have the potential to have very

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		significant/profound adverse effects on soils and peat stability for the following reasons (-3): › 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. › 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 impact on peat stability. › 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 impact on the degraded blanket bog. › 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. › Removal of the below ground elements of the turbine foundations and reinstating the crane hardstand areas will have a very significant negative impact 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. › 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 impact 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. › Blocking and infilling of the drains that were constructed for the windfarm could have a moderate to significant impact 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.
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

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		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 effect 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). 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). The decommissioning works will have a temporary slight to moderate adverse effects on Telecoms through the removal of the power supply to the third-party mast located within the Derrybrien Wind Farm (-1).

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		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. 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.

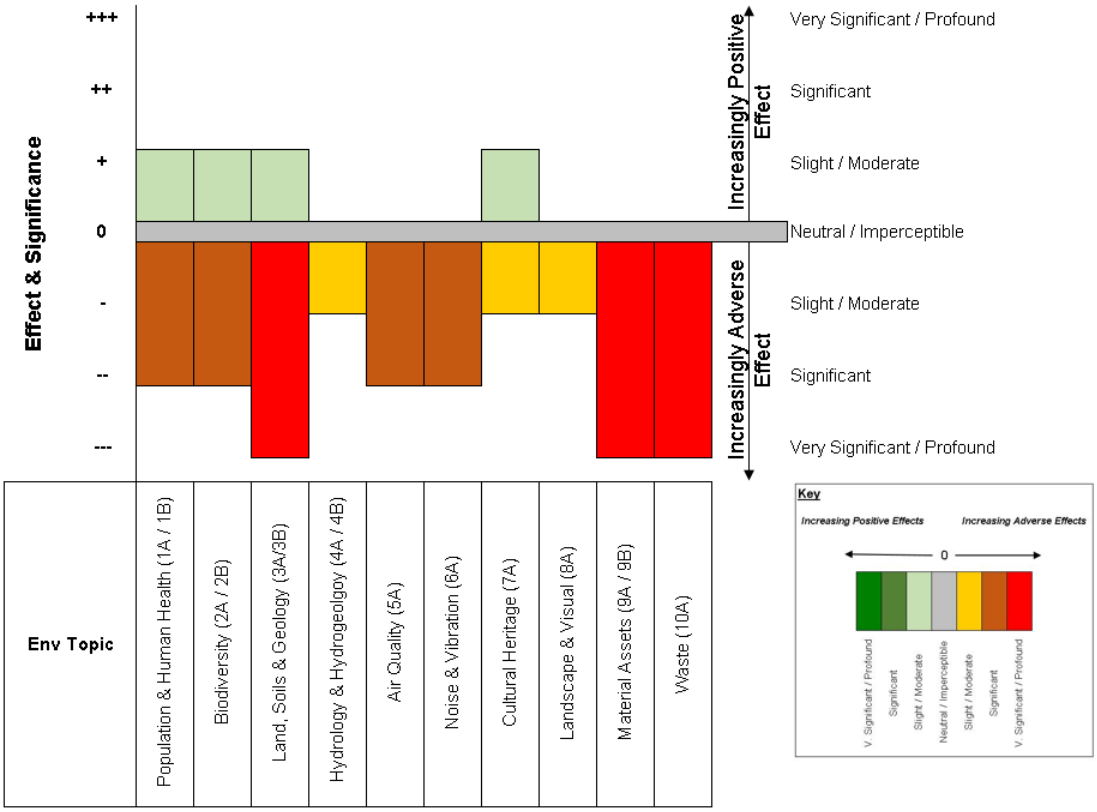


Figure 3-6 Summary chart of Predicted Effects of Alternative 2 (Work Area A) when compared to the Do-Nothing scenario.

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.

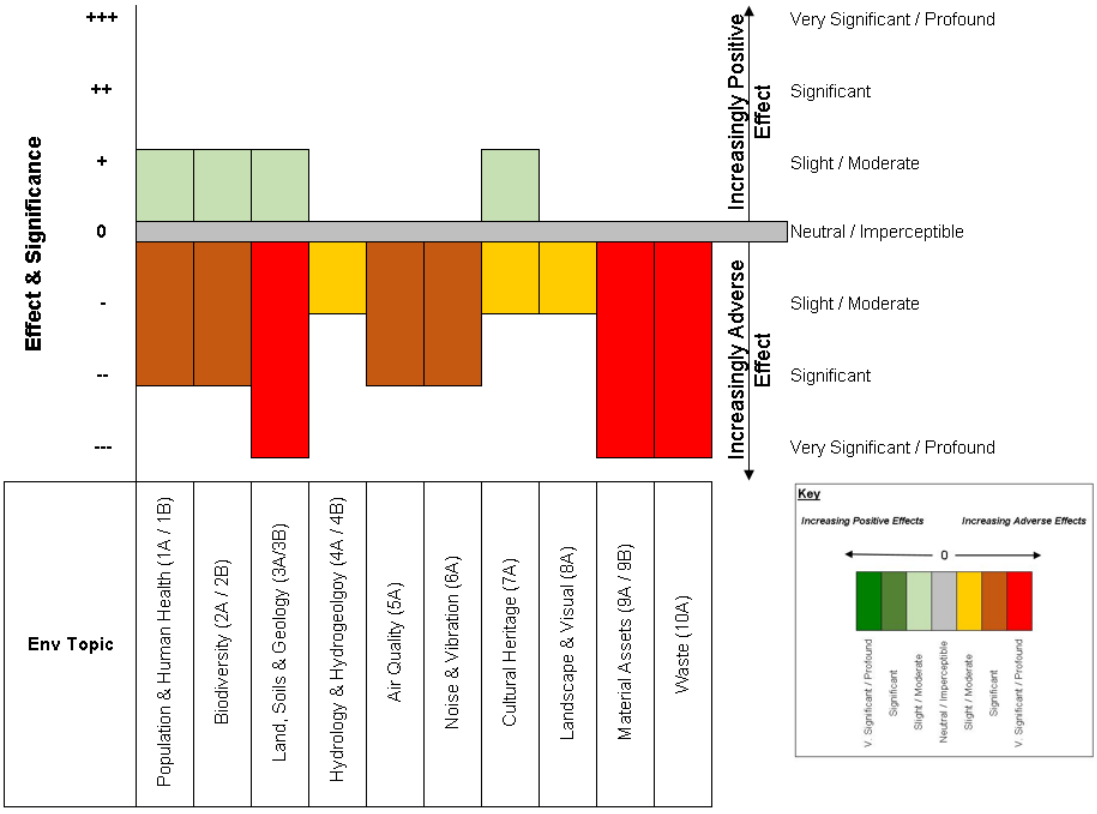


Figure 3-7 Summary chart of Predicted Effects of Alternative 3 (Work Area A) when compared to the Do-Nothing scenario.

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). 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). 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). 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). 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 is 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 negligible to slight adverse effect on peat stability (-1). 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. 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. 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. 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. 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. 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. 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 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 it 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). 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.

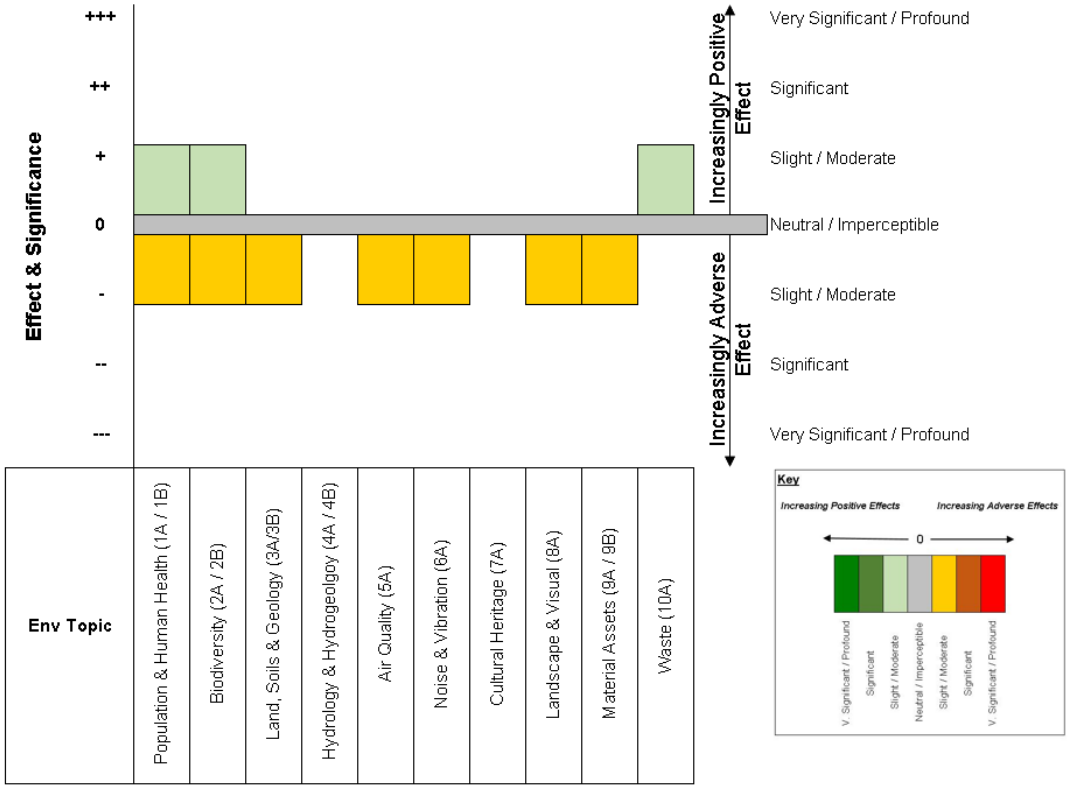


Figure 3-8 Summary chart of Predicted effects of Alternative 4 (Work Area A) when compared to the Do-Nothing scenario.

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 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.

Alternatives 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 therefore no 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).

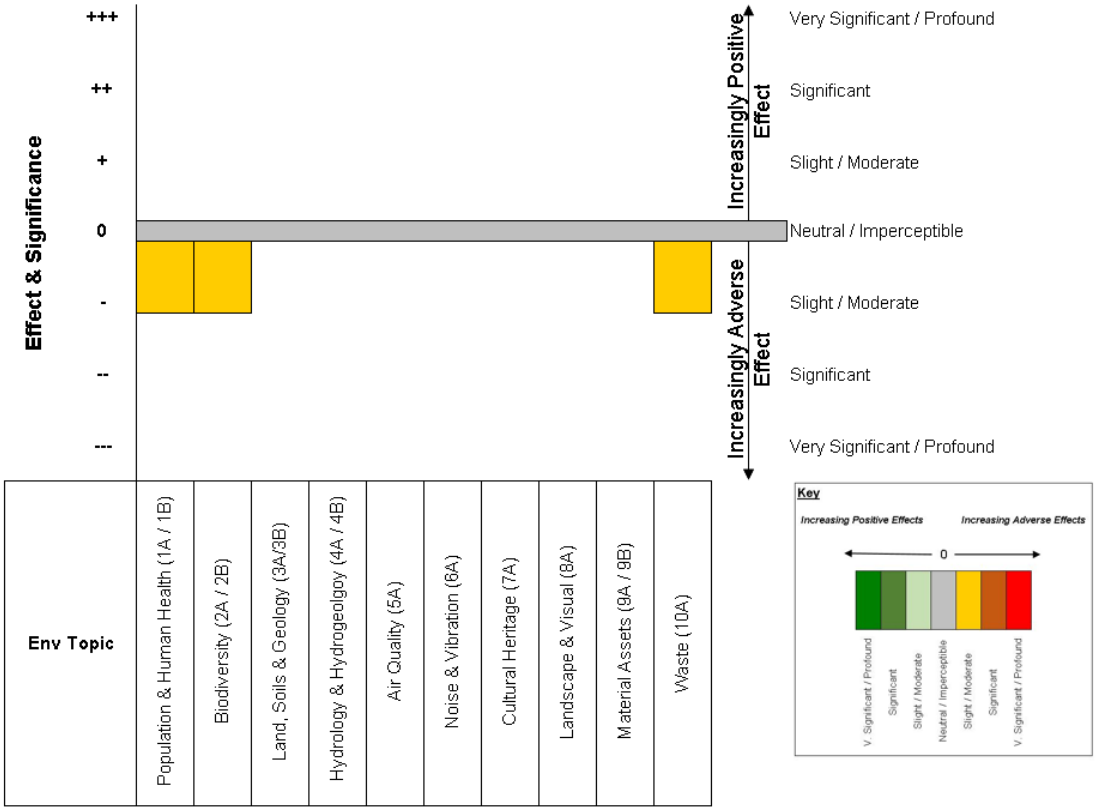


Figure 3-9 Summary chart of Predicted Effects of Alternative 1 (Work Area B)

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 at the location of the reinforced concrete foundations for the control building and compound hardstand areas.
- Removal and reinstatement 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). 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). 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).

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
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 is 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 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).

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		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. 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.

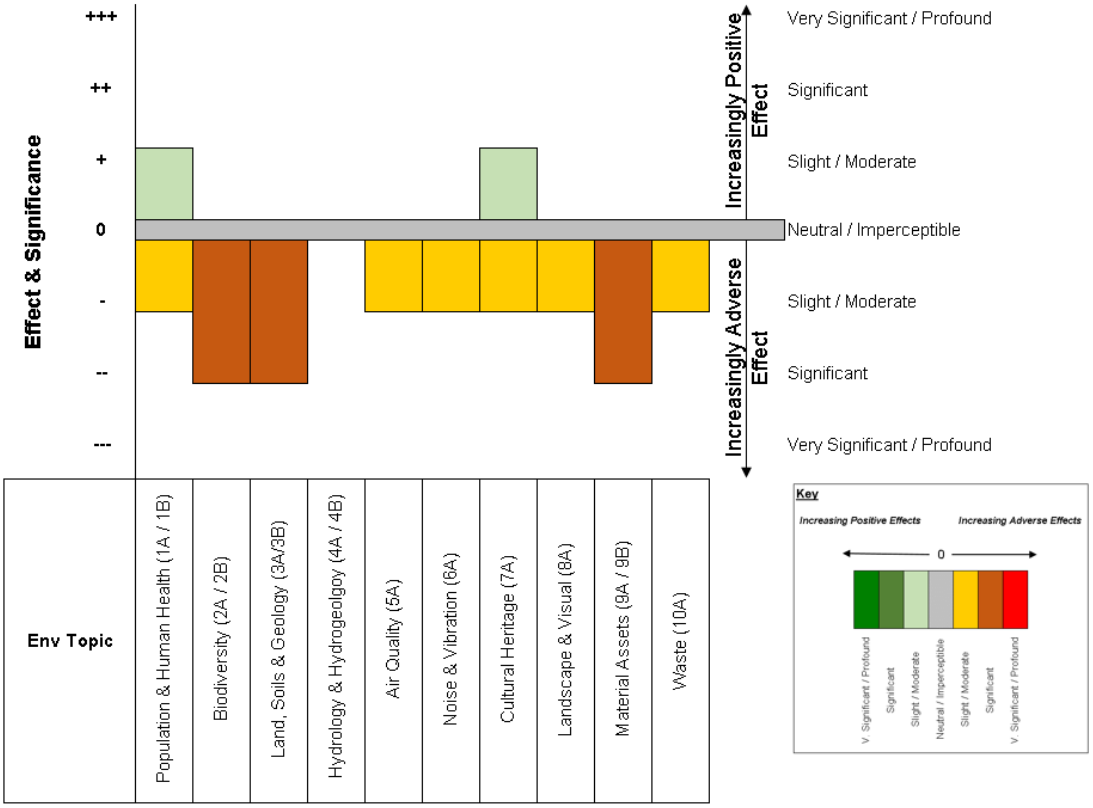


Figure 3-10 Summary chart of Predicted Effects of Alternative 2 (Work Area B) when compared to the Do-Nothing scenario.

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.

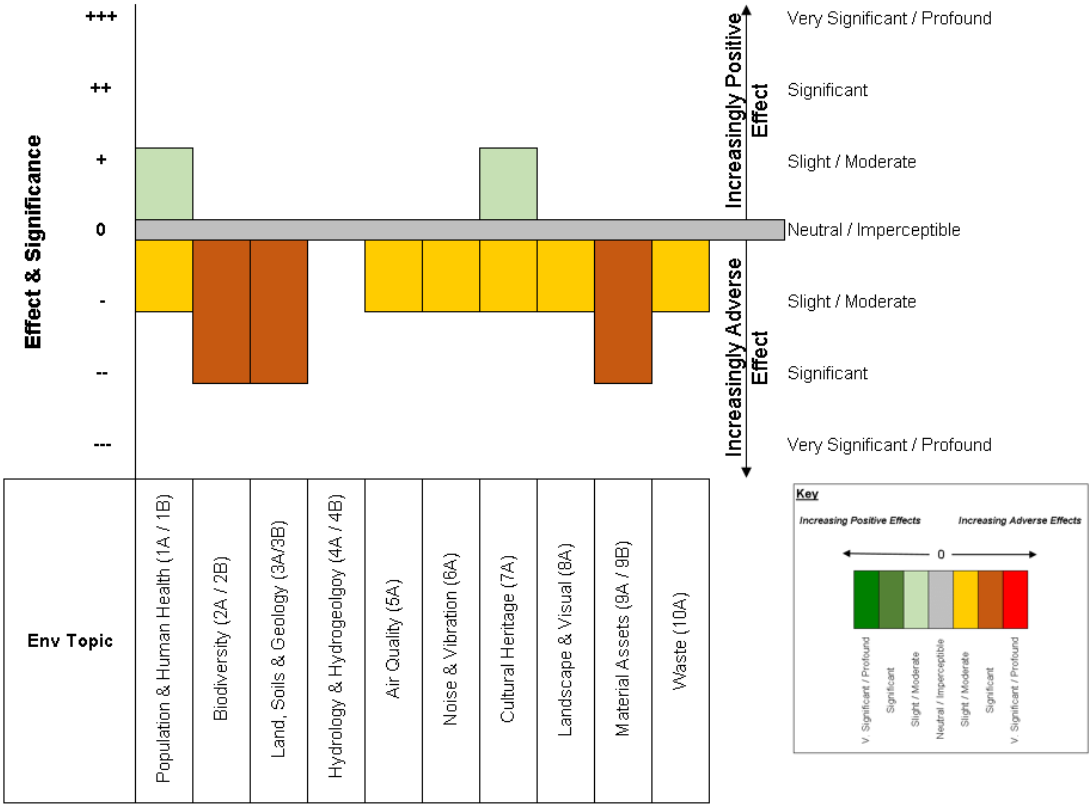


Figure 3-11 Summary chart of Predicted Effects of Alternative 3 (Work Area B) when compared to the Do-Nothing scenario.

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 effects 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). 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).

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		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 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		
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.

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
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 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.

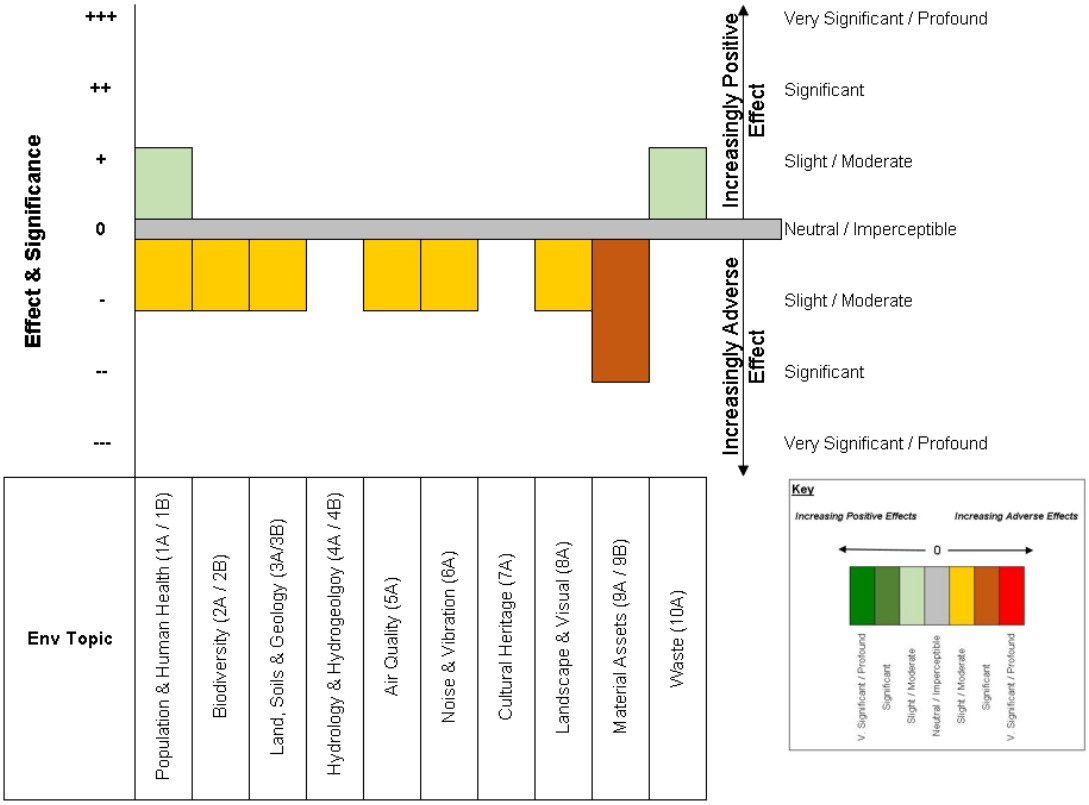


Figure 3-12 Summary chart of Predicted Effects of Alternative 4 (Work Area B) when compared to the Do-Nothing scenario.

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 Slight to Moderate positive.

Alternatives 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
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 and 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).

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
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 regime 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 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).
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 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).

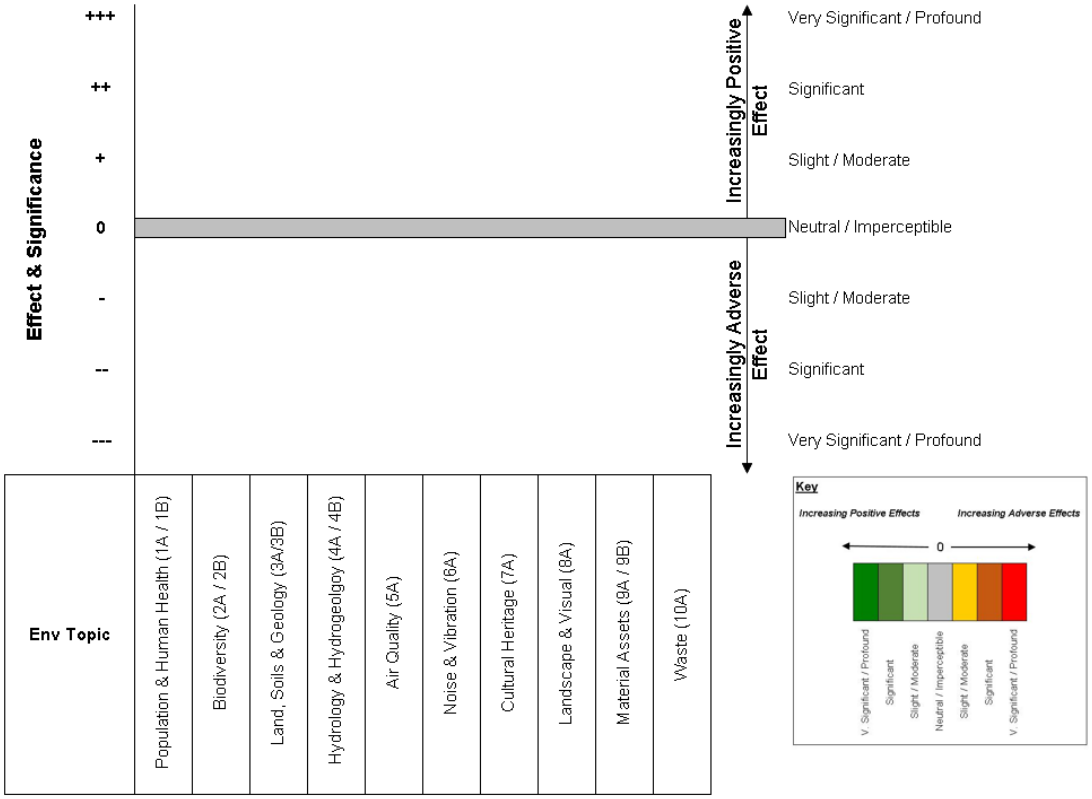


Figure 3-13 Summary chart of Predicted Effects of Alternative 1 (Work Area C)

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 riverbank 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). 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). 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 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). In a worst-case scenario, Alternative 2 has the potential to have a temporary 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

Environmental Topic (Sub-objective)	Degree of Potential Effects	Description
		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). 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 effect further downstream during large flood events (-1).
Groundwater (4B)	0	No alteration with hydrogeological features therefore no effect to groundwater quality anticipated (0).
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

Environmental Topic (Sub-objective)	Degree of Potential Effects	Description
		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). 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. 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.

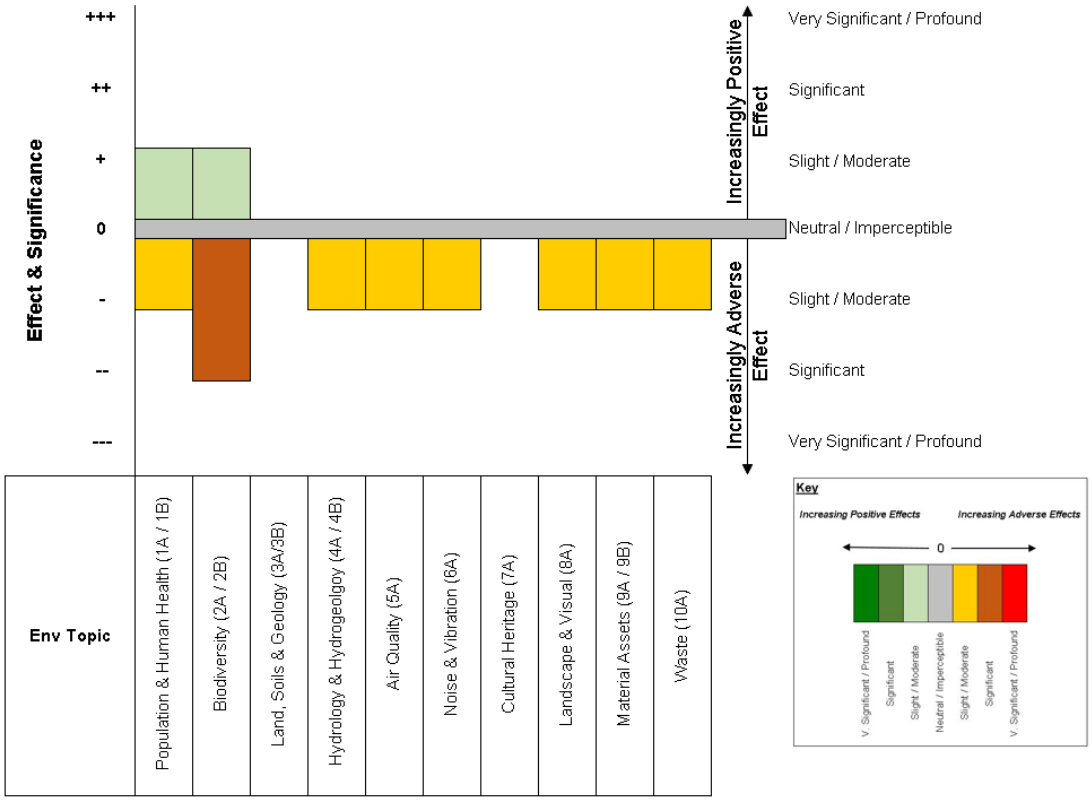


Figure 3-14 Summary chart of Predicted effects of Alternative 4 (Work Area B) when compared to the Do-Nothing scenario

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).

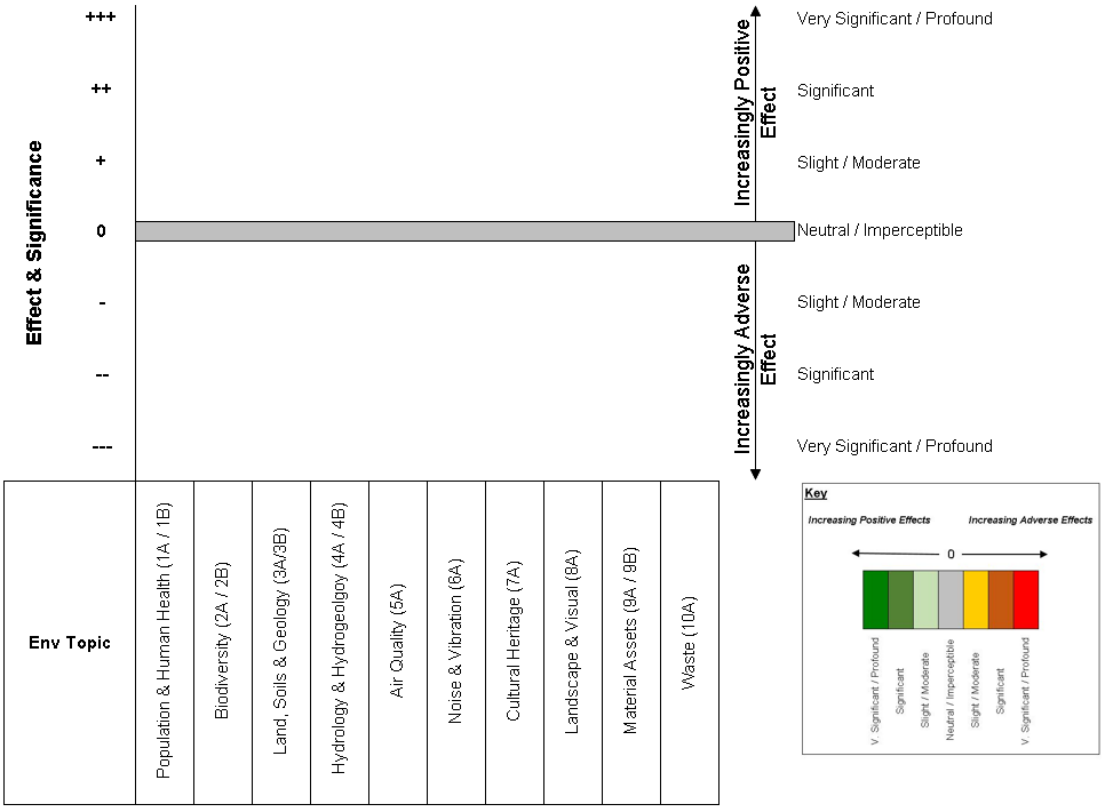


Figure 3-15 Summary chart of Predicted effects of Alternative 3 (Work Area C) when compared to the Do-Nothing scenario

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). 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 loss, disturbance and loss of a roost (if present in barrages). Short

Environmental Topic (Sub-objective)	Degree of Potential Effect	Description
		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). 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). 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). 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 hydrological 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. 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.

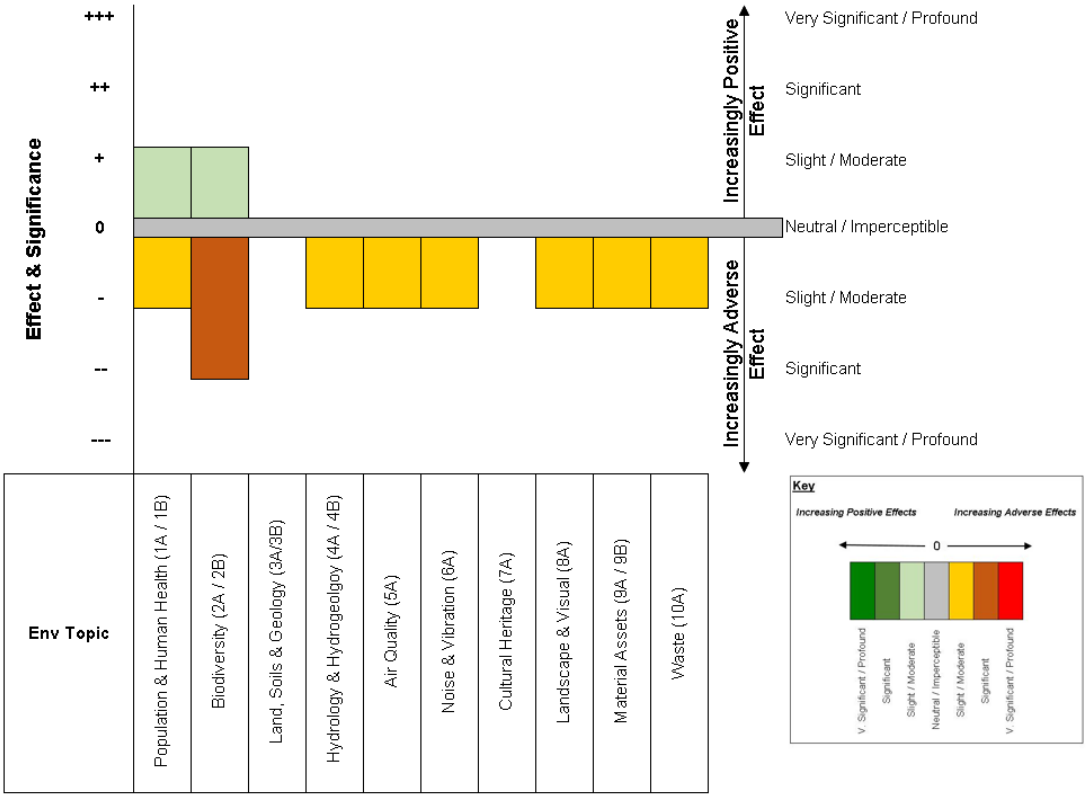


Figure 3-16 Summary chart of Predicted Impacts of Alternative 4 (Work Area C) when compared to the Do-Nothing scenario

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 rEIAR 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 material 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 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 PROJECT

4.1 Introduction

This section of the remedial Environmental Impact Assessment Report (rEIAR) 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 177E of the Planning and Development Act 2000, as amended ("the 2000 Act") for substitute consent to retain certain at and below ground elements of the existing Derrybrien Wind Farm Development in situ ("the Retained Development").

In addition, the Project also comprises the development which is the subject of the application made to ABP for permission to decommission the Derrybrien Wind Farm Development, under section 37L of the 2000 Act ("the Prospective Development") (which application is accompanied by, inter alia, and Environmental Impact Assessment Report [EIAR]).

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 Development Decommissioning Project, including the "Prospective Development" and "Retained Development".

For the purposes of the application for substitute consent under section 177E, and the Board's consideration of this rEIAR (and the remedial Natura Impact Statement [rNIS] also submitted with that application), the Retained Development comprises the following:

- Derrybrien Windfarm including the Derrybrien 110kV Substation:
  - Reinforced concrete foundations for 70no. wind turbines.
  - Reinforced concrete foundations of structures and buildings within the Derrybrien Substation compound.
  - Reinforced concrete foundations of 2no. Anemometer masts.
  - Approx. 17.5km of access tracks and 70no. hardstand areas
  - Underground Electrical and communications cabling.
  - 3no. Borrow Pits / Quarries.
  - Naturalised Peat Repository areas.
  - Onsite Drainage Infrastructure.
- Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation:
  - Below ground element of 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.
- Off-site Features constructed in response to the peat slide:
  - Barrage 1 and Coillte Access Track.
  - Barrage 2, Access Track and Repository Area.
  - Barrage 3 and Repository Area.
  - Barrage 4.
  - Repository Area at the Black Road Bridge.
  - Minor repairs work to instream structures/bridges – at Black Road Bridge, Flaggy Bridge, Unnamed Bridge C and Crooked Bridge.
  - Minor borrow pits used to source material.
  - Drainage works.

Detailed descriptions of all elements of the Retained Development are provided in Section 4.3, below. The area of the Retained Development for which permission is sought under is defined by the "red line" application boundary on the accompanying drawings. Figure 4-1 illustrates the primary study area used in the preparation of the remedial Environmental Impact Assessment Report.

4.2 Existing Derrybrien Wind Farm Development

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

Derrybrien Wind Farm Development site 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 proposed element is provided in Sections 4.2.1 – 4.2.4. The main components of the existing Derrybrien Wind Farm Development are shown in Figure 4-2.

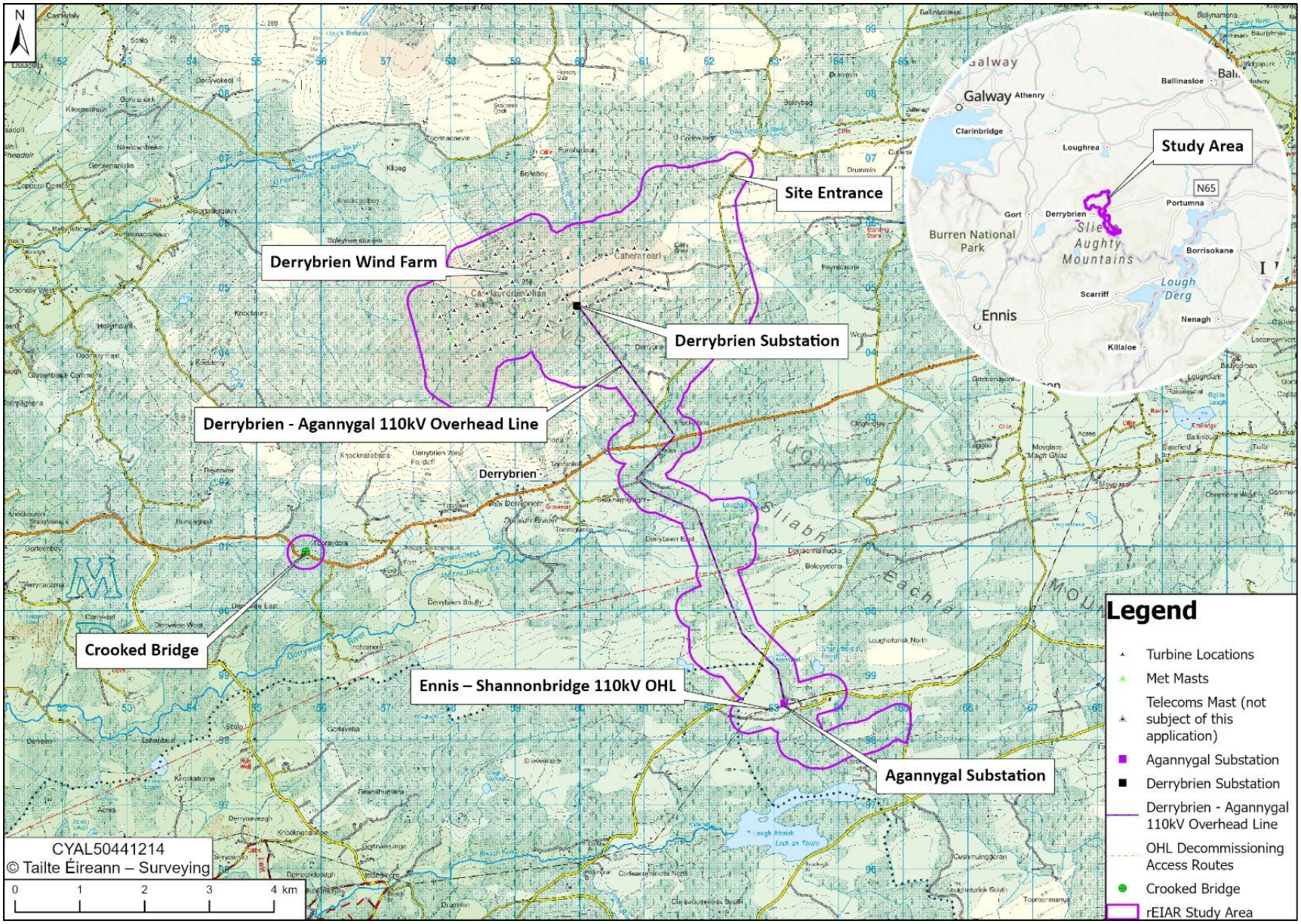


Figure 4-1 Derrybrien Wind Farm Development – rEIAR Study Area

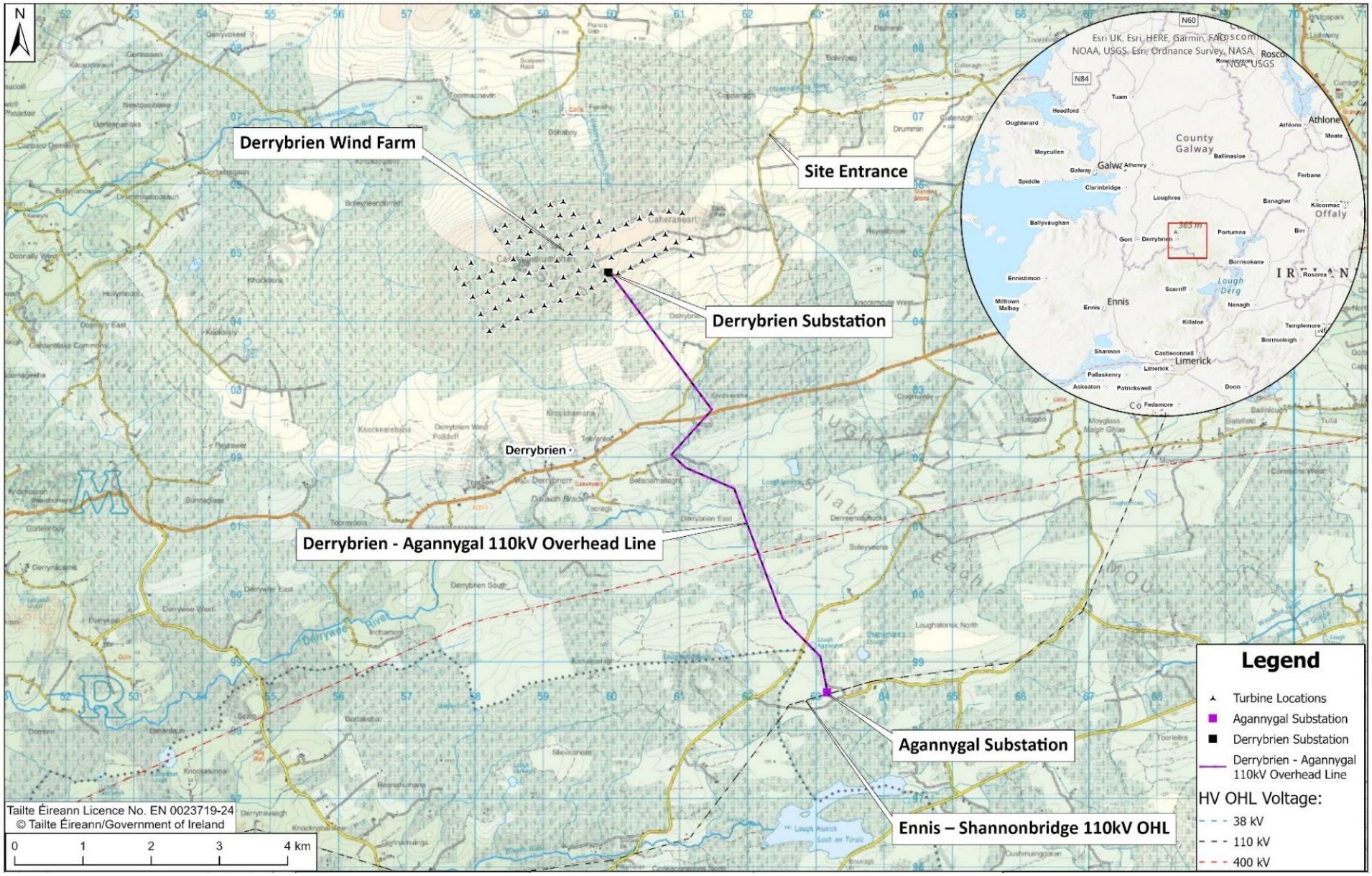


Figure 4-2 Existing Derrybrien Wind Farm Development

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 2no. 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 3 metres 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/structures

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.
- 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).

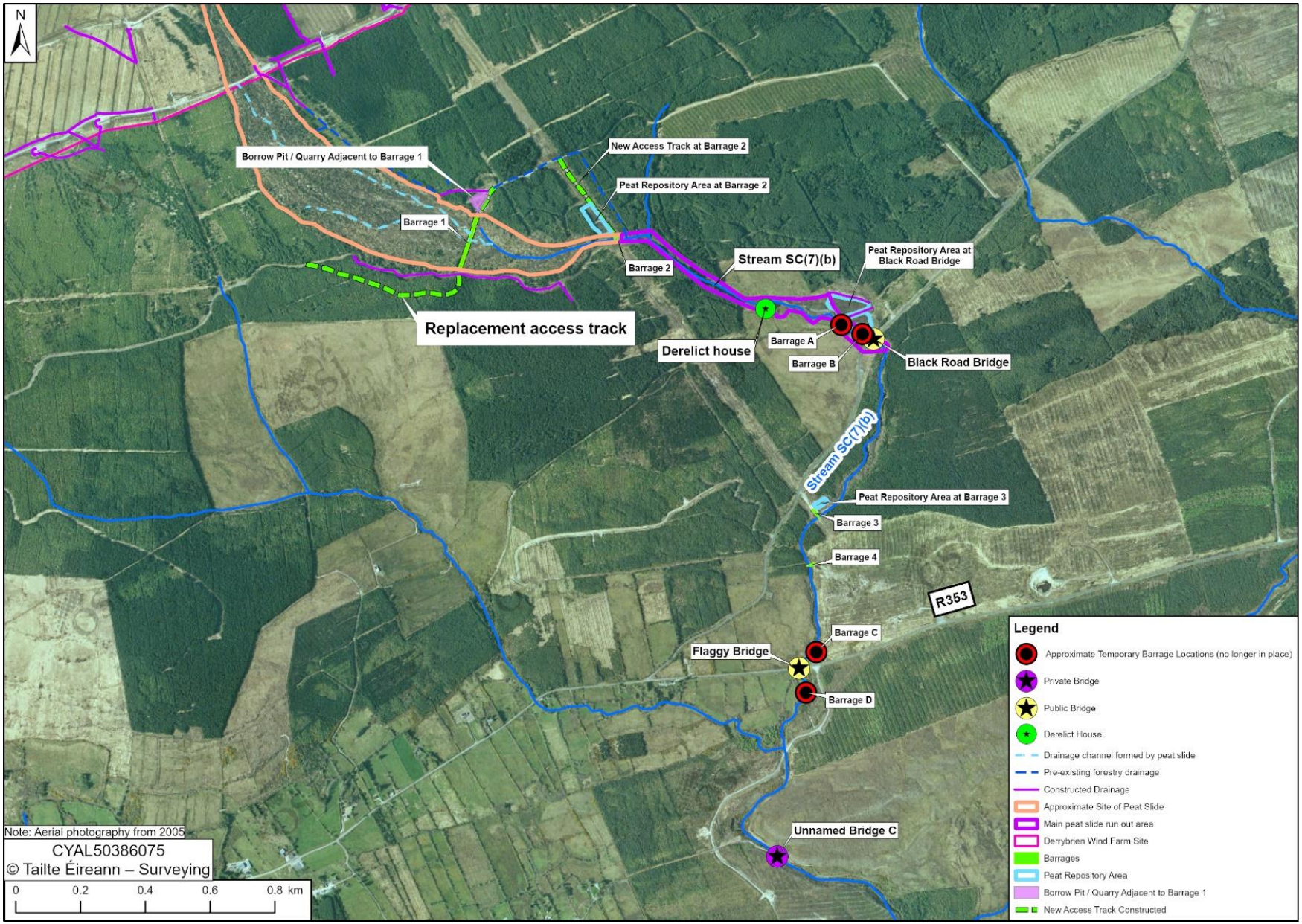


Figure 4-3 Location of and the Extent of Peat Slide and Main Peat Slide Run Out Area.

4.2.5 Summary of Project Features

A summary description of the main features associated with the existing Derrybrien Wind Farm Development is included in Table 4-1 below. Full details of each project feature is included in **Appendix 4-2** of this rEIAR (Section 3).

Table 4-1 Summary description of main features associated with the existing Derrybrien Wind Farm Development and associated works

Derrybrien Wind Farm and associated ancillary works	Appendix 4-2 Reference
Provision of hardstanding associated with temporary contractor compound and laydown area on access road to wind farm site-approximate dimensions 77 x 38m.	Section 3.2
Wind Farm Access Road: Upgrade of Coillte access road connecting the local road (Black Road) to wind farm site entrance-approximate length 3.1km; approximate widened width 4m, approximate width at bends 4.5m. Upgrading of Coillte access track linking turbary access track within the wind farm site to the Black Road -total length-approximately 1.6km	Section 3.2
Works to improve and maintain sections of local roads and bridges including: › Minor widening works and resurfacing of sections of the Black Road used for construction and operational access-approximate length 5km. › Upgrade works to three bridges (Unnamed Bridge A, Unnamed Bridge B, Black Road Bridge) on Black Road involving strengthening of the bridges, surfacing works and the replacement of the bridge parapets. › road widening for a distance of approximately 30m on either side of the Crooked Bridge on the R353 to facilitate the delivery of equipment to the wind farm site.	Section 3.2
Felling of approximately 222 ha of forestry	Section 3.4
Access roads/tracks within site (approximately 17.5km in total) for the construction, operation and maintenance of the wind farm comprising: › New floating roads-approximately 14.6 km of access track. › New non-floating roads-approximately 0.9 km, (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). › Upgrade of pre-existing floating roads-approximately 2.0km.	Section 3.5.1
Seventy (70) crane hard standing areas adjacent to turbines.	Section 3.5.2
Seventy (70 no.) Vestas V52-850 kW wind turbines (with hub height and blade length of 49m and 26m respectively) on reinforced concrete bases. The turbines are numbered T1 to T15 & T17 to T71. It is noted that a permitted turbine T16 and the connecting access tracks were not constructed as a peat stability risk mitigation measure. Wind Farm contains the necessary lighting to meet aeronautical requirements. Aviation lights are provided on nine turbines (T1, T18, T26, T44, T46, T47, T52, T61 and T65).	Section 3.4.3 and Section 3.4.4
Two (2) anemometer (met) masts	Section 3.4.5
Communication cabling: › Direct buried copper communication cables for Supervisory Control and Data Acquisition (SCADA) system laid alongside electrical cables from substation to each turbine. › 7.6km of fibre optic cable run in approximately 2.6km of ducting from the substation to the first turbine on communications cable run which connects into	Section 3.4.6

Derrybrien Wind Farm and associated ancillary works	Appendix 4-2 Reference
the existing copper communication cables at Turbine T25, T10, T26, T29, T24, T63 and T67. Electrical cabling: › Approximately 22.5km of direct buried (no ducts) underground 20kV (3 core) electrical cables.	
On-site 110kV/20kV Substation (including end mast) with control building in palisade fenced compound and associated services. Temporary containers (number varies) for equipment and parts located on hardstanding adjacent to Derrybrien Substation - currently three 40ft x 8ft, one 30 ft and one 20ft container.	Section 3.5.7
Drainage: (a) Improvement works were undertaken on the 27km (approx.) of pre-existing drainage within wind farm site and (b) 12km (approx.) of new drainage channels were constructed.	Section 3.5.8
Wind Farm – Spoil Management / Peat Repositories: Peat repository areas (up to 1m in height) in areas of flat or gently sloping ground (less than 3°) across the site, for the storage of peat/spoil excavated from the turbine hard standing areas and substation locations.	Section 3.5.9
3 no. borrow pits / quarries for the sourcing of a total of approximately 232,000m^3 of rock and clay; with works to manage these areas following the cessation of extraction activities (i.e. Fencing): › Borrow Pit/Quarry 1: Area 0.46ha (approx.); estimated volume 40,000cum (approx.). › Borrow Pit/Quarry 2: Area 0.42ha (approx.); estimated volume 12,000cum (approx.). › Borrow Pit/Quarry 3: Area1.72ha (approx.); estimated volume 180,000cum (approx.).	Section 3.5.10
Derrybrien to Agannygal 110kV Overhead Line and associated ancillary works	**Appendix 4-2 Reference**
Felling of approximately 33.1 ha of forestry along OHL route.	Section 3.4
Lowering of ground below 400kV overhead line to facilitate required ground clearance to Derrybrien-Agannygal 110kV line crossing underneath.	Section 3.3
An overhead line, approximate length 7.8 km connecting the wind farm from Derrybrien Substation to the National Grid on the Agannygal-Shannonbridge (Galway West) 110kV line via Agannygal Substation comprising: › 34 double wood pole structures. › 2 end masts (1 within Derrybrien Substation). › 6 angle masts. › 1 intermediate mast.	Section 3.6.2
Agannygal 110kV Substation	**Appendix 4-2 Reference**
Felling of approximately 1.6 ha of forestry at site of Agannygal Substation.	Section 3.4
Access to Agannygal Substation › Upgrading of pre-existing Coillte track (approx. length 2.9km, approx. width 3.5m) including removal of bend. › Construction of new access road (approx. length 0.14km, approx. width 3.5m) from public road to Agannygal Substation.	Section 3.6.3

Derrybrien Wind Farm and associated ancillary works	Appendix 4-2 Reference
Agannygal Substation with control room in palisade fenced compound and all associated works and services connecting into National Grid on the Ennis-Shannonbridge (Galway West) 110kV line, including removal of approximately 1.3km of pre-existing conductor between Angle Mast x and Angle Mast y on the pre-existing Ennis-Shannonbridge line and replacement with 2 spans emanating from Agannygal Substation comprising: › End mast and Agannygal-Shannonbridge line span (approximate length 0.7km). › End mast and Agannygal-Ennis line span (approximate length 0.6km).	Section 3.6.4
Offsite features/works undertaken in response to peat slide (2003)	**Appendix 4-2 Reference**
Construction of Borrow pit / Quarry adjacent to Barrage 1 for sourcing material for barrages. Approximate plan area 2314m^2 (0.23ha), estimated volume 1371 cum.	Section 3.7.2
Wind Farm 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 peat slide	Section 3.7.3 and 3.7.4
Barrage 1-approximate max length 94m, max width 8m, estimated volume 900m^3 rock/boulders. Replacement of forestry access road across area of peat slide and Barrage 1 - approximate length 830m, width 4.5m (approx.)	Section 3.7.5
New access track to Barrage 2 -approximate length 284m, approximate width 4.5m. Barrage 2: approximate max length 17m, max width 20m, estimated volume 650 cum rock/boulders. Peat repository area at Barrage 2 -approximate max length 34m, max width 108m, estimated area 3498m^2.	Section 3.7.6
Barrage 3: approximate max length 41m, max width 9m; estimated volume 350cum rock/boulders. Peat repository area at Barrage 3 -approximate max length 41.5m, max width 16m; estimated area 597m^2	Section 3.7.7
Barrage 4: approximate max length 25m, max width 10m; estimated volume 300cum rock/boulders	Section 3.7.8
Peat repository area at Black Road Bridge- repository in two sections -northwest section and south east section: › North west section: approximate max length 130m and width 73m; estimated area 5322m^2. › South east section: approximate max length 68m and width 51m; estimated area 2898m^2.	Section 3.7.9.
Drainage works within and in the vicinity of the site of the peat slide area and peat repository areas.	Section 3.7.10
Repairs to bridges on public roads (Black Rd Bridge and Flaggy Bridge), Repair to Bridge repairs on private land (Unnamed Bridge C) and Crooked Bridge.	Section 3.7.11

4.2.6 Construction Phase (2003 – 2006)

The construction phase of the Derrybrien Wind Farm Development took place between 2003 and 2006.

- Construction Phase 1 (June -October 2003).
- Peat Slide and Response Phase (October 2003-June 2004).
- Construction Phase 2 (June 2004-March 2006).

The activities and scope of works associated with each phase is summarised in Table 4-2 below. Full details of the construction activities/sequencing are included in **Appendix 4-2** of this rEIAR (Section 4).

Table 4-2 Summary of the sequencing of the construction activities/works associated with the existing Derrybrien Wind Farm Development

Construction Phase 1 Activities (June – October 2023)	Appendix 4-2 Reference
Upgrades to access Track to Wind Farm site	Section 4.2.1
Setup of construction compound	Section 4.2.2
Construction Phase 1 - Felling of Forestry	Section 4.2.3
Construction Phase 1 – Opening of Borrow Pits / Quarries for extraction of rock	Section 4.2.4
Construction Phase 1 – Construction of Wind Farm Access Roads	Section 4.2.5
Construction Phase 1 – Construction of Turbine Foundations	Section 4.2.6
Construction Phase 1 – Construction of Hardstanding Areas	Section 4.2.7
Peat Slide and Response Phase (October 2003-June 2004)	**Appendix 4-2 Reference**
Installation of Temporary Barrages (A, B, C and D)	Section 4.3.2
Access Track at T68	Section 4.3.3
Access Track between T23 and T70	Section 4.3.4
Access Track to Barrage 1	Section 4.3.5
Installation of Barrages 1 - 4	Section 4.3.6 – Section 4.3.9
Repository Areas related to Peat slide	Section 4.3.10
Drainage Diversions	Section 4.3.11
Construction Phase 2 (June 2004 – March 2006)	**Appendix 4-2 Reference**
Construction Phase 2 – Felling of Forestry	Section 4.4.1
Construction Phase 2 – Construction of Wind Farm Access Roads	Section 4.4.2
Construction Phase 2 – Construction of Turbine Foundations	Section 4.4.3
Construction Phase 2 – Construction of Hardstanding Areas	Section 4.4.4
Installation of 2no Anemometer Masts	Section 4.4.5
Construction Phase 2 – Borrow Pits / Quarries	Section 4.4.6
Reinstatement of Borrow Pits	Section 4.4.7
Spoil Management – Wind Farm site	Section 4.4.8
Wind Farm Underground Services	Section 4.4.9
Turbine Assembly and Installation	Section 4.4.10
Derrybrien Substation	Section 4.4.11
Overhead Line	Section 4.4.12
Agannygal Substation	Section 4.4.13
Wind Farm Project Commissioning	Section 4.4.14

4.2.7 Operation and Maintenance Phase (2006 -2022)

The operation and maintenance of the Derrybrien Wind Farm Development in the period between March 2006 and February 2022. The activities and scope of works associated during the operation and maintenance phase is summarised in Table 4-3 below. Full details of the operation phase are included in **Appendix 4-2** of this rEIAR (Section 5).

Table 4-3 Summary of maintenance activities undertaken at Derrybrien Wind Farm Development (2006-2024)

Existing Development at Derrybrien Wind Farm	Appendix 4-2 Reference
Routine Maintenance and Repair of Turbines	Section 5.4.1
Routine clean, maintenance and repair carried out at Derrybrien Substation and control building	Section 5.4.2
General maintenance of Site Access Tracks. Remedial Works undertaken in 2014.	Section 5.4.3
Periodic inspection / maintenance of drainage network	Section 5.4.4
General Maintenance of Cables and Ducting. Upgrade to communication cables in 2017	Section 5.4.5
Cutting back of tree regrowth	Section 5.4.6
Waste Management	Section 5.4.8
Existing Development at Derrybrien to Agannygal 110kV OHL	**Appendix 4-2 Reference**
Routine inspection and maintenance of the overhead line undertaken.	Section 5.5.1
Cutting back of tree regrowth along the OHL was carried out along the OHL route in 2018 and 2019.	Section 5.5.2
Existing Agannygal 110kV Substation	**Appendix 4-2 Reference**
Routine maintenance and repairs	Section 5.6
Existing Agannygal 110kV Substation	**Appendix 4-2 Reference**
Routine inspections and maintenance at Barrages, Peat Repositories and roads/bridges	Section 5.7

4.2.8 Ceased Operation Phase (2022 -2025)

In February 2022, An Bord Pleanála, refused an application for substitute consent made by Gort WFL in relation to the Derrybrien Wind Farm Project. Following the decision, commercial electricity generation at the site was ceased by ESB and it was confirmed that the Project would be decommissioned.

The turbines have been maintained by the turbine supplier to ensure the site remains safe, while in a prolonged non-operational state. Gort Windfarms Ltd have monitored and maintained the site in the interim, having regard to all safety standards. No development or use is on-going.

4.2.9 Decommissioning Phase (Prospective Development)

The proposed 'Derrybrien Windfarm Development Decommissioning Project' comprises two types of "development" for which separate Prospective Development Consent and Retrospective Development Consent is sought from the Board:

- "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.

A detailed description of the Decommissioning activities associated with the "Prospective Development" has been included in the accompanying EIAR submitted with the application for permission under section 37L of the 2000 Act. For ease of reference, and to enable the An Bord Pleanála to carry out an assessment of all elements of the Derrybrien Windfarm Development Decommissioning Project, the description of the Prospective Development has been summarised in the table x-x below. Full details of the construction activities/sequencing are included in **Appendix 4-2** of this rEIAR (Section 7).

Table 4-4 Summary of Decommissioning activities associated with the Derrybrien Wind Farm Development Decommissioning Project (Prospective Development)

Enabling Works to facilitate the decommissioning of the Derrybrien Wind Farm Development.	Appendix 4-2 Reference
Establishment of Temporary Compounds. Minimal Vegetation / Scrub Clearance. Minor Levelling Works at existing hardstand area and access tracks. Improvements to existing access roads and forestry tracks.	Section 7.1.1
Decommissioning and removal of the Derrybrien Wind Farm (including the Derrybrien 110kV Substation	**Appendix 4-2 Reference**
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 and are considered typical of the industry norm in respect of windfarm decommissioning. 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. 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 .	Section 7.1.2

Decommissioning and Removal of Derrybrien to Agannygal 110kV OHL	Appendix 4-2 Reference
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. 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. On completion of the works, all above-ground structures will have been removed from the route of the overhead line. 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	Section 7.1.3
Decommissioning of Agannygal 110kV Substation	**Appendix 4-2 Reference**
The decommissioning of Agannygal Substation will involve the removal of the above-ground elements of the substation. These works will entail the de-energising of the electrical equipment and the removal of sub-station from site. 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. Following the decommissioning of the wind farm grid connection the Ennis-Shannonbridge 110kV Overhead Line will be reinstated. These works will involve the re-conducting 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). On completion of the works, all above-ground structures will have been removed from the Agannygal substation site. Any disturbed areas shall be reinstated and below ground features rendered imperceptible. The reinforced concrete bases will remain in situ.	Section 7.1.4

4.3 Derrybrien Wind Farm Development Decommissioning Project (Retained Development)

This section of the rEIAR describes the "Retained Development" associated with the Derrybrien Wind Farm Decommissioning Project that is the subject of this rEIAR. The features of the Retained Development, to remain *in situ in* perpetuity after the Prospective Development has been completed are listed below:

- **At-ground and below-ground structures/features associated with the Derrybrien Wind Farm Development, including**:

  Derrybrien Windfarm including the Derrybrien 110kV Substation
  - 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.

  Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation
  - 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.

- **Offsite development constructed in response to the peat slide in 2003, including**:
  - Barrage 1 and Coillte Access Track.
  - Barrage 2, Access Track and and Repository Area.
  - Barrage 3 and Repository Area.
  - Barrage 4.
  - Repository Area at the Black Road Bridge.
  - Drainage Diversion Works.
  - Repairs to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C andCrooked Bridge.

4.4 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 rEIAR includes a cumulative impact assessment where appropriate. The potential cumulative impact of the retained development and other relevant developments has been carried out with the purpose of identifying what likely significant effect the retained development has had, and will have on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed, and constructed projects in the vicinity of the Retained 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 Retained 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 Retained 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 Retained 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.

4.4.1 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts arising all phases of the Retained Development and for which all relevant data was reviewed include those listed below.

4.4.1.1 Derrybrien Windfarm Development Decommissioning Project Decommissioning Works (Prospective Development)

The proposed **'Derrybrien Windfarm 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").
- 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 rEIAR accompanies the application made to An Bord Pleanála, under section 177E of the Planning and Development Act 2000, as amended ("the 2000 Act") for substitute consent for the Retained Development. In addition, an application has been made simultaneously, under section 37L of the 2000 Act, for planning permission in respect of the Prospective Development (which application is accompanied by, *inter alia*, an Environmental Impact Assessment Report [EIAR]).

Thus, this rEIAR assesses the potential cumulative effects associated with the Prospective Development (which forms the subject-matter of the Section 37L planning application).

4.4.1.2 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.

4.4.1.3 Wind Farms in Slieve Aughty Mountains

Sonnagh Old Wind Farm: There is a second wind farm (Sonnagh Old Wind Farm) within the Slieve Aughty Mountains to the north of the Derrybrien Wind Farm site which was commissioned a year before Derrybrien Wind Farm (2004). This wind farm comprises 9 no. Vestas V52-850KW turbines (same turbine model as at Derrybrien Wind Farm) situated on high ground about 3.4 km north west of the Derrybrien wind farm.

The original permission for the wind farm was granted to Corr Na Gaoithe Teo on 16th October 2000 (GCC Reg. Ref. 00/3234) for a 10-turbine wind farm.

The main construction activity for Sonnagh Old Wind Farm Project coincided with construction activity for Derrybrien Wind Farm in 2003-2005.

Planning permission was granted to ESB for the 38kV overhead line grid connection from Loughrea 38kV Substation at Caherlavin to Sonnagh Old Wind Farm on 29th October 2001.

Keeldeery Wind Farm: Planning permission was granted by Galway County Council (Reg. Ref. 00/5248) and on appeal by An Bórd Pleanála (ABP -PL 07 125978) to Keelderry Windfarm Ltd. in July 2002 for a 48 x 1MW wind farm and associated works at Keeldeery approximately 3 km to the west of the Derrybrien wind farm site (in an unforested area of the Slieve Aughty Mountains). An extension of duration of planning permission until September 2011 was granted in September 2007 (Reg. Ref. 07/3345). Internal access roads were constructed circa 2007 but the rest of the development was never built.

4.4.1.4 Thermal Generation

Tynagh 400MW Power Station in the townland of Derryfrench County Galway at the site of Tynagh Mines was granted planning permission in 2003 (GCC Reg. Ref. 03/2943). The main construction activity for the Power Station took place in 2004-2006.

The Tynagh 220kV grid connection to the ESB Oldstreet to Cashla Line was granted planning permission in 2003 (GCC Reg. Ref. 04/1974). The main construction activity for the Power Station grid connection took place in 2004-2006.

4.4.1.5 Overhead Transmission Lines

Moneypoint - Oldstreet 400 kV Overhead Line (OHL): The OHL was developed prior to the development of the Derrybrien Wind Farm Project. The line was commissioned in 1984, is 102.5 km long, and runs from the Moneypoint substation in Kilrush, Co. Clare to the Oldstreet substation in Portumna, Co. Galway.

Planning permission for refurbishment works on the overhead line was granted by Clare County Council (CCC) (Reference 16/1011) in September 2017 and Galway County Council (GCC) (Reference 16/1747) in October 2017.

All structures on the OHL will be refurbished. The scheduled outage for this project was in February 2020. The works will continue periodically into 2021.

The Derrybrien-Agannygal 110kV line passes under the Moneypoint – Oldstreet 400kV line at co-ordinates Easting - 562119, Northing -700626.

Ennis - Shannonbridge 110kV Line: The Ennis - Shannonbridge line was installed in 1952 with some further structures installed in 1968.

The Derrybrien Wind Farm Project connected into this line. Specifically, the construction of Agannygal Substation for the Derrybrien Wind Farm Project resulted in the line being split into two circuits: Agannygal - Shannonbridge (Galway West) and Agannygal - Ennis (Galway West).

4.4.1.6 Gort Regional Water Supply Scheme

Prior to construction of the Derrybrien Wind Farm Project up to the present time, the public water supply for the Gort region was supplied from the Gort Regional Water Supply Scheme which is sourced from the Gort/Cannahowna River within the Owendaluleegh River System. The water

treatment plant is located in the townland of Rindifin to the east of Gort. It is envisaged that the Gort/Cannahowna River water supply source will continue to be used for the foreseeable future.[1]

4.4.1.7 Flood Relief Schemes

Local OPW Flood Relief Scheme Gort: In 1997, prior to the development of the Derrybrien Wind Farm Project, the OPW completed a local flood relief scheme in Gort to combat potential serious winter flooding events (such as had occurred in 1994).

Local Flood Relief Works at Kiltartan: Permanent remedial works constructed at Kiltartan in 2011-2012 by Galway County Council to combat potential serious winter flooding events (such as had occurred in November 2009).

Flood Relief Works at Kinvarra: Temporary flood relief works were undertaken at Kinvarra in December 2015 during flood event.

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.

4.4.1.8 M18 Motorway Project

The M18 motorway project was planned and constructed after the Derrybrien Wind Farm Project was developed. Construction of the motorway between Oranmore and Gort as part of the overall Gort to Tuam scheme was carried out between January 2015 and September 2017. This resulted in the N18 being retained as the R458 regional road while the newly constructed M18 became the primary route between Galway and Limerick.

4.4.1.9 Quarries/Sand extraction

Sand extraction at Cloghvoley: Planning permission was granted for a sand extraction site (GCC Ref. Ref. 08/1664) located at Cloghvoley to the south-east of the Project in May 2008 after the Derrybrien Wind Farm Project was developed.

Coillte Quarry: There is a Coillte quarry just east of the junction between the R353 and the Black Road, to the south-east of the Derrybrien wind farm site. The quarry is registered under Section 261 of the Planning and Development Act 2000 (as amended) ((ref QRY62).Documents in relation to quarry registration were submitted to GCC in April 2005 by Coillte. It's a relatively small (1.8 ha aggregate quarry with an extraction area of 1.3 Ha), the aggregate being used for forest road repairs.

Ballynakill Quarry: Ballinakill Quarry is operated by Ballinakill Quarries Ltd at Cregg on the R353. The quarry is registered under Section 261 of the Planning and Development Act 2000 (as amended) ((ref QY 6). In October 2013, An Bórd Pleanála granted a substitute consent for works and operations undertaken prior to August 2012 (Ref. 07.SU0038). Planning permission was granted in December 2018 for the quarry extension (GCC Ref:18/687).

4.4.1.10 Works to Beagh Bridge

The privately owned four-span Beagh Bridge at the outlet of Lough Cutra which provides access to a private house and farm was structurally assessed by ESBI in August 2004. This followed on from the

[1] *Galway County Development Plan 2015 – 2021*

temporary installation of straw filter barriers on the upstream face of the bridge in the aftermath of the peat slide to capture and filter any suspended sediment that may have transported from the landslide area. Deterioration of the bridge identified comprised corrosion of deck slab reinforcement bars, some cracks in pier wall and some scouring at base of two of the three intermediate piers. It was noted by ESBI engineers at the time that the installation of straw filter barriers could not have caused or contributed to the corrosion in deck or cracks in pier wall. ESBI recommended in their assessment report that river flow be diverted away from these piers during the repair works to the pier bases. The recommended works were undertaken in January 2005.

4.4.2 Adjacent Land Uses

4.4.2.1 Forestry and Turf Cutting

Forestry: 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 4-4.

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.

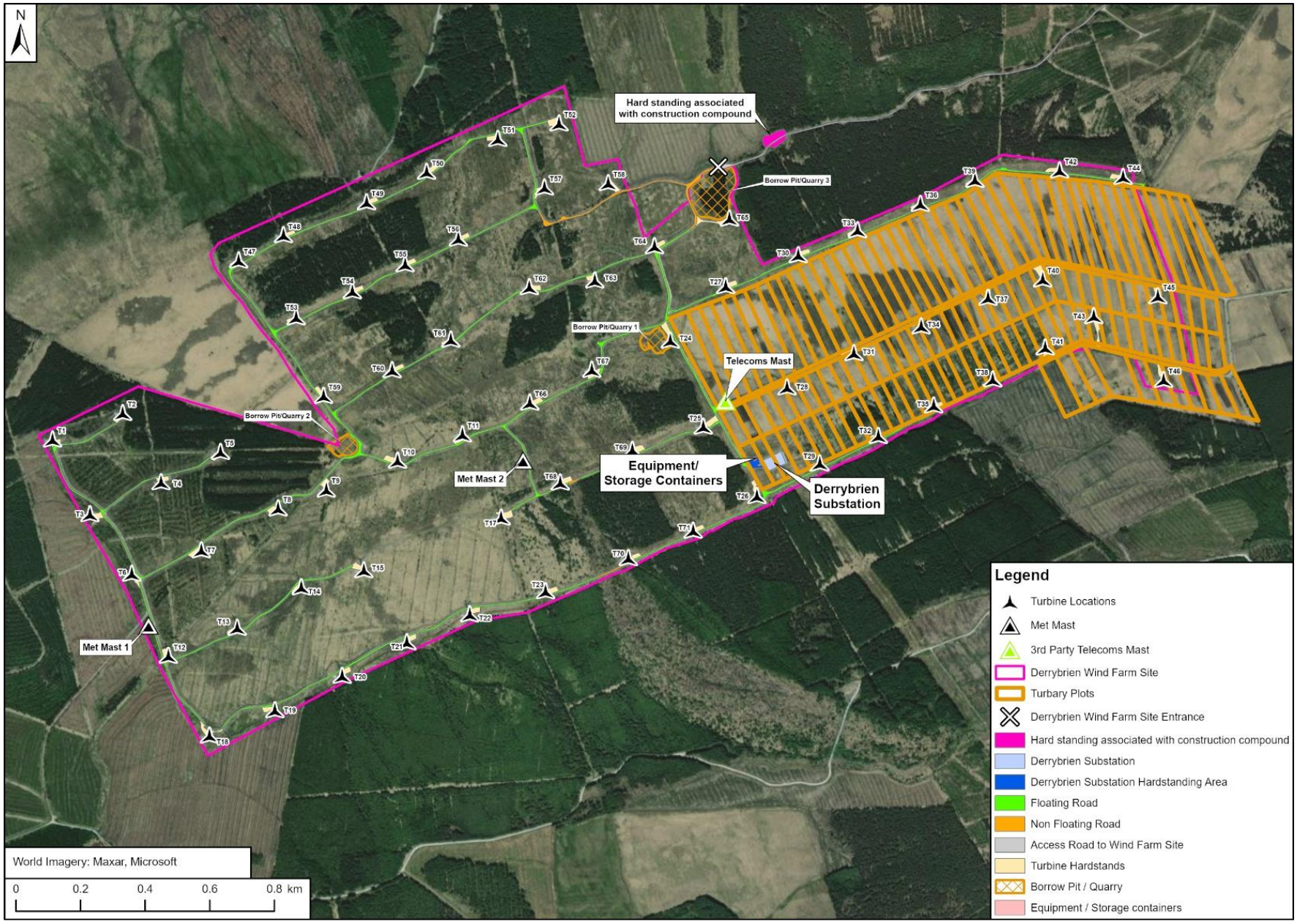


Figure 4-4 Location of Turbary within and immediately adjacent to wind farm

Figure 4-5 shows considerable areas of cutover bog but a considerable distance from the project and largely separated from the site by forestry.

4.4.2.2 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 proposed development is presented and assessed in Chapter 6 of this rEIAR and, in the case of European sites, in the Appropriate Assessment Screening Report (AASR) and Remedial Natura Impact Statement (rNIS) submitted with the application for substitute consent.

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 Retained Development is presented and assessed in Chapter 12 of this rEIAR.

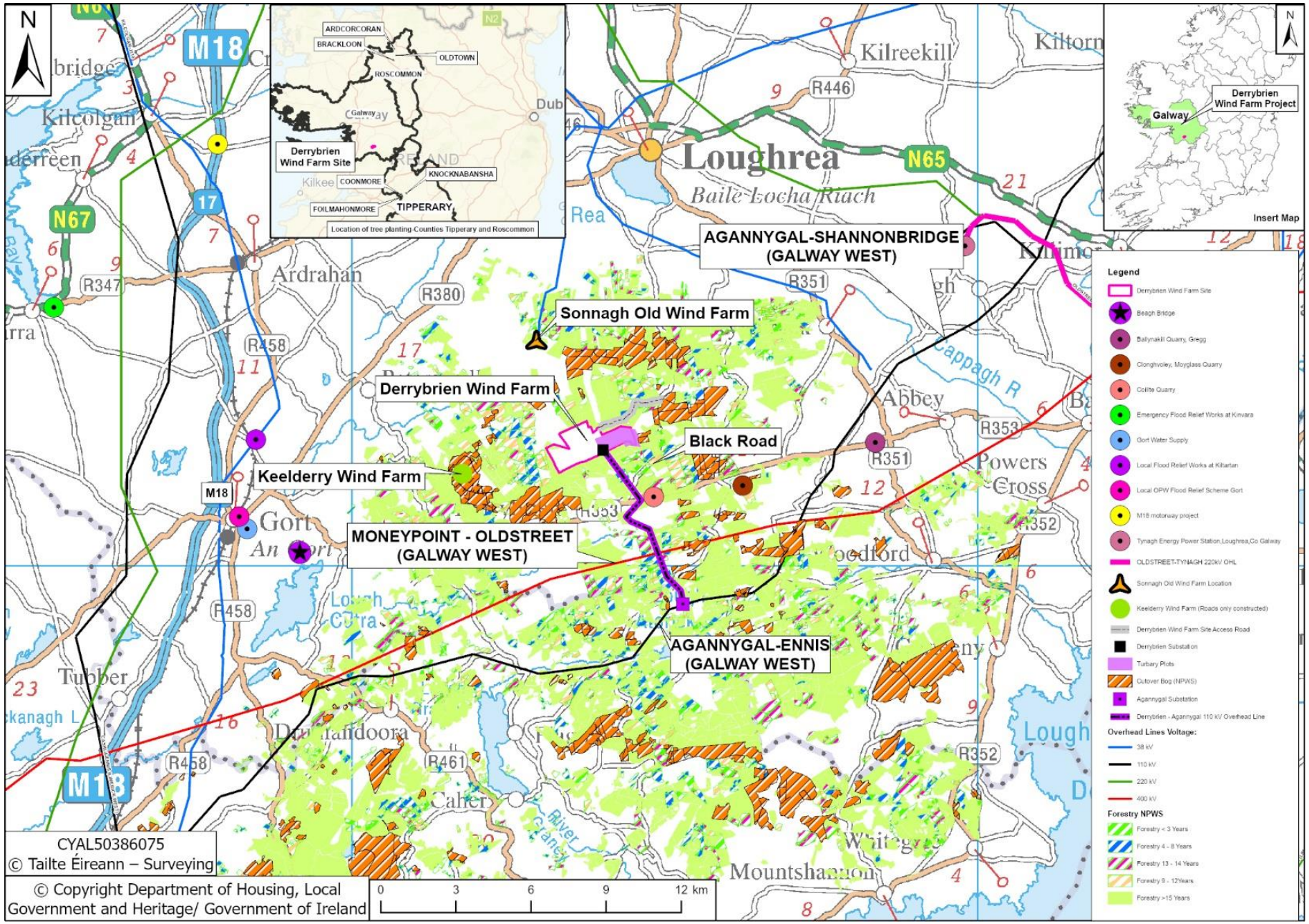


Figure 4-5 Location of Projects/Activities considered

5. POPULATION AND HUMAN HEALTH

5.1 Introduction

5.1.1 Chapter Scope

This section of the remedial Environmental Impact Assessment Report (rEIAR) identifies, describes, and assesses the potential effects of the Retained Development associated with the "Derrybrien Windfarm Development Decommissioning Project" on population and human health. The assessment has been completed in accordance with the EIA guidance and legislation set out in Chapter 1: Introduction. The full description of the Retained Development is provided in Chapter 4 of this rEIAR.

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 construction, operation, or 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 rEIAR 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 rEIAR has been prepared by Morgan Valvik and reviewed by Thomas Blackwell, both of MKO. Morgan is a Graduate Environmental Scientist at MKO. Morgan holds an MSc in Environmental Science from Trinity College Dublin. Morgan's key strengths and areas of expertise are in report writing and Environmental Impact Assessment management and coordination. Since joining MKO, Morgan has been involved in the preparation of Environmental Impact Assessment Screening Reports, Construction and Environmental Management Plans, and Environmental Impact Assessment Reports for a wide range of projects.

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. 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 renewable energy, mining, solid waste management, residential and commercial development, and public sectors.

5.1.3 Relevant Legislation

The population and human health section of this rEIAR is carried out in accordance with legislation and guidance referred to in Chapter 1 of this rEIAR. The decommissioning works of the Derrybrien Wind Farm Development Decommissioning Project 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 rEIAR 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) report 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 Retained Development, the Study Area for the Population section of this rEIAR 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 Retained Development. The Retained Development lies predominantly within Derrylaur and Aille EDs, while also lying partly in the adjacent EDs of Kilthomas, Castleboy, Mountain and Marblehill (combined with the ED of Loughatorick). 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 Scoping and Consultation

Chapter 2this rEIAR describes the scoping and consultation exercise undertaken for the Retained Development element of the Derrybrien Wind Farm Development Decommissioning Project. Scoping responses pertinent to this chapter of the rEIAR 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 and rEIAR 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.

5.2.3 Impact Assessment Methodology

The EPA "Guidelines on the Information to be contained in Environmental Impact Assessment Reports" (EPA, 2022) 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 (varying), Fáilte Ireland and any other literature pertinent to the area.

Population and health information has been obtained from historic reports, records and Census data which cover the relevant time periods relating to the baseline year (1998), the construction period 2003 to 2006, the operational period 2007 to 2022 to varying degrees, and the non-operational period 2022 to 2024. Information was also obtained from the Census of Agriculture and from the CSO website

(www.cso.ie). Census information is divided into State, Provincial, County, Major Town and Electoral Division (ED) level.

5.2.4 Limitations/Difficulties Encountered

Employment information in consistent format was not always available at ED level; however, a general picture of employment and trends has been obtained from data available for the West Region and for Galway County indicating the range and changes in the nature of employment in rural county Galway which was similar to available ED information where available. Health data was also limited for the ED areas and reference was made to available information at West Region and Galway County level which again correlated generally with available ED information.

As this rEIAR assesses a project that is already complete, the opportunity to directly measure or monitor certain environmental effects — such as dust deposition or air quality impacts — no longer exists. The absence of continuous historical air quality data (for example, dust monitoring during construction) limits the ability to quantify actual effects with certainty.

In such cases, the assessment relies on standard methodologies, professional judgment, and contextual information such as separation distances to sensitive receptors, site conditions, and the nature of construction activities. This approach reflects best practice where data gaps exist. Any reference to potential or estimated effects should be understood within this context of data limitation.

Overall sufficient information was available to allow a robust assessment of the Retained Development effect on Population and Human Health to be made.

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 CSO, the Galway County Development Plan (as varied), 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 historic reports, records and Census data which cover the relevant time periods relating to the baseline year (1998), the construction period 2003 to 2006, the operational period 2007 to 2022 to varying degrees, and the non-operational period 2022 to 2024; the Census of Agriculture 2020; and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town and District Electoral Division (ED) level (where possible).

The Derrybrien Wind Farm Development Decommissioning Project (Retained 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 site is located within the townlands of Coppanagh, Boleyneendorrish, Kilbeg, Toormacnevin, Funshadaun, Bohaboy, Derrybrien North and Derrybrien West. 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 Retained Development, the Population Study Area for the Population section of this rEIAR was defined in terms of the Electoral Divisions (EDs) where the Retained Development is located, and where relevant, nearby EDs which may be affected by the Retained Development. The Retained Development lies predominantly within Derrylaur and Aille

EDs, while also lying partly in the adjacent EDs of Kilthomas, Castleboy, Mountain and Loughatorick /Marblehill. It should be noted that the population of Loughatorick is so low that it is combined with Marblehill for statistical purposes. These six EDs therefore comprise the Study Area for the Population section of this rEIAR. The Study Area had a population of 1,655 persons, as of 1996 and comprised a total land area of 232km^2 (Source: CSO Census of the Population 2022). In 2016, the Study Area had a population of 1,866 persons. The study area is shown in Figure 5-1.

There are 11 no. private residential dwellings within 500m of the Retained 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 rEIAR.

5.3.1 Population

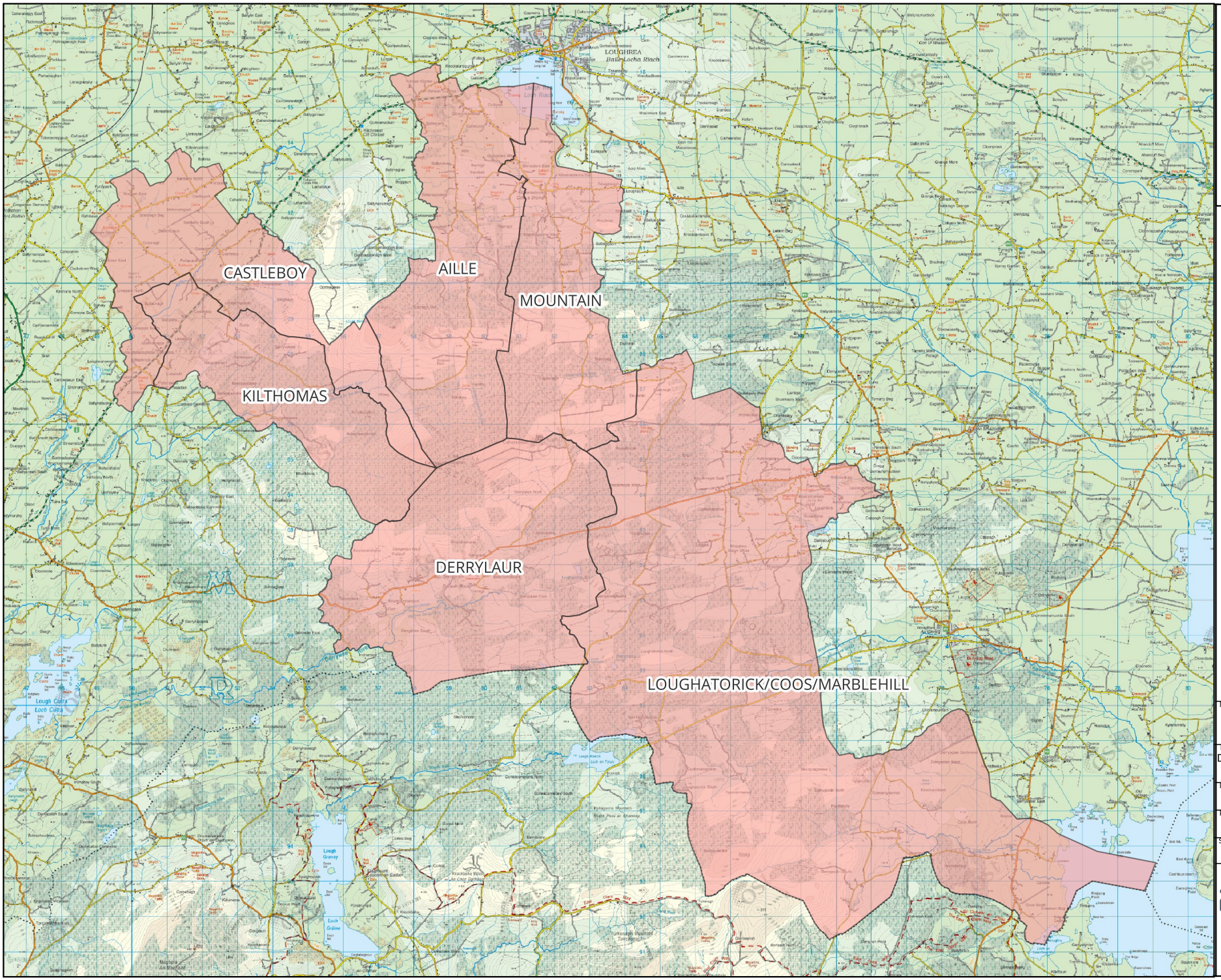
5.3.1.1 Population Trends

In the period between the 1996 and 2022 Census, the population of Ireland increased by 42.0%. During this time, the population of County Galway grew by 46.9% from 131,613 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 Population 2002 – 2016 (Source: CSO)Table 5-1.

Table 5-1 Population 2002 – 2016 (Source: CSO)

Area	Population Change						% Population Change
	1996	2002	2006	2011	2016	2022	1996 - 2022
State	3,626,087	3,917,203	4,239,848	4,588,252	4,761,865	5,149,139	42.0%
County Galway	131,613	143,245	158,256	175,124	179,390	193,323	46.9%
Study Area	**1,655**	**1,734**	**1,767**	**1,834**	**1,866**	**2,008**	**21.3%**

The data presented in Table 5-1 shows that the population of the Study Area increased by 21.3% from 1,655 to 2,008 people between 1996 and 2022. The population growth during this period is significantly less than the growing population of both the State and County. When the population data is examined in closer detail, it shows that the rate of population increase varies between the Study Area EDs. The population of Mountain increased by 44.4%; meanwhile, the population of Derrylaur decreased by 31.3%.



Map Legend

Electoral Divisions

Microsoft product screen shots reprinted with permission from Microsoft Corporation
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517

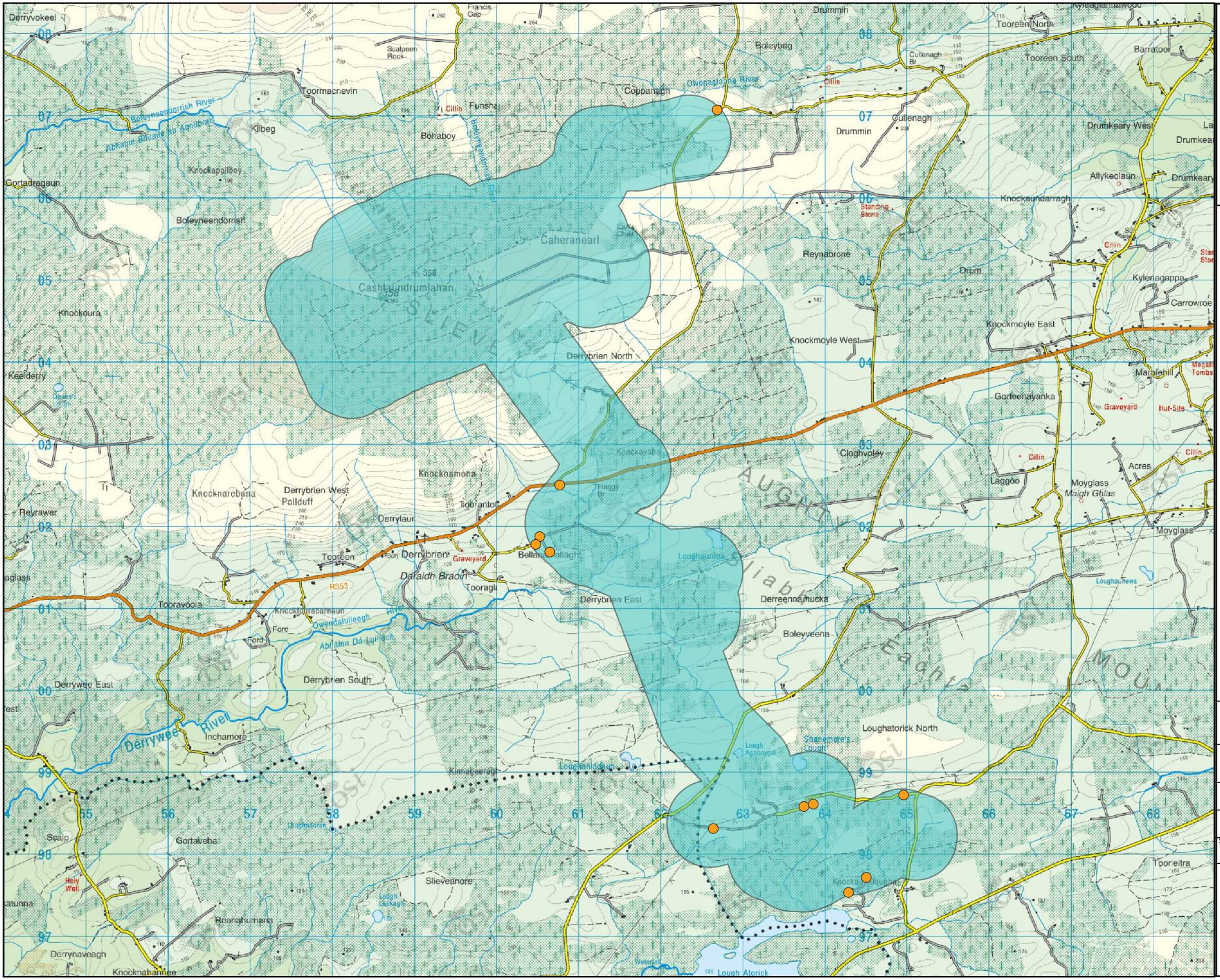
N

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

- 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

Dwellings Map

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

5.3.2 Summary of Baseline Information

5.3.2.1 Population Density

The population densities recorded within the State, County Galway and the Study Area during the 1996 and 2022 Census are shown in Table 5-2.

Table 5-2 Population Density in 2002 and 2016 (Source: CSO)

Area	Population Density (Persons per square kilometre)					
	1996	2002	2006	2011	2016	2022
State	52	55.7	60.3	65.29	67.8	73.3
Co Galway	22	23.5	25.96	28.72	29.4	31.7
Study Area	**7**	**7.5**	**7.6**	**7.9**	**8.0**	**8.6**

The population density of the Study Area recorded during the 1996 Census was 7 persons per km^2. This figure is significantly lower than the national population density of 52 persons per km^2 and the county population density of 22 persons per km^2. From 1996 to 2022, the population density of the Study Area increased slightly from 7 persons per km^2 to 8.6 persons per km^2. While the Study Area experienced growth in terms of population density, these figures are significantly lower than the national and County Galway population densities. Thus, these findings confirm that the site of the Project is located within a very sparsely populated area.

5.3.2.2 Household Statistics

The number of households and average household size recorded within the State, County Galway and the Study Area during the 2002 and 2016 Censuses are shown in Table 5-3. It should be noted that the number of households and average household size (persons) for 1996 was not included below, as there is no census data available at an ED level.

Table 5-3 Number of Household and Average Household Size 1996 – 2016 (Source: CSO)

Area	1996		2002		2006		2011		2016		2022	
	No. of Households	Avg Size (persons)	No. of House holds	Avg. Size (persons)	No. of House holds	Avg. Size (persons)	No. of House holds	Avg. Size (persons)	No. of House holds	Avg. Size (persons)	No. of House holds (persons)	Avg. Size (persons)
State	1,127,318	3.2	1,287,958	2.9	1,469,521	2.8	1,654,208	2.7	1,697,665	2.7	1,841,152	2.7
County Galway	38,849	3.4	45,253	3.1	53,308	2.9	60,952	2.8	63,040	2.8	68,021	2.8
Study Area	**N/A**	**N/A**	**549**	**3.1**	**594**	**2.9**	**638**	**2.9**	**683**	**2.7**	**746**	**2.7**

The figures in Table 5-3 show that while the number of households at State and County level continues to increase, the average number of people per household decreased from 1996 to 2022 (i.e., there are more households and the fewer people per house). Similar trends were seen at the County and Study Area-level.

The Study Area recorded an increase in households, but the average household size in the period between 2002 and 2022 has decreased slightly. Similar to trends observed above, the average household size recorded across the Study Area varied between EDs.

5.3.2.3 Age Structure

The tables below present the population percentages of the State, County Galway and Study Area within different age groups as defined by the Central Statistics Office during the 2002, 2006, 2011, 2016, and 2022 Census. Please note that the data for population percentages within different age groups is not available in the ED-level from the 1996 Census and thus has not been included below.

Table 5-4 Population per Age Category in 2002 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	19.7%	16.4%	30.1%	21.2%	11.1%
County Galway	21%	14.2%	27.7%	22.5%	12.8%
Study Area	**32.2%**	**16.2%**	**37.1%**	**27.9%**	**16.2%**

Table 5-5 Population per Age Category in 2006 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	20.4%	15%	31.7%	21.9%	11.0%
County Galway	22%	13.3%	30%	23.1%	11.8%
Study Area	**31.4%**	**15.5%**	**34.5%**	**31.9%**	**16.6%**

Table 5-6 Population per Age Category in 2011 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	21.4%	12.7%	31.6%	22.7%	11.7%
County Galway	22.7%	11.4%	29.3%	24.1%	12.6%
Study Area	**26.8%**	**15.9%**	**32.4%**	**35.1%**	**16.6%**

Table 5-7 Population per Age Category in 2016 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	21.1%	12.1%	29.5%	23.8%	13.4%
County Galway	22.7%	10.9%	26.3%	25.6%	14.5%
Study Area	**23.4%**	**18.3%**	**26.0%**	**38.6%**	**20.4%**

Table 5-8 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%**

For the Study Area, during the 2002 and 2006 Census, the highest population percentage occurs within the 25-44 age category. During the period of 2011 to 2022, the highest population percentage occurs within the 45-64 age category followed by the 25-44 age category. Across all years, the least represented age category is 15-24.

The proportion of persons in the 65+ category in the Study Area population has steadily increased from 2002 to 2022 – indicating an aging population. This increase in population percentage over time for this age category is seen at the State and County-level, as well. However, the proportion of persons in the 65+ category in the Study Area across all Census periods is higher than that recorded at State or County-level. This age category would be considered to be sensitive to change. When the data is examined more closely, it can be seen that the figures for the 65 + age category, vary between EDs. In 2022, Mountain ED has the lowest percentage of people in this age category, with 13.38%; while Derrylaur records the highest, with 25.3% of people in 65+ age category.

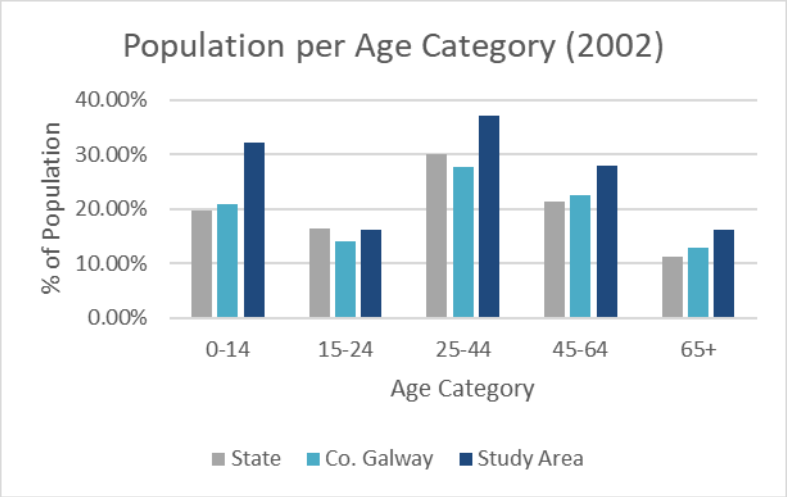


Figure 5-3 Population per Age Category in 2002 (Source: CSO)

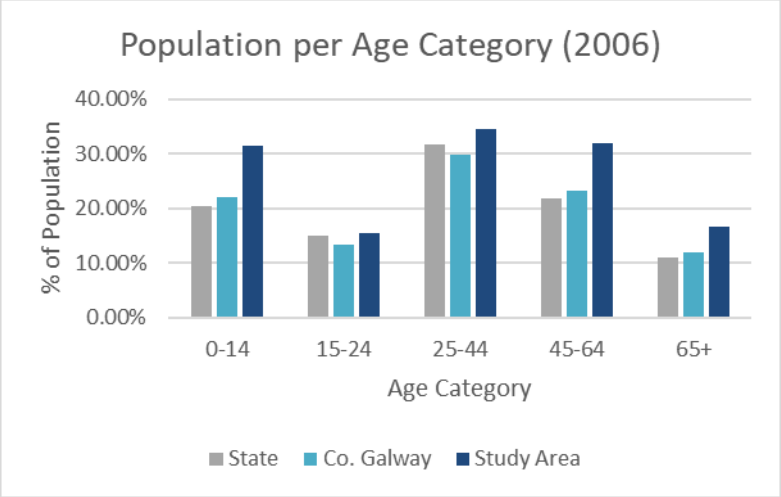


Figure 5-4 Population per Age Category in 2006 (Source: CSO)

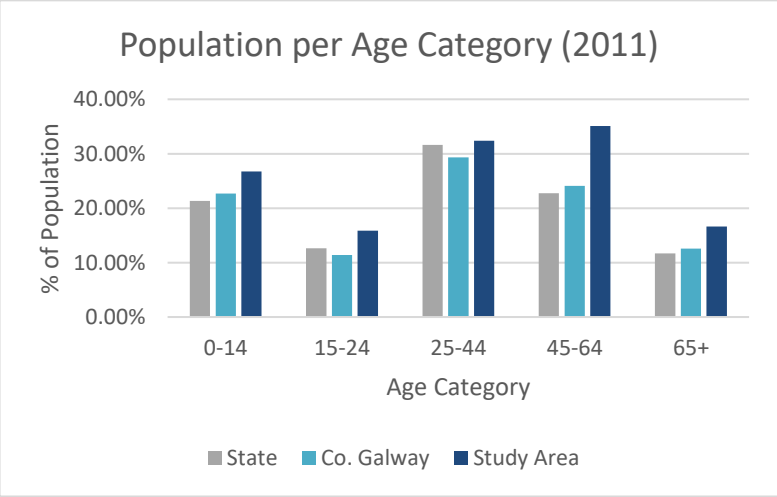


Figure 5-5 Population per Age Category in 2011 (Source: CSO)

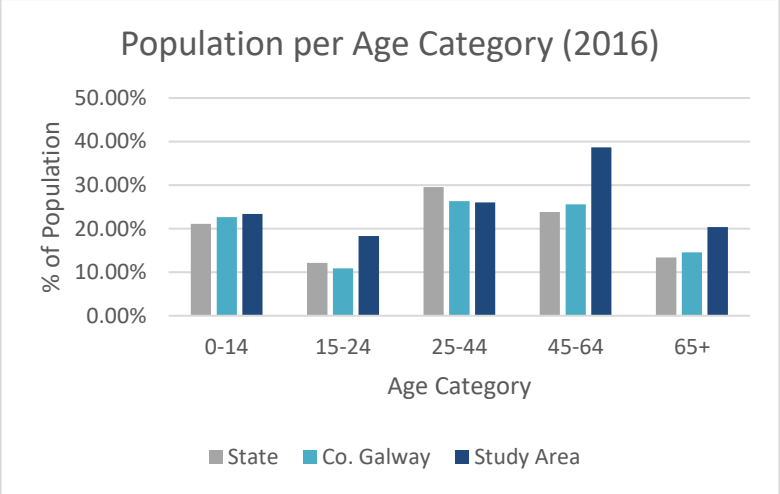


Figure 5-6 Population per Age Category in 2016 (Source: CSO)

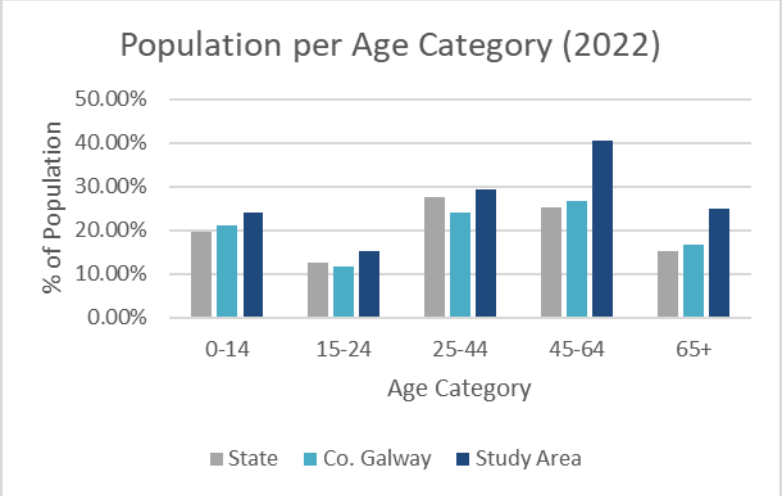


Figure 5-7 Population per Age Category in 2022 (Source: CSO)

5.3.2.4 Employment and Economic Activity

5.3.2.4.1 *Economic Status of the Study Area*

Table 5-9, Table 5-10, and Table 5-11 show the percentage of the total population aged 15+ who were in the labour force in the State, County, and Study Area, respectively across the entirety of the Derrybrien Wind Farm Development (from 1996 to 2022). 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 5-9 Economic Status of the Total Population Aged 15+ in the State (Source: CSO)

Status	1996	2002	2006	2011	2016	2022
% of population aged 15+ who are in the labour force	55.4%	58.6%	60.0%	62.2%	63.6%	61.2%

Status		1996	2002	2006	2011	2016	2022
% of which are:	At work	51.6%	64.9%	76.3%	71.4%	79.3%	91.7%
	First time job seeker	1.1%	0.8%	1.2%	1.3%	??	1.4%
	Unemployed	7.9%	6.3%	7.1%	16.8%	11.7%	7.0%
% of population aged 15+ who are not in the labour force		44.6%	41.4%	40.0%	37.8%	36.4%	38.8%
% of which are:	Student	21.1%	21.8%	21.8%	25.5%	26.6%	28.6%
	Home duties	34.5%	27.3%	21.2%	21.2%	19.0%	17.0%
	Retired	16.1%	20.8%	28.5%	28.5%	34.0%	41.0%
	Unable to work	4.9%	7.2%	8.6%	9.8%	9.9%	11.8%
	Other	0.2%	2.2%	8.6%	0.8%	0.9%	1.7%

Table 5-10 Economic Status of the Total Population Aged 15+ in the County (Source: CSO)

Status		1996	2002	2006	2011	2016	2022
% of population aged 15+ who are in the labour force		54.4%	56.5%	61.5%	62.4%	63.3%	60.6%
% of which are:	At work	51.6%	61.6%	76.3%	74.7%	81.1%	92.8%
	First time job seeker	1.1%	0.7%	1.2%	1.3%	1.0%	1.1%
	Unemployed	7.9%	6.3%	5.4%	15.3%	9.7%	6.2%
% of population aged 15+ who are not in the labour force		44.6%	43.5%	38.5%	37.6%	36.7%	39.4%
% of which are:	Student	35.3%	19.9%	20.1%	23.6%	24.7%	27.7%
	Home duties	46.0%	28.5%	26.7%	22.2%	20.1%	16.8%
	Retired	21.5%	20.8%	23.3%	28.5%	34.2%	43.0%
	Unable to work	6.4%	8.4%	8.9%	9.6%	9.5%	10.8%
	Other	0.1%	2.2%	0.6%	0.8%	0.7%	1.7%

Table 5-11 Economic Status of the Total Population Aged 15+ in the Study Area (Source: CSO)

Status		1996	2002	2006	2011	2016	2022
% of population aged 15+ who are in the labour force		N/A*	75.5%	73.2%	68.5%	62.6%	59.7%
% of which are:	At work	N/A	69.4%	76.3%	73.4%	78.8%	95.0%
	First time job seeker	N/A	0.5%	0.4%	0.9%	1.1%	0.7%
	Unemployed	N/A	5.2%	4.3%	12.2%	6.3%	4.3%
% of population aged 15+ who are not in the labour force		N/A	43.5%	40.7%	40.8%	37.4%	40.3%
% of which are:	Student	N/A	21.7%	19.9%	28.8%	27.6%	25.8%
	Home duties	N/A	34.6%	31.2%	23.0%	23.2%	19.7%
	Retired	N/A	20.8%	23.2%	28.2%	29.1%	43.8%
	Unable to work	N/A	7.2%	8.0%	7.5%	8.4%	9.5%
	Other	N/A	2.3%	0.3%	0.8%	0.3%	1.2%

**It should be noted that the population data on the ED-level is not available from the 1996 Census.*

During the construction and peat slide period of the development (2003 to 2006) the national economic boom which occurred at that time was also reflected in the Study Area population statistics. The total percentage of people within the Study Area over the age of 15 who were in the labour force was 75.5% in 2002 and 73.2% in 2006. This figure is higher in the Study Area when compared to State and County level.

During the initial operational period of Derrybrien Wind Farm from 2006 to 2011, changes in employment in the Study Area reflect the changes seen on a national level as a result of the post-2008 Irish economic downturn. The percentage of unemployed people over the age of 15 within the Study Area increased significantly during this period from 4.3% to 12.2%. This increase in unemployment from the 2006 Census to the 2011 Census is reflected in unemployment rates at both the County and State level.

In the non- operational period of Derrybrien Wind Farm, the percentage of people over the age of 15 who were in the labour force recorded in the Study Area has decreased from 62.2% to 59.7% from 2016 to 2022. It should be noted that the percentage of people over the age of 15 who were employed within the Study Area increased during from 2016 to 2022 (i.e., 78.8% to 95.0%). 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.

5.3.2.4.2 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. Figures 5-9, 5-10, 5-11, and 5-12 show the percentages of those employed in each socio-economic group in the State, County Galway and the Study Area from 2002 to 2022.

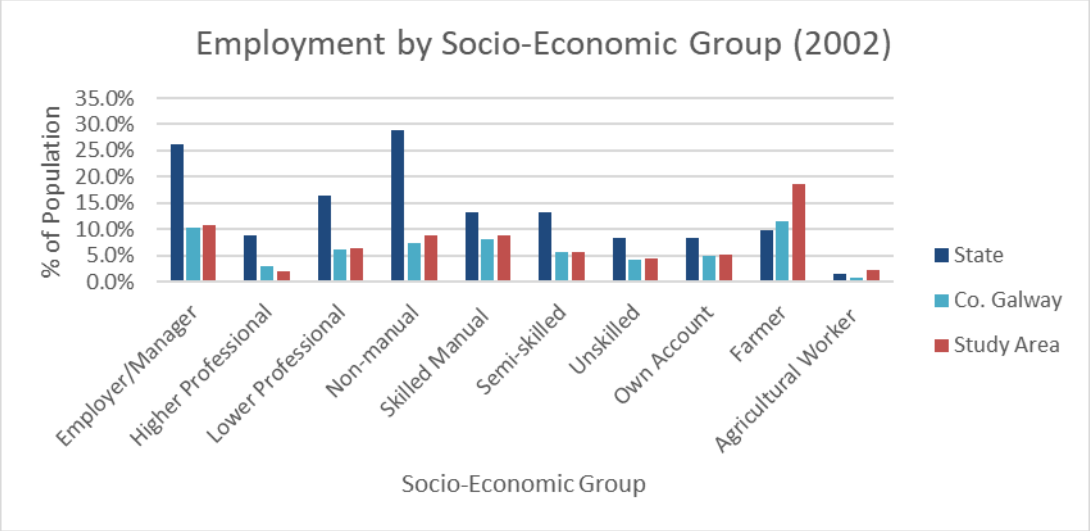


Figure 5-8 Employment by Socio-Economic Group in 2002 (Source: CSO)

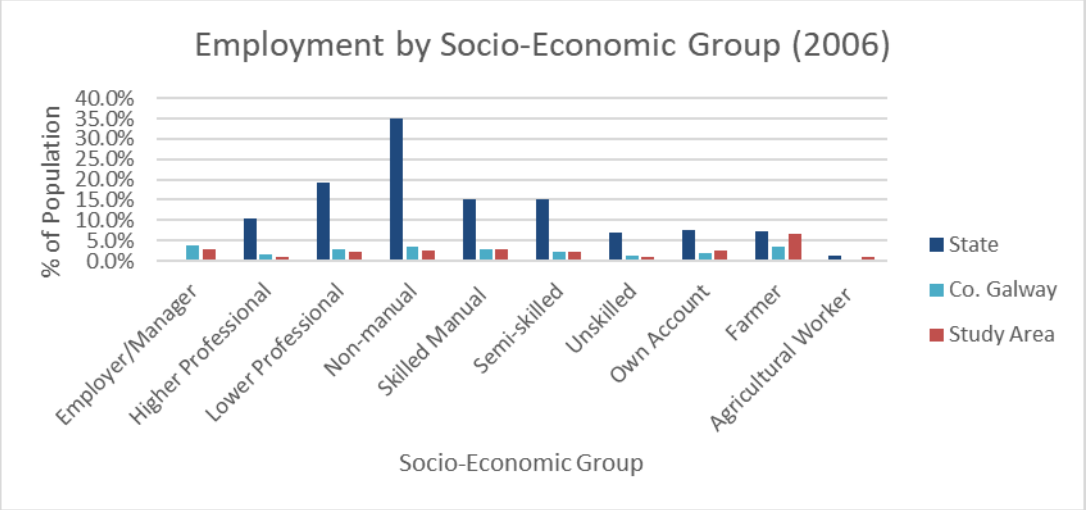


Figure 5-9 Employment by Socio-Economic Group in 2006 (Source: CSO)

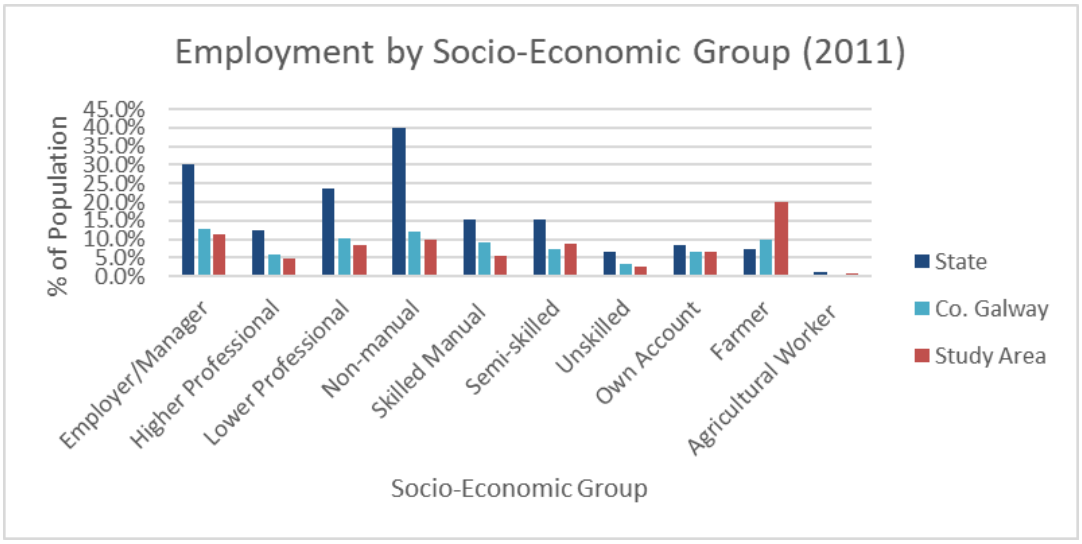


Figure 5-10 Employment by Socio-Economic Group in 2011 (Source: CSO)

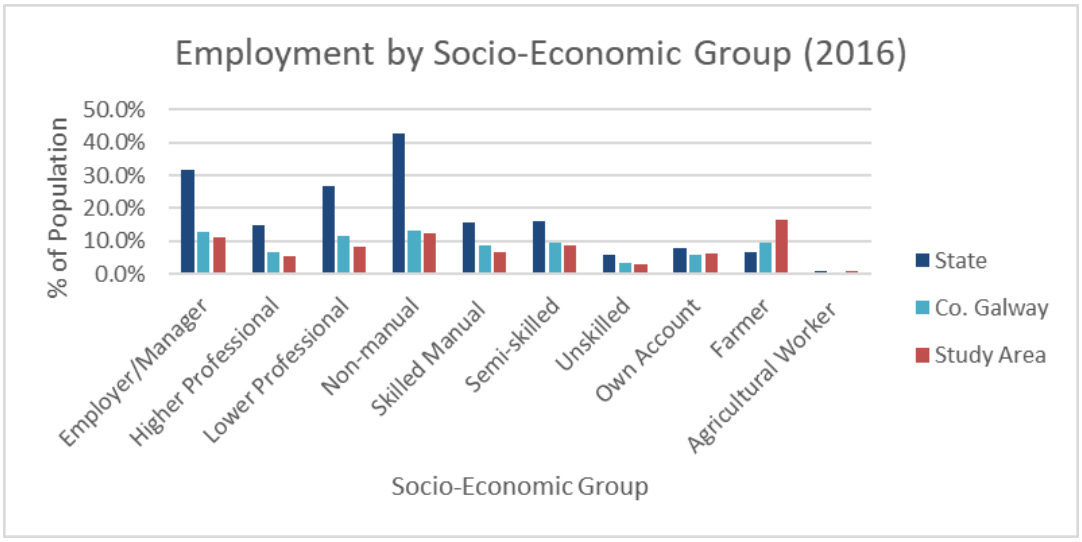


Figure 5-11 Employment by Socio-Economic Group in 2016 (Source: CSO)

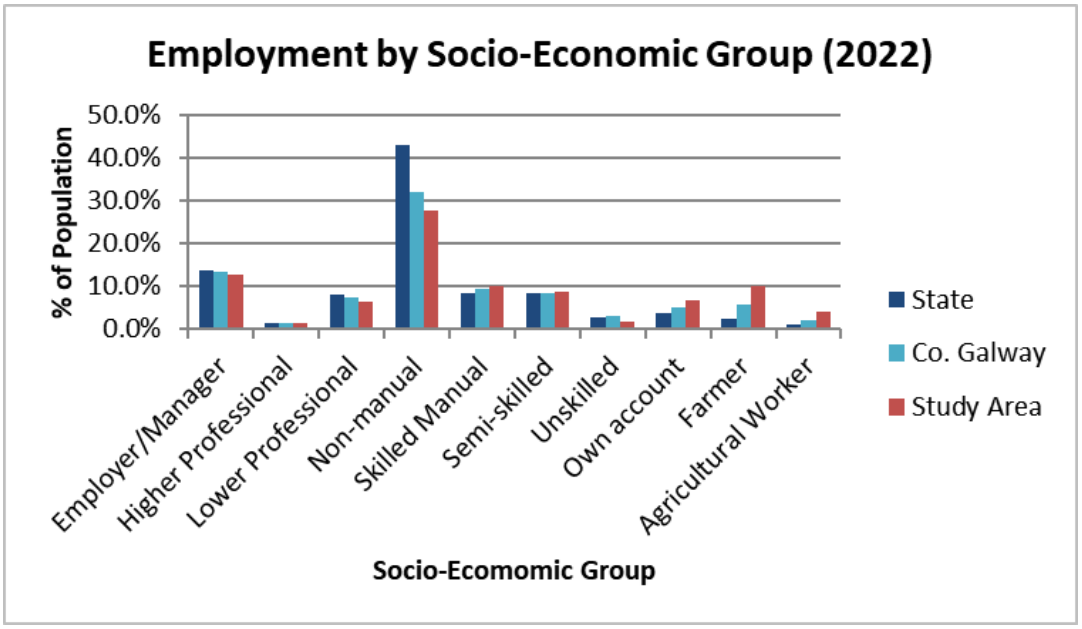


Figure 5-12 Employment by Socio-Economic Group in 2022 (Source: CSO)

While socio-economic data was unavailable for 1996, data for the Electoral Divisions areas adjacent to the Retained Development has been obtained from the CSO Small Area Population Statistics which provides employment by industry on a broad scale. Employment in 1996 in these EDs is dominated by the agricultural, forestry and fisheries sector followed by commerce, professional services, manufacturing, transport and construction, similar to the county area.

The CSO employment figures grouped by socio-economic status includes only the population 'at work'. The highest level of employment within the Study Area from 2002 to 2016 was recorded in the Farmer category which was generally higher than the percentages recorded on State and County level. In 2022, the highest level of employment within the Study Area was in the non-manual category which was still lower than the percentages recorded on State and County level. In 2022, 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.

While the percentages of employment have declined in the 'Farmer' and 'Agricultural Worker' categories in 2022, given the rural nature of the Study Area, employment of the workforce in these areas is likely to remain associated with agriculture and forestry activities.

5.3.3 Land-Use

Prior to construction of the Derrybrien Wind Farm Development, the site had been previously used for commercial conifer forestry over the central and western parts of the site, and turf cutting in turbary plots on the east side. Land use along the grid connection route and at Agannygal substation was also dominated by commercial forestry.

This can be seen from the Ordinance Survey historic aerial views of the area (http://map.geohive.ie/mapviewer.html) dating to 1995 to 2012. The 1995 and 2000 series aerial views show forest plantation and turbary on the wind farm site and peat slide area as the main land use at that time representing the baseline receiving environment and just prior to construction. Prior to the peat slide and response works, the upper slopes of Cashlaundrumlahan Mountain, where the slide originated, were used for forestry, which extended downslope to above the Black Road Bridge where some agricultural grass land is present. Below the Black Road Bridge, there is a mix of forestry and agricultural land. The mix of forestry and agricultural land is typically classed as transitional woodland (scrub) by the EPA Corine mapping dataset.

The Project site has been a non-functioning wind farm since February 2022. The 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 and areas of blanket bog. 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. No additional changes are to be made to the land uses of the areas surrounding the Project site.

In 2000, the total area of farmland within the six EDs that comprise the Population and Human Health Study Area (Derrylaur, Aille, Kilthomas, Castleboy, Loughatorick/Marblehilland, and Mountain) measured approximately 7,631.4 hectares, comprising approximately 38.8% of the Study Area (19,680

hectares) according to the CSO Census of Agriculture 2000. There were 272 farms within the Study Area, with an average farm size of 25.2 hectares.

Table 5-12 shows the breakdown of farmed lands within the Study Area. Farmland within the Study Area was mostly grassland for livestock grazing, with a small amount of land recorded for cereals or tillage. Livestock within the Study Area was predominantly cattle with a sheep herd also recorded within the Study Area. There were a small number of dairy cows recorded during the CSO Census of Agriculture 2020 within the Study Area.

Table 5-12 Farm Size and Classification within the Study Area in 2000 (Source: CSO)

Characteristic	Value
Size of Study Area	19,680 hectares
Total Area Farmed within Study Area	7,631.4 hectares
Farmland as % of Study Area	38.8%
Breakdown of Farmed Land	**Value**
Total Grassland	6,851.3ha
Total Cereals	17.4 ha
Total Cattle Herd (Beef)	10,092
Total Dairy Cows	349
Total Sheep	9,473

In 2010, the total area of farmland within the six EDs that comprise the Population and Human Health Study Area (Derrylaur, Aille, Kilthomas, Castleboy, Loughatorick/Marblehilland, and Mountain) measured approximately 6,859.0 hectares, comprising approximately 34.9% of the Study Area (19,680 hectares) according to the CSO Census of Agriculture 2010. There were 262 farms within the Study Area, with an average farm size of 26.2 hectares. This was slightly larger than the 25.8-hectare average farm size for Co. Galway.

Table 5-13 shows the breakdown of farmed lands within the Study Area. Farmland within the Study Area was mostly grassland for livestock grazing, with a small portion being utilized for cereals or tillage. Livestock within the Study Area was predominantly cattle with a smaller sheep herd also recorded within the Study Area. There were a small number of dairy cows recorded during the CSO Census of Agriculture 2010 within the Study Area.

Table 5-13 Farm Size and Classification within the Study Area in 2010 (Source: CSO)

Characteristic	Value
Size of Study Area	19,680 hectares
Total Area Farmed within Study Area	6,859.0 hectares
Farmland as % of Study Area	34.9%
Breakdown of Farmed Land	**Value**

Characteristic	Value
Total Grassland	6,851.3 ha
Total Cereals	5.5 ha
Total Cattle Herd (Beef)	8,318
Total Dairy Cows	340
Total Sheep	2,560

In 2020, the total area of farmland within the six EDs that comprise the Population and Human Health Study Area (Derrylaur, Aille, Kilthomas, Castleboy, Loughatorick/Marblehilland, and Mountain) measured approximately 7,202.7 hectares, comprising approximately 31% of the Study Area (23,200 hectares) according to the CSO Census of Agriculture 2020. There were 266 farms within the Study Area, with an average farm size of 27.1 hectares. This was slightly larger than the 26.5-hectare average farm size for Co. Galway.

Table 5-14 shows the breakdown of farmed lands within the Study Area. Farmland within the Study Area was entirely grassland for livestock grazing, with no land recorded for cereals or tillage. Livestock within the Study Area was predominantly cattle with a smaller sheep herd also recorded within the Study Area. There were a small number of dairy cows recorded during the CSO Census of Agriculture 2020 within the Study Area.

Table 5-14 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	7,069.9 ha
Total Cereals	0 ha
Total Cattle Herd (Beef)	9,777
Total Dairy Cows	433
Total Sheep	3,808

5.3.4 Services

The Project site 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 Retained Development where larger scale retail and services are available.

5.3.5 Education

The nearest school to the Retained Development site is Drim National School, located approximately 6.4 km west of the rEIAR Study Area. St Thomas' National School is located approximately 8.0 km northwest of the rEIAR Study Area Boundary.

The closest secondary school is Gort Community School which is located approximately 12.7 km west of the Project site.

The closest Third-Level Institution to the site is ATU Galway which is located approximately 32.7 km northwest of the Project site.

5.3.6 Access and Public Transport

The Retained Development site is accessed via local roads off the R353 Regional Road, which travels in an east to 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 Project is not served by public transport. The nearest train station to the site is at Gort, located approximately 12.7km west of the site.

From the town of Gort, approximately 12.7 km west of the Project site, 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 Project.

5.3.7 Amenities and Community Facilities

The majority of amenities and community facilities, including 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 has a branch library in Galway town also.

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 Retained Development.

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.

Although no specific reports relate to the Study Area, tourist information relating to the West Region has been identified from specific CSO reports and from published Fáilte Ireland reports. The CSO published a report on tourism and travel in Ireland in 1999 (published in 2000) which also references the baseline year, 1998. This indicated that there were 6,068,000 overseas visits to Ireland by non-residents in 1999, compared with 5,716,000 in 1998, an increase of 6.2%. Travel on transatlantic routes accounted for 19.9% of this increase. The total expenditure by tourists in 1998 was 1,828 million pounds

with Irish carriers earning an additional 470 million pounds (a total tourism revenue of 2,297 million pounds). A significant portion of visitors would have been expected to have visited the West Region.

Tourist numbers and expenditure in the West Region drawn from available Fáilte Ireland annual Tourism Fact reports for the period 2004 to 2006 indicates an overall increase in tourist numbers in the West Region in the period 2004 to 2006 of circa 6% with an increase in tourism revenue and a slight increase in employment in the sector (1.4% in 2006)

The period 2007 to 2011 proved challenging for tourism due to the significant downturn in the world and Irish economies which occurred at that time. In the period 2007 to 2010 tourist numbers and tourism revenue to the West Region decreased and a significant reduction in national employment in the sector also occurred. Significant decreases were recorded in 2011 and 2012. Tourist numbers and revenue to the West Region increased steadily in the period 2012 to 2018 with increased national employment also in the sector. Recent years have seen significant changes to tourism in Ireland brought about by brand marketing, such as the Wild Atlantic Way, The Ancient East and Ireland's Hidden Heartlands initiatives and the real and perceived challenges from Brexit and Government policy changes.

During 2019, total tourism revenue generated in Ireland was approximately €9.5 billion, an increase on the €9.1 billion revenue recorded in 2018. Overseas tourist visits to Ireland in 2018 grew by 6.5% to 9.6 million ('*Tourism Facts 2019*, Fáilte Ireland, March 2021).

Ireland is divided into seven tourism regions. Table 5-15 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2018 ('*Tourism Facts 2019*, Fáilte Ireland, March 2021).

Table 5-15 Overseas Tourists Revenue and Numbers 2018 (Source: Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Dublin	€2,095m	6,309
Mid-East/Midlands	€ 393m	1,030
South-East	€261m	1,028
South-West	€987m	2,512
Mid-West	€511 m	1,497
West	**€727m**	**1,963**
Border	€244m	752
Total	**€5,218 m**	**15,091**

The Retained 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 5-16 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). 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 at €589 million.

Table 5-16 Overseas Tourism to Border Region during 2017 (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	€472m	1,432
West	**€653m**	**1,943**
Border	€259m	768
Total	**€5,173 m**	**15,021**

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 5-17.

Table 5-17 Domestic Tourism Revenue by Region

Region	Estimated Expenditure (€m)
Mid East/ Midlands	395
Dublin	419
South East	381
South West	665
Mid West	261
West	**459**
Border	350

The Development falls within the West region which received an estimated €459 million from domestic tourism in 2022 and was the second highest earning region in this period. The West region comprises the counties of Galway, Mayo and Roscommon. Tourism is one of Ireland's most important industries – contributing to the economic and social fabric of the country. It is a leading creator of jobs and revenue.

5.3.9 Tourist Attractions

There are no key identified tourist attractions pertaining specifically to the 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 Study Area is not within any of the strategic tourism areas identified in the Galway County Development Plan nor does it impact on any of the sites of existing tourism attractions.

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 population and on human health should focus on health issues and environmental hazards arising from the other environmental factors (e.g. 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 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 Retained Development on these areas of consideration. There was the potential for negative effects on human health due to the Retained Development construction related to potential emissions to air of dust (Section 5.6.2.7), potential emissions to land and water of hydrocarbons (Section 5.6.2.10), release of potentially silt-laden runoff into watercourses and noise emissions (Section 5.6.2.8).

The potential for negative health effects associated with the Retained Development during all phases is considered in Section 5.6 below.

5.4.1 Vulnerability of the Project to Natural Disasters and Major Accidents

As outlined in Section 5.4 above, the Retained Development is not a recognised source of pollution. 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., are limited. Furthermore, the risk of pollution has been minimised through the implementation of the best practice control measures, which are proposed in the various chapters of this rEIAR.

There is limited potential for significant natural disasters to occur at the Retained Development site because 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 at the Retained Development site. However, as outlined in Chapter 15 of this rEIAR, the Retained Development has been designed in line with current best practice. Furthermore, the Retained Development has been/shall be subject to mitigation measures including restrictions to burning of vegetation and Department of Agriculture, Fisheries and Food (DAFM) national warning systems, and the use of firebreaks which will assist in the reduction of any major risks of fire on site. Furthermore, due to the nature of the Retained Development (stone hardstandings, below ground concrete foundations, roads, etc.) should a fire occur on the site it would not have any effect on the Retained Development that could cause environmental emissions. Therefore, it is considered that the risk of significant fire occurring that could cause the Retained Developmentto have significant environmental effects is very low and therefore a significant effect on human health is very unlikely. . As described earlier, there are no significant sources of pollution 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 Retained 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 Retained Development site – it is located approximately 31km northwest of the Retained Development site.

A peat slide occurred during project construction on the 16th of 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. The peat slide area extended approximately 1.65 km downslope from turbine T68 and displaced peat and forestry over an area of approximately 25ha.

As part of the Development, it is proposed to retain in situ and in perpetuity part of the existing development – including at- and below-ground structures such as turbine bases 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. Further details on the risk of instability and potential failures, particularly landslides, are discussed in Chapter 8 on Land, Soils, and Geology.

A detailed discussion of the vulnerability of the project to natural disasters and major accidents is provided in Chapter 15 of this rEIAR.

5.5 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 Development site 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 project site.

When considering the amenity of residents in the context of a Project, 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. Noise effects of the Project are assessed in Chapter 11 of this rEIAR. A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 13 of this rEIAR. Impacts on human beings from the Project 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 below. The effect on residential amenity is then derived from an overall judgement of the combination of effects due to changes to land-use and visual amenity, noise, traffic, dust and general disturbance.

5.6 Likely Significant Effects 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,

water resources, and residential amenity during all phases of the Project., including the Retained Development.

5.6.1 "Do-Nothing" Scenario

Under the do-nothing scenario , 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. There would be a potential long term, slight, negative effect on health and safety resulting from potential unauthorised access to substations and the deterioration of turbines and other wind farm infrastructure in the absence of an ongoing maintenance programme.

5.6.2 Construction Phase Impacts (2003-2006)

5.6.2.1 Population Levels

Those who worked on the construction phase of the Derrybrien Wind Farm Development were employed to construct the wind farm infrastructure and travelled daily to the site from the wider area. The construction phase had no impact on the population of the area in terms of changes to population trends or density, household size or age structure, as workers did not move permanently (or even temporarily) to the locality for the duration of the works

5.6.2.2 Employment and Investment

As part of the Derrybrien Windfarm Development, the design and construction of the Project provided employment for technical consultants and contractors. The Gort Windfarms Ltd team on the Project site varied in size through the construction phase and typically consisted of between 4-10 representatives on site. The main civil works contractor had a team of circa 60 staff on site during the peak construction activities. Forest clearance operations were undertaken by Coillte who employed tree felling workers at the site to carry out the felling activities. These consisted of a number of teams totalling up to circa 10 staff/operatives during peak periods. The construction of the Derrybrien Windfarm also necessitated the presence of electrical works contractors and personnel for the wind turbine supply and installation. Changes to personnel numbers were fairly evenly distributed across the Project duration of 34 months.

Based on the timeframe of the construction phase and the relatively large number of staff involved, the construction of the Derrybrien Windfarm Development had a **short-term, moderate, direct, positive** effect on employment.

5.6.2.3 Land Use Patterns & Activities

Prior to construction of Derrybrien Wind Farm Development, the site had been previously used for commercial conifer forestry over the central and western parts of the site, and turf cutting in turbary plots on the east side.

The peat slide displaced peat and forestry on the slopes over an area of 25Ha that extended 1.65km downslope from Turbine T68, which slide event is considered very large (>10Ha). However, forest plantation in the adjacent area has not changed appreciably since prior to project construction and prior to construction represented and currently represents over 50% of land use in the immediate vicinity of 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. Current land use in the wider landscape comprises of forestry, agricultural practices and residential/ commercial activities.

Significance of Effects

There was no significant effect on land use/activities due to the construction phase of the Project.

5.6.2.4 Tourism

Given that there were no tourism attractions specifically pertaining to the Retained Development site, there were no direct impacts on tourism associated with the construction phase of the Project.

During the response to the peat slide, temporary road closures and delays were experienced as described by Chapter 14 of this rEIAR. During those times, there were **temporary, indirect, negative, imperceptible** effects on tourists accessing the local area via these roads.

Significance of Effects

There was no significant effect on tourism due to the construction phase of the Project.

5.6.2.5 Residential Amenity

The potential for effects on residential amenity is discussed in Section 5.5 above. There was the potential for impacts on residential amenity during the construction phase of the Project from air, traffic, noise and vibration emissions due to additional traffic and plant machinery. Furthermore, there was the potential for impacts on residential amenity due to the peat slide which occurred during the construction phase of the Project.

The construction of the Project resulted in significant negative effects on the surrounding roads, traffic and transport network (which are set out in Chapter 14 of this rEIAR and in Section 5.6.2.9 below). However, those significant effects were typically temporary or short-term in nature; therefore, there was no traffic effect on residential amenity. Air emissions were localised to the construction works and imperceptible at most (see Section 5.6.2.7), with noise and vibration, as detailed in Chapter 11 of this rEIAR not significant to impact on residential amenity.

While no injury or loss of life occurred, the effects of the peat slide on Health and Safety and mitigation measures implemented are discussed further in Section 5.6.2.6 below.

5.6.2.6 Health and Safety

Construction of the Project necessitated the presence of a construction site and travel on the local public road network to and from the 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. This could have had in a worst-case scenario, potential significant permanent negative effect on health and safety.

Accidents

A number of Contractor construction related incidents, which resulted in injury to workers on site or to incidents with potential to cause injury, occurred during the construction period. None of the incidents resulted in permanent health injuries to the various contractor(s) work force or to members of the

public. To mitigate against serious accident and health impact the site operated under Health & Safety Plans.

Natural Disaster

A peat slide occurred in October 2003 which resulted in the damage to public roads, road bridges, and private access bridges. One private house, which was unoccupied at the time, was cut off by the peat slide. However, no injury or loss of life occurred. In the aftermath of the peat slide there were concerns in the population in Derrybrien regarding their health, wellbeing and safety related to the slide which had occurred and the potential for additional peat slides to occur.

As incidents did occur during the construction phase, the effect on health and safety was negative, slight in nature, direct and short-term in duration.

Mitigation measures relating to Health and Safety are outlined below.

Mitigation and Monitoring Measures

The Project was constructed 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) (Amendment) Regulations 2016 (S.I. No. 36 of 2016);
- Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006;
- Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

To mitigate against the effect of the existing and potential peat slides, a series of barrages were constructed down along the course of the slide to stop the movement of any additional peat. In addition, all construction works on the wind farm site were halted until a full review of peat stability was undertaken and the site works were assessed and approved by an engineering team.

Additional remedial and mitigation measures were also developed for the construction activities post the peat slide event which included increased geotechnical supervision and certification of works, instrumentation and monitoring of the site, additional geotechnical site investigations, further assessments of floating roads, wind turbine areas and crane hardstandings, spoil management and disposal, drainage improvements, and tree felling management, as well as other project construction areas.

Residual Impact

There was an **imperceptible negative, direct, short-term effect** on health and safety as none of the incidents reported during the construction phase of the Project resulted in permanent health injuries to the various contractor(s), work force, or to members of the public.

Significance of Effects

There was no significant effect on health and safety. With the implementation of the mitigation and remedial measures to reduce the impact of the peat slide and protect against potential additional slides, the risk of incidents decreased and impacts on Health and Safety were not significant.

5.6.2.7 Air Quality

Potential dust and exhaust emissions sources during the construction phase of the Project included construction works and vehicle and plant movements. An increase in dust emissions had the potential to cause a nuisance to receptors in the immediate vicinity of the site. However, the nearest occupied dwellings to the wind farm site itself were located just over 2km distance from the site. Based on the Institute of Air Quality Guidance, the risk of air borne dust or dust depositing on human receptors at this distance is imperceptible and not significant.

The entry and exit of staff vehicles and heavy machinery had the potential to result in the transfer of mud to the public road, particularly when the weather was wet. This in turn had the potential to cause nuisance to residents and other road users by generating dust as it dried. However, these effects would not be significant and would be relatively short-term in duration. Additional potential dust and exhaust emissions sources during construction phase of the project included Light Goods Vehicles ferrying staff and light machinery used for the construction of the Project within the site. An increase in dust emissions had the potential to cause nuisance on sensitive receptors in the immediate vicinity of the site. The potential dust impacts that occurred are further described in Chapter 10: Air and Climate of this rEIAR.

The peat slide material consisted of wet peat and did not give rise to air quality impacts. The measures taken in response to the peat slide included the rebuilding of short sections of road within the wind farm site at two locations and the installation of barrages along the downslope of the route of the slide between the wind farm and downstream of Flaggy Bridge. Peat from the slide area was also removed and deposited in peat repositories. There would therefore have been some potential for air borne dust and vehicle emissions to impact on air quality. However, the distance from the slide area to an occupied dwelling was over 500m. Furthermore, the timeframe of the effects would have been limited to the peat slide and remediation works. Therefore, the impact from dust would have been imperceptible, negative, and short-term.

Residual Impact

Effects on human health from exhaust emissions and dust associated with construction activities and machinery are considered to have been **short-term, direct, imperceptible and negative** due to the distance from the works to the nearest sensitive receptors, as well as the implementation of standard construction-phase controls.

Significance of Effects

There were no significant effects on human health from dust or exhaust emissions during the construction phase of the Project.

5.6.2.8 Noise

There was an increase in noise levels in the vicinity of the Project site during the construction phase, as a result of heavy machinery and construction work. These effects were short-term in duration, as they were restricted to the duration of the construction works.

Construction noise at any given noise sensitive location was variable throughout the construction of the Project, depending on the activities underway and the distance from the main construction activities to the receiving properties. The potential noise effects that occurred during the construction phase of the Project are further described in Chapter 11: Noise and Vibration.

Based on the timeframe for the construction phase, as well as the predicted noise levels, in terms of these construction activities, the associated likely effect was negative, slight, direct and short-term.

Mitigation Measures

During the construction phase of the Project, there were no specific regulations from the planning authorities or other agencies in Ireland about the amount of noise that can come from wind farms. As set out in the original Environmental Impact Statement (which is included as Appendix 5-1), the law governing noise as a nuisance was contained in two legal instruments, namely: The Environmental Protection Agency Act, 1992, (sections 107 and 108) and The Environmental Protection Agency Act, 1992 (Noise) Regulations, 1994 (S.I. No. 179 of 1994). However, these did not specify permitted sound levels around wind farms.

The Irish Planning Institute Wind Energy Guidelines (1995) recommended that wind farms should be located a minimum distance of 500m from existing dwellings although it is stated that this distance may vary from site to site.

The nearest turbine was constructed about 2000m from the nearest occupied dwelling, well outside recommendations.

Residual Impact

As set out in Chapter 11 Noise, no significant residual on-site construction noise effects were predicted to have arisen as all noise associated with construction activities are estimated to have been below the relevant construction noise limit. In terms of these construction activities, the associated residual effects were **negative, imperceptible to slight, direct and temporary to short-term**.

Significance of Effects

Due to the distances from works to sensitive locations, noise arising from the construction of the Project did not have any significant effects.

5.6.2.9 Traffic and Transport

An assessment of the potential effects from Traffic and Transport is provided in Chapter 14. These effects were related to traffic on the roads, upgrading of existing roads and 3 no. bridges, and some new road construction.

The impacts during the construction phase which were experienced to date were not dissimilar to those typical of a project of this scale in that they were primarily as a result of the movements of personal vehicles, abnormal loads and HGV's during the construction of the project.

In regard to the peat slide, the effects included:

- Temporary closure of local and regional roads during the response to the peat slide.
- Movement of materials from on-site and off-site borrow pits/quarries to the location of barrages and the construction of barrages.
- New access track (approximately 300m long) to Barrage No. 2.
- Replacement of existing track adjacent Baggage No. 1.
- Repairs to Black Road Bridge and Flaggy Bridge, both located on public roads.
- Tree felling at repositories.
- Bridge repairs on private land.

Therefore, based on the above and the assessment in Chapter 14 of this rEIAR, the construction of the Project has resulted in significant negative effects on the surrounding roads, traffic and transport network. However, those significant effects were typically temporary or short-term in nature, as they were restricted to the duration of the construction works.

Although a potential for injury or accident to occur existed on local roads, diversions were put in place to ensure avoidance of the impacted road network and no impact on human health associated with Traffic and Transport occurred as a result of the peat slide

Proposed Mitigation Measures

During the construction of the Project, the following mitigation measures were implemented in order to reduce significant effects relating to roads, traffic and transport:

- Some potential impacts were avoided through the use of on-site borrow pits and resources (e.g. trees felled used for access track construction).
- Significant volumes of construction materials were sourced on-site thereby reducing impacts on the surrounding transport network in relation to material movements to the site.
- Deliveries of abnormal loads were undertaken in the hours of darkness as much as possible in order to minimise impacts on road users and effects experienced by them.
- Diversions were put in place to ensure avoidance of the impacted road network.

Residual Impact

As set out in Chapter 14, during project construction, both slight and moderate, negative effects were experienced due to a number of activities on the surrounding roads, traffic and transport network. These effects are considered to be as follows:

- During peak construction stages, where maximum vehicle movements were experienced, short-term, significant, negative effects were experienced by users of the local network in the immediate vicinity of the Project.
- Beyond the local network, short-term, imperceptible, negative effects were experienced by users of the national network.

As set out in Chapter 14, during the response to the peat slide, although responses to impacts which resulted in temporary, significant, negative effect were prompt, there was no mitigation available to alter the following negative effects experienced:

- Temporary, significant, negative effects were experienced by users of the local network in the immediate vicinity of the Project site.
- Beyond the local network, short-term, imperceptible, negative effects were experienced by users of the national network.

Although a potential for injury or accident to occur existed on local roads, mitigations were put in place to ensure that no effect on human health associated with Traffic and Transport occurred during the construction phase.

Significance of Effects

No significant effect on human health associated with Traffic and Transport occurred during the construction phase.

5.6.2.10 Pollution of Water Supply

A detailed assessment of the potential population and human health effects of the construction phase of the Project on the hydrology and hydrogeology is provided in Chapter 9: Hydrology and Hydrogeology. Please see Chapter 9 for broader water quality impacts that would have resulted from the peatslide.

The construction activities could have resulted in the release of suspended solids to surface watercourses, increased sediment load with downstream water quality impacts in downstream waterbodies. This, in turn, could affect the quality of water abstracted for drinking water. Potential effects would have been negative, imperceptible, locally significant, and temporary. The potential effect of hydrocarbon spills was assessed as Slight to Moderate and Negative on the Local environment and temporary throughout the construction stage.

The peat slide generated a very large volume of peat solids and debris which entered the Owendalulleegh River during a period of heavy rains. In the period after the peat slide, the colour and level of suspended matter in the raw water increased. It should be noted that the treatment afforded the Gort water supply at the time was basic sand filtration and high treated water colour was common in the supply. Galway County Council increased cleaning of the sand bed filters and frequency of the back-wash cycle for the rapid sand filters in the treatment plant. The high colour resolved after several weeks; at no time was the water supply interrupted.

The effect of drinking water would have been locally significant, indirect, negative and temporary throughout the peat slide period but remedial works including the construction of barrages along the peat slide course significantly reduced the potential for peaty material and suspended solids to enter the Owendalulleegh River; thus, preventing longer term effects. Furthermore, no effects were reported on the Group water supply scheme in Derrybrien.

Mitigation Measures

A number of mitigation measures were put in place to address the risk to both surface and groundwater. Concrete wash-out areas were established for the purpose of capturing washout water from ready-mix concrete lorries. All concrete lorries delivering ready-mix concrete to the site were required to wash-out their vehicles at these specific wash-out points upon completion of their concrete deliveries and prior to exiting the site. Spill kits were available and used to deal with any minor or localised oils and / or fuels from the machinery in operation at the site and the re-fuelling of that machinery. Drip trays were used during refuelling.

The offsite measures to minimise the impact of the peat slide included the installation of a 10 no. barrages, two within the wind farm boundary and the remaining eight, (of which four remain in place) along the route of the slide on Coillte land between the wind farm and Flaggy Bridge on the R353.

Following the initial peat slide mitigation measures, the contractor was instructed to carry out further precautionary drainage measures as follows:

- Improvement of drainage in the slide area of the wind farm, clearance of obstructions and release of any visibly trapped water and construction of silt traps.
- Cleaning out of 3 no. gorges (pre-existing narrow steep-sided streams adjacent to offsite repositories) including construction of areas locally (trees, brash, boulder clay, etc.) to store removed peat, removal of sidecasting of the removed peat, provision of silt traps as necessary and possible reduction of rock barrage;
- Re-establishment of the original stream and access road at Black Road Bridge to include construction of areas to store removed peat from available materials (trees, brash, boulder clay, etc.), removal and side casting of the removed peat, provision of silt traps as necessary.

Residual Impact

The residual effect on human health resulting from potential water quality changes during the construction phase – including those associated with the peat slide – is assessed as **indirect, negative, not significant, and temporary**. Mitigation measures, including sediment control, drainage

improvements, and adjustments to the water treatment process, ensured the protection of the public water supply and prevented any adverse health outcomes.

Significance of Effects

Based on the assessment undertaken, it can be concluded that the Project has not given rise to any significant effects on Human Health.

5.6.3 Operational and Maintenance Phase Impacts (2006-2022)

5.6.3.1 Population

Those who worked on the operational phase of the Derrybrien Windfarm, were employed to maintain and operate the wind farm and travelled daily to the Site from the wider area. The operational phase had no impact on the population of the area in terms of changes to population trends or density, household size or age structure.

5.6.3.1 Employment and Investment

In terms of the overall Derrybrien Windfarm, the Operation and Maintenance (O&M) sub-contractor, Vestas, had a maintenance crew of 4-6 technicians stationed full-time on the site for operation and maintenance of the turbines. ESB staff undertook supervisory operational and monitoring activities remotely using a Supervisory Control and Data Acquisition (SCADA) system with the aid of computers connected via a telephone modem link. In addition, ESB staff were engaged in administration and engineering duties.

The effect of the Project on local employment during this phase is assessed as **positive**, due to the creation and retention of a small number of skilled jobs. However, given the limited number of personnel required, the scale of the employment effect is considered **slight**. As these roles were ongoing throughout the life of the project, the effect is classified as **moderate in duration**.

5.6.3.2 Health and Safety

Machinery and vehicles, such as vehicles of contractors and employees who worked during the operational phase posed a potential health and safety risk to the employees of the Derrybrien Windfarm, due to the potential for injury or accident.

Vehicles entering and exiting the subject site also posed a potential risk to members of the public.

These potential effects could have occurred throughout the duration of the operational and maintenance phase.

The risks associated with the operational phase of the Project were considered to be potential long-term, direct, slight, negative effects.

Proposed Mitigation Measures

Derrybrien Wind Farm operated a Safety Management System (SMS) which met the requirements of OHSAS 18001. Derrybrien Wind Farm operated an emergency procedure. This covered procedure in event of accidents, lone working, persons falling into water, forest/gorse fire, fire in wind turbine towers

and procedure in event of landslide. Contact details are provided for emergency services, including the local authority and An Garda Síochána.

Residual Impact

The health and safety risks associated with operational vehicles and machinery were direct, long-term, and slight in nature. However, due to the implementation of a comprehensive SMS and the absence of recorded incidents, the residual effect is assessed as **direct, negative, long-term, and imperceptible**.

Significance of Effects

Based on the assessment above, there were no significant effects.

5.6.3.3 Accidents and Natural Disasters

No significant works took place during the operational period of the Project. Maintenance and ancillary works occurred which could have given rise to potential peat instability. These works would have led to increased load on access tracks from vehicle traffic and deposition of new road materials, excavations into peat potentially impacting intact areas and lowering of water table.

The potential for effects in terms of accidents and natural disasters from the Project is considered to be slight, negative and long-term. However, no peat failure occurred during this operational period.

Mitigation Measures

Mitigation measures were implemented which included instrumentation and monitoring of the site, geotechnical supervision of maintenance works and site inspections, maintenance, repair of infrastructure, as well as drainage improvement and maintenance.

Residual Impact

The residual effect associated with potential peat instability during the operational phase is classified as **indirect, negative, long-term, and not significant**, due to the absence of any peat failure and the implementation of site monitoring and geotechnical mitigation measures.

Significance of Effects

Based on the assessment above there were no significant direct or indirect effects.

5.6.3.3.2 *Water Quality Impacts*

Untreated wastewater would have the potential to contaminate groundwater with harmful bacteria and other potential pathogens. The Derrybrien Windfarm site is provided with sanitary facilities for use by maintenance staff. The intermittent presence of maintenance staff at the substation leads to the generation of foul sewage from these facilities. If this wastewater were to be discharged untreated, there would be a slight negative impact on local downstream water quality, and by extension, a potential indirect risk to human health.

Water quality impacts potentially arising during the operational phase of the Project were limited to minor siltation or pollution incidents as a result of small-scale maintenance works which were not significant and posed no material risk to human health.

Mitigation Measures

An Envirocare P6 sewage treatment plant unit caters for the wastewater generated in these facilities. It is regularly serviced under a maintenance contract with Environmental Services.

At Agannygal Substation wastewater is adequately treated by a Biocycle wastewater treatment system before discharge off site.

Residual Impact

The residual effect associated with wastewater from maintenance activities is classified as **indirect, negative, long-term, and not significant**, due to the effective implementation of wastewater treatment systems and the limited wastewater generation.

Significance of Effects

Based on the assessment, there were no significant direct or indirect effects on water quality or on human health during the operational phase of the Project.

5.6.3.3.3 *Air Quality*

As set out in Chapter 10 Section 10.1.4.3.1, the Project had a beneficial effect in providing energy without emissions of recognised environmental pollutants through displacement of fossil fuel energy production with clean renewable energy. There was a moderately positive effect on air quality through the reduction in emissions of NO_x, CO, NMVOC, SO_x and $PM_{2.5}$ through displacement of fossil fuel combustion for electricity generation continued throughout the Project's operational period.

Considering that the WHO and the EPA regard NOx and particulate matter (dust) as key air pollutants for human health a reduction in these emissions can be seen as an indirect, moderately positive effect in the long term.

Mitigation Measures

- Ensured that all maintenance and monitoring vehicles were maintained in good operational order while onsite, and, when stationary, were required to turn off engines thereby minimising any emissions that arose.

Residual Impact

The associated reduction in greenhouse gas emissions and key air pollutants such as nitrogen oxides and particulate matter resulting from the operation of the Derrybrien Wind Farm had indirect positive effects for population and human health. These air quality improvements contribute to the overall reduction of ambient pollutant concentrations associated with respiratory and cardiovascular illnesses, as recognised by the WHO and the EPA. Therefore, the effect on human health during the operational phase of the Derrybrien Wind Farm Development was positive, indirect, moderate, and long-term.

Significance of Effects

Based on the assessment, there were no significant negative direct or indirect effects on human health during the operational phase of the Project.

5.6.4 Ceased Operation Phase Impacts (2022 - Present)

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

There are no likely additional effects on population levels, employment and investment, property values, tourism, residential amenity, traffic, noise and vibration in the non-operational phase of the Project.

5.6.4.1 Health and Safety

Machinery and vehicles, such as vehicles of contractors and employees who are on site for monitoring or maintenance works during the non-operational phase pose a potential health and safety risk to the employees of the Derrybrien Wind Farm Development.

Vehicles entering and exiting the subject site also pose a potential risk to members of the public.

In the absence of mitigation, the risks associated with the non-operational phase of the Project are considered to be potential short-term, significant, negative Effects.

Proposed Mitigation Measures

Derrybrien Wind Farm operates a Safety Management System (SMS) which meets the requirements of OHSAS 18001. Derrybrien Wind Farm operates an emergency procedure. This covers procedure in event of accidents, lone working, persons falling into water, forest/gorse fire, fire in wind turbine towers and procedure in event of landslide. Contact details are provided for emergency services, including the local authority and An Garda Síochána.

Residual Impact

The activities on the site and presence of personal are limited. Assuming that the proposed health and safety mitigation measures are implemented, the residual impact associated with the non-operation phase of the Project are be **slight, direct, negative, and short-term**.

Significance of Effects

Based on the assessment above there has been and is not likely to be any significant effects on Health and Safety during the Ceased Operation Phase.

5.6.4.2 Accidents and Natural Disasters

Works activities on site during the non-operational period were similar to those described in the operational period to date and generally comprise maintenance and ancillary works which could give rise to a potential peat instability, with the potential to impact on human beings.

According to Chapter 8, during the ceased operational phase of the wind farm (2022-2024), the effects of direct effects from the construction, operation and maintenance phases of the windfarm that are still occurring at the end of 2024 would include ongoing decomposition of excavated peat in the peat storage areas, repository sites and slide area, and accelerated peat decomposition due to groundwater lowering caused by drainage improvements on the wind farm site.

At this stage the peat repository sites have sunk into the underlying intact peat on the slopes and peatlands vegetation has become well established on the surface. Therefore, the net rate of carbon release has significantly reduced so that the incremental effect on the peat in these areas is at a new equilibrium of carbon flux, possibly with peat accumulation and net carbon storage, which will help to mitigate the original impact.

While carbon release and soil destabilisation can have indirect links to human health—through pathways such as climate change, air quality, and water quality—the current site conditions do not give rise to any measurable or significant risks to human health.

Proposed Mitigation Measures

No additional site activities related to the peat slide or response works were undertaken during the ceased operational phase. As such, no further mitigation measures were required.

Significance of Effects

There are no significant direct or indirect effects on population and human health likely to occur during the ceased operational phase of the Project.

5.6.4.3 Water Quality Impacts

Water quality effects potentially arising during this phase of the Project are considered to be limited to minor low-level siltation on the minor watercourses within the site as a result of runoff from roads and other infrastructure. The limited, low-level siltation anticipated during this phase is not expected to significantly affect water quality in receiving watercourses. As a result, there is no pathway for significant impacts on human health.

5.6.5 Impacts of the Retained Development

The features of the Retained Development, to remain *in situ in* perpetuity after the Prospective Development has been completed will not result in any impacts on population and human health.

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 Retained Development on these areas of consideration. As there are no significant effects associated with those areas of consideration as a result of the Retained Development, and given that effects on human health are typically linked to changes in these areas, there will be no significant effects associated with human health as a result of the Retained Development.

Since there will be no construction activity or ongoing management of the Retained Development there is no potential for effect on population, land use, services, tourism, or other amenities as a result of the Retained Development.

5.6.6 Cumulative and In-Combination Effects

For the assessment of cumulative effects, 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 effect of the Retained Development and other relevant developments has been carried out with the purpose of identifying what influence the Retained 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), landscape and visual impacts (Chapter 13) and traffic (Chapter 14).

5.6.6.1 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, resulting in a long-term slight positive cumulative effect.

5.6.6.2 Tourism and Amenity

There are no key identified tourist attractions pertaining specifically to the Retained Development site itself. It is not considered that the Retained Development, together with other projects in the area has/will cumulatively affect any tourism infrastructure in the wider area.

5.6.6.3 Health and Safety

The Retained Development had no cumulative effects in terms of health and safety. All other proposed, permitted or operational/existing developments (wind energy or otherwise) would be expected to follow all relevant Health and Safety Legislation during the construction, operation and decommissioning phases of the development. It is assumed also that all mitigation measures in relation to the other cumulative projects will also be implemented.

5.7 Conclusion

Following consideration of the residual impact (post-mitigation), overall, it is noted that the Project has not resulted in any significant, long-term effects on population and human health. The features of the Retained Development, to remain in situ in perpetuity after the Prospective Development has been completed will not result in any impacts on population and human health.

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 – Retained Development Project, as described in Chapter 4 and its associated appendices.

The baseline for receiving terrestrial biodiversity has been assessed based on data available for the period 1998 – 2001, prior to the construction of the wind farm.

Impacts have been assessed over the following phases of the life cycle of the project:

- Impacts that have occurred, i.e. during construction (2003-2006), during the operation and maintenance phase of the project up to the Mid 2020 and during its ceased operation phase (2022 to present day).
- Impacts that are likely to occur as a result of the Retained Development.

Details of the construction, operation and post-operation phases of the project can be found in Chapter 4: Project Description.

Specific consideration has been given to the peat slide that occurred on the site during construction in October 2003, including emergency measures implemented in response to the slide.

Mitigation measures and monitoring have also been identified, where required.

Residual impacts are also assessed, along with cumulative impacts arising in conjunction with other projects and activities in the area.

The likely significant effects of the project on aquatic biodiversity are addressed in Chapter7 Biodiversity (Aquatic Ecology and Fisheries).

A standalone remedial Natura Impact Statement (rNIS) 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 (referred to in this report 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 considers the likely significant effects of the project on European sites (sites designated as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) within the Zone of Influence of the project 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 13 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.

Brian Madden (BA. Mod., Ph.D., 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 (ACIEEM); and holds licences for bats and great crested newt in 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 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 (MCIEEM); 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 2009 –2015 (Galway County Council, 2009).
- County Development Plan 2015 –2021 (Galway County Council, 2015).
- County Development Plan 2022 –2028 (Galway County Council, 2022).
- Environmental Report for the Galway County Development Plan 2015-2021.
- Natura Impact Report In Support of the Appropriate Assessment of the Galway County Development Plan 2015- 2021.
- 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 2017 - 2023 (As Varied).

- Clare County Development Plan 2017 - 2023 Natura Impact Report (Clare County Council, 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) Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2.
- 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.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition).
- Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th 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 remedial Environmental Impact Assessment (rEIAR) is the date when the environmental impact assessment should originally have been carried out and taken into account by the decision-maker. The decisions in relation to the planning applications and appeals for the wind farm and grid connection were made in the period 1998 – 2001. Therefore, for the purposes of this rEIAR the baseline date is 1998.

Baseline data to inform the construction phase impacts was collected from a desktop review of existing datasets and the original Environmental Impact Statements (EISs) prepared for the project during the pre-planning stages. Aerial photography (historic and recent) was used to assist in determining the type and distribution of habitats within the project area prior to the commencement of the construction phase. The nature and distribution of habitats allowed certain assumptions to be made in relation to fauna species likely to have been present pre-construction.

Ecological monitoring of the project began in 2003 during construction of the project. The monitoring has at various times included bird, bat, terrestrial habitats and aquatic ecology and fisheries field surveys. The results of these surveys have informed the impact assessment of the operational phase of the project and have also defined the existing receiving environment conditions against which the potential impacts associated with the ceased operation and Retained Development can be assessed.

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 project and to identify any ecological receptors within this area which may have the potential to be affected as a result of the project.

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 December 2024).

Specific data requests were made to the NPWS in relation to a number of protected species. A specific data request was made to the NPWS in 2004 in relation to the distribution of hen harrier breeding territories in the hinterland of the wind farm site (up to approximately 5 km distance from the project boundary).

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.
- Reports of the various National Surveys of Breeding Hen Harrier in Ireland were reviewed, as follows:
    - 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.
    - 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.
    - 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., 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.
- 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 have been reviewed to inform the assessment (some of which are provided in Appendix 6-1):

- Environmental Impact Statement (EIS) submitted with GCC Reg. Ref. 97/3470 / ABP Reg. Ref. PL.07.106290 – 'the Phase 1 EIS.'

- EIS submitted with GCC Reg. Ref. 97/3652 / ABP Reg. Ref. PL.07.106292 – 'the Phase 2 EIS'.
- EIS submitted with GCC Reg. Ref. 00/4581 / ABP Reg. Ref. PL.07.122803 – 'the Phase 3 EIS'.
- Ecological Impact Assessment of Emergency and Stabilisation Work at Derrybrien Bog Slide Area. March 2004. Inis Environmental Services (2004a).
- Derrybrien Windfram Peat Slip Environmental Impact Assessment on the Owendalulleegh River. 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 (2004c).
- Summer assessment of the lesser horseshoe bat roost at Lough Cutra demesne. Inis Environmental Services (2004d).
- Ecological Recovery of Peat Slip Area at Derrybrien, Monitoring Survey. November 2005. Inis Environmental Services (2005).
- Reports on Hen Harrier Monitoring at Derrybrien Wind Farm:
    - Derrybrien Wind Farm Bat Assessment (Draft report) – Faith Wilson Ecological Consultant (2012).
    - Derrybrien Wind Farm, Hen Harrier Monitoring, 2004 Report (Biosphere Environmental Services, 2004). Prepared for Hibernian Wind Power.
    - Derrybrien Wind Farm, Hen Harrier Monitoring, 2006 Report (Biosphere Environmental Services, 2006). Prepared for Hibernian Wind Power.
    - Derrybrien Wind Farm, Hen Harrier Monitoring, 2007 Report (Biosphere Environmental Services, 2007). Prepared for Hibernian Wind Power.
    - Derrybrien Wind Farm, Hen Harrier Monitoring, 2009 Report (Biosphere Environmental Services, 2009). Prepared for Hibernian Wind Power.
    - Derrybrien Wind Farm, Hen Harrier Monitoring, 2011 Report (Biosphere Environmental Services, 2011). Prepared for Hibernian Wind Power.
    - Derrybrien Wind Farm, Hen Harrier Monitoring, 2015 Report (Biosphere Environmental Services, 2015). Prepared for Hibernian Wind Power.

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, and ecosystems and the processes on which they depend (CIEEM, 2018).

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 15km and in some cases less than 100m, 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 project and identify the range of ZoI using the source-pathway-receptor conceptual model. Impacts associated with the project, 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 project were considered.
- The sensitivities of the relevant ecological receptors were considered.
- The known and potential impact sources and pathways were identified.

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 approximately 2 km, with a maximum range of up to 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 up to 10 km of the wind farm project site, though most focus is on a distance of 2 km from the wind farm project area. This ZoI, which has been established with reference to the guidance document Assessing Connectivity with Special Protection Areas (SPAs) (SNH, 2016a). The project is located entirely within the Slieve Aughty Mountains SPA and therefore this SPA is within its ZoI. The nearest SPA after that is Lough Rea SPA, located approximately 8.9 km north of the wind farm site.

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). 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. Given the long distances that can be travelled by bats a zone of influence of 10 km for bat species is considered appropriate for the project.

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 project is likely to be very localised with regard to bats.

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).

6.2.4 Field Surveys

Field surveys undertaken to monitor the ecological impact of the wind farm project commenced either during construction or post-construction. The survey methods employed were appropriate for the purpose of monitoring target species and habitats during the construction and operational phases of the project and were undertaken in line with best practice methods available at the time.

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). Inis Environmental Services.

- Monitoring of habitat recovery within peat slide area (July 2004) Inis Environmental Services.
- Monitoring of habitat recovery within peat slide area (February 2005). Inis Environmental Services.
- Monitoring of habitat recovery within peat slide area (October 2005). Inis Environmental Services.
- Habitat assessment of wind farm and peat slide area (September 2011). Wetland Surveys Ireland Ltd.
- 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). Wetland Surveys Ireland Ltd.
- Habitat survey of wind farm site, peat slide area, and the Derrybrien-Agannygal 110kV OHL corridor (July 2018). Wetland Surveys Ireland Ltd.
- Habitat survey of wind farm site, peat slide area, and the Derrybrien-Agannygal 110kV OHL corridor (August 2022, February, and May 2023). Wetland Surveys Ireland Ltd.

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 site. Detailed habitat data was also recorded in the area affected by the peat slide in order to describe the establishment of vegetation and habitat structure during the period since the peat slide occurred. The most recent ecological surveys of the wind farm site (undertaken in 2022 and 2023) inform the assessment of the ceased operations impacts, retained development impacts and cumulative impacts.

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

6.2.4.2.1 *Breeding Bird Surveys*

Vantage point surveys for breeding hen harrier

A programme for monitoring of breeding hen harrier distribution within the Derrybrien Wind Farm commenced in March 2004. The monitoring was in compliance with Condition 9 of Galway County Council Planning Ref. 02/3560, provided below. Post-construction monitoring of operational wind farms usually only focuses on target or key species. Hen harrier *Circus cyaneus* and merlin *Falco columbarius* were identified as target species given that they are the sole Special Conservation Interests for the Slieve Aughty Mountains SPA and the fact that both are of high conservation importance. While not requested in Planning Condition no. 9, 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.

Planning Condition:

> "**9**. *The developer shall retain the services of a suitably qualified and experienced bird specialist to undertake appropriate surveys of this site for the Hen Harrier. Details of the surveys to be undertaken shall be agreed in writing with the planning authority prior to commencement of development.*
>
> *REASON: To ensure that the developer contributes towards knowledge of the local Hen Harrier population and of the impact of windfarms on that species."*

The objectives of the monitoring programme, which has continued at intervals up to 2024 (see below), were as follows:

- To determine if hen harriers or 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 (version 2, SNH, 2017).

The method involves survey of the core wind farm site through the breeding season (March/April to July/August), with coverage also of a wide area (up to 5 km) around the wind farm site to establish locations of nesting pairs in the vicinity. Part of the route of the Derrybrien to Agannygal overhead line grid connection was included as part of the wider 5 km study zone. The distance of 5 km was as recommended by NPWS methodology based on the distance where majority of hunting is done from a nest site. With the use of VHF transmitter tags, Irwin *et al.* (2012) showed that 89% of hunting was done within 5 km of the focal nest.

The core site survey area was defined as the wind farm site and a strip approximately 500 m beyond the outermost turbines. Two vantage points were established within the wind farm from which observations were made, as follows:

Vantage Point (VP)	Description
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.300m north of '365m' high point on Cashlaundrumlahan.

Six hours of observations were made from each vantage point in each month of survey. Casual observations were also made from various other locations whilst travelling around the wind farm.

The wider area around the site, to approximately 5 km from the site boundary, was checked for breeding occupancy based largely on information supplied by NPWS in 2004 and then available from ongoing surveys for the Prospective Development. This wider area is known as the hinterland or peripheral area. Surveys here were mainly in the early part of the season (March-May) when territorial birds are most active. However, later visits were made to occupied territories to assess breeding success.

Monitoring surveys for breeding birds following the vantage point survey methodology were carried out in the following years:

- 2004 – construction works had commenced but were on hold due to peat slide and no turbines yet erected, site still largely afforested – construction phase.
- 2006, 2007, 2009, 2011, 2015, 2018 – operational phase.
- 2022, 2024 - ceased operational phase.

Transect surveys for breeding birds, 2022 and 2024

Surveys by transects were carried out for all breeding birds within the wind farm site and along the overhead line corridor in 2022 and 2024. 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[1] to T37 – through cutover blanket bog (see Plate 6-1[2]).
- No. 2: T23 to T70 – through peat slide section.
- No. 3: T12 to T15 – through regenerating bog area (see Plate 6-2[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[3] (substation) to PS4 – tall conifers to both sides (see Plate 6-3[2]).
- No. 6: PS10 to PS12 (both sides of Black Road) - tall conifers to both sides.
- No. 7: Local road to PS36 to AM34[4] – 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.

[1] T stands for turbine.
[2] Plates 6.1 – 6.3 provide a sample of transects walked during bird surveys.
[3] PS stands for pole set.
[4] AM stands for angle mast, which is a steel structure.

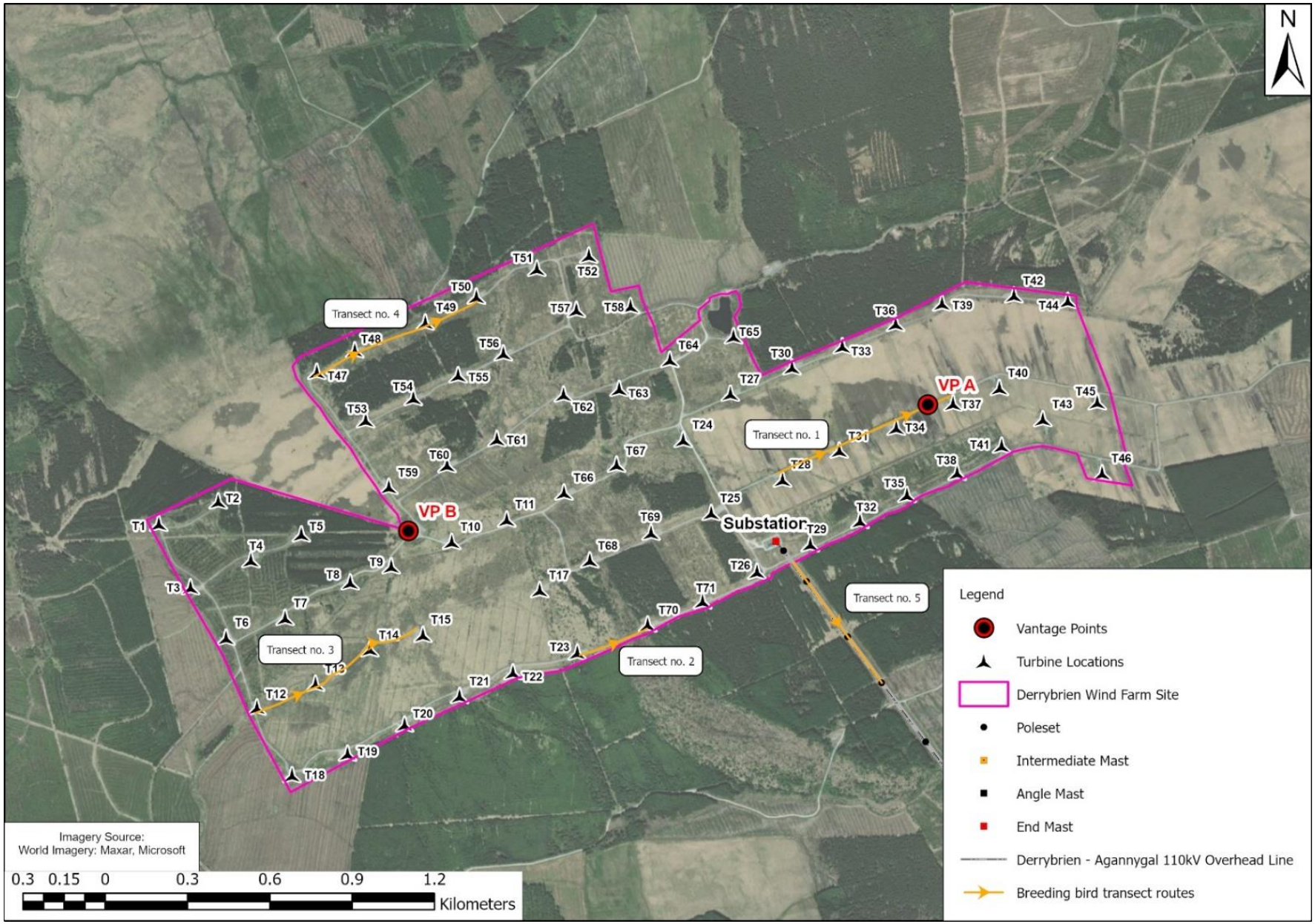


Figure 6-1 Survey transects used on Derrybrien Wind Farm site, 2022 and 2024.

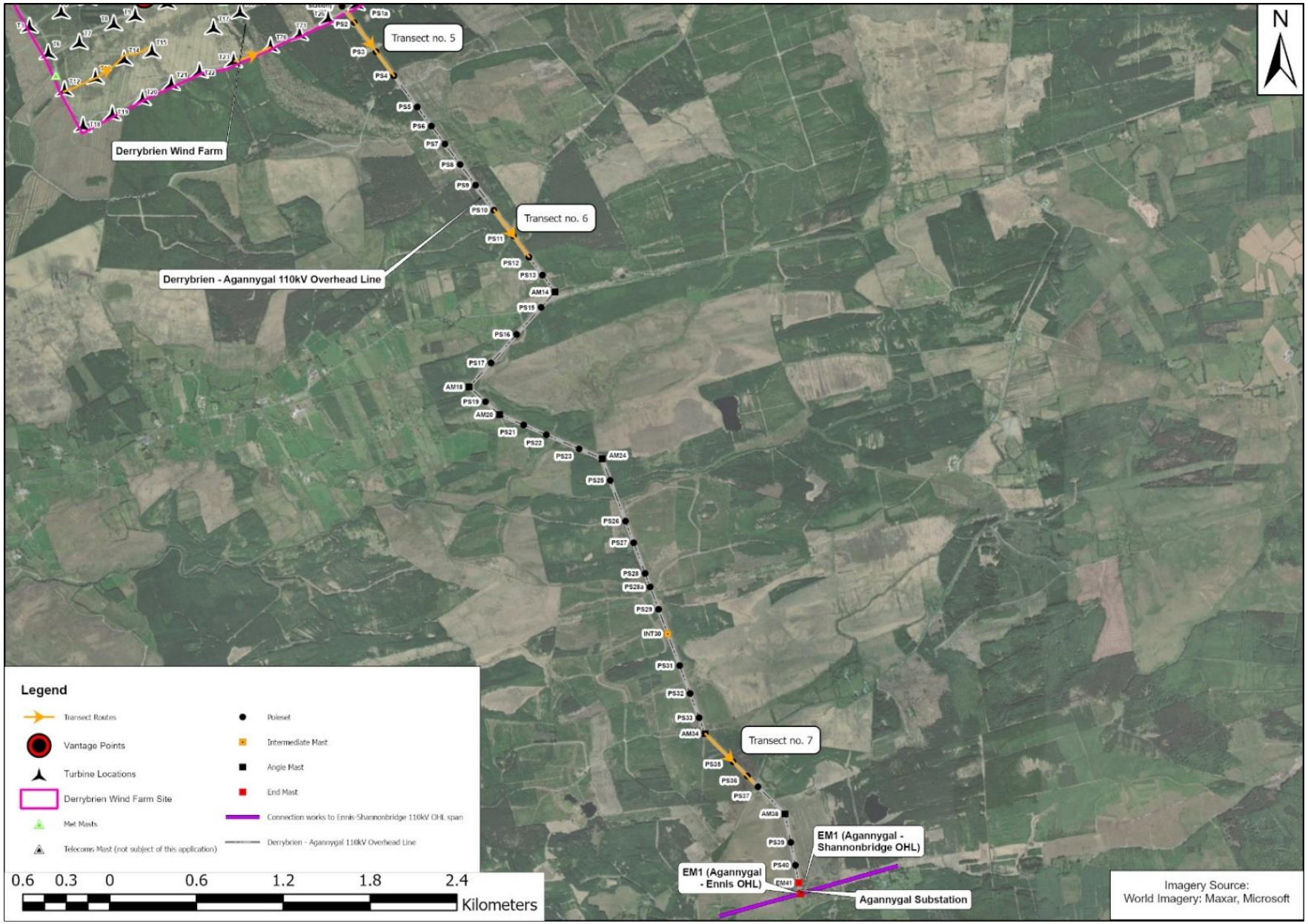


Figure 6-2 Survey transects used along overhead line grid connection between Derrybrien Wind Farm and Agannygal Substation, 2022 and 2024.



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.

6.2.4.2.2 Winter Bird Surveys

Monitoring surveys for winter birds were carried out in the following years:

Winter 2011-12: a survey was carried out from November 2011 to January 2012. This included observations from the vantage points within the wind farm (9 hours in November, 7 hours in December, 8 hours in January).

Specific searches for night roosting hen harriers in the hinterland area were undertaken on six dates between November and January. The winter roost survey followed the method of the Irish Hen Harrier Winter Survey (O'Donoghue 2019).

Winter 2019-20: a second winter survey commenced in October 2019 and continued to March 2020. This included vantage point watches within the wind farm (6 hrs from each VP per month). Specific searches for night roosting hen harriers in the hinterland area were also undertaken (following the method of the Irish Hen Harrier Winter Survey, O'Donoghue 2019).

Winter 2024-25: a further winter survey commenced in October 2024 and continued to March 2025. As with the earlier surveys, this included vantage point watches within the wind farm and specific searches for night roosting hen harriers in the hinterland area (following the method of the Irish Hen Harrier Winter Survey, O'Donoghue 2019).

6.2.4.3 Bats

Very limited data was available regarding the local bat population in the Slieve Aughty Mountains prior to monitoring surveys commencing in 2011. Bat activity surveys were undertaken between 2011 and 2023. 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.

The most recent work has included inspections of buildings and trees on site to specifically inform the EIAR of the Prospective Development. Initial building and tree inspections were completed in 2022, with the building inspections repeated in summer 2023. Whilst the buildings did not exist prior to the construction of the wind farm, and therefore are not part of the baseline, information is included due to potential in combination impacts with decommissioning.

6.2.4.3.1 Bat Survey 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).

6.2.4.3.2 Bat Survey 2016

The bat survey methods were derived with reference to guidance documents produced by BCI (2012), Natural England (2014) and the Bat Conservation Trust (Hundt, 2012).

Field surveys to inform the assessment for the site comprised the following elements:

- Driven transect survey.
- Static bat detector survey.
- A search, using specially trained dogs, for bat corpses (accompanied by a scavenger removal study).

Driven transect survey

Driven transect surveys were carried out in April, June and August 2016. The survey route was designed to sample bat activity across the whole site. Driven transect surveys followed a predetermined route, passing as many turbines as possible without repeatedly driving along the same tracks. The car was driven at a constant speed of 15 mph. A Song Meter SM2BAT+ detector was placed in the car with an omnidirectional microphone attached by cable and bracket approximately 30 cm above the roof of the car. The direction that the route was driven was alternated between surveys, so that different parts of the route were surveyed at different times in relation to dusk. The driven transect route is shown on Figure 6-3.

Surveys were carried out when weather conditions were most suitable for bats to be active, avoiding temperatures below 10°C, heavy rain and high wind speeds. Surveys started at sunset, as recommended in BCT (2012) guidance, and took approximately 2.5 hours to complete. The timing of the surveys covered the bat emergence period and the period of most intense foraging activity when invertebrate prey is most abundant (Altringham, 2003).

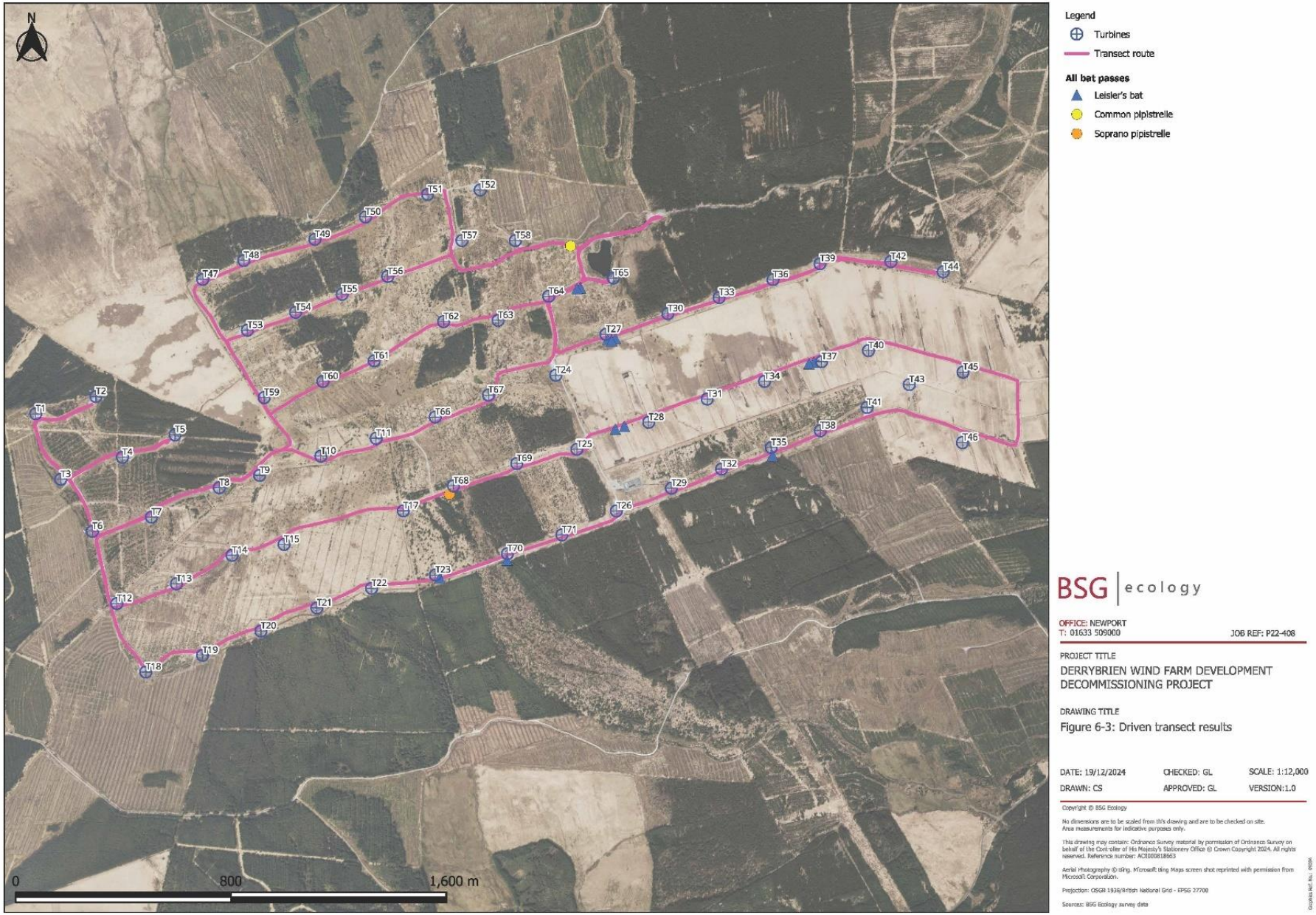


Figure 6-3 Driven transect results

Static detectors

The site was divided into three broad areas in order to allocate static detectors across the range of habitats present in the site:

The western area (turbines including and west of T11, T17 and T23) which is bordered by forestry, but has no retained forest blocks within it. This area was formerly afforested and cleared for wind farm construction.

The eastern area of the wind farm (turbines including and east of T24 - 26) which is an area of cutaway bog bounded to the north and south by plantation. The land is accessible to the public and there is unauthorized peat cutting.

The central and northern part of the wind farm. This is irregular in shape and characterised by a mixture of open acid grassland and heather moor with small, retained forest coupes. A flooded borrow pit/quarry is present in the north-eastern corner of the area, along with a number of smaller water bodies that may represent remnants of the original landscape and habitats prior to afforestation.

The forest edge (particularly mature stands offering shelter from the prevailing south-westerly wind), the retained compartments of forestry within the wind farm, and the flooded borrow pit were all considered likely to offer greater foraging opportunities for bats than the rest of the wind farm.

Song Meter (SM2+) bat detectors with external microphones were deployed in each of the above areas in order to obtain representative coverage of the habitats present (18 bat detector units overall). The SM2 detectors were configured to record above the level of ambient noise, such as from wind or rain using an adaptive trigger set to 6 decibels (dB) and were set to define a bat pass as a call note of >2 milliseconds (ms) which is separated from another by more than one second. Each bat detector was housed in a waterproof Peli-case. An external microphone was connected via a cable to the logger and attached to a pole or suitable tree approximately 2 m above ground level.

The following turbines were selected for detector deployment in 2016 (locations are shown on Figure 6-4):

- Western area: T5, T18, T21 (forest edge); T59, T13, T15, T11 (open regenerated grassland and moorland areas).
- Eastern area: T32, T33, T41 (forest edge); T27 (open cut away bog).
- Central and northern area: T54, T62, T67 (on potential bat commuting routes between retained forest compartments); T65 (close to water body); T17, T70, T71 (forest edge habitats – the former on the edge of an area of historical peat slide).

The static detectors were deployed each month with the aim of ensuring five nights of data were recorded each month from April to August 2016 inclusive (see Appendix 6-2, Table 1 for deployment dates). The detectors were set to record from half an hour before sunset to half an hour after sunrise, the period during which bats are usually active away from their roosts. The duration of recording per night varied throughout the survey period according to day/night length.



Figure 6-4 Turbine and bat detector locations (2016)

Bat Mortality (Corpse) Searches

BSG Ecology contracted Conservation Dogs (part of Wagtail UK), a company that trains anti-poaching and wildlife detection dogs, to complete carcass searches. The company regularly works in Ireland (principally undertaking drug searches) and has completed considerable wind farm related work in the UK.

Bat Carcass Searches

The objective of bat carcass searches was to identify whether there was any evidence that the operation of Derrybrien Wind Farm was resulting in bat fatalities. Turbines with the highest levels of bat activity (based on data collected using static detectors) were targeted for searching by the dogs.

The available evidence indicates that trained dogs are much more efficient than humans in locating bat corpses below wind turbines (Mathews *et al*, 2016). Dogs were used to search an area extending 60 m around each turbine tower. This included areas of hard-standing as well as semi-natural habitats. The area was defined based on the fact that a team of two dogs can typically search the area around six turbines during a working day (dawn to late morning in August / September) before becoming exhausted, with the area it is possible to cover around each turbine depending on habitat structure.

Searches were conducted on two consecutive mornings at 6 turbine locations (T11, T17, T18, T21, T27, and T71) on 31 August and 1 September 2016 to give an indication of bat mortality. During the survey the dogs were followed by the handler, who provided constant instruction. The dogs can effectively survey to 5 m either side of them when walking a transect.

In the event a bat carcass was found, the turbine(s) it was under was to be noted, as well as the position of the bat in relation to it (distance and direction from turbine base). The bat species was to be identified immediately on site where possible, and if this could not be achieved (due to decomposition or inconclusive biometric data), the corpse removed for identification via DNA analysis.

Carcass Scavenging Rate

In order to provide some information on the rate at which the corpses of dead animals are removed from the wind farm (and therefore not be available for dogs to find), scavenger removal trials were completed.

A carcass was left at 6 locations (T11, T17, T18, T21, T27 and T71) within the wind farm and monitored through the use of a trail cam for 7 days (from 01 to 07 September). After 7 days the cameras were collected and notes were made on presence and degradation of the corpses. Bat carcasses are not readily available (as they are protected species) so rodents of equivalent body size (obtained from pet shops where they are supplied for feeding snakes etc.) were substituted.

Data Analysis

Bat Call Identification and calculation of relative activity

Recorded bat calls were analysed using Analook software to confirm the identity of the bats present. Where possible, the bat was identified to species level. Species of the genus *Myotis* were grouped together as overlapping call parameters make species identification problematic (Hundt, 2012).

For Pipistrelle species the following criteria, based on measurements of peak frequency, were used to classify calls:

- Common pipistrelle ≥42 and <49 kHz.
- Soprano pipistrelle ≥51 kHz.
- Nathusius' pipistrelle <39 kHz.
- Common pipistrelle / Soprano pipistrelle ≥49 and <51 kHz.
- Common pipistrelle / Nathusius' pipistrelle ≥39 and <42 kHz.

Bat calls which could not be ascribed to any of these categories were not used in the analysis.

AnalookW (Version 3.8, 2010) software was used for all analysis of bat calls. The software enables analysis of the relative activity (referred to as 'activity' in the text below) of different species of bats by counting the number of bat passes (B) recorded within a unit of time (hour (h) was used). More than one pass of the same species was counted within a sound file if multiple bats were recorded calling simultaneously. During analysis of sound files, it was possible to estimate the minimum number of bats recorded on individual sound files but not whether consecutive sound files had recorded one bat or multiple bats. Although relative abundance cannot therefore be estimated from this analysis, the number of bat passes does provide an indication of the importance of features/habitats to bats by assigning a level of bat activity that is associated with that feature, regardless of the type of activity.

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)[5]. Survey work comprised:

- 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). The same locations were sampled as the surveys in 2016, along with an additional 14 locations which were spread evenly across the site (locations for 2019 survey are shown on Figure 6-5). Ten consecutive nights of data were collected at each location.

Bat data were analysed using the same processes and parameters as the 2016 data.

[5] *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.*

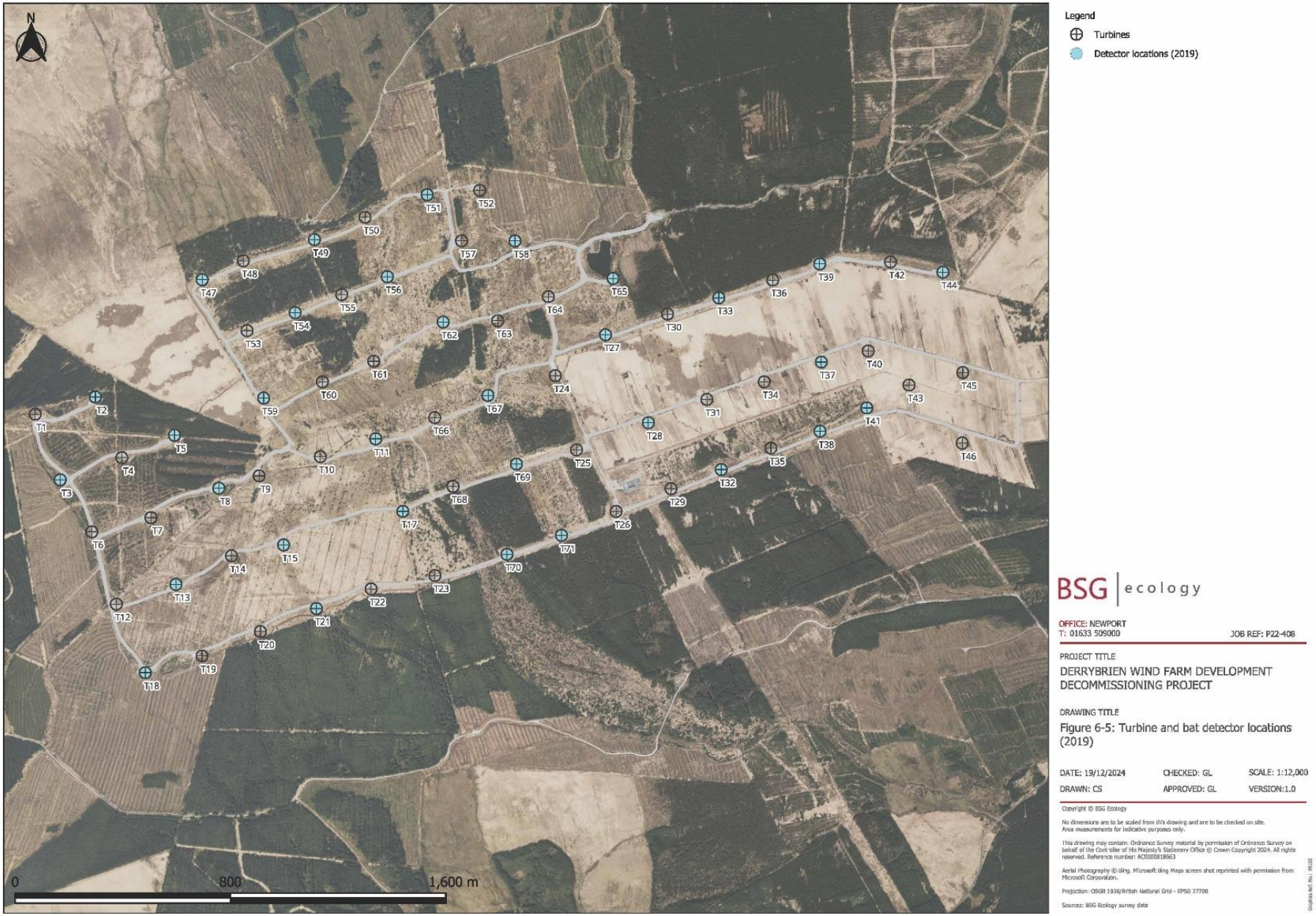


Figure 6-5 Turbine and bat detector locations (2019)

6.2.4.3.4 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[6]). 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[7].

Bat data were analysed using the same processes and parameters as the 2016 data.

6.2.4.3.5 Bat survey 2022 and 2023

BSG Ecology completed field surveys to inform the decommissioning of the wind farm (i.e. Prospective Development) with reference to best practice survey methodologies set out by Bat Conservation Trust (Collins 2016; Collin 2023). 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 (2022 and 2023). In 2022 work was undertaken on 15 August (building inspection followed by a dusk emergence survey8), 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 6-3.
- 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 6-3.
- Assessment of the potential use by bats of three bridges along the L4214 where structural works are proposed including inspection for bats and/or evidence of bats (completed on 16 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, and habitat around barrages 3 and 4 (completed on 15 August 2022; a follow up dawn re-entry survey was completed at barrage 3 on 27 September 2022).

[6] *This has since been superseded, and is now attributable to NatureScot et al (2021). The changes between the 2019 and 2021 guidance are minor.*
[7] *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. The work in 2020 and 2021 followed a curtailment regime being implemented.*
[8] *Both emergence surveys involved two surveyors standing on different aspects of the building.*

eDNA analysis of bat droppings collected during the surveys was completed by a specialist laboratory.

6.2.4.3.6 *Mammals (other than bats)*

Otter

A survey of the Owendalulleegh River was undertaken by the Shannon Regional Fisheries Board (SRFB) and Inis Environmental Services between the 9th – 22nd December 2003 following the peat slide which occurred in October 2003. An OS 6" map of the river channel from Flaggy Bridge (located on the R353) to Lough Cutra was chained in 100 m sections according to the system used by the Office of Public Works and the Central Fisheries Board (Anon, 2004 & Inis Environmental Services, 2004b). The survey involved a visual assessment of the river, its banks, instream vegetation and nature and condition of riverbed substrate. Animal tracks and signs including those of otter were recorded during the survey.

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 20th July 2018 and included a thorough search of the drains within the site. Otter signs were also recorded during aquatic habitat surveys on the Owendalulleegh River on 25th August 2018 and on the Boleyneendorrish River while undertaking Q-value assessments on October 10th, 2018.

Other mammals

Based on an assessment of current habitat suitability for other large mammals within the wind farm site and along the OHL corridor, no other dedicated large mammal surveys were undertaken.

6.2.4.4 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). The assessment was based upon percentage of Purple-moor grass *Molinia caerulea* and Devil's-bit scabious (*Succisa pratensis*), scrub cover, sward height and presence of tussocks (NRA, 2009). 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 Impact 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). 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 development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to effects of the 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 project) was evaluated in accordance with Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018) 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 (project 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) 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) 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).

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) 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 rEIAR). 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 project, including the Retained 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 project (including the Retained Development) are Article 12(1)(b) deliberate disturbance (bats and otter) and Article 12(4) in respect

of incidental killing of Annex IV species (bats)[9]. 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: 6.3.7, 6.3.8.1, 6.42.3, 6.4.2.4, 6.4.3.3, 6.4.3.4, 6.4.4.3, 6.4.4.4, 6.4.5.3, 6.4.5.4, 6.4.6.3, 6.4.6.4, 6.4.7.3, 6.4.7.4, 6.5.3 and 6.5.4.

6.2.8 Limitations/Difficulties Encountered

In general, no significant difficulties were encountered in carrying out the assessment of the impact of the project on biodiversity.

The primary difficulty was regarding information available for the baseline environment pre-construction. The assessment of the construction phase of the project is partly based on information collated from a review of third-party datasets relating to the planning and construction phases of the project. The information on the baseline (pre-construction) environment within the project area was gathered through a desktop review of literature prepared from 1998 to 2003 from various sources, and an analysis of aerial photography (Ordnance Survey Aerial Photographs, 1995 and 2000).

Limited and non-quantitative bird surveys were carried out within the wind farm project area for the original EISs and the pre-construction period, on behalf of Saorgus Energy Ltd. From the original EISs, assumptions have been made in considering baseline conditions for birds on site at the time.

Bats were not specifically considered in the original EIS documents prepared between 1998 and 2001. Therefore, the use of the area by bats pre-construction, during construction and during the operation phase (up to 2011) cannot be characterised based on empirical data. Instead assumptions have been made as to the likely use of the area by bats based on habitat type, species present in the wider area and species ecology.

The first detailed bat surveys of the wind farm site were completed in spring and summer 2016, ten years into the operational period. The autumn period was not sampled. Further detailed survey work to address this data gap was undertaken in autumn 2019.

---

[9] A High Court Judgment in 2012 has provided some clarity regarding the issue of 'deliberate' killing of birds and bats at windfarms (Eaton V. Natural England And RWE Npower Renewables Ltd [1012] EWHC2401). Whilst this case relates to the British judicial system, in the absence of an equivalent Judgment in Ireland it provides a useful reference point.

In determining this case the Judge considered in detail whether operating a wind farm where the likelihood of killing or injuring of birds and bats had been accepted, would constitute an offence under the Wildlife and Countryside Act 1981 or the Habitats Regulations 2010. The Environmental Statement (ES) for the scheme being considered had identified that there was a low risk to wildlife.

In the Judgment it is noted that Article 12(4) seems to indicate that the Habitats Directive accepts, in some circumstances, that there will be incidental capture, killing or injury of protected species that would not constitute an offence as envisaged under Article 12(1)(a). The Judge considered what this might mean in assessing the likelihood of an offence being committed in this case. He concluded that "*the expression 'incidental killing' cannot be confined to the case of a one-off accident*" where there would clearly not be an offence, and noted that the particular activities included under Article 12(1) would include those where "*killing may occur from time to time*". In other words there is a range, from a one-off accident that is clearly incidental killing, through to deliberate targeting of protected species, which would be considered an offence under Article 12 1(a).

Data collected during the operational phase is considered to provide appropriate baseline information to assess ongoing and future impacts of the wind farm on bats.

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.

Despite these constraints, it is considered that the data available is adequate to describe and assess the baseline terrestrial environment present within the project area prior to development. In addition, two of the authors of this chapter have been involved with the project since first visiting the site in the days following the peat slide event in late 2003.

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 project 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 project, including the wind farm site, grid connection and associated works.

The project is entirely within the Slieve Aughty Mountains SPA (site code 004168). The SPA had not been publicly notified at the time of the planning and construction of the project (classified as a SPA in March 2007 and formally designated by Statutory Instrument in March 2012 (S.I. No. 83 of 2012)).

In addition to the Slieve Aughty Mountains SPA, 25 other European sites have been identified within the 15 km radius of the Project (in total 4 SPAs and 21 SACs). Some of these sites are hydrologically linked to the Project and while these links are over a distance greater than 15 km along the hydrological pathway the sites are located within the 15 km radius.

A further 4 European sites outside of the 15 km radius have been identified as being within the ZoI of the project (i.e. having the potential to have been or be impacted by the project) owing to the hydrological connection between these sites and the project. One of these sites is a SPA (Inner Galway Bay SPA) and the other 3 sites are SACs - Galway Bay SAC; Cahermore Turlough SAC; and, Caherglassun Turlough SAC. These sites were identified using GIS data downloaded from www.npws.ie (accessed December 2024). Refer to Table 6-1 and Figure 6-6 for details and locations of these sites.

All but two of the 30 sites had been proposed for designation under the Habitats and Birds Directives by the time works began on the project. As mentioned previously, the Slieve Aughty Mountains SPA was proposed for designation in March 2007 and Lough Rea SPA was proposed for designation in February 2007. Work commenced on the wind farm project in June 2003 and was completed in early 2006.

Although many sites were not formally designated by Statutory Instrument until much later, legal protections, consummate with those set out in the Directives, have applied to the sites since initially proposed for designation either as Sites of Community Importance (SCI) for SACs or proposed Special Protection Areas (pSPAs).

These European sites are valued as being of International Importance.

Table 6-1 SACs and SPAs within the Zone of Influence of the Project

European Sites (Natura 2000)	Distance from the Project (Approximate)	Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site-Specific Conservation Objectives)
Slieve Aughty Mountains SPA (004168)	The entire project is within the boundary of the SPA.	› Hen Harrier (*Circus cyaneus*) [A082] › Merlin (*Falco columbarius*) [A098] NPWS (2022a)
Sonnagh Bog SAC (001913)	1.5 km north-west of wind farm site 2.8 km north-west of grid connection No potential hydrological impact pathway. The Boleyneendorrish River (which is connected to the project) 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] NPWS (2019d)
Drummin Wood SAC (002181)	7.4 km south-west of wind farm site 9.3 km west of grid connection No potential hydrological impact pathway as it is located upstream of the project via the Owendalulleegh River system	› Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] NPWS (2021a)
Peterswell Turlough SAC (000318)	7.7 km north-west of wind farm site 9.8 km north-west of grid connection No potential hydrological impact pathway as it is located upstream of the project via the Kilchreest River, a tributary of the Boleyneendorrish River	› Turloughs [3180] › Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270] NPWS (2021b)
Lough Rea SPA (004134)	8.9 km north of wind farm site 9.7 km north of grid connection No hydrological connection	› Shoveler (*Anas clypeata*) [A056] › Coot (*Fulica atra*) [A125] › Wetland and Waterbirds [A999] NPWS (2025)
Lough Rea SAC (000304)	8.9 km north of wind farm site 9.7 km north of grid connection No hydrological connection	› Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140] NPWS (2019e)

European Sites (Natura 2000)	Distance from the Project (Approximate)	Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site-Specific Conservation Objectives)
Lough Coy SAC (002117)	9 km north-west of wind farm site 11 km north-west of grid connection No hydrological connection	› Turloughs [3180] NPWS (2021c)
Pollagoona Bog SAC (002126)	9 km south-east of wind farm site 2 km south of grid connection No hydrological connection	› Blanket bogs (* if active bog) [7130] NPWS (2017)
Gortacarnaun Wood SAC (002180)	9 km south-west of wind farm site 11 km west of grid connection 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] NPWS (2021d)
Carrowbaun, Newhall and Ballylee Turloughs SAC (002293)	9.6 km west of wind farm site 11.9 km west of grid connection 15 km downstream of the wind farm site via the Boleyneendorrish River system	› Turloughs [3180] NPWS (2021e)
Lough Cutra SPA (004056)	10 km south-west of wind farm site 12 km west of grid connection 22 km downstream of the wind farm site via the Owendalulleegh River system	› Cormorant (*Phalacrocorax carbo*) [A017] NPWS (2025)
Lough Cutra SAC (000299)	10 km south-west of wind farm site 12 km west of grid connection 22 km downstream of the wind farm site via the Owendalulleegh River system	› *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] NPWS (2018a)
Ballinduff Turlough SAC (002295)	11.7 km north-west of wind farm site 13.7 km north-west of grid connection No hydrological connection	› Turloughs [3180] NPWS (2021f)
Pollnaknockaun Wood Natura Reserve SAC (000319)	12.6 km south-east of wind farm site 10.9 km east of grid connection No hydrological connection	› Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] NPWS (2018b)
Loughatorick South Bog SAC (000308)	12.8 km south-east of wind farm site 6 km south-east of grid connection No hydrological connection	› Blanket bogs (* if active bog) [7130] NPWS (2019f)
Kiltartan Cave (Coole) SAC (000286)	12.7 km west of wind farm site 15 km west of grid connection No hydrological connection	› Caves not open to the public [8310] › *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] NPWS (2018c)
Derrycrag Wood Nature Reserve SAC (000261)	13 km south-east of wind farm site 10 km east of grid connection No hydrological connection	› Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] NPWS (2018d)
Coole-Garryland	13.4 km west of wind farm site 15.5 km west of grid connection	› Natural eutrophic lakes with *Magnopotamion* or

European Sites (Natura 2000)	Distance from the Project (Approximate)	Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site-Specific Conservation Objectives)
Complex SAC (000252)	30 km downstream of the wind farm via the Boleyneendorrish River system	*Hydrocharition* - type vegetation [3150] › Turloughs [3180] › Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation [3270] › Juniperus communis formations on heaths or calcareous grasslands [5130] › Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] › Limestone pavements [8240] › *Taxus baccata* woods of the British Isles [91J0] NPWS (2024)
Coole-Garryland SPA (004107)	13.8 km west of wind farm site 16 km west of grid connection 30 km downstream of the wind farm via the Boleyneendorrish River system	› Whooper Swan (*Cygnus cygnus*) [A038] NPWS (2025)
Ardrahan Grassland SAC (002244)	14.6 km north-west of wind farm site 16 km north-west of grid connection No hydrological connection	› Alpine and Boreal heaths [4060] › *Juniperus communis* formations on heaths or calcareous grasslands [5130] › Limestone pavements [8240] NPWS (2024)
Rosturra Wood SAC (001313)	15.5 km east of wind farm site 13.7 km east of grid connection No hydrological connection	› Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] NPWS (2018e)
Cloonmoylan Bog SAC (000248)	15.9 km east of wind farm site 13.7 km east of grid connection No hydrological connection	› Active raised bogs [7110] › Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] › Bog woodland [91D0] NPWS (2016)
Glendree Bog SAC (001912)	16 km south-west of wind farm site 15 km south-west of grid connection No hydrological connection	› Blanket bogs (* if active bog) [7130] NPWS (2019h)

European Sites (Natura 2000)	Distance from the Project (Approximate)	Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site-Specific Conservation Objectives)
Barroughter Bog SAC (000231)	18 km east of wind farm 14.3 km east of grid connection 22 km downstream of the wind farm site via the Duniry River system	› Active raised bogs [7110] › Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the *Rhynchosporion* [7150] NPWS (2015b)
Lough Derg (Shannon) SPA (004058)	18 km south-east of wind farm site 13 km east of grid connection 23 km downstream of the wind farm site via the Duniry River system	› Cormorant (*Phalacrocorax carbo*) [A017] › Tufted Duck (*Aythya fuligula*) [A061] › Goldeneye (*Bucephala clangula*) [A067] › Common Tern (*Sterna hirundo*) [A193] › Wetland and Waterbirds [A999] NPWS (2024)
Lough Derg, North-east Shore SAC (002241)	18 km east of wind farm 14.7 km east of grid connection 23 km downstream of the wind farm site via the Duniry River system	› *Juniperus communis* formations on heaths or calcareous grasslands [5130] › Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] › Alkaline fens [7230] › Limestone pavements [8240] › Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] › *Taxus baccata* woods of the British Isles [91J0] NPWS (2019i)
Caherglassaun Turlough SAC (000238)	16 km west of wind farm 18 km west of grid connection 40 km downstream of the wind farm site via the Owendalulleegh River, Lough Cutra and the Beagh/Gort River	› Turloughs [3180] › Rivers with muddy banks with *Chenopodion rubri* p.p. and Bidention p.p. vegetation [3270] › *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] NPWS (2018f)
Cahermore Turlough SAC (002294)	16 km west of wind farm 18 km west of grid connection 40 km downstream of the wind farm site via the Owendalulleegh River, Lough Cutra and the Beagh/Gort River	› Turloughs [3180] NPWS (2021h)

European Sites (Natura 2000)	Distance from the Project (Approximate)	Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site-Specific Conservation Objectives)
Galway Bay Complex SAC (000268)	21 km west of wind farm 23 km west of grid connection 45 km downstream of the wind farm site via the Owendalulleegh River, Lough Cutra, the Beagh/Gort River and submarine springs and shoreline springs at KInvarra	› Mudflats and sandflats not covered by seawater at low tide [1140] › Coastal lagoons [1150] › Large shallow inlets and bays [1160] › Reefs [1170] › Perennial vegetation of stony banks [1220] › Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] › *Salicornia* and other annuals colonising mud and sand [1310] › Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] › Mediterranean salt meadows (*Juncetalia maritimi*) [1410] › Turloughs [3180] › *Juniperus communis* formations on heaths or calcareous grasslands [5130] › Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] › Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] › Alkaline fens [7230] › Limestone pavements [8240] › *Lutra lutra* (Otter) [1355] › *Phoca vitulina* (Harbour Seal) [1365] NPWS (2013)
Inner Galway Bay SPA (004031)	21 km west of wind farm 23 km west of grid connection 45 km downstream of the wind farm site via the Owendalulleegh River, Lough Cutra, the Beagh/Gort River and submarine springs and shoreline springs at KInvarra	› Black-throated Diver (*Gavia arctica*) [A002] › Great Northern Diver (*Gavia immer*) [A003] › Cormorant (*Phalacrocorax carbo*) [A017] › Grey Heron (*Ardea cinerea*) [A028] › Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] › Wigeon (*Anas penelope*) [A050]

European Sites (Natura 2000)	Distance from the Project (Approximate)	Qualifying Interest / Special Conservation Interest Bird Species (Reference to their Site-Specific Conservation Objectives)
		› Teal (*Anas crecca*) [A052] › Red-breasted Merganser (*Mergus serrator*) [A069] › Ringed Plover (*Charadrius hiaticula*) [A137] › Golden Plover (*Pluvialis apricaria*) [A140] › Lapwing (*Vanellus vanellus*) [A142] › Dunlin (*Calidris alpina*) [A149] › Bar-tailed Godwit (*Limosa lapponica*) [A157] › Curlew (*Numenius arquata*) [A160] › Redshank (*Tringa totanus*) [A162] › Turnstone (*Arenaria interpres*) [A169] › Black-headed Gull (*Chroicocephalus ridibundus*) [A179] › Common Gull (*Larus canus*) [A182] › Sandwich Tern (*Sterna sandvicensis*) [A191] › Common Tern (*Sterna hirundo*) [A193] › Wetland and Waterbirds [A999] NPWS (2013)

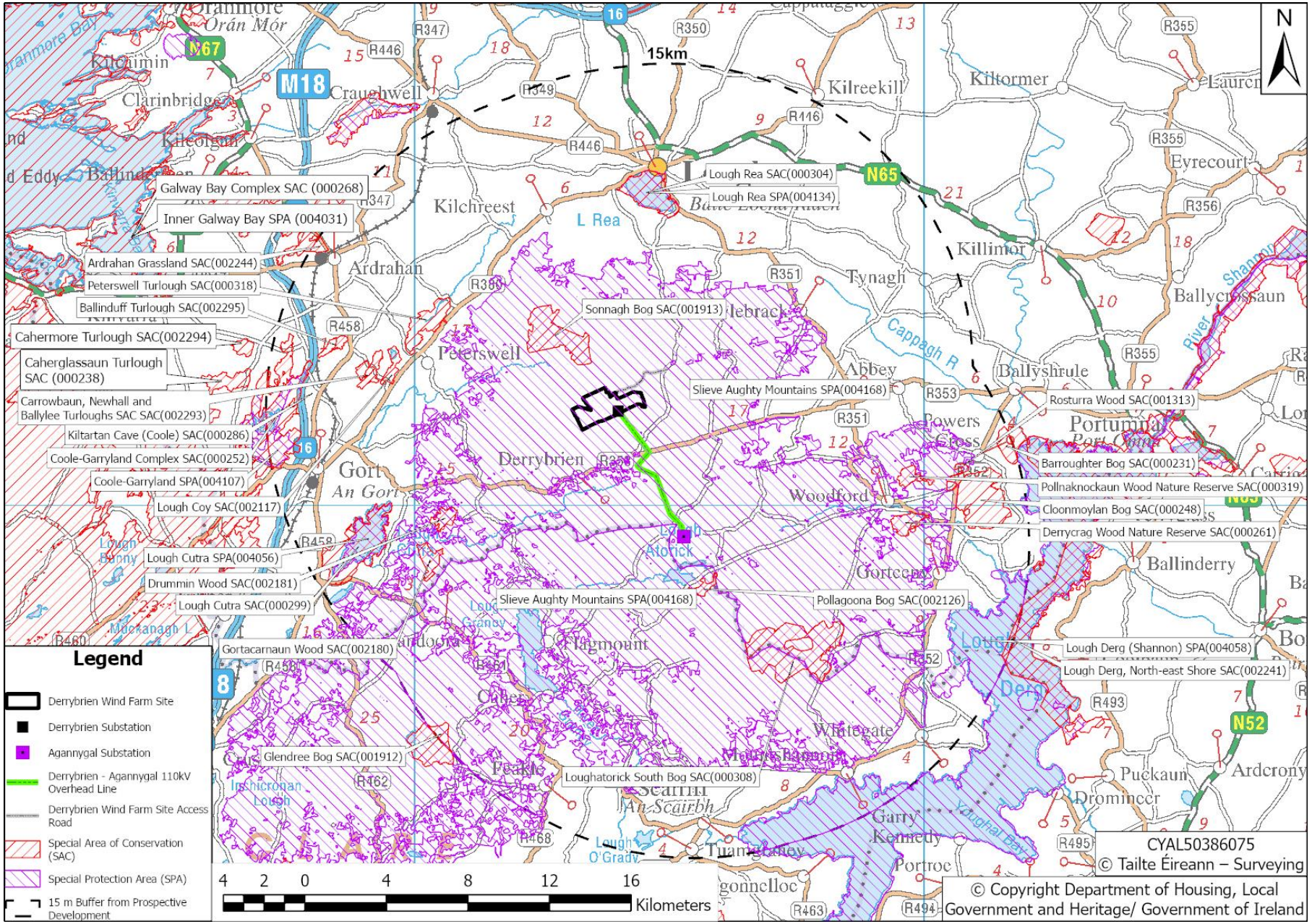


Figure 6-6 SACs and SPAs within the wider environment of the Derrybrien Wind Farm Development Decommissioning Project

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 (as amended). 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.

Four NHAs were identified and18 pNHAs within 15 km of the project. 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, and two wooden polesets of the Ennis-Shannonbridge 110 kV OHL. There are two pNHAs hydrologically connected to the project that are located beyond 15 km of the project: Caherglassaun Turlough pNHA and Galway Bay Complex pNHA, both of which are also SACs.

Refer to Table 6-2 and Figure 6-7. It should be noted that 15 of the pNHAs are also designated European sites (SAC or SPA) and the assessment of impacts to these sites is covered in the rNIS.

These sites were identified using GIS data downloaded from www.npws.ie (accessed December 2024).

These nationally designated sites are valued as being of National Importance.

Table 6-2 NHAs and pNHAs within the wider environment of the Derrybrien Wind Farm Development Decommissioning Project.

Name of site	Distance from the Project (Approximate)	Reason(s) for Designation
Slieve Aughty Bog NHA (001229)	1.6 km east of wind farm site Angle mast AM24 is entirely within this NHA's site boundary, while the minor sections of the site boundary partially overlap with this NHA: grid connection corridor adjacent to AM24, and two wooden polesets of the Ennis-Shannonbridge 110 kV OHL. 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 2.8 km north-west of grid connection No potential hydrological impact pathway. The Boleyneendorrish River (which is connected to the project) is located in close proximity to the pNHA, however they are separated by a terrestrial land buffer of approximately 14 m at its closest point, comprising a	For reasons outlined above in Table 6-1 under Sonnagh Bog SAC

Name of site	Distance from the Project (Approximate)	Reason(s) for Designation
	public road and conifer plantation/scrub habitat	
Lough Atorick District Bogs NHA (002377)	6 km south of wind farm site 460 m south of grid connection No hydrological connection	› Peatlands
Peterswell Turlough pNHA/SAC (000318)	7.8 km north-west of wind farm site 9.8 km north-west of grid connection No potential hydrological impact pathway as it is located upstream of the project via the Kilchreest River, a tributary of the Boleyneendorrish River	For reasons outlined above in Table 6-1 under Peterswell Turlough SAC
Lough Rea pNHA/SAC/SPA (000304)	8.9 km north of wind farm site 9.8 km north of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Lough Rea SAC and SPA
Cahermurphy Wood pNHA (000022)	9.1 km south-west of wind farm site 6.7 km south-west of grid connection No hydrological connection	› Oak woodland (NPWS, 2009a)
Lough Cutra pNHA/SAC/SPA (000299)	10 km south-west of wind farm site 12 km west of grid connection 22 km downstream of the wind farm site via the Owendalulleegh River system	For reasons outlined above in Table 6-1 under Lough Cutra SAC and SPA
Lough Graney Woods pNHA (001714)	12.1 km south-west of wind farm site 9 km south-west of grid connection No hydrological connection	› Acid woodland (NPWS, 2009b)
Pollnaknockaun Wood Nature Reserve pNHA/SAC (000319)	12.6 km south-east of wind farm site 10.1 km east of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Pollnaknockaun Wood Nature Reserve SAC
Kiltartan Cave (Coole) pNHA/SAC (000286)	12.7 km west of wind farm site 15 km west of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Kiltartan Cave (Coole) SAC
Pollduagh Cave, Gort pNHA (000320)	14 km west of wind farm site 16.5 km west of grid connection 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 6 km south-east of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Loughatorick South Bog SAC
Derrycrag Wood Nature Reserve pNHA/SAC (000261)	13 km south-east of wind farm site 9.1 km east of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Derrycrag Wood Nature Reserve SAC
Rosturra Wood pNHA/SAC (001313)	15.5 km east of wind farm site 12.3 km east of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Rosturra Wood SAC
Derryoober Bogs NHA (002379)	13 km south-east of wind farm site 7.8 km south-east of grid connection	› Peatlands

Name of site	Distance from the Project (Approximate)	Reason(s) for Designation
	No hydrological connection	
Coole Garryland Complex pNHA/SAC (000252)	13.4 km west of wind farm site 15.5 km west of grid connection 30 km downstream of the wind farm via the Boleyneendorrish River system	For reasons outlined above in Table 6-1 under Coole-Garryland Complex SAC and SPA
Maghera Mountains Bogs NHA (002442)	13.5 km south-west of wind farm site 12.8 km south-west of grid connection No hydrological connection	› Peatlands
Glendree Bog pNHA/SAC (001912)	16 km south-west of wind farm site 15 km south-west of grid connection No hydrological connection	For reasons outlined above in Table 6-1 under Glendree Bog SAC
Barroughter Bog pNHA/SAC (000231)	18 km east of wind farm 14.3 km east of grid connection 22 km downstream of the wind farm site via the Duniry River system	For reasons outlined above in Table 6-1 under Barroughter Bog SAC
Cloonamirran Wood pNHA (001686)	21 km south-east 14.3 km south-east of grid connection No hydrological connection	› Raised bog site naturally recolonised with woodland species. (NPWS, 2009d)
Lough O'Grady pNHA (001019)	20 km south of wind farm 14.2 south of grid connection No hydrological connection	› Waterfowl species, especially Greenland white-fronted geese › Variety of habitats – open water to wet grassland/marsh, wet woodland and scrub (NPWS, 2009e)
Lough Derg pNHA/SAC/SPA (000011)	22 km east of wind farm site 13.6 km east of grid connection 23 km downstream of the wind farm site via the Duniry River system	For reasons outlined above in Table 6-1 under Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA
Caherglassaun Turlough pNHA/SAC (000238)	16 km west of wind farm project 40 km hydrologically via the Owendalulleegh River, Lough Cutra and the Beagh/Gort River	For reasons outlined above in Table 6-1 under Caherglassaun Turlough SAC
Galway Bay Complex pNHA/SAC (000268)	21 km north west of wind farm project 45 km hydrologically via the Owendalulleegh River, Lough Cutra, the Beagh/Gort River and submarine springs and shoreline springs at KInvarra	For reasons outlined above in Table 6-1 under Galway Bay Complex SAC and Inner Galway Bay SPA

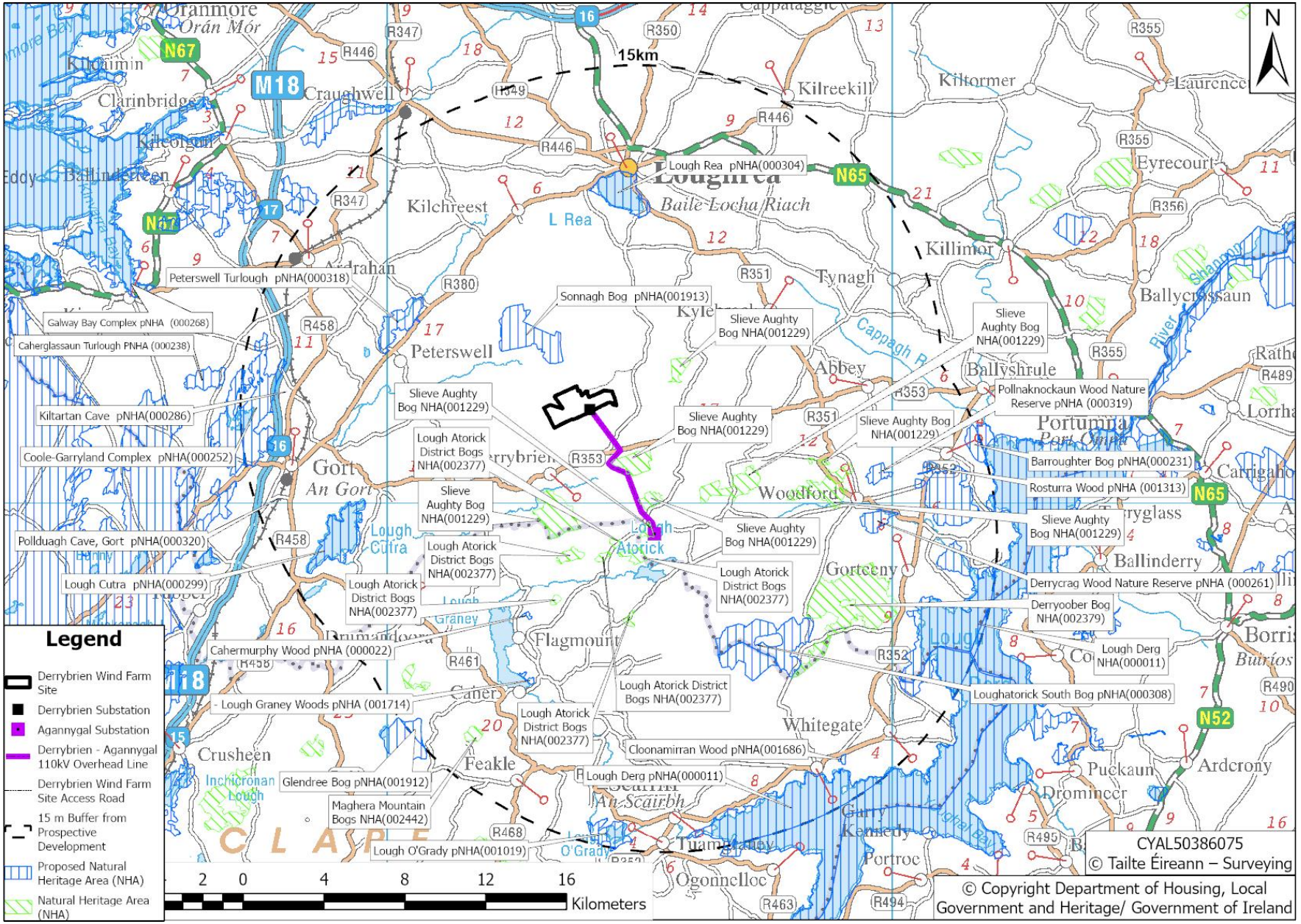


Figure 6-7 NHAs and pNHAs within the wider area of the Derrybrien Wind Farm Development Decommissioning Project.

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 project -

- Coole-Garyland Nature Reserve is approximately 13.4 km west from the project and over 30 km downstream of the wind farm site.
- Caher (Murphy) Nature Reserve is approximately 6.7 km west of the project.
- Pollnaknockaun Wood Nature Reserve is approximately 10.1 km east of the project.
- Rosturra Wood Nature Reserve is approximately 12.3 km east of the project.
- Derrycrag Nature Reserve is approximately 10 km east of the project.

Four of these five Nature Reserves (Coole-Garyland, Pollnaknockaun Wood, Rosturra Wood and Derrycrag) are also designated as European sites and impacts to these sites is addressed in the rNIS. Cahermurphy Natura Reserve is also designated as a pNHA and impacts to this site are addressed in Section 6.4.1.1.

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 mammal and amphibian species within the 10 km squares M50, M60 and R69 occupied by the project (Refer to Appendix 6-4).

No rare or protected plant species were recorded during the 2022 or 2023 terrestrial habitat 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 Project Area

A map illustrating the distribution of habitats within the wind farm project area prior to development is presented in Figure 6-8 and Figure 6-9. The distribution of habitats is primarily informed by:

- A review of the original EISs submitted in support of the project (Saorgus Energy Ltd. 1998 - 2001).
- Interpretation of colour OSI Aerial Photography dated 2000.
- Habitat surveys undertaken by Wetland Surveys Ireland on behalf of Inis Environmental Services during the construction phase (2003).
- Habitat survey of wind farm site, peat slide area, and the Derrybrien-Agannygal 110kV OHL corridor (August 2022, February, and May 2023). Surveys undertaken by Wetland Surveys Ireland Ltd.

Terrestrial habitats recorded within the wind farm project area are described in the following paragraphs and summarised in Table 6-3. Habitat names and codes correspond with the Fossitt (2000) classification system which is a three-tier hierarchical approach.

6.3.3.2 Conifer plantation (WD4)

The wind farm site was developed on lands primarily used for the production of commercial forestry (conifer plantation (WD4)) occurring on upland blanket bog (PB2). The conifer forestry comprised single species stands of Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*) of variable growth rates and stages. A review of planting dates provided by Coillte confirms that different parts of the site were planted at different times from 1963 to 1996. Mature stands with a dense canopy cover were present in the western, northern, and central sections of the site (varying planting dates from 1963 to 1980). Conifer forestry within the south central part of the site comprised immature open canopy with heathland / bog vegetation persisting in the ground layer (varying planting dates from 1993 to 1996). Parts of this area are likely to have corresponded with failed conifer plantations.

Conifer plantation also occurred along the entire length of the Overhead Line route, and as with the wind farm site itself, the plantation ages and maturity varied from mature closed canopy forestry to open recently planted heath and bog. A map showing the distribution of habitats along the route of the OHL and at the substation site is presented in Figure 6-9 below.

Mature conifer plantation occurred in the footprint of the Agannygal substation and the associated access route (see Figure 6-9).

Following construction the extent of conifer plantation declined due to felling and are largely reclassified as Recently felled woodland (WS5) (see Section 6.3.3.6 below).

Following the construction and operational phase of the project a small number of mature conifer stands remain 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*.

Conifer plantation also continued to occur 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.

Evaluation

Extensive conifer plantations of varying ages dominated the entire project area. These highly modified areas that were managed as commercial timber plantations are considered to have been of low ecological value with poor species diversity, altered hydrological conditions, and dominance of non-native tree species.

Local importance, lower value.

6.3.3.3 Cutover bog (PB4)

Cutover bog (PB4) occurred throughout the eastern section of the wind farm site where active turbary was practiced (see Plate 6-4). The habitat was not present elsewhere within the project area. Peat extraction continues to take place within this section of the site. Much of the cutover areas comprised old turf banks which extended into the small remnants of intact blanket bog (PB2). The vegetation within the cutover bog area was dominated by purple moor-grass (*Molinia caerulea*) with an abundance of cotton-grass (*Eriophorum* sp.) in places. Few *Sphagnum* species were recorded within the cutover bog, species that were recorded included *S. cuspidatum* and *S. capillifolium*. Turf cutting

had adversely affected the quality of the blanket bog within the site, drainage channels (FW4) and peat banks occurred regularly within the site (EIS 1998). From an assessment of the blanket bog within the wind farm site carried out in 1998 the blanket bog was described as being of 'reasonable quality at best'. Remnant areas of blanket bog elsewhere in the site were recorded as having been negatively affected by drainage associated with afforestation.

Following construction and operation of the wind farm cutover bog continues to occur throughout much of the eastern part of the site.

Evaluation

The habitat was described as being relatively species poor. It was also determined that this area may have been subject to burning, with the bog being firm underfoot and dried out. 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 6-4 Cutover bog in the eastern parts of the site (photo during operational phase).

6.3.3.4 Upland blanket bog (PB2)

There were two areas of intact blanket bog remaining in the study area. One of these was located within the wind farm site boundary in the central part of the site. It was an area of unplanted blanket bog with a pool and hummock complex that was, prior to construction, surrounded by mature conifer plantation. This area supported vegetation typical of upland blanket bog. It is possible that the area was considered too wet for forestry in the past. The layout of the wind farm avoided this peatland area. The bog area was not described in the original EIS, but the following description of the habitat in 2003 taken from Inis Environmental Services (2004a) is likely to accurately reflect the pre-construction character of the habitat:

> *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 cespitosum),*

Hare's-tail Cotton-grass (Eriophorum vaginatum), and Common Cotton-grass (Eriophorum angustifolium) are all present.

The second area of intact blanket bog recorded was in the western portion of the study area, just outside the wind farm site boundary. This area is described here as it comprised the last remaining area of extensive intact blanket bog in proximity to the wind farm. As above, this area was first described in detail in 2003 (Inis Environmental Services, 2004a) following a survey by the author of this report:

This blanket bog comprises a mosaic of Purple Moor-grass (Molinia caerulea) dominated blanket bog and Ling Heather (Calluna vulgaris) dominated blanket bog vegetation types. This distribution of vegetation types is likely to reflect past land use and management practices. The areas where heather dominates have an abundance of other bogland species such as Deer-grass (Trichophorum germanicum), Carnation Sedge (Carex panacea), Bog Asphodel (Narthecium ossifragum), Bilberry (Vaccinium myrtillus), Sphagnum capillifolium, Sphagnum magellanicum, and Sphagnum papillosum. The Purple Moor-grass (Molinia caerulea) areas have less bogland species apparent as they are shaded out by the dominance of Purple Moor-grass. The moss layer is dominated by Sphagnum capillifolium. 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 (NHA / SAC). Both species are also present on the nearby Slieve Aughty Bog, Moyglass and Woodford pNHA.

The habitat has remained unaffected by the development of the wind farm as illustrated in Plate 6-5. Following the construction and operation of the wind farm the habitat shows no signs of change.

Evaluation

The blanket bog within the wind farm site boundary was 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 Annex I habitat Active Blanket Bog and is deemed to be of county importance.

County importance



Plate 6-5 Upland blanket bog within the wind farm site. Same area photographed in 2004 (LHS) and 2018 (RHS) (Grid Reference (ITM): E 558938 N 705040).

6.3.3.5 Dystrophic lake (FL1)

A small dystrophic lake (FL1) was present within the central part of the site. The layout of the wind farm avoided this small lake. The lake was first described following a site visit by the author in late 2003 as follows:

The characteristics of the lake were typical of dystrophic conditions with a margin of Sphagnum cuspidatum around the edges. A narrow band of soft rush (Juncus effusus) was recorded along the southern margin of the lake. A small area of flush (poor fen and flush (PF2)) to the east of the lake was dominated by purple moor-grass, with an abundance of ling heather in places and Sphagnum capillifolium occurring in the ground layer. It was noted that the lake appeared to have been in a relatively natural state despite the planted forestry in the adjacent area (see Plate 6-6).

Following the construction and operation of the wind farm the lake and surrounding terrestrial habitats remain in situ and retain similar characteristics as present before development of the wind farm.

Evaluation

It was noted that the lake appeared to be in a relatively natural state. Natural dystrophic lakes and ponds are listed on Annex I of the EU Habitats Directive [3160] and therefore the habitat is deemed to be of County importance.

County importance



Plate 6-6 Small dystrophic lake located within the central part of the wind farm site. Same area photographed in 2004 (LHS) and 2018 (RHS) (Grid Reference (ITM): E559305 N705073).

6.3.3.6 Recently felled woodland (WS5)

As discussed above, 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 6-7). 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 6-7 Regeneration of peatland vegetation across felled woodland areas in southern part of wind farm site.

Table 6-3 Overview of terrestrial habitats present within the project area prior to project development.

Habitat type	Occurrence	Evaluation
Conifer plantation (WD4)	Dominant habitat throughout the wind farm site, the OHL route, and at Agannygal Substation (see Figure 6-8 and 6-9).	Local importance, lower value

Habitat type	Occurrence	Evaluation
Cutover bog (PB4)	Eastern extent of wind farm site (see Figure 6-8).	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 (see Figure 6-8).	County
Dystrophic lake (FL1)	Single pond in central part of wind farm site (see Figure 6-8).	County

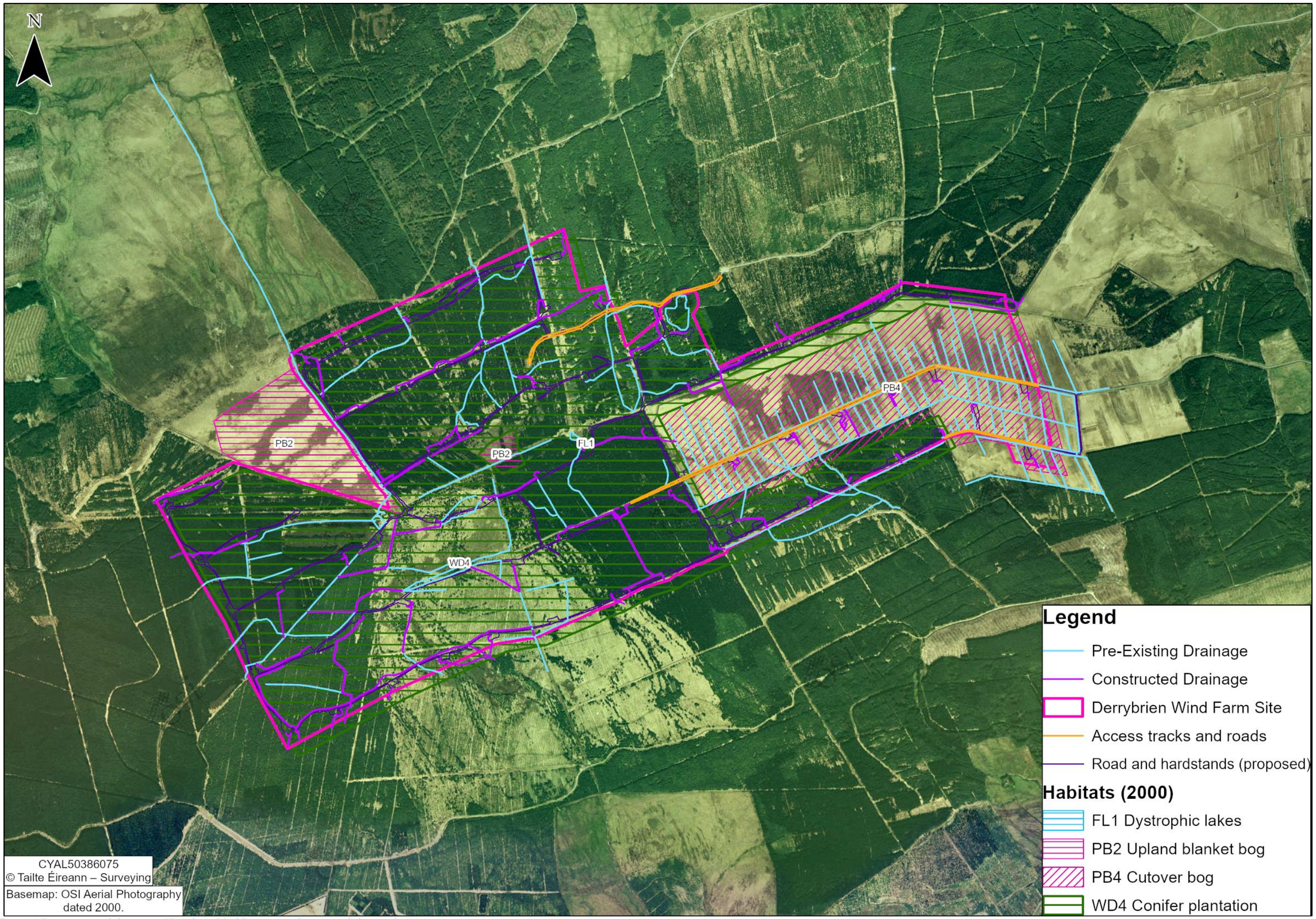


Figure 6-8 Pre-construction habitat map of Derrybrien Wind Farm site overlain on aerial photography (2000)

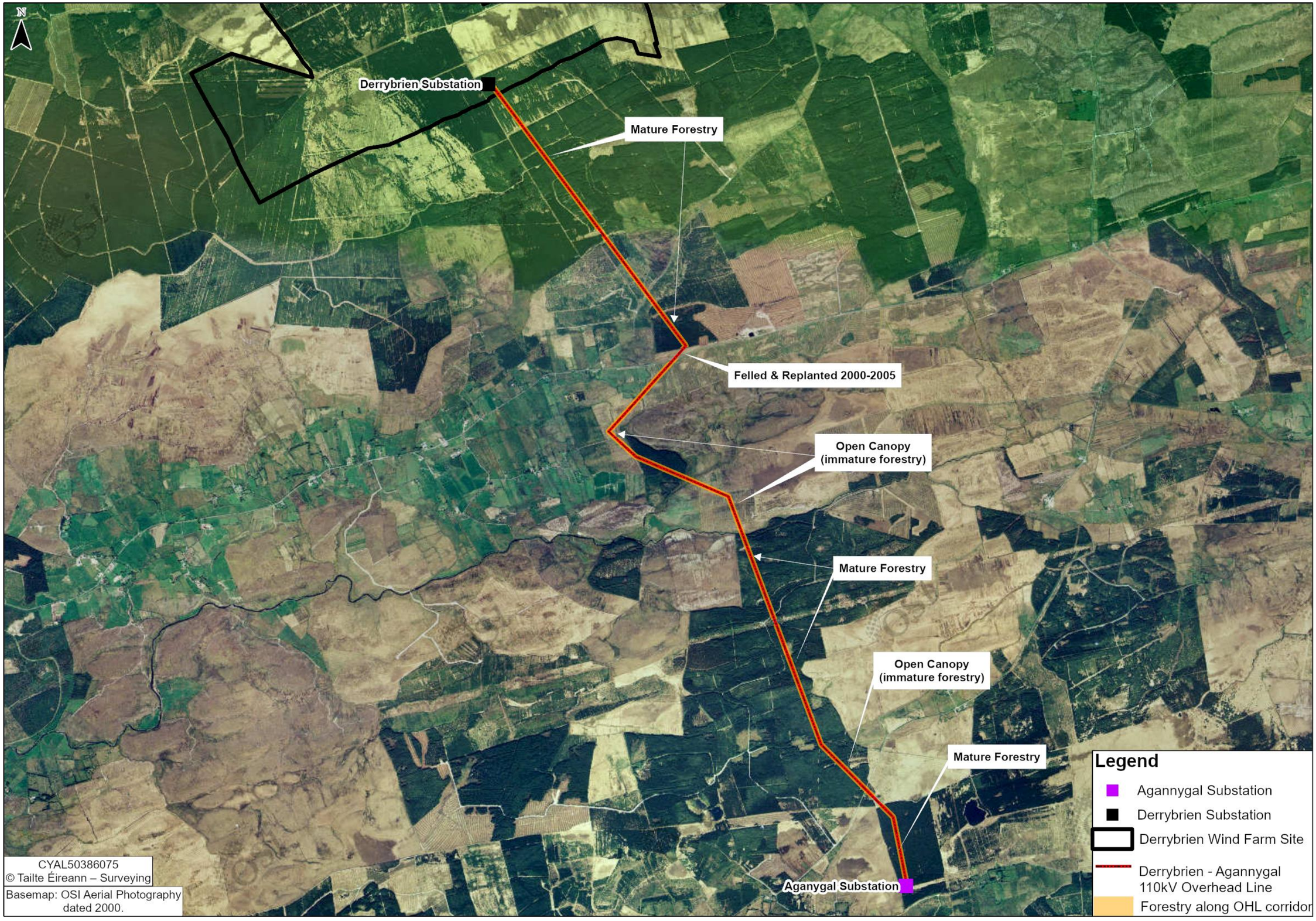


Figure 6-9 Aerial photograph (OSI dated 2005) showing the pre-existing habitats present along the OHL Route and at the Agannygal Substation site (southern extent)

6.3.4 Terrestrial Habitats in Peat Slide Area

The peat slide largely occurred within Coillte owned lands to the south and south-east of the development site, smaller areas of privately owned land were also within the path of the peat slide. The habitat types that occurred along the peat slide route were discussed in an Ecological Impact Assessment for emergency and stabilisation works associated with the slide (Inis Environmental Services 2004a) and the recovery of same was later reported in 2005 (Inis Environmental Services 2005). The route of the peat slide was described with reference to the location of barrage and bridge locations. Coniferous forestry (WD4) of different aged stands occurred between the southern boundary of the wind farm site and Barrage 1 and between Barrage 1 to Barrage 2. The section of the affected area from Barrage 2 to the Black Road Bridge included a stream (FW1) and potentially a natural stream channel with wet grassland (GS4) on either bank and in adjoining fields. The section of the peat slide extending from the Black Road Bridge to Flaggy Bridge to the south supported a tributary (FW1) of the Owendalulleegh River and associated banks, wet heath (HH3) vegetation, and conifer plantation (WD4). South and downstream of Flaggy Bridge, the slide was mostly confined to the river channel and adjacent riparian riverbank vegetation. Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) addresses impacts on the aquatic environment.

An evaluation of habitats recorded along the peat slide area is presented in Table 6-4. The impacted habitats and subsequent recovery is discussed in the Section 6.4.2 below.

6.3.4.1 Conifer Forestry (WD4)

Much of the habitat affected by the peat slide comprised conifer forestry at various growth stages. A review of aerial photography available for the area pre-2003 was undertaken to determine the density of conifer forestry along the peat slide route. Aerial imagery indicates that there were some areas of open canopy forestry.

Evaluation

Local importance, lower value.

6.3.4.2 Wet Heath (HH3)

Remnant wet heath habitat was recorded along sections directly affected by the peat slide. The heath was dominated by ling heather and purple moor-grass. The wet heath habitat affected by the peat slide was small in extent and occurred on moderate to steep slopes either side of the peat slide area.

Evaluation

County importance.

6.3.4.3 Wet grassland (GS4)

This habitat was recorded in fields adjoining an area affected by the peat slide west north-west and upslope of Black Road Bridge (E561094; N703726). The wet grassland is likely to have been a species poor sward dominated by soft rush (*Juncus effusus*), Yorkshire Fog (*Holcus lanatus*), and Creeping Buttercup (*Ranunculus repens*) as is typical of agricultural wet grasslands in the locality. Agricultural grassland is also the principal habitat adjoining the river downstream of Flaggy Bridge towards Lough Cutra.

Evaluation

Based on the quality of wet grassland in nearby areas, the likely value of the habitat is deemed to have been Local importance, lower value.

6.3.4.4 Eroding / upland streams (FW1)

A number of streams and rivers were directly affected by the peat slide and subsequent emergency works. Effects on water quality and aquatic ecology are assessed in Chapter 7 of the rEIAR.

Table 6-4 Overview of terrestrial habitats within the peat slide area.

Habitat type	Occurrence	Evaluation
Conifer plantation (WD4)	Dominant habitat throughout the area most impacted by the peat slide. Tree density and maturity varies from dense mature canopies to open immature trees. Mature trees within the main peat slide area occupied ca 4.5ha (1.44ha within wind farm site and 3.06ha outside of wind farm site)	Local importance, lower value
Wet heath (HH3)	Small areas of wet heath occurred within the peat slide area on steep banks adjacent to the pre-existing watercourse, between Barrage 2 and Black Road Bridge, and also between Black Road Bridge and Flaggy Bridge.	County importance
Wet grassland (GS4)	Wet grassland occurred in the area upstream of Black Road Bridge, and also more extensively on either side of the River downstream of Flaggy Bridge.	Local importance, lower value

6.3.5 Invasive Species

No problematic alien invasive species have ever been 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.

6.3.6 Birds

6.3.6.1 Review of status of breeding birds in study area, 1998-2024

6.3.6.1.1 *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 (date of site visit not provided). 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). The following was noted in the bird section of one of the original EISs: "*One major limiting factor in the number of bird species found in the area is the extent of coniferous forestry plantation. This is such that the amount of open moorland is relatively small. The moorland is needed for hunting and food supply, while the forestry is mainly used for cover and nesting. Therefore, a dearth of open blanket bog would restrict the number of species frequenting the site.*"

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 2003 (with comparable data where available dating back to 2000). For the 2003 breeding season, there was a total of 12 territories (possible duplication with 1-2 territories), with status as follows:

- Confirmed – 9.
- Probable – 1.
- Possible – 2.

Up to seven of these territories had been known since the 2000 season (when confirmed breeding occurred at four).

The total population for the Slieve Aughty Mountains in the first National Hen Harrier Survey from 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.

6.3.6.1.2 *Construction phase of Derrybrien Wind Farm (mid 2003 – March 2006)*

A survey of breeding birds took place in 2004 (BES 2004) during the period when construction works were on hold due to the peat slide. Some 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 development site for foraging, with sightings over the bog in the eastern sector on three dates in May and June (see Table 6-5 and Figure 6-10).

Within the hinterland area, a total of ten breeding territories were located, with nine confirmed and one possible. Distribution of territories was similar to that in 2003. The slight difference in number of territories between 2003 and 2004 is most likely due to natural variation (such as early breeding failure) or possibly duplication in totalling the number of pairs 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.

Table 6-5 Summary of hen harrier observations from Vantage Point watches for 2004 survey.

VP & line no.	Date	Duration	Sex	Habitat	Behaviour	Activity	Flight altitude
A No. 1	13 May 2004	300+ sec	Male	HB F	Fl H	Flew fast over bog and then foraged over forest to SE of site (joined by female).	-
A No. 2	13 May 2004	200 sec	Female	HB F	Fl	Flew over bog & joined male from above to fly over forest outside site.	-
A No. 3	12 June 2004	350 sec	Male	HB	Fl H	Glides over bog leisurely, forages	-
A No. 4	13 June 2004	120 sec	Male	HB	H	Forages over bog at extreme east end of site and continues over bog to east of site.	-

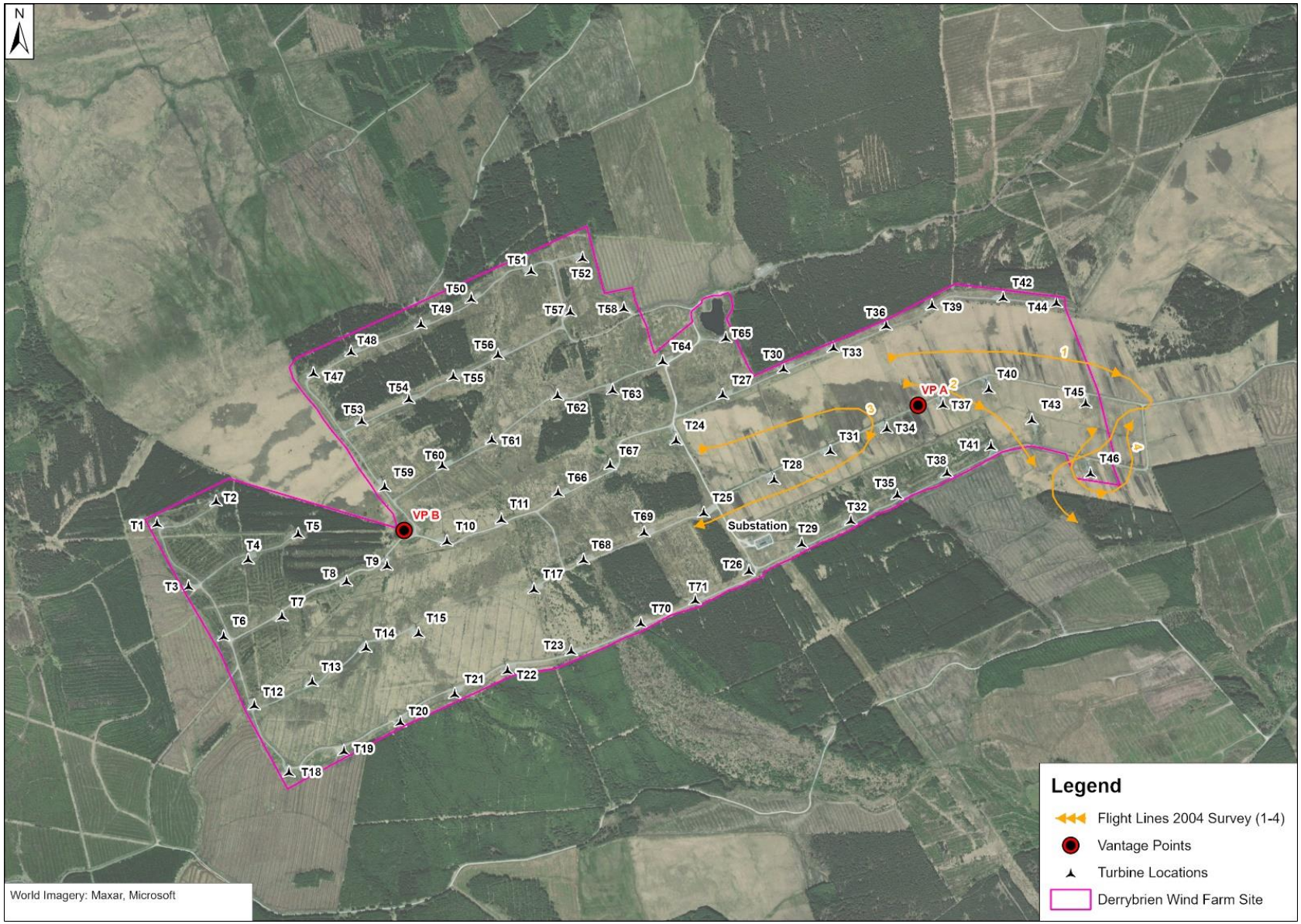


Figure 6-10 Derrybrien Wind Farm - Hen Harrier Flight Lines 2004 Survey

6.3.6.1.3 *Operation and Maintenance Phase (2006 – 2022)*

Usage of wind farm site by hen harrier, 2006-2018

Surveys for breeding 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 since monitoring commenced have hen harriers been 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. There follows a summary of the observations of hen harrier within the wind farm during the various surveys, with details presented in Table 6-6 and Figures 6-11 and 6-12.

The survey in the 2006 season (BES 2006) was carried out when the wind farm was in full operation and most of the forestry within the site had been cleared. There were nine separate sightings of hen harriers within the site and/or along the boundaries of the site (within 200 m) during 2006, with one further sighting over 1 km to the northwest. Two of the sightings were in April, three in June, and four in July. All were of male birds apart from one female. Five of the birds were well within the site flying through and/or foraging between the turbines. Most of the activity was over the bog in the eastern end of the site, though birds were also recorded over the clearfell and remaining forest stands. Most of the birds were foraging within 10 m of the ground. However, birds were watched at altitudes up to 100 m over the site. At least one bird came within 10 m of the base of a turbine. One hen harrier was observed catching an avian prey item on site.

Further monitoring was carried out during the 2007 season (BES 2007). There was only one hen harrier sighting within the site and two others of male harriers off site but seen from within the site. (A further within-site sighting was reported by wind farm staff).

Monitoring was again carried out in the 2009 season (BES 2009). Three hen harrier flight lines were recorded in the 2009 season, all on 24th July. Two of the flight lines were of birds on site while a third came within 500 m of the site boundary. These involved at least two individual birds. A female came particularly close to the base of turbine no. 59 (to within c.10 m) at a height of 15-20 m and hunted slowly within the wind farm between turbines at the usual foraging height of under 10 m.

A further season of monitoring was carried out in 2011 (BES 2011). One hen harrier was recorded within the site in 2011 – an adult male flew low (< 10 m) through the south-west sector (east of T18 & T12) of the wind farm on 30th May.

Monitoring in the 2015 season resulted in two sightings (male and a female) within the site, one hunting over the bog in the east and one over the clearfell in the western sector (BES 2015).

There was one sighting of a hen harrier within the site in 2018 – a female flying over and at times foraging over clearfell in the centre of the site in April and passing within 50 m of T66 and continuing north between T60 and T61.

The survey in 2004 demonstrated that hen harriers used the strip of bog within the eastern sector of the site for foraging before any of the turbines were erected. At the time, much of the remainder of the site was covered with closed canopy conifer plantation and would have been largely unsuitable for foraging. From 2006 onwards, hen harriers have been recorded within the site in each year of monitoring. Usage, however, has been relatively low (apart from in 2006 which may have been due to the proximity of an active nest) but included both foraging birds and birds merely flying through the site. Sightings have been both in the vicinity of the unplanted bog in the eastern sector of the site

(see Plate 1, Appendix 6-5) and in the areas which were clear felled to facilitate the wind farm (see Plates 2 and 3, Appendix 6-5). The clear felled areas have developed to a mix of low scrub (brambles, willows etc.) and re-vegetating bog species (heather, grasses etc.). This mosaic of vegetation supports a range of potential prey items for hen harriers, especially meadow pipit and skylark.

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. Should such an area of second rotation be in proximity of the wind farm, the birds could be expected to also forage within the wind farm. For example, the forest area immediately to the west of the wind farm (46.2 ha) which was harvested and replanted by Coillte between 2016 and 2018 will provide suitable second rotation foraging habitat from about 2020 onwards – birds foraging here would be expected to also use the habitats within the wind farm.

In addition to the records described above for the period 2006-2018, two *ad-hoc* sightings of hen harrier within the wind farm were made by John Curtin (bat ecologist) in 2020 as follows:

a) 30th June 2020 - female perched on a stump in clear-fell in the western sector of site, then flew

b) 8th September 2020 – ringtail near substation

See Figures 6-11 and 6-12 for flight lines. See Appendix 6-6 for definition of Habitat and Behaviour codes.

Table 6-6 Summary of Hen Harrier observations from Vantage Point watches for surveys since 2006.

VP & line no.	Date	Duration	Sex	Habitat	Behaviour	Activity	Flight altitude
2006							
A No. 1	7 April 2006	245 sec	Male	HB F	Fl H	Foraging over bog at eastern end of site, also over forestry outside of site	<10 m
B No. 2	29 April 2006	14 sec	Male	CF	Fl	Flew over clear fell in western sector of site	<10 m

VP & line no.	Date	Duration	Sex	Habitat	Behaviour	Activity	Flight altitude
						within 20 m of T9.	
B No. 3	1 June 2006	223 sec	Male	F	Fl	Flew over edge of forest just outside west end of site	20-100 m
A No. 4	1 June 2006	295 sec	Male	F HB	H Fl	Seen over forest to south of site, then passes over bog within site foraging, continues north of site.	<10 m 95 sec; 10-20 m 20 sec; 20-50 m 180 sec
B No. 5	3 June 2006	-	Male	F	C S	Circling and soaring to north-west of wind farm.	>200 m
A No. 6	3 July 2006	227 sec	Male	HB CF F	Fl H C S	Hunting around base of T41, aerial strike later over bog.	<10 m 163 sec; 10-20 m 20 sec; 10-50 m 44 sec
A No. 7	3 July 2006	221 sec	Male	HB F	H	Hunts between T37 and T40 then over forest parallel to line of turbines	<20 m
B No. 8	4 July 2006	54 sec	Femal e	HB	H Fl	Female arrives from NW and hunts	<10 m
A No. 9	5 July 2006	59 sec	Male	HB	H	Male hunting just east of site	<10 m
2007							
A. No. 10	14 July 2007	247 sec	Male	HB	H	Male hunting over bog, continues east of site	<10 m

VP & line no.	Date	Duration	Sex	Habitat	Behaviour	Activity	Flight altitude
2009							
A. No. 11	24 July 2009	388 sec	Male	HB F	H Fl C S	Male flies and hunts between T43 and T45. Continues east of site	<10 m 170 sec; 10-50 m 34 sec; 50+ m 184 sec
B. No. 12	24 July 2009	197 sec	Female	HB CF	H S	Female soars into site close to T59, hunts by T9, T14 & T19 to within 50 m at times	50 m - <10 m
2011							
B. No. 13	30 May 2011	25 sec	Male	HB	Fl	Male flies through western end of site, east of T18 and T12	<10 m
2015							
B No. 14	7 May 2015	120 sec	Male	CF	H	Male hunting over clearfell between T13 & T14	<10 m
A No. 15	26 May 2015	60 sec	Female	HB	H	Female type over bog in east	<20 m
2018							
B. No 16	20 April 2018	90 sec	Female	CF	H Fl	Female flying and at times foraging over clearfell in centre of site, passed within 50 m of T66 and continued north between T60 and T61.	<20 m

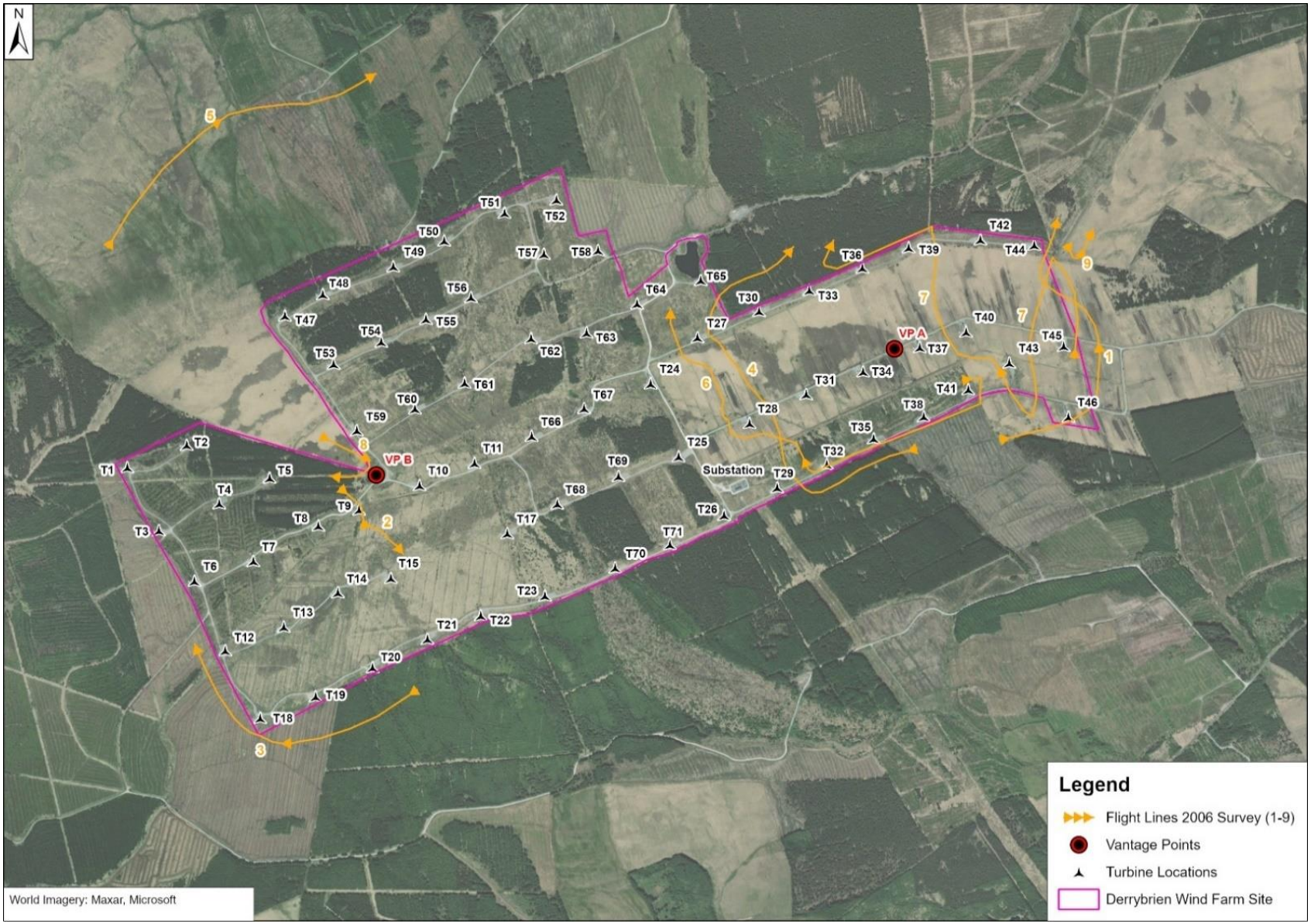


Figure 6-11 Derrybrien Wind Farm - Hen Harrier Flight Lines 2006 Survey

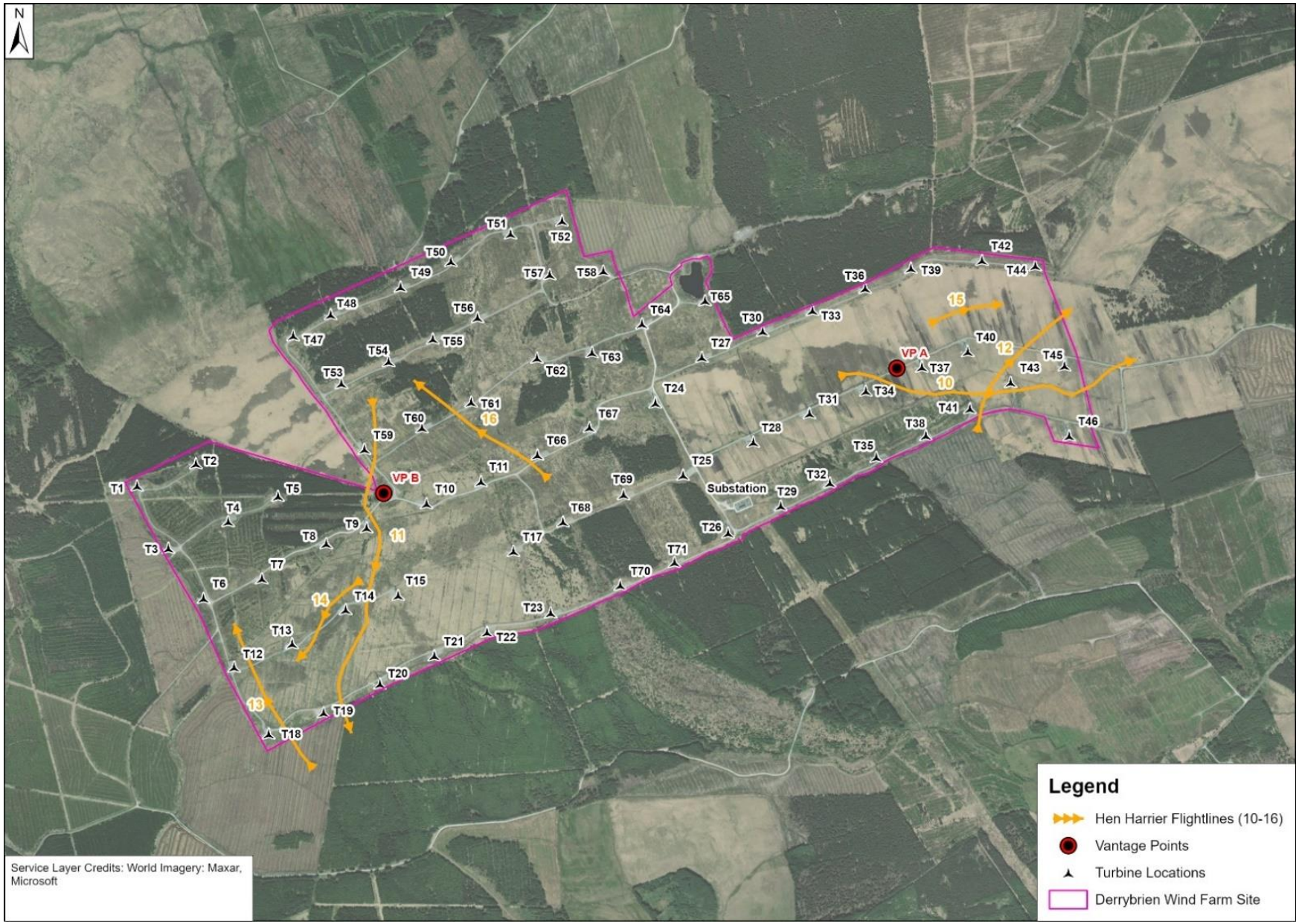


Figure 6-12 Derrybrien Wind Farm - Hen Harrier Flightlines 2007-2018 Surveys

Hen harrier breeding territories within 5 km of wind farm site, 2006-2018

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 often varied between years.

Table 6-7 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 6-7 Summary of the number of territories occupied in various years from 2004 to 2018 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, 2015) 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 6-8, 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 bred on the substation in several of the survey years. 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 species (all Green listed) which are regular and expected to breed on site include sparrowhawk, cuckoo, mistle thrush, whitethroat, stonechat, chaffinch, lesser redpoll and reed bunting.

Table 6-8 Status of birds recorded within 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

Species	Breeding Status	Conservation Status
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 corrugated iron shed east of T24 - regular over site during summer	A
Willow warbler	Breeding confirmed	A
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

Species	Breeding Status	Conservation Status
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

6.3.6.1.4 *Ceased Operation Phase (2022 – 2024)*

Surveys for breeding birds within the Derrybrien Wind Farm and the hinterland area were carried out in 2022 and 2024. The vantage point and hen harrier hinterland search surveys followed the same methods as in previous surveys. Other breeding birds within the wind farm site and along representative sections of the overhead grid connection line were surveyed by fixed transects (see Section 6.2.4.2.1).

Vantage point watches & Hinterland surveys

Details of the vantage point watches carried out in 2022 and 2024 are given in Appendix 6-7.

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 project 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 (Red list): 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 (Amber list): pair seen flying across regenerating bog south of T10 and T11 on 28th April 2022. Breeding likely on site.

Red grouse (Red list): 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).

Snipe (Red list): displaying bird heard over cutover bog between T31 and T33 on 29th April 2022.

Lesser Black-backed Gull (Amber list): party of seven flew northwards over central area of site on 30th June 2022.

Sparrowhawk (Green list): 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.

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.

Transect surveys

Details of the results of each transect survey within the wind farm and along the grid connection route for the 2022 and 2024 breeding seasons are given in Appendix 6-8. 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 surveys 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.

6.3.6.1.5 *Other 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.

6.3.6.2 Wintering birds in study area, 1998-2024

Surveys for wintering birds were carried out in two winters during the operation phase.

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.

Five of the species recorded on site, kestrel, golden plover, snipe, 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. The flock then flew up above turbine height and landed again near T34. The flock was present on site for at least 3 hours and was generally very active, with flighting within and above the rotor sweep zone. On 23rd December, a flock of c.150 was still present on the bog near T33 and was again observed flying at and above turbine blade height. On 22nd January 2012, a flock of 15 golden plover took off from near T27 and flew north.

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.

Snipe, a species now Red-listed on basis of breeding population, was recorded in the winter surveys though usually only single 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).

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 was recorded on or over the site on four occasions between October 2019 and February 2020. Flock size varied from 16 to 260 birds. Records were as follows:

- 22nd October 2019: a flock of c.60 flew westwards over the site at a height just above turbine rotor tip height.
- 17th December 2019: a flock of 260 birds was observed over the eastern extremity of the wind farm and later landing on the bog within the site.
- 18th February 2020: flock of 16 on bog in eastern sector of site, later flew northwards out of site.
- 24th February 2020; flock of 110 observed circling high (> 100m) over site.

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.

Wintering birds in study area, 2024-2025

Surveys for wintering birds were carried out in winter 2024/25 during the ceased operation phase.

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.

6.3.6.3 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 6-9. Data are from the National Hen Harrier Surveys (Norriss *et al.* 2002, Ruddock *et al.* 2011, 2016, 2024) and from the Hen Harrier Project (2020, 2021).

Table 6-9 Comparative population data from the national hen harrier surveys in 1998-2000, 2005, 2010, 2015 and 2022 for the Slieve Aughty Mountains, and from Hen Harrier project for 2020 and 2021. Figures are total estimated pairs.

1998-2000	2005	2010	2015	2020	2021	2022	Change % (2005-2022)
10-21	24-27	15-23	8-14	7	8	3-5	-67%

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.

Habitat change

While open moorland is the natural nesting habitat for hen harriers in Britain and Ireland (Watson 1977), the population in Ireland has readily adapted to nesting within young conifer plantation since

the widespread plantings in the 1960s and 1970s (as highlighted by Norriss et al. 2002 in the first national hen harrier survey). Indeed, Wilson et al. (2009) have shown pre-thicket conifer plantations to be the most frequently used nesting site throughout Ireland. This trend is particularly prevalent in the Slieve Aughty Mountains and in the 2015 national survey, all confirmed nesting pairs were in conifer plantation (Ruddock et al. 2016). Foraging activity, however, continues to indicate a preference for open habitats (bog-heath-grassland) though pre-thicket second plantation is also used extensively.

It can be assumed that over time the proportions of the main land uses within the Slieve Aughty Mountains SPA will remain fairly constant, which is roughly as follows: forestry 50%, bog/heath 30%, grassland 20% (NPWS, 2015).

Within the forestry component, however, there is continuous change as trees mature over the (average) 40 year cycle, are clearfelled and then replanted. As only the pre-thicket or open canopy phase of the forest cycle (usually forest not more than 10-12 years of age) provides useful nesting and foraging habitat for hen harriers, it follows that the status of the age cohorts of the forest in any one area at a given time is likely to have an important effect on the local hen harrier population. This trend was shown quite well in the 2005 National Hen Harrier Survey when a marked increase was recorded in the Hen Harrier population in the Ballyhoura Mountains since the 1998-2000 survey (Barton et al. 2006). The authors of the survey report considered that the increase in the amount of pre-thicket second rotation forest was a main reason for the increase in the number of birds.

In the 2010 National Hen Harrier Survey, Ruddock et al. (2012) wrote (page 55 of report) as follows:

> 'Forest maturation may be partly responsible for regional decreases in breeding hen harriers, as a shift in age structure of plantations was recorded between the two surveys with a general increase in older classes of suitable forest breeding habitats'. In discussing significant population declines in three of the six SPAs designated for hen harrier, they noted further (page 57 of report): "There has been a decrease in the forest age-classes suitable for hen harrier nesting and a decline in afforestation across all the SPAs which may have affected distribution. Afforestation in all SPA areas appears to have dramatically increased during 2006, immediately prior to SPA designation in 2007 and has since declined annually. The quality of open habitats for hen harriers may need to be improved in order to compensate for decreased availability of young forest habitats due to the changing age profile of forest plantations in these areas."

In discussing the decline in the population in the Slieve Aughty Mountains SPA between the 2010 and 2015 national surveys, Ruddock et al. (2016) wrote that surveyors observed that forest maturation is likely to have reduced the availability of suitable habitat since the previous survey and they suggest that this may have led to a redistribution of some breeding pairs from the Slieve Aughty's to areas south of the SPA as some increases were recorded in the Slievefelim – Silvermines Mountains complex. From analyses carried out on forest age structure within all six SPAs selected for hen harriers in Ireland, Ruddock et al. (2016) predicts that the extent of usable forest habitat for nesting and foraging purposes will decline over the next 10 years.

Predation

Compared to open habitats, the increase and maturation of commercial forest plantations has led to an increase in potential predators of hen harrier nests due to the provision of cover and breeding sites. Avian predators include hooded crow, raven, magpie and more recently jay, while mammalian predators include fox, pine marten, mink and rat. In the 2015 national hen harrier survey, Ruddock et al. (2016) identified the main predators as fox, pine marten, hooded crow and mink.

While there is little direct evidence of predation in the Slieve Aughty Mountains SPA, other than a nest being predated by a fox in 2008 (recorded by nest camera), all the key predators are widespread throughout the SPA as well as in the Derrybrien area. Indeed, populations of species such as pine marten and fox have increased in the past decade or so.

Persecution

Persecution or illegal killing of hen harriers has been recorded in some parts of the country (including Kerry and west Clare) (Ruddock et al. 2016). While there has been no evidence of such events in the Slieve Aughty Mountains, this does not necessarily rule out the possibility of persecution occurring.

Access and Recreation

Ruddock et al. (2016) identified disturbance to hen harriers from human presence as being widespread throughout the species range and probably responsible for nest abandonment in some cases. This category included dedicated walking and cycling tracks, quad bikes, as well as local paths. Disturbance can occur particularly when users leave the dedicated routes.

In the 2015 national survey, surveyors in the Slieve Aughty Mountains identified access tracks and cycling tracks, including use of non-paved forest roads, as a pressure on the hen harrier population.

Non-intensive grazing

Appropriate grazing levels to optimize habitat conditions for hen harrier can be difficult to achieve and will vary in any one area over time. While under-grazing may facilitate development of tall stands of heather suitable for nesting, the absence or near-absence of grazing may lead to scrub encroachment which may not be suitable for either nesting or foraging. Similarly, over-grazing can lead to unsuitable conditions for both nesting and foraging.

While Ruddock et al. (2016) does not identify grazing levels as an issue in the Slieve Aughty Mountains, they do note uncontrolled burning (which may be related to local grazing) as a pressure on the hen harrier population.

Wind energy & Utility and service lines

For the Stacks Mountains complex in Kerry and Cork, Ruddock et al. (2016) cited wind energy production as one of the most frequently recorded pressures on the hen harrier population. The effects of the presence of wind farms are considered mainly through loss of suitable habitat and disturbance to breeding during the construction phase. For the Slieve Aughty Mountains SPA, they note that there are 77 turbines located within the SPA boundary and no others within 500 m of the boundary. Wind energy was not reported as a main pressure on the hen harrier population within the SPA.

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.

6.3.7 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 of the Directive. 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.

6.3.7.1 Pre-construction baseline data: 1998-2001

There is no baseline data available for bats between 1998 and 2001. It has been assumed for the purpose of this assessment that all bat species identified during field surveys as being present during the operational phase of the project were present pre-construction. Although habitat extent and condition has varied within the Project area since the pre-construction period, it is not likely that this variation would result in a different bat species composition being recorded.

6.3.7.2 Construction phase: circa June 2003-March 2006

There is no bat data available for the Construction Phase circa June 2003 – March 2006. As described in Section 6.3.7.1, all bat species identified during field surveys as being present during the operational phase of the project are assumed to have been present during the construction phase.

6.3.7.3 Operation Phase: 2006 -Oct 2022 data

Desk Study

Bat Conservation Ireland (BCI) data were obtained for a 10 km[10] search area around the wind farm 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 wind farm.

The review of bat records from the National Biodiversity Data Centre indicated that common pipistelle *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 wind farm. The information obtained from BCI (Wilson, 2012) matches this information, with no other species recorded.

One planning application was found within a 10 km radius of the wind farm that was submitted within five years of 2019; the Ballinakill Quarry Extension EIS. The EIS for this application had no mention of bats (Ballinakill Quarry Extension, 2015).

A number of EIS reports are available within the preceding 15 years. Of those reviewed only two made reference to bats (the redesign of Keelderry Wind Farm [2009], and Keelderry Grid connection and substations [2010] – 3 km west and 0.7 km south of the site respectively); the first recorded a partial pipistrelle bat pass during driven transects and the second concluded that no evidence of bat roosts or suitable roosting features were present following an assessment of habitat suitability for bats.

6.3.7.3.2 *Bat survey results 2011*

Two bat passes were recorded during the activity survey work, an unidentified bat pass and an unidentified pipistrelle sp. pass.

[10] *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).*

No roosts were identified in the desk study of the 2011 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.

6.3.7.3.3 *Bat survey results 2016*

Driven transect survey

Details of the driven transect surveys are provided in Table 6-10 Details of driven bat transect (Lead: Rachel Taylor (RT) and Caroline Lalor (CL). Non-technical second: Tom Lalor (TL))0, the transect route along with all recorded bat passes are show in

.

Table 6-10 Details of driven bat transect (Lead: Rachel Taylor (RT) and Caroline Lalor (CL). Non-technical second: Tom Lalor (TL))

Survey date	Surveyors	Sunset	Time	Weather
20/04/2016	RT, CL	20:40	START: 20:40 FINISH: 22:49	START: Wind F3, 3/8 cloud, no rain, 12°C FINISH: Wind F2-3, 3/8 cloud, no rain, 10°C
29/06/2016	CL, TL	21:55	START: 21:55 FINISH: 00:37	START: Wind F0-1, 7/8 high cloud, no rain, 10°C FINISH: Wind F0-1, 7/8 high cloud, no rain, 10°C
08/08/2015	CL, TL	21:15	START: 21:15 FINISH: 23:10	START: Wind F0-1, 5/8 , no rain, 11°C FINISH: Wind F1-2, 0/8 , no rain, 11°C

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 site.

Static bat detector survey

Static bat detectors recorded bat calls for a combined total of 406 nights, equating to 3290.5 hours of survey time during April-August 2016. Table 1 in Appendix 6-2 gives details of static detector deployment dates and locations with the latter illustrated in Figure 6-4. On some occasions the battery life of the detectors was reduced by high frequency noise; in these cases the detectors were redeployed so that five night periods were still recorded (where possible) but these were not all consecutive. In June the detector at T54 failed to record, in July, the detector at T62 failed to record and in August the detectors at T59, T67 and T71 failed to record. This was accounted for in bat passes per hour calculations. Table 6-11 gives details of the number of passes and activity recorded during automated detector surveys.

A total of 13,109 passes from at least five species of bat were recorded. Figure 6-13 illustrates the proportion of activity (bat passes per hour) recorded for different species at each automated survey location. Data for which there were less than 0.1 bat passes per hour (P/h) (e.g. long-eared bat sp.) have not been illustrated.

Table 6-11 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2016.

Species	P	P/h
Common / Nathusius' pipistrelle	82	<0.1
Common pipistrelle	2751	0.8
Common / Soprano pipistrelle	49	<0.1
Soprano pipistrelle	360	0.1
Myotis species	97	<0.1
Myotis / Long-eared bat sp.	3	<0.1
Long eared bat sp.	20	<0.1
Leisler's bat	9747	3.0
Total	**13109**	**4.0**

Summary of Activity

The highest activity rate was recorded for Leisler's bat, at an average of 3 P/h with 74% of all the recorded passes identified as Leisler's bats. The next most commonly recorded species were common pipistrelle (0.8 P/h) and soprano pipistrelle (0.1 P/h). *Myotis* species and long-eared bat sp. were both recorded at low encounter rates of <0.1 P/h (97 and 20 bat passes respectively). There were 82 passes which fell within the call parameters for both common and Nathusius' pipistrelle[11] and 49 passes which fell within the call parameters for soprano and common pipistrelle.

The data presented in Table 6-12 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2016.

show that much higher levels of relative bat activity were recorded in April, May and June (7.5, 6.4 and 6.2 P/h) than in July and August (0.7 and 0.4 P/h). Monthly changes in activity for individual species are discussed below.

[11] *There was no clear evidence from any of the data that Nathusius' pipistrelle was present during the period sampled. Overlapping call parameters are typical of any wind farm sampling work, but on sites where Nathusius' pipistrelle would be expected to occur (based on what is known about distribution and relative abundance) we record calls that are outside the call parameters of common pipistrelle, as well as overlapping calls, that can be more confidently attributed to the species.*

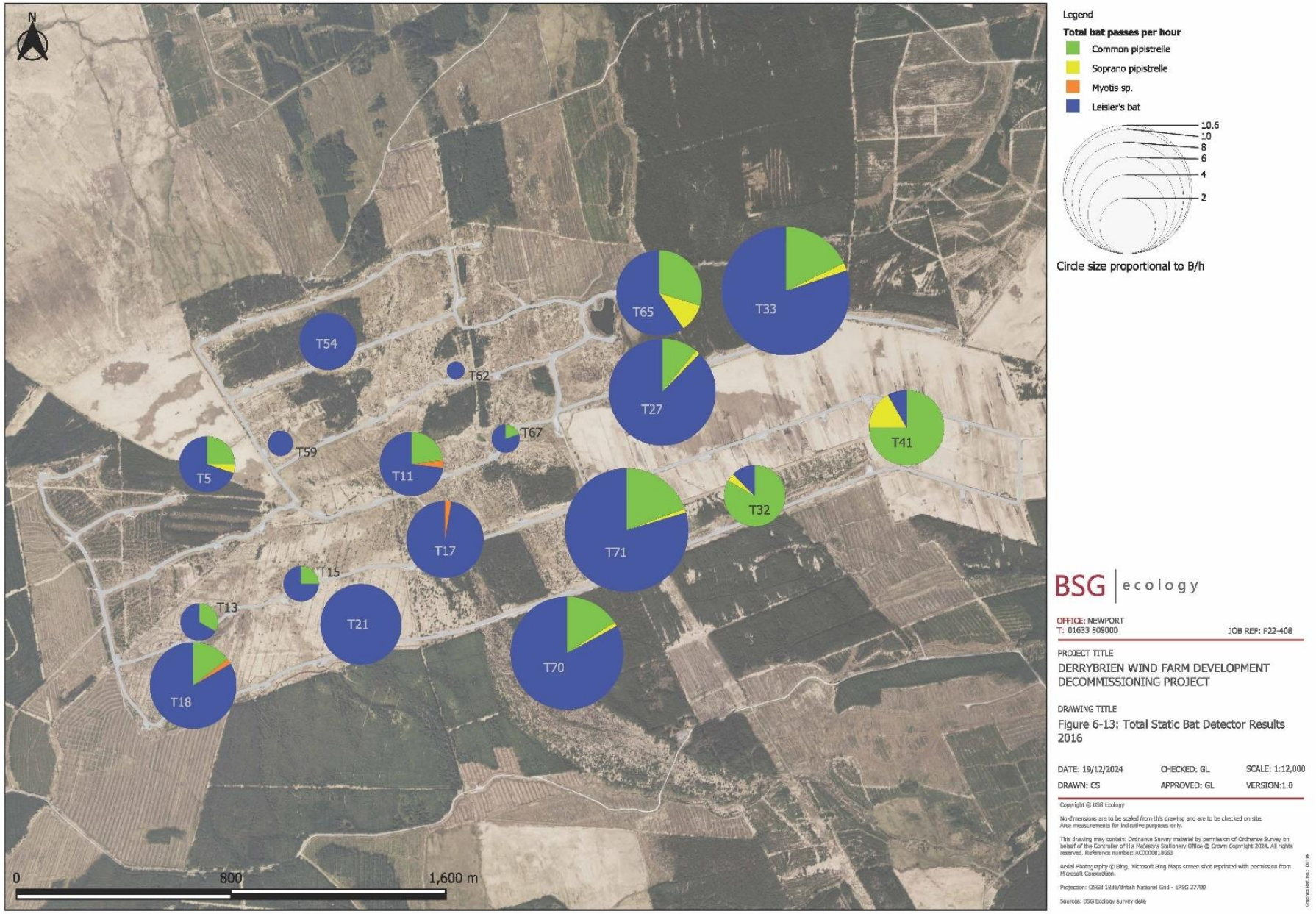


Figure 6-13 Total Static Bat Detector Results 2016

Table 6-12 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2016.

	April		May		June		July		August	
Species	**P**	**P/h**	**P**	**P/h**	**P**	**P/h**	**P**	**P/h**	**P**	**P/h**
Common / Nathusius' pipistrelle	21	<0.1	28	0.1	33	0.1	0	0	0	0
Common pipistrelle	320	0.4	74	0.1	2110	4.5	214	0.4	33	0.1
Common / Soprano pipistrelle	1	<0.1	3	<0.1	45	0.1	0	0	0	0
Soprano pipistrelle	25	<0.1	5	<0.1	277	0.6	26	<0.1	27	<0.1
Myotis species	21	<0.1	9	<0.1	28	0.1	25	<0.1	14	<0.1
Myotis / Long-eared bat sp.	0	0	0	0	3	<0.1	0	0	0	0
Long eared bat sp.	4	<0.1	3	<0.1	12	<0.1	0	0	1	<0.1
Leisler's bat	5652	7.0	3388	6.2	418	0.9	151	0.3	138	0.2
Total	6044	7.5	3510	6.4	2926	6.2	416	0.7	213	0.4

The data presented in Table 6-13 Activity (P/h) of bat species at each detector location 2016.

show the activity of each species at the different turbine locations sampled in 2016. This information is also illustrated as scaled pie charts in Figure 6-13. The number of bat passes recorded for each location can be found in Table 2 Appendix 6-2.

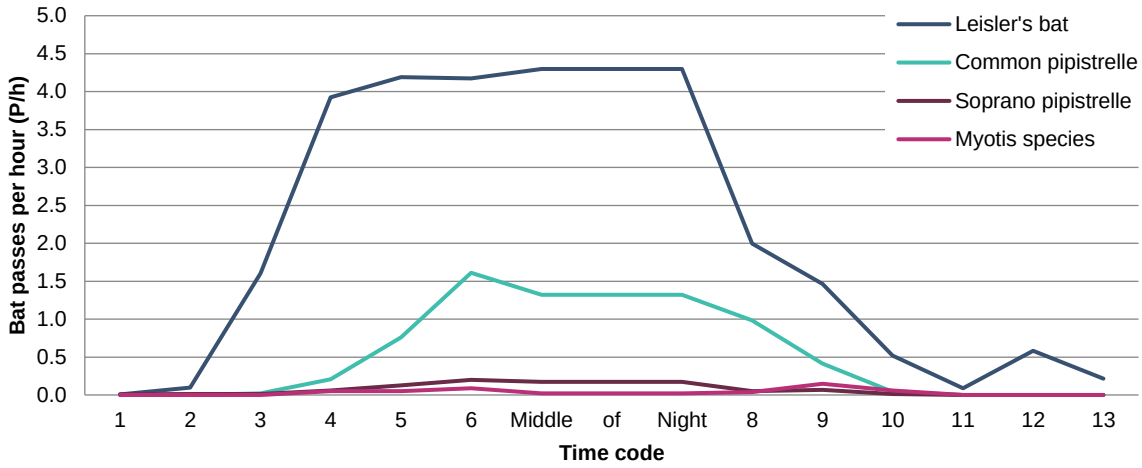
Table 6-13 Activity (P/h) of bat species at each detector location 2016.

Species	Common / Nathusius' pipistrelle	Common pipistrelle	Common / Soprano pipistrelle	Soprano pipistrelle	Myotis species	Myotis / Brown long-eared bat	Brown long-eared bat	Leisler's bat	Total
T5	0	0.5	0	0.1	0	0	0	1.4	**2**
T11	0	0.6	0	0	0.1	0	0	1.9	**2.6**
T13	0	0.3	0	0	0	0	0	0.6	**1**
T15	0	0.2	0	0	0	0	0	0.6	**0.9**
T17	0	0	0	0	0.1	0	0	3.7	**3.8**
T18	0	0.7	0	0	0.1	0	0	4	**4.8**
T21	0	0	0	0	0	0	0	4.2	**4.2**
T27	0.1	0.8	0	0.1	0	0	0	6.4	**7.4**
T32	0	2	0	0.1	0	0	0	0.3	**2.6**
T33	0	1.9	0	0.2	0	0	0	8.5	**10.6**
T41	0	2.7	0.2	0.6	0	0	0	0.3	**3.8**
T54	0	0	0	0	0	0	0	2.1	**2.2**
T59	0	0	0	0	0	0	0	0.4	**0.4**
T62	0	0	0	0	0	0	0	0.2	**0.2**
T65	0	1.4	0	0.5	0	0	0	2.8	**4.7**
T67	0	0.1	0	0	0	0	0	0.4	**0.5**
T70	0.1	1.3	0	0.1	0	0	0	6.8	**8.4**
T71	0.1	1.9	0	0.1	0	0	0	7.8	**10**

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 densest areas of coniferous forestry (see Figure 6-13). T5, T11, T17, T18, T21, T32, T41, T54, and T65 had activity between 2 and 5 P/h, most of these locations are bordered on at least one side by plantation woodland with the exception of T17 (although there is a block of plantation to the east) and T11 which is in an open area. T13, T16, T62 and T67 have activity of <1 P/h, all of these are in more open areas, where adjacent plantation (if present) is in narrow strips. Differences in activity for individual bat species at each detector location are discussed below.

Graph 6-1 shows the average activity of bats throughout the night (based on all recorded data). The highest levels of activity were recorded between 41 minutes after sunset and 101 minutes before sunrise. Differences in activity for individual bat species throughout the night are discussed below.

Graph 6-1: Activity (P/h) of bat species throughout the night.



Leisler's bat

Leisler's bats were recorded during every month of survey. There was a peak in activity in April and May (7.0 and 6.2 P/h respectively), and a marked decrease in activity in June, July and August (0.9, 0.3 And 0.2 P/h).

The highest levels of activity were recorded in locations T33, T71, T70 and T27. Lower levels of activity (between 4.2 and 1.9 P/h) were recorded at T21, T18, T17, T65, T54 and T11. The lowest levels of relative activity (<1.4 P/h) were recorded at T5, T13, T15, T32, T41, T59, T62 and T67.

In April the highest levels of activity were recorded at T21 and T71 (both 21.6 P/h) followed by T70, T17 and T18 (17.4, 14.1 and 12.5 P/h respectively). All other locations had activity below 7 P/h. In May, the highest levels of activity were recorded at T33 (40.8 P/h) followed by T21, T70, T65 and T27 (17.9, 10.3, 6.9 and 5.4 P/h respectively) with 3.1 P/h or less recorded at all other locations. In June the highest level of activity was recorded at T65 (5.6 P/h) with 1 P/h or less recorded at all other locations for July and August all locations recorded 1.1 P/h or less.

The highest activity was recorded from 61 minutes after sunset (4.2 P/h), with a peak 101-120 mins after sunset (6.1 P/h), continued through the night (5.9 P/h) until 101 minutes before sunrise when activity reduced. Low activity was recorded within the 20 minutes after sunset and before sunrise (<0.1 and 0.2 P/h respectively). 33 Leisler's bat passes were recorded before sunset (7 bat passes) or after sunrise (26 bat passes). Early / late bat passes were recorded at T27, T67 T18 and T41 over nine separate nights.

Common pipistrelle

Common pipistrelles were recorded during every month of survey. There was a peak in activity in June (4.5 P/h), and lower levels of activity in April, May, July and August (0.4, 0.1, 0.1 and 0.4 P/h respectively).

The highest level of activity was recorded at T41 (2.7 P/h) followed by T32, T33, T71 and T65 (2, 1.9, 1.9 and 1.4 P/h respectively). Relatively activity at all other detector locations was less than 1 bat pass per hour.

In June the highest levels of activity were recorded at T41 and T32 (14.9 and 11.3 P/h) followed by T65, T33 and T27 (6.1, 5.9 and 4.3 P/h respectively). All other locations had activity below 3.7 P/h.

The highest activity was recorded from 101-120 minutes after sunset (1.6 P/h), continued through the night (1.3 P/h) until 101 minutes before sunrise when activity reduced. Low activity was recorded within the 40 minutes after sunset and before sunrise (<0.1 P/h).

Soprano pipistrelle

Soprano pipistrelles were recorded during every month of survey and at all detector locations, apart from those located at T59 and T67. There was a peak in activity in June (0.6 P/h), and low activity in April, May, July and August (all <0.1 P/h).

The highest level of activity was recorded at T41 (0.6 P/h) followed by T65 and T33 (0.5 and 0.2 P/h respectively). Relatively activity at all other detector locations was 0.1 bat passes per hour or less.

In June the highest levels of activity were recorded at T41 and T65 (2.9 and 1.8 P/h) followed by T32 and T33 (Both 0.6 P/h). All other locations had activity below 0.5 P/h.

The highest activity was recorded from 101-120 mins after sunset (0.2 P/h), continued through the night at the same level until 101 minutes before sunrise when activity reduced. Low activity was recorded within the 40 minutes after sunset and before sunrise (<0.1 P/h).

Myotis sp.

Myotis sp. bats were recorded during every month of survey and at all detector locations, apart from T62. The highest activity was recorded in June (0.1 P/h). All other months had activity of <0.1 P/h. The highest levels of activity were recorded at T11, T17 and T18 (0.1 P/h). Relatively activity at all other detector locations was less than 0.1 bat pass per hour. *Myotis* sp. bats were recorded between 40 and 101 minutes after sunset and 100-61 minutes before sunrise (all 0.1 P/h) at all other times activity was <0.1 P/h.

Brown long-eared bat

Brown long-eared bat was recorded during every month of survey except June. Low numbers of passes were recorded at nine detector locations (T5, T11, T13, T15, T18, T27, T32, T41 and T70). The highest activity was recorded in June (0.1 P/h). All other months had activity of <0.1 P/h. The highest levels of activity were recorded at T11, T17 and T18 (0.1 P/h). Relatively activity at all other detector locations was less than 0.1 bat pass per hour.

Carcass searches and scavenger removal trials

During the carcass searches one dead bat was found by the search team. This bat (a soprano pipistrelle) was found at T11 in tall *Molinia caerulea* tussocks. Although searcher efficiency trials were

not carried out, trials from other sites using the same dog team in similar habitats (in Wales and Scotland) suggests an efficiency level of 80% or higher is likely.

The carcass searching involved visiting six of the turbines twice (in effect 12 turbine searches). These were the turbines that (based on data analysed at that point) showed the highest levels of bat activity.

After 7 days all of the mouse corpses had been removed from view of the cameras. Table 6-14 Number of days the mouse corpses were present in photographs. shows the results from the removal trials. At T21 the mouse had been buried by sexton beetles *Nicrophorus* sp. and only the tail remained visible. At other locations the cameras recorded varying removal rates, with the fastest being 1 day at T71 and the slowest being 7 days. At T18 the camera was knocked out of alignment and it was not possible to determine when the mouse was removed, however it was not there when the cameras were collected (7 days). An average of 5 days removal rate was recorded for the site (discounting T18).

Table 6-14 Number of days the mouse corpses were present in photographs.

Location	T11	T17	T18	T21	T27	T71
Number of days before removal	7 days	6 days	N/A	7 days	4 days	1 days

6.3.7.3.4 Bat survey results 2019

Static bat detector survey

Static bat detectors recorded bat calls for a combined total of 311 nights, equating to 3519 hours of survey time during Autumn 2019. Detector locations are illustrated in Figure 6-5. On two occasions the battery life of the detectors was reduced by high frequency noise, recording 7 nights of data at T15 and 4 nights at T58. This has been accounted for in analysis. Table 6-15 gives details of the number of passes and activity recorded during automated detector surveys.

A total of 16264 passes from at least six species of bat were recorded. Figure 6-14 illustrates the proportion of activity (bat passes per hour) recorded for different species at each automated survey location. Data for which there were less than 0.1 bat passes per hour (P/h) (e.g. brown long-eared bat) have not been illustrated.

Table 6-15 Total number of bat passes (P) and activity (P/h) for each bat species recorded during automated surveys in 2019.

Species	P	P/h
Nathusius' pipistrelle	7	<0.1
Common / Nathusius' pipistrelle	189	0.1
Common pipistrelle	8397	2.4
Common / Soprano pipistrelle	1473	0.4
Soprano pipistrelle	2971	0.8
Myotis species	590	0.2
Myotis / brown long-eared bat	144	<0.1
Brown long-eared bat	156	<0.1
Leisler's bat	2039	0.6
Unidentified bat species	298	0.1
Total	**16264**	**4.6**

Summary of Activity

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 long-eared bat sp.

were both recorded at low frequencies 0.2 P/h and <0.1 P/h respectively. Seven Nathusius' pipistrelle passes were recorded. There were 189 passes which fell within the call parameters for both common and Nathusius' pipistrelle and 1473 passes which fell within the call parameters for soprano and common pipistrelle.

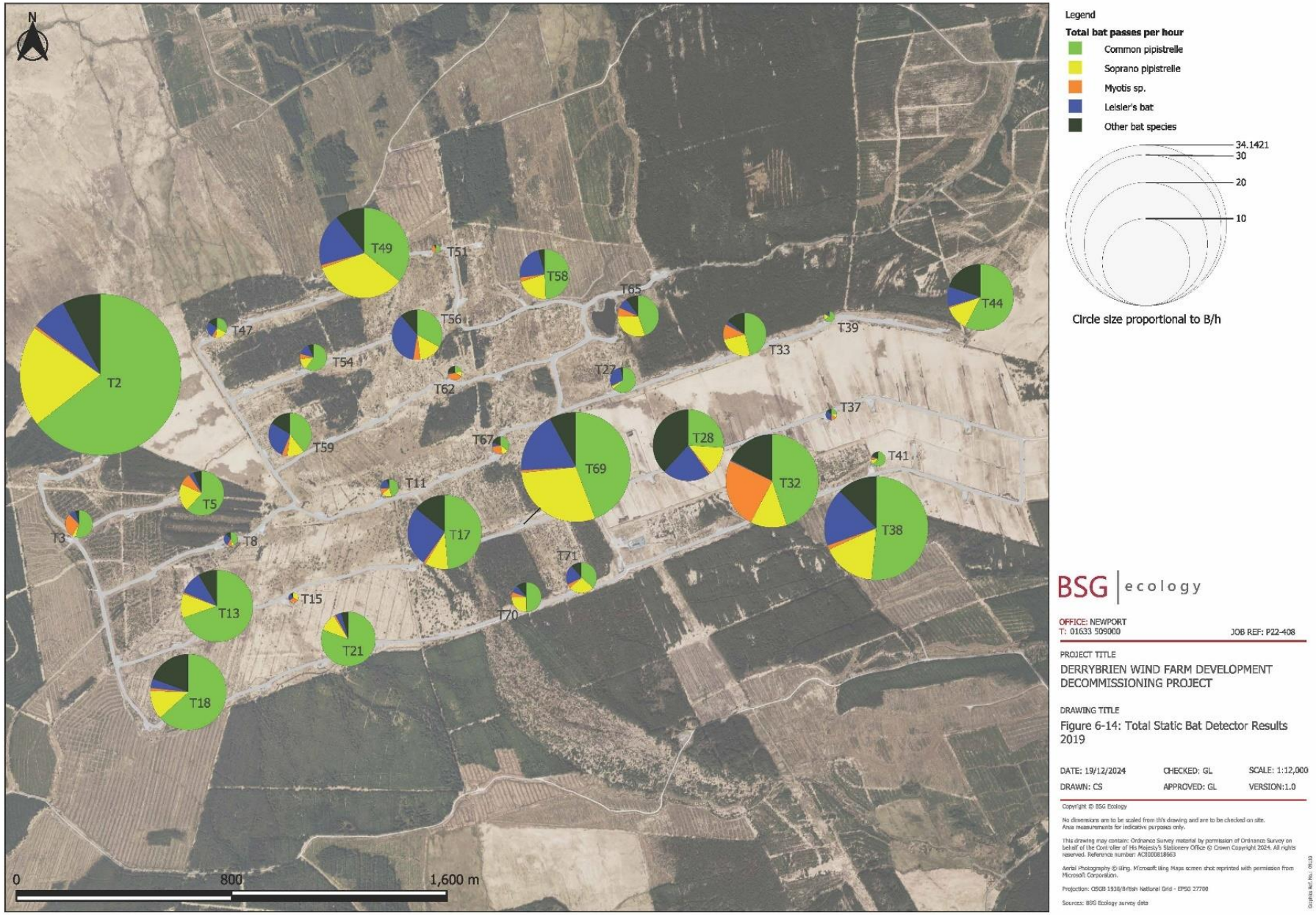


Figure 6-14 Total Static Bat Detector Results 2019

The data presented in Table 6-16 show the activity of each species at the turbine locations sampled in 2019. This information is also illustrated as scaled pie charts in Figure 6-14. The number of bat passes recorded for each location can be found in Table 4 Appendix 6-2.

Table 6-16 Activity (P/h) of bat species at each detector location 2019.

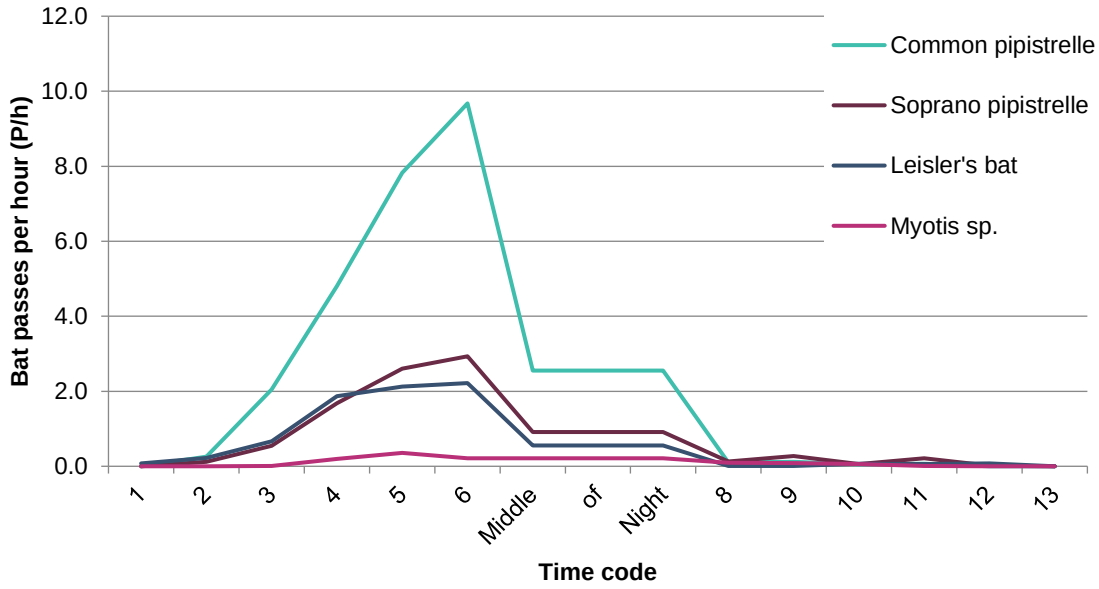
Turbine Location	Nathusius' pipistrelle	Common / Nathusius' pipistrelle	Common pipistrelle	Common / Soprano pipistrelle	Soprano pipistrelle	Myotis sp.	Myotis / Long-eared bat sp.	Long eared bat sp.	Leisler's bat	Unidentified bat species	Total bat P/h
T11	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	**0.4**
T13	0.0	0.1	4.7	0.4	0.7	0.0	0.0	0.0	0.7	0.0	**6.8**
T15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
T17	0.0	0.2	3.5	0.6	0.7	0.1	0.1	0.1	1.9	0.0	**7.2**
T18	0.0	0.2	4.6	1.1	0.9	0.1	0.0	0.0	0.3	0.3	**7.6**
T2	0.0	0.2	21.9	2.3	6.9	0.2	0.0	0.2	2.4	0.1	**34.1**
T21	0.0	0.1	3.1	0.1	0.4	0.0	0.0	0.0	0.1	0.0	**3.9**
T27	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.0	**0.9**
T28	0.1	0.0	1.7	2.3	0.9	0.1	0.1	0.1	1.4	0.0	**6.6**
T3	0.0	0.0	0.5	0.0	0.0	0.3	0.0	0.0	0.1	0.0	**1.0**
T32	0.0	0.0	5.1	1.7	1.4	2.8	0.2	0.0	0.0	0.1	**11.4**
T33	0.0	0.0	1.1	0.1	0.6	0.3	0.1	0.1	0.1	0.0	**2.4**
T37	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.2**
T38	0.0	0.2	7.2	1.4	2.3	0.2	0.1	0.1	2.5	0.1	**14.1**
T39	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
T41	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
T44	0.0	0.1	3.3	0.6	0.7	0.0	0.3	0.0	0.6	0.0	**5.8**
T47	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	**0.5**
T49	0.0	0.1	3.8	0.8	3.6	0.1	0.1	0.1	2.0	0.0	**10.7**

Turbine Location	Nathusius' pipistrelle	Common / Nathusius' pipistrelle	Common pipistrelle	Common / Soprano pipistrelle	Soprano pipistrelle	Myotis sp.	Myotis / Long-eared bat sp.	Long eared bat sp.	Leisler's bat	Unidentified bat species	Total bat P/h
T5	0.0	0.0	1.6	0.1	0.5	0.2	0.0	0.0	0.1	0.0	**2.6**
T51	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
T54	0.0	0.0	0.6	0.0	0.1	0.1	0.0	0.0	0.1	0.0	**0.9**
T56	0.0	0.0	1.1	0.2	0.5	0.2	0.0	0.1	1.2	0.0	**3.3**
T58	0.0	0.0	1.6	0.0	0.7	0.1	0.0	0.0	0.7	0.0	**3.3**
T59	0.0	0.0	1.0	0.2	0.3	0.1	0.0	0.1	0.7	0.0	**2.4**
T62	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**0.3**
T65	0.0	0.0	0.9	0.1	0.6	0.1	0.0	0.1	0.2	0.2	**2.2**
T67	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**0.4**
T69	0.0	0.2	6.4	0.8	4.2	0.1	0.1	0.1	2.6	1.2	**15.8**
T70	0.0	0.0	0.6	0.1	0.3	0.1	0.0	0.0	0.1	0.0	**1.2**
T71	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.2	0.3	**1.2**
T8	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.3**
Total bat P/h	**0.0**	**0.1**	**2.4**	**0.4**	**0.8**	**0.2**	**0.0**	**0.0**	**0.6**	**0.1**	**4.6**

The highest levels of overall bat activity (34.1 P/h) were recorded at T2, followed by T69, T38, T32 and T49 (all of which recorded between 10.7 and 15.8 P/h). All of these detectors were located near to the areas of plantation woodland. T37, T39, T15 and T51 had activity of <0.2 P/h; two of these locations are in open areas, the other two are at turbines which have coniferous forestry immediately to the north. Differences in activity for individual bat species at each detector location are discussed below.

Graph 6.2 shows the activity of bats throughout the night for species with activity levels above 0.1 P/h. The highest levels of activity for all species were recorded between 81 minutes after sunset and 100 minutes before sunrise, with the exception of brown long eared bat and Nathusius' pipistrelle which were most frequently recorded in the middle of the night (i.e. not in the hours immediately post-dusk or pre-dawn). Differences in activity for individual bat species throughout the night are discussed below.

Graph 7.2: Activity (P/h) of bat species throughout the night.



Leisler's bat

The highest levels of activity (2.0 – 2.6 P/h) were recorded in locations T69, T38, T2 and T49. The lowest levels of relative activity (<0.1 P/h) were recorded at T32, T67, T15, T39, T62, and T41. No Leisler's bats were recorded at T51.

The highest activity was recorded from 61 minutes after sunset (1.9 P/h), with a peak 101-120 minutes after sunset (2.2 P/h). Low activity was recorded within the 20 minutes after sunset and before sunrise (0.1 and <0.1 P/h respectively). One Leisler's bat pass was recorded two minutes after sunrise. Early / late bat passes (within 20 minutes of sunset) were recorded at T28, T69, T17, T18, T2, T5 and T41 over five separate nights.

Nathusius' pipistrelle

Seven confirmed Nathusius' pipistrelle passes were recorded during the surveys. One pass was recorded at T33 in the middle of the night on 07 September 2019 and six passes were recorded at T28 in the middle of the night on 11 September 2019. The six passes all occurred within a two minute period.

Common pipistrelle

The highest level of activity was recorded at T2 (21.9 P/h) followed by T38, T69, T32, T13 and T18 (7.2, 6.4, 5.1, 4.7 and 4.6 P/h respectively). Activity at a further ten locations was between 1 and 3 P/h, the remaining sixteen recorded <1 P/h.

The highest activity was recorded from 61 minutes after sunset (4.8 P/h), with a peak 101-120 minutes after sunset (9.7 P/h). Activity dropped to 2.6 P/h over the night period and there was no peak in activity prior to sunrise. No passes were recorded within 20 minutes of sunset or sunrise.

Soprano pipistrelle

The highest level of activity was recorded at T2 (6.9 P/h) followed by T69, T49, T38 and T32 (4.2, 3.6, 2.3 and 1.4 P/h respectively). Activity at all other locations was between <1 P/h.

The highest activity was recorded from 61 minutes after sunset (1.7 P/h), with a peak 101-120 mins after sunset (2.9 P/h). Activity dropped to 0.9 P/h over the night period and there was low activity prior to sunrise with two small increases 100-81 mins before sunrise (0.3 P/h) and 60-41 minutes before sunrise (0.2 P/h). No passes were recorded within 20 minutes of sunset or sunrise.

Myotis sp.

Myotis sp. bats were recorded at all turbine locations, apart from T39. The highest levels of activity was recorded at T32 (2.8 P/h); activity at all other locations was <0.4 P/h.

A small peak in activity was recorded between 81 and 100 minutes after sunset (0.4 P/h), activity through the night was low (0.2 P/h) and there was no peak in activity prior to sunrise. No passes were recorded within 20 minutes of sunset or sunrise.

Brown long-eared bat

Brown long-eared bat was recorded at 21 turbine locations (of 32 locations sampled). The highest activity was recorded at T44 (0.3 P/h) and T32 (0.2 P/h). Activity was 0.1 P/h or under at all other locations brown long-eared bat was recorded.

Brown long-eared bat was recorded from 65 minutes after sunset to 82 minutes before sunrise, with most passes recorded during the middle of the night (0.1 P/h).

6.3.7.3.5 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).

Two common pipistrelle and one Leisler's bat corpses were found during fatality searches in summer 2020. No bat fatalities were recorded during the autumn[12].

[12] *Turbines were curtailed during the survey period.*

6.3.7.3.6 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, long eared bat species species[13] 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).

No bat fatalities were recorded[14].

6.3.7.4 Ceased Operation Phase Impacts (2022-Present)

6.3.7.4.1 Desk study

Updated data from BCI was obtained for a 10 km[15] 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 bat roost approximately 7.1 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 10 km 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 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.

6.3.7.4.2 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

[13] *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.*
[14] *Turbines were curtailed during the survey period.*
[15] *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).*

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 and barrages

Three bridges and two barrages were inspected for their potential for roosting bats. Results are outlined below:

- Bridge A (northmost bridge on Black Road), Bridge B (middle bridge on L4214) and Bridge C (southern bridge on L4214) 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).
- The area around Barrage 3 has vegetation including young trees up to the barrage. This vegetation does not offer opportunities for roosting bats, but is suitable foraging / commuting habitat. The barrage has some limited potential for roosting bats (in small voids between the large boulders from which it is constructed). These are likely to become very wet during rain, and the voids are also close to ground level, further reducing their suitability. They could not be thoroughly inspected, hence the slightly precautionary conclusion that the barrage has low potential for roosting bats.
- The area around Barrage 4 also has vegetation including young trees up to the barrage. This vegetation does not offer opportunities for roosting bats but is suitable foraging / commuting habitat. Only one side of the barrage could be accessed as it was very overgrown (by willow / bramble scrub). It appears to be of a similar construction to Barrage 3 so may offer bat roost potential in areas that were not accessed. The barrage was assessed as having low potential for roosting bats.

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.

Re-entry survey Barrage 3

A re-entry survey was completed on 27 September 2022. No bats were recorded entering the barrage.

6.3.7.5 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).

SNH *et al.*, 2019 provide a table (Table 6-17 Bat species which are potentially most vulnerable to collision base on physical and behavioural characteristics. Taken from SNH et al., 2019.

) categorising which bat species are potentially most vulnerable to collision based on physical and behavioural characteristics combined with evidence of casualty rates in Europe.

Table 6-17 Bat species which are potentially most vulnerable to collision base on physical and behavioural characteristics. Taken from SNH et al., 2019.
Note Serotine Eptisicus serotinus, noctule Nyctalus noctula and barbastelle Barbastellus barbastellus are not considered to be resident or regularly occurring species in Ireland.

	Risk of turbine impact		
Factor	Low Risk	Medium Risk	High Risk
Habitat preference	Bats preferring cluttered habitat	Bats able to exploit background cluttered space	Bats preferring to use open habitat
Echolocation characteristics	• Short range • High frequency • Low intensity • Detection distance ~15m	Intermediate – more plastic in their echolocation[14]	• Long range • Low frequency • High intensity • Detection distance ~80m[15]
Wing shape	• Low wing loading • Low aspect ratio • Broadest wings	Intermediate	• High wing loading • High aspect ratio • Narrow wings
Flight speed	Slow	Intermediate	Fast
Flight behaviour and use of landscape	• Manoeuvre well • will travel in cluttered habitat • Keeps close to vegetation • Gaps may be avoided	Some flexibility	• Less able to manoeuvre • May avoid cluttered habitat • Can get away from unsuitable habitat quickly • Commute across open landscape
Hunting techniques	• Hunt close to vegetation • Exploit richer food sources in cluttered habitat • Gleaners	• Hunt in edge and gap habitat • Aerial hawkers	• Less able to exploit insect abundance in cluttered habitat • Aerial hawker • Feed in open
Migration	Local or regional movements.	Regional migrant in some parts of range	Long-range migrant in some parts of range
Conclusion	*Myotis* spp. Long eared-bats Horseshoe bats	Serotine Barbastelle	Common pipistrelle[16] Soprano pipistrelle Noctule Leisler's bat Nathusius' pipistrelle

Bat activity at the site was not recorded in a detailed and structured manner until 2016. Therefore, for the baseline, assumptions on bat activity for impacts that have occurred are made based on the species present in desk study data for the wider area, relative bat species abundance in Ireland (Marnell *et al.,* 2009) and a professional judgement-based assessment of the value of the habitat for bats.

For impacts that are occurring during operation, all available data on bat activity has been used to assess impacts. As the assessment is split in this way, data on bat activity is therefore presented in the operational phase impacts Section 6.4.3.3 rather than in the species evaluations below.

6.3.7.5.1 *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 in the project area 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 project area 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 farm houses 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 the project area is considered to be of site value to common pipistrelle.

Substations are considered to be of local value to common pipistrelle.

The masonry bridges that were damaged during the peat slide may have had potential for roosting common pipistrelle, and are considered to be of site value to common pipistrelle.

Common pipistrelles are considered to be at high risk of turbine collision.

6.3.7.5.2 *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 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 elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst soprano pipistrelle is known to use exposed upland sites, there is considerable similar habitat at lower, less expose altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

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 the project area are considered to be of site value to soprano pipistrelle.

Substations are considered to be of local value to soprano pipistrelle.

The masonry bridges that were damaged during the peat slide may have had potential for roosting soprano pipistrelle, and are of site value to soprano pipistrelle.

Soprano pipistrelles are considered to be at high risk of turbine collision

6.3.7.5.3 *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 commercial plantation and open habitats in the project area 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 elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst Nathusius' pipistrelle is known to use exposed upland sites, there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

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 the project area 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 the masonry bridges that were damaged during the peat slide may have had potential for roosting Nathusius' pipistrelle, and are of site value to Nathusius' pipistrelle.

Nathusius' pipistrelles are considered to be at high risk of turbine collision.

6.3.7.5.4 *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 2009 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).

The commercial plantation and open habitats in the project area 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 elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst Leisler's bat is known to use exposed upland sites, there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

Whilst the data show that Leisler's bat uses the project area (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 the project area 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.

Leisler's bats are considered to be at high risk of turbine collision.

6.3.7.5.5 *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.*, 2012; BCI, 2019[a]). 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).

The commercial plantation and open habitats in the project area 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 elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst brown long-eared bat is known to use exposed upland sites, there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

Data collected shows that there is some use of the project area 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 the project area 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 that were damaged during the peat slide may have had potential for roosting brown long-eared bats, and are of site value to brown long-eared bat.

Brown long-eared bats are considered to be at low risk of turbine collision.

6.3.7.5.6 *Natterer's bat*

Natterer's bats are widely distributed throughout Ireland (McAney, 2006; Schofield & Mitchell-Jones, 2011). The population in Ireland 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 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).

The commercial plantation and open habitats in the project area 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 elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Natterer's bat is more likely to have used the coniferous plantation that was available prior to site development than other bats, although there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

Data collected shows that there is some use of the project area 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 the project area 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 that were damaged during the peat slide may have had potential for roosting Natterer's bats, and are of site value to Natterer's bat.

Natterer's bats are considered to be at low risk of turbine collision.

6.3.7.5.7 *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).

The commercial plantation and open habitats in the project area 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 elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst Daubenton's bat may use exposed upland sites, there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

Data collected shows that there is some use of the project area 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 the project area 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 that were damaged during the peat slide may have had potential for roosting Daubenton's bats, and are of site value to Daubenton's bat.

Daubenton's bats are considered to be at low risk of turbine collision.

6.3.7.5.8 *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).

The commercial plantation and open habitats in the project area are widely available within the Slieve Aughty Mountains (local area). The condition and ratios of these habitats is variable locally. The elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst whiskered bat may use exposed upland sites, there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes

Data collected shows that there is some use of the project area 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 the project area are considered to be of negligible value to whiskered bat.

Substations are considered to be of negligible value to whiskered bat.

The masonry bridges that were damaged during the peat slide may have had potential for roosting whiskered bats, and are of site value to whiskered bat.

Whiskered bats are considered to be at low risk of turbine collision.

6.3.7.5.9 *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 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 'least concern' 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 the project area 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 project area to forage, and there is no evidence from any of the previous data sets that the species uses the project area.

The commercial plantation and open habitats at the site are widely available within the Slieve Aughty Mountains (local area). The condition and ratios of these habitats is variable locally. The elevation of the wind farm means it is more exposed than other areas in the Slieve Aughty Mountains. Whilst lesser horseshoe bats may use exposed upland sites, there is considerable similar habitat at lower, less exposed altitudes. Lower levels of activity are generally expected at these higher more exposed altitudes.

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 the project area 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.

Lesser horseshoe bats are considered to be at low risk of turbine collision.

6.3.8 Mammals (other than Bats)

6.3.8.1 European Otter

The otter (*Lutra lutra*) is fully protected in Ireland under the Irish Wildlife Act 1976 (as amended). It is also listed on the Irish Red Data book as 'Internationally Important'. The 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 Special Areas of

Conservation. The 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.

There was no data relating to otter in the original EISs prepared for the project.

During the survey of the Owendalulleegh River undertaken by the SRFB and Inis Environmental Services (2004b) in December 2003, following the peat slide which occurred in October 2003, otter signs were recorded at a number of locations along the Owendalulleegh River. The survey commenced at Flaggy Bridge and continued along the length of the river to Lough Cutra. Otter tracks were recorded on the tributary below Flaggy Bridge (within sub-catchment SC7(d) as shown on Figure 7.3 Chapter 7). Within the SC7(d) tributary, signs were noted within a 600 m stretch upstream of the confluence with the main channel of the Owendalulleegh River. Downstream of the confluence otter tracks were noted at several locations over the next 6.6 km along the main channel of the river.

No signs of otter were recorded during the survey of the wind farm site undertaken on 20th July 2018. In August 2018 four sprainting sites were noted on the Flaggy Bridge tributary, the most upstream 300 m downstream of Flaggy Bridge and the most downstream 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 at the wind farm site. While the latter observations were mainly incidental, it is clear that otter use all of the main channels of the 3 main catchments and likely also use substantial proportions of all of the side tributaries for feeding and marking.

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.

Otter likely use the main river channels of the three river catchments within the Zone of Influence of the project (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[16].

6.3.8.2 Other mammals

Pre-construction the 344.5 ha wind farm site had 265 ha of conifer plantation of which 222 ha was felled to facilitate construction of the wind farm. The eastern section of the site comprised cutover bog habitat used for turbary. These habitats would have had the potential to support a number of mammal species.

[16] *Galway Bay Complex SAC (000268) is the nearest SAC designated for otter, which is hydrologically connected to the project. This SAC is located approximately 45 km downstream of the project, 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 project not likely to be connected to the SAC population given the significant instream distance between the project and nearest hydrologically connected SAC, Galway Bay Complex SAC.*

The original EISs prepared for the project refer to evidence of Sika deer (*Cervus nippon*) being recorded during a site visit. Other species referenced as possible visitors to the site in the report include fox (*Vulpes vulpes*), mountain hare (*Lepus timidus hibernicus*), badger (*Meles meles*) and stoat (*Mustela erminea*) (source: local NPWS Conservation Ranger). The reports also make reference to the fact that the extent of coniferous forestry would serve to restrict the numbers and variety of mammals present.

According to the NBDC database, there are records of the following protected mammal species (in addition to the mammal records described above in Sections 6.3.7) within the 10 km squares M50, M60 and R69 occupied by the project: 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[17] and August 2022[18]. 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).

6.3.9 Other Fauna

Common frog (*Rana temporaria*), smooth newt (*Triturus vulgaris*) and the common lizard (*Lacerta vivipara*) are all protected species under the Wildlife Act 1976 (as amended). 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 project. They are likely to occur 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.

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 the majority of the pre-existing channels were left unchanged except where there was a conflict with new infrastructure. The impact on amphibians using drainage channels is considered likely to have been minor and short term. The removal of 222 ha of conifer plantation would have been a positive impact and made the site more favourable for common lizard which basks in sunlight to raise its body temperature. The loss of approximate 0.7 ha cutover bog habitat in the footprint of the project is considered a minor permanent impact of no significance. The construction phase of the project is not likely to have had a significant effect on amphibians or lizards.

[17] *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.*
[18] *The recent record from 15th August 2022 was observed at T51.*

The drainage improvements that were carried out during the operation and maintenance period generally involved minor excavation of peat along existing drains and was undertaken gradually over a 6 year period. These works would likely have had a minor negative impact on amphibians. Since the cessation of the project there has been no active maintenance that could give rise to negative effects. The long term retention of in-ground infrastructure (turbine and substation foundations, underground cable infrastructure), the road network, emergency works associated with peat slide, borrow pits and peat repository areas will not give rise to any negative impacts on amphibians or common lizard.

There is no potential for the project to have significant effects on amphibians and reptiles and therefore they are not considered further in this assessment.

6.4 Likely, Significant Impacts and Mitigation Measures Implemented

This section outlines the impacts of the project, which have occurred between 2003 to the present day during the construction (including the peat slide), operation and ceased operation phases of the project as well as potential impacts which are likely to occur as a result of the Retained Development (post-decommissioning phase). Details of the construction, operation and ceased operation phases of the project as well as the Retained Development can be found in Chapter 4: Project Description.

Potential impacts on designated nature conservation sites during all phases of the project as well as the Retained Development are presented below in section 6.4.1.1, while potential impacts for all other ecological receptors are presented for each respective phase of the project (sections 6.4.2 to 6.4.5) as well as the Retained Development (section 6.5.6).

6.4.1.1 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.

6.4.1.2 Designated Nature Conservation Sites

European sites

As part of the rNIS, the AA Screening process considered the potential impacts and significance of effects on 30 European Sites identified within the potential ZoI of the project (see Table 6-1). Based on the findings of the screening assessment, it was determined that the project has not had nor is likely to have, either alone or in-combination with other plans and projects, significant effects on 28 out of 30 European site(s) assessed. Two sites were identified as having the potential to have been or to be significantly affected as a result of the project, Lough Cutra SPA and Slieve Aughty Mountains SPA.

The assessment identified the potential for significant effects to have occurred on Lough Cutra SPA, as a result of the peat slide which occurred during the construction phase of the project. The potential for significant effects to occur during the operation of the project were also identified. There was or is no potential for impacts to arise on Lough Cutra SPA as a result of ceased operation phase and/or the Retained Development.

As the project is entirely within the Slieve Aughty Mountains SPA, the assessment also identified the potential for significant effects to have occurred on the habitats and associated birds within the Slieve

Aughty Mountains at the time of construction (including the peat slide) (prior to SPA designation) and the potential for significant effects to have occurred during the operation and the ceased operation phase.

The rNIS concluded that the project (including the Retained Development) has not adversely affected nor is likely to adversely affect the integrity of the Slieve Aughty Mountains SPA, Lough Cutra SPA or any other European site, either individually or in combination with other plans and projects.

Natural Heritage Areas and Proposed Natural Heritage Areas

Four NHAs and 18 pNHAs were identified within the 15 km of the project (refer to Table 7.2). In addition, there are two pNHAs hydrologically connected to the project that are located beyond 15 km the project: Caherglassaun Turlough pNHA and Galway Bay Complex pNHA. 15 of the pNHAs identified are also designated as European sites and potential impacts to these sites are assessed in the rNIS.

The four NHAs - Slieve Aughty Bog NHA (001229), Lough Atorick District Bogs NHA (002377), Derryoober Bogs NHA (002379) and Maghera Mountains Bogs NHA (002442) are all designated for peatland habitats. The Slieve Aughty Bog NHA comprises a number of discrete sites within close proximity to the project. A single angle mast on the OHL is within the boundary of this NHA and was constructed in conifer plantation on the boundary of the site. The Ennis - Shannonbridge 110kV OHL was installed in 1952 with some further structures installed in 1968. There are two wooden polesets within the Slieve Aughty Bog NHA to the west of Agannygal Substation. The site is designated for intact blanket bog and this habitat was not impacted by the project.

The remaining three sites are too far removed from the project to have been affected or to have the potential to be affected based on their feature of interest and as such have been scoped out from further assessment.

There is no potential for impacts to arise on any of these four NHAs as a result of the ceased operation phase and/or Retained Development.

Three of the remaining 6 pNHAs, Cloonamirran Wood pNHA (001686), Cahermurphy Wood pNHA (000022) and Lough Graney Woods pNHA (001714) are designated for woodland habitats; given the nature of the habitats and distance between these sites and the project it is considered that there is no potential for the project to have impacted these sites.

Pollduagh Cave, Gort pNHA (000320) is designated for Daubenton's bat. The commercial plantation and open habitats available in the project area are considered to be of negligible value to Daubenton's bat and this species was not recorded at Derrybrien Wind Farm during surveys undertaken in 2011, 2016 and 2019. The pNHA is also 14.2 km from the wind farm. The project has not had nor is likely to have an impact on the pNHA.

Lough O'Grady pNHA (001019) is 13 km south of the Agannygal Substation and designated for Greenland White-fronted Geese. This species of bird has never been recorded during field surveys for the project and given the distance from the project is not likely to occur in the project area.

Lough Derg pNHA (000011) is over 23 km from the project and of significant ecological interest, with five habitats listed on Annex I of the EU Habitats Directive. The Lough Derg (Shannon) SPA (004058) approximately covers the same extend as Lough Derg pNHA but is designated for birds. Given the distance from the project and the nature of the ecological features of interest in the site it is considered that there is no potential for impacts to have occurred or to occur to this site as a result of the project.

Based on the above consideration, none of the listed NHAs or pNHAs require further assessment for impacts.

6.4.2 Construction Phase Impacts (2003-2006)

6.4.2.1 Terrestrial Habitats

Pre-Mitigation Impact

Direct impacts

Two types of direct impacts associated with the construction of the wind farm project have been identified; i) habitat loss and ii) habitat alteration and disturbance. No potential sources of pollution to terrestrial habitats were identified. Potential pollution of aquatic habitats is addressed in Chapter 7 Biodiversity (Aquatic Ecology and Fisheries) of the rEIAR.

Direct habitat loss occurred within the footprint of site infrastructure whereas habitat alteration occurred within the site boundary where large areas of commercial conifer forestry were felled. The elements of the wind farm project which led to direct habitat loss and habitat alteration include:

- Felling of conifer forestry.
- Civil Works:
  - Site mobilisation – installation of site compound and delivery of welfare cabins, offices, etc;
  - Construction of site access tracks – approximately 17.5km in total, 15.5 km of new access tracks were constructed, largely comprising floating roads and 2.0 km of existing floating roads were upgraded;
  - Construction of turbine bases and associated crane hardstanding areas;
  - Derrybrien Substation and associated compound construction; and
  - Site drainage works.
- Anemometer and telecommunications mast construction.
- Peat repository site development.
- Borrow pit development.
- Cables and ducting installation.
- Overhead line development.
- Agannygal Substation development

The felling of ca 222ha of conifer forestry was required to facilitate the development of the wind farm site. Felling activity carried out on site included felling for a 15m wide corridor along all access tracks and extended felling around a significant proportion of turbine bases, felling around borrow pits and in proximity to the substation.

Site mobilisation comprised the development of a site compound within the north-eastern corner of the site. The footprint of the compound was approximately 77 m x 38 m in extent. The site compound was developed either side of an existing Coillte access track.

Access tracks constructed largely comprised floating roads. Floating roads that were constructed were typically 4.5 m wide. Upgrade works to existing turbary track was also undertaken where necessary, upgrade works did not require the widening of existing access tracks. The total length of new access tracks constructed within the wind farm site was 15.5 km.

Hard standing areas were also constructed to facilitate turbine erection. A crane pad comprising a hard standing area is located adjacent to each turbine location, 70 in total. These hard standing areas were required during the construction phase of the development and remained during the

operational phase of the project. The footprint of individual crane pads had a land take of approximately 47 m x 18 m.

The extent of constructed wind farm drainage is considered to be relatively small scale in comparison to similar developments of this type and scale. Improvement works were undertaken on the 27 km (approx.) of pre-existing drainage within wind farm site and 12 km (approx.) of new drainage channels were constructed.

A 110kV/20kV substation (Derrybrien) and associated compound was constructed within the southern parts of the site. The substation control building covers an area of approximately 202 m² within the envelope of the compound which has a footprint of approximately 1494 m².

A 110kV overhead line to connect the constructed wind farm to the electricity grid was developed in the southern sections of the site to the Agannygal Substation ca 7.8km to the south of the wind farm. The OHL comprises 43 structures, including 34 double wood pole structures, 2 end masts (1 within Derrybrien Substation), 6 angle masts and 1 intermediate mast. There are two additional masts within Agannygal Substation associated with the connection to the National Grid on the Ennis-Shannonbridge 110kV line.

There are three borrow pits on site which were used during construction to extract rock and clay for use in the construction of access tracks and hardstanding areas. The borrow pits have been closed since the completion of construction activities in 2005.

There are 32 small peat repository sites (up to 1 m in height) in areas of flat or gently sloping ground (less than 3 degrees) across the wind farm site, for the storage of peat/spoil excavated from turbine hardstanding areas and substation locations.

The initial phase of the wind farm development required the felling of ca 222ha of conifer forestry. Site mobilisation comprised the installation of a construction site compound site along an existing Coillte access track that was upgraded and the subsequent construction of access roads and turbine hardstanding areas. The construction of access roads and hardstanding lead to permanent habitat loss of felled conifer forestry habitat. Direct habitat loss (site access tracks, hardstands, roads and the substation) affected an area of approximately 13.6ha of felled conifer forestry habitat and 0.7ha of cutover bog (see Table 6-18).

A further 0.19 ha loss of felled conifer plantation occurred in the footprint of the Agannygal Substation and short access track. The very minor loss of conifer plantation habitat within the footprint of the 43 OHL structures is considered a negligible impact.

Considering the relatively low value of the conifer plantation, and small area impacted in the context of the site, the loss of this habitat is considered a minor permanent negative impact that has caused no significant effect.

The loss of 0.7ha of cutover bog is deemed to constitute a permanent negative impact that has caused no significant effect. This conclusion is based on the small extent of loss compared with the overall area of the habitat within and surrounding the site. The effect of this habitat loss on bird species is addressed in Section 6.4.2.2 below.

Habitat alteration and disturbance of commercial conifer plantations due to felling to facilitate the development occurred throughout the wider area (within the wind farm site (222 ha) and along the corridor of the OHL (33.1 ha)). The felled plantations were not replanted, and natural regeneration of bog and heath vegetation occurred throughout the area (including the peat repository and borrow pit locations).

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 6-8). Locally there is abundant natural regeneration of Lodge-pole Pine (*Pinus contorta*) and Sitka Spruce (*Picea sitchensis*) in places.

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*).



Plate 6-8 Regenerating bog and heath in areas of previously felled conifer. Areas of former open canopy forestry (LHS) and former closed canopy forestry (RHS) are regenerating at different rates.

The topography of the felled forestry area is undulating throughout with tree stumps a common feature. Brash from the felling process has been wind rowed and is slowly decomposing.

Since the time of felling the heath and bog species have expanded and the habitat is likely to continue a trend towards upland bog habitat. This trend is most rapid and notable in areas with impeded drainage. The habitat is of higher value than conifer plantation with greater species diversity.

Habitat alteration from commercial forestry to open habitat is considered to be a positive long-term impact of moderate magnitude considering the low cover of open habitats in the wider landscape. The felled areas outside the footprint of site infrastructure have since developed more heath and bog vegetation and the habitat is likely to continue a trend towards upland blanket bog. The establishment of open habitat across approximately 255 ha is considered to be a significant positive effect by causing an overall improvement in the quality of terrestrial habitats within the area. The habitat that has established in the area since construction is deemed to be of local importance, higher value compared to the lower value of the pre-existing conifer plantation. Some natural colonisation by conifers of the felled areas has been observed at varying densities.

Some temporary localised habitat disturbance is likely to have occurred immediately adjacent to the footprint of the development due to movements of track machinery. This would have caused a minor negative temporary short term impact (no significant effect) on conifer plantation and cutover bog.

There were no direct impacts on hydrologically sensitive habitats and habitats deemed to be of high ecological value during the construction phase of the project. The intact upland blanket bog and

dystrophic lake within the wind farm site remain unaffected by construction activity and associated drainage works.

An artificial lake currently occupies 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 (see Plate 6-9). The other borrow pits on site were reinstated to near current ground level and are dominated by heath and rush dominated vegetation. The artificial lake is classed as being of low ecological importance and occurs in an area covered by mature conifer plantation. The habitat alteration in this area is deemed a neutral permanent impact that, based on the low value of the original habitats, has led to no significant effect.



Plate 6-9 Artificial lake located in footprint of a borrow pit that was used during the construction phase of the wind farm.

Table 6-18 Summary of direct habitat loss in footprint of project.

Construction activity	Habitat(s) affected	Area Affected (ha)
Site access tracks	Felled conifer plantation (WS5) Cutover bog (PB4)	8.3
Turbine base and hardstanding areas	Felled conifer plantation (WS5) Cutover bog (PB4)	4.9
Derrybrien Substation	Felled conifer plantation (WS5)	0.4
Construction Compound	Access track (BL3) Conifer plantation (WD4)	0.29
Met masts	Felled conifer plantation (WS5) Cutover bog (PB4)	0.05
Agannygal Substation	Felled conifer plantation (WS5)	1.6

Indirect impacts

Drainage works associated with the wind farm development had the potential to alter the hydrology of the habitats in proximity to the drainage network. Surveys of hydrologically dependent habitats (upland blanket bog, dystrophic lake and associated flush) undertaken post construction demonstrate that the construction of the wind farm did not have a negative effect on these habitat types. Intact blanket bog, and the dystrophic lake were avoided by site infrastructure and there is no evidence to suggest that they have been affected by drainage and / or other works. This is based on the results of field surveys undertaken during the period 2003 and 2018 combined with an analysis of aerial photography. Similarly, the area of intact upland blanket bog adjacent to the northern boundary was not affected by drainage as no new drainage was developed in proximity to this area.

Areas of cutover bog were impacted by drainage prior to the construction phase of the wind farm development. Apart from very localised drainage effects surrounding turbine bases and hard stand areas there is no indication that the habitat has changed since the development of the wind farm. These localised drainage effects are considered to have had a minor negative long term impact (no significant effect) on the cutover bog.

Proposed Mitigation Measures

Significant effects on terrestrial habitats of highest conservation value (blanket bog and dystrophic lake) were avoided by the layout of the project. In addition, the use of floating roads reduced the likelihood of hydrological effects on these habitats.

As no significant negative effects on terrestrial habitats have been identified due to the construction there is no requirement for specific mitigation or remedial actions.

Residual Impact

The permanent felling of conifer plantation has had a significant positive effect on the overall quality of terrestrial habitats within the project area. The removal of dominant non-native trees throughout the wind farm site and OHL corridor has allowed the reestablishment of native bog and heath vegetation suited to the area. A substantial portion of these areas is likely to develop into stable peatland habitats of significant ecological value similar to what would have been present prior to the original planting with conifers.

Significance of Effects

There are no residual adverse significant effects on terrestrial habitats due to the construction of the wind farm project.

6.4.2.2 Birds

Pre-Mitigation Impact

The entire Derrybrien Wind Farm project is within the Slieve Aughty Mountains SPA. However, the SPA designation had not been publicly notified at the time of the planning and construction of the project (classified as a SPA in March 2007 and formally designated by Statutory Instrument in March 2012 (S.I. No. 83 of 2012)).

Construction works on site commenced in June 2003 with tree felling operations which were undertaken by a contractor on behalf of Coillte. Civil engineering works commenced in July 2003 with road construction and excavations at turbine locations. The works were stopped on 16th October 2003 due to a peat slide on site (the impact of this on birds is considered in Section 6.4.2).

Construction works re-commenced in June 2004, including work on the Derrybrien to Agannygal 110kV overhead line and Agannygal Substation, and were complete by March 2006.

The principal impacts on birds which occurred or had the potential to have occurred during the construction of the wind farm project were:

(i) Loss of habitats (inc. subsequent alteration/change of habitat),

(ii) Mortality of individual birds,

(iii) Disturbance to birds (noise, human presence etc)

6.4.2.2.2 Loss of habitats

Wind farm site

At the time of wind farm construction, the main habitats on the Derrybrien Wind Farm site were conifer plantation and cutover (blanket) bog. The conifer plantations were planted between 1963 and 1996 on areas dominated by blanket bog. At the time of construction, the plantations were largely in the closed canopy state though the trees planted in the 1993 to 1996 period (located in the south-southwestern sector of site and measuring approximately 42 ha in total) still had open canopy in 2003. The cutover bog is located within the eastern sector of the site.

Conifer plantation forest is a non-native habitat and is of low value for birds. As noted by Caravaggi et al. (2020), commercial forest expansion across traditional open heath and blanket bog Hen Harrier habitats in the uplands of Ireland and the UK has been associated with population declines in these areas. Further, in an upland landscape, conifer plantation presents a threat to adjoining unplanted bog and heath habitats from spread of self-seeded conifer trees. While the pre-thicket phase is useful for supporting a range of small bird species (passerines) and also provides useful foraging and nesting habitat for hen harrier, it is a transient habitat that loses its value from about 10-12 years of age onwards. The removal of approximately 222 ha of conifer forest (total of approximately 263 ha in wind farm site) as a habitat for birds due to the construction works is considered as a positive impact of long-term duration because of the non-native status of the habitat. With the clearance of conifer plantation and without replanting, bird species more typical of blanket bog (the natural habitat of the area) have had an opportunity to become re-established on the regenerating open habitats outside the construction footprint. This is considered to have been a significant positive effect for the local bird populations including meadow pipit (Red-listed), skylark (Amber-listed) and hen harrier (Annex I species).

At the time of felling, however, some stands measuring approximately 42 ha) was still in the pre-thicket phase and would likely have provided suitable habitat for foraging hen harriers for perhaps another 5 years. While the loss at the time of this 42 ha is rated as a negative impact, it is considered slight and of short-term duration. It is noted that the subsequent creation of open habitat across the 42 ha would have been more valuable for birds such as hen harrier in the medium to long term as the area developed into regenerating bog/heath and scrub after several years (as shown by vegetation surveys), whereas the trees upon attaining closed canopy status would have been of little or no value for hen harriers.

Within the 222 ha of plantation forest which was cleared, the construction footprint, including turbine bases, hardstands, roads and the substation, measured 13.6 ha. While built surfaces are not of significant value to birds, it is noted that species such as meadow pipit and skylark and occasionally red grouse, will utilize the road surfaces and hardstand areas, and especially the margins which adjoin the regenerating areas, for feeding and perching/resting purposes. On warm days, birds may also use the hard surfaces for dust bathing. When hunting, hen harriers will often follow linear features including embankments, tracks and road margins and therefore the wind farm roads/tracks can be considered of some value to foraging hen harriers. Of the 13.6 ha of conifer plantation that was removed to facilitate the wind farm infrastructure, the majority (11 ha) was closed canopy forest planted between the 1960s and 1980s. Without the wind farm development, it is expected that this

would have been clear-felled and replanted at some stage up to the 2020s. The replanted pre-thicket forest phase would have provided potential foraging habitat for hen harrier from the age of approximately 3 years to 10-12 years (depending on growth rate). It is noted that the felling and replanting of the 11 ha would have taken place at different times across the wind farm and the later plantings (1980s) would have remained as closed canopy forest into the 2020s. While the loss of up to 11 ha of future pre-thicket second rotation forest is rated as a negative impact, the effect on hen harrier is considered slight and of medium-term duration (i.e. potentially available to harriers for up to 10 years before canopy closes).

The construction works in the cutover bog in the eastern sector of the site resulted in the loss of an estimated 0.7 ha of cutover bog (the tracks through the bog were already in place for forestry purposes). While mostly in a cutover state, the bog is well vegetated and apparently supported (at time of construction) species typical of bog such as skylark, snipe and meadow pipit (latter two species now Red-listed but not at time of construction). While this is a negative impact, the area of loss is minor in the context of the overall amount of cutover bog within the wind farm site (i.e. amounting to less than 1% of the area of cutover bog habitat). Overall, the loss of 0.7 ha of cutover bog as a habitat for birds is rated as a long-term negative slight effect at the International level of importance.

Overhead line corridor and Agannygal Substation

The overhead line linking the wind farm to the Agannygal substation extends for approximately 7.8 km along a corridor of up to 45 m width. The line comprises 34 double wood pole structures, two end masts (one within Derrybrien substation), six angle masts and one intermediate mast.

Much of the line corridor was within commercial conifer plantation and required the removal of approximately 33.1 ha of forest. Only a small fraction of this was built upon (i.e. polesets and masts), with the majority of the corridor allowed to regenerate to a mix of habitats including low scrub, wet grassland and regenerating bog vegetation (see Plate 4, Appendix 6-5). Overall, the removal of the conifer plantation from along the overhead line corridor and without replanting is rated as a positive long-term impact as the conifer habitat is alien to the landscape and of low value for birds. This is considered to have been a significant positive effect for local bird populations. The Agannygal substation includes a control room in a palisade fenced compound. The base platform measures 72 m x 52 m (3,744 m^2). At time of construction, the location for the substation was closed canopy conifer plantation. A total of 1.6 ha of forest was cleared to facilitate the substation construction. Without the wind farm development, the conifer plantation would have been clear-felled and replanted at some stage up to the 2020s. The replanted pre-thicket forest phase would have provided potential foraging habitat for hen harrier from the age of approximately 3 years to 10-12 years (depending on growth rate). The loss of approximately 1.6 ha of future pre-thicket forest at the substation site is rated as a negative impact of slight significance and of medium-term duration (i.e. potentially available to harriers for up to 10 years before canopy closes).

6.4.2.2.3 *Mortality of individual birds*

Construction works involving felling of trees and ground excavations in cutover bog which took place between the months of approximately May and August would likely have resulted in the loss of some active nests. It appears that pre-construction bird surveys, which could have identified areas to be temporarily avoided due to nesting birds, were not carried out on site. Species affected would likely have been mainly woodland species though species associated with bog (including meadow pipit, skylark and possibly snipe) could also have been involved.

The likely loss of active nests is rated as a negative impact. However, at the population level the loss of some active nests for bird species which are all widespread in distribution (other than snipe) would have resulted in a non-significant effect. The potential loss of a snipe's nest (now a Red listed species) would have resulted in a moderate negative impact considered to be a significant effect as the national population has been in long-term decline since at least the late 1990s (Newton et al. 1999).

However, the physical loss of a nest was probably unlikely as snipe is a scarce species on site (not more than 1-2 pairs) confined at the time to the cutover bog in the east of the site.

6.4.2.2.4 Disturbance to birds

Construction works can cause disturbance to birds within surrounding areas. This arises from noise and the physical presence of humans, machinery etc. Potential disturbance is of most concern for breeding birds as nests could be deserted or at the least left unattended for prolonged periods. Foraging birds, including hen harriers, may be displaced from suitable habitats during the period of construction. In a review of potential displacement effects on birds at twelve wind farm sites in Britain, Pearce-Higgins et al. (2012) reported that observed negative effects of wind farms on bird species occur principally as a result of disturbance by high levels of activity during the construction phase rather than the operational phase.

The bird surveys undertaken in the late 1990s as part of the original EISs noted the presence of snipe, a relatively sensitive species, on site. However, it appears that there was no pre-construction survey to establish if snipe were nesting close to the work areas. Pearce-Higgins *et al.* (2012) identified snipe as one of the species showing significant avoidance at wind farms and cited a disturbance distance of 400 m. On this basis, it can reasonably be expected that works during the breeding season could have caused disturbance to breeding snipe within the wind farm site (in the cutover bog area). Passerine bird species would be more tolerant of disturbance and would be expected to be disturbed only if very close to the works (probably within several tens of metres).

The likely disturbance to breeding birds due to construction related activities is rated as a negative impact of short-term duration. However, at the population level of most breeding species the loss of some breeding pairs for one season would not be a significant effect. The possible disturbance to breeding snipe (site unlikely to support more than 1-2 pairs) would be considered a significant adverse effect as the national population has been in long-term decline since at least the late 1990s and the species is now Red-listed on basis of the decline in the breeding population (Gilbert et al. 2021).

It can reasonably be expected that foraging hen harriers would have been displaced from suitable foraging habitats within the site during the construction works. Such an effect is rated as significant but of temporary duration.

Proposed Mitigation Measures

As far as can be ascertained from the original EIAR reports, no mitigation was proposed for birds during the construction phase of the project.

Residual Impact and Significance of Effects

The principal residual adverse effect from the construction works was the loss of an estimated 0.7 ha of cutover bog, which would have provided nesting and/or foraging habitat for various upland bird species, including hen harrier and red grouse. This is considered as a long-term negative slight effect at the International level of importance as it relates to hen harrier.

The removal of approximately 222 ha of conifer forest to facilitate the project is considered a significant positive impact of long-term duration for birds, as conifer forest is a non-native habitat and had replaced the natural peatland habitats. With the clearance of conifer plantation, habitats of value to upland bird species, including hen harrier, have been allowed to become re-established on the areas outside the construction footprint.

6.4.2.3 Bats

The construction of the Project comprised the clear felling of 222 ha of coniferous woodland, creation of wind farm tracks, creation of turbine and angle mast bases, trenching of cables and creation of borrow pits. Working hours were between 07:00 and 19:00 Monday – Saturday, although it is noted in the construction methodology that hours were occasionally extended. The activities had the potential to result in the disturbance, displacement and temporary loss of habitat for bats.

Pre-Mitigation Impact

Protected sites for bats

Lough Cutra SAC is of International Importance for lesser horseshoe bats.

The project area is hydrologically connected to Lough Cutra SAC via the Owendallulleegh River (over a distance of 22 km). Woodlands within the SAC that are used by lesser horseshoe bats would not have been affected by construction works due to their distance from the site. Any impacts on water quality are likely to have been local to the site, and even in the event that these resulted in a change to the hydrology of Lough Cutra, are unlikely to have affected horseshoe bats (Wilson, 2012).

The habitats along the Owendallulleegh River vary between open farmland and narrow strips of riparian woodland. The rest of the area between the SAC and the project area is a mixture of farmland, mixed aged coniferous plantation and cut over bog. There is no distinctive linear flight path linking the SAC and the project area that would allow bats to move between it and the SAC, and lesser horseshoe bat have not been recorded using the project area subsequently. It follows that the project area is unlikely to have been of any importance to maintaining the SAC bat population, and temporary displacement effects resulting from construction are very unlikely to have occurred.

A roost count at Lough Cutra in winter 1999/2000 recorded (49 individuals). The population has remained stable following the construction of the wind farm, with a peak roost count recorded in January 2010 (142 individuals) (Wilson, 2012).

Construction phase impacts are not likely to have had a significant effect on the lesser horseshoe bat population of Lough Cutra SAC.

Bat species

The habitats within the wind farm area comprised coniferous plantation (265 ha) and open habitat, principally degraded blanket bog (67 ha). The habitats within the area of the OHL corridor and Agannygal Substation also comprised coniferous plantation (33.1 ha and 1.6 ha respectively).

The removal of coniferous plantation increased the amount of open habitat available, resulting in a net increase of ca. 222 ha open habitats across the project area. Additional edge habitat was created along the OHL corridor as an indirect effect of felling 33.1 of forestry.

Lesser horseshoe bat, whiskered bat, and Daubenton's bat

The commercial plantation and open habitats available in the project area are considered to be of negligible value to lesser horseshoe bat, whiskered bat and Daubenton's bat.

The reduction of commercial plantation during the construction phase is considered likely to have had a negligible impact on lesser horseshoe bat, whiskered bat and Daubenton's bat. The net increase in open habitats / edge is also likely to have had a negligible impact on lesser horseshoe bat, whiskered bat and Daubenton's bat.

The effect on lesser horseshoe bat, whiskered bat and Daubenton's bat populations in the local area are not considered to have been significant given the value of the habitats for these species, and scale and duration of the impacts.

Brown long-eared bat

The commercial plantation and open habitats available in the project area are considered to be of site value to brown long-eared bat.

The reduction of commercial plantation during the construction phase is considered likely to have had a temporary negative impact on brown long-eared bats at site level. The net increase in open habitats / edge is likely to have had a long term[19] positive impact on brown long-eared bats at site level.

The effects on brown long-eared bat populations in the local area are not considered to have been significant given their scale and duration.

Natterer's bat

The commercial plantation and open habitats available in the project area are considered to be of local value to Natterer's bat.

Information on the use of commercial coniferous plantation by bats is limited, with most roosting records coming from bat box studies and roost surveys of buildings within plantation areas. Mortimer (2006) conducted a study on the use of Tentsmuir Forest, a 9,143 ha commercial coniferous plantation by Natterer's bats on the north-eastern coast of Fife, Scotland. The study found 22 natural tree roosts; of these 18 were in double-leadered Corsican pine *Pinus nigra*, three in woodpecker holes and one in a small cavity in a Scots pine.

Double-leadered trees are less favourable commercially than single-leadered trees, and are generally managed out of commercial plantations. In addition, woodpecker species were not recorded breeding in Ireland until 2007 (McDevitt *et al.*, 2011). Therefore the availability of suitable roosting locations in conifer plantation in the project area is likely to have been low pre-construction, although the presence of roosting features in some trees cannot be ruled out and a low number may have been lost.

The interface between coniferous woodland and open habitats such as blanket bog, as well as rides / tracks within the plantation will also have been suitable for use by foraging and commuting Natterer's bats.

The reduction of commercial plantation and potential loss of a low number of roost sites during the construction phase is considered likely to have had a temporary negative impact on Natterer's bats at site level. The net increase in open habitats / edge is likely to have had a long term minor positive impact on Natterer's bats at site level.

The effects on Natterer's bat populations in the local area are not considered to have been significant given the scale and duration of the impacts.

Nathusius' pipistrelle

The commercial plantation and open habitats available in the project area are considered to have been of negligible value to Nathusius' pipistrelle.

[19] *Long-term is defined as 15 - 60 years (EPA, 2017. Table 3.3). Once decommissioned land management at the wind farm could change.*

The reduction of commercial plantation due during the construction phase construction activities is considered likely to have had a negligible impact on Nathusius' pipistrelle. The net increase in open habitats / edge is likely to have had a negligible impact on Nathusius' pipistrelle.

The effect on the Nathusius' pipistrelle population in the local area are not considered to have been significant given the value of the habitats for these species, and scale and duration of the impacts.

Common and soprano pipistrelle

The commercial plantation and open habitats available in project area are considered to have been of site value to common and soprano pipistrelle.

The reduction of commercial plantation and potential loss of a low number of roost sites during the construction phase is considered likely to have had a temporary negative impact on common and soprano pipistrelles at site level. The net increase in open habitats / edge is likely to have had a long term positive impact on common and soprano pipistrelles at site level.

The effects on common and soprano pipistrelle populations in the local area are not considered to have been significant given the scale and duration of the impacts.

Leisler's bat

The commercial plantation and open habitats available in the project area are considered to have been of site value to Leisler's bat.

The reduction of commercial plantation during the construction phase is considered likely to have had a temporary negative impact on Leisler's bat at site level. The net increase in open habitats / edge is likely to have had a long term positive impact on Leisler's bat at site level.

The effects on Leisler's bat populations in the local area are not considered to have been significant given the scale and duration of the impacts.

Proposed Mitigation Measures

No mitigation measures were put in place during the Construction Phase.

Residual Impact

The residual impacts for each species remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on bat populations during the Construction Phase are not considered to have been significant for any species given the scale and duration of the impacts.

6.4.2.4 Mammals (other than bats)

Otter

Pre-Mitigation Impact

Under most circumstances human disturbance is not likely to be the main factor influencing otter activity, and the availability of prey appears to be more important (Carrs, 1995). Otters can habituate to human activity, which is attested to by the fact that they are regularly sighted in waterways in the centre of Cork City (Sleeman and Moore, 2005). Moreover, disturbance was not noted as an important factor influencing their prevalence in the 2010/2012 national survey of the species (Reid et al., 2013). No signs of otter were recorded during a survey of the wind farm site in summer 2018. This is not surprising given that there are no fish-bearing streams on the site. It is possible that otter, possibly young males at the margins of home ranges, may forage for frogs in and around the wind farm site in late winter early spring. However, given that there would have been no physical barriers to their entering the site during the construction period, it is unlikely that this foraging activity, had it been a feature of the area, would have been significantly impacted by on-site activity during the construction period, given that otter generally feed at dawn and dusk (Carrs, 1995). Overall, construction of the wind farm is considered to have had at most a slight, negative and short-term impact on any individuals which may have been using the site, taking the form of intermittent disturbance, mainly to frog foraging activity during winter and spring, which would likely have been offset by increased foraging outside the site by individuals potentially affected. This is not believed to have had any significant effect on the local otter population in the area. It is also worth noting that apart from the headwater tributary impacted by the peat slide in October 2003, which is discussed in more detail in Section 6.4.2.4, the construction phase would have had a minimal impact on all of the other tributaries draining the wind farm to three main river channels i.e. all those draining from sub catchment SC1-SC9 including SC7(a and c) but not including SC7(b) and SC7(d) (refer to Figure 7.3 in Chapter 7). So, while the fish resources in these small tributaries would likely not have been a major source of fish for otters in the area, as a resource it would not have been diminished by the construction phase.

Proposed Mitigation Measures

No mitigation measures were put in place during the Construction Phase.

Residual Impact

The residual impacts for otter remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on otter during the Construction Phase are not considered to have been significant given the scale and duration of the impacts.

Other large mammals

Pre-Mitigation Impact

Pine martens have historically been associated with woodland areas, and in Europe they are most frequently found in coniferous and broadleaved woodland and scrub (NRA, 2009). The removal of coniferous forestry within the wind farm site, along the OHL corridor and at Agannygal Substation would likely have resulted in a loss of suitable habitat for pine marten. However, given the highly

mobile nature of this species and the large expanses of coniferous forestry immediately adjacent to the felled areas, this impact is likely to have been slight negative and long term with no significant effect on the local pine marten population.

Red squirrels have a similar association with woodland areas, though through the course of the 20th Century, became more associated with areas of coniferous forestry due to displacement by the introduced grey squirrel (there is evidence of a reversal of this trend in recent years, due in part to the recovery of pine marten populations (Lawton et al. 2020). The removal of coniferous forestry as part of the project would likely have resulted in a loss of suitable foraging habitat for red squirrel. There is also the potential for the disturbance or destruction of squirrel nests (dreys) to have occurred. Direct mortality to red squirrels is considered to have been limited as all felled areas were in direct proximity to retained forestry compartments, where any displaced animals could relocate to. Overall, given the large expanses of coniferous forestry in the surrounding areas, impacts are likely to have been slight negative and long term with no significant effect on the local red squirrel population.

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; badger setts may be located in areas which facilitate ready access to both foraging areas and cover for sett entrances and are therefore most frequently located in areas with a mosaic of habitats. There is the potential for the disturbance of active setts to have occurred during the felling phase to facilitate construction, however given the elevation of the site and the close association of the plantation forestry with bog habitat considered sub-optimal for badger, the local population density is considered to be low. As a result, the likelihood of any such sett disturbance is expected to have been low. Overall, given the large expanses of coniferous forestry in the surrounding areas, impacts are likely to have been slight negative and short term with no significant effect on the local badger population.

Construction works associated with the wind farm most likely would have resulted in localised disturbance to foraging mammals, including pine marten, badger, red squirrel and deer but this would have been a short-term negative impact and no significant effect would have resulted on local mammal populations

Proposed Mitigation Measures

No mitigation measures were put in place during the Construction Phase.

Residual Impact

The residual impacts for each species remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on each species during the Construction Phase are not considered to have been significant given the scale and duration of the impacts.

6.4.3 Offsite peat slide works: Oct 2003-end 2005

6.4.3.1 Terrestrial Habitats

Pre-Mitigation Impact

A peat slide occurred during the construction phase of the wind farm development in October 2003. The peat slide involved the disturbance and partial displacement of peat and forest debris onto Coillte owned land and areas of privately owned land between the southern boundary of the wind farm site and the Flaggy Bridge to the south-east. Following the peat slide, emergency off-site measures were undertaken by geotechnical experts and Galway County Council. Emergency measures included the installation of a series of boulder dam barrages, four of which remain in –situ. Barrages 1 and 2 are located upstream of Black Road Bridge over which access tracks have been constructed by Coillte to replace tracks displaced by the peat slide. Barrages 3 and 4 are located between the Black Road Bridge and Flaggy Bridge across a tributary of the Owendaluleegh River. Accumulated peat from two of the barrage locations (1) and (3) and from private land near the Black Road Bridge which resulted from the slide was placed within peat repository sites on adjacent Coillte lands.

The terrestrial habitats directly impacted by the peat slide largely occurred outside the wind farm site boundary and therefore the description of habitats affected by the slide were determined after the peat slide had occurred and through a review of pre 2003 aerial photography of the affected area. Terrestrial habitats that were directly affected by the peat slide comprised conifer forestry (WD4) (open canopy pre-thicket and mature closed canopy) and wet grassland (GS4) used for agriculture (wet grassland (GS4)). It was estimated that the peat slide had a direct impact on ca 25 ha of land, impacting conifer forestry and wet grassland.

Direct Impacts

The habitat characteristics of the peat slide area immediately following the event was described in a report prepared by Inis Environmental Services (2004a). The habitat recovery of the area was further reported again by Inis Environmental Services in October 2005. The area of terrestrial habitat most affected by the peat slide occurred in the area between the wind farm site and the Flaggy Bridge. Following the peat slide, much of the area towards the wind farm that was formerly afforested comprised bare peat and exposed mineral soil with isolated vegetated islands which continued to support typical bog / heath species and individual conifer trees. The following paragraphs describe the areas of the peat slide immediately after the event in October 2003 (Inis Environmental Services, 2004a), subsequent recovery, and a description and assessment of the direct impacts.

Impacts relating to watercourses and aquatic ecology are addressed separately in Chapter 7 of the rEIAR.

Wind farm to Barrage 1

The following description is from the area between the wind farm site and Barage 1 during February 2004 (Inis Environmental Services, 2004a):

> *In the upper areas of the peat slide much of the surface peat and vegetation remains in situ although obvious movement has taken place. It is estimated that more than 50% of the area has a cover of live vegetation compared to only 10% further downstream.*
>
> *The bare peat areas that exist along the path of the slide in this location are totally denuded of vegetation. At the time of the survey there was no evidence of mosses or vascular plants having colonised these areas.*

There is one small narrow stream (<50cm wide and c.20cm deep) formed in the northern areas within the windfarm site but this appears to split into a number of streams further downhill or possibly other streams originate in the path of the slide further down stream. Further down the slope from the windfarm site the situation changes and less of the surface peat remains in place (Grid Reference: 59743 04109).

North of the main Barrage 1 the land is largely bare of peat and now stripped to the underlying mineral soil and bedrock. There are few clumps of vegetated surface peat that came to rest in the area (probably originated from further up the peat slide). The peat that was once in the area appears to have been carried down stream from this area. Mature displaced Spruce and Pine trees litter the area. Few isolated trees remain in situ.

In the area just North of the Barrage 1 there are three newly formed streams. There is no peat remaining in the path of these streams that in the main part run over a fine silt-sand substrate. In steeper areas the substrate changes to bare rock surfaces. On the day of the survey the water of the streams appeared clear indicating that low levels of peat are present in the water but it should also be noted that water levels were also low following a relatively dry period. Most of the peat that remains in the area is relatively shallow black peat. Other peat clumps that originate from surface peat that is deposited in places are firm un-humified brown peat. The peat clumps that are present in the area have surface vegetation remaining intact although they may not have come to rest upright. 80 to 90 % of the area in this location is bare peat and underlying mineral soil (an estimated 20% of which comprises stripped mineral subsoil and bare rock). Only c. 10 % of the area comprises deposited surface peat vegetation clumps, an isolated pine tree that remains in-situ following the peat slide.

There are no major peat deposits on the northern side of the main boulder barrage (Barrage 1). This is probably due to the fact that the dam was only installed weeks after the major peat slides occurred and was built as a preventative measure in case of future peat slides.

The habitat in the above area had stabilised and established moderate vegetation cover within 20 months as illustrated in Plate 6-10.



Plate 6-10 Recovery of peat slide area upslope of Barrage 1 in February 2004 (LHS) and October 2005 (RHS).

Habitat monitoring surveys undertaken along the peat slide areas in 2011 and 2018 have shown almost full recovery of vegetation and habitat structure throughout this area (see Plate 6-18 (a-b)). The area now comprises 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 (*Trichophorum 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 lanuginosum*, 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.

The loss and transport of peat leading to extensive disturbance of low value habitat in this area was a direct moderate negative impact of medium term duration. Resulting in no significant effects on the basis that the habitat affected was of low value and represented a relatively small area of conifer plantation that is common throughout the wider landscape. Since the peat slide event, the habitat has recovered and developed into a semi-natural mosaic of heath of scrub.

Emergency works in this area included the installation of Barrage 1 and the replacement of a forest access track, using stone sourced from an adjacent borrow pit. The loss of a small area (0.23ha) of low value habitat (conifer plantation) associated with the borrow pit is a permanent minor impact with no significant effects. The footprint of the barrage and access road overlapped with a pre-existing access road and therefore did not lead to direct habitat loss.

Barrage 1 to Barrage 2

The following description is from the area between Barage 1 and Barage 2 during February 2004:

> *Just South of the Barrage 1 much of the area is similar to that just described North of the barrage with the land being relatively bare of peat and now stripped to the underlying mineral soil and bedrock. The peat in the area is relatively shallow estimated to be less than 1 metre in depth. There are a few clumps of vegetated surface peat that came to rest in the area (originated from further up the peat slide). The peat that was once in the area appears to have been carried downstream from this section of the peat slide. Mature displaced Spruce and Pine trees litter the area. Few isolated trees remain in situ. On the northern side of Barrage 2 there is an area of deep peat that has built up since the dam was put in place, this peat appears to be well-humified 'black peat'.*

The habitat in the above area had stabilised and established moderate vegetation cover within 20 months as illustrated in Plate 6-11.



Plate 6-11 Recovery of peat slide area downslope of Barrage 1 between February 2004 (LHS) and October 2005 (RHS).

Surveys undertaken along the peat slide areas in 2011 and 2018 have shown almost full recovery of vegetation and habitat structure throughout this area (see Plate 6-18 (c,d)). The habitat that has established in this area is similar in character to that described above for the section between the wind farm and Barrage 1 being dominated by heath and scrub vegetation.

The loss and transport of peat leading to extensive disturbance of low value habitat in this area was a direct moderate negative impact of medium-term duration. This resulted in no significant effects on

the basis that the habitat affected was of low value and represented a relatively small area of conifer plantation that is common throughout the wider landscape. Since the peat slide event, the habitat has recovered and developed into a semi-natural mosaic of heath of scrub.

Emergency works in this area included the installation of Barrage 2 across the peat slide (0.01ha) and the installation of a new section of forest access track (0.1ha), and the installation of a peat repository site in an adjacent area (0.42ha). The loss of a small area (0.53ha) of low value habitat (conifer plantation) associated with these works is a negative permanent minor impact with no significant effects. The peat repository site now supports an area of willow (Salix spp.) scrub.

Barrage 2 to Black Road Bridge

The following description is from the area between Barage 2 and Black Road Bridge during February 2004 (parts of this area were not surveyed at this time due to access difficulties):

> *There is little peat present in the area just to the South of Barrage 2. The area near the gorge has a steep incline and the peat slide would have moved rapidly through the narrow channel area. There is a light scattering of peat on the sides of the channel where it is possible to make out the level that the peat slide reached as it passed through the gorge. The banks of the stream in this area are steep and comprise a shallow wet heath type habitat dominated by Ling Heather and Purple Moor-grass with mineral influences from the mineral soil evident by the abundance of grasses and other minerotrophic species. This habitat appears to have remained largely intact following the peat slide.*
>
> *To the Northern side of the Black Road Bridge there are considerable quantities of peat and large surface peat clumps deposited. Galway County Council had constructed two earthen dams just north of the Black Road Bridge to slow the peat slip. Displaced peat mounded in the area above these dams which were subsequently overtopped. It appears that the area where most of this peat has been deposited was a natural river channel with wet grassland on a mineral based soil on either bank and adjoining fields prior to the peat slide episode (based on local information and surveying of adjoining lands). The area was probably used for agriculture. Based on the flora of the adjoining fields the vegetation of the area would have been dominated by grass species such as Yorkshire Fog and Soft Rush with an abundance of species such as Creeping Buttercup.*
>
> *Peat has deposited at different depths in this area depending on the underlying topography. In areas of shallow peat it is evident that the original vegetation of Soft Rush is already appearing up through the surface at the time of survey.*
>
> *There has been some land clearance in the area to the East of the river by heavy machinery as part of emergency drainage works. Some peat has been placed in 'lagoon' like features after being cleared. A diversion channel has been dug in a successful attempt to direct the river away from the large peat mass that has deposited in the area.*

The habitat in the above area had stabilised and established moderate vegetation cover, following the implementation of a range of emergency measures, within 20 months as illustrated in Plate 6-12. Surveys undertaken along the peat slide areas in 2011 and 2018 confirmed the full establishment of wet grassland and willow scrub throughout this area.

The deposition of peat leading to extensive smothering of low value grassland in this area was a direct moderate negative impact of medium term duration. This led to no significant effects on the basis that the habitat affected was of low value and represented a relatively small area of wet grassland that is common throughout the wider landscape. Since the peat slide event, the habitat has recovered and re-established wet grassland and scrub vegetation.

Emergency works in this area included the temporary installation Barrage A and B, some drainage works of areas adjacent to the peat slide, and the installation of a peat repository area (0.29ha) in an area of former conifer plantation. The loss of a small area (0.29ha) of low value habitat (conifer plantation) associated with these works is a negative permanent minor impact with non-significant effects. This peat repository site now supports an area of willow (*Salix* spp.) scrub.



Plate 6-12 Recovery of peat slide area upslope of Black Road Bridge between February 2004 (LHS) and October 2005 (RHS).

Black Road Bridge to Flaggy Bridge

The following description is from the area between Black Road Bridge to Flaggy Bridge during February 2004 (parts of this area were not surveyed due to access difficulties):

> *There are two dams installed between Black Road Bridge and Flaggy Bridge, the first Barrage 3 and the Barage 4. The river passes through a dense mature conifer plantation immediately South of Black Road Bridge and therefore access to these areas proved difficult. Considerable depths of peat have also been deposited by the slide on each side of the river, which made the area very difficult to survey and treacherous.*
>
> *From what was surveyed it is apparent that large deposits have resulted on each river-bank around the base of trees within the plantation and in the river channel, this continues down as far as the first dam (Barrage 3) south of Black Road Bridge. Immediately North of this dam the peat depth is considered to be extremely deep and appears to be highly humified black peat with high water content. The main concern in this area should be safety; this area of deep peat is a hazard.*
>
> *There is little vegetation in the area South of the first dam (Barrage 3) and the river appears in good condition although a light cover of peat has been deposited in places.*
>
> *Immediately to the North of the second dam (Barrage 4) there is a deposit of peat extending 20m into the conifer plantation on each bank of the river. This peat appears to be at least 1 metre deep in places.*
>
> *At the second dam (Barrage 4) there is a deposit of deep black peat to the East of the dam. The area just South of the second dam (Barrage 4) has a peat deposit (approximately 8m in width) on the western side of the river. Otherwise there is very little peat deposit between this dam and Flaggy Bridge, the lower banks of the river are washed clear of peat, further up the banks the natural Wet Heath vegetation dominated by Purple Moor-grass and Ling Heather was recorded and appears to have survived the disturbance of the peat slide.*
>
> *The area immediately North of Flaggy Bridge has small quantities of peat deposited on western side of river. There has been land clearance in this area since the bog slide. An earthen dam constructed by Galway County Council at this location has been removed. It is*

evident that vegetation is already colonising much of the area with fresh growth of Soft Rush, Grasses, Creeping Buttercup and Dock species recorded.

The area upstream of Barrage 3 as described above had significant emergency measures undertaken between February 2004 and October 2005 (see Plate 6-13 and Plate 6-14).

The deposition of peat throughout the forestry areas nearby Barrage 3 and 4 caused a minor medium term negative impact on this low value habitat with no significant effects. Riparian habitats downstream of the forestry and upstream of Flaggy Bridge suffered a direct short term impact due to smothering of vegetation, the area recovered within a relatively short period. This short-term impact had no significant effects.

Emergency works in this area included the installation of Barrage 3 (0.02ha) and Barrage 4 (0.02ha), and the installation of a peat repository site (0.06ha) nearby Barrage 3. The loss of a small area (0.1ha) of low value habitat (conifer plantation) associated with the barrages and peat repository site is a permanent minor impact with no significant effects. The peat repository site has since established scrub vegetation.



Plate 6-13 Area between Black Road Bridge and Barrage 3 is dominated by mature conifer plantation. Deep peat deposits observed in this area in February 2004 (LHS) were removed by October 2005 (RHS).



Plate 6-14 North and upstream of Flaggy Bridge. Good recovery was noted here between October 2004 (LHS) and October 2005 (RHS).

Downstream of Flaggy Bridge to Lough Cutra

Riverside habitats downstream of Flaggy Bridge mostly corresponded with open wet grassland and conifer plantation. Terrestrial habitat closest to Flaggy Bridge were most affected following the peat slide with significant peat deposits. Reports prepared by Inis Environmental Services (2004a) and the Shannon Regional Fisheries Board (Anon 2004) based on a joint site visit in late December 2003

details the extent of peat deposition along the river corridor downstream of Flaggy Bridge in the period shortly after the peat slide. The survey approach taken was to divide the river into two hundred 100m sections, each given a chainage number. Flaggy Bridge was denoted as chainage 200 and the Owendalulleegh's inflow at Lough Cutra denoted as chainage 0. Riparian habitats from Flaggy Bridge (chainage 200) down as far as Derrybrien East (chainage 169) where reported as being severely impacted by scouring, and peat deposition recorded where low banks were present. Further downstream only occasional localised peat deposits were observed.

These areas recovered in a relatively short period with good vegetation cover dominated by grassland and scrub species observed in all areas in October 2005. The following text is from a monitoring report prepared by Inis Environmental Services (2005):

> *From the walkover survey of the affected stretch of riverine habitats below Flaggy Bridge it is clear that there has been a marked recovery since last year. The elements coupled with time have broken down the larger fractions of peat that stayed lodged in land pockets along the river and no peat banks remain on the lands adjoining the river. In many areas (see plates 25 – 30) there is no longer evidence of the peat slip. The habitats in these areas appear to have recovered.*
>
> *At certain points along on the river, especially at bridges, larger detritus such as tree stumps and large masses of root material still remains and will take years to break down completely. This however is not deleterious to the system as this matter provides additional habitat for invertebrates and fish alike and in doing so improves the health status of the river.*

As described above, the terrestrial grassland habitats along the riverbanks in this section had largely recovered by October 2005 as illustrated in Plates 6-14 to 6-16.

Surveys undertaken of littoral habitats surrounding Lough Cutra suggest that no discernible impacts occurred (Inis Environmental Services, 2005).

The deposition of peat throughout the section from Flaggy Bridge to Derrybrien East caused a moderate short term negative impact on riparian habitats caused by scouring and smothering of vegetation. The impact was relatively small in extent being restricted in the most part to the immediate banks of the river, the impact only extended into adjacent fields in those areas with low banks. The impact led to no significant effects on the basis of relatively low value habitats being impacted and the duration of the impact being short term.

No emergency works were undertaken along this section of the peat slide.



Plate 6-15 Stream just south of Flaggy Bridge, immediately after peat slide (November 2003) and two years later (October 2005).



Plate 6-16 Ford crossings downstream of Flaggy Bridge (October 2005). Little evidence of disturbance from peat slide.



Plate 6-17 Discrete clumps of peat was the only evidence of past peat slide amongst the riparian habitat downstream of Flaggy Bridge in October 2005.

Indirect Impacts

Drainage works were carried out within areas of conifer forestry affected by the peat slide. Drainage works may have had a drying out effect on the peat substrate in the affected area. The conifer forestry had already been drained with a herring bone type system in place prior to the peat slide. It is considered that drainage works associated with the peat slide had a neutral impact on terrestrial habitats as it is unlikely that the works caused a noticeable change to the ecological value of the affected habitat. The felling of conifer forestry as a result of quarrying associated with barrage dam building is considered to be a negligible impact (no significant effect) as the area affected represents a very small fraction of the habitat type. The affected habitat, conifer forestry, is of low ecological value.

Impacts on watercourses and aquatic ecology are dealt with separately in Chapter 7 of the rEIAR.

Table 6-19 Summary of impacts of peat slide on terrestrial habitats.

Peat slide section	Terrestrial habitat receptors	Impact description	Impact assessment
Wind farm to Barrage 1	Conifer plantation	Loss and transport of peat leading to extensive disturbance of low value habitat. Recovery has progressed and the area stabilised with the development of a mosaic of scrub and wet heath.	Negative, direct, moderate impact of medium term duration, affecting ca 23ha of low value habitat. Impact is non-reversible although recovery of semi-natural habitat has occurred in the medium term. No significant effects.
Barrage 1 to Barrage 2	Conifer plantation		
Barrage 2 to Black Road Bridge	Conifer plantation, wet grassland and wet heath	Extensive deposition of peat smothering dominant low growing vegetation.	Negative direct moderate impact of medium term duration, affecting low value habitat. Impact is non-reversible although recovery of semi-natural habitat in the medium term. No significant effects.
Black Road Bridge to Flaggy Bridge	Conifer plantation	Peat deposits throughout conifer plantation, smothering ground layer of low value habitat.	Negative moderate impact of medium term duration, affecting low value habitat. Impact is non-reversible although recovery of semi-natural habitat in the medium term. No significant effects
Flaggy Bridge to Lough Cutra	Riparian river bank mainly dominated by wet grassland	Localised smothering of vegetation due to peat deposition on riverbanks (mostly	Direct negative impact due to habitat disturbance, moderate magnitude of short term

Peat slide section	Terrestrial habitat receptors	Impact description	Impact assessment
		confined to upstream of confluence with Owendulleagh River). No discernible impacts observed on lower reaches of river and along lakeside habitats	duration. No significant effects.



Plate 6-18 Series of photos showing recovery of habitat along peat slide area between 2005 (LHS) and 2018 (RHS). Following locations are illustrated: (a) peat slide area at wind farm site at Access Track / Barrage at T23-T70 (Grid Ref. E559396, N704396); (b) downslope of wind farm at Access Track / Barrage at T23-T70 (Grid Ref: E559433; N704355); (c) downslope of Barrage 1) (Grid Ref. E560277, 703918); (d) upslope of Barrage 2 (E560562, N703920); (e) upstream of Flaggy Bridge (Grid Ref. E561150, N702623).

Proposed Mitigation Measures

Emergency measures were undertaken to address significant impacts arising from the peat slide in 2003. These emergency measures, which mainly involved the installation of barrages and creation of repositories for peat debris, largely related to the safeguarding of downstream water quality and reducing the risk of further peat slides.

As no significant impacts on terrestrial habitats have been identified due to the peat slide and associated emergency works, there is no requirement for specific mitigation or remedial actions.

Residual Impact

No residual impacts of significance on terrestrial habitats have been identified.

Significance of Effects

There are no residual adverse significant effects on terrestrial habitats due to the peat slide and associated emergency works.

6.4.3.2 Birds

Pre-Mitigation Impact

The peat slide which occurred in October 2003 affected an area in the southern part of the wind farm and extended to Flaggy Bridge on the R353. Emergency works which were carried out immediately after the slide involved the construction of barrages to contain the displaced peat and debris. The area affected was conifer plantation, both pre-thicket and closed canopy phases. Following the slide, the area comprised bare peat and exposed mineral soil with isolated vegetated islands which continued to support individual conifer trees and typical bog-heath species. The total affected area was estimated at 25 ha.

Survey of the peat slide area in 2011 showed almost full recovery of vegetation and habitat structure throughout the area (P. Crushell & B. Madden personal observations) (see Plates 5 and 6 in Appendix 6-5). The area was mapped as a mosaic of heath and scrub, with a well-developed herb and shrub layer dominated by ling heather (*Calluna vulgaris*) and purple moor-grass (*Molinia caerulea*). Soft rush (*Juncus effusus*) was common where mineral soil predominated. The tree layer supported scattered pine and spruce of varying ages, many of which appeared to be self-sown since the peat slide occurred. Willow was also common.

The impacts on birds owing to the peat slide are considered to be the following:

Mortality

As the slide occurred in October, it would not have impacted any nests of birds. Adult birds present in the area would not have been affected.

Habitat loss

The area of the slide included both closed canopy and pre-thicket phase forest. The closed canopy forest is of low value to birds and its removal would not be of concern. As already noted, conifer forest is a non-native habitat and its removal without replanting is considered as a positive impact of long-term duration resulting in no significant effects.

The pre-thicket phase forest, which occurred in the slide area within and below the wind farm, would have been suitable for foraging by hen harriers for perhaps a further five years before the canopy

would have closed. While the loss of pre-thicket forest is rated as a negative effect, it is considered slight and of short-term duration. Also, the removal of the forest plantation created open habitat of considerably more value to hen harrier and other bird species in the short to long-term.

Habitat regeneration

Regeneration of the peat slide area to a mix of scrub and heath, with occasional conifer trees still standing and self-seeded trees becoming established (see Plates 5 and 6 in Appendix 6-5) provides excellent habitat for birds including hen harriers. The revegetation of the peat repository areas at the barrages was mainly rushes – this provides low quality habitat for birds. The development of the new vegetation in the slide area after a short number of years is rated as a significant positive effect of long-term duration.

Proposed Mitigation Measures

It is understood that mitigation for birds was not required for the peat slide works.

Residual Impact and Significance of Effects

The permanent removal of conifer plantation and replacement by a more open habitat, albeit mostly afforested by regenerating and self-seeded trees by 2024, is considered a positive effect of moderate significance for birds.

6.4.3.3 Bats

The peat slide resulted in the loss of approximately 25 ha of coniferous woodland (some of which had to be felled due to the slide) and damage to three bridges (referred to as Black Road Bridge[20], Flaggy Bridge and Slattery's Bridge respectively, locations are shown on Figure 6-15). Immediate action to reduce the impact of the peat slide involved the creation of eight barrages and creation of peat repositories. These activities also had the potential to result in the disturbance and displacement of bats, temporary loss of bat habitat and permanent loss of potential roost sites in the two bridges. The peat slide resulted in an increase in the amount of open habitat available, resulting in a net increase of approximately 25 ha of open habitat.

[20] *Black Road bridges were inspected as part of works to inform the Prospective Development, for that purpose they are referred to as Bridge C and Bridge B. Bridge C was the only bridge along Black Road that was impacted by the peat slide.*

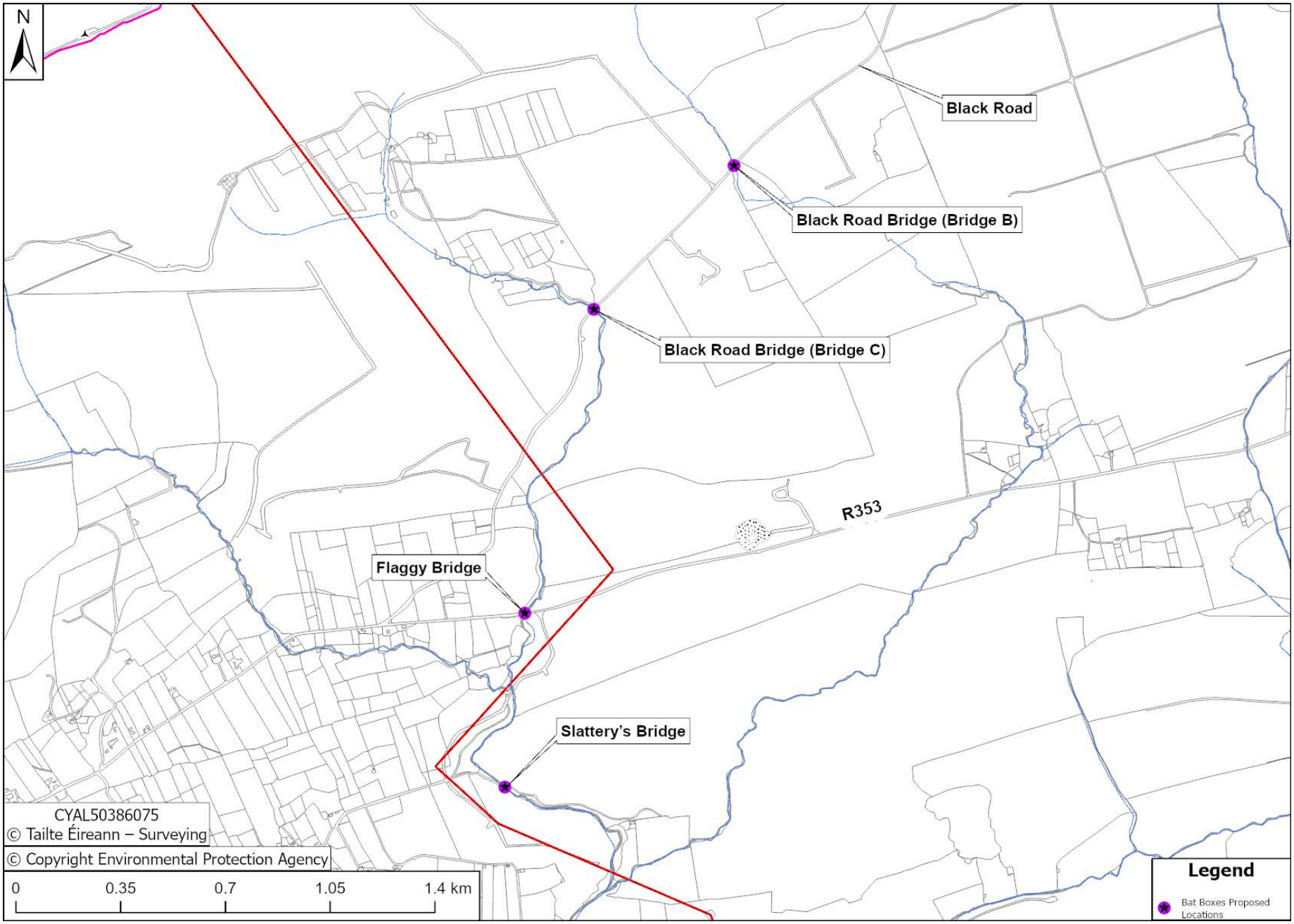


Figure 6-15 Location of bridges

Pre-Mitigation Impact

Protected sites

Lough Cutra SAC is of International Importance for lesser horseshoe bats.

The peat slide resulted in peat entering the upper reaches of the Owendalulleegh River and flowing along its length to Lough Cutra (approximately 22 km downstream). At the time of the event a visible plume was observed at the confluence of the Owendalulleegh River with Lough Cutra.

Those habitats within range of the lesser horseshoe roost at Lough Cutra would have been unaffected by the peat slide at Derrybrien with the exception of Lough Cutra itself. The principal foraging habitat for lesser horseshoe bats has been shown through radio tracking studies to be woodlands with some use of pasture and wetlands, rarely foraging over open water (Biggane (2004a, 2004b, Bontadina et. al. (2002).

A survey of bats in the Lough Cutra Castle Demesne was undertaken in March and August 2004 by Inis Environmental Services (2004d) to assess the impact of the peat slide on bats roosting and foraging at the lake. The assessment found the following:

> *Lesser horseshoe bats were noted feeding along the lakeshore in vegetation to the southeast and southwest of the castle and along an inlet of the lake to the southwest. Earlier studies in March 2004 also indicated that bats feed along the woodland paths and in the woods themselves.*
>
> *Activity along the lakeshore and over the lake was most intense on the night of August 8th, 2004. During observations in the area of the lake behind the castle, soprano pipistrelle, common pipistrelles, Daubenton's bats and Leisler's were all active at the same time over the lake. It was very clear that insects were abundant in the vicinity of the lake especially where there was vegetation to provide shelter towards the lakeshore.*
>
> *Given that any waterborne peat entered into the lake at the opposite side via the River Owendalulleegh, it is improbable that there has been any significant impact upon the invertebrate fauna that would constitute the prey items of the bat species of the castle and lodges.*
>
> *In summary, bat activity, diversity and abundance was high in the Lough Cutra Estate and on Lough Cutra in August 2004. This clearly demonstrates that the slide did not have a significant effect on invertebrates in the lake on which bats feed.*

Wilson (2012) also concluded that the peat slide, whilst causing a fish kill and degradation of water quality in the Owendalulleegh River, was not likely to have impacted on local bat populations in particular the lesser horseshoe bats in Lough Cutra Castle.

Given that the lesser horseshoe bat population at Lough Cutra Castle has ultimately remained stable and in some years has increased there would appear to be no negative impacts on this population from the peat slide and subsequent pollution event.

The impact of the peat slide on the Owendallulleegh River is not likely to have had a significant effect on the lesser horseshoe bat population of Lough Cutra SAC.

Lesser horseshoe bats

Habitats that were within the area of offsite peat slide works are also considered to have had negligible value to lesser horseshoe bats that are not part of the SAC. No effects on lesser horseshoe bat populations are likely to have occurred due to habitat loss and / or alteration related to the offsite peat slide works.

Whiskered bat

Habitats that were within the area of offsite peat slide works are considered to have had negligible value to whiskered bat. No effects on whiskered bat populations are likely to have occurred due to habitat loss and / or alteration related to the offsite peat slide works.

Daubenton's bat

Habitats that were within the area of offsite peat slide works are considered to have low value to Daubenton's bat. Effects on Daubenton's bat populations due to habitat loss and / or alteration are likely to have been minor and localised.

Offsite peat slide works resulted in damage to three bridges that may have had roosting potential for low numbers of Daubenton's bats. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on Daubenton's bats at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Brown long-eared bat

Habitats that were within the area of offsite peat slide works are considered to have had site value to brown long-eared bats. No significant effects on brown long-eared bats populations are likely to have occurred due to habitat loss and / or alteration related to the offsite peat slide works.

Offsite peat slide works resulted in damage to three bridges that may have had roosting potential for brown long-eared bats in low numbers. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on brown long-eared bats at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Natterer's bat

Habitats that were within the area of offsite peat slide works are considered to have had been of site value to Natterer's bats. No significant effects on Natterer's bat populations are likely to have occurred due to habitat loss and / or alteration related to the offsite peat slide works.

The availability of suitable roosting locations for Natterer's bat in conifer plantation is likely to have been low pre-peat slide, but the presence of roosting features by this species in some trees cannot be ruled out.

The loss of coniferous plantation and open habitats is considered likely to have had a temporary negative impact on Natterer's bats at site level. The net increase in open habitats is likely to have had a long term positive impact on Natterer's bats at site level.

The effects on Natterer's bat populations in the local area are not considered to be significant given the scale and duration of the impacts.

Offsite peat slide works resulted in damage to three bridges that may have had roosting potential for Natterer's bats in low numbers. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on Natterer's bats at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Nathusius' pipistrelle

Habitats that were within the area of offsite peat slide works are considered to have been of negligible value to Nathusius' pipistrelle. No significant effects on Nathusius' pipistrelle populations are likely to have occurred due to habitat loss and / or alteration during the offsite peat slide works.

Offsite peat slide works resulted in damage to three bridges that may have had roosting potential for low numbers of Nathusius' pipistrelle. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on Nathusius' pipistrelle at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Common pipistrelle

Habitats that were within the area of offsite peat slide works are considered to have had site value to common pipistrelles. No significant effects on common pipistrelle populations are likely to have occurred due to habitat loss and / or alteration during the offsite peat slide works.

Offsite peat slide works resulted in damage to three bridges that may have had roosting potential for low numbers of common pipistrelle. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on common pipistrelle at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Soprano pipistrelle

Habitats that were within the area of offsite peat slide works are considered to have had site value to soprano pipistrelles. No significant effects on soprano pipistrelle populations are likely to have occurred due to habitat loss and / or alteration during the offsite peat slide works.

Offsite peat slide works resulted in the damage of three bridges that may have had roosting potential for low numbers of soprano pipistrelle. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on soprano pipistrelle at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Leisler's bat

Habitats that were within the area of 'offsite peat slide works' are considered to have had site value to Leisler's bats. No significant effects on Leisler's bat populations are likely to have occurred due habitat loss and / or alteration during the offsite peat slide works.

Offsite peat slide works resulted in damage to three bridges that may have had roosting potential for low numbers of Leisler's bat. Masonry bridges are common within the local landscape. The loss of features is considered likely to have had a permanent negative impact on Leisler's bat at site level.

Given the scale and duration of the impact, a precautionary assessment is that there is likely to be a permanent negative significant effect at the site level.

Remedial (Mitigation) Measures

The damage to three bridges may have resulted in the loss of potential roosting features for bats. Bat Conservation Ireland provides guidance for planners, engineers and developers on appropriate mitigation for the loss of roosting opportunities in bridges stating:

> *"Ready-made roosting boxes or tubes are available and can be easily inserted into structures to provide roosting sites for bats. Where natural crevices are not available or cannot be retained, a bat tube should be attached to the structure. Ensure that the bat tube is located at sufficient height (at least 1m) above winter flood waters to prevent residing bats from being drowned. Bat boxes are also available for attachment to mature trees or buildings"(BCI, 2010)*

A minimum of two bat boxes will be fixed to Black Road Bridge (Bridge C) and Flaggy Bridge, both of which were impacted by the peat slide. Two boxes will also be placed on Black Road Bridge (Bridge B) rather than Slattery's Bridge.

Residual Impact

The loss of potential roost features at bridges affected by the peat slide resulted in a permanent negative impact significant at the site level for Daubenton's bat, brown long eared bat, Natterer's bat, Nathusius', common and soprano pipistrelle and Leisler's bat. Mitigation for the loss of potential roost features by providing suitable bat boxes at the bridges will result in a permanent positive residual significant effect at the site level for Daubenton's bat, brown long eared bat, Natterer's bat, Nathusius', common and soprano pipistrelle and Leisler's bat.

Significance of Effect

Mitigation for the loss of potential roost features by providing suitable bat boxes at the bridges will result in a permanent positive residual significant effect at the site level for Daubenton's bat, brown long eared bat, Natterer's bat, Nathusius', common and soprano pipistrelle and Leisler's bat.

6.4.3.4 Mammals (other than bats)

Otter

Pre-Mitigation Impact

As no otter surveys were undertaken as part of the original EISs, it is not known how many otters were present along the Owendalulleegh River or its tributaries, or where in the system they had holts or resting places. According to O'Neill et al. (2008), quoted in Reid et al., 2013), in Ireland, the

territory of female otters in mesotrophic rivers (i.e. those with an intermediate level of productivity) is approximately 7.5 ± 1.5 km. This would suggest that on the Owendalulleegh main channel there may have been up to 3 female otters. However, given that the Owendalulleegh is classified as an oligotrophic (i.e. low nutrient) system it might have a lower density than this. In a study in the Araglin Valley in the Munster Blackwater catchment, Ottino and Giller (2004) found four holts within the study catchments, three on the main channel and one on a small side channel. The authors estimated that 6 otters occupied the study area (56 km of channel) including 1 adult female, 2 cubs, 1 adult male and two sub-adults, presumed males. The family holt, where the female and cubs were present was situated about halfway along the system. The Araglin would be considered a more productive system than the Owendalulleegh given that there is more agricultural land in the lowlands. But if we take these figures for population size to be on the low size, combining them with those of O'Neill et al. (2008), we could speculate that there might have been 2 females with cubs within the overall Owendalulleegh system, and possibly another one close to or around Lough Cutra. Natal holts where the females raise cubs would be more likely situated in the more productive parts of the system, i.e. within the main river valley closer to the best feeding, rather than in the upper parts of tributaries where food resources would be lower. The one referred to in the Araglin study (Ottino and Giller, 2004) as the family holt was toward a more downstream part of the study area along the main channel. Ruiz-Olmo et al. (2005) in a study of female otters in northeastern Spain noted that females with small cubs showed a preference for river stretches with lower water speed, longer stretches of calm water, fewer waterfalls and a greater abundance of food. These observations would suggest that females and their cubs within the Owendalulleegh catchment were more likely to be concentrated toward the middle to lower reaches of the main channel. In those locations they would have likely avoided any risk of direct mortality from the peat slide. Adults and subadult males, being more mobile, even if they included the impacted tributary (SC7b/d) within their home range, would likely have been able to avoid any direct mortality from the peat slide. It is concluded therefore that the slide was very unlikely to have caused the direct mortality of any otters.

Reduction in Available Food

Records of otter footprints by the ShRFB (Anon, 2004) and Inis Environmental Services (2004a) personnel, 2 months after the slide in December 2003, confirmed that otters were still active in the Owendalulleegh including in the lower reaches of the impacted tributary after the peat slide. It is not known what these animals were feeding on but given that the signs were by the river there is a good chance that fish did form part of their diet. Although otter tracks were only noted in the first 6.6 km downstream of the confluence of the affected tributary from a point 600 m upstream on that tributary, there is no doubt that otter would also have been active in the lower reaches of the Owendalulleegh as well, given that the river is wider, and there are larger deeper pools in the middle and lower reaches with good fish holding capacity.

While the 2003 peat slide in Derrybrien resulted in a large fish kill in the Owendalulleegh River some fish may well have survived in the lower reaches of the river and there was no evidence of fish mortality in Lough Cutra. In addition, all fish in the main channel of the river upstream of the confluence of the affected tributary and in the smaller side tributaries would also have survived. Thus, while a significant proportion of the fish component of the diet of the otter in the Owendalulleegh catchment area would have been reduced, some fish would certainly have been available within normal foraging distances of any otter present, as this species is known to travel long distances to feed. In the initial days following the slide it is possible that otter in the area fed on recently dead fish as the species has been noted to take carrion (O'Sullivan 1994, quoted in Reid et al., 2013). Importantly, however, otter would have been able to shift their diet to alternative foods sources, especially to frog, although frog normally appear in the diet in later winter early spring. They may also have availed of the diverse fish resource in Lough Cutra more during this period. It can be postulated therefore that for a few months after the slide, food resources may have been reduced for whatever number of animals that had a home range in the Owendalulleegh catchment and that these would have had to travel farther to find adequate fish prey and possibly to have shifted their diet more to non-fish prey types also.

The pressure of a reduction in food would have most acutely affected adult females with litters, as their energetic requirement are known to rise very sharply when lactating. Females without cubs would have been less impacted as their energetic requirement would have been normal. A 5-year study in Shetland, Kruuk et al. (1991) showed a significant positive relationship between the density of prey fish available in July-August and the number of cubs present along a 20 km stretch of coast. Similarly, in an 11-year study of otters on a river in northeastern Spain, the number of cubs per kilometre per year was positively correlated with the abundance of fish in any given year (Ruiz-Olmo, 2011). Thus breeding success is linked to food availability and in such a scenario one could postulate that in the breeding season immediately following the Derrybrien peat slide that the number of otter cubs in the local population might have been reduced, if the affected female (or females) were unable to substitute enough of the energy lost by the reduction in fish numbers with either fish from alternative locations or alternative prey sources. Such an effect, had it occurred would have lessened in each successive year as fish numbers recovered. This impact had it occurred would have been temporary to short-term and constituted a minor to moderate negative impact at the local population scale. Even had there been a reduction in cub numbers, due either to smaller litters or greater cub mortality, this is not likely to have had a significant effect on the adult population because as Kruuk et al. (1991) noted in the Shetland study, despite a large variability in annual recruitment, the adult otter population in the same area remained stable. They postulate that a compensatory mechanism may operate, such as variation in adult mortality, or immigration from elsewhere. It is important to note that none of these impacts would have occurred in either the Boleyneendorrish or Duniry catchments which were not impacted by the peat slide.

Proposed Mitigation Measures

No mitigation measures were put in place during the offsite peat slide works.

Residual Impact

The residual impacts for otter remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on otter during the offsite peat slide works are not considered to have been significant for the reasons outlined above.

Other mammals

Pre-Mitigation Impact

The conifer plantation lost during the peat slide would have had the potential to support several mammal species as described for the construction phase. Given the arboreal nature of pine marten and red squirrel, it is expected that these two species would have been able to rapidly transition away from the peat slide area. The slide occurred in October so there would have been no direct mortality of the young of either species. Badgers present in the peat slide area may have been subject to direct mortality or displacement due to loss of parts of (or entire) setts, though as noted above, the likelihood of setts in the project area is considered to be low. The peat slide is therefore considered to have had a long-term negative impact, with no significant effect resulting on local mammal populations.

Proposed Mitigation Measures

No mitigation measures were put in place during the offsite peat slide works.

Residual Impact

The residual impacts for each species remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on each species during the offsite peat slide works are not considered to have been significant for the reasons outlined above.

6.4.4 Operation and Maintenance Phase Impacts (2006 – 2022)

6.4.4.1 Terrestrial Habitats

Pre-Mitigation Impact

A map showing the current distribution of habitats within and in proximity to the wind farm site is presented in Figure 6-16.

Direct Impacts

In the assessment of operational phase impacts from 2006 to February 2022 the following activities are considered:

- Maintenance of on-site road (c. 6 km length) and drainage network.
- Cutting back re-growth of trees in areas of felled forestry within the wind farm site and along the OHL route.
- Felling of forestry (46.2 ha) immediately west of the wind farm during the period 2016-18.

There has been very little additional habitat loss during the operational phase from 2006 to February 2022. Minor road widening works at culverts at Turbines T10, T24, T35, T50, and T56 were undertaken in 2014 where the existing road was too narrow and the side slope into drainage channels was too steep. These road widening works would have resulted in minor direct habitat loss of cutover bog and felled forestry habitat, each of these turbines is sited within felled forestry habitat with the exception of T24 where cutover bog occurs to the east of the turbine.

Occasional cutting back of re-growth of trees within the felled forestry areas prevents canopy closure occurring. As a result the dominant heath / bog vegetation continues to occupy these areas. This is considered a minor positive impact of long term duration as the habitat is of higher biodiversity value than a closed canopy conifer plantation that would otherwise have established in the area (significant positive effect).

Offsite phased tree felling (approximately 46.2 ha in total) was undertaken by Coillte under felling licence (Ref FL 18197) immediately to the west of the wind farm site in 2016, 2017 and 2018 to optimise productivity of the wind farm. It is noted that these areas had been scheduled for felling as part of Coillte's routine tree felling programme and that the felled areas are being replanted. The habitat is of low ecological value and represents a modified habitat under forestry management. It is concluded that the felling and replanting of conifer plantations adjacent to the wind farm resulted in a neutral impact on terrestrial habitats (no significant effects).

Indirect Impacts

Following the completion of construction, drainage effects of the project are likely to have continued into the operational phase. However, considering the pre-existing drainage regime of the site coupled with the absence of sensitive habitats within proximity of the wind farm infrastructure, the impacts of continued drainage are considered neutral (no significant effect). Results of field surveys demonstrate that the habitats most sensitive to hydrological impacts (dystrophic lake and upland blanket bog) remain in good condition and there is no evidence to suggest any drying out effects. Species composition and habitat structure within these remnant habitat areas remains unaffected by the presence of the wind farm.

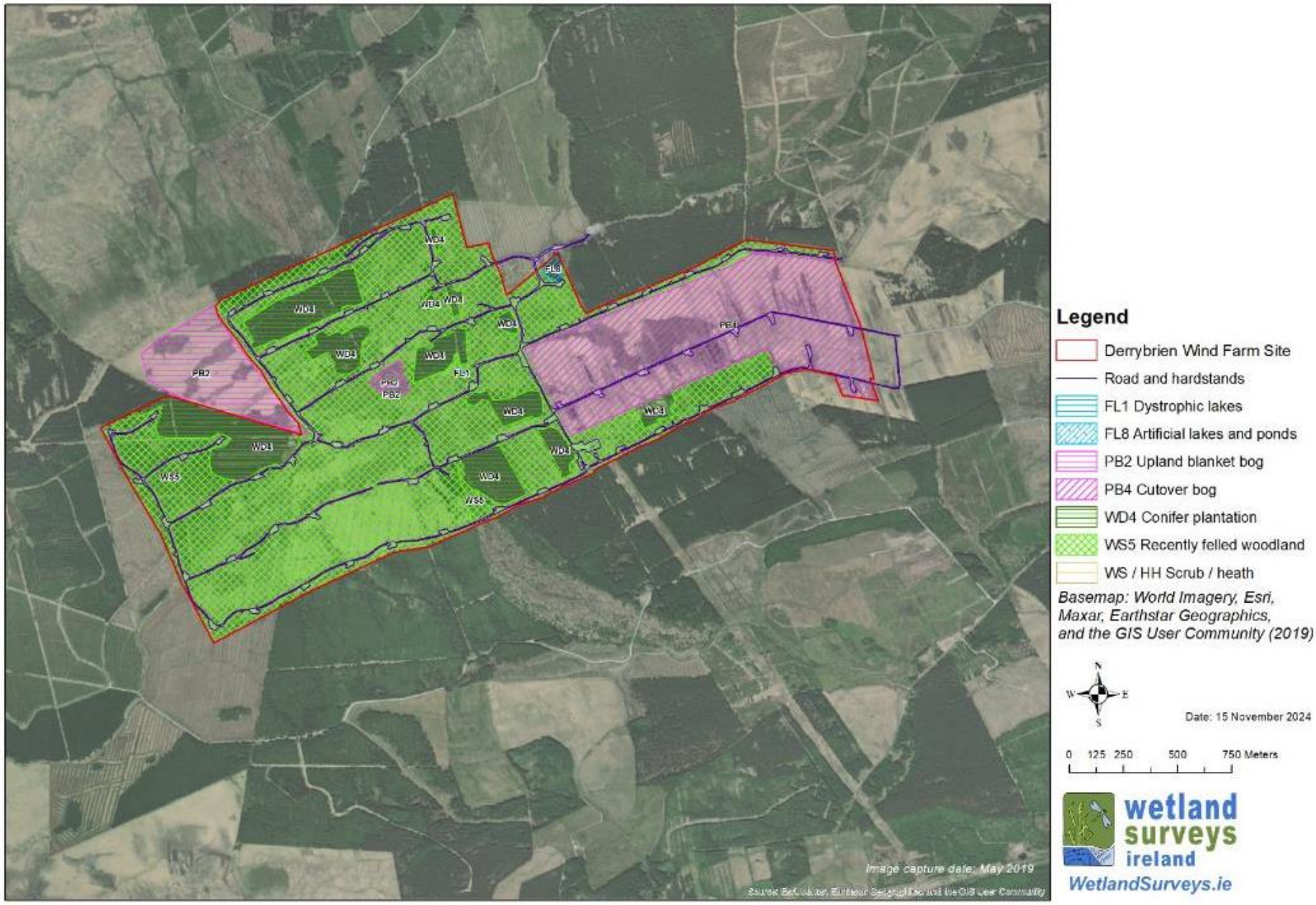


Figure 6-16 Habitats extent and distribution within the wind farm site (dated 2022).

Proposed Mitigation Measures

As no significant negative effects on terrestrial habitats have been identified due to the operation of the wind farm project there is no requirement for specific mitigation or remedial actions.

Residual Impact

No residual impacts of significance on terrestrial habitats due to the operation of the wind farm project have been identified.

Significance of Effects

There are no residual adverse significant effects on terrestrial habitats due to the operation of the wind farm project.

6.4.4.2 Birds

Pre-Mitigation Impact

The principal potential impacts on birds owing to the operation of the project are:

- Collision.
- Displacement.
- Impacts on reproductive output in relation to wind turbine proximity.
- Barrier effects.
- Development of habitats.

In addition, maintenance works include maintenance and periodic upgrade of access tracks and drains, and substation inspections and maintenance.

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 to allow crane access. Also in 2018, self-seeded tree growth beneath the overhead line was cut back where required.

The assessment is focused on the hen harrier, as the SPA supports a population of international importance. Also, according to McGuinness et al., (2015) this species is considered to be highly sensitive to wind farm development. The potential impact on other breeding bird species and on wintering birds are considered in separate sections.

6.4.4.2.2 *Potential collision impact*

Collision risk posed to bird species is one of the main environmental concerns associated with wind energy developments (Drewitt & Langston 2006, Band et al. 2007, Drewitt & Langston 2008). However, bird species differ widely in their susceptibility to collision mortality. Essentially, birds are at risk of collision only 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. Previous studies have reported low flight heights for hen harriers (Whitfield & Madders 2006a, Madden & Porter 2007, Ruddock et al. 2012), with low proportions (5-15%) of observations at rotor sweep height (Garvin et al 2011). In general, when hen harriers are engaged in hunting behaviour they are outside of the area of greatest risk of collision with wind turbines, i.e. below the rotor sweep zone. However, courtship displays such as sky dancing occur at heights of up to 100 m or more, overlapping with the rotor sweep of most modern wind turbines.

In a study of flight behaviour of adult and juvenile hen harriers at various wind farms in Ireland, Wilson et al. (2015) found that adult hen harriers spent most of their time (82.8%) flying below the reach of turbine blades. The study also showed that the time spent flying at heights with risk of collision (25m – 125m) was similar between wind farms and control sites, which suggests that hen harriers do not modify their flight height in areas where wind turbines have been installed. Of particular interest is that the study showed that recently fledged hen harriers (< 5 weeks) spent almost all of their time (99.1%) below 25 m and thus not within the collision risk zone.

It is important to note that there appears to be very few documented cases of hen harrier collision mortality from turbines in the literature (Johnson et al. 2001, Smallwood & Thelander 2004, Whitfield & Madders 2006b, Scott & McHaffie 2008). At the Altamont Pass Wind Resource Area in the United States, which is the largest concentration of wind turbines anywhere in the world and is located on a busy bird migration route, only seven collisions by northern harriers (the US equivalent of the hen harrier) were documented over a 17-year period between 1989 and 2007 (Smallwood & Karas 2008).

At the Derrybrien Wind Farm, there were no documented collisions during the various surveys for the period of 2006 to 2019, though it is noted that carcass search was not part of the monitoring. During the hen harrier summer surveys at Derrybrien between 2006 and 2018, hen harriers were observed within the wind farm site for a total of 2,457 seconds. The time spent by birds flying within the rotor sweep of the turbines was 637 seconds or 28.2% of the total, with the remainder (71.8%) of the time below 25 m height (and much of that below 10 m height). While the time spent within the rotor sweep area is somewhat higher than the figure of 18.2% given by Wilson et al. (2015), it is still relatively low and reflects the typical low flying behaviour of the hen harrier.

Bird fatality monitoring was undertaken at 32 turbine locations at Derrybrien Wind Farm from July to October 2020 and again from April to October 2021, a total of 200 days of searches (Eire Ecology, 2022). This monitoring involved dog lead corpse searches within the wind farm site. Only one bird fatality was discovered over the period of the corpse searches – a sparrowhawk at T69 on the 30th September 2021.

Collision with overhead lines is a well-documented cause of bird mortality (Bevanger 1998, Ferrer & Janss 1999, Jenkins et al. 2010, SNH 2016). 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), the risk may be highest in the stretch at Knockavana where there is a traditional hen harrier breeding territory. Nesting has however been confirmed at this territory in each of the survey years 2006 to 2011 and by 2018 (when no birds were present) it was considered that the local habitat was no longer suitable due to conifer forest maturation.

Taking into account the findings from the various surveys at Derrybrien since 2006 (including the findings of the bird fatality monitoring undertaken in 2020 and 2021), the detailed study of hen harrier flight behaviour at Irish wind farms by Wilson et al (2015), and also the studies from the international literature, it can be demonstrated that hen harriers are at low risk of collision with wind turbines as a result of their typically low flight height. However, in the absence of mitigation, the risk of collision with the overhead line is considered a potential negative impact which could be of significance.

6.4.4.2.3 Potential 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 (Drewitt & Langston 2006, 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. In a further review (but not including hen harrier), Pearce–Higgins et al. (2012) reported that observed negative effects of wind farms on birds occur principally as a result of disturbance by high levels of activity during the construction phase. Various studies have also reported hen harriers breeding within a few hundred metres of turbines (Whitfield & Madders 2006a).

Wilson et al. (2015) studied the movement of adult hen harriers at wind farm and control sites in Ireland using GPS tags and data collected during vantage point watches. The study aimed to determine whether habitat use by foraging hen harriers differed at wind farm and control sites. The study found that at wind farm sites hen harriers favoured open habitats over afforested areas. Hen harriers at control sites foraged preferentially over peatland and young forest plantations, while those at wind farm sites foraged preferentially over natural and semi-natural open habitats (i.e. scrub, rough grassland) and to a lesser extent over peatland. While the authors noted that the selection of the somewhat different foraging habitats between the wind farm and control sites is difficult to explain, the study demonstrated that wind farms were actively used for foraging purposes.

At the Derrybrien wind farm, since 2006 hen harriers have been recorded both foraging and flying through the wind farm in all surveys (Biosphere Environmental Services 2006, 2007, 2009, 2011, 2015, also see Madden & Porter 2007). Birds were often seen flying close to wind turbines (<50 m) and on one occasion within 10 m of the base. The habitats within the wind farm, which comprise a mix of cutover blanket bog, regenerating bog/heath vegetation, scrub and stands of mature conifer, are considered as optimum for foraging by hen harriers. While breeding has not been known to have been attempted within the wind farm, there are two traditional territories approximately 1 – 2 km distance from the wind farm and it can be assumed that most, or at least a significant proportion, of the sightings within the wind farm involve birds from these territories. Research on the spatial ecology of hen harriers has shown that foraging females spend most of their time within 1 km of the nest, while males hunt mostly within 2 km of the nest (Irwin et al. 2011, Arroyo et al. 2014).

While there is conflicting evidence from the literature on displacement of foraging hen harriers from close to wind turbines, there is overwhelming evidence that hen harriers have continued to forage within the Derrybrien wind farm since its operation in 2006. Taking this into account, as well as the results of research by Wilson et al. (2015) and reviews such as Madders & Whitfield (2006), it is considered that displacement of hen harriers from areas near turbines at Derrybrien has not been a significant impact. On the available evidence, it is considered that the operation phase of the Derrybrien Wind Farm has not had a significant displacement impact on the hen harrier population of the Slieve Aughty Mountains SPA.

6.4.4.2.4 Impact on reproductive output in relation to wind turbine proximity

Wilson et al. (2015) studied the breeding performance of hen harriers in relation to wind farm sites across Ireland (also see Fernandez-Bellon et al. 2015). The results showed that there were no significant differences between the breeding outputs of hen harrier nests located at different distances from wind turbines. However, non-statistically significant lower nest success rates and productivity were observed within 1 km of wind turbines. Of the nine nests monitored in the 0-1 km band during the study, 33.3% were successful, while nest success in all other distance bands was 56.0% (n = 75). It was noted that hen harrier nest success rates vary considerably throughout their range and are

influenced by many external factors. No trend was observed in fledged brood size with increasing distance from wind farms in their study, suggesting that potential impact of wind turbines on hen harrier breeding output is mediated through nest success rather than clutch or brood size.

At the Derrybrien Wind Farm, since 2006 hen harriers have been recorded nesting within a 1-2 km distance of the wind farm boundary, with one or two of territories occupied in each year of survey. In all of the survey years, breeding was confirmed at one of the two territories, and in 2009 and 2011 both territories were occupied (possible and confirmed categories).

While there have been no breeding attempts or known historic territories within the 0-1 km distance band of the wind farm, there is no evidence to suggest that the wind farm has had any impacts on the reproductive output of the two regular hen harrier territories within a 1-2 km distance band.

6.4.4.2.5 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. Commenting on studies to assess the barrier effect, Rees writes "*Avoidance of turbines should be related to whether or not flights were initially in line with the wind farm, rather than in relation to all bird movements in the area, as including the latter artificially boosts sample sizes used for calculating avoidance rates.*"

As the project area is not used by migrating birds of prey or indeed species such as whooper swan, the issue of a possible barrier effect created by the turbines is not considered relevant.

6.4.4.2.6 Development of habitats in clear felled areas

As already noted, the removal of much of the plantation forest on site (c.255 ha) without replanting has allowed the subsequent development of habitats that are suitable for a range of bird species including species typical of unplanted upland areas (such as meadow pipit and red grouse). While the regenerating bog/heath vegetation is prone to invasion by self-seeded conifers, this is localised within the site and is occurring at a relatively slow rate. From aerial images, it appears that approximately 69 ha of the original felled area had been colonised by self-seeded conifers up to 2021.

The replacement of non-native conifer plantation with an open sward (albeit prone to colonisation by self-seeded conifers) is having a positive impact of long-term duration for birds including hen harrier, resulting in a significant positive effect.

6.4.4.2.7 Maintenance activities during operation phase

As described in the Project Description (Chapter 2), the main activities undertaken on site which are not specifically related to the operation of the turbines were the maintenance and periodic upgrading of access tracks and drains, and substation inspection and maintenance. As noted, self-seeded tree growth along four sections of track (to 10 m width either side of the track) and beneath the overhead line was cut back on one occasion in 2018-2019.

Maintenance and upgrading of access tracks within the wind farm is an occasional activity. Such works, which are assessed in advance for potential environmental impacts (including issue of peat stability), are relatively minor and localised within the site and largely confined to the original road footprint. Also, routine works such as this would usually be carried out outside of the bird nesting season. It is considered that track maintenance and upgrading works would not have any measurable effect on the

foraging potential of the site for the local hen harrier population and would not affect the breeding of birds in the hinterland of the wind farm site.

Since the clearing of conifer plantations within the wind farm site and along the overhead line corridor between 2003 and 2005, self-seeded conifer trees, mostly lodgepole pine, have become established throughout much of the site, though their distribution and density varies. Some of these trees have now reached 4 m or more in height and in places the trees are encroaching along the access tracks. A programme to remove these trees from along four identified sections of tracks (to 10 m either side) was undertaken in autumn 2018. Removal of trees from within the overhead line corridor was also undertaken in 2028-19. The works in each year were carried out outside of the bird breeding season and as not to cause disturbance to nesting birds. Overall, it is considered that the removal of any conifer trees is a positive impact of long-term duration for birds such as hen harrier which naturally forage over open habitats such as bog, heath and low scrub.

Of particular relevance is the harvesting and replanting of the forest area immediately to the west of the wind farm (46.2 ha) by Coillte between 2016 and 2018 (this was done a few years before the due felling date to facilitate the wind farm). This area will provide suitable second rotation foraging habitat for hen harriers from about 2020 onwards to 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.

Maintenance works at the wind farm substation and the Agannygal Substation would not be expected to have any impacts on local bird populations or species such as hen harrier which nest in the hinterland of the wind farm as they are confined to the substation compounds.

6.4.4.2.8 *Impact on other breeding bird species*

While surveys were focused on the use of the wind farm site and surrounding areas by hen harrier, it is apparent that a substantial number of other bird species breed within, or feed in, the wind farm site. While these species were not subject to specific breeding surveys, young, fledged birds (especially meadow pipit, skylark, stonechat etc) were often seen so it can be assumed that successful breeding does occur on site.

It is generally considered that passerine species are not significantly impacted by wind farms (SNH 2017). Wilson et al (2015), however, found that breeding bird densities were lower at wind farm sites than at control sites and lower closer to wind turbines than further away. For forest birds, densities were significantly lower within 100 m of wind turbines. In the study, the proportion of calling birds recorded was lower at wind farm sites than at corresponding control sites but only within 100 m of turbines. Other studies have found that where reduced bird abundance has been reported at wind farms this effect has been confined to an area very close to the wind turbines and not extended into the wider landscape (Leddy et al. 1999, Pearce-Higgins et al. 2009).

At the Beinn Tharsuinn Wind Farm in Scotland, Douglas et al. (2011) found no significant differences in the changes in abundance of either breeding red grouse or golden plover between the wind farm and control site, and no evidence that changes in species' distribution were related to wind farm infrastructure. The analysis of species distribution highlighted a positive association between red grouse occurrence and turbine proximity. Anecdotal evidence suggests red grouse may use tracks as a source of grit, which they ingest to aid digestion (Watson & Moss 2008). The observations of red grouse within the Derrybrien Wind Farm in both summer and winter concur with the above.

It can be concluded that during the operation phase of the wind farm since 2006, the regenerating habitats have attracted a range of breeding bird species that are similar to those characteristic of open bog and heath habitats. This applies also to the OHL corridor and the peat slide area. Of particular importance is the frequency of meadow pipit, a Red-listed species, as well as skylark and linnet (all Amber-listed species). On occasions, red grouse (Red-listed) has been recorded within the former afforested areas of the site as well as the cutover bog habitat. The retention of the site in an unplanted state during the operation phase, and with some limited removal of trees from alongside tracks and the

overhead line corridor, is rated as significant positive of long-term duration for breeding and summer bird species.

6.4.4.2.9 *Impact on winter bird species*

While hen harrier was observed in the hinterland of the Derrybrien Wind Farm in October 2019, December 2024 and February 2025 and at times could roost locally during the winter period (though no roosts located during any of the three winter surveys, it is not expected that the feeding or roosting behaviour of this species in autumn or winter (if present) would be affected by the presence of the wind farm. Similarly, the wind farm project would not be expected to impact upon merlin which may be in the hinterland in the winter period (one recorded *c.*2.5 km from wind farm in October 2019).

Golden plover, a species of high conservation importance (Annex I & Red listed), was recorded on the wind farm site in winter and spring as well as several winter records in the hinterland. There is no evidence to indicate that this species is affected by the presence of the wind farm project.

Proposed Mitigation Measures

Any required significant maintenance works, such as track repairs or cutting of trees (as in 2018-19), were done outside of the bird breeding season so as to avoid disturbance to nesting birds.

Residual Impact and Significance of Effects

In the absence of mitigation, the risk of collision with the overhead line by bird species such as hen harrier is considered a potential negative impact which could be of significance.

The removal of much of the plantation forest on site (c.255 ha) without replanting has allowed the subsequent development of habitats that are suitable for a range of bird species including species typical of unplanted upland areas, including hen harrier, meadow pipit and red grouse. While the regenerating bog/heath vegetation is prone to invasion by self-seeded conifers, the majority of the site is still a largely open landscape (though with time, the self-seeded conifers are likely to become dominant in some sectors). The replacement of non-native conifer plantation with an open sward is considered a positive impact of long-term duration for birds, resulting in a significant positive effect.

6.4.4.3 Bats

The potential impact of operational wind farms on bats is fatality caused by interaction with wind turbines. This section of the assessment concentrates on those bat species that are at high risk of collision with wind turbines due to their ecology and for which empirical studies have shown, fatalities at wind farms are likely.

Common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and Leisler's bat have been included in the impact assessment for the operational phase, as guidance suggests that these species are considered to be at high risk of turbine collision.

Since 2002, the State Bird Conservation Authority of the Brandenburg State Office for the Environment has been collating available data on collisions of birds and bats with wind turbines (WTs) across Europe (Dürr, 2024). No published data are available on bat fatalities recorded at wind farms in Ireland, but 133 fatalities have been recorded at UK wind farms (and passed on to the recording centre). A summary of the data from UK and Europe (total) for high risk species recorded in Ireland are given in Table 6-.

Table 6-22 Summary of bat fatalities (high risk species) at wind turbines in the UK and Europe (total including UK figure up to 2023).

Bat species	UK	Europe
Nathusius' pipstrelle	1	1792
Common pipistrelle	46	3401
Soprano pipistrelle	52	494
Leisler's bat	0	813

One soprano pipistrelle corpse (in 2016), two common pipistrelles and one Leisler's bat corpses (in 2020) were found during mortality surveys, confirming that bat mortality has occurred during the operation phase of the wind farm. The turbines were subsequently curtailed[21] in Autumn 2020 after which no fatalities were recorded.

Monitoring studies at other operational wind farm sites have demonstrated between year differences in fatality rates. These fatality rates do not always closely reflect bat activity data recorded pre and post-construction. It is therefore difficult to accurately predict future fatalities based on historical data. For this reason a precautionary approach has been taken when determining the significance of effects on bat populations in the project area.

Lesser horseshoe bat, whiskered bat, Daubenton's bat, Natterer's bat and brown long-eared bat

Lesser horseshoe bat, whiskered bat, Daubenton's bat, Natterer's bat and brown long-eared bats are considered to be at low risk of collision with turbines due to their foraging and commuting behaviours. No effects on Lesser horseshoe bat, whiskered bat, Daubenton's bat, Natterer's bat and brown long-eared bat populations are considered likely to have occurred during the operational phase.

Nathusius' pipistrelle

Nathusius' pipistrelle was recorded in the project area on two nights in autumn 2019 (6 passes in three minutes on 11/09/2019 and 1 pass on 07/09/2019). On the basis of the data collected to date it is reasonable to assume that Nathusius' pipistrelles have been present throughout the operation phase, particularly in autumn.

The activity recorded is consistent with natural dispersal (following the summer breeding period) and migratory patterns of Nathusius' pipistrelle across Europe (Dietz and Keifer, 2016). Although the period over which Nathusius' pipistrelle is at risk of collision is limited to Autumn, observations by Dürr and Bach (2004) found that the majority of all bat fatalities (89%) for this species occurs also during the autumn.

Nathusius' pipistrelle are considered to be at high risk of collision with turbines due to their foraging and commuting behaviours and the evidence of fatalities for the species at monitored wind farms across Europe.

It is likely that a long-term negative impact on Nathusius' pipistrelle bats has occurred at site level.

[21] *A curtailment strategy was implemented mid-Autumn 2020 that stopped the operation of turbines when temperatures were above 11 degrees Celsius and wind speed was below 5 m/s between dusk and dawn each night.*

The relative abundance of Nathusius' pipistrelle bats in Ireland is 'rarest', and it has not been recorded breeding to date. The levels of activity recorded suggest that low numbers of Nathusius' pipistrelle pass through the areas around the turbines. Given the indicative size of the population in Ireland, a precautionary assessment is that the effect of mortality is likely to have had a long term negative significant effect at the county level.

Common and soprano pipistrelle

Common and soprano pipistrelle were recorded in the project area during 2016 and 2019, although comprehensive data were not collected prior to 2016, survey in 2012 confirmed that *pipistrelle* sp. were present on site. It is reasonable to assume that common or soprano pipistrelles have been present throughout the operation phase.

In 2016, Common pipistrelles were recorded during every month of survey. There was a peak in activity in June (4.5 P/h), and relatively low activity in April, May, July and August (0.4, 0.1, 0.1 and 0.4 P/h respectively). Soprano pipistrelles were also recorded during every month of survey. There was a similar peak in activity in June (0.6 P/h), and far lower activity in April, May, July and August (all <0.1 P/h). Given that a peak in activity only occurred in June for both species, it likely that the bats were responding to a period of high food availability and / or calm weather.

The highest activity was recorded from 101-120 mins after sunset for both common and soprano pipistrelle; the lowest activity was recorded within the 40 minutes after sunset and before sunrise (<0.1 P/h both species). Both common and soprano pipistrelles are early emerging and late returning species, therefore the temporal data suggests that there are no large roosts of either species in close proximity to the site.

Common and soprano pipistrelle activity during the autumn of 2019 (29 August – 3 October inclusive), was lower than recorded in June 2016 for common pipistrelle (2.4 P/h) but slightly higher for soprano pipistrelle (0.8 P/h). Activity was lower in 2016 in all other months. Low activity was recorded within the 40 minutes after sunset and before sunrise for common and soprano pipistrelle (0.2 and 0.1 P/h respectively), suggesting a similar temporal pattern to that recorded in 2016.

Both species are considered to be at high risk of collision with turbines due to their foraging and commuting behaviours and the evidence of fatalities for both species at wind farm across the UK and Europe (and therefore assumedly Ireland).

It is likely that a long-term negative impact on common and soprano pipistrelle bats has occurred at site level.

The project area is considered to be of site value to both common and soprano pipistrelles, the relative abundance of both species in Ireland is common, and monitoring data suggest both populations are stable.

The effect of mortality due to wind turbines on the favourable conservation status of common and pipistrelle bat populations is likely to have had a long term negative significant effect at the site level.

Leisler's bat

Leisler's bats were recorded on site during 2016 and 2019.

In 2016, an average activity rate was recorded of Leisler's bats of 3 bat passes per hour (P/h) between April and August.

Leisler's bats were recorded during every month of survey. There was a peak in activity in April and May (7.0 and 6.2 P/h respectively) which coincides with the end of the hibernation period as bats start

to move to their summer roosts, and a marked decrease in activity during bat maternity season in June, July and August (0.9, 0.3 And 0.2 P/h).

Low activity was recorded within the 20 minutes after sunset and before sunrise (<0.1 and 0.2 P/h respectively). Thirty-three Leisler's bat passes were recorded before sunset (7 bat passes) or after sunrise (26 bat passes). Early / late bat passes were recorded at T27, T67 T18 and T41 over nine separate nights. This temporal pattern suggests that it is unlikely that there was a permanent roost in or close to the wind farm during the recording period, but that individual bats may have opportunistically roosted nearby on a few occasions.

Leisler's bat activity during the autumn of 2019 (29 August – 3 October inclusive), was lower than recorded in spring 2016, and similar to the activity recorded in summer of the same year (average in autumn 2019 0.6 P/h). One pass was recorded after sunrise, and none before sunrise, suggesting a similar pattern to that recorded in 2016.

Leisler's bats are considered to be at high risk of collision with turbines due to their foraging and commuting behaviours and the evidence of fatalities for the species at wind farms across Europe (and therefore assumed Ireland). No Leisler's bat fatalities have been recorded in the UK, however, there have been Noctule fatalities recorded (11 bats), which is the more common *Nyctalus* sp. in the UK. It is reasonable to assume that Leisler's bats have been present throughout the operation phase.

It is likely that a long term negative impact on Leisler's bats has occurred at a site level.

The habitats in the project area were considered to be of local value to Leisler's bat. The relative abundance of Leisler's in Ireland is rarer, however, monitoring data suggest populations in Ireland are stable.

The effect of mortality due to wind turbines on the favourable conservation status of Leiser's bat populations is likely to have had a long term negative significant effect at the local level.

Proposed Mitigation Measures

No mitigation was in place whilst the turbines were operational. Survey suggests that turbine curtailment would have reduced the impact on bat species at risk from collision. Curtailment was implemented in September 2020 and no fatalities were recorded during survey work following curtailment.

No mitigation is required following the cessation of turbine operations as this has removed the potential for impact on bats.

Residual Impact

The residual impact of the operation of turbines is provided below for those species identified as at high or moderate risk of turbine collision.

Nathusius's pipistrelle

During the operational phase of the project it is likely that some fatality has occurred as a result of blade strike whilst the turbines were operational. A precautionary assessment is that the effects of fatality alone and in combination with other operational projects is likely to have resulted in in a residual negative effect on Nathusius' pipistrelle that was significant at the County level.

Common pipistrelle

During the operational phase of the project it is likely that some fatality has occurred as a result of blade strike whilst the turbines were operational. A precautionary assessment is that the effects of fatality alone and in combination with other operational projects is likely to have resulted in a residual long term negative effect on common pipistrelle that is significant at the local level.

Soprano pipistrelle

During the operational phase of the project it is likely that some fatality has occurred as a result of blade strike whilst the turbines were operational. A precautionary assessment is that the effects of fatality alone and in combination with other operational projects is likely to have resulted in a residual long term negative effect on soprano pipistrelle that is significant at the local level.

Leisler's bat

During the operational phase of the project it is likely that some fatality has occurred as a result of blade strike whilst the turbines were operational. A precautionary assessment is that the effects of fatality alone and in combination with other operational projects is likely to have resulted in a residual long term negative effect on Leisler's bat that is significant at the local level.

Significance of Effect

A precautionary assessment is that the effects of fatality alone and in combination with other operational projects has resulted in a residual negative effect on Nathusius' pipistrelle that was significant at the County level. For common pipistrelle, soprano pipistrelle and Leisler's bat effects of fatality alone and in combination with other operational projects has resulted in a residual negative that was significant at the local level.

6.4.4.4 Mammals (other than bats)

Otter

Pre-Mitigation Impact

The assessment of impacts on fisheries in Chapter 7 suggests that full trout biomass would likely have been restored in 3-5 years, with stone loach biomass being restored even sooner. These changes would have gradually relieved the reduction in prey availability for otter in the Owendalulleegh system, coinciding largely with the commissioning of the wind farm in 2006. After that time and up to the present, the operation of the wind farm is not believed to have had any significant negative impact on fish biomass within the Owendalulleegh catchment or any other river catchment draining the project area and therefore no negative impact on the food availability of otter.

Proposed Mitigation Measures

No mitigation measures were put in place during operation.

Residual Impact

The residual impacts for otter remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on otter during operation are not considered to have been significant for the reasons outlined above.

Other mammals

Pre-Mitigation Impact

Offsite phased tree felling and replanting (approximately 46.2 ha in total) was undertaken immediately to the west of the wind farm site in 2016, 2017 and 2018 to optimise productivity of the wind farm. The impact of this scheduled felling, which was limited in extent and carried out on a phased basis is comparable to the impacts already discussed in relation to the felling prior to wind farm construction. Due to the overall small area of forestry felled and the phasing of felling, these operational activities are considered to have had a short-term negative impact which would not have resulted in a significant effect on the local mammal population.

Proposed Mitigation Measures

No mitigation measures were put in place during operation.

Residual Impact

The residual impacts for each species remain unchanged from the pre-mitigation impacts.

Significance of Effects

The effects on each species during operation are not considered to have been significant for the reasons outlined above.

6.4.5 Ceased Operation Phase Impacts (2022-Present)

6.4.5.1 Terrestrial Habitats

Pre-Mitigation Impact

Since the cessation of the project there has been no active maintenance that could give rise to negative effects.

Drains have not been maintained or cleaned during the period and this may have reduced the effectiveness of site drainage. This however is unlikely to have had any measurable effect on the ecological value of the habitats present on site.

There has been no control of vegetation (such as growth of conifer trees) within the site. This has led to the increased spread and maturation of conifer trees throughout felled areas within the site. In the long term the continued spread and maturation of conifer species would have a negative impact on the ecological value of the affected habitats. To date this has had no significant negative effect.

Proposed Mitigation Measures

As no significant negative effects on terrestrial habitats have been identified due to the ceased operation of the wind farm project there is no requirement for specific mitigation or remedial actions.

Residual Impact

No residual impacts of significance on terrestrial habitats due to the ceased operation of the wind farm project have been identified.

Significance of Effects

There are no residual negative significant effects on terrestrial habitats following the ceased operation of the of the wind farm project.

6.4.5.2 Birds

Pre-Mitigation Impact

In February 2022, the wind farm ceased operation and all maintenance works on site have been suspended since.

As noted in Section 6.4.3.2.2 above, collision risk posed to bird species is one of the main environmental concerns associated with wind energy developments.

At the Derrybrien Wind Farm, there is no collision risk as turbines are in a prolonged non-operational state (subject to maintenance by the turbine supplier). The risk of collision with rotating turbine blades will be completely eliminated at the Derrybrien Wind Farm as a result of the Prospective Development, and conditions will revert to the status prior to construction of the wind farm project. It is noted, however, that in the case of hen harrier the risk of collision with wind turbines was considered low (for reasons described in section 6.4.4.2.2 above).

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 2016). For the Derrybrien to Agannygal 110kV line, which does not have bird flight diverters as mitigation, the risk of collision still exists for hen harrier and other large bird species. However, any risk of collision with the overhead line will be eliminated by the removal of the line as part of the Prospective Development – thus, conditions will revert to the status prior to construction of the wind farm project, i.e. no power lines, though the line corridor will not be replanted and hence will be of more value to birds than the original forest plantation (notwithstanding the gradual spread of self-seeded conifers).

The cessation of maintenance works will allow self-seeded conifer trees to spread along the road edges (see Plate 6-19), where the slightly drier conditions may be more suitable for growth, and also within the overhead line corridor. However, the spread will be at a slow rate and the landscape will retain a largely open character. The potential effect on hen harrier by the spread of trees in areas where otherwise they might have been controlled by cutting is rated as a non-significant negative effect at an International level of importance.

With the absence of any drain maintenance, the effectiveness of the site drainage may be reduced over time and this could lead to a gradual increase in the extent of wet bog in some parts of the site. Blanket bog and heath, even in a degraded state, provides optimum breeding habitat for passerine species such as meadow pipit and skylark. As these small birds are principal prey species of hen harrier and merlin, there is expected to be a Positive Effect of Long-term Duration, at an International

level of importance. The re-establishment of peatland habitats would also have a potential Positive effect for nationally important species such as snipe, kestrel and red grouse.

Mitigation Measures

As no works are being carried out at the wind farm or along the overhead line corridor, mitigation for birds has not been required in the period since February 2022. Bird diverters may be installed along the OHL to reduce the potential collision with birds, however this action would be redundant given that it is proposed to permanently remove the OHL as part of the Prospective Development

Residual Impact and Significance of Effects

The principal residual effect since operations ceased at the wind farm is the elimination of any risk of collision with rotating turbine blades (subject to maintenance by the turbine supplier) - conditions will thus revert to the status prior to construction of the wind farm project for hen harrier and all bird species. However, the risk of collision with overhead lines still remains, though this will be eliminated by the removal of the line as part of the Prospective Development. Until the lines are removed or bird diverters installed, this is rated as a negative impact which could be of significance.



Plate 6-19 Spread of self-seeded conifers in occurring in parts of site, including along road edges where slightly drier conditions exist – view is along southern road between T32 and T35, looking eastwards. April 2024.

6.4.5.3 Bats

Pre-Mitigation Impact

The only operational impacts identified for the project on bats relates to the risk of bats colliding with rotating turbine blades. There is no impact associated with stationary turbines or any other operational activities.

During the ceased operation phase, there is no collision risk as turbines are in a prolonged non-operational state (subject to maintenance by the turbine supplier). The risk of collision with rotating turbine blades will be completely eliminated at the Derrybrien Wind Farm as a result of the Prospective Development.

Proposed Mitigation Measures

As no impacts have been identified, no mitigation is proposed.

Residual Impact

No impacts have been identified during the ceased operation phase.

Significance of Effects

As no impacts have been identified, there are no significant effects for any bat species.

6.4.5.4 Mammals (other than bats)

Otter

Pre-Mitigation Impact

Following the cessation of operation, there has been no maintenance undertaken within the site, including no drain cleaning or vegetation clearance. As such, considering the absence of any activities, there is no potential for impacts on otter.

Proposed Mitigation Measures

No mitigation measures are required.

Residual Impact

As no impacts have been identified, there are no significant effects for otter.

Significance of Effects

As no impacts have been identified, there are no significant effects for otter.

Other mammals

Pre-Mitigation Impact

Following the cessation of operation, there has been no maintenance undertaken within the site, including no drain cleaning or vegetation clearance. As such, considering the absence of any activities, there is no potential for impacts on any other mammal populations.

Proposed Mitigation Measures

No mitigation measures are required.

Residual Impact

As no impacts have been identified, there are no significant effects for any other mammal populations.

Significance of Effects

As no impacts have been identified, there are no significant effects for any other mammal populations.

6.4.6 Impacts of Retained Development – Decommissioned Phase

6.4.6.1 Terrestrial Habitats

Pre-Mitigation Impact

It is expected that the long term retention of in-ground infrastructure (turbine and substation foundations, underground cable infrastructure), the road network, emergency works associated with peat slide, borrow pits and peat repository areas will not give rise to any negative impacts on terrestrial habitats.

The retention of in-ground infrastructure roads and the road network will not give rise to any additional habitat loss. Localised effects on soil hydrology due to their continued presence will not give rise to any negative impacts considering the adjacent habitats which are of low ecological value and not overly sensitive to such impacts. Long term recolonisation of hard road and hardstand surfaces with vegetation is expected to occur and is likely to lead to a minor positive impact.

The retention of emergency works, borrow pits and peat repository areas will not lead to any habitat disturbance of loss. The terrestrial habitats present at the various locations are now stabilized and semi-natural vegetation has become established. These habitats are expected to retain their current ecological value.

Proposed Mitigation Measures

As no significant negative effects on terrestrial habitats have been identified due to the retained project there is no requirement for specific mitigation or remedial actions.

Residual Impact

No residual impacts of significance on terrestrial habitats due to the retained development have been identified.

Significance of Effects

There are no residual negative significant effects on terrestrial habitats following the retained development.

6.4.6.2 Birds

Pre-Mitigation Impact

6.4.6.2.2 *Wind farm*

For convenience, the site is divided into the main habitats existing in 1998, unplanted cutover bog and afforested bog.

Unplanted cutover bog

The retention of concrete turbine foundations, hardstand areas, the substation foundations, and constructed roads within the unplanted eastern sector of the site is a negative impact as the original cutover bog which was lost would have been of value for a range of bird species associated with peatland habitats, including hen harrier, merlin and red grouse.

Whilst the area of these built surfaces is relatively small (0.7 ha), any loss of bog habitat (including cutover) is of some importance and the potential effect on hen harrier is rated as a long-term negative slight effect, at an International level of importance.

For snipe and meadow pipit (both Red-listed), the potential effect is rated as a negative effect of slight significance and of permanent duration, at a National level of importance.

The retention of underground cabling within the bog is rated as a Neutral impact on birds as negative effects from the existence of the buried cables are unlikely, i.e. whether the cables are present or not does not have impacts on any bird species.

The naturalized peat repository areas are now fully vegetated mainly with bog vegetation species. From the perspective of birds, their present value for nesting and/or foraging would be similar to the value of the original cutover bog. The retention of the repositories is rated as a Neutral impact.

Some small sections of drains were constructed within the bog area. These are unlikely to have had any effects on bird species, as the entire bog had at the time a network of drains associated with peat cutting. The retention of the constructed drains is rated as a Neutral impact.

Planted bog

From the perspective of birds, commercial conifer plantation is a non-native habitat that has limited value for birds. When in the pre-thicket stage (c.3-12 years) of the rotation, the open character of the forest is useful for both breeding and feeding for a range of bird species, including hen harrier. However, for the greater part of the rotation cycle the closed canopy forest provides low opportunities for birds other than conifer specialists such as jay, siskin and crossbill. Also, the forest can support nesting species such as sparrowhawk (present in wind farm site) and merlin (not recorded during any of the studies). Generally, the edges of the closed canopy conifer stands are of most value to birds. Also, areas of planted forest which have failed or grown poorly can be useful habitat for birds.

The retention of concrete turbine foundations, hardstand areas, the substation foundations, the 2 no. mast foundations and constructed roads within the planted area of the site is rated as a Neutral impact on the basis that the limited value to birds of the retained structures is comparable to the limited value of the conifer habitat that was present in 1998.

The retention of underground cabling within the previously planted areas is rated as a Neutral impact on birds as negative effects from the existence of the buried cables are unlikely, i.e. whether the cables are present or not does not have effects on any bird species.

The naturalized peat repository areas are now fully vegetated mainly with bog vegetation species. From the perspective of birds, their present value for nesting and/or foraging is greater than the value of the original forest habitat. The retention of the repositories is rated as a Positive impact of Moderate Significance and of Permanent duration at the International level of importance.

Drains were constructed within the afforested area and were in addition to the existing forest drains. As these drains are of some value to local birds, their retention is rated as a Positive impact of Moderate Significance and of Permanent duration.

The presence of the 3 no. borrow pits (inc. 1 quarry pond) is of value to local birds. The Red-listed grey wagtail breeds at the quarry pond, whilst hirundines feed regularly over this feature. The other two borrow pits are now open areas with scrub. As the presence of these three pits, and especially the quarry pond, is of more value to birds than afforested ground, their retention is rated as a Positive impact of Moderate Significance and of Permanent duration at the International level of importance.

6.4.6.2.3 *OHL and Agannygal Substation*

Conifer plantation occurred along the entire length of the overhead line corridor and at the site for the Agannygal Substation. As already noted, conifer plantation is a non-native habitat and is generally of low value for birds.

The concrete and reinforced concrete foundations for the polesets and masts are now largely overgrown with scrub vegetation and are of some limited value to birds. The concrete foundation for the structures within the substation will develop as an open area with sparse vegetation, which will be of some value to birds

The retention of these structures is rated as a Neutral impact on the basis that the limited value to birds of the retained structures is comparable to the limited value of the conifer habitat that was present in 1998.

6.4.6.2.4 *Off-site features related to peat slide*

The habitats affected by the various features constructed in response to the peat slide were conifer plantation and wet grassland (semi-improved). The barrages and repository areas were colonised by wet rushy grassland and gradually by scrub.

The replacement of conifer plantation by wet grassland and scrub is rated for birds as a Positive impact of Moderate Significance and of Long-term duration at an International level of importance. The replacement of former wet grassland areas by the present wet grassland/scrub habitat is rated as a Neutral impact.

Mitigation Measures

As negative impacts are not predicted by the retention of the off-site features, mitigation measures for birds are not required.

Residual Impact and Significance of Effects

The principal residual effects by the retention of the features are as follows:

The permanent loss of 0.7 ha of cutover bog which is habitat used by peatland species including hen harrier – rated as a long-term negative slight effect, at an International level of importance.

The retention of the naturalized peat repository areas, drains, and borrow pits is rated as a Positive impact of Moderate Significance and of Permanent duration at the International level of importance, as

these constructed areas are now mostly vegetated with bog type vegetation, which is more useful to birds than conifer plantation.

6.4.6.3 Bats

Pre-Mitigation Impact

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. Whilst it is likely that over time the tracks will be colonized by vegetation the extent of this re-vegetation in the context of the project area is minimal and unlikely to have an impact on any bat species.

Proposed Mitigation Measures

No impacts associated with the Retained Development have been identified, therefore no mitigation will be required during this phase of development.

Residual impact

No impacts have been identified that could have an effect on bat species recorded in the project area.

Significance of effect

There will be no significant effect on the species recorded in the project area.

6.4.6.4 Mammals (other than bats)

Otter

Pre-Mitigation Impact

The Retained Development includes the retention of ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. There are no activities associated with the Retained Development. As such, there is no potential for impacts on otter.

Proposed Mitigation Measures

No mitigation measures are required.

Residual Impact

As no impacts have been identified, there are no significant effects for otter.

Significance of Effects

As no impacts have been identified, there are no significant effects for otter.

Other mammals

Pre-Mitigation Impact

The Retained Development includes the retention of ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. There are no activities associated with the Retained Development. As such, there is no potential for impacts on any other mammal population.

Proposed Mitigation Measures

No mitigation measures are required.

Residual Impact

As no impacts have been identified, there are no significant effects for any other mammal populations.

Significance of Effects

As no impacts have been identified, there are no significant effects for any other mammal populations.

6.4.7 Cumulative and In-Combination Effects

The following projects/activities in proximity to the Retained 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 Retained 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.

- Prospective Development.
- Turbary activity.
- Wind Farms in Slieve Aughty Mountains.
- Adjacent coniferous forestry operations.
- Overhead Transmission Lines.

6.4.7.1 Terrestrial Habitats

When the impacts on terrestrial habitats 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 a small area of cutover bog habitat (0.7ha), the Prospective Development will not result in any additional permanent loss of bog habitat. Hence, there is no cumulative loss of habitat when both Developments are considered together.

It is concluded that no potential cumulative impacts from the Retained Development and the Prospective Development on terrestrial habitats are identified.

Turbary may result in loss and disturbance of peatland habitat. The loss of 0.7ha due to the Retained Development will make a minor contribution to cumulative loss of habitat when considered with

turbary. The additional loss caused by the Retained Development is minor and not significant considering the extent of the habitat in the wider area.

Considering the characteristics of other land uses and other projects in the area together with the predicted impacts of the Retained Development in isolation it is concluded that there are no potential cumulative impacts identified.

6.4.7.2 Birds

Cumulative Impacts with the "Prospective 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 additional 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 will not result in any additional changes to habitats used by birds when considered with the Prospective Development (as discussed in Section 6.4.5.2).

Cumulative Impacts with other developments

The Retained 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 planting of very substantial areas of the Slieve Aughty Mountains has resulted in a significant loss of blanket bog and heath habitats of high value for upland bird species. While species such as hen harrier will also utilise conifer plantation for breeding and foraging purposes, the value of conifer plantation for birds is low compared to the natural open bog.

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 site.

As the Retained Development had caused the removal of a small area of cutover bog (0.7 ha) which would have provided suitable foraging habitat for hen harrier, merlin and other peatland bird species, there will be a minor cumulative negative effect in the loss of bog habitat when considered with the loss of bog habitat as a result of forestry in the surrounding areas of the Site.

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 on birds from turbary within and around the wind farm site have not been quantified, the Retained Development will contribute (albeit to a very minor extent – 0.7 ha) to a cumulative negative effect on birds, including hen harrier and merlin, by loss of peatland habitat.

6.4.7.3 Bats

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on any bat species in the project area. Therefore, there is no cumulative effect with identified projects.

Proposed Mitigation Measures

No impacts have been identified and therefore no mitigation is required.

Residual Impact

No impacts associated with the Retained Development have been identified that could have an impact on bat species found in the project area. There is therefore no cumulative residual impact.

Significance of In-Combination Effects

No impacts associated with the Retained Development have been identified that could have an impact on bat species found in the project area. There will be no significant effect on bat populations recorded in the survey area.

6.4.7.4 Mammals (other than bats)

Otter

The Retained Development includes the retention of ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. There are no activities associated with the Retained Development. As such, there is no potential for impacts on otter. Therefore, there is no cumulative effect with identified projects, including the Prospective Development.

Proposed Mitigation Measures

No mitigation measures are required.

Residual Impact

No impacts associated with the Retained Development have been identified that could have an impact on otter found in the project area. There is therefore no cumulative residual impact.

Significance of Effects

No impacts associated with the Retained Development have been identified that could have an impact on otter found in the project area. There is therefore no cumulative residual impact.

Other mammals

The Retained Development includes the retention of ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. There are no activities associated with the Retained Development. As such, there is no potential for impacts on other mammal populations. Therefore, there is no cumulative effect with identified projects, including the Prospective Development.

Proposed Mitigation Measures

No mitigation measures are required.

Residual Impact

No impacts associated with the Retained Development have been identified that could have an impact on other mammal populations found in the project area. There is therefore no cumulative residual impact.

Significance of Effects

No impacts associated with the Retained Development have been identified that could have an impact on other mammal populations found in the project area. There is therefore no cumulative residual impact.

6.5 Conclusion

6.5.1 Terrestrial Habitats

No residual significant effects on terrestrial habitats have been identified from the construction, operation and decommissioning of the wind farm project.

6.5.2 Birds

The residual impact on birds by the retention of the various features (as discussed) compared to the baseline situation in 1998 varies from negative slight effect and of permanent duration to positive moderate effect of and of permanent duration, with most of the effects rated as neutral. However, none of the effects are rated as significant (according to EPA Guidelines 2022).

While, the retention of the various features is expected to contribute to a cumulative effect on birds as a result of loss of peatland habitat of value for birds when considered with forestry and peat cutting activities within and around the site, this has not been identified as significant.

6.5.3 Bats

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on any bat species in the project area. Therefore, no mitigation is proposed and there is no cumulative effect.

The Retained Development will result in no significant effects on any bat species in the project area.

6.5.4 Mammals (other than bats)

6.5.4.1 Otter

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on otter in the project area. Therefore, no mitigation is proposed and there is no cumulative effect.

The Retained Development will result in no significant effects on otter in the project area.

6.5.4.2 Other mammals

The Retained Development includes ground level and below ground infrastructure that have been present within the project area since the wind farm was constructed. No impacts have been identified that could result in a significant effect on any other mammal population in the project area. Therefore, no mitigation is proposed and there is no cumulative effect.

The Retained Development will result in no significant effects on any other mammal population in the project area.

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

7.1 Introduction

Lauren Williams, Senior Freshwater Ecologist, was commissioned by ESB to provide the Aquatic Ecology chapter to the remedial Environmental Impact Assessment Report (rEIAR) (prepared by MKO) in relation to the Derrybrien Wind Farm Development Decommissioning Project – Retained Development as described in Chapter 4 (Project Description) of this rEIAR. The area of the Retained Development for which permission is sought, and is the subject of this chapter, is defined by the "red line" application boundary included in the planning drawing pack.

7.1.1 Chapter Scope

This chapter contains the environmental impact assessment for the Retained Development as relates to aquatic ecological receptors providing statements of the likely significant effects (if any) on the aquatic environment that: (i) have occurred, (ii) are occurring, or (iii) could reasonably be expected to occur, by reason of the development having already been carried out, as well as the likely significant effects of the Prospective and Retained Development. It also details measures already undertaken and proposed to avoid, prevent, remedy, mitigate, reduce or offset any significant negative effects.

As described in Chapter 1 (Section 1.7.2), the baseline year for the Retained Development is 1998, i.e., preceding the 2003-2006 construction phase of the wind farm, substations and Derrybrien to Agannygal Overhead Line (OHL). The proposed retained elements of the Derrybrien Wind Farm Project could not have been constructed without constructing the entire development, hence this impact assessment addresses effects on aquatic ecology arising from the Derrybrien Wind Farm Project during the Construction Phase (2003-2006, including the peat slide in October 2003); the Operation and Maintenance Phase (2006 – 2022); the Ceased Operation Phase (2022 – Present) and any effects of the Retained Development going forward, taking into account cumulative and in-combination effects, including the proposed Derrybrien Wind Farm Development Decommissioning Project (i.e., the "Prospective Development").

7.1.2 Statement of Authority

This chapter was prepared by 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 National Parks and Wildlife Service (NPWS)), and an accredited River Habitat Survey (RHS) and River Hydromophology Assessment Technique (RHAT) practitioner.

7.1.3 Relevant Legislation

The authors have 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 and Policy

- Planning and Development Act, 2000 (as amended).
- 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.
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009).
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 (S.I. No. 77/2019).
- Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH, 2024)
- European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report

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.
- European Commission (EC), Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- 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.

7.2 Methodology

7.2.1 Approach to Establishing the Baseline

For the purposes of this rEIAR for the Retained Development, the baseline year is 1998. The following are important aspects that informed the approach taken to establishing the aquatic ecology baseline for the Retained Development and the evolution of the receiving environment in the 26 years since 1998:

1. The original EIS for Derrybrien Wind Farm (prepared 1997; submitted 1998) provided no evidence of baseline information for the aquatic environment or water quality.
2. The 2020 remedial EIAR (rEIAR) for the Derrybrien Wind Farm Project (prepared by Aquatic Services Unit (ASU), University College Cork(UCC)) contained very detailed desk and field studies which included literature review and extraction of historical water quality and fisheries data to establish: (i) retrospectively, the likely baseline for the receiving aquatic environment prior to commencement of the wind farm construction in 2003; (ii) the effect of the October 2003 peat slide, and (iii) the evolution of the receiving environment between 2003 and 2020, i.e., covering construction and the operational / maintenance phases.
3. The 2024 EIAR for the Derrybrien Wind Farm Development Decommissioning Project (prepared by ASU, UCC) contains additional desk and field studies that establishes the current condition of the receiving environment, i.e., the ceased operation phase.

Of the above reports, (2) and (3) were used extensively to inform the current rEIAR for the proposed Retained Development.

7.2.2 Overview of Methods for the Aquatic Study

The current assessment relied on a combination of a desktop review of available data sources, consultation and field surveys (2011-2024). The data collected was used to inform a description of the phases that are referred to in this assessment:

Baseline conditions 1998 - 2001

Available data was compiled from the period prior to the construction of Derrybrien Wind Farm Development. This was important to set the benchmark against which all future changes had to be assessed. The data consisted almost exclusively of what the EPA had available in relation to biological water quality monitoring for the principal river catchments within the drainage area of the wind farm, plus a limited amount of water chemistry data for Lough Cutra and the lower reaches of the Owendalulleegh River.

Construction Phase 2003-2006

At the time of the October 2003 peat slide and for a number of months after it, Galway County Council undertook water chemistry testing, looking mainly at, turbidity, colour and pH, at sites along the Owendalulleegh from the site of the peat failure through to the outflow river from Lough Cutra (Beagh/Cannahowna/Gort River) as far as Gort and at several sites farther downstream, to assess the potential impacts of the slide on the potable water supply source for Gort. These data were useful to explain the dynamics of the peat slide at the time from a water chemistry standpoint.

Operation and Maintenance Phase (2006-2022):

EPA water chemistry data collected monthly from 2007 to 2022, from a site in the lower reaches of the Owendalulleegh River was an important resource used to assess water chemistry of the main river. Given that the Owendalulleegh River drains 66.2% of the wind farm site and 92% of the OHL land area, the data is highly representative of overall water quality trends associated with the Project between 2007 and 2024. Fish survey data for the lower Owendalulleegh River by Inland Fisheries Ireland (IFI) in 2009, 2013 and 2016 informs the assessment, particularly in terms of the recovery of the fish population after the peat slide.

Detailed field surveys were carried out by ASU, UCC between 2011 and 2022, to obtain biological water quality (i.e. Q-value), water chemistry and fisheries data for the extensive network of smaller tributaries draining the wind farm site, the OHL corridor and the Agannygal Substation. The surveys were conducted across a broad range of weather conditions and flow levels allowed judgements to be made as to how these factors influenced the response of watercourses. In addition to the above, the study has also relied on an examination of aerial imagery available from the Ordinance Survey of Ireland (OSI) from 1995, 2000 and 2005 which allowed high level judgements to be made on forestry clear-felling in the study area and to ground-truth these against mapped forestry management data supplied by Coillte for the same catchments. Google Earth imagery was also used to compliment this.

Ceased Operation Phase (2022 – Present)

EPA water chemistry data collected monthly in 2022 and 2023, from a site in the lower reaches of the Owendalulleegh River was used to assess water chemistry of the main river. This was supplemented by biological water quality data arising from field surveys at select sites in 2022 and 2024 and river corridor walkover survey at select locations in 2024.

7.2.3 Zone of Influence

The Zone of Influence for this Project is the drainage area of the upper reaches of the Boleyneendorrish, Owendalulleegh and Duniry Rivers including their headwater tributaries, plus the western and eastern Agannygal streams that flow towards Lough Atorick which is the upper Bleach River catchment.

7.2.4 Desktop Study

Data sources accessed for the desktop review included the following:

- EIAR for the Derrybrien Wind Farm Development Decommissioning Project, importantly the baseline as of 2022 and the impact assessment as set out in Chapter 7 – Biodiversity (Aquatic Ecology & Fisheries).
- rEIAR for the Derrybrien Wind Farm Project (2020), importantly the baseline and impact assessment set out in Chapter 8 - Aquatic Ecology & Fisheries.
- Derrybrien Wind Farm Environmental Impact Statement (1998) prepared by Saorgus Energy Ltd., Tralee, Ireland.
- 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/).
- 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.

- Water Framework Directive (WFD) maps and data (https://www.catchments.ie/).
- NPWS online maps of Special Areas of Conservation (SACs) and associated conservation information for the study area and downstream connected waterbodies (available at https://www.npws.ie/maps-and-data).
- Report Fish Passage Assessment of the Upper Owendalulleegh River in the Vicinity of Flaggy Bridge (IFI, 2023).
- Historic and current maps, reports and data relating to the wind farm site and adjoining areas provided by the client.
- Relevant reports and papers in the scientific literature.
- Consultation with IFI regarding certain aspects of the project.

7.2.5 Field Studies

7.2.5.1 Survey Site Locations

Locations of field survey sites referred to throughout this chapter are shown on Figure 7-1 (map of survey sites) with Irish Transverse Mercator (ITM) coordinates set out in Table 7-1. The following field surveys were undertaken to inform this impact assessment at various sites as indicated in Table 7-1 between 2011 and 2024:

(i) Macroinvertebrate Q-value surveys in 2011, 2014, 2018, 2019, 2020, 2022 and 2024.
(ii) Electrofishing surveys in 2011, 2014, 2019 and 2022.
(iii) Water chemistry surveys in 2011, 2018, 2019 and 2022.
(iv) Benthic grab sampling survey in Lough Cutra, to characterise the nature of the bottom substrates in the lake and to assess the type of soft sediment benthic macroinvertebrates present (October 2019).

Table 7-1 sets out the site names and locations (ITM) of field survey sites sampled for all field surveys carried out between 2011 and 2024 covering biological water quality (Q-values), water chemistry, electrofishing and sediment sampling in Lough Cutra. Relevant survey dates appear in the applicable results tables.

Table 7-1 Survey Site names and locations (ITM) 2011-2024.

Site	Easting	Northing	Site	Easting	Northing	Site	Easting	Northing
B1	559242	707252	**O4**	561355	703613	**O9B**	557222	701285
B1A	559132	707017	**O4A**	561369	703628	**O10**	554623	698968
B1B	559684	706518	**O4B**	560122	703936	**O11**	551046	698476
B2	557160	706458	**O5**	561145	702597	**OHL1**	563756	697352
B2A	558830	705969	**O5A**	560309	702507	**OHL2**	562111	700693
B3	555860	706871	**O6**	561114	701977	**OHL2A**	563549	697832
B3A	556951	707095	**O6A**	561095	701268	**OHL 3**	565044	698238
B4	555846	706780	**O7**	560139	701249	**CU1**	547770	697490
B4A	556591	705574	**O7A**	561059	701246	**CU2**	547774	697505
B4B	556560	705261	**O7B**	561134	701215	**CU3**	547768	697745
B4C	556829	704589	**O7C**	562447	701486	**CU4**	547749	697843
B5	555451	706853	**O8**	559177	700865	**CU5**	547748	697893

Site	Easting	Northing	Site	Easting	Northing	Site	Easting	Northing
D1	564088	707702	O8A	558798	701824	CU6	547279	698287
D1A	561580	707058	O8B	557263	701255	CU7	548254	698546
O1	562231	705635	O9	556110	699652	CU8	547435	698805
O2	563548	703119	O9A	555524	701567	CU9	547944	699050
O3	562729	702986	O9A1	555625	701661	CU10	548298	699974
O3A	561942	703971	O9A2	555648	701680	CU11	548442	700256

7.2.5.2 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 samples of aquatic macroinvertebrates and habitat conditions. The index assigns a score to the macroinvertebrate assemblage 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. The desk study included a review and tabulation of all relevant EPA Q-value data for the watercourses draining the Project. The EPA River monitoring sites are marked on Figure 7-1.

In addition, a total of 74 sites: 2011 (11), 2014 (6), 2018 (7), 2019 (26), 2020 (1), 2022 (17) and 2024 (6) were surveyed for Q-value assessment within the project drainage area. Figure 7-1 includes all these sites along with a few where water sampling and electrofishing surveys were also conducted. Several sites were surveyed in more than one year. Sites were distributed along the main channel of the Owendalulleegh and Boleyneendorrish rivers, as well as on the smaller streams in these catchments draining the wind farm site or lands immediately adjoining the wind farm site. Two sites were also surveyed in the Duniry catchment to which a tiny portion (0.6%) of the footprint of the wind farm drains to the east. Finally, four sites were surveyed on small streams draining the OHL corridor, the Agannygal Substation and the proposed access track to the Agannygal Substation for the proposed decommissioning phase. One (OHL1) eventually joins the main channel of the Owendalulleegh and the other three flow southwards to the shore of Lough Atorick, located south of the study area. The strategy underlying the choice of sites was to cover all the smaller and larger streams draining the wind farm, the Agannygal Substation and the OHL during the construction, operation, ceased operation and decommissioning phases. At each survey site a three-minute moving kick-sample and one-two minute stone washing was 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 either examined on the bankside in a white tray (2014, 2018, 2019, 2020, 2022 and 2024) or preserved on site with 70% alcohol and brought back to the laboratory for faunal extraction, enumeration and identification (2011). Relative abundance categories were assigned 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.

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

Q-value	Quality Description	Water Quality	[1]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	

[1] Status assigned in this report is "potential" WFD status as it is not part of the EPA's formal WFD river monitoring programme, except at those sites where the EPA results are being reported.

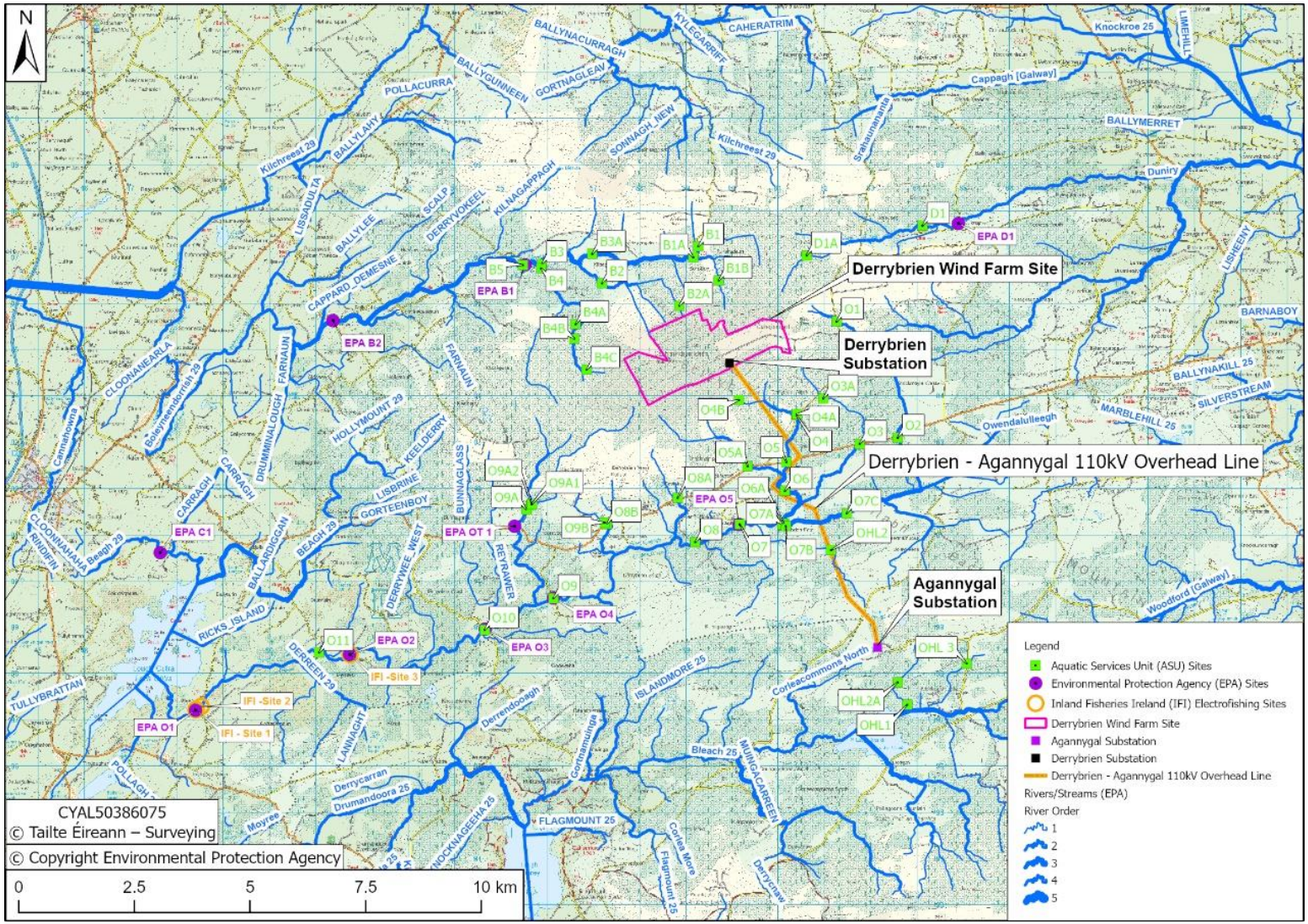


Figure 7-1 Sample Site Code and Location Map (Project Specific, EPA and IFI)

7.2.5.3 Water Chemistry

Chemistry data was required to characterise the nature of the conservative parameters i.e. pH, conductivity, alkalinity, anions and cations etc., 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, [2]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 icepacks in the field and delivered within hours of collection to the EPA approved ASU 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 7-3 Water chemistry analysis methods

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)
Total Suspended solids (TSS)	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 Organic Carbon (DOC)	mg/l, C	SHIMADZU TOC-VCPH TOC analyser
Soluble Reactive Phosphorus (SRP)	mg/l P	Automated Molybdate method using Lachat™ Quikchem FIA
Total Phosphorus (TP)	mg/l P	Manual molybdate method after sample digestion
Ammonia	mg/l N	Automated salicylate method using Lachat™ Quikchem FIA
Total Oxidised Nitrogen (TON)	mg/l N	Automated colourimetric method using Lachat™ Quikchem FIA after cadmium reduction
Potassium	mg/l K^+	Flame AAS method

[2] 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
Sodium	mg/l Na^+	Flame AAS 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)

Water chemistry data was interpreted in accordance with Surface Water Regulations (S.I. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations as amended by S.I. 77 of 2019) to support the achievement of high and good ecological status, as set out in Table 7-4.

Table 7-4 Physico-chemical boundary values for Irish rivers ([3]S.I. 77 of 2019)

	High Status	Good Status
MRP (mg P/l)	≤ 0.025 (mean) and ≤ 0.045 (95%ile)	≤ 0.035 (mean) and ≤ 0.075 (95%ile)
Ammonia (mg N/l)	≤ 0.040 (mean) and ≤ 0.090 (95%ile)	≤ 0.065 (mean) and ≤ 0.140 (95%ile)
BOD (mg O_2/l)	≤ 1.3 (mean) or ≤ 2.2 (95%ile)	≤ 1.5 (mean) or ≤ 2.6 (95%ile)
Dissolved Oxygen (% sat.)	80 -120%	

7.2.5.4 Electrofishing Surveys

Electrofishing surveys were carried out at a total of 29 sites as follows: 2011 (12), 2014 (6), 2019 (11), 2022 (10). Locations of fish survey sites are shown in Table 7-1 and on the map in Figure 7-1. A number of the sites were visited on more than one occasion across the four survey years. Survey sites were situated mainly on small tributary streams draining the wind farm site in two main river catchments (Owendalulleegh and Boleyneendorrish) but also at several main channel sites in both catchments and at a site in the upper reaches of the Duniry catchment (2011). The choice of survey site was prompted by a number of considerations: (1) the need to assess the smaller tributaries, in particular the Derrybrien North tributary (SC7(b) and SC7(d) (see Figure 7-3) affected by the 2003 peat slide, and (2) in the absence of pre-slide fish records it was important to get an understanding of the significance of these small streams to the overall fish population within each catchment. It was also considered prudent to survey several main channel sites, both upstream and downstream of the stretch on the Owendalulleegh impacted by the peat slide, to assess the current fish populations in both the affected and unaffected stretches and to gauge the likely importance of the unaffected stretch with regard to the recovery of the population in the impacted stretch after the slide. Finally, because IFI's fishing surveys (2009, 2013 and 2016) were in the lower reaches of the Owendalulleegh River it was considered important to sample at least one site within that area to compare fish densities and age structures derived from the current surveys with those obtained by IFI. A single main channel site was surveyed also on the Boleyneendorrish River.

[3] *S.I. No. 77/2019 - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019*

On receipt of the necessary permits from IFI via the relevant government department at the time (Department of Agriculture Fisheries and Food; Department of the Environment, Climate and Communications) and with implementation of the specified biosecurity protocols, electrofishing was undertaken using two standard methods:

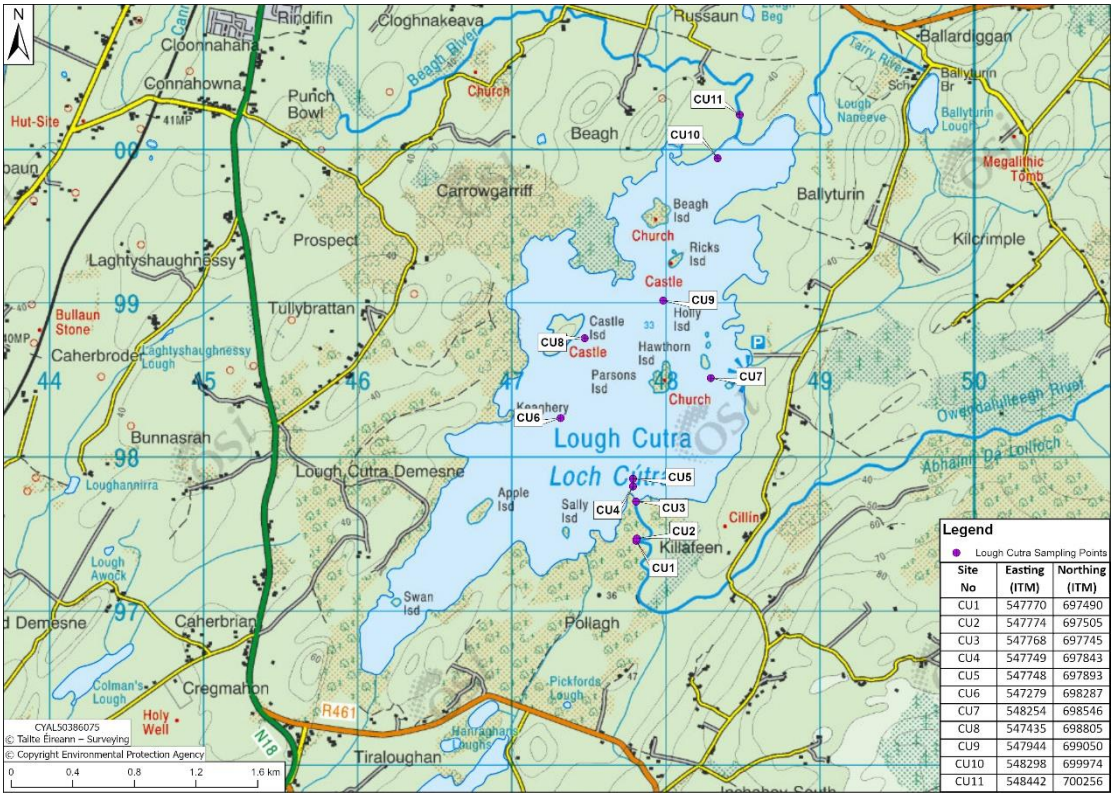
(1) Quantitative surveys (3-pass depletion) in 2011, 2014 and 2019 entailed securing stop nets upstream and downstream of a defined length of stream channel (usually a minimum of 30m) to prevent fish from upstream or downstream of the stretch entering during the survey and to prevent fish within the stretch from escaping. The stretch was fished three times in succession with the fish from each session being identified, measured (length) and counted.

(2) Qualitative 10-minute timed electrofishing surveys were used in 2022, a method regularly used by IFI for juvenile fish surveys in wade-able rivers (Delanty *et al.,* 2022). This method allowed more sites to be fished in a day, without the requirement to carry heavy stop-nets and usually allowing a longer stretch of channel to be fished. Importantly, the results between timed and depletion methods tend to be strongly correlated (Kelly *et al.,* 2007), noting that the results obtained in the 2022 surveys compared well with surveys undertaken previously at the same sites using the quantitative method.

Under both quantitative and qualitative methods, fish collected at each site were placed in a holding bin of 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. The 2011 survey employed a bankside generator system connected by a long cable to the operator. Surveys in 2014 and 2019 employed a back-pack petrol generator system operated at a voltage of 400 or 750 volts at low amperage. The 2022 surveys were undertaken using a battery powered backpack electro fisher. At each of the surveyed sites, habitat notes were taken 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.

7.2.5.5 Grab Sampling - Lough Cutra

Benthic sediment and invertebrate sampling were conducted on Lough Cutra (EPA Code: IE_WE_29_37) on 31 October 2019, entailing the collection of a single Van Veen grab sample ($0.047m^2$) of the bottom sediment at 11 sites from the lower reaches of the Owendalulleegh River to the outflow of the Beagh River (see Figure 7-2 for sample site locations). Grainsize analysis was carried out on oven-dried sediment samples from each site using the protocols described by Holme & McIntyre (1984). The pre-treated and dried sediment was passed through a series of nested brass test sieves with the aid of a mechanical shaker. Sieve meshes chosen were 4mm, 2mm, 1mm, 500µm, 250µm, 125µm and 63µm. The sediments were then divided into three fractions: % Gravel (>2mm), % Sand (<2.0mm >63µm) and % Silt-Clay (<63µm). Organic matter was estimated using the Loss on Ignition (LOI) method. One gram of untreated dried sediment was washed at 450˚C for 6 hours and organic matter was calculated as % sediment weight loss. Macroinvertebrates were extracted after sieving fresh samples through a 1mm sieve and preserved in 70% ethanol. They were identified using standard keys to the freshwater fauna of Britain and Ireland.



Site No	Easting (ITM)	Northing (ITM)
CU1	547770	697490
CU2	547774	697505
CU3	547768	697745
CU4	547749	697843
CU5	547748	697893
CU6	547279	698287
CU7	548254	698546
CU8	547435	698805
CU9	547944	699050
CU10	548298	699974
CU11	548442	700256

Figure 7-2 Lough Cutra Sediment Sample Location Map

7.2.6 Scoping and Consultation

As part of the 2020 rEIAR, consultation was undertaken with the EPA about current (at that time) and historical trophic status and ecological status of Lough Cutra. IFI (Shannon Region) were contacted about the fish kill on the Owendalulleegh River which followed the October 2003 peat slide. In addition, an officer of a local angling club was contacted in relation to current (at that time) and historical fishing activity on Lough Cutra, as well as any recollections of the condition of the lake immediately after the 2003 peat slide.

In 2022, the project team consulted with IFI on the issue of fish passage in sub-catchment SC7(b) (see Figure 7-3) with a view to assessing the likely impacts of the 'do-nothing scenario' for the Derrybrien Wind Farm Development Decommissioning Project in relation to offsite ancillary works associated with peat slide (2003), particularly regarding Barrages 3 and 4 which are lower down on the main tributary affected by the 2003 peat slide. 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. As part of the National Barriers Surveillance Programme, IFI assessed the effect of natural and artificial fish migration barriers on the Derrybrien North tributary (SC7(b) and SC7(d) (IFI, 2023). This report is addressed and further discussed in Section 7.4.6.3.3. of this Chapter, along with the implications of identified fish migration barriers downstream of Flaggy Bridge in SC7.

7.2.7 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).
- National Roads Authority (NRA) Guidelines for the Assessment of Ecological Impacts of National Road Schemes – Versions 1 and 2 (NRA, 2003, 2009).

7.2.8 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 of contextual information for the resource at a geographic level. The evaluation criteria used to classify sites is shown in Table 7-5. This is mainly based on NRA (2003) guidelines which referenced 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 7-5. 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 7-5 Ecological evaluation criteria (Adapted from NRA, 2003, 2009)

Relevant Criteria	Category
International Importance: 1. Sites designated (or qualifying for designation) as an SAC 2. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988) 3. Major salmonid (salmon, trout, or char) lake fisheries	**A**
National Importance: 4. Sites or waters designated or proposed as a Natural Heritage Area (NHA), Statutory Nature Reserve or National Park 5. Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU habitats directive 6. 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 7. Major trout fishery rivers 8. Waterbodies with major amenity fisheries value 9. Commercially important coarse fisheries	**B**
County Importance: 10. Small water bodies with known salmonid populations or with good potential salmonid habitat 11. Undesignated sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive 12. Large water bodies with some coarse fisheries value 13. 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
14. Small water bodies with some coarse fisheries value or some potential salmonid habitat. 15. Any waterbody with unpolluted water (Q-value rating 4-5, Q5)	
Local Importance (Lower value): 16. Water bodies with no current fisheries value and no significant potential fisheries value.	**E**

7.2.9 Impact Assessment Criteria

Impact types and levels of significance were assigned according to the terminology of EPA (2022), as set out in Table 7-6 and Table 7-7. Potential direct, indirect and cumulative impact significance associated with the project were assessed in accordance with criteria set out in EPA Guidelines (EPA, 2022). Guidance was also sought from and NRA (2003, 2009).

Table 7-6 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 7-7 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

Impact Duration	Criteria
Permanent Effects	Effects lasting over sixty years
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.

7.2.10 Limitations/Difficulties Encountered

The original Environmental Impact Statements for the project provided no water quality or aquatic ecology (macroinvertebrate, fisheries or water chemistry) data and therefore no detailed site-specific pre-construction baseline was available for the small sub catchment streams draining the development. In addition, except for triennial EPA data on Q-values at several sites on the main channel of the Owendalulleegh, Boleyneendorrish and Duniry Rivers (which have proven crucial in the current assessment) there was a lack of more site-specific baseline data for these main channels into which the minor streams draining the wind farm and much of the OHL corridor flow. There was a similar paucity of baseline fisheries, ecological and water chemistry data for Lough Cutra (into which the Owendalulleegh flows as the main lake inlet: draining 66.2% of the wind farm site and 92% of the OHL area) for the years immediately prior to, during and immediately after, the 2003 peat slide. Moreover, there were very limited follow-up fisheries, water chemistry or macroinvertebrate surveys carried out in the years immediately following the commissioning of the wind farm, especially given the occurrence of a very large peat slide during the construction. That made it difficult to assess the speed of recovery of the ecological status and fish populations in some watercourses impacted by the 2003 peat slide. That being said, IFI fish survey data from 2009, 2013 and 2016 combined with site-specific ASU fish survey data from 2011, 2014, 2019 and 2022 provide for a reliable analysis of the fish communities present during most of the operation / maintenance phase and up to the present day. Despite the constraints, it is considered that primarily the EPA data available, combined with data collected during repeated, extensive field surveys between 2011 and 2024, is adequate to conduct the impact assessment for the proposed Retained Development.

7.3 Receiving Environment

7.3.1 River Catchments Overview

Drainage from the Derrybrien Wind Farm site flows to three major 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 southwest 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, plus the Agannygal substation area, flow south to a small unnamed stream eventually entering the north shore of Lough Atorick, which ouflows as the Bleach River, part of the Shannon catchment. The wind farm, substations and OHL drain to small headwater sub catchments of these larger river catchments, and for reference throughout this chapter, the small drainage sub catchments from the wind farm site (SC1 to SC9 and OHL1) are shown in Figure 7-3.

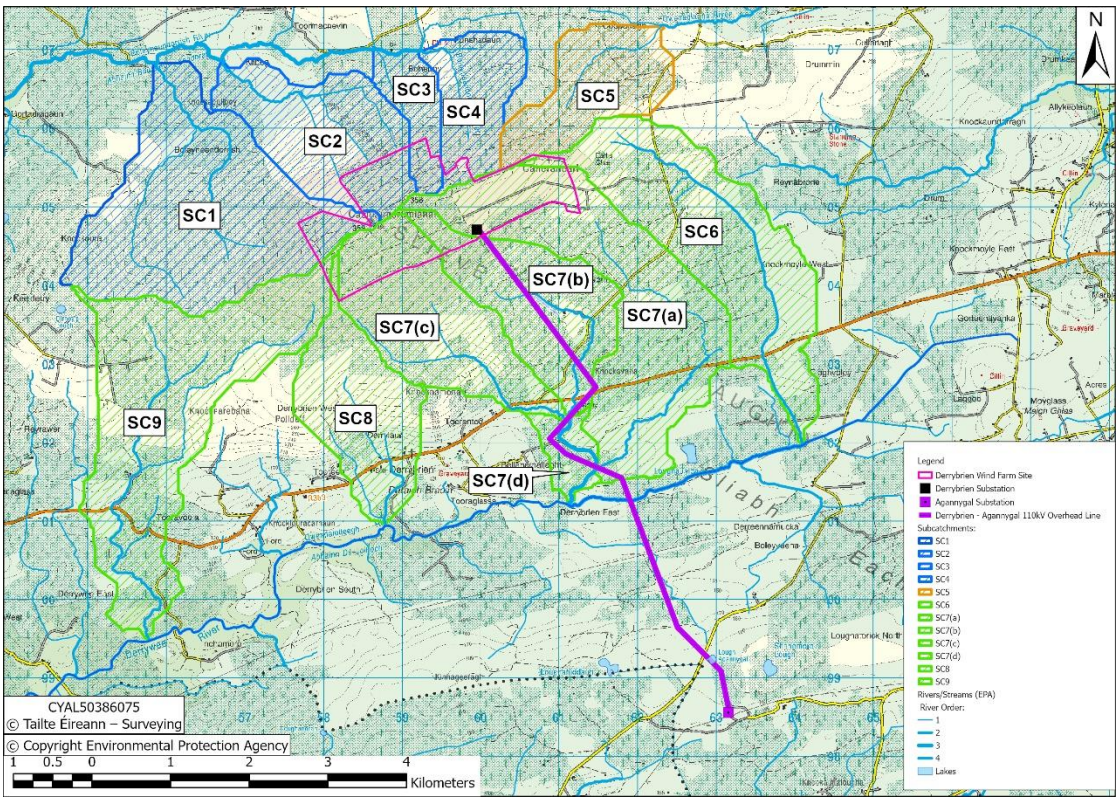


Figure 7-3 Sub catchments draining the wind farm to Owendalulleegh, Boleyneendoorish and Duniry Rivers

7.3.1.1 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. 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 (see turbary map Chapter 4, Figure 4-4) follows a 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 Retained Development.

7.3.1.2 Drainage from the Wind Farm

The wind farm site drains to three separate river catchments. 33.4% of the site (115.2ha); it 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 (0.6%, 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. For example, SC7(a) 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 wind farm to the three main river channels tend in the main to be 1st or 2nd 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), 8 no. barrages were constructed along the Derrybrien North watercourse to stem the flow of liquefied peat down into the Owendalulleegh. Since that time 4 no. barrages have been removed and 4 no. remain in place (see Chapter 4, Figure 4-3). The EIAR for the Derrybrien Wind Farm Development Decommissioning Project considered the potential impacts of removing or retaining some of these structures in terms of fisheries and general aquatic ecological effects. This is specifically dealt with in this rEIAR in Chapter 3, Alternatives.

None of the small streams draining the wind farm 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. Several channels within the same or adjoining sub-catchment are included within the same River Water Body (RWB) on EPA mapping.

7.3.1.3 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.

7.3.1.4 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 Special Areas of Conservation (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].

7.3.2 Hard Geology and Soils

The underlying hard geology within the study area is sedimentary including mudstone, siltstone and conglomerate of the Ayle River Formation and greywackes, siltstones and mudstones of the Derrynafadda Formation. In addition, along parts of the main downstream channel of the Owendalulleegh River, there are sections of Visean limestone. The overlying quaternary deposits comprise blanket peat in the uplands, till derived from Devonian sandstones and, close to the main downstream channel of the Owendalulleegh, alluvial deposits. The upland areas comprise blanket peat, which underlies all the forestry in the area, with acid brown earths/brown podzolics and peaty gleys acidic underlying most of the agricultural lands farther down the valleys in both the Boleyneendorrish and Owendalulleegh catchments.

7.3.3 Sub catchments and Land use

The land use for the small and very small upper tributaries of the Owendalulleegh, Boleyneendorrish, Duniry and Lough Atorick/Bleach rivers that drain the footprint of the Project is almost exclusively a combination of commercial coniferous forest in various states of growth or re-growth and open blanket bog moorland which has not been afforested. Moving down the system, agricultural land begins to form part of the land use within the drainage areas, especially along the mid to lower reaches of the main channels of the Owendalulleegh and Boleyneendorrish rivers but is absent from most of the small sub catchments draining the wind farm except SC8 and SC9 (see Figure 7-3) where it makes up a small part in the lower reaches. Virtually all of the land along the 7.8 km OHL route corridor between the wind farm site and Agannygal Substation comprises coniferous plantation as does much of the drainage area between the Agannygal Substation and Lough Atorick to the south, into which it eventually drains.

In addition to forestry, blanket bog within the study area contains extensive areas of cut-over bog where turbary is practiced. Within the wind farm site itself, about one third of the area, all on the eastern side, has been drained for turbary (see turbary map Chapter 4, Figure 4-4), and areas of turbary contribute drainage to sub catchments to varying degrees. Only catchments SC4, SC7(b) and SC7(c) have no turbary drainage input. The degree to which these extensive areas are used for turf cutting is likely to be very variable both spatially and temporally, which is borne out by examination of aerial photography that shows that small amounts of active cutting tend to be concentrated in any one year in very small parts of otherwise very large areas of cut-over bog. For example, Google Earth imagery for 2018 shows evidence of active turf cutting (angular deep brown areas where the raw turf has been recently exposed) and clusters and lines of white bags, used to store the dried sods, in several parts of the turbary on the wind farm in SC7(a).

Table 7-8 lists the area of each sub catchment draining the wind farm, its forestry cover in hectares and that cover as a percentage of the sub catchment area as it was at the beginning of construction just prior to 2000 and again in 2018. The areas included are those of Coillte's commercial forestry only. The proportion of private forestry is generally not more than 10% on average of the Coillte areas. As part of the construction phase of the wind farm, 222 ha of forestry was felled within the wind farm boundary between 2003 and 2005. This area was split between the 3 main river catchments as follows: 66.2% in the Owendalulleegh River catchment, 33.4% in the Boleyneendorrish and just 0.6% in the Duniry River catchment. Table 7-9 further apportions the 222 ha of clearfell among each of the sub catchments draining the wind farm. The table also lists the various survey sites within each of these sub catchments. During the same period (2003-2005) approximately 35ha of forestry was also felled along the OHL corridor and Agannygal Substation.

The data shows a very high percentage of forestry present within these sub catchments which has remained essentially the same in terms of area throughout the operation phase of the wind farm. While forestry management operations have remained at a minimum within the wind farm site itself, given that the area was not replanted post felling, a constant feature of sub catchments draining the wind farm is the regularity of commercial forest felling and replanting that takes place in those sections of the sub catchments beyond the wind farm perimeter. For example, between 2016 and 2018 a total of 257ha of forestry was earmarked for felling on Coillte land, more than the area felled when the wind farm project was being constructed. In the event, a lesser area of timber was felled but it shows that clearfelling is a consistent land use activity in lands adjoining the wind farm site. In 2018, approximately 81ha was felled within the sub catchments draining the wind farm but outside its boundary. An examination of how the various watercourses respond to recent current felling events within these sub catchments help inform the assessment of the impacts at the time that the wind farm was constructed, wherever contemporary water quality data is not available.

Table 7-8 Forestry (ha) in sub catchments draining the wind farm in 2000 (pre-construction) and 2018 (late operation phase)

Sub catchment Number	Sub catchment area (ha)	Coillte forested area in 2000 (ha)	Coillte forested area in 2018 (ha)	Coillte forestry as % of total area (2000)	Coillte forestry as % of total area (2018)
SC1	643.8	571.6	546.8	88.8	84.9
SC2	316.6	165.5	114.5	52.3	36.2
SC3	95.9	94.1	72.6	98.1	75.7
SC4	173.7	160.3	150.3	92.3	86.5
SC5	221.7	184.1	183.0	83.1	82.5
SC6	513.7	272.7	273.9	53.1	53.3
SC7(a)	586.8	373.1	340.9	63.6	65.3
SC7(b)	302.0	243.7	223.1	80.7	61.5
SC7(c)	354.7	252.0	173.5	71.0	48.9
SC7(d)	61.8	27.5	27.2	44.4	44.6
SC8	280.9	63.0	58.0	22.4	20.6
SC9	648.1	394.7	390.4	60.9	60.2

Table 7-9 Area (ha) of forestry felled - wind farm and OHL during construction phase apportioned to each sub catchment

Sub catchment Number	Sub catchment Area (ha)	Area of on-site felling within each Sub catchment (ha)	*OHL felling apportioned Sub catchment Area (ha)	Felled area as % of Sub catchment Area	Field survey site
SC1	643.8	18.4	0	2.9	B4, B4A, B4B, B4C
SC2	316.6	36.2	0	11.4	B2, B2A
SC3	95.9	20.1	0	20.9	B1A
SC4	173.7	8.8	0	5.1	B1B
SC5	221.7	1.3	0	0.6	D1, D1A
SC6	513.7	1.9	0	0.4	O1, O2
SC7(a)	586.8	33.8	3.3	6.2	O3, O3A
SC7(b)	302.0	17.8	11.71	9.8	O4, O4A, O4B, O5
SC7 (c)	354.7	74.7	0.16	21.1	O5A
SC7(d)	61.8	0	4.7	7.6	O6, O6A
SC8	280.9	4.6	0	1.6	O8A
SC9	648.1	4.6	0	0.7	O9A, O9A1, O9A2
Agannygal (Atorick/Bleach)	**200**	**0**	****2.26**	**1.13**	**OHL2, OHL2A, OHL3**

** Approximate areas ** A further 1.6ha was felled to accommodate the Agannygal Substation*

7.3.4 Biological Water Quality (Q-values)

7.3.4.1 EPA Q-values

The EPA has biological monitoring sites assessing invertebrate Q-values on each of the three major rivers draining from the wind farm and also monitors water chemistry at one of these sites (O1) on the Owendalulleegh. See Figure 7-1 for the locations of these sites and Table 7-10 for EPA River Station codes corresponding to the abbreviated ones used on the map. With one exception (EPA OT1), each of the EPA sites is located on the main channel of the rivers, located several kilometres downstream of the Project at points below where most of the minor streams flowing from the boundary of the wind farm join the main channels.

On the Owendalulleegh, there are five EPA Q-value monitoring sites, the first about 7 km downstream from the wind farm boundary and 5 km downstream from the base of the 2003 peat slide (EPA O5) while the last site is just 1.5 km upstream of Lough Cutra, i.e., about 22 km downstream from the wind farm site (EPA O1). At the latter site, both Q-values and water chemistry are monitored. The outflow river from Lough Cutra (the River Beagh) is also monitored for Q-values at EPA C1, 1.6 km downstream from the lake. There are several sites on the Boleyneendorrish River, the most upstream situated 4.5 km downstream of the nearest point to the wind farm boundary (EPA B1). Only a very small portion of the wind farm drains east to the Duniry River and the nearest EPA site to the boundary is approximately 6 km downstream (EPA D1). Apart from one small tributary of the Owendalulleegh (EPA OT1) the EPA does not monitor any of the minor tributary streams which drain the wind farm or the OHL area.

Table 7-10 EPA River Monitoring Station Locations

Map Code (see Figure 7-1)	EPA River Station (RS) Code	ITM	
Owendalulleegh River (main channel)		Easting	Northing
EPA O1 (Q-value and water)	RS29O011000	548377	697234
EPA O2	RS29O010900	551710	698438
EPA O3	RS29O010800	554640	698989
EPA O4	RS29O010700	556107	699657
EPA O5	RS29O010500	560122	701247
Owendalulleegh Tributary (SC9)			
EPA OT1 (Knocknarebana Stream)	RS29K040100	555271	701209
Beagh River (outflow from Lough Cutra)			
EPA C1	RS29B020100	547612	700641
Boleyneendorrish River			
EPA B1	RS29B040100	555497	706856
EPA B2	RS29B040300	551350	705655
Duniry River			
EPA D1	RS25D070100	564867	707753

Relevant EPA monitoring data for each of the EPA sites on the three main receiving river systems (Owendalulleegh, Boleyneendorrish , Duniry) and one small tributary of the Owendalulleegh (EPA OT1) was accessed from EPA online data portal and is presented in Table 7-11.

Table 7-11 EPA Q-value results for the three major rivers draining the Project (1996- 2023)

Year	EPA O1	EPA O2	EPA O3	EPA O4	EPA O5	EPA OT1	EPA B2	EPA B1	EPA C1	EPA D1
1996	-	-	-	-	-	-	-	-	-	5
1997	4-5	4-5	-	4-5	4-5	4-5	5	5	4	-
1999	-	-	-	-	-	-	-	-	-	4-5
2000	4-5	5	5	5	4-5	4-5	5	4-5	4	-
2003	4	4	4	3-4	2	4	5	5	4	4-5
2006	4	5	-	4-5	4-5	4-5	4-5	5	4	4
2009	4-5	4-5	5		4-5	4-5	-	-	4-5	4
2012	4-5	4-5	4-5	4-5	4-5	4-5	5	5	4	4
2015	4-5	4-5	4-5	4-5	4-5	3-4	4-5	4-5	3-4	-
2017	-	-	-	-	-	-	-	-	-	4
2018	5	5	4-5	4-5	4-5	4	4-5	5	3-4	-
2019	-	-	-	-	-	3-4	-	4	-	-
2021	5	5	-	4-5	4-5	4	4-5	4-5	4	-

Year	EPA O1	EPA O2	EPA O3	EPA O4	EPA O5	EPA OT1	EPA B2	EPA B1	EPA C1	EPA D1
2022	-	-	5	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-	-	3-4

O1-O5 = Owendalulleegh main channel, OT1 = Owendalulleegh Tributary, C1 = Outflow from Lough Cutra, B1 & B2 = Boleyneendorrish main channel, D1 = Duniry River.

The relevant data record began in 1996, several years before commencement of the wind farm construction and continues until 2023. It includes the data for 2003, for which surveys were conducted within one month of the peat slide. Of most relevance are the Owendalulleegh sites (O1 to O5, OT1) which drain 66.2% of the wind farm site and all but a tiny fraction of the OHL area. Next most relevant are the Boleyneendorrish sites (B1, B2) which drain 33.4% of the wind farm area. The Duniry site (D1) only receives 0.6% of the wind farm drainage and is relatively least affected.

In the monitored pre-construction period 1996-2000, all the main channel sites downstream of the Project returned high status results (Q4-5 or Q5). The only exception was the first site downstream of Lough Cutra which was at good status (Q4), noting that this site is also influenced by the wider catchment area surrounding the lake.

In 2003, sampling was undertaken exactly one month after the peat slide – showing all Owendalulleegh sites had dropped from high status by at least one status class. Site O5, nearest the peat slide (5km downstream) declined to bad status (Q2); the next site (O4), 11 km downstream of the peat slide fell to moderate status (Q3-4), and site from O3 to O1 (14 to 22km downstream of the the peat slide) fell to good status (Q4). This demonstrated a clear pattern in 2003, of significant negative effect within 5km of the peat slide, with the severity of that effect diminishing over downstream distance from the peat slide.

Following the obvious decline in biological water quality triggered by the peat slide, all sites had returned to high status (Q5, Q4-5) by 2006 to 2009 as the amount of peat silt in the channel diminished in a downstream direction (Clabby et al., 2004). These data indicate that the impact of the 2003 peat slide on biological water quality on the main channel of the Owendalulleegh River was short-term significantly negative but reversible, with pre-slide high status conditions resuming within three years (at most) at sites within 18km of the peat slide (O2 – O5) and within 6 years (at most) at O1 (22 km downstream). All main stem sites have remained at high status since, i.e., throughout the operation phase.

Over the period (1997-2021) the sole survey site on the outflow river from Lough Cutra (EPA C1, Beagh River) returned mixed results. In the years prior to, during and immediately after the peat slide (1997-2006), a Good Status result was recorded, even within a month of the peat slide, when it was monitored in November 2003. In 2009, the status increased to High then oscillated between Moderate (Q3-4) and Good status (Q4) until 2021. At the same time (2009-2021), the main channel of the Owendalulleegh River downstream of the Derrybrien wind farm project (feeding in to Lough Cutra) maintained High status, i.e., unpolluted water quality. This sequence of results indicates the status of Site EPA C1 was independent of the status of the Owendalulleegh, with no evidence of effect from the wind farm project on Q-value, and hence status, downstream of Lough Cutra.

The EPA monitors one tributary site of the Owendalulleegh, EPA OT1, located in sub catchment SC9. It returned high status results in each survey from 1997 to 2012 except for 2003 when 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. The results at this site show that the smaller tributaries of the

Owendalulleegh tend to have less buffering against environmental change as compared to main channel sites.

On the Boleyneendorrish River, the two survey sites on the main channel of the Boleyneendorrish (EPA B1 and B2) both returned High Status (Q4-5 or Q5) results on each sampling occasion from 1997 to 2021, all but once when good status (Q4) was recorded in 2019 at B1. This catchment was not affected by the 2003 peat slide. The drop to good status at Site B1 in 2019 may have related to some clearfelling in SC1. There is no evidence that there has been any impact on the biological water quality of the main channel of the river from activities on the wind farm site either before, during or at any time since the wind farm's construction, based on the long-term Q-rating trend at this site.

The EPA site on the Duniry (EPA D1) is just under 6km downstream from the boundary of the wind farm and only drains a very small fraction of its area (1.3ha). Its water quality was high status (Q4-5 or Q5) from 1996 to 2003 dropping in the four most recent surveys up to 2017, to a consistent good status (i.e. Q4). It would seem to be extremely unlikely that the wind farm gave rise to the decline from High to Good Status noted three years after the construction, given the very small proportion of the wind farm site draining to the Duniry catchment, in comparison to the large area of intervening catchment and the length of channel between the survey site and the wind farm boundary (6 km).

7.3.4.2 Project specific Q-values

The EPA Q-value data principally refer to the main channel sites and, in most cases, not to the smaller tributaries draining the immediate wind farm area where evidence of water quality impacts would be more likely to be discernible. To assess these channels a total of 39 sites were surveyed (2011-2024) for the current study, which also included a small number of main channel sites. Some sites were surveyed on just one occasion while several were surveyed two or more times. The surveys were undertaken in 2011, 2014, 2018, 2019, 2020, 2022 and 2024. A grid reference for each survey site is included in Table 7-1 and Figure 7-1 is the map of site locations.

Summarised Q-value results (2011-2024) are presented in Table 7-12. Macroinvertebrate species lists and habitat notes are presented in **Appendix 7-1**. Seven sites were surveyed on the main channel of the Owendalulleegh (O7A & O7B and O7-O11) and two sites on the main channel of the Boleyneendorrish (B5 & B3) with B5 coinciding with EPA B1. The remaining thirty sites were situated on tributary streams in the three catchments draining the wind farm, while four (OHL1, OHL2, OHL2A and OHL3) were on streams draining the OHL route corridor and the Agannygal Substation. Sites O8A and O8B were in sub catchment SC8, which receives 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.

7.3.4.2.1 *Owendalulleegh*

Main channel sites surveyed on the Owendalulleegh River downstream of the confluence of the SC7 sub catchment stream (i.e., those affected by the 2003 peat slide) were predominantly high status during each sampling run between 2011 and 2024 which is consistent with the EPA findings over that time interval. A coating of peat silt was noted at the margins of the channel at Site O7 (Tooraglassa Ford) when sampled in 2018 but the kick sample in parts of the channel unaffected by the silt gave a high-status result (Q4-5). The provenance of the silt is not known but some was also noted during the same sampling effort at Sites O2 and O3 in SC7(a) and SC6, also in 2018, where turbary is considered to have been a possible source, at least partly. The most recent sample, taken in September 2024, at Site O7 (Tooraglassa Ford) returned a Q4-5 (High status), with a high proportion of sensitive *Ecdyonurus* mayflies and three sensitive stonefly species present. No silt was evident at that time.

Macroinvertebrate water quality in Owendalulleegh tributaries (O1-O9B) surveyed between 2011 and 2024 ranged from High Status, through Good to Moderate Status, mainly, with one Poor verging on Moderate Status (Q3/3-4) result at O4 in 2014. Site O1 is at Unnamed Bridge A on Black Road at the top of sub catchment SC6. It receives a very small portion of its drainage from the wind farm site. It generally returned moderate status (Q3-4) even as recently as August 2024. The substrate at this site was coated in a pronounced iron bacterial biofilm on each sampling occasion, which is believed to have contributed to the impaired water quality results. A peaty texture in the biofilm was noted: attributed to possible turbary influence in 2019, and forestry felling influence in August 2024. Forestry felling had recently occurred upstream of O1 during 2024 along with ongoing turbary activity. Further downstream in the same sub catchment at Site O2, conditions were generally marginally better, with Good status verging on Moderate recorded in 2011 and 2019 and Moderate status recorded in 2018. On all 3 occasions iron scum was also noted but in 2018 there was also a thick peaty coating on embedded cobbles. This may well have been related to the felling of just under 10ha of forestry upstream the same year combined with the lower water levels experienced that summer. However, turbary, a continuing activity in the eastern end of the wind farm site and in adjoining parts of SC6, may be a contributing factor.

Just to the west in sub catchment SC7(a), Site O3 returned Good Status in 2011 and High bordering on Good in 2019. The latter result is somewhat unexpected, as this catchment experienced 15-20ha of felling in 2018 but there doesn't seem to have been any residual impact in the 2019 survey. Further upstream on the same watercourse at O3A, good verging on high status was also recorded in 2019 and high status (Q4-5) in 2024. Just over 17ha of felling occurred upstream of this survey site in 2018 but the stream showed little effect in 2019 or August 2024. In sub catchment SC7(b), Site O4 at Black Road Bridge is situated just over 1km downstream of the base of the peat slide. It was sampled on five occasions, returning Good Status or Good verging on Moderate status in three of those surveys. In 2014 it was Poor Status verging on Moderate, and in 2022 was a clear Moderate status. In 2014 there was extensive upgrading of access tracks on the wind farm site, which also included works to drains, culverts etc. Those maintenance phase works cannot be ruled out as a contributory factor, even though silt control measures were recommended to minimise suspended solids losses from those operations. It is also notable that water levels were very low at the time of the 2014 survey, which may have added to the stress on some of the smaller tributaries surveyed at the time.

A very small tributary joining the channel immediately upstream of Black Road Bridge (O4A) was sampled in 2019, it returned a Good Status result, even though there was a thick biofilm on peaty/iron scum biofilm noted on substrate at the time. Further upstream in the same catchment in the small stream draining beneath Barrage 1 (O4B) returned a high-status result (Q4-5) in January 2020. This is the nearest site to the base of the 2003 peat slide and the 2020 result indicates an absence of residual effect from the peat slide that had occurred 17 years prior. Further downstream, still in SC7(b), Site O5 at Flaggy Bridge was surveyed four times, meriting moderate status (Q3-4) in 2014 and high status (Q4-5), good/high status in 2019 and 2022 and high status in August 2024. Site O6A, located just upstream of the Owendalulleegh main channel at the very bottom of this (peat slide) tributary, was surveyed in 2019 and 2022 meriting good verging on high status (Q4/Q4-5) and good status (Q4) were recorded, respectively. Site O5A, in the next sub catchment to the west, SC7(c), was sampled in 2019 and 2022 returning high/good status and good status, respectively.

One sample each was surveyed in 2019 in the next two sub catchments to the west, namely O8A in SC8 and O9B in the next adjoining sub catchment which doesn't drain any part of the wind farm. In 2019, 5ha of non-project related forestry was clearfelled in the catchment of O8A and 8ha in that of O9B. Both returned moderate status Q-ratings verging on good status. Site O8A was resurveyed in 2022, still returning moderate status. Finally, in SC9, Sites O9A1 and O9A2 on two small upper tributaries in this sub catchment returned moderate status (Q3-4) in 2019, while O9A just below the confluence of both, returned Q4, good status in 2018, the same year.

Site OHL1 was surveyed in 2019 and 2022, returning high/good status (Q4-5(4)) and moderate status (Q3-4), respectively. The site is on a small stream which drains much of the southern half of the Derrybrien – Agannygal OHL corridor and joins the Owendalulleegh just upstream of Site O7. The reason for decline in Q-value at this site between the sampling years had no obvious explanation except that flows were much lower in July 2022 compared to December 2019. It is common in small headwaters to observe seasonal differences in Q-value as macroinvertebrate fauna respond not just to changes in nutrient or sediment, but also to other environmental queues, e.g., temperature and flow which can affect oxygen conditions more readily in smaller volume streams.

7.3.4.2.2 Boleyneendorrish

The larger channels in the Boleyneendorrish catchment (B2, B3, B3A and B5/EPA B1) all returned high status results when surveyed over the years. Site B4 (at the bottom of SC1) was mainly high status or good/high status but dropped to moderate during 2022. This SC1 sub catchment represented by B4B and B4C further upstream was visibly very clean but was very small and had limited substrate for kick-sampling and merited Q3-4 suggesting some impairment. However, such small tributaries can be susceptible to localised disturbances and weather-related stress such as low water levels, and the record shows here, that the effects tend not to persist into the larger downstream channels. Note that B5 (EPA B1), the most downstream site surveyed within the Boleyneendorrish catchment, incorporating all the tributaries which combined drain 33.4% of the wind farm site, has always been classified at high status for macroinvertebrates in both the EPA's Q-value records (Table 7-11), and in the 2011 and 2024 samples taken for this project. The remaining small tributary sites within the Boleyneendorrish, B1, B1B and B2A, returned either Good (Q4) or Moderate (Q3-4) status results.

7.3.4.2.3 Duniry

Site D1 (SC5) in the Duniry catchment which drains only a fraction of the wind farm site (~0.6%) returned a high-status result for macroinvertebrates in 2011, while its smaller headwater extension (D1A) returned a good/moderate status result in both 2019 and 2022.

7.3.4.2.4 Lough Atorick / Bleach

Site OHL2 is situated on a small unnamed stream which drains a small portion of the southern end of the OHL corridor and Agannygal Substation site and flows into Lough Atorick (which outflows to the Bleach River). It was high status (Q4-5) in 2019. In 2022, Site OHL2A was indicative of moderate status (but considered to be closer to Q4 better than that given the habitat was unsuitable for kick-sampling). Site OHL2A is located ~670m upstream of OHL2 at the point where the Agannygal substation decommissioning haul route 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. A few 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 Good Status, Q4.

7.3.4.3 Biological Water Quality Summary

Overall, the EPA macroinvertebrate results demonstrate that for all the main channel sites on the Owendalulleegh River, at least as far upstream as the confluence of the 'peat slide' sub catchment SC7 (i.e. a channel length of about 18 km), and the most upstream EPA sites on the Boleyneendorrish (EPA

B1 and B2) that High Status (Q5 and Q4-5) has been the rule rather than the exception. These results have, in the main, been confirmed during field surveys for the current study (2011-2024). The only notable exception was on the Owendalulleegh during 2003 EPA surveys undertaken within a month of the peat slide, when quality dropped significantly at several main channel sites. However, that interruption in the high-status norm was short lived (i.e., 3 to 6 years at most), returning the high status from 2006 (4 out of 5 EPA sites) or 2009 (1 out of 5 EPA sites) onwards. Similarly, there has been a persistent trend of high status on the main channel of the Boleyneendorrish, evidenced from both EPA and project-specific results, including the recent survey in September 2024 at Site B5 (EPA B1).

Results for the many smaller tributaries in the upper regions of the study catchments showed more variable results between 2011 and 2024, ranging from high status down to moderate/poor (one location). What is also apparent at several of these sites is that repeat surveys over the years frequently, though not invariably, produced different results. For many of these sites it is postulated that occasional drops to moderate status in the record are 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 are also likely to be at play, including water levels and to a lesser extent site- specific factors such as turbary on the eastern portion of the wind farm (possibly affecting O2 and O3) and the presence of iron bacterial biofilm (possibly in combination with peat silt) also affecting O1 and O2. Overall, the observed inter-annual variability in the Q-ratings for the smaller tributaries during the operation phase of the Project are considered to be largely driven by variation in the level of land use pressure in the same year or the year before, exacerbated in some years by low water levels. Apart from the construction phase and the peat slide in 2003, it is considered likely that the bulk of the inter- annual variability in water quality noted in many of the small streams in the Slieve Aughty sub catchments draining the wind farm site or its grid connection (OHL) were unrelated to activities of the Project itself. The only notable exception to this could be in the case of Sites O4, O5 and O6 in 2014, where impaired water quality may have been contributed to by site maintenance measures being undertaken that year on the wind farm, which included access track upgrade and maintenance and culvert/drain cleaning. What is very clear is that any interannual variability in Q-ratings in the smaller tributaries has been proven by this long-term study to not translate to a decline at any time in high status Q-ratings on the main channels of the primary receiving rivers (Owendalulleegh and Boleyneendorrish).

Table 7-12 Project Specific Q-value Summary

Catchment	Site	2011	2014	2018	2019	2020	2022	2024
Owendalulleegh	O11		4 (4-5)					
	O10		4-5					
	O9	4-5						
	O9A			4				
	O9A1				3-4 (4)			
	O9A2				3-4 (4)		3-4	
	O9B				3-4 (4)			
	O8		4 (4-5)					
	O8A				3-4 (4)		3-4	
	O8B						4 (3-4)	
	O7			4-5				4-5
	O7A				4			
	O7B				4			
	O6	4-5 (5)	4 (3-4)					
	O6A				4 (4-5)		4	
	O5		3-4		4-5 (4)		4(4-5)	4-5
	O5A				4-5 (4)		4	
	O4	4	3 (3-4)	4 (3-4)	4 (3-4)		3-4	

Catchment	Site	2011	2014	2018	2019	2020	2022	2024
	O4A				4			
	O4B					4-5		
	O3A				4 (4-5)		4-5	4-5
	O3	4			4-5 (4)			
	O2	4 (3-4)		3-4 (4)	4 (3-4)			
	O1	3-4		3-4 (4)	3-4 (4)		3-4	3-4
	OHL 2				4-5 (4)			
Boleyneendorrish	B5	4-5						5
	B4	4 (4-5)		4-5 (5)	4 (4-5)		3-4	4-5
	B4B				3-4 (4)			
	B4C				3-4			
	B3			4-5	4-5			
	B3A				4-5			
	B2	4-5			4-5			
	B2A				4			
	B1	4						
	B1A						4	
	B1B				3-4			
Duniry	D1	4-5 (5)						
	D1A				3-4 (4)		4(3-4)	
Lough Atorick / Bleach	OHL1				4-5		3-4	
	OHL2				4-5			
	OHL2A						3-4	
	OHL3						4	

7.3.4.4 Lough Cutra Sediment Sampling (2019)

7.3.4.4.1 *Grain Size Analysis*

Samples were collected on 31 October 2019. Site locations are shown on Figure 7-2. Grain size results are presented in Table 7-13. Images of the fresh sediment samples are presented in **Appendix 7-2**. Sites in the general body of the lake (CU6 - CU10) were dominated by mud (i.e. the <63µm silt/clay fraction), although CU7, closer to the eastern shore and possibly influenced by some onshore wave action, also had a high proportion of sand. These samples also had the highest organic matter content as measured using the LOI (Loss on Ignition) method. The two samples within the final 100m of the Owendalulleegh River (CU3 and CU4) and the first sample within the lake proper (CU 5) were dominated by sand, with a good amount of medium to coarse sand fractions present. This area of the lake is being constantly winnowed of its mud (silt/clay) and fine sand fractions by the power of the water exiting the river during periods of high flow. CU11 in the outflow channel from the lake (River Beagh) is also dominated by sand but in the finer sand fractions and it also contains 14% mud. So, while CU11 is affected by fluvial currents, the velocities are clearly lower in this deeper (5.6m) site compared to the outflow area of the Owendalulleegh. The first two samples collected within the lower reaches of the Owendalulleegh (CU1 and CU2) were very different from those from the lake proper. CU1 contained a pure red clay with no visible organic content which was confirmed by the very low LOI value measured, while CU2 (nearby) comprised a consolidated clay and gravel pan with a loose plant-derived fibrous litter overlay. This very coarse composition made it a bit of an outlier in terms of grain-size analysis. The diversity of substrate types in this part of the river is not surprising given the range of depths and the mix of deposition and scour areas within the large meanders present there. In contrast,

in the open lake, away from the immediate influences of the river, very slack currents probably prevail and promote the deposition of fine mineral and organic particles. This was confirmed by the high mud content and high organic content of samples CU6 – CU10 in particular. The sites visited turned out to be quite shallow and the brown colour of all the surfaces of all the sediment samples collected indicated that the bottom surface at all these sites was oxygenated.

Table 7-13 Sediment Sample – Grain Size Analysis (31/10/2019)

Site	Depth (m)	%>2 mm	%>1 mm	%>0.5 mm	%>0.25 mm	%>0.125 mm	%>0.063 mm	%<0.063 mm	LOI %
		Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Mud	
CU1	3.7	0.0	0.0	0.0	1.4	3.6	1.7	93.2	2.0
CU2	1.5-3	25.3	13.4	7.8	7.5	6.7	7.0	32.2	12.2
CU3	2-3	4.3	12.7	35.5	38.0	6.8	0.0	2.7	11.1
CU4	NM	15.1	19.6	31.7	22.0	5.2	2.0	4.5	0.5
CU5	NM	0.0	2.4	6.9	46.1	32.7	5.4	6.4	7.4
CU6	6.2	0.0	0.0	0.0	0.2	0.8	1.6	97.4	NM
CU7	2.8	0.1	0.1	0.0	0.3	5.1	42.1	52.4	6.8
CU8	3.6	2.6	1.5	1.7	2.3	5.6	5.9	80.5	17.1
CU9	4.3	0.0	0.0	0.0	0.1	0.9	2.7	96.3	14.4
CU10	2.3	0.0	0.0	0.1	0.3	1.6	4.1	93.8	9.3
CU11	5.6	0.1	0.4	1.5	42.8	37.0	3.8	14.4	4.9

NM = Not Measured

7.3.4.4.2 Lake Macroinvertebrates

The 11 grabs samples from Lough Cutra contained 21 macroinvertebrate taxa (Table 7-14) but there were several additional species including chironomid larvae, oligochaete worms and *Pisidium* sp. (pea mussels) all of which were identified to genus or higher taxonomic level. The mix of species present point to two broad benthic habitat types, (1) open water mud-dominated bottoms (CU6, CU8, CU9 and CU10) that tended to have lower species diversity and (2) littoral / out-flow / inflow habitats with a much higher proportion of sand (CU3, CU4, CU5, CU7 and CU11) and generally higher species diversity. The two samples in the lower Owendalulleegh, CU1 and CU2, which had only 2 taxa present, are considered non-representative due to the physical nature of the samples collected, rather than the location. The open-water sites were all characterised by a limited range of typical soft sediment species, in particular oligochaete worms and to a lesser extent chironomid midge larvae belonging to the sub-family chironomini. These sites also contained phantom midge larvae of the family Chaoboridae, which prey on zooplankton and are important in juvenile fish diets. They make vertical migrations in the water column, feeding at night and burying in the mud during the day. The samples with higher sand content were located in the inlet and outlet sites to the lake (CU4, CU5 and CU11) and toward the margin (CU7) and these are likely exposed to much greater water movement which combined with the greater structural diversity of the substrate is likely contributing to higher taxa counts at these sites. The presence of *Ephemera danica* and three species of cased caddis larvae at these sites, as well as the mayfly *Caenis horaria* and the uncased caddis *Neureclipsis bimaculata* (in the outflow at CU11) combined with low densities of oligochaete worms and the absence of Chironomus larvae at the muddier open-water sites, points to good or moderate water quality, rather than poor water quality conditions in the lake. The latter is consistent with EPA classification of the lake as Good or Moderate Status since 2010, currently Good status (2016-2021 period).

Table 7-14 Lough Cutra – Macroinvertebrate Taxa

	CU1	CU2	CU3	CU4	CU5	CU6	CU7	CU8	CU9	CU10	CU11
MAY FLIES (Ephemeroptera)											
Ephemera danica				7	9		1			2	1
Canis horaria											1
CADDIS FLIES (Trichoptera)											
Ocetis ochracea				1							
Mystacides sp.											1
Arthripsodes cinereus				1							
Neureclipsis bimaculata											1
TRUE FLIES (Diptera)											
Chironomini	1	8	3		7			1	1		6
Tanypodinae								1			
Ceratopogonidae				3	2	1					2
Chaoboridae						7	1	1	1	1	
ALDER FLIES (Megaloptera)											
Sialis lutaria											8
BEETLES (Coleoptera)											
Beetle larvae (indet.)							1				
Elmidae			2	1							
F/W SHRIMPS (Crustacea)											
Asellus				1		1	1				
Crangonyx			1	3	3		1				
SNAILS (Mollusca)											
Potamopyrgus antepodarum				6	8						
Bithynia tentaulata				1			2			2	
Anodonta anatina							1				
Shhaerium sp				1			1			4	7
Pisidium sp(p)					20		7			5	
WORMS (Annelida)											
Oligochaetae	2	1	3	13		6	3	2	4	3	3

7.3.5 Water Chemistry

For context, water chemistry data is interpreted in accordance with the physico-chemical conditions supporting the biological elements required under the Water Framework Directive as set out in S.I. 77 of 2019, European Union Environmental Objectives (Surface Waters) (Amendment) Regulations as shown in Table 7-4.

7.3.5.1 EPA Water Chemistry Data

The EPA has one water chemistry monitoring station on the lower reaches of the Owendalulleegh about 22 km downstream from the wind farm, at Killafeen Bridge (EPA O1, Figure 7-1, EPA code: RS29O11000). The site has been monitored monthly since 2007. Data for the period 2007-2023 is summarised and presented in Table A7-3.1**, Appendix 7-3** as annual averages for the period based on 12 monthly samples in most years.

The EPA results for the lower reaches of the Owendalulleegh data point to a neutral water chemistry with generally moderately soft water conditions, low nutrient and low BOD concentrations. The annual results consistently fall within the range set for supporting conditions for high ecological status according to Surface Water Regulations (S.I. 77 of 2019) for phosphate, ammonia and BOD. There is no nitrate standard set in Ireland, however, the most recent EPA Water Quality Indicators reports notes that, "average nitrate concentration values less than 4 mg/l NO_3 (0.9mg/l N) and less than 8 mg/l NO_3 (1.8mg/l N) are considered by the EPA to be indicative of high and good quality respectively" (EPA 2024). On that basis, the site has had consistently low mean annual nitrate levels, indicative of high status, throughout the monitoring record. This is fully consistent with high-status Q-value ratings assigned with regularity by the EPA at this river monitoring site (Table 7-11). The EPA monitoring site is just 1.5 km upstream of the inflow to Lough Cutra and the river water chemistry record shows no impact from the wind farm site and its environment between 2007 and 2023, inclusive.

As suggested by the Q-value results in 2003 at this site (Table 7-11), water chemistry was likely to have been impacted in the weeks and months following the peat slide, perhaps by increased suspended solids and possibly a period of increased nutrient (ammonia, phosphate, BOD) which caused the recorded decline from high status (Q4-5) in 2000 to good status (Q4) in 2003 and 2006, with a return to consistently high status (Q4-5 and Q5) thereafter. See Section 7.3.5.4 for a discussion on Lough Cutra water quality data.

7.3.5.2 Project Specific Water Chemistry

Water samples for the present study were taken on at least one occasion at 27 no. sites during three water sampling runs, in October 2011, October 2018 and September 2019 across several lower order tributary streams draining from the wind farm and adjoining downstream sub catchments. A further sampling round was undertaken in July 2022 on 13 sites: 12 no. on streams previously sampled and draining the wind farm and 1 no. sample from the small stream draining the OHL corridor (OHL1) towards Lough Atorick. Results of all sample runs are presented in **Table A7-3.2, Appendix 7-3.** The following paragraphs provide a summary of parameter trends across the sampling rounds.

Alkalinity and pH: The 2018 and 2022 surveys were undertaken during dry weather when water levels were generally average-to-low, while the 2011 and 2019 surveys were undertaken shortly after wet weather, especially the 2011 survey. Apart from Sites O7 and O9 which are on the main channel of the Owendalulleegh further down the system, and B5 the lowest site in the Boleyneendorrish catchment, each of the other sites are within mainly smaller sub catchments dominated by coniferous forest on blanket peat or non-afforested blanket peat. These more headwater sites are characterised by generally lower alkalinities and pH than the main channel sites farther down in the system and can be described as soft water sites. A comparison of the pH and alkalinity data for B4 and O2-O4 for 2011, 2018 and 2019 shows how during the wetter weather in 2011 and to a lesser extent in 2019, lower pH and alkalinity results were recorded compared to the drier weather survey of 2018. B4 had very low pH during elevated flows in 2011 which is a characteristic of heavily afforested small catchment and a noted effect of elevated run-off draining from blanket peat sites in many parts of Ireland (Kelly-Quinn et al., 2008). However, only at three of the twenty-seven sites, namely B4 in 2011, and D1A and O8A in 2019 did the pH drop below 5, and in the case of B4 and D1A the alkalinity turned negative, indicating an acid pulse. Several sites including on main channels and small tributaries (B1, B1B, B2, B4, B4B, O1, O3, O4, O8A, O9A1, O9A2, D1A) dropped below pH 6.0 on occasion which is below the recommended criteria for [4]salmonid waters in Ireland. Elsewhere there was sufficient buffering in the underlying geology to prevent a similar drop in these parameters. It is significant that at B4 there were no mayfly nymphs present in the macroinvertebrates taken in 2011, and just a single specimen (*Baetis*

[4] *S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations*

sp.) in the 2019 survey. Mayflies are a group known to be sensitive to acidification (Feeley et al., 2011). Overall, however, the chemistry of these sites seems to be at least partially buffered against acid pulses.

Nutrients: Ortho-phosphate (measured as SRP in this study), Ammonia and BOD are parameters 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. The shading of boxes in the results tables in **Appendix 7-3** corresponds to mean value criteria for supporting high status (blue), good status (green) or moderate status (yellow). This indicates the nutrient/water quality parameters in terms of 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 poorest site for SRP, based on just one sample was Site O8A in 2019 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. During elevated flows in 2011 and 2019, a few sites (O5A, O8A, O9A1, O9B) failed to meet at least Good status for SRP. In 2022, during average-low flow none of the sites sampled failed Good status and most were high status.

For ortho-phosphate (SRP) the highest values were recorded at O9A, O9A1, O9A2, O9B, O8A, O5A and B2A, mainly in 2019, all within the Moderate range. Most of these sites are within sub catchments where forest clearfelling occurred in either 2018 or 2019. For example, in 2019, 21ha of coniferous plantation on blanket peat was felled in an area just to the southwest of and immediately adjoining the wind farm site. An estimated 5ha of the felled plot drains to SC8 (which contains O8A), 8ha drains to SC9, which contains O9A and O9A1, while another 8ha drains to the central area between SC8 and SC9 where O9B is situated. Site O8A had the highest SRP value at 0.124mg/l, P, a concentration significantly higher than any others, indicating a point or diffuse source. Although O5A also returned elevated SRP concentrations, felling in the SC7(c) catchment in 2017 occurred as part of turbulence felling when ~7 ha was felled at the top of the catchment.

Some higher ammonia concentrations coincided with sites that also had higher phosphate levels, but not all. Only four sites fell into the moderate range for ammonia, B1, B4 and O4 (2011), and OHL1 (2022) whereas the remaining samples were within criteria for good or high status.

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. Ammonia was slightly elevated at a few sites over the sampling years, with no clear pattern between years and generally Good status or better. Ammonia can be leached from mineralised peat, especially as it dries seasonally or is drained which can be related to forestry drainage on peat soils (Daniels et al., 2012). Note that ammonia tends to rapidly oxidise to nitrate with distance downstream from headwater streams, however Total Oxidised Nitrogen (TON) was generally very low at all sites over the years.

BOD was predominantly in the high-status range, with a handful of sites at Moderate status during 2011 (wet weather sample) and 2018 (dry weather sample). There was no clear pattern in BOD results, except to say that values were generally low, elevated from time to time, possibly in relation to forestry activity.

7.3.5.3 Land Use and Water Chemistry

The work of Cummins and Farrell (2003a) and Rodgers et al. (2010) both show that forestry clearfelled on blanket peat in the West of Ireland results in sharp increases in orthophosphate run-off, with a tendency for higher concentrations in bog drains and tiny streams rather than in larger streams farther downstream, where the concentrations tend to be diluted. Both papers indicate that phosphate levels can remain elevated for at least two seasons, sometimes taking up to four years to approach pre-felling

concentrations (Rodgers et al., 2010). Several blocks of forestry have been felled over the past 3 years within several of the catchments draining the Derrybrien Wind Farm and adjoining area and it is thought likely that this activity has contributed to some of the higher SRP values measured at several sites in 2019 and at least one site in 2018, as noted above. The situation with ammonia is not as clear as with phosphate when it comes to forest felling on peat and although some ammonia increases can be associated with clearfelling (Finnegan et al, 2014; Cummins and Farrell, 2003b) the chemistry of nitrogen in terms of nitrate, ammonia and organic N is complex and depends on aspects of site management among other factors. The pattern we see in the present study is that the highest ammonia concentrations tend to be located in the smaller lower order streams and drains closest to their sources, diminishing in concentration farther downstream. The likelihood also is that some at least of these higher values are also associated with forestry management activities in these small catchments. In terms of absolute values of ammonia, however, as mentioned previously, they fall mainly within the good and high status ranges.

Another feature of the data noted in the 2011 survey are the high concentrations of total and monomeric aluminium at several sites. Elevated aluminium levels may be a feature of the overall catchment because in 2009, for example, the EPA measured the annual average aluminium concentration on the main channel of the Owendalulleegh at 103µg/l with a maximum of 215µg/l the same year. Aluminium at certain concentrations and within certain pH ranges is known to be toxic to fish, especially salmonids. Aluminium toxicity can be an issue in highly afforested catchments because plantation forestry on poorly buffered geology can lead to episodic low pH in headwater streams which exacerbates toxic effects on fish (Kelly Quinn et al. 2008). However, calcium and humic substances, the latter in the form of dissolved organic carbon are known to ameliorate its toxicity (Brown, 1983; Laudon et al., 2005).

The chemistry of aluminium is very complex and the forms and solubility in which it occurs vary depending on the pH. The inorganic monomeric forms are considered most toxic. At pH <5.5 the free aluminium becomes the predominant form along with inorganic monomeric complexes and the increased availability at this pH (and lower) is reflected in higher toxicity. In the pH range 6.0-7.5, solubility declines and generally so does toxicity (Crane et al, 2007). Sites with the highest monomeric aluminium values (in 2011) were B2, B4, O3 to O4. However, only B4 was appreciably below pH 5.5. Combined with this, however, each of these sites had high DOC levels contributing to elevated Acid Neutralising Capacities (ANC) and amelioration of the toxic potential of aluminium (see Laudon et al., 2005). The latter author suggested using the 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 mortality could occur, as opposed to sites with lower index values where the likelihood of mortalities would be expected to be higher. A low index value doesn't preclude trout from being present (and they were present at B4 when surveyed in September 2011 and 2019) but points to a higher risk.

In conclusion, acidification and aluminium, while they cannot be entirely ruled out as having some negative impacts from time to time on trout at the sites listed above, the effects of their impacts are not believed to be significant at the Derrybrien sites, as pH tends to be above 5.5 at most sites most of the time. Moreover, DOC levels are elevated at the same sites offering an ameliorating effect. The level of risk in any susceptible stream is also likely to be variable over time depending on the level of precipitation and the stage in the life cycle of any trout present. While this area may warrant further investigation in itself, it should be noted that elevated aluminium levels are not due to the presence of the wind farm nor are they having any negative impact on fish in the main channels of the main river catchments draining the site.

7.3.5.4 Lough Cutra Water Chemistry

The EPA began to systematically monitor the WFD status of Lough Cutra including biological and physico-chemical elements in 2010 and have continued annually each year since. The lake is visited four times annually for water sampling with a single sample taken at two open water sites each time. A limited amount of chemistry-only surveys were also undertaken pre-2010. There is a very limited amount of data available for 2001 and 2003, and somewhat more for 2004-2006. There does not appear to be any data available for the lake for 2007-2009. Only one sample run was undertaken in 2001 and 2003, in March and July respectively, and in 2004 and 2005 three visits were made and four in 2006. No additional data for the period 2001 to 2003 has been found. Table 7-15 is taken from the 2020 rEIAR, providing summarised annual average data for Lough Cutra 2001-2019 for: pH, conductivity, alkalinity, secchi disc transparency, average chlorophyll a, maximum chlorophyll a and Total-P. Note that the 2001 and 2003 data are for just a single sample run in each case.

The lake pH is neutral to slightly alkaline and the water is highly coloured. Chlorophyll a and Total P levels generally place the lake in the mesotrophic category, although in 2001 and 2003 it would have been classified as oligotrophic based on maximum chlorophyll a. However, the single result for both years would be insufficient on which to gauge the trophic status. It is notable that average annual Total-P and annual average colour in the lake data for 2010 to 2019 shows a strong positive correlation (Figure 7-4) while annual average colour and annual average secchi disc transparency for the same period show negative correlation (Figure 7-5). In the case of Total-P the colour is acting as a proxy for flow with high colour years indicating higher levels of flow from the catchment (mainly via the Owendalulleegh) which in turn would mobilise more Total-P in the form of soluble and particulate components. Within the lake, the high colour has a strong influence on the transparency depth. Over the same period, there is no correlation evident between average Total-P and average chlorophyll a, and none between average transparency and average chlorophyll. In each case, high colour levels in the lake are likely to be masking these correlations and, in some cases, supressing them, i.e. higher Total-P inputs may be having less effect on primary production than would be the case in a clear water lake due to a shading effect from elevated colour.

The WFD ecological status in Lough Cutra is assessed by the EPA and to date four periods have been reported i.e. 2010-2012 (Good Status), 2010-2015 (Moderate Status), 2013 – 2018 (Good Status) and 2016-2021 (Good Status). In each case, the assigned status is based on the results for phytoplankton (Chlorophyll a), aquatic macrophytes and supporting physico-chemical and hydromorphological quality. Lough Cutra is classified by the EPA as “not at risk” of failing objectives under the WFD.

Table 7-15 Annual average water chemistry values for Lough Cutra 2001-2019 (EPA data).

Year	pH	Conductivity (µS/cm)	Alkalinity (mg/l $CaCO_3$)	Colour (Hazen)	Transparency (m)	Chlorophyll (µg/l)		Total-P (µg/l)
						Mean	Max	
2001	7.6	124	33.6	131	1.1	4.0	4	0.030
2002	-	-	-	-	-	-		-
2003	-	-	-	112	1.5	4.4	4.4	0.014
2004	-	-	-	-	-	8.3	18	0.040
2005	-	-	-	-	-	9.0	14	0.065
2006	-	-	-	-	-	5.2	11	0.055
2007	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-
2010	7.6	111	37.6	110	1.4	4.8	9.7	0.015

Year	pH	Conductivity (µS/cm)	Alkalinity (mg/l $CaCO_3$)	Colour (Hazen)	Transparency (m)	Chlorophyll (µg/l)		Total-P (µg/l)
						Mean	Max	
2011	7.8	113	34.0	120	1.6	7.6	24.0	0.016
2012	7.5	103	34.4	176	1.1	4.7	9.7	0.019
2013	7.7	136	44.3	65	2.3	7.4	11.0	0.010
2014	7.7	146	39.5	69	2.1	4.7	8.5	0.014
2015	7.5	129	32.5	96	1.6	3.4	5.2	0.016
2016	7.5	120	39.0	114	1.1	2.0	6.0	0.017
2017	7.5	119	37.3	121	1.4	4.2	7.5	0.018
2018	7.7	145	43.7	68	2.4	3.4	5.1	0.013
2019	7.6	130	36.8	127	1.1	4.7	8.9	0.019

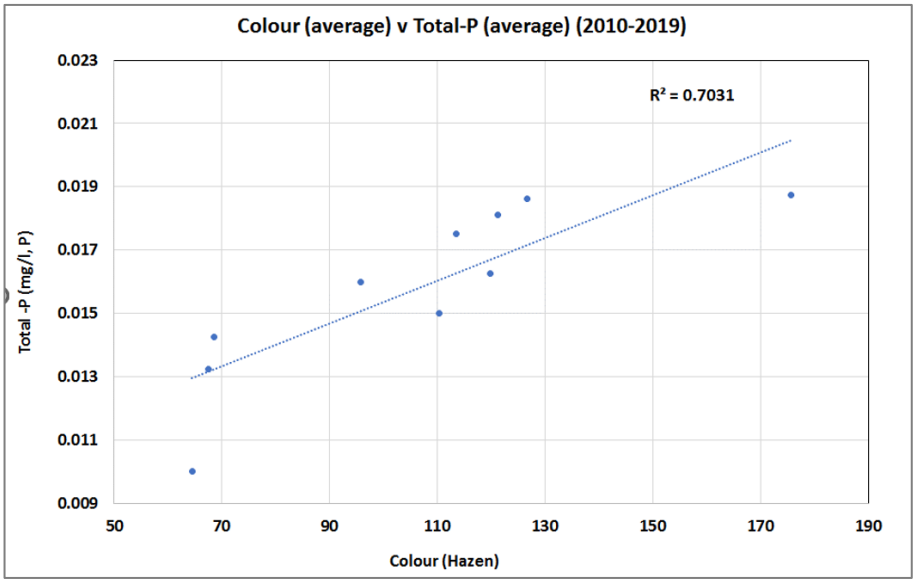


Figure 7-4 Correlation of annual average colour and annual average Total-P in Lough Cutra

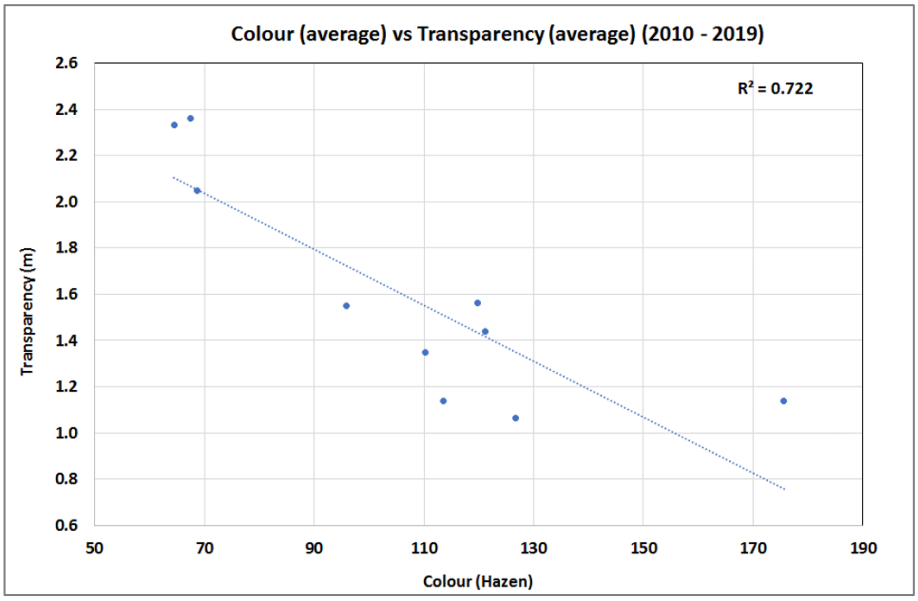


Figure 7-5 Correlation of annual average colour and annual average transparency in Lough Cutra

7.3.6 Fisheries Data

Data on fisheries in the study area comes from IFI surveys, plus electrofishing surveys undertaken in 2011, 2014 and 2019 for the 2020 rEIAR and 2022 surveys for the Derrybrien Wind Farm Development Decommissioning Project. The IFI published results derived from their WFD monitoring programme, all of which are published on the WFD Fish website (http://wfdfish.ie/). They relate to sites on the lower stretch of the Owendalulleegh River before it enters Lough Cutra. 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 smaller tributaries comes from the 2020 rEIAR and field studies for the Derrybrien Wind Farm Development Decommissioning Project. Survey sites referred to in this section are shown on Figure 7-1.

Electrofishing surveys were undertaken in the upper tributaries of the Owendalulleegh, Boleyneendorrish and Duniry Rivers in 2011 (September 26th and 27th), in the Owendalulleegh catchment in 2014 (July 17th), in the Owendalulleegh and Boleyneendorrish catchments in 2019 (September 21st and 22nd) and in the Owendalulleegh, Boleyneendorrish and Duniry catchments in 2022 (24th September). The 2011 conditions were sub-optimal for electrofishing due to high flows and very coloured water levels, whereas the 2014 survey was undertaken in ideal conditions. The 2019 and 2022 surveys were slightly sub-optimal, in that the water was highly coloured at all sites, even though flows were not excessive. This means that the fish numbers encountered in 2011, 2019 and 2022, especially the former, are likely to have been at least slight underestimates in the case of all species at some sites. This would have been least noticeable in the case of trout and stone loach, and more the case for lamprey and eel which are more cryptic species, not easily roused from the bottom and therefore more likely to be overlooked, especially in deeper areas.

7.3.6.1 Overview and IFI Fisheries Data

The Owendalulleegh River flows into Lough Cutra (382ha), the outflow from which eventually flows to the sea via an underground river to Kinvarra Bay. This barrier effect explains why, despite excellent salmonid habitat and high status water quality, there are no salmon in the system. Although it isn't known, it is assumed that the lampreys present are the non-migratory brook lamprey (*L. planeri*) rather than the migratory river lamprey (*L. fluviatilis*). Only the catadromous European eel manages to reach

Lough Cutra and the Owendalulleegh River from the sea. The Boleyneendorrish system is similarly has an underground connectivity to the sea and would likely have similar barriers to migration as the Owendalulleegh. 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 and for this reason likely to have very few if any salmon.

IFI has undertaken surveys on the lower reaches of the Owendalulleegh in 2009, 2013 and 2016, within 6km of the inflow to Lough Cutra (Kelly et al., 2017). The following species were recorded: 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 being present in the meandering 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 in project specific electrofishing in 2011, 2014, 2019 and 2022 were brown trout and stone loach.

7.3.6.2 Project Specific Fisheries Data

Table 7-16 provides a summary of fish species, densities and numbers for sites fished in 2011, 2014, 2019 and 2022. See Figure 7-1 for survey site locations.

Project specific electrofishing surveys were undertaken in the upper tributaries of the Owendalulleegh, Boleyneendorrish and Duniry Rivers in 2011 (September 26th and 27th), in the Owendalulleegh catchment in 2014 (July 17th); in the Owendalulleegh and Boleyneendorrish catchments in 2019 (September 21st and 22nd) and in the Owendalulleegh, Boleyneendorrish and Duniry Rivers in 2022 (September 24th). Site descriptions and photographs from survey rounds are in **Appendix 7-4**.

Table 7-16 Results of electrofishing surveys in Owendalulleegh, Boleyneendorrish and Duniry Catchments - Numbers of fish per m² (total numbers)

Sites	Trout	Trout	Trout	Trout	Lamprey	Lamprey	Stone loach	Stone loach	Stone loach	Stone loach	Eel	Eel	Stickleback	Minnow	Minnow
	2011	2014	2019	2022	2011	2014	2011	2014	2019	2022	2011	2014	2019	2011	2022
B1	0.06 (4)	-	-	-	-	-		-	-	-	-	-	-	0.007-0.009 (1)	-
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	Lamprey	Lamprey	Stone loach	Stone loach	Stone loach	Stone loach	Eel	Eel	Stickleback	Minnow	Minnow
	2011	2014	2019	2022	2011	2014	2011	2014	2019	2022	2011	2014	2019	2011	2022
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)	0.022 (2)	-	-
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)	-	-
O9	0.003 (2)	0.101 (34)	-	-	(2) 0.003		0.039 (26)	0.157 (53)			0.002 (1)				
O10	-	0.267 (52)	-	-				0.134 (26)				0.005 (1)			
O11	-	0.183 (94)	-	-		(1) 0.002		0.006 (3)							
OHL1	-	-	-	0.028 (1)					-	-	-	-	-	-	-

The 2011 conditions were sub-optimal for electrofishing due to high flows and very coloured water levels at the time, whereas the 2014 and 2022 surveys were undertaken in good to ideal conditions. The 2019 surveys were slightly sub-optimal, in that the water was highly coloured at all sites, even though flows were not excessive. This means that the fish numbers encountered in 2011 and 2019, especially the former, are likely to have been at least slight underestimates in the case of all species at some sites. This would have been least noticeable in the case of trout and stone loach, and more the case for lamprey and eel which are more cryptic species.

In terms of prevalence, brown trout was by far the most frequently encountered species in each survey round. This is to be expected because all sites fished had habitat suitable for salmonids even if it wasn't always optimal. Moreover, the Q-value surveys indicated that all sites were suitable in terms of biological water quality for the species (Kelly et al., 2007). It is noted that 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 physical habitat and water quality are suitable.

In reading the results, it's important to note that the Boleyneendoorish and Duniry catchments were unaffected by the peat slide, so the fish populations / distribution in those catchments had not been influenced by that event. The peat slide drained via the SC7(b) and SC7(d) sub catchments (Figure 7-3) to the main channel of the Owendalulleegh River.

Owendalulleegh Fish Results

In the 2011 survey, no fish were recorded in three of the upper Owendalulleegh tributary sites nearest the wind farm, namely at O1 (SC6), O2 (SC6), and O4 (SC7b) with just a single eel taken at O3 (SC7a) and one trout at O5A (SC7c) on the same occasion. Sites O2 and O3 had a few trout in later years (2019, 2022). No fish were recorded on any sampling occasion (2011, 2014, 2019 or 2022) at O5 (SC7b), i.e., just upstream of Flaggy Bridge. The data indicates that even on Owendalulleegh tributaries adjacent, but not affected by the peat slide, trout are only present in small numbers, if at all.

In all four years, small numbers of trout were taken on SC7(d) at O6, 800-850m downstream of Flaggy Bridge, 2 in 2011, 9 in 2014, 2 in 2019 and 5 in 2022. The higher numbers in 2014 and 2019 probably reflected the better fishing conditions at the time. At the base of this tributary at O6A, just upstream of the main channel of the Owendalulleegh and 1.8 km downstream from Flaggy Bridge, the 2019 survey returned fair number of trout (13) and high numbers of stone loach (41).

Apart from this latter site on the lower portion of SC7 sub catchment, all the small steep tributaries which drain the wind farm site down toward the main channel of the Owendalulleegh, including those not affected by the peat slide, had low densities of trout and other species. This is believed to be due to the generally very course nature of the substrate at several sites and the steeper gradients in these channels that would not be optimal for spawning. Along the main channel of the Owendalulleegh however, the picture is different, with significantly higher densities of trout at all sites in most surveys.

In 2011, only one main channel site was surveyed (O9) where just 2 trout, were recorded as well as 2 lamprey, 1 eel and 26 stone loach. In 2014, 34 trout and 53 stone loach were recorded - likely attesting to the optimal fishing conditions and lower water level during the 2014 survey. Also in 2014, another two sites were surveyed on the middle and lower reaches of the main channel, O10 which is 10.3 km upstream from Lough Cutra and O11, 5 km upstream. Site O11 coincides with the IFI 2016 survey point, Site 3. In the 2019 survey, three other sites were surveyed on the main channel, this time toward the upper reaches: (O7A) situated immediately below the confluence of the Flaggy Bridge tributary (SC7) (i.e. ~18 km u/s Lough Cutra) and O7B and O7C both situated above the confluence at 18.1 km and 19.7 km upstream of the lake respectively. Results from each of these 5 sites recorded a fish

community dominated by trout and stone loach. Trout densities at all five sites were similar, ranging from 0.183 fish/m^2 to 0.295 fish/m^2. At the same sites, stone loach densities ranged from 0.114 fish/m^2 to 0.226 fish/m^2 with one outlier of 0.006 fish/m2 at O11 in 2014 (Table 7-16).

These results show that trout densities on the Owendalulleegh are consistently higher in the main channel than in any of the small tributaries surveyed in the same catchment. Furthermore, the densities encountered are at least as high as those recorded by IFI in their surveys in the lower reaches of the river, suggesting that in the past decade at least overall fish production in the system has been quite stable. The data also shows that the densities of fish encountered in the channel upstream of the tributary impacted by the slide (SC7) are at least as high as those at sites downstream of the confluence and indicate that throughout the main channel trout densities appear to be fairly similar. The latter also confirms that the upper section of the main channel may well have been a very important source of replacement stock during the post-slide recovery period, as they comprise a full range of age classes.

Boleyneendoorish and Duniry Fish Results

In the Boleyneendorrish tributaries, brown trout were present as the only species in any year at all four sites surveyed (B1, B2, B4 and B5) with one minnow at B1 in 2011 (Table 7-16). 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 present at very low densities.

The Duniry which only drains 0.6% of the area of wind farm was fished at Site D1 in 2011 when it returned a moderate density of trout (0.13-0.18 fish/m^2) dominated by the 0+ age cohort. The upper Duniry (Site D1A), located 2.4km downstream of the boundary of the wind farm, was fished in 2022 and the only species present was minnow. This aligns with habitat observations in the upper Duniry, where there are extensive, continuous bedrock substrates that would prevent salmonid spawning.

Lough Atorick / Bleach Fisheries

Electrofishing surveys were not undertaken on either the eastern or western streams along the proposed Agannygal substation decommissioning 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 and generally unsuitable habitat 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 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.

7.3.6.3 Fish Densities

Overall fish densities encountered in all three catchments were most characteristic of upland soft-water sites. Kelly-Quinn et al. (1996) reporting on extensive fish surveys in upland afforested and moorland sites in Wicklow recorded trout densities mainly in the range 0.2-0.6 fish/m^2, while Fahy et al. (1984) reported densities of mixed salmonids in waters in Connemara draining granite areas in the range 0.06 to 0.71 fish/m^2. In contrast, Lehane et al, (2004) working in the south west reported much higher trout densities in streams draining Old Red sandstone (0.662-0.983 fish/m^2). These observations would indicate that the Owendalulleegh, Boleyneendorrish and Duniry populations are more typical of upland soft water geologies. Kelly-Quinn et al. (1996) also reported lower trout densities on steeper, narrow channels with coarse substrates, noting also that lower densities of 1+ and older trout may inhabit suitable pools in such areas. This tendency was also evident in the fish survey results from the current

assessment where most of the upper tributaries of the Owendalulleegh and Boleyneendorrish had lower fish densities than the main channels. The only exceptions were B2 and to a lesser extent B1, where the gradient was low and the substrate dominated by gravel, which favoured spawning and hence higher densities of 0+ fish.

Electrofishing surveys undertaken by the ESB Fisheries Division at several river sites within 10km of the Owendalulleegh including the Bleach River draining from Lough Atorick, in 1992 (ESB, 1993), 1994 (ESB, 1994) and 1996 (ESB, 1996) returned trout densities in the range of (0.01-0.26/m^2, average 0.1/m^2 across 12 sites) i.e. very much within the range typical of sites surveyed in the Owendalulleegh and Boleyneendorrish for the present study. These data were reported by Inis Environmental Consultants (2008).

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. With regards to Owendalulleegh sub catchment SC7 which experienced the peat slide in 2003, despite surveys on three separate occasions at Site O5 (Flaggy Bridge) and Site O4 (Black Road Bridge, further upstream on the same channel), no fish were recorded at either site despite habitat being suitable at both. In contrast, fish were present at Site O6 and O6A further downstream on the same watercourse, including trout, stone loach and eel. The absence of fish at the two upstream sites is thought to be owing to the combined effects of two natural cascade/waterfalls and a poorly constructed culvert downstream of Site O5 (Flaggy Bridge). These features were also identified by Inland Fisheries Ireland National Barriers Survey (IFI, 2023) as “Natural Bedrock Outcrop 1”, “Natural Bedrock Outcrop 2” and “Forestry Culvert”, respectively. OSI aerial imagery (Geohive Mapviewer) shows the forestry culvert was constructed between 1996 and 2001. It is not a part of the Derrybrien Wind farm Project. Table 7-17 summarises the IFI Barriers Assessment on the Derrybrien North tributary (affected by the peat slide in 2003) and places their findings in context with results of the electrofishing surveys for this project. The criteria for IFI Barrier classification are as follows:

- Complete barrier: Impassable, complete obstacle for the target species/life-stage.
- High impact barrier: The structure represents a significant impediment to the target species/life-stage but some of the population (e.g. < one third) will pass eventually.
- Low impact barrier: The structure represents a significant impediment to the target species/life-stage but most of the population (e.g. > two thirds) will pass eventually.
- Passable barrier: No obstacle.

Table 7-17 IFI Barriers Report in relation to Derrybrien Electrofishing Results

IFI Barrier Name	IFI Barrier Assessment	Relationship to Derrybrien Project Electrofishing Results
Forestry Culvert	**High impact barrier** to adult brown trout due to shallow water depth (0.07m on day of assessment). High impact barrier to juvenile salmonids, juvenile eel and juvenile lamprey due to the structure length (12.5m) and the medium turbulence levels.	When electrofished on three occasions (2011, 2019, 2022) at Site O5A, ~900m upstream of the Forestry Culvert in mid-reaches of subcatchment SC7(c) only a single fish was captured (**Plate 7.1**) on the first two occasions and none on the third, confirming that the forestry culvert is indeed likely to be a **High Impact barrier** for fish migrating up the Derrybrien North tributary of the Owendalulleegh. Note that the O5A tributary (SC7(c)) was not directly affected by the peat slide, it is a small tributary of the peat affected tributary. The fish results at O5A are compared to numbers of trout caught further down the tributary at Site O6 (~500m d/s of the Forestry Culvert): 2011 (2), 2014 (9), 2018 (2), 2022 (5), and 13 trout being returned at Site O6A, another ~600m downstream on the same tributary in 2019. Whilst these are not high numbers, the data does support the conclusion that the forestry culvert is likely a partial a barrier to fish movement.
Natural Bedrock Outcrop 1	**High impact partial barrier** to adult brown trout, juvenile salmonids, adult lamprey. No barrier to juvenile eel. In high flow conditions this structure will pond out and present no barrier to fish passage.	Site O5 immediately upstream of Flaggy Bridge returned no fish on each of three separate electrofishing surveys (2014, 2019, 2022) despite habitat being suitable. This site is upstream of the series of barriers formed by Natural Bedrock Outcrops 1 and 2 (see **Plate 7.2**) and the forestry culvert (**Plate 7-3**). Natural Bedrock outcrops 1 and 2 are located between Sites O5A (with small numbers of trout) and O5 (no trout). Inis Environmental (2008) also found no fish at Flaggy Bridge, but in the same survey, 3 trout were present 350m d/s Flaggy Bridge (i.e., d/s of the Forestry Culvert) and 2 trout, 22 stone loach and 1 eel were recorded at the site a further 100m d/s. This suggests that the Natural Rock Outcrops 1 and 2 (along with the Forestry Culvert), either alone or cumulatively, are complete barriers to fish passage because there is no pertinent reason why fish would not have colonized site O5 at Flaggy Bridge after the peat slide given that water quality (Q4-5) and habitat (gravel, riffle/runs) have recovered and are suitable for salmonids. Whether or not fish were present upstream of Flaggy Bridge prior to the peat slide, the series of natural and artificial barriers downstream of Flaggy Bridge are likely to have presented difficulty to upward migrating fish, even prior to the construction phase.
Natural Bedrock Outcrop 2	**High impact or complete barrier** to all fish passage in low flows. **In higher flows: low impact partial barrier** to adult brown trout and **high impact partial barrier** to juvenile salmonids and adult lamprey, i.e., in elevated flow passage will be eased for adult brown trout.	
Barrage 4 (IFI Ref. "Barrage 1")	Complete barrier (all flow conditions) to adult brown trout, juvenile salmonids, adult lamprey, and cyprinids. No barrier to juvenile eel	Barrages 3 and 4 (a.k.a., IFI "Barrages 2 and 1", respectively) are certainly barriers to all fish species except eel. However, the electrofishing data from several occasions (2014, 2019, 2022) plus the data from Inis Environmental Surveys (2008) shows that fish are not, in any case, reaching as far as Flaggy Bridge owing to downstream natural (bedrock outcrops) and artificial (forestry culvert) barriers. Hence the presence of Barrages 3 and 4 have no material effect on fish passage further up this tributary.
Barrage 3 (IFI Ref. "Barrage 2")	Complete barrier (all flow conditions) to adult brown trout, juvenile salmonids, adult lamprey, and cyprinids. No barrier to juvenile eel	



Figure 7-6 Location of Fish Migration Barriers on Derrybrien North Tributary (SC7(d) and SC7(b))

Surveys for the Derrybrien Wind Farm Development Decommissioning Project in 2022 identified additional potential rock outcrop barriers (at least partial) at sites downstream of the barriers listed in Table 7-17, i.e., between O6A and O6 on the same Derrybrien North tributary, which may also be influencing fish migration success (at ITM [561336, 701926] [561158, 701960] and [561141, 701972]. Noted also is that the "Forestry Culvert" is privately owned, and it pre-existed the Derrybrien Wind farm construction. It was not altered as part of the project in response to the peat slide.



Plate 7-1 Single (only) trout (1++) taken at O5A (SC7c) in September 2019



Plate 7-2 Waterfall [IFI Natural Bedrock Outcrop 2] ~300m downstream from Flaggy Bridge (Site O5, SC7b) – August 2018



Plate 7-3 View downstream though Forestry Culvert, downstream of Flaggy Bridge (30 August 2024)

7.3.7 Ecological Valuation Summary

Table 7-18 Ecological Valuation Summary

Site Code	EPA Watercourse Name	EPA Waterbody Code	Ecological Valuation Category (NRA, 2009)	Reason
Owendalulleegh Catchment				
O1	Un-named	IE_WE_29O010500	E – Local Importance (Low)	No fish present, Moderate Status (Q3-4)
O2	Un-named	IE_WE_29O010500	E – Local Importance (Low)	No fish present, Moderate Status (Q3-4)
O3	Un-named	IE_WE_29O010500	C– County Importance	Trout nursery habitat + confirmed trout population, High Status (Q4-5).
O3A	Un-named	IE_WE_29O010500	D – Local Importance (High)	Trout nursery habitat present, High status (Q4-5) waters.
O4B	Derrybrien North	IE_WE_29O010500	E – Local Importance (High)	Some salmonid habitats but no trout present due to downstream barriers. High status (Q4-5) waters.
O4A	Derrybrien North	IE_WE_29O010500	E – Local Importance (Low)	Very small stream with limited salmonid habitat but no trout present due to downstream barriers. Good status (Q4) waters.
O4	Derrybrien North	IE_WE_29O010500	E – Local Importance (Low)	Potential salmonid habitat but no trout present due to downstream barriers. Good or Moderate status (Q4, Q3-4) waters.
O5	Derrybrien North	IE_WE_29O010500	D – Local Importance (High)	Potential salmonid habitat but no trout present due to downstream barriers. High status (Q4-5) waters.
O6	Un-named (lower Derrybrien North)	IE_WE_29O010500	D – Local Importance (High)	Some salmonid habitats but low densities of trout, possibly related to partial downstream barriers. High status (Q4-5, (2011) and Good Status (2014))
O6A	Un-named (lower Derrybrien North)	IE_WE_29O010500	C– County Importance	Salmonid nursery habitat, confirmed good trout population, 3rd order channel, Good Status (Q4)
O5A	Un-named (branch of Derrybrien North)	IE_WE_29O010500	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.

Site Code	EPA Watercourse Name	EPA Waterbody Code	Ecological Valuation Category (NRA, 2009)	Reason
O7A	Owendalulleegh	IE_WE_29O010500	C – County Importance	Good trout spawning and nursery habitat. Good trout population confirmed. Good status (Q4) waters, 3rd order channel.
O7B	Owendalulleegh	IE_WE_29O010500	C – County Importance	Good trout spawning and nursery habitat. Good trout population confirmed. Good status (Q4) waters, 3rd order channel.
O7C	Owendalulleegh	IE_WE_29O010500	C – County Importance	Good trout spawning and nursery habitat. Good trout population confirmed. Good status (Q4) waters, 3rd order channel.
O8A	Derrybrien West	IE_WE_29O010700	D – Local Importance (High)	Some potential trout spawning / nursery habitat. Good status (Q4) waters.
O8B	Un-named	IE_WE_29O010700	D – Local Importance (High)	Some potential trout spawning / nursery habitat. Moderate status (Q3-4) waters.
O9B	Un-named	IE_WE_29O010700	D – Local Importance (High)	Some potential trout spawning / nursery habitat. Moderate status (Q3-4) waters.
O9A	Knocknarebana	IE_WE_29O010800	D – Local Importance (High)	Some potential trout spawning / nursery habitat. Moderate status (Q3-4) waters.
O9A1	Knockoura 29	IE_WE_29O010800	E – Local Importance (Low)	Limited potential trout spawning / nursery habitat. Moderate status (Q3-4) waters.
O9A2	Knocknarebana	IE_WE_29O010800	E – Local Importance (Low)	Limited potential trout spawning / nursery habitat. Moderate status (Q3-4) waters.
OHL1	Derrybrien East	IE_WE_29O010500	D – Local Importance (High)	Some salmonid spawning and nursery habitat, low-density trout population. confirmed High and Moderate (Q4-5, Q3-4) waters.
Boleyneendorrish				
B1	Un-named	IE_WE_29B040100	D – Local Importance (High)	Some potential trout spawning / nursery habitat, and a low trout density confirmed (Q4)

Site Code	EPA Watercourse Name	EPA Waterbody Code	Ecological Valuation Category (NRA, 2009)	Reason
B1A	Boleyneendorrish 29	IE_WE_29B040100	D – Local Importance (High)	Some potential trout spawning / nursery habitat, and a low trout density confirmed (Q4)
B1B	Boleyneendorrish 29	IE_WE_29B040100	E – Local Importance (Low)	No significant salmonid potential (Q3-4)
B1C	Boleyneendorrish 29	IE_WE_29B040100	D – Local Importance (High)	Some potential trout spawning / nursery habitat
B2A	Kilbeg 29	IE_WE_29B040100	E – Local Importance (Low)	Some potential trout spawning / nursery habitat. Good Status (Q4)
B2	Kilbeg 29	IE_WE_29B040100	C– County Importance	Good trout spawning and nursery habitat. Good trout population confirmed. High status (Q4-5) waters.
B3A	Boleyneendorrish 29	IE_WE_29B040100	C– County Importance	Good trout nursery habitat. 3rd order channel, High status (Q4-5) waters.
B3	Boleyneendorrish 29	IE_WE_29B040100	C– County Importance	Good trout nursery habitat. 3rd order channel, High status (Q4-5) waters.
B4	Boleyneendorrish 29	IE_WE_29B040100	C– County Importance	Good trout nursery habitat. Modest to good trout population confirmed. High status (Q4-5) waters.
B5	Boleyneendorrish 29	IE_WE_29B040100	C– County Importance	Good trout nursery habitat. Modest to good trout population confirmed. High status (Q4-5) waters.
Duniry Catchment				
D1A	Un-named	IE_SH_25D070100	E – Local Importance (Low)	Some potential salmonid habitats present but minnow the only fish recorded, 1st order stream, Moderate – Good Status (Q4 or Q3-4)
D1	Duniry	IE_SH_25D070100	D – Local Importance (High)	
Lough Atorick / Bleach Catchment				
OHL2	Un-named	IE_SH_25B070100	D – Local Importance (High)	Some potential trout spawning / nursery habitat near lake confluence. High status (Q4-5) waters.
OHL2A	Un-named	IE_SH_25B070100	E – Local Importance (Low)	No significant potential fisheries value. Highly modified by forestry drainage

Site Code	EPA Watercourse Name	EPA Waterbody Code	Ecological Valuation Category (NRA, 2009)	Reason
OHL3	Un-named	IE_SH_25B070100	D – Local Importance (High)	Some patchy, potential trout spawning / nursery habitat. Good status (Q4) waters.

7.4 Likely, Significant Effects and Mitigation Measures Implemented

7.4.1 Relevant Characteristics of the Proposal

The Retained Development comprises the following elements that will be left in-situ according to the proposed decommissioning plan:

Derrybrien Wind farm including the Derrybrien 110kV Substation:

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approx. 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.

Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation:

- 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.

Off-site development constructed in response to the peat slide in 2003:

- Barrage 1 and Coillte Access Track.
- 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 to Black Road Bridge, Flaggy Bridge, Unnamed Bridge C and Crooked Bridge

The baseline year for the proposed Retained Development is 1998, i.e., preceding the 2003-2006 construction phase. The proposed elements for retention would not have been present without constructing the entire development, hence this impact assessment includes the retrospective assessment of effects of the entire Project, throughout its lifetime. The impacts and effects on rivers and streams draining from the Project area relating to the Retained Development are assessed for the following stages of the Project:

1) Construction Phase (2003-2006): Derrybrien Wind Farm and 110kV substation; Derrybrien - Agannygal 110kV OHL and Agannygal 110kV Substation, including containment works in response to the peat slide of October 2003.

2) Operation and Maintenance Phase (2006 – 2022): Maintenance works on the wind farm, substations and along the overhead line during the operation of the wind farm.
3) Ceased Operation Phase (2022 – Present): Maintenance works on the non-operational wind farm, substations and OHL.
4) Proposed Derrybrien Wind Farm Development Decommissioning Project (the 'Prospective Development'): Works associated with the removal of above ground elements of the wind farm, substations, OHL and the effect of off-site features associated with the 2003 peat slide response.
5) Effects of the Retained Development
6) Cumulative and In-Combination Effects (including the 'Prospective Development')

7.4.2 Construction Phase Effects (2003-2006)

7.4.2.1 Description of Sources of Effects

The 2003-2006 construction of the Derrybrien Wind farm and Substation, plus the OHL and Agannygal 110 kV Substation comprised the following components that could potentially have given rise to negative impacts on the aquatic environment:

Derrybrien Wind farm including the Derrybrien 110kV Substation:

- Felling of 222 ha of coniferous forestry at various stages of maturity within the footprint of the wind farm (total wind farm area being 344.5ha).
- Supplementing the existing on-site drainage mainly on the western part of the site, as the eastern portion had already been well supplied with drains for turbary.
- Insertion of tracks-side drains and drains from turbine bases.
- Building a site compound.
- Construction of internal access tracks to turbine locations (mainly floating roads).
- Coillte access track upgrade.
- Road upgrades.
- Establishment of borrow pit/quarry/quarries as sources of stone and boulder clay for construction work and as post-construction peat repositories.
- Reinstatement of borrow pit/quarries.
- Construction of 70 no. turbine foundations involving excavation of peat and mineral subsoil (64 no. foundations of 9.8 m x 9.8 m and 6 no. foundations of 11 m x 11 m) and adjoining hardstanding areas (approximately 47 m x 18 m).
- Provision of 32 peat repositories throughout the site to store peat excavated during construction.
- Trenching for cables linking turbines to the Derrybrien Substation.
- Wind farm substation and compound construction.

Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation:

- 33.1 ha of coniferous forestry felling along the 7.8 km of the OHL corridor and 1.6 ha of felling for Agannygal Substation.
- Overhead line (OHL) construction.
- Agannygal Substation construction.

Off-site Features constructed on Derrybrien North Stream (SC7(b)) in response to the October 2003 peat slide:

- Installation and removal of temporary Barrages A, B, C, D (2003-2005).

- Installation of extant Barrages 1, 2, 3 and 4 and Coillte Access Track.
- Formation of Peat Repository Areas at Barrages 2, 3 and at Black Road Bridge.
- Minor repairs work to instream structures/bridges – at Black Road Bridge, Flaggy Bridge, Unnamed Bridge C, Crooked Bridge and Stepping Stones.
- Minor borrow pits used to source material.
- Drainage works to help stabilise the peat slide.

In the interest of clarity, the impacts associated with construction of the wind farm (including the 2003 peat slide) and those of the OHL and the Agannygal Substation have generally been presented separately, despite some minor overlap.

Given the nature of the Project, as well as the site's antecedent land-use and dominant blanket peat overburden, the main contaminants likely to have arisen from the construction activities on the wind farm were (1) peat solids and nutrients commonly associated with clearfelling for site preparation, and (2) mineral and peat solids associated with excavations as part of construction activities. Considering that these two activities proceeded in tandem, their potential effects on receiving streams would also have occurred at more or less the same time. In relation to the evolution of suspended solids contamination during routine construction (i.e., other than the unexpected peat slide which is dealt with separately in Section 7.4.2.4) this would have been associated with many different components of the infrastructure installation, including access tracks, turbine bases, cable trenches, peat repositories, borrow pit/quarries etc. In most cases these components are evenly spread across the site so that it would not be feasible to attempt to separate their proportional contributions to the impacts on receiving streams. A few features can be more precisely assigned to a given receiving watercourse or sub catchment e.g. the substation or Borrow pit/quarry 3. The following paragraphs deal with those aspects of construction works that could have been the source of contaminants in run-off. Once these have been described, their combined effects on water quality (Q-value) and fish are discussed in Sections 7.4.2.2 and 7.4.2.3. Aquatic ecological effects and impact significance of the peat slide that occurred early in the construction phase (October 2003) is discussed separately in Section 7.4.2.4.

Coillte Access Track & Road Upgrades: A total of 3.1 km of existing Coillte access track to the site had to be widened to 4 m with 4.5 m at bends to facilitate the use of the site as a wind farm. This entailed strengthening, construction of lay-bys and remedial works to drainage along the road as well as the placement of geogrid, rock material and regrading and surfacing works. The track drains to sub catchment SC4 in the upper section of the Boleyneendorrish and SC5 in the upper section of the Duniry catchment. The works would have generated some mineral solids the coarser fractions of which would have been intercepted in roadside drains and intermediate connecting drainage, while the fine fractions would have dispersed widely but very thinly in these upper catchment sections.

In addition, some minor widening and resurfacing of the Black Road was required over a 5 km distance to take the increased level of construction traffic. As part of these improvements, upgrades to Black Road Bridge and Bridges A and B were also undertaken. These works would have generated very little in the way of solids washout due to their minor nature. The re-surfacing, presumably with asphalt would have given rise to a temporary rise in trace hydrocarbon contaminants (PAH's) in the initial run-off events following re-surfacing. Much of which would have been intercepted in roadside soils and the residual amounts rapidly diluted in the receiving waters of SC6, SC7(a) and SC7(b).

Tree Felling: Clearfelling of the 222 ha of coniferous plantation on site was the first action on the site in preparation for the construction and installation of the wind farm infrastructure. It began in June 2003, a month before civil works began on site, was interrupted in mid-October 2003 owing to the peat slide and recommenced in the second half of 2004 and finished in September 2005. During the initial period up to October 16th, 2003, felling proceeded along a 15 m wide corridor to open up a pathway for the turbine access tracks. Felling at the 3 borrow pit/quarries and at the wind farm substation was also undertaken in this initial period. In total, this initial felling amounted to around 31 ha. A significant

feature of this felling was its diffuse distribution across the site with any derived runoff divided between at least 9 of the sub catchments draining the site. At the same time as the preliminary on-site clearfelling was being undertaken, felling of the 33.1 ha along the OHL was also beginning at the wind farm end of the 7.8km route. 3.4 ha was felled before work ceased in October 2003 because of the peat slide. This had covered about the first 500 m of the OHL corridor beyond the wind farm which lay within the upper catchment of SC7(b), i.e., upstream of Site O4. After a gap of 8 months the remaining on-site felling of 191 ha of mixed maturity stage forestry and the remaining 29.7 ha of forestry along the OHL were completed in the roughly 12 months between mid-2004 and mid- 2005.

The area of forestry that was felled between 2003 and 2005 has been apportioned between each of the sub catchments draining the wind farm, OHL and Agannygal Substation in Table 7-9, above. The % of the overall area of each of those sub catchments constituted by the felled area is also shown. This includes the smaller areas felled along the section of the OHL that flow to the same sub catchments draining the wind farm site, i.e., in SC7(b) and SC7(d). It also includes the felling area at the southern end of the OHL line at Agannygal (2.25ha) and the area felled for the substation (1.6ha) which drains towards Lough Atorick (3.85ha in total). Within the wind farm site, the greatest proportion of felling (by area) occurred in sub catchments of the Boleyneendorrish (SC1, SC2, SC3) and the Owendalulleegh (SC7(a), SC7(b), SC7(c)).

Insertion of Additional Drains: The eastern part of the site already had a well-developed network of drainage channels before work on the wind farm began but additional drainage was required, mainly in the central and western portions of the site where they supplemented the pre-existing drains. Installing drains would have potentially generated some peat silt. However, given that most of the bases of these drains would have been in peat, any solids arising would have been low, although some release of ammonia may have occurred as a response to drying of the peat layers (Nieminen, 2003). Where the new drains cut into mineral soils below the peat layer, e.g. in some areas toward the southern edge of the site, suspended solids loss would potentially have been higher (Nieminen, 2003).

Wind Farm Site Compound: The site compound for the construction phase was established at the northeast corner of the wind farm site not far from Borrow pit/quarry 3 on an existing Coillte track turning area. As activities ramped up, this was expanded on either side to a final size of 77 m x 38 m. The extension was formed by stripping the peat and back-filling it with crushed rock from the borrow pit/quarry. The surface was finished with imported hardcore. The excavated peat was side cast. The construction of this compound would have generated some silt at the time, mainly associated with washout of fines from the hard-core topping layer and the side-cast peat, which could have made its way into the headwater tributary of the Boleyneendorrish in SC4.

Access Tracks: 15.5 km of internal roads were laid to provide access to the turbine locations. Over 14.6 km of these roads were floating roads built on top of the existing peat layer, with just a short length of non-floating road. Floating roads were topped with a 500mm layer of crushed rock from the borrow pit/quarries on site and a 50 mm layer of imported Clause 804. This was overlain in places by a thin layer of quarry dust. Non-floating roads (0.9km) were finished in a similar manner. In the case of both road types the parallel roadside drainage was maintained throughout.

Non-floating roads (0.9 km) required the initial removal of the mainly thin overlying peat layer which was side-cast and later placed in designated peat repositories. The construction of floating and non-floating roads would have given rise to run-off of some fine mineral solids, mainly from the finished surfaces in the case of both road types. However, the fact that the vast majority of the tracks were floating, requiring no excavation into mineral sub-soil, significantly reduced the potential for solids loss. This combined with the mainly gentle gradients on much of the site also reduced the level of erosion during heavy rainfall. The main source of suspended solids from these surfaces would have been early in their construction when easily erodible fine solids would have washed from the surfaces before they were fully bedded in. Although some of this washout would have reached the drain network running in

parallel to the tracks, these tended in the main to be set back by a few meters so that some solids would have had an opportunity of being filtered out in the intervening vegetation before reaching the drains. At the base of the drains, silt traps were installed in order to intercept the bulk of the solids. Residual solids leaving the site from this aspect of the works would have been broadly distributed among the sub catchments draining the site, given the even spread of roads around the site.

Borrow pit/quarries: The 3 borrow pit/quarries developed on site initially had the peat and mineral soil overburden removed and side cast and later amalgamated into repositories adjacent to each. The 3 pits had the potential to be sources of mineral solids associated with initial surface stripping and due to washout of dust and mineral particles associated with concentrated heavy vehicle movements, residual solids from the excavation of stone (Borrow pit/quarries 1 and 3) and the excavation of boulder clay (Borrow pit/quarry 2) during their operation. Crushed stone in itself would be unlikely to generate high levels of solids and any generated would be amenable to rapid deposition. Constant movement of heavy machinery at entrances could increase the level of fines available to be washed out at these locations. The management of entrances to these areas would have been important. A rock crusher was used in Borrow pit/quarry 3 but it's location within the pit itself would have precluded it becoming a source of solids. In summary therefore, it's thought that the borrow pit/quarries themselves are unlikely to have been a significant source of solids washout because by their nature they are more likely to retain solids within their boundaries. Nevertheless, the entrance areas to each could have been a source of some solids washout into surface drainage during periods of heavy rain and resulted in at least some residual solids exiting the site, especially around Borrow pit/quarry 3, the largest and most active.

Turbine Bases: 70 turbines of two different types of bases were constructed on the site. The bases of each type were excavated by removal of the peat layer and any boulder clay rock using a digger on wide tracks to protect the underlying peat. All excavated material was side cast. Where foundations had to be dewatered, the water was broadcast across the vegetated bog to filter out solids. Once the bases were shuttered and reinforced, depending on the size of the turbine base, either $96m^3$ or $121m^3$ of concrete was poured to form the pads. The concrete was provided by an external supplier; no concrete was batched on site. Once in place the surrounds of the base were backfilled with the boulder clay originally stripped from the footprint and then topped with crushed stone from the borrow pit/quarries. At this time also a buried land drain was installed around the base, the outlet of which was connected into the surface drainage network. Water ponding in any of the turbine foundation excavations was pumped out to nearby surface drainage, often over the vegetated surface to filter out solids.

Wind Farm Substation: Peat was stripped from the footprint and brought by dumper truck to the peat repository between T24 and T25. The work began in October 2003 but was stopped after 3 days due to the peat slide and wasn't resumed until December 2004. Prepared ground was brought up to formation level using crushed stone from the borrow pit/quarries on site. All concrete used on site was imported rather than batched on site and all pouring was into shuttered or concrete moulds (e.g. for end mast leg foundations). A drainage ditch was dug around the northern and eastern perimeter of the substation compound set back between 7m and 13m from its perimeter. This drain exited the site into the source of SC7(a) via an existing Coillte drain. The edge of the substation is set back 75m from the southern perimeter of the wind farm, so solids-contaminated runoff from the construction area would not have readily exited the wind farm site, assuming that the new perimeter drain was not inserted until after the compound had been completed. However, given the frequent movements of heavy traffic in and around the compound during construction, which was undertaken in winter, it is likely that some suspended solids would have reached surface drainage downstream from this site, i.e., into sub catchment SC7(a).

Cable Installation: 8 no. cable routes were constructed within the site, most of them running east-west close to and parallel to the access tracks, all of them eventually linking to the substation. They were laid in shallow peat trenches (without ducting) which were being backed- filled as soon as the cables were being laid with the excavated peat that had been temporarily side cast when opening the trenches. This

procedure is likely to have given rise to the washout of small amounts of peat solids which would have entered the drainage network throughout the site with residual amounts exiting the site via the sub catchments draining the site. Where the trenches had to pass under existing cross drains the potential for solids washout would have been higher but given that this was a continuous cut, lay and back-fill exercise, it's unlikely to have given rise to appreciable amounts of peat silt washout. Furthermore, whatever amount did exit the site would have been distributed across all sub catchments rather than being concentrated in any particular one.

Peat Repositories: 32 no. peat repositories were dotted throughout the site and maintained on level ground with no more than 1m of deposited material. These were all inserted post the October 2003 slide when work resumed on the site later in 2004. Peat for the repositories came from peat previously side cast beside the 37 no. wind turbines completed prior to the peat slide and from the balance constructed after the slide. A larger repository between T24 and T25 accommodated the peat stripped from the platform for the on- site substation (see Wind Farm Substation above). After completion, these repositories would have rapidly revegetated with pioneer species such as bulbous rush and later by other species, thereby reducing and eventually preventing further erosion of peat solids. Some of the peat silt washed from the repositories while they were still being used would have been intercepted in vegetation at the margins of tracks and between these and the drainage system. However, the assumption is being made that at least a portion of the mobilised solids would have left the site in all drainage channels during heavy rainfall events despite the presence of silt traps on outlet drains.

7.4.2.2 Wind Farm and Substation Water Quality Effects

Clearfelling - Effects on Water Quality (Chemistry & Q-values)

Studies in the west of Ireland have shown that in upland blanket peat catchments clearfelling 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 with additional contributions possibly arising from increased peat solids in runoff following felling. Significantly increased concentrations of phosphorus have been shown by Rodgers et al., (2010) and Cummins and Farrell (2003a) to occur in small drainage channels near the felling plots following clearfelling of conifers on upland blanket peat in the west of Ireland, particularly in the first 2 years after felling. Finnegan et al., (2014) and Rodgers 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, nor of extended duration, with limited effect downstream of the first confluence with the next (higher order) stream.

It can be assumed that relevant Forest Service Guidelines for harvesting (Forest Service 2000a, 2000b) were employed during on-site felling operations that took place 2003-2005. The Guidelines prescribe industry best practise including standard mitigation measures to protect water quality during all felling operations. The required felling occurred on the relatively low gradient, upland 'plateau' of the wind farm footprint which is upstream of the main stems of the tributary streams that ultimately drain the area. For that reason, any impacts and consequent water quality effects in relevant sub catchment tributaries were indirect, i.e., downstream, effects as a result of run-off via overland flow and on-site drains of the wind farm construction area.

Elevated soluble reactive phosphorus levels (SRP) were recorded, mainly in 2019, within several of the small streams draining land surrounding the wind farm at sites in sub catchments SC9, SC8, SC7(c), SC2 and to a lesser extent SC1(see Figure 7-7). In several of these instances, the elevated SRP concentrations followed non-project related clearfelling in 2018 and 2019, i.e., SC1, SC8, SC9 and an unnamed sub catchment situated between SC9 and SC8. Sites in several of these sub catchments also had Moderate Status (Q3-4) or Moderate bordering on Good (Q3-4/Q4), when they would have been expected to be at least Good Status (Q4). Given the observations quoted in the literature cited above (Rodgers et al., 2010, Cummins and Farrell, 2003a), elevated SRP (leading to depressed Q-value) can

be attributed to the clear-felling that occurred in these sub catchments in 2018 and 2019. This link could not always be demonstrated in the 2018 and 2019 data for this study, either in terms of water chemistry or Q-ratings, e.g., despite several hectares of felling in sub catchment SC7(a) in 2018, increased SRP concentrations were not recorded at site O3 in 2019 in this sub catchment and a Q-rating of High bordering on Good (Q4-5/Q4) was recorded. One possible explanation for this is precipitation of phosphorus by iron (Fe) in the system, especially as iron bacterial growths were noted from time to time at Sites O1, O2, O4 and O4A.

Therefore, even with standard Forest Service water quality protections in place, it can be expected that clearfelling related nutrient loss (mainly SRP) to surfaces waters was likely to have occurred in at least some of the small tributaries draining the wind farm during the 2003-2006 construction phase. The effect was likely to have been a temporary to short-term decline in Q-value locally in the tributary streams, more evident during summer months when flows were also low in the smaller channels. Elevated nutrient has potential to drive eutrophication caused by ephemeral, filamentous green algal blooms leading to diurnal oxygen fluctuations and decay processes that depress habitat quality for macroinvertebrates and fish which cause the decline in Q-value and hence ecological status. Data collected over the course of the current study indicates that construction phase effects of clearfelling on water quality in the small tributaries would have been reversible (i.e., SRP concentrations returned to High status within 3 years, at worst), though there may have been a slight lag time for recovery of macroinvertebrate communities (and hence improved Q-value) locally within the smaller tributary streams. The level of that impact and consequent effect would have depended broadly on the size of the area felled as a % of the area of the individual sub catchment to the monitoring site in the stream where water quality was being assessed. The indirect (i.e., downstream) impact of this was likely a moderate negative effect on macroinvertebrate diversity and abundance at sites downstream of the wind farm, potentially causing a temporary-to-short-term drop-in Q-value (by a half or full class) within the receiving small tributary streams associated with a felled plot.

The evidence collected over the course of the current study (since the 2003-2006 construction phase) has been that while there are localised effects of clearfelling in the smaller tributary streams draining a felled plot, this does not extend to significant negative effects on main stem rivers downstream of the wind farm / substation area in terms of Q-values, and hence water quality, i.e., at EPA monitoring sites on main channel receiving rivers (Owendalulleegh, Boleyneendoorish, Duniry).

See Section 7.4.2.3, below, for effects associated with clearfelling along the OHL corridor and Agannygal Substation and Section 7.4.2.5 for combined effects of all 2003-2006 construction phase elements.

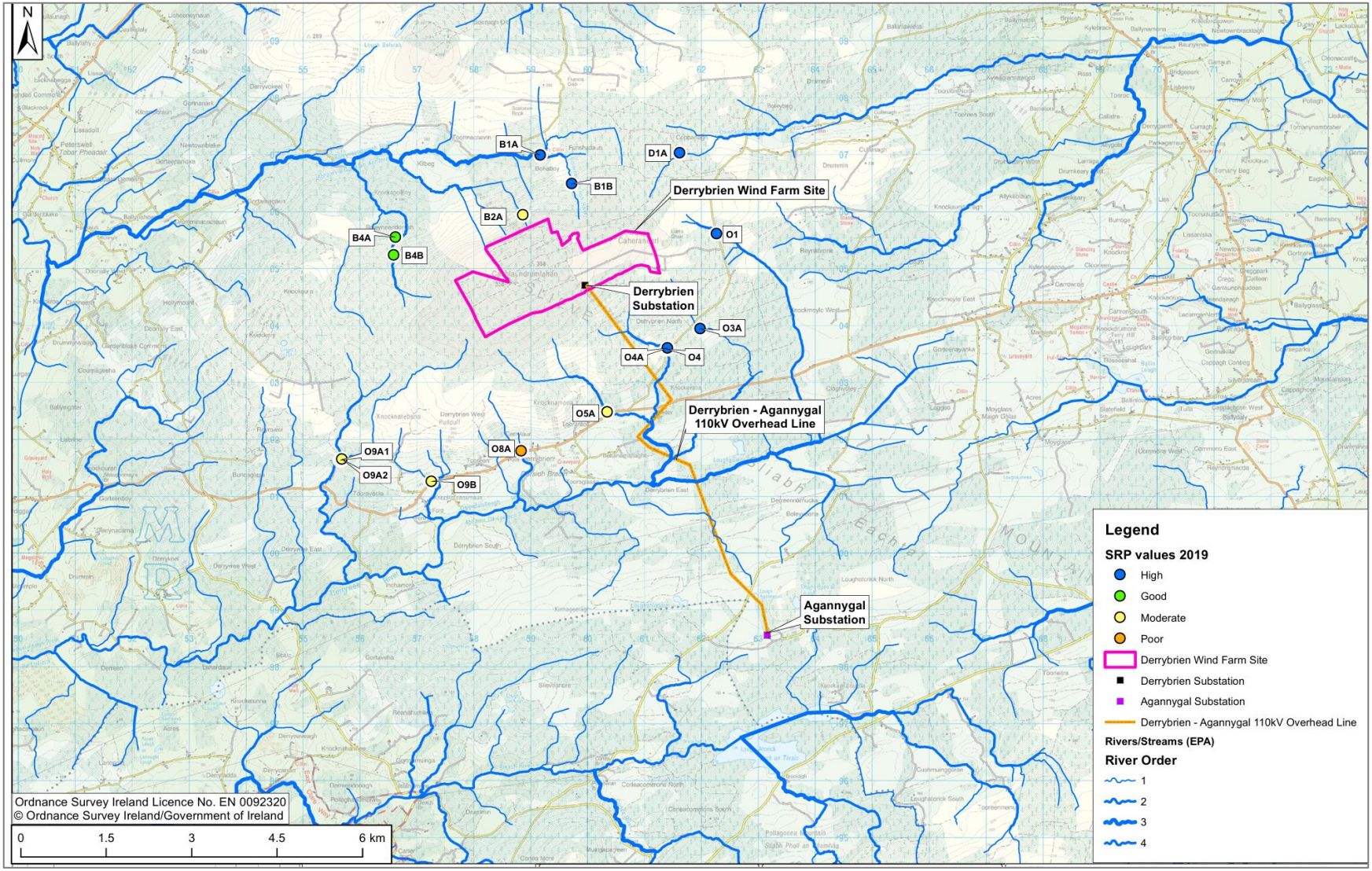


Figure 7-7 SRP (ortho-phosphate) levels 2019 expressed as WFD status

Suspended Solids – Effects on Macroinvertebrates & Water Quality

Suspended and deposited inorganic sediments can have a negative effect on macroinvertebrates in streams through a wide variety of mechanisms including burial, reduced oxygen supply to sediment interstices, abrasion of soft body parts such as gills, increased invertebrate drift, dilution of food quality due to increased supply of inorganic particles, reduction of refugia in coarse sediment by clogging with deposited sand, increased habitat instability etc. (Jones et al., 2012). At a localised patch-scale, increased sediment deposition and cover in upland streams in temperate waters has been linked to reduced taxa richness especially of [5]EPT (mayflies, stoneflies and caddis flies), depending on the quantum of sediment involved (Larsen et al., 2009). Despite these observations, however, both cited papers emphasize the difficulty associated with establishing the role and scale of macroinvertebrate impacts in streams attributable specifically to inorganic sediment, as opposed to other impacts related for example to changes in land use and associated water quality effects.

Excluding the effect of the 2003 peat slide (which is dealt with in detail in Section 7.4.2.5), in the case of the present study area, the Larsen et al. (2009) paper would suggest that increased sediment supply as a result of activities in the construction phase could have led to a reduction both in the diversity and the density of the more sensitive macroinvertebrate groups (mayflies, stoneflies and caddisflies) in small tributaries draining the wind farm area. These groups were present in most samples taken as part of the current study between 2011 and 2024 on the small streams draining the wind farm. Such alterations in the macroinvertebrate community could contribute to a deterioration in the Q-rating of a site. That being said, the terrain on all sides of the wind farm falls away steeply beyond the boundaries of the site and, in the many sites surveyed as part of this study, fine sediment deposition was very rarely observed in the main channel of any stream. This doesn't mean that sediment lost from the site during the construction phase would not have had an impact, it does suggest that mobilized solids would have been widely distributed longitudinally, and therefore thinly spread in the downstream watercourses. However, increased inorganic and peat solids in runoff, combined with increased nutrients from clearfelling and peat excavation, would be more likely to be detectable as reductions in ecological status (decline in Q-value). A site-specific assessment of the combined impacts of clearfelling and general wind-farm site construction on Q-ratings is presented in Section 7.4.2.5, Table 7-18, below.

Suspended Solids – Effects on Fisheries

Deposited solids both organic and inorganic can have negative impacts on fish recruitment in affected streams. Solids deposited on salmonid spawning redds, could result in a reduction in oxygen exchange around the buried eggs due to clogging up of gravels, thereby reducing egg and fry survival. Hatched fry would also be at risk from elevated suspended solids levels in the water column potentially causing gill clogging and/or abrasion leading to mortality due to osmotic stress or leading to gill disease which in turn could result in increased mortality rates. Other than the Derrybrien North tributary (SC7(b), SC7(d)) which was profoundly impacted by the peat slide (see details of effects in Section 7.4.2.4), it is consisered unlikely that significant effects on trout survival occurred in the other small tributary streams draining the wind farm site because: (a) the very upper reaches of the tributary streams lack fisheries value, and (b) given their spatey nature, solids would have dispersed widely and relatively thinly downstream. It is also important to point out that electrofishing surveys undertaken in several of the streams draining the wind farm site showed that most of the fish present tended to be 1+ and older, with a lower representation of 0+ fish, suggesting that they are not significantly productive spawning channels. One notable exception is B2 in sub catchment SC2, where 0+ fish dominated in both fish

[5] *Ephemeroptera, Plecoptera and Trichoptera*

surveys at the site in 2011 and 2019. Therefore, the impact which washout of mineral and organic solids from the wind farm construction had on fish in the receiving water courses (as opposed to macroinvertebrates) is believed to have been at worst indirect slight, negative and temporary to short-term in duration.

The reason why felling and the other construction phase activities on the wind farm site could have impacted moderately negatively on macroinvertebrates as indicated in the previous paragraph is because it has been shown that brown trout, as the main fish species in the streams draining the wind farm, are barely impacted by moderate impairments in water quality, i.e., of at least as low as Q3-4, and only marginally negatively impacted by poor water quality (Q3) (Kelly et al., 2007). Also, there is either no or very little evidence of spawning in most of these upper tributaries which means that there would have been only minor reductions (if any) in trout recruitment at a catchment scale owing to construction activity. While increased nutrients associated with felling would not necessarily negatively affect trout, it could register a negative effect on invertebrate Q-ratings. Once again, the impact described here refers only to those accruing from the on-site clearfelling and general construction works and not to the impact on fish and invertebrates caused by the peat slide in SC7(b) and SC7(d) and the associated emergency measures required to contain the slide which were implemented during an extended period over one to two years after the slide took place (see detailed effects in Section 7.4.2.4). It should be noted that other than the peat slide which affected the Owendalulleegh main channel, construction phase impacts were likely to have been confined in the main to the tributary streams, with no significant effects on the main channels of the Boleyneendorrish or Duniry Rivers. Furthermore, if the peat slide had not occurred there would also have been no significant effects on the fish populations of the Owendalulleegh River.

7.4.2.3 OHL and Agannygal Substation Water Quality Effects

Clearfelling – Effects on Water Quality

The wind farm was connected to the grid at the Agannygal Substation along a 7.8 km corridor of about 45 m in width along which a 110kV line was installed using 34 pole sets, 6 angle masts, 1 intermediate mast and 2 end masts. In preparation for the installation Coillte contractors felled 33.1 ha of forestry along OHL to facilitate access. They also felled 1.6 ha for the Agannygal Substation at the end of the line. 30.82 ha of the OHL corridor felled area drains to the Owendalulleegh catchment, while the remaining 3.86 ha drains to Lough Atorick in the Bleach River catchment to the south. The Owendalulleegh catchment portion can be conveniently divided into 3 segments, (1) 19.34 ha that drain to the SC7 (a-d), including approximately 10 ha which drains to Site O4, 2.5 ha draining between Sites O4 and O5, and a further 6.84 ha between Sites O5 and O6A. The impact of this felling has been addressed in the previous section. (2) A further approximately 2 ha drains to the main channel of the Owendalulleegh near Site O7C, and (3) the remaining 9.47 ha drains to a small unnamed stream (EPA Code: 29D21, Segment Code: 29_361), the lower kilometre of which had been straightened and drained in the past. This small stream joins the main channel of the Owendalulleegh from the southern bank 750 m downstream of the confluence of the SC7 sub catchments at ITM 560397 701227 just upstream from Site O7 (Tooraglassa Ford). Water quality in the latter stream was found to be good-to-high status in December 2019 at OHL1 near structure 28A (Table 7-12). As described in the previous section clearfelling over blanket peat is associated with the release of nutrients, especially phosphorus, plus variable amounts of suspended solids. In the case of a large block of forestry one would expect that this might be a significant effect. However, the OHL corridor is a narrow (45 m wide) linear feature and the opportunities for interception of nutrients and solids before they reach surface drainage, even in the absence of implementation of Forest Service harvesting water quality protection guidelines, would be expected to have been much higher than if the area to be felled had been in the form of a square or rectangular block. The ~2ha draining to the main channel of the Owendalulleegh near Site O7C is such a tiny area relative to the size of the receiving water that it is likely that any impact would have been negligible and not resulted in a decline in ecological status nor would it have had any negative impact

on fisheries. Felling of the main southern section of the OHL corridor comprising 9.47 ha could have given rise to a slight negative but temporary, reversible impact on the quality of the unnamed stream referred to above, i.e., temporary indirect reversible decline from Q4-5 to Q4 (decline from high to good). However, this channel only comes close to the corridor in a few limited places, and it is probable that this effect might not have occurred. No negative effect would have occurred in the main channel of the Owendalulleegh below the confluence of this small stream.

At the southern end of the OHL corridor, draining to Lough Atorick, there was only a very small amount of felling required including 2.26 ha on the OHL corridor and another 1.6 ha for the Agannygal Substation, amounting to 3.86 ha in total. This ground, flowing via a nexus of small drains joins an unnamed 1st order stream (EPA Segment code: 25_1002, catchment area = 2 km^2) which flows more of less due south to the northern shore of Lough Atorick. By the time nutrients and or solids derived from the felling would have reached this stream they would likely have been much diminished due to biological uptake and sedimentation, so that an indirect temporary imperceptible negative, reversible and hence not significant effect on the water quality would likely have been detectable as a result at Site OHL2 on the small stream in question.

Installation of Structures – Effects on Water Quality

Very few of the structures along the OHL corridor, either pole-sets or masts, are constructed close to any of the small streams or to the main channel of the Owendalulleegh where they are crossed by the line. The only exceptions are poleset 8 and 9 toward the northern end of the line and poleset 28A and mast 30 toward the middle of the line. In the latter case, the access track to the mast 30 foundations tracked across a small stony-bottomed stream about 1m wide. In addition, significant local excavations were required between polesets 28A and 29 to keep the conductors of the north-south Derrybrien OHL below the east-west conductors of the Moneypoint- Oldstreet 400kV overhead transmission line. The excavated till and topsoil from this area was removed to the sides forming an embankment at either side of the OHL (Plate 7-4) this could have given rise to solids washout into the small unnamed stream (EPA Code: 29D21, Segment Code: 29_361) near invertebrate sampling site OHL 1. However, the fact that the ground is lower than the track close to poleset 28A where the stream is culverted under it and that the embankment formed by the excavations on the eastern side of the area shields the stream on that side, means that the risk of solids washout was probably relatively low at the time. That and the sandy nature of the subsoil would have reduced further the risk of any negative impact.



Plate 7-4 OHL corridor – lowered ground under Moneypoint-Oldstreet 400kV OHL. View south from Poleset 28A

To access angle mast 24 and poleset 25, construction machinery had to cross a shallow fording point on the main channel of the Owendalulleegh at Site O7C (**Figure 7-1**, ITM: 562447, 701486,Plate 7-5) At those locations, where the structures were close to the stream, there was a risk that suspended solids would have reached the channels due to run-off from damaged ground being tracked by vehicles or from solids-contaminated water that was pumped out of foundations for the structures. In the case of the masts there was the added risk of cement run-off as the foundations for the legs had to be concreted. In the latter case large concrete pipes turned vertically were used as forms for the concrete foundations, so these would have confined any poured cement and thereby very considerably reduced the chances of any significant amounts reaching surface water. Tracking over the small stream at mast 30 would certainly have generated some increase in suspended solids in the stream, although the overburden at that point is very sandy, and the amounts mobilised are likely to have been small.



Plate 7-5 Fording Point (Site O7C) Owendalulleegh River

Vehicular traffic at the fording point on the main channel of the Owendalulleegh to access angle mast 24 could have given rise to some localised juvenile trout and stone loach mortalities. IFI were contacted at the time for their advice about this crossing and although no record exists of the advice provided at the time, the likelihood is that IFI would have requested the contractors to keep the crossing route as narrow as possible, i.e., as close as possible to the width of the widest vehicle required and for all vehicles to follow that route (possibly demarcated by red and white tape) and that the operation would be designed in order to keep the number of vehicle movements at the fording point to the absolute minimum required to accomplish the works.

The installation of the structures along the OHL line is likely at most to have given rise to temporary, negligible to slight negative impacts, most likely manifest as reductions in macroinvertebrate biomass in affected reaches of the small unnamed stream that joins the Owendalulleegh just upstream of Site O7, with a possible reduction in Q-value at OHL1 (Table 7-18). In addition, a small number of trout and stone loach mortalities would likely have occurred at the Owendalulleegh fording point to access the mast (structure 24), although over a narrow front of about 3-4 meters wide at the crossing, the numbers involved would have been very low and any direct (i.e., physically induced mortality) or indirect (i.e., water quality related)negative impact on the population, even in that localised part of the river, would have been negligible and not significant.

Construction of the Agannygal Substation and Access Routes

The substation compound was 63 m x 47.5 m containing outdoor electrical equipment and a control building. A short, approximately 138 m, north-south approach road was constructed to access the site and connect it with an existing east-west local road immediately to the south. 80 m of the latter had to

be upgraded and widened to 3.5 m with Cl 804. In addition, 2.9 km of an existing Coillte track was widened to 3.5 m to facilitate construction traffic and stoned with Cl 804 to bring it up to the necessary weight bearing standard. This process also required a small amount tree felling along that route. Both these operations would have given rise to some fines washout during heavy rain. The substation site and the short stretch of new road (138 m), as well as about 40% of the 2.8 km of the upgraded Coillte track, drain to the 1st order unnamed stream (EPA Segment code: 25_1002, catchment area = 2km2), which flows into Lough Atorick on the northern shore toward the eastern end of the lake. The remaining approximately 60% of the upgraded Coillte track lies within the catchment of two smaller unnamed 1st order streams immediately to the east, i.e. EPA Segment Codes: 25_2800 and 25-1116. These also flow into the northern shore of Lough Atorick, 240 m and 400 m respectively east along the shoreline from the inflow of 25_1002. Only at one point does the Coillte track cross any of these three streams i.e., at Site OHL2A, where the bulk of the diffuse drainage from around the substation coalesces at the head of a canal-like stretch of this small watercourse (Plate 7-6) (ITM: 563565, 697855). The latter would have acted as a large in-line settlement basin, where the bulk of any suspended solids generated at the substation during construction would have dropped out of suspension. Beyond this point the remaining stretch of the Coillte track runs more or less due east, its route well removed from the two small streams draining this last stretch of the track and therefore unlikely to have affected either as a result of sediment washout.



Plate 7-6 View downstream from Site OHL2A – heavily drained, depositing reach upstream of Lough Atorick

The sandy nature of the overburden at the substation site may have increased the rate of soil erosion during construction once the overlying vegetated layer was removed. However, it would also have facilitated rainfall infiltration and led to a more rapid settlement of eroded sandier solids. This notwithstanding, the presence of the natural settlement basin, referred to above, on the stream draining from the site would have intercepted much of the solids generated on the site during construction. Impacts arising would have included temporary increases in suspended solids concentrations in each of the three small streams draining the works, mainly Segment 25_1002 (leading to Site OHL2) and have at most resulted in a reduction in biomass of macroinvertebrates due to physical abrasion and or localised smothering. In a worst-case scenario this may have resulted in a temporary reduction from High to Good water quality status as measured by the Q-value system (Table 7-18), although this may not have occurred. Had it occurred, this can be described as an indirect localised, slight negative effect of temporary-to-short-term duration. The very lower reaches of Stream 25_1002 were surveyed in late 2019 and found to have a high-status Q-rating (at Site OHL2, Figure 7-1) and habitat suitable as trout nursery. However, there is no survey data available to confirm that trout do occur in the lower part of this stream, despite the presence of suitable habitat. Certainly, the nexus of small drains flowing to this stream from around the substation have no suitable fisheries habitat at all. Overall, the construction of the substation and its associated access track are thought to have had at most an indirect slight negative

effect on fisheries in any of these three streams, not significant at a geographical scale, which had it occurred would have taken the form of a slight reduction in egg and or fry survival and not persisted for more than one or two seasons.

None of the works referred to above would have had any negative impacts on freshwater pearl mussels (*Margaratifera margaritifera*), which are recorded from a single historical reference for a site very far down in the Lough Atorick catchment. This is because none of the habitats directly affected by the works are remotely suitable for the species and because the presence of Lough Atorick and the even larger Lough Graney between the construction site and the only known historical record for the species means that no nutrients or solids generated during the OHL and substation construction phase could ever reach that far down in the catchment. It is worth noting also that there are no recent records for the species in any part of the catchment.

7.4.2.4 Effect of the Peat Slide (2003)

This section deals with the impacts and consequent effects of the 2003 peat slide, including emergency remedial works, on water quality and fisheries in the downstream channels and in Lough Cutra.

Relevant Details of the Peat Slide

On 16 October 2003, a peat slide occurred on the south-central section of the wind farm (T68) which affected several hectares of plantation forestry planted on drained blanket peat. The slide was followed on October 29th and especially the 30th by heavy rainfall which resulted in a very large volume of peat and associated tree and shrub vegetation being displaced into an upper tributary of the Owendalulleegh River, specifically sub catchment SC7(b) (Figure 7-3), flowing down past Black Road Bridge (Site O4), Flaggy Bridge (Site O5) and Unnamed Bridge C (Site O6) in SC7(d) and on into the main channel of the Owendalulleegh, being joined on the way by streams from SC7(a) and SC7(c). The slide material continued downstream into the lower reaches of the river, eventually reaching Lough Cutra about 22km downstream of the peat slide. Within the next month, up to November 28th, to control the passage of the peat slide, 8 barrages (or boulder dams) (Barrages 1-4 and Barrages A-D) were installed along the route of the slide from the boundary of the wind farm site downstream to just below Flaggy Bridge (Site O5). To facilitate these works and to further reduce the risk from the flowing peat, an extension to an existing Coillte track was constructed to access the site (Barrage 1) from the west and another to access Barrage 2 from an existing Coillte track on the eastern side of the slide. Stone for these tracks and some of the boulder dams was sourced from a newly opened borrow pit very close to, just NE of Barrage 1. Also, a diversion drainage channel was excavated along part of the southern edge of the main slide area commencing upstream of Barrage 1 and extending downhill to just below Barrage 2. This was intended to prevent any further instability in the peat mass in the area and to reduce washout of additional peat solids to adjoining lands and downstream drainage channels. A minor amount of clearfelling was required to assist access to remedial works to control the slide. In addition, three peat repositories were opened to store peat excavated as part of these emergency works, one just east/northeast of Barrage 2, another beside Barrage 3 and a third, in two sections adjoining each other just upstream of Black Road Bridge. All of these works, of necessity, were undertaken using a wide range of heavy machinery and most were completed by the end of November 2003.

Nature of Physical & Habitat Damage

After the heavy rains of October 30th, a very large mass of peat and associated woody and herbaceous vegetation moved downstream under the weight of the peat. Just over a month later in December 2003 a walk-over survey of the entire 20km of channel from Flaggy Bridge downstream to Lough Cutra was undertaken by the officers of the then Shannon Regional Fisheries Board (ShRFB) to establish the extent to which the peat and debris had progressed down the catchment, and to gauge the type and

degree of damage to riverine habitats caused. The survey was undertaken over a period of 2 weeks under good conditions. The ShRFB staff were also accompanied by an ecological consultant (Inis Environmental Services) on behalf of ESB International. The survey approach taken was to divide the river into two hundred x 100m sections, each given a chainage number. Flaggy Bridge was denoted as chainage 200 and the Owendalulleegh inflow at Lough Cutra denoted as chainage 0. ShRFB and Inis Environmental Services issued separate reports on the survey, but both were in general agreement about the nature and extent of the physical damage.

The findings of the survey were published by ShRFB (Anon, 2004). The following summary is taken from both reports. These point to the impact of the peat slide being most evident along the first 1.8km of channel downstream from Flaggy Bridge as far as the confluence of this tributary, SC7(b)/SC7(d), with the main channel of the Owendalulleegh River at chainage 182. This tributary is steep and narrow and suffered severe physical damage from the peat slide at the time. This was most evident in the first 1.1km downstream (chainage 200-189). All the loose substrate in this stretch comprising gravel and small and large cobbles was scoured out by the peat and large amounts of peat were deposited on the banks and at the edges of the channel causing severe damage to riparian vegetation. There were large sand deposits evident in bends in the river also and much deposited peat in the channel. Parts of the channel were re-aligned due to the force of the peat flow. The channel between chainage 189 and 182 at the confluence with the main channel of the Owendalulleegh River had been severely impacted but not much scouring had occurred. At the point of confluence, the gradient drops substantially, the channel widens and therefore the force of the flow would have dropped considerably. Downstream from chainage 182 to 151, the river, now the main channel of the Owendalulleegh, seems to have been devoid of bankside damage and while some in-channel physical impacts were evident including damage to aquatic vegetation, the damage was much less than that observed in the tributary. It was noted that there was also good fisheries habitat available in this stretch. From 151 to chainage 0 at Lough Cutra (~15 km) both reports agree that the instream physical habitats all appeared unaffected although peat and sand deposition were still evident in stretches, particularly, although not exclusively, at the margins of the channel and in deeper stretches, all the way to the lake.

These observations agree with those of the EPA who carried out Q-value surveys at 5 points in the middle and lower reaches of the main river two weeks earlier on November 17th, 2003 (Clabby et al., 2004). They noted that the upper 5 km section of the river was effectively wiped out in terms of aquatic invertebrate stream life, while the impact on the lower section was “not as bad as might have been feared initially”. At the final EPA monitoring site, 1.5 km upstream of Lough Cutra (i.e. some 22 km downstream from the peat slide) the author noted that the impact of the peat slide was “surprisingly low” and also noted that mid-stream kick sampling did not raise peat silt. Deposits of fine peat silt were again noted in the riparian zone and some light- coloured, grass-like plant debris was present among the stones, but the amount of larger woody debris was less than at the upstream sites. At their site 1.5 km downstream of Lough Cutra on the Beagh River, the EPA report during their Q-value survey of November 18th that ‘*No major impact was noted with the range of species quite similar to that found on previous occasions and water quality was satisfactory*’ (Clabby et al., 2004). The Q-value was Q4 on that occasion, the same as had been measured during the previous monitoring run in 2000 (i.e., pre-construction). The same day, in Gort town (at Gort Bridge) the EPA survey gave the same result as the 2000 survey there, i.e. Good Status (Q4). These combined observations suggest that there were no measurable negative impacts experienced by the river macroinvertebrate community because of the peat slide at sites downstream of Lough Cutra.

Effects on Water Quality (Q-Value)

In terms of ecological status and water quality, the peat slide impact indicates that macroinvertebrate fauna of the entire channel of sub catchment SC7(b) and SC7(d) were probably wiped out and that the first 1 km downstream from the confluence of SC7(d) with the main channel of the Owendalulleegh as far as EPA O5 was similarly impacted. Macroinvertebrate faunal assemblages underpin the Q-value and

the effect was a drop from High Status (Q4-5) down to Bad Status Q2 (Table 7-11) This can be described as profound negative, short term, reversible effect, both direct (i.e., physical impact of peat mass) and indirect (i.e., water quality deterioration). Over the following 5.7km downstream to EPA O4, the water quality dropped from High Status (Q5) to Moderate Status (Q3-4) which can be described as a very significant negative, short-term reversible effect. In the next 7.2km downstream from EPA O4 to EPA O1 (1.5km upstream of Lough Cutra), the Q-rating fell from High Status (Q5 and Q4-5) to Good Status (Q4), which can be described as a significant to moderate negative, short-term reversible effect. The EPA surveyor also noted that from EPA O5 downstream to EPA O3 that the fauna themselves would not indicate the degree of damage to the ecosystem, which was denoted by a single asterisk after the Q-value. When assessing these impacts, it's important to note that they occurred over a 20 km stretch of a large 4th order river, that had always been rated as high status (Q4-5 / Q5) along that stretch up to the time of the peat slide. We know that these impacts, at least on the main channel of the Owendalulleegh, were short-term and reversible because by 2006 all the same sites were back up to high status (Q4-5) except for EPA O1, which remained at Good Status Q4 in 2006, but returned to high status by 2009 and thereafter.

Effects on Fisheries in Rivers and Streams

This large influx of peat and woody debris resulted in a large fish kill. Although no systematic count of fish was possible at the time, as the peat buried many of the cadavers, it is known that trout, stone loach, lamprey, eel, gudgeon and perch were included in the kill, the two latter species only known from the lower reaches of the river. Subsequent electrofishing surveys undertaken by IFI and for this study would suggest that brown trout and stone loach were likely to have been the most numerous species killed at the time. When asked about where the gudgeon and perch had been found at the time, Michael Fitzsimmons, who was the Environmental and Fisheries Officer for the ShRFB at the time of the slide, indicated that they were recovered from peat deposited about halfway down the main channel from the confluence of the SC7 tributary to Lough Cutra. It is possible that even though they were numbered among the dead fish observed that eel and lamprey stood a greater chance of survival than the other species, especially in the lower reaches of the river. This is because lamprey juveniles burrow into soft sediments along the channel margins and eel can also respire through their skin and are a very tolerant species in general. Without knowing what the concentrations of suspended solids were in the river especially in the lower reaches when the first main wave of peat was washed down the river, it is very hard to know whether some trout survived the peat slide. A month or so after the event officers from the ShRFB carried out some qualitative spot electrofishing in the river and confirmed the presence of small numbers of fish (pers comm. Mr. Michael Fitzsimmons, IFI). There are no records of the fish density in the river prior to the peat slide and no systematic follow-up surveys were undertaken in the years immediately following the event, so it isn't possible to know with any degree of accuracy the numbers of fish lost due to the peat slide nor the rate of recovery in the very early years after the event.

The impact of the peat slide on any fish population in the immediately affected tributary, SC7(b) and (d), was likely to have been very severe with the resident population eliminated by the sheer mechanical force of the peat slurry moving down the channel. Moreover, it's likely that a full recovery would have taken at least 3 to 5 years (for trout and stone loach) and perhaps up to 6-7 years for brook lamprey to recover. The overall effect can be classified as profound, direct negative of short-term duration locally in the Derrybrien North tributary SC7(b) and SC7(d). It is important to note, however, that given the absence of pre-construction fish surveys, and the presence of natural and artificial fish passage barriers (rock outcrops and Forsetry Culvert, see Section 7.3.6) in the SC7(b) and SC7(d) sub catchment, it is not possible to know the extent to which trout were present prior to the peat slide, upstream of Flaggy Bridge. The electrofishing evidence strongly suggests that fish would have been absent from SC7(b) sub catchment in the baseline scenario owing to the pre-existing migration barriers downstream of Flaggy Bridge.

The effect on the main channel of the Owendalulleegh, downstream of the confluence of the combined SC7 sub catchment, is classified as significant to very significant, negative and short-term in relation to fisheries and would have taken at least 3-5 years to fully reverse to pre-existing numbers for trout and stone loach, and up to 6-7 years for brook lamprey. The range of possible impact levels suggested here for fisheries impact stems from the paucity of quantitative information on the extent of the original fish kill on the main channel and the possibility that more fish survived, especially in the lower reaches of the Owendalulleegh River, than was believed at the time.

Effects on Fisheries in Lough Cutra

No records were found for fish mortalities having occurred in Lough Cutra at the time of the peat slide. Given observations that the influence of peat and debris was diminishing toward the lower reaches of the river, it is considered that any direct impact on the lake's fish population was at worst, slightly negative and not significant and of temporary to short-term duration, especially considering the sheer size of the waterbody (382ha). Any impact in terms of direct fish mortalities that would have occurred is likely to have been localised to the immediate inlet area of the Owendalulleegh River, with no significant ongoing indirect effects. Supporting this assessment is Suspended Solids (SS) data from Galway County Council (GCC) for water samples taken down along the Owendalulleegh on Saturday 1st November 2003 (2 weeks after the peat slide and the day after heavy rainfall remobilized peat). This data showed a very strong decline in concentrations from Black Road Bridge in SC7(b) downstream to the lower reaches at Killafeen Bridge (Table 7-19 and Figure 7-8). Furthermore, EPA Q-value data shows the Owendalulleegh, as the main inlet river to Lough Cutra had improved back to High status (Q4-5) by 2006, three years after the peat slide.

Table 7-19 SS measured by GCCI in the SC7(b) tributary and main channel of Owendalulleegh (01/11/2003)

Site	Sample location in Fig 7.1	Suspended Solids (mg/l) 1/11/2003	Distance (km) from peat slide origin (T68)
Black Rd Bridge	Site O4	690	~2 km
Flaggy Bridge	Site O5	1410	~3 km
Tooraglassa Ford	Site O7	230	~6 km
Inchamore Bridge	Site O8	33	~8.5 km
Killafeen Bridge	EPA Site O1	44	~22 km

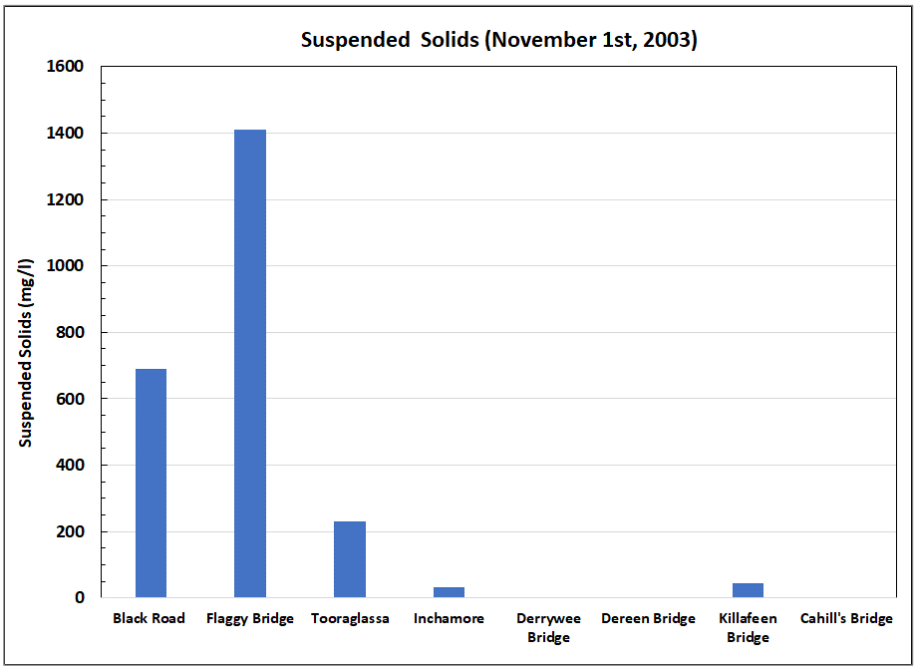


Figure 7-8 Suspended solids in the Owendalulleegh and SC7 (01/11/2003)

The EPA made the following observation when undertaking a biological survey on the outlet river from Lough Cutra (River Beagh) 'Straw bales were placed at the lake outflow in order to settle peat silt and prevent it from causing siltation in the river'. The result of the Q-value assessment at their survey point, located 1.55 km downstream from the lake outlet (EPA C1 in Figure 7-1), stated that 'no major impact was noted with the range of species quite similar to that found on previous occasions and water quality was satisfactory'. These observations combined with observations of a fisherman very familiar with Lough Cutra is that peat silt did enter the lake and did spread, at least as far as the outflow river. Depending on how long it lasted, there is a possibility that more coloured and turbid conditions in the lake could have temporarily disrupted the normal predator-prey interactions between fish species or among different age classes of the same species, mediated by a change in the rate of visual capture success. However, without any previous or more recent qualitative or semi-quantitative knowledge of the fish population in the lake, it is impossible to say whether these factors had a significant effect (positive or negative) on any of the species present. It is important to note however, that the occurrence of the peat influx late in the season when fish activity and biological activity in general in the lake would have been at its lowest, probably significantly reduced any impact that may have arisen. The following spring and summer after winter floods would have facilitated the flushing of silt from the system, the significance of any silt-related impacts would be expected to have diminished substantiality.

Effects on Water Quality in Lough Cutra

The flux of the finer fractions of the peat slide would have deposited in littoral and open water areas within Lough Cutra in the days and weeks following the event with the main pulse arriving in the first few floods, thereafter, diminishing with time. The light nature and larger particle size of peat probably facilitated its dispersal over a wide area within the lake thereby reducing the thickness of the deposited layer. Furthermore, given that during floods there would be a definite flow tendency up the lake from the inflow of the Owendalulleegh to the outflow of the Beagh River, this would have tended to direct suspended solids toward the outlet. About a third of the lake lies to the south of this line, which may indicate that it received much less peat. The fact that straw bales were placed across the lake outlet shortly after the peat slide confirms that the silt was reaching the outflow river and therefore peat flushing from the lake was taking place very early in the event. While much of the peat slide material was probably flushed within a short timescale, residual amounts in pools, along channel margins and on

banksides may have taken longer to flush completely out of the Owendalulleegh. In fact, there appears to be some evidence of an effect of the peat slide in the lake chemistry data for Total-P and to a lesser extent for chlorophyll *a* for up to 3 years after the slide. Figure 7-9 shows the annual average Total-P and annual average chlorophyll a (just a single reading for 2001 and 2003), with several gaps, between 2001 and 2019. The most obvious feature of these data are the three elevated Total-P results for 2004-2006 when compared to the 2001 (March) and 2003 (July) results, as well as all the 2010-2019 results. The 2004 and 2005 average chlorophyll *a* concentrations are also the highest recorded, even though the disparity between chlorophyll in this and the later period is much less pronounced and probably not significant or only marginally so. Not a lot can be gleaned from the 2001 and 2003 data for either parameter; indeed the 2001 result for Total-P (measured in March) is itself higher than all the 2010 to 2019 data. However, as that only refers to a single reading it has limited value. If the Total-P results for 2004, 2005 and 2006 are correct, it might point to a residual influx of fine peat particulates from the peat slide site, resuspension of un-consolidated peat fines within the lake proper or a combination of both. Unfortunately, there isn't any means of independently verifying this because the EPA do not analyse Total-P or suspended solids in their river monitoring site at Killafeen Bridge and in any case the river monitoring data only stretches back to 2007.

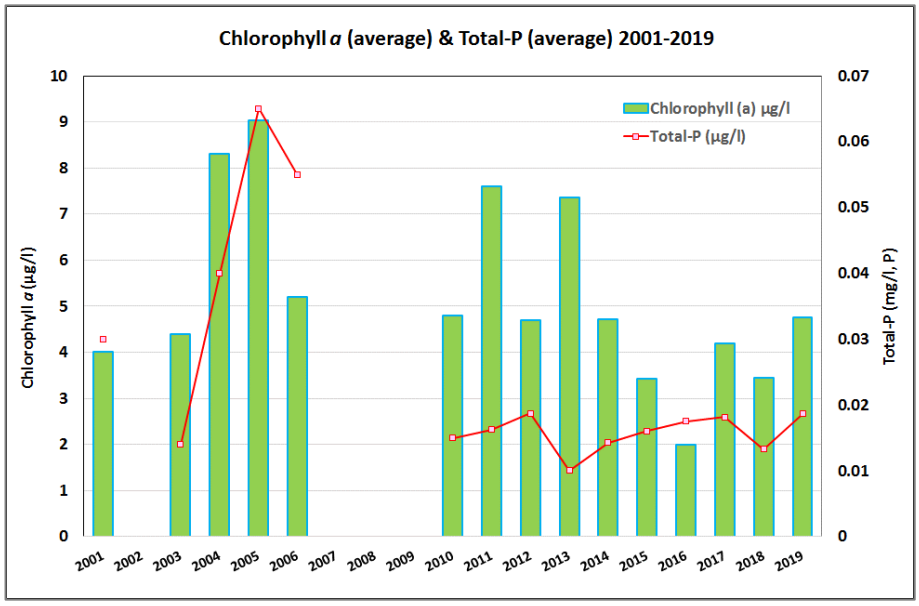


Figure 7-9 Annual average chlorophyll a and Total-P in Lough Cutra

In the case of the heavier mineral fractions in the form of medium and coarse sands scoured out by the peat slide, these would only have gradually migrated to the lake perhaps over years during successive floods and unlike the peat would have dropped out almost immediately on arrival at the lake. This latter flux is naturally ongoing all the time, but the Derrybrien peat slide marked a short-term increase in the natural rate of supply.

A recent survey of the benthos of the Lough Cutra (see Section 7.3.4.4) indicates that the open water sites are dominated by a small range of invertebrates all of which can burrow, while shallower sites with coarser sediment components had a more diverse range of species and also included more mobile species. Littoral macrophyte beds which are scattered all around the lake in shallow depths (<2m) would be expected to hold the highest diversity of invertebrates. Overall, the peat slide may have caused localised reductions in diversity and biomass of benthic macroinvertebrates in both littoral and open water areas wherever deposits were thick. The fact that the event occurred late in the year, just before the main winter rains, was probably a positive factor, as much of the peat would have flushed out of the lake by the following spring and early summer when macroinvertebrates would begin to reproduce and when annual phytoplankton and zooplankton blooms would help drive biological

activity within the system again. Macrophyte beds would also be beginning their annual growth in spring and summer. It isn't possible to measure the level of these impacts on the fish population via food-chain effects, as very little fish population density data is available from before or after the event from Lough Cutra. However, the late seasonal occurrence of the event, the likelihood that impacts on benthic invertebrate biomass were probably minor, and that the subsequent (2004) annual spring/summer coarse fish spawning season would not have been disrupted suggests that the impact on fisheries can be classified as neutral or slight negative, temporary to short-term and not significant. Anecdotal accounts from a local angler indicated that there was no obvious change in angling success in the years immediately following the slide, although there was some suggestion anecdotally (in 2020) that fish sizes had declined in recent years, which if it is true would have nothing to do with the events of 2003.

Effects on Water Quality Downstream of Lough Cutra

Section 7.3.1, earlier in the chapter, details the complex course of the Beagh/Cannahowna River draining out of Lough Cutra that reaches the sea at Kinvarra, which will help to put the following section in context. At the time of the peat slide, from mid-October 2003 until mid-January 2004, Galway County Council undertook water analysis from sites from Black Road bridge, down the length of the Owendalulleegh at bridges and downstream of Lough Cutra, including the Beagh River, Cannahowna/Gort River, the Gort Raw Water supply, the Gort River, Coole River, Kiltartan and Kinvarra among others. The parameters tested included suspended solids, turbidity, colour and pH. Not all sites were sampled on every date and not all parameters were analysed on the samples collected. Nevertheless, the data (see **Appendix 7-5**) provides a unique dataset with which to attempt to assess the impact of the peat slide on the downstream water quality at the time.

As suspended solids tended to be measured less frequently in samples than turbidity, by correlating turbidity with suspended solids in samples in which both parameters were assessed we can use turbidity as a proxy to gauge what the suspended solids would have been in samples where only turbidity results are available. Figure 7-10 shows the correlation between suspended solids and turbidity in all the samples for which both were measured. This shows a very strong correlation between both, although, as would be expected, there is some scatter around the trend line. In general, the data indicates that turbidity is a very good direct proxy for suspended solids with both parameters giving very similar readings, below ~20mg/l suspended solids. However, this correlation changes, as demonstrated when just the low concentrations are correlated (Figure 7-11). In this case it can been seen that suspended solids are significantly lower than the corresponding turbidity readings, especially at the lowest turbidities, varying from about 65-70% of the turbidity value at turbidity 20 to just 30% at ~turbidity 3.5. Bearing that caveat in mind for lower concentrations, the two parameters can be used interchangeably for this assessment.

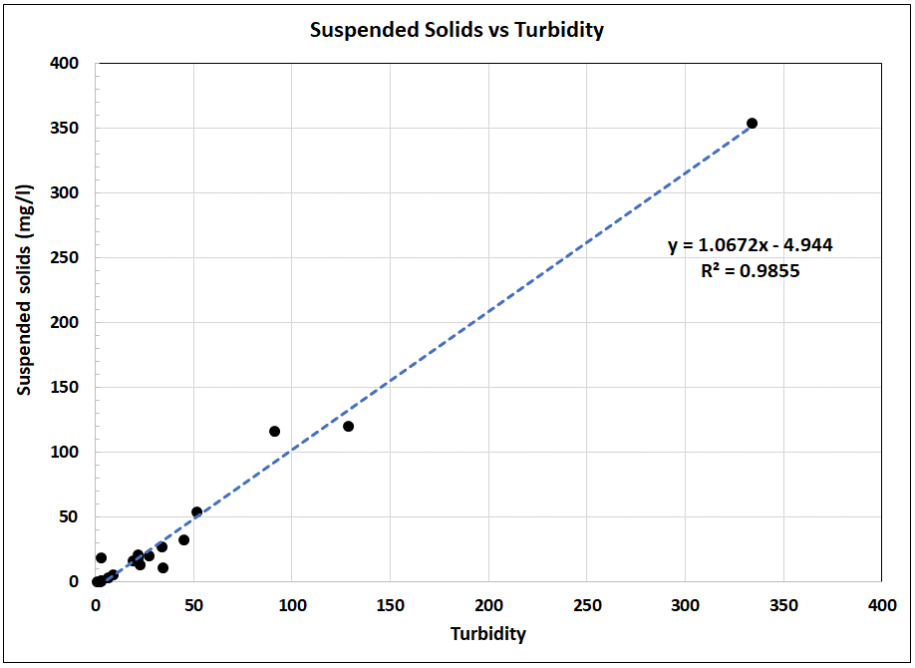


Figure 7-10 Correlation between suspended solids and turbidity (all data)

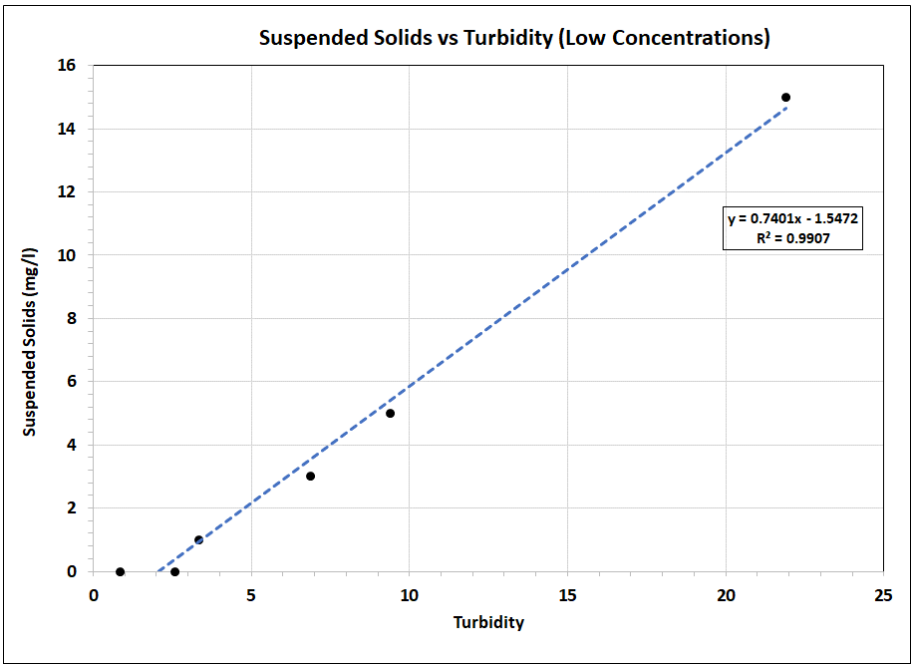


Figure 7-11 Correlation between suspended solids and turbidity (low concentrations only)

Figure 7-12, below, shows the turbidity measured upstream of Lough Cutra at Killafeen Bridge, i.e., the last monitoring site on the Owendalulleegh, just 1.5 km upstream of the lake, and at two sites downstream of the lake, Cahill's Bridge on the Beagh River and at the Raw Water Intake at the Gort Water Treatment Plant. The intake is partially supplied by the Gort/Cannahowna River, which is the name of the Beagh River after it emerges from the Punch Bowl just upstream. The graph covers thirteen sampling occasions from November 3rd, 2003 to January 22nd, 2004. Note that the downstream data set is more comprehensive and that the upstream set (for Killafeen Bridge) is patchy, although very instructive. The graph indicates that early in the period covered and close to the time of the main mobilisation of the peat slide that samples taken both upstream and downstream of the lake revealed

elevated values but that after 2.5 months the levels had dropped considerably at the sites downstream of the Lough but remained periodically much higher upstream in the Owendalulleegh. This indicates that the turbidity, and by extension the suspended solids levels, peaked downstream of the lake between the 5th and 6th of November and then gradually decreased in concentration over the following seven to ten days up to November 18th, thereafter remaining low until the end of the monitoring period at around turbidity 10 (Hazen units), which, as discussed above, probably only equated to around 5mg/l suspended solids. Also noteworthy in the data for the two downstream sites is the stable and gradual change in turbidity observed, which contrasts markedly with the changes observed in the Owendalulleegh site during the same period, which were much more erratic. This points to Lough Cutra acting: (i) as a strong buffer, dampening downstream changes in concentration and, (ii) functioning as a sink for the peat solids as time went on. This suggests that early in the event a large amount of peat fines discharged and settled in the lake which became a source of increased suspended solids for a limited period. However, subsequently, despite periodic spikes in concentrations in the lower Owendalulleegh, these appear to have had no or very minimal effect on concentrations downstream. This indicates that solids which had already settled in the lake were not being re-suspended and flushed out. The graph also shows that while the Killafeen Bridge turbidity levels are responding to rainfall levels (measured in Derrybrien), rainfall is having no influence on the downstream trends, presumably again due to the dampening effect of the lake. It is important to point out that while the upstream concentrations at Killafeen Bridge were elevated at the time, they are much lower than the concentrations in the impacted tributary at Black Road Bridge and Flaggy Bridge around the same time.

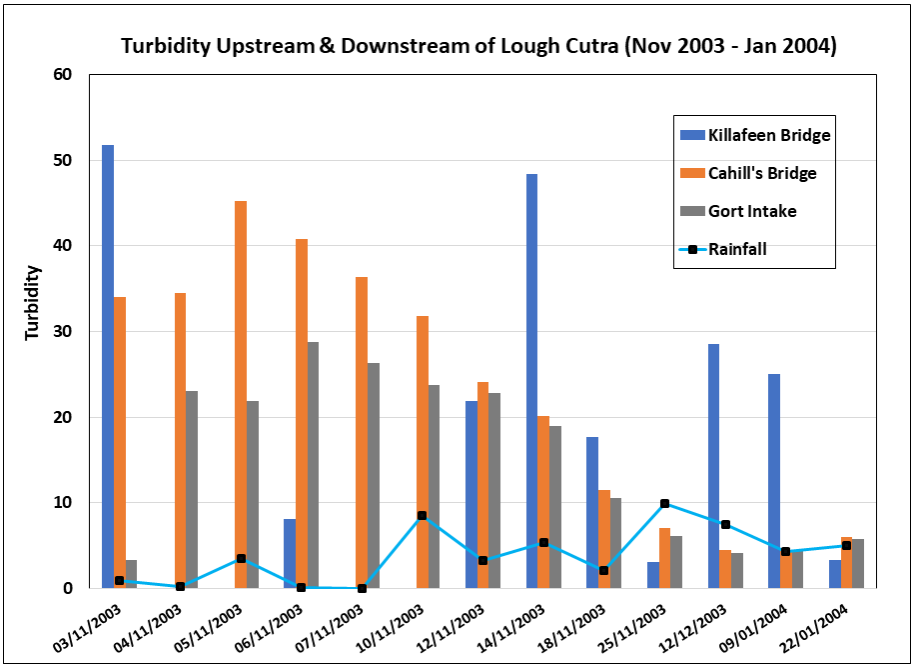


Figure 7-12 Turbidity (Hazen) measured at selected sites upstream and downstream of Lough Cutra between November 3rd, 2003 and January 22nd, 2004.

Note: Rainfall data is from Derrybrien

Figure 7-13 presents the data on colour (Hazen) for sites downstream of Lough Cutra as far as Kinvarra Raw water intake. These data demonstrate the influence of the mixing of water sources, i.e., surface and groundwater, which demonstrates the diluting effect of the latter and shows how the surface water influence of the Owendalulleegh, even at a time when the river was most impacted by the peat slide, diminished markedly with progression downstream.

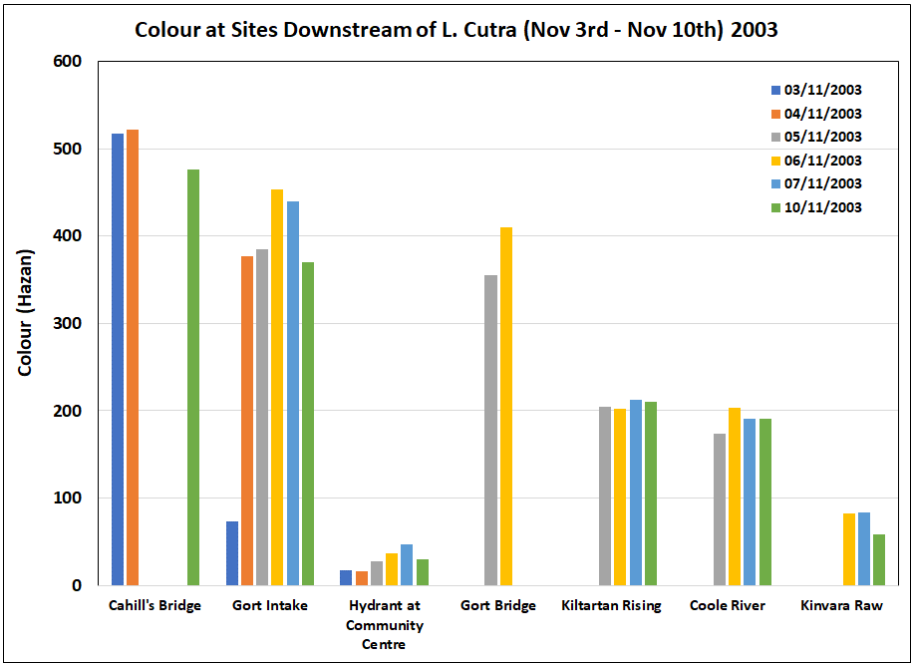


Figure 7-13 Colour measured at sites downstream of Lough Cutra between November 3rd and November 10th, 2003

It is worth noting that there is a strong linear correlation between turbidity and colour in the data set indicating that as colour diminished, so did turbidity. It should be noted that at the time of the Derrybrien peat slide, the Gort water supply was fed from both surface and groundwater sources, with surface water abstracted from the Cannahowna River comprising circa 70% of the supply and the balance coming from three boreholes. The treatment afforded was basic, slow sand filtration which removed the turbidity and some associated colour, followed by disinfection. The graph shows that the colour values at Cahill's Bridge, the Gort Raw Water Intake and Gort Bridge all had essentially the same colour values for the six-day period observed, with a slight diminution between Cahill's Bridge and Gort Bridge, which may be due to some small level of groundwater ingress in the intervening channel distance. The notable exception is 3rd November 2003 measurement at the Gort Raw Water intake, which, considering the trend in all the other data, appears to be an outlier. The Community Centre Hydrant values are much lower in colour than the Gort River because it represents the water supply post treatment after having been mixed with the low colour bore-hole sources. Coole River and Kiltartan are effectively the same flow and hence have almost the same colour levels which were about 50% of the colour levels of the Cannahowna/Gort River. This is because the Kiltartan- Coole channels contain the combined flows of all three river systems, i.e., the Owendalullegh/Beagh/Gort River and the Boleyneendorrish and Kilchreest Rivers. Clearly, the latter two rivers which were unaffected by the peat slide and may also have lower natural colour at the point of mixing have diluted the Gort River flow very substantially. Finally, the colour in the Kinvarra Raw water, downstream of all three rivers which coalesced in Coole-Garrylands wetland complex had the lowest colour (and the lowest suspended solids and turbidity levels) of any of the sites, indicating the very strong influence of groundwater on this supply in its 7-8 km underground passage from Coole Garrylands to the sea. These data as a whole point to a relatively short period of 2 to 3 weeks when elevated turbidity/suspended solids and colour levels in the Owendalulleegh spilled over into the Gort-Kinvarra system but thereafter resumed what were probably more representative seasonal trends in the system for all these parameters. The data also reveals a very rapid decline in the influence from the peat slip from the Black Road Bridge, down through the 22 km of the Owendalulleegh as far as the lake, a subsequent dampening and settlement effect in the lake and thereafter a diminution in all concentrations moving down that system due to

additional sedimentation but especially due to the mixing of low solids, low colour groundwater and surface waters from the two other main river systems.

Effects of Peat Slide on Gort Regional Water Supply Scheme

The water supply from Gort is derived from a combination of both groundwater supplies and surface water sources, which at the time of the peat slide were in the ratio of approximately 3:7 groundwater to surface water. The surface water supply came from the Cannahowna River which emerges from a subterranean cavern (Polldouagh) on the west side of Gort. The Cannahowna River is a continuation of the Beagh River, Lough Cutra and the Owendalulleegh River. In the period after the peat slide the colour of the treated water in the supply increased, although the supply periodically registered very high colour levels at that time of year in any case. Galway County Council also reported an increase in the frequency of the back-wash cycle for the rapid sand filters in the treatment plant which was probably due to an increase in suspended solids in the surface water source caused by the peat slide. This persisted at the time for several weeks. However, at no time was the supply interrupted. The raw water sources currently supplying the town remain essentially the same as in 2003. The effect on the water supply treatment process was a **slight negative of temporary duration**.

Effects of offsite peat slip works: Oct 2003- end 2005

Between early October 2004 and January 2005 several remedial works were undertaken upstream and downstream of Black Road Bridge in order to improve drainage, manage newly mobilising peat and clear peat build-ups. These works were undertaken by ESB contractors and Galway County Council (GCC) and involved significant peat handling and storage in adjoining repositories. The following autumn between August 2nd, 2005 and September 2nd, 2005 two large peat repositories were created beside the river immediately upstream of Black Road Bridge between sites O4 and O4A (Figure 7-1). Straw bales were put in the river at the time to prevent peat solids washing downstream. Within the same period the temporary dam (Barrage B) which had been installed by GCC was removed from upstream of Black Road Bridge (September 2nd, 2005).

The likelihood is that both of these sets of activities would have mobilised appreciable amounts of peat solids at the time, which would have washed down into the system at SC7(b) after heavy rainfall in the days and weeks following these activities. The impact, however, is likely to have been limited given that they would have occurred late in the season in both years. Nevertheless, they probably delayed the recovery at Sites O4, O4A, O5 and O6 as reflected in the predicted Q-rating for 2005 and 2006 in Table 7-19, which can be described as an indirect moderate, negative temporary reversible effect. Effects on fisheries would have been expected to have been very slight to moderate, negative and temporary to short term, if peat silt lodged in spawning gravels in the lower reaches of SC7(d) and in the upper sections of the main channel of the Owendalulleegh downstream of the confluence of SC7, thereby reducing hatching success or fry swim-up. If such an effect occurred, it's likely to have only affected a small number of redds as the volumes of escaped peat would have been relatively minor and much lower than that mobilised at the time of the main slide in 2003.

Residual Effects - Recovery of Owendalulleegh Fish Populations

> *"Assessing post-disturbance recovery of fish populations are difficult to implement and are often opportunistic, given the unpredictable nature of fish kill episodes and frequent lack of baseline information detailing natural pre-disturbance conditions" (Sheldon and Meffe, 1995 quoted in Kennedy et al., 2012)."*

There are several small to medium-sized tributaries flowing into the Owendalulleegh from both the northern (RHS) and southern (LHS) bank of the river and probably most important of all the main

channel of the river upstream from where the impacted Derrybrien North tributary (SC7(b) & (d)) joins the Owendalulleegh. None of these watercourses were impacted by the peat slide and all of them would have provided trout and stone loach, and to a lesser extent lamprey to recolonise the main channel. It is likely that a very large proportion of the spawning trout population from Lough Cutra was already in the Owendalulleegh when the peat slide occurred resulting in a large cull of that cohort. However, it is possible that some larger trout resident in Lough Cutra, or some surviving the peat slide in the larger pools farther downstream, would have run into the main channel and tributaries to spawn in the weeks immediately following the peat slide. In this case, any spawning in the main channel would have resulted in poorer hatching success due to the presence of peat silt in the gravels, especially in the middle and upper reaches as far as the confluence with the impacted tributary. In contrast, any spawning in the unaffected tributaries would have had the normal level of success, especially in the main channel stretch upstream of the confluence of the impacted tributary and in slightly larger tributaries with a resident trout population (e.g., SC9, Knocknarebana Stream) . In addition, as lake trout do not necessarily spawn every year, some spawning only every second year (Kennedy & Fitzmaurice, 1971), any trout from Lough Cutra spawning in the main channel of the Owendalulleegh the following year (2004) would have had a greater chance of successful egg hatching. In any case, recolonization would have been expected to begin immediately and be largely reaching full biomass within 3 to 5 years after the peat slide.

The rate of recolonization would have been facilitated in the initial years by a reduction in intraspecific competition for territories and food by newly hatched alevins due to the drop-in fish density and the reduction in competition from older age classes following the slide, both of which would be expected to improve survival and recruitment rates. Initial recruitment would have been from fish in the tributaries moving down into the main channel and maturing to spawning age which would range from 1 to 3 years depending on the age of the fish initially and assuming that the bulk of trout would have reached sexual maturity by their 3rd year. Some re-colonisation of the impacted SC7 tributary, especially in the lower 1km would have been expected to occur within this time scale also.

In a follow-up study of a fish kill in the Ulster Blackwater which resulted in a 2.4km stretch of the river being effectively wiped out by a silage effluent spill, it took 3 years for the trout population structure in the impacted zone to reach the same level of density and biomass as the control sites which were immediately upstream and downstream of the impacted reach or the levels recorded previously in the impacted reach (Kennedy et al., 2012). It was also notable that the majority of the early colonisers were 0+ fish, i.e., young-of-the-year, which may well have been the case in the Owendalulleegh also. In other studies, a major oil spill in the US which affected 37km of river and around 30 different fish species, it took 4 years and 4 months to fully recover (Kubach et al., 2011). In an incident not too dissimilar to the Derrybrien peat slide, Lamberti et al., (1991) report on the impact of a 'catastrophic debris flow' in the Pacific North West which decimated a cutthroat trout (*Oncorhynchus clarkii*) population over a 500m stretch of channel, further progress of the slide being halted by a large debris dam, with a lesser impact for a distance below the debris dam. Follow up work noted that within 2 years the population in the affected reaches were higher than in the pre-slide densities upstream. The recovery was attributed to immigration of 1+ fish and increased reproductive success and survival of fry in the impacted reach. In a review of fish recovery after kills in the US (Detenbeck et al., 1992) it was reported that salmonids generally took longer than other species to fully recover. The study also noted that recovery was more rapid in response to 'push' rather than 'press' events. A push event being one caused for example by a non-persistent toxicant, e.g., silage effluent or a strong acid or alkali solution while a 'press' event would be one that fundamentally altered the habitat e.g. arterial drainage.

The Derrybrien peat slide can be largely described as a 'push' event (also known as a 'pulse' event). The ShRFB suggest in their report (Anon, 2004) that part of the upper reaches of the Owendalulleegh channel for 3.7km downstream of Flaggy Bridge, in particular the upper 0.5-1.1km of channel, was scoured of gravel, thereby reducing or removing habitat suitable for trout spawning. However, the findings of the electrofishing surveys undertaken for the current assessment in the tributaries draining

the wind farm would suggest that several of these, including several unaffected by the 2003 peat slip, are sub-optimal for trout spawning in any case. A 2014 survey at Black Road Bridge (O4) and another at the same site and at Flaggy Bridge (O5) in 2011, 2019 and 2022 recorded no fish (Table 7-16). In the 2011 survey no trout were caught in very similar channel and substrate types in two adjoining tributaries east of the impacted tributary, SC7(b), at O2 (SC6) and O3 (SC7a) (Figure 7-1), neither of which were affected by the peat slide. In repeat surveys in 2019 and 2022 at the same sites only a very small number of fish were recorded. The tributary immediately west of Flaggy Bridge along the same road (Site O5A) only returned 1 trout each in surveys in 2011 and 2019 (Plate 7-1). The first site downstream of Flaggy Bridge in which trout were recorded for the current study, in 2011, 2014, 2019 and 2022, was at site O6 in SC7(d) i.e., 800-850m downstream near a farm vehicle bridge and also in 2019 at the base of the tributary at O6A. In July 2018 the stretch from Flaggy Bridge down past O6 as far as Tooraglassa Ford on the main channel was walked. Along most of this 2km stretch the substrate was very coarse, comprising mainly cobble and in the more upstream parts boulders and bedrock also. In fact, the stretch from Flaggy Bridge downstream to O6 (800m d/s) is torrential in long stretches with much bedrock and step and pool type habitat with only very limited amounts of gravel suitable for spawning. There are at least three identified fish passage barriers in the reach (at least partial, possibly complete, see Table 7-17), comprised of natural rock outcrops and a forestry culvert. Given the steep nature of the channel, it seems unlikely that much finer material could be retained within the channel during conditions of high flow in this stretch of the river. It is only as the gradient diminishes rapidly just before and immediately after the confluence with the main channel of the Owendalulleegh, i.e., 1.2km downstream from O6 that finer substrate more suitable for spawning begins to appear within the channel itself.

The question of whether a 3.7 km stretch in the upper reaches of the Derrybrien North tributary in SC7(b) suffered a significant reduction in its spawning capacity by the loss of gravel as suggested at the time by the fisheries board (Anon, 2004) cannot be definitively determined from the available information. What we do know is that repeated surveys in the upper reaches of the impacted tributary upstream of Flaggy Bridge (SC7b) returned no fish at all, which is believed to be due to the inability of spawning fish to access these upper reaches owing to the presence of natural rock outcrops and a forestry culvert within the first 300m downstream of Flaggy Bridge. These pre-existing barrier effects are independent of the effect of the two project-related Barrages (No. 3 and 4) between Flaggy Bridge and Black Road Bridge (see Table 7-17). If fish were able to ascend these pre-existing barriers downstream of Flaggy Bridge, they would be able to spawn in patchy gravels that are available between the most upstream of those barriers (Bedrock Outcrop 2) and the most downstream Barrage, but no fish have ever been recorded in this reach in repeated electrofishing surveys to date. Surveys in 2011 and 2019 have shown that the middle reaches of this tributary (i.e. 650-850 m d/s Flaggy Bridge) do contain trout in low densities and that the lower reaches of the same tributary, just upstream of the confluence with the Owendalulleegh, i.e., 1.8km d/s Flaggy Bridge, hold reasonable densities of trout and good densities of stone loach (Table 7-16). These data combined with the very poor fishing returns from the three adjoining tributaries, SC6, SC7(a) and SC7(c), with similar physical habitats but unaffected by the peat slide, suggests that if the peat slide diminished the spawning capacity of SC7(b) the effect was largely confined to the first 1km downstream and probably diminished gradually over time with the transport downstream of replacement gravel eroded from banks. Taken as a whole and considering the narrowness of this channel, and what seems to be a natural patchiness of suitable spawning habitat, a complete loss, or more likely a reduction in the spawning capacity of this stretch for trout, can be described as a moderate to significant negative effect, but short-term and reversible for the reaches that are accessible to trout, i.e., downstream of the Forestry Culvert. The SC7(d) and SC7(b) channels upstream of the Forestry Culvert are of low importance to trout because of its barrier effect, in-combination with the natural bedrock outcrops, hence the effect of the installation of the Barrages in response to the peat slide is considered not significant, certainly in ters of the potential contribution that channel could have made to the overall trout population of the Owendalulleegh system.

In contrast to trout, the likelihood is that the stone loach population would have made a full recovery faster because they are summer spawners and therefore likely to have encountered a much-reduced deposit of peat silt during their first spawning, 6-8 months after the slide. They also have an extended spawning season and a very short hatching time (~3 weeks), and they don't bury their eggs like salmonids; all factors likely to favour them over salmonids in the circumstances of the slide, at least for the first season post the event. Overall, the effect on the stone loach population of SC7(b) and SC7(d) can be described as significant negative, but short-term and reversible.

Brook lamprey remain for 5-6 years in soft marginal sediment during the larval or ammocoete stage after which they transform into adults and are ready to reproduce. At this stage they usually range in size from 13-15cm. That would suggest that the Owendalulleegh population would take a minimum of 7 years before reaching pre- peat slide levels. However, it is likely that many vacant niches were filled by immigrants from tributaries such that even in a few years after 2003 suitable larval habitats would have been at least partially re-colonised. It is possible that there may also have been a residual population surviving in the lower reaches after the peat slide. IFI recorded one lamprey at their catchment survey sites in 2009, 2013 and 2016. The present study recorded two lampreys on the Owendalulleegh main channel at Site O9 (both 11cm) in 2011, and again in 2014 three lamprey (4, 8 and 9cm). A single specimen (of 11cm) was recorded at Site O11 in 2014. Lampreys are more difficult to survey using electrofishing methods unless they are being specifically targeted, so general electrofishing surveys are likely to underestimate their densities. The very spatey nature of the upper tributary sites on the Owendalulleegh and its very coarse substrate means that the density of lamprey in these areas is likely to be very low. It may also be the case that the mobilisation of sand and peat silt noted during the follow-up walkover survey in December 2003 may have boosted marginal pockets of finer material where juveniles of the species would have colonised after the slide. Overall, the impact on lamprey can be described as moderate to significant negative and short to medium-term in duration.

Eel are a robust species, and some are likely to have survived the peat slide in the mid to lower reaches of the river. Those that were killed because of the peat slide could only be replaced by immigration either from tributaries within the catchment or from beyond the catchment, as the species does not reproduce in freshwater. Many eels spend 25 years or more in Irish freshwaters. It is presumed that eel reach Lough Cutra and the Owendalulleegh catchment by some underground river, given the lack of a surface water connection to the sea. In either case, full replacement may have taken several years. This can be described as a moderate to significant, negative impact of short to medium-term in duration. During the 1970's and 80's Moriarty (1975 and 1986) reported eel densities of between 0.6 and 2.3 per unit effort (i.e. 1 fyke x 1 night) in Lough Cutra. Current eel densities in the lake are not known.

Three electrofishing surveys in the lower reaches of the Owendalulleegh undertaken by IFI in 2009, 2013 and 2016 recorded a fish diversity the same as that reported dead in the October 2003 peat slide. There were similar size distributions of trout between the three IFI surveys, suggesting a population that had regained equilibrium. This contention is supported by surveys undertaken for this study in 2014 at a nearby site (O11), where a slightly higher trout density with a good spread of age cohorts was also noted, and again in the 2019 survey at sites O7A, O7B and O7C on the main channel of the Owendalulleegh further upstream.

In conclusion, it is thought likely that the pre-peat slide diversity, biomass and population structure for all fish species in the watercourses would have been fully restored by between 2009 and 2010, possibly sooner. Stone loach would have recovered first, probably within 2-3 years, trout next within 3-5 years, followed by lamprey within 6-7 years. Any vacant niches left for eel after the peat slide would have been recolonised by immigration from other sections of the Owendalulleegh and its tributaries, but full replacement could only occur by immigration from the marine environment which likely would have required several years to complete.

7.4.2.5 Summary of Combined Construction Phase Effects (2003-2006)

Projected Changes to Biological Water Quality in the 2003-2006 Construction Phase

Table 7-20 sets out the predicted changes in quality that could have taken place in the small upland streams draining the wind farm in 2003 and 2005 in response to the clearfelling on the wind farm and Substation, combined with the OHL and Agannygal Substation during the construction phase combined with those contributed by solids washout from general onsite construction activity undertaken at the same time. For the purposes of this exercise, it has been assumed that the streams in question, with the possible exception of site O1 at the upstream end of SC6 were all at High Status (Q4-5) at the outset of the construction of the wind farm, which may not have always been the case for all sites. Site O1 was assigned Good Status (Q4) because the present study has shown a consistently impaired quality rating at this site which has been attributed to natural causes linked to the presence of iron bacterial biofilms at the site. The analysis has also taken into account the fact that the 2003 peat slide probably completely wiped out the macroinvertebrate communities throughout SC7(b) sub catchment (Site O4 and O5) and its downstream continuation, SC7(d) (Sites O6 and O6A). That impact would have completely masked any impact of clearfelling on the site or on the OHL corridor, as well as any wash-out of solids associated with on-site construction activities, all of which would have been expected to otherwise have been slight or moderate negative and temporary to short-term in duration.

In the 2003 column of Table 7-20, Q1-2 (Bad Status) was assigned to all the sites within SC7(b) and SC7(d) because the EPA assigned Q2 (also Bad Status) to EPA O5 at Tooraglassa Ford (Site O7 in this study, Figure 7-1) on the main channel of the Owendalulleegh just 1km downstream from the confluence of SC7. It should be noted that this impact was caused by the mechanical erosive effect of the moving peat rather than to a decline in water quality per se. Normally in Irish rivers a Bad Status Q-rating (i.e. Q1, Q1-2 or Q2) is caused by elevated concentrations of organic waste, often accompanied by persistently elevated BOD, ammonia and phosphorus concentrations, but this would not have been the case for the peat slide.

It may seem surprising that in the 2005 column the SC7(b) and SC7(d) sites all show a significant improvement in quality since the 2003 peat slide. That is because it has been shown that macroinvertebrates can recover very rapidly (in less than 12 months) from even catastrophic mechanical-related damage (Lamberti et al, 1991). Moreover, in 2006 the EPA survey site on the main channel of the Owendalulleegh at O7 (EPA O5 in Figure 7-1) was assigned a High Status (Q4-5) rating, a significant improvement since the Bad Status rating of Q2 in the 2003 survey at the same site. In the case of O6 and O6A in 2005, these are also benefiting from the confluence of side tributaries unaffected by the peat slide i.e. SC7(c) and SC7(a) respectively, which would also have hastened the improvements predicted at these sites. What this analysis also postulates, however, is that any impact that would have affected sites O4, O5, O6 and O6A along the SC7(b)/SC7(d) channel, as a result of the 2004/2005 felling on the wind farm site and along the OHL corridor to that point (~15ha) would have been masked by the residual impact of the 2003 peat slide at the same sites. Site O4A on a very small side tributary joining from the east immediately upstream of Black Road was not in the path of the peat slide but may have been impacted by the emergency remedial works that were undertaken in the adjoining areas upstream, in particular the installation of two peat repositories on its banks in August 2005. In the absence of any significant off-site felling in these catchments over the following 2 years, it would be anticipated that all these sites would have reverted to at least Moderate Status (Q3-4) and in some cases to Good Status (Q4) by 2006. This is supported by the 2006 EPA data for the main channel of the Owendalulleegh and its side tributary EPA OT1 (SC9) (Table 7-11) all of which showed improvements from 2003 to 2006. In conclusion, the impact on macroinvertebrates in the streams and rivers listed in Table 7-20, outside of the SC7(b) and SC7(d) sub catchment (dealt with separately in Section 7.4.2.4), can be described as (i) no impact: O1, O2, B5 and D1, (ii) very slight negative and

temporary: B1A, B2, D1A, OHL1 and OHL 2, (iii) slight, negative, temporary to short-term: B4, O3, O8A, O9A, O9A1, O9A2, O9B, (iv) moderate, negative, temporary to short-term: O3A, B2A, B4B, B4C.

The impact of the peat slide on fish in SC7(b) and SC7(d) as well as the main channel downstream of the confluence of SC7, is dealt with in detail in Section 7.4.2.4. Outside of these stream and river stretches, the slightly more enriched conditions in terms of nutrient levels giving rise to possible changes in Q-ratings from High to Good Status or Moderate Status due to the clear-felling on the wind farm site during the construction period, combined with very light increases in bottom siltation derived from other aspects of the construction, is likely to have had minimal effects on the macroinvertebrate and fish populations in any of the small tributary streams, as all of these are well oxygenated and turbulent. In fact, an increase in macroinvertebrate biomass mediated by a temporary increase in nutrient inputs, in an otherwise oligotrophic system, could have improved feeding for trout in these streams.

Table 7-20 Predicted impacts of wind farm and OHL clearfelling, on-site construction activities and the 2003 peat slide and emergency measures (2003- 2006) on water quality (Q-value) in receiving streams between 2003 and 2006

Site Code	Sub catchment	2000	2003	2005	2006
O1	SC6	4	4	4	4
O2	SC6	4-5	4-5	4-5	4-5
O3	SC7(a)	4-5	4 (4-5)	4	4 (4-5)
O3A	SC7(a)	4-5	4 (4-5)	3-4	4
*O4	SC7(b)	4-5	1-2	2-3	3-4 (3)
O4A	SC7(b)	4-5	4	3-4	4
*O5	SC7(b)	4-5	1-2	2-3 (3)	3-4
*O6	SC7(d)	4-5	1-2	3	3-4
*O6A	SC7(d)	4-5	1-2	3-4 (3)	4
O5A	SC7(c)	4-5	4-5	4 (3-4)	4
O8A	SC8	4-5	4-5	4	4-5
O9B	unnamed	4-5	4-5	4	4-5
O9A	SC9	4-5	4-5	4	4-5
O9A1	SC9	4-5	4 (4-5)	4	4 (4-5)
O9A2	SC9	4-5	4 (4-5)	4	4 (4-5)
B1B	SC3	4-5	4-5	4 (4-5)	4-5
B2	SC2	4-5	4-5	4 (4-5)	4-5
B2A	SC2	4-5	4 (4-5)	3-4	4
B4	SC1	4-5	4-5	4	4 (4-5)
B4B	SC1	4-5	4-5	3-4	4
B4C	SC1	4-5	4 (4-5)	3-4	4
B5	SC1	5	5	4-5	4-5
D1	SC5	4-5	4-5	4-5	4-5
D1A	SC5	4-5	4-5	4 (4-5)	4-5

Site Code	Sub catchment	2000	2003	2005	2006
OHL 1	unnamed*	4-5	4-5	4(4-5)	4-5
OHL 2	unnamed***	4-5	4-5	4(4-5)	4-5

* = *sites directly impacted as a result of the peat slide*

** = *unnamed stream flowing to Owendalulleegh River just downstream of Site O7*

***= *small stream which flows to Lough Atorick from Agannygal Substation*

Summary of Residual Effects in the Construction Phase - Clearfelling and Solids Losses

Firstly, outside of the effects of the peat slide, and taking a conservative approach in combining data gleaned from macroinvertebrate, fish and water chemistry surveys for the current assessment, plus published EPA Q-rating data for the river systems, it is considered that clearfelling associated run-off from the wind farm and OHL construction would have resulted in temporary to short term elevations in nutrient concentrations (mainly SRP) registering in smaller tributary streams draining the felled plots. This combined with the effects of general suspended solids loss associated with forestry felling, substation and access track construction, cable trenching, drain digging, peat repositories and all other on-site construction activities 2003 to 2006 is likely to have caused temporary to short term reduction in the Q-rating from High (Q4-5) to Good (Q4) or mainly Moderate (Q3-4), and occasionally to Moderate bordering on Poor, (Q3-4/Q3). In addition, slight increases in sedimentation may have had temporary to short-term slightly negative effects on trout recruitment, mainly affecting the lower reaches of small tributaries draining the site, i.e., where stream flows and substrates are more suitable for fish spawning and nursery.

As detailed in Section 7.4.2.4, the effects of the peat slide were significantly to profoundly negative, both direct (i.e., physical impact of peat mass) and indirect (i.e., water quality deterioration from solids and short term nutrient wash out) causing fish mortalities, habitat degradation and Q-value declines in the Derrybrien North tributary (SC7(b) and SC7(d)) and the Owendalulleegh River downstream of SC7 confluence. The effects on the Owendalulleegh main channel sites were of short-term duration at worst, with a recovery in Q-value and fish communities as documented in this study.

Summary Significance of Effects - Construction Phase (2003 – 2006)

Effect Significance excluding the Peat Slide:

- Ranging between neutral and temporary to short term, indirect, moderate and not significant, reversible negative effects related to nutrient (clearfelling) and general solids washout within the smaller tributary streams, with no significant long-term effects.
- At worst, slight at worst temporary to short-term, indirect slight, negative effects on fisheries values, with no significant effect on trout recruitment in the sub catchment tributary streams.
- Neutral to imperceptible negative and not significant effects on water quality, Q-value or fish community or recruitment within main channel receiving rivers (Owendalulleegh, Boleyneendoorish, Duniry) downstream of the wind farm / substation area.

Effect Significance of the Peat Slide and Remedial Measures:

- Profound negative, short term, reversible effect, both direct and indirect in Derrybrien North tributary (SC7(b) and SC7(d)) and for the next 1km of the Owendalulleegh River main channel as far as Torraglassa Ford (EPA O5).

- The next 5.7km of Owendalulleegh River downstream of Tooraglassa Ford incurred very significant negative, short-term reversible effects in terms of Q-value decline and fisheries habitat impact.
- The next 7.2km downstream from EPA O4 to EPA O1 (1.5km upstream of Lough Cutra), incurred significant to moderate negative, short-term reversible effects.
- Note that the construction phase impacts of the peat slide on the Owendalulleegh main channel were demonstrably short-term in duration as evidenced by the EPA Q-value record whereby 4 out of 5 sites returned to High status (Q5, Q4-5) by 2006 and 1 site had returned to High status by 2009.

7.4.3 Operation and Maintenance Phase Effects (2006 – 2022)

7.4.3.1 Effects on Water Quality and Fisheries

Effects of Onsite Road Upgrade and Maintenance

In April and May 2014 wear and tear on many parts of the floating road system on the wind farm necessitated repair and upgrade. These remedial works were assessed in detail in 2013 as part of an Appropriate Assessment screening process for the works and included recommendations for silt control mitigation on any of the drains likely to receive silt run-off from sections of the track ear-marked for repair. The assessment at the time concluded that the silt control measures would have been sufficient, given the nature of the works and the gently sloping terrain, to prevent any downstream impacts on the ecology of the receiving waters caused by solids runoff. It is noted that Q-value macroinvertebrates surveys undertaken in July 2014 indicated poor or moderate water quality conditions at Sites O4, and O5 in SC7(b) which could have been attributed to these maintenance activities on the wind farm (see Section 7.4.2.2 and Table 7-12). If this was the source of the impact the residual effects, i.e., even with the stated silt control mitigation measures employed, can be described as localised slight to moderate, negative and short-term on macroinvertebrates, and slight, negative and short-term on fish in locally affected small headwater tributaries draining the wind farm site.

Effects of Onsite Drain Cleaning

A visit to the wind farm site undertaken in July 2018 showed that the site overall had well vegetated soil cover apart from very localised and small areas of exposed peat or mineral soil, and with most drains stable and not showing signs of excessive erosion. Drains on the site require cleaning from time to time in order to maintain conveyance. This entails removal of accumulated vegetation and any deposited material build-up using a back-hoe digger which side-casts the removed sediment and vegetation from the drains. This activity could generate suspended solids and may release nutrients from the peat (e.g., ammonia) which could, if mobilized downstream, have had a negative impact on fish spawning in the streams draining the site if silt were to accumulate in spawning beds during the spawning or hatching periods in winter and spring or if algal blooms were promoted by nutrient release from drained peat soils. Importantly, however, there is no fisheries value on the wind farm site, near the drains. Fisheries value increases, generally from 1-2km downstream of the wind farm further increasing with downstream distance as the channels become of lower gradient, broader, and with more gravel deposition for spawning purposes. It is considered that drain cleaning in the operation phase had potential for neutral effects on the wind farm site itself, but slight to moderate, negative, temporary effects on macroinvertebrates and fish in the small headwater tributaries of the Owendalulleegh, Boleyneendoorish and Duniry. In most if not all cases unlikely to result in a change of ecological status in the receiving waters downstream. The effect of drain clearing on water quality, fish and macroinvertebrates on the downstream main channels of the Owendalulleegh and Boleyneendoorish

(the two main drainage receiving waters) is considered to have been imperceptible to slightly negative and temporary. There was no change of ecological status in the main channel receiving waters downstream arising from this activity as evident by the EPA Q-value record of continuous High status.

Effects of Tree Growth Cut-back

Cut back of tree regrowth was required at intervals. Small amounts were undertaken in 2018 for a distance of 10 m either side of access tracks in selected areas around the wind farm site. Tree cutting was also carried out along the OHL corridor. This activity could potentially have increased nutrients and suspended solids in drains and small headwaters near the wind farm and the OHL. However, their limited extent and dispersed nature strongly suggest that any impacts in receiving waters were either imperceptible or slight, negative and temporary and in most if not all cases unlikely to have resulted in a change of ecological status in the receiving waters downstream arising from this activity.

Effects of Turbulence Felling (2016-2018)

To optimise the energy production of the wind farm, it was necessary to clearfell some of the maturing forestry adjoining the site. This was undertaken in 2016, 2017 and 2018 immediately adjacent to the western boundary and southwestern and north-western corners of the wind farm. The total area felled came to 46.2 ha divided as 22.30 ha (2016), 20.47 ha (2017) and 3.43 ha (2018). It is worth noting that much of this forestry was already ear-marked by Coillte for commercial felling as it was coming to maturity. The felled area drained to sub catchments SC1, SC7(c), SC8 and SC9. The approximate breakdown apportioned to these catchments in the 3 years of the felling is given in Table 7-21.

Table 7-21 Turbulence felling areas by sub catchment 2016-2018

	2016 (ha)	2017 (ha)	2018 (ha)
SC1	10.03	0.00	0.00
SC7(c)	0.00	6.95	0.05
SC8	0.49	8.72	3.37
SC9	**11.77**	**4.78**	**0.00**

Q-value samples undertaken in SC9 in 2018 (at O9A) gave a Q-4 result (i.e. good status) the same result as the EPA in 2018 at a station less than 500 m downstream on the same channel (EPA OT1, Table 7-11). The latter marked an improvement from the previous EPA survey at the same site in 2015 when a value of Q3-4 (Moderate Status) was recorded, a result thought to relate to a significant amount of felling in the catchment upstream in the interval since the previous survey in 2012 when a High status result of Q4-5 had been recorded. The nearest points of the turbulence felling in 2016 and 2017 in SC9 to the EPA OT1 site were 4.2 km and 3.9 km respectively, which suggests that much of the peaty/organic solids and some of the nutrient that would have emanated from the felling, would have settled, and been biologically adsorbed/consumed along the intervening channel, only giving rise to a very marginal, if any, effect at EPA OT1. When Site O9A in the current study was also surveyed in 2018, the same result recorded at EPA OT1 was obtained, i.e. Q4 (good status). Turbulence felling in SC9 is therefore thought to have given rise at worst to a slight, negative, temporary effect on macroinvertebrates.

The following year in 2019 the EPA recorded a Moderate Q-rating of Q3-4, a drop from the previous year. This agreed with the same rating recorded upstream in Sites O9A1 and O9A2 the same year for the current study, which is being attributed to non-project related felling in the upper part of SC9 in 2018 and 2019 and was unrelated to the earlier turbulence felling.

Drainage from the felling which occurred in SC1, travelled via a small nexus of drains including B4B and B4C to site B4 at the end of the catchment over a distance of 3-4 km. In 2018, that site returned a High-status Q-value (Q4-5/5) and therefore doesn't appear to have been impacted by the clearfelling which occurred in 2016. However, in 2019, for the first time in over 20 years, the Q ratings at EPA B1 fell from High to Good (Q4) and it is possible that this was connected with clearfelling in SC1 carried out since 2016 but not associated with turbulence felling. Sites B4B and B4C in the upper part of that tributary surveyed for the current study in 2019 did return Moderate (Q3-4) ratings, although the site at the bottom of the tributary and just upstream of EPA B1, returned a Q4 (4-5) i.e. good verging on high status. In 2019, the Owendalulleegh sub catchment SC7(c), sampled at Site O5A returned a High status Q-value (Table 7-12) suggesting that felling in that catchment in 2017 left no residual ecological impact, even though the SRP concentration was elevated above background when sampled around the same time (see **Appendix 7.3**). A water sample taken at the base of SC8 in August 2019 returned the highest SRP value of any site sampled (0.214 mg/l) and it is considered unlikely that all of that was contributed by felling in the upper catchment. At around the same time a Q-rating of Q3-4 was recorded at the same site. However, it is doubtful that this can be attributed in its entirety to the turbulence felling in the catchment carried out in 2017 and 2018 and was likely to have been affected more immediately by non-project related felling in 2019, of which 5ha of the felled plot drained to SC8 (Site O8A).

Overall, therefore, it is believed that the 46.2 ha of turbulence felling undertaken between 2016 and 2018 across 4 sub catchments probably did give rise to an increase in nutrient runoff (as SRP primarily) but the effects were not significant, being at worst only slight negative and temporary in terms of temporarily altering macroinvertebrate diversity which affects Q-value rating and ecological status at sites lower down in the sub catchments in question.

The main channels of the Owendalulleegh River which drains 66.2% and Boleyneendorrish River which drains 33.4% of the wind farm site, respectively, maintained biological water quality of High status (Q5/Q4-5) throughout the turbulence felling period, hence there was no significant effect of this activity on the main stem receiving waters.

7.4.4 Ceased Operation Phase Effects (2022-Present)

7.4.4.1 Effects on Water Quality and Fisheries

Pre-Mitigation Effects

Currently no aspect of the ceased operation of the wind farm, the OHL line or the Agannygal Substation is known to be giving rise to, nor has potential to cause, any negative effects on surface water quality, aquatic habitats or fish. There have been no changes to the recorded high ecological status (Q5/Q4-5) of the main rivers draining the site (Owendalulleegh and Boleyneendoorish) between 2021 (EPA Q-values, Table 7-11) and 2024 (project-specific Q-values, Table 7-12).

Proposed Mitigation Measures

- None required

Residual Effects

Neutral

Significance of Effects

Neutral

7.4.5 Effects of Retained Development

7.4.5.1 Wind Farm, Substations and OHL - Water Quality and Fisheries Effects

Pre-Mitigation Effects

Once the Prospective Development is complete (decommissioning of above ground structures) remaining elements of the Project (as set out in Section 7.4.1, above) will be the various reinforced concrete foundations of the wind farm, substation and the OHL structures, plus disused crane hard standing areas, borrow pit/quarries and access tracks, the underground cabling and peat repositories. The key to whether these elements have potential for likely significant effects on the aquatic environment by remaining *in-situ* in perpetuity, is the degree to which they represent possible sources of water quality degradation that could impact on downstream aquatic habitats and fish populations. In this respect the main issue for water quality (as demonstrated during the construction phase) is the level of peat stability and the degree to which retention of individual, at and below ground elements could cause peat failure into the future. On this, the residual peat stability assessments following the Prospective Development are presented in Chapter 8 Land, Soils and Geology. Table 7-22 summarizes the findings of Chapter 8 with regards to effects of the retained elements on peat stability into the future, which is then used to underpin the assessment of risk and effects on water quality and fisheries.

Disused access tracks, crane hard standings, redundant drains and concrete foundations will, over time, be encroached upon and colonized by vegetation. This is likely to promote greater infiltration and evaporation, intercept suspended solids and in the long term will buffer peak flows from the site.

It is noted that the Project, during its operational phase, with these elements in-situ, has not caused deterioration in the monitored rivers downstream and has, in the case of the two main receiving rivers (Owendalulleegh and Boleyneendoorish), maintained high ecological status (Q4-5/Q5) (see Table 7-12). So, while there is predicted to initially be slightly negative, temporary to short term effects on water quality, mainly related to suspended solids leaving the areas proposed to be disturbed by the decommissioning works, this will gradually diminish to neutral to slightly positive effects on water quality and aquatic habitats into the future. High status (based on macroinvertebrate community) will be maintained in the downstream main stem rivers and the smaller tributaries will continue to respond to other, unrelated land use effects, e.g., Coillte and private forestry activities, and turbary.

Table 7-22 Peat stability and corresponding Aquatic Ecology Effects of Retained Development Elements

	Significance of Effect on Peat Stability after decommissioning (see Chapter 8)	Note on peat stability (from Chapter 8, Section 8.4.6: Residual Impacts)	Duration and Significance of Effects on Water quality and Fisheries (based on peat stability assessment)
Site Access Tracks	Negligible and Not Significant	Peat under floating and rockfill berm roads has increased in strength through compression which has decreased probability of shear failure.	Low to no risk of emissions to surface waters, hence, **long term neutral** effects on water quality and fisheries

	Significance of Effect on Peat Stability after decommissioning (see Chapter 8)	Note on peat stability (from Chapter 8, Section 8.4.6: Residual Impacts)	Duration and Significance of Effects on Water quality and Fisheries (based on peat stability assessment)
Turbine Foundations and Crane Hardstandings	Negligible and Not Significant to Slightly Significant positive	These retained elements act as a shear key preventing shear failure in peat upslope of them, i.e., increased peat stability	Low to no risk of emissions to surface waters, hence, **long term neutral** effects on water quality and fisheries
Drainage	Low and Slightly Significant	Minor reduction in efficiency of drainage network over time will gradually restore groundwater levels with low significance in terms of peat stability	**Long-term slight positive** through increased evaporation, infiltration, solids entrapment and reduction in peak flows over time
Peat Repositories	Permanent negligible and Not Significant	Remoulded, excavated peat has become stable and revegetated, underlying peat has consolidated & increased in shear strength reducing likelihood of peat failure	Low to no risk of emissions to surface waters, hence, **long term neutral** effects on water quality and fisheries
Borrow Pit/quarries (BPQ)	Imperceptible	Borrow pits/quarries were closed since 2005 and have been stable since. BPQ No. 3 (wind farm site entrance) has filled with groundwater and has a stable water level.	Low risk of deleterious emissions to surface waters, hence, **long term neutral** effects on water quality and fisheries. BPQ No. 3 represents a positive effect on water quality and biodiversity of the Duniry catchment as it provides a settlement area and potentially an evolving wetland/pond habitat
Barrages 3 and 4	Negligible and Not Significant	These are rockfill berms on glacial till below, with neglible effect on stability of underlying geology	**Permanent neutral** effects on water quality. *See Section 7.4.6.3.3, below, for description of effects on fisheries and hydromorphology*
Concrete foundations for OHL polesets	Negligible and Not Significant	Built on glacial till below the peat and apply no load to peat. With above ground structure removed, no load will be applied to underlying geology	Low to no risk of emissions to surface waters, hence, **long term neutral** effects on water quality and fisheries
Concrete foundations at Agganygal Substation	Negligible and Not Significant	Built on granular fill and glacial till below the peat and apply no load to peat. With above ground structure removed, no load will be applied to underlying geology	

Proposed Mitigation Measures

- None required

Residual Effects

Within as little as 1-2 growing seasons following completion of the Prospective Development (decommissioning) there will be ever diminishing levels of residual suspended solids leaving the areas where ground disturbance occurred to remove above ground elements of the project (i.e., wind farm, OHL and substations), owing to consolidation and revegetation of disused, retained features with a corresponding gradual increase in the level of on-site attenuation of peak run-off. With vegetation growing over the retained features and into drains, the level of onsite attenuation and filtration will increase which will further reduce solids run-off from the decommissioned site. 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 runoff arising and therefore no likely significant effects on water quality and downstream fisheries habitats.

Significance of Post Mitigation Effects

Permanent or long-term not significant; neutral to slight positive.

7.4.5.2 Effects of Off-site Features related to Peat Slide

As of 2024, the off-site elements associated with the 2003 peat slide have been in-situ for at least 19 years (i.e., works completed in November 2005). The following sections examine the effects of individual peat slide response elements that will remain *in-situ* in perpetuity.

7.4.5.2.1 *Barrages 1 and 2, Peat Repositories, Drainage, Borrow pits / quarries*

Pre-Mitigation Effects

The following elements, to remain *in-situ* in perpetuity will have a long-term neutral and not significant effect on water quality and fisheries values, as described in the below paragraphs:

- Barrage 1 and Coillte Access Track.
- Barrage 2 and peat repository area.
- Barrage 3 peat repository area.
- Repository Area at the Black Road Bridge.
- Minor borrow pits used to source material.
- Drainage works.

Drains, minor borrow pit / quarries and the three peat repository areas that were utilized in response to the peat slide have stabilized, grown over and largely naturalized into the surrounding landscape and are not sources of deleterious emissions to surface waters either currently or into the future. Their retention in a naturalized state will likely promote greater infiltration and evaporation, intercept suspended solids and reduce peak flows from the site.

Barrage 1 (plus the Coillte Access Track that runs over it) and Barrage 2 are very high in the Derrybrien North tributary (SC7(b) sub catchment) where there is very little fisheries habitat and the watercourse is small, and somewhat ephemeral in nature, especially upstream of Barrage 1. The retention of these two structures, so high in the catchment and very close to the on-site drains/runnels of the wind farm which have no fisheries significance, has no material effect on the fish recruitment

capacity of this tributary. In addition, repeated electrofishing efforts for this study (2008, 2014, 2019, 2022) at Site O5 (Flaggy Bridge, 2km downstream of Barrage 2) revealed no fish on each occasion. There are currently at least three identified fish passage barriers (natural and artificial) downstream of Flaggy Bridge that apparently (individually or cumulatively) prevent fish passage up this tributary upstream even as far as Flaggy Bridge, let alone higher in the sub catchment to Barrages 1 and 2. Furthermore, Barrages 3 and 4, which will be left *in-situ* (discussed in detail in Section 7.4.6.3.3 below) would prevent fish passage (apart from eel) between Flaggy Bridge and Barrages 1 and 2.

Proposed Mitigation Measures

- None required

Residual Effects

As the recovery / naturalisation from the 2003-2006 construction phase and peat slide has shown, within two decades it is hard to decipher these features (other than Barrage 1 and 2) were ever there. Left undisturbed, there are no deleterious emissions that could arise from these features that have potential to impact on water quality and fisheries downstream.

Significance of Post Mitigation Effects

Permanent not significant to neutral.

7.4.5.3 Off-site Bridge Repairs and Works

7.4.5.3.1 *Peat Slide Related Repairs*

Pre-Mitigation Effects

Repairs to the following (existing) bridges and features were carried out following the peat slide damage:

1) Black Road Bridge: Replacement of bridge parapets.
2) Flaggy Bridge (R353): Parapets repaired and replaced after the peat slide.
3) Replacement of Stepping Stones across Owendalulleagh River.
- Unnamed Bridge C: Removal of the existing structure and re-construction of the entire bridge span.

Repairs to parapets of items (1) and (2) Black Road Bridge and Flaggy Bridge do not affect water quality and instream habitats. These elements did not alter existing hydromorphology, have no direct effect on instream habitat, and will have a neutral effect on the aquatic environment when left *in-situ* in perpetuity.

The replacement of Item (3) Stepping Stones across the Owendalulleagh River occurred at Site O7 (EPA O5 - Tooraglassa Ford) [ITM 560123, 701248]. The channel is generally 8m wide (wider at the fording point) and up to 30cm deep in riffle/run habitat over substrates of small boulder (10%), cobble (40%), gravel (40%), coarse sand (10%) with patches of *Fontanalis antipyretica, Ranunculus flammula* and *Myriophyllum alterniflorum*. The habitat comprises excellent salmonid spawning and nursery water (**Plate 7-7**) Indeed, electrofishing surveys in 2019 at a similar site on the main channel (O7A), 1 km upstream, returned high numbers and density of trout (Table 7-16). A macroinvertebrate sample at Site O7 in August 2024, merited Q5, equating to high status (Table 7-12). The boulders have large gaps

between them and create beneficial microhabitats for fish and macroinvertebrates. The retention *in-situ* in perpetuity of the replaced Stepping Stone boulders represents a neutral effect on water quality, fisheries and hydromorphology.



Plate 7-7 Stepping Stones (Tooraglassa Ford/ Site O7) - 30 August 2024

Item (4) Unnamed Bridge C is located 750m downstream of Flaggy Bridge and 450m downstream of the privately owned "Forestry Culvert" identified in the IFI Barriers Report (IFI, 2023). Unnamed Bridge C forms a clear span over the river and is not a barrier to fish migration. Small numbers of trout were taken at Site O6, ~50m downstream of Unnamed Bridge C in 2011(2), 2014 (9), 2019 (2) and 2022 (5). At the base of this tributary at O6A, just upstream of the main channel of the Owendalluleegh and 1.2 km downstream from Unnamed Bridge C, the 2019 fish survey returned fair number of trout (13) and high numbers of stone loach (41). Inis Environmental (2008) found 3 trout were present 350m downstream of Flaggy Bridge and 2 trout, 22 stone loach and 1 eel were recorded at the site a further 100m downstream, i.e., both sites are upstream of Unnamed Bridge C, but downstream of the Forestry Culvert (identified barrier). It is concluded that Unnamed Bridge C is having a neutral effect on fish migration and hydromorphology.

Proposed Mitigation Measures

- No mitigation is required at Black Road Bridge, Flaggy Bridge (R353), Unnamed Bridge C or Stepping Stones across Owendalulleagh River at Tooraglassa Ford.

Residual Effects

The works carried out in response to the peat slide at Black Road Bridge, Flaggy Bridge (R353), Unnamed Bridge C and Stepping Stones currently have no residual effect and will have no significant residual effects into the future in terms of water quality, hydromorphology and fisheries.

Significance of Post Mitigation Effects

Permanent neutral and not significant effects in relation to Black Road Bridge, Flaggy Bridge (R353), Unnamed Bridge C and the Stepping Stones across Owendalulleagh River at Tooraglassa Ford.

7.4.5.3.2 *Crooked Bridge (R353)*

Pre-Mitigation Effects

Road widening was undertaken during the construction phase, for a distance of approximately 30m on either side of the Crooked Bridge on the R353 [ITM: 555730, 700940] to facilitate the delivery of equipment to the wind farm site (Figure 7-14). This did not require any instream works, just a reduction in the height of the parapets, plus lateral expansion of the road surface and associated vegetation removal east of the bridge itself. The widened area east of the bridge is comprised of hardcore and has consolidated and largely grown over with vegetation in the 18 years since the construction period. The residual widened area is being used as a lay-by on this reasonably tight bend in the regional road between Gort and Portumna. The bridge spans the Derrywee East Stream, a small tributary of the Knocknarebana Stream which was represented in the current study by Site O9A (SC9). Site O9A is located 1.5km upstream of the Derrywee East stream confluence. The Derrywee East stream has a very small catchment area and is somewhat ephemeral (very low summer flows) and of low fisheries significance. It connects to the larger Knocknarebana Stream ~600m downstream of Crooked Bridge. The EPA monitors the Knocknarebana at Site EPA OT1 (Figure 7-1), located in sub catchment SC9. It returned high status results in each survey from 1997 to 2012 with the exception of 2003 when status was good (Q4). SC9 sub catchment was not affected by the 2003 peat slide. EPA OT1 oscillated between moderate (Q3-4) and good status (Q4) from 2015 to 2021 which was linked with clearfelling upstream in SC9, not related to the wind farm. SC9 only drains a very small portion of the western side of the wind farm site. The Knocknarebana has patches of potential trout habitat, although it is steep in places with a number of natural rock waterfalls that could be preventing fish migration from the Owendalulleegh River, another 1.7km downstream. The widened road area east of Crooked Bridge may still be contributing low levels of suspended solids to the Derrywee East stream during rainfall events, and this may increase slightly during the decommissioning if HGVs track over it. However, given the very limited source area and the current land use mix (including extensive non-Project related forestry) in the wider Knocknarebana Stream catchment (SC9) the solids concentrations arising from the small source area at Crooked Bridge will likely be **long term imperceptible negative**, unlikely to have any noticeable effect on the macroinvertebrate community defining ecological status, nor the fisheries potential of the Knocknarebana sub catchment.



Figure 7-14 Crooked Bridge (R353) road widening (2006 Google Earth Image) and 2022 (Google Maps image)

Proposed Mitigation Measures

- None required

Residual Effects

Low levels of suspended solids wash-out to the Derrywee East stream from the residual small, largely vegetated, hardcore layby area east of Crooked Bridge with no noticebale effects on any sensitivities of the Knocknarebana sub catchment. Into the future, the lay-by area may further vegetate, further reducing the source area for solids wash-out.

Significance of Post Mitigation Effects

Moderate to long term imperceptible, not significant negative.

7.4.5.3.3 *Effects of Barrages 3 and 4*

Pre-Mitigation Effects

Barrages 3 and 4 occur ~550 m and ~350 m upstream of Flaggy Bridge, respectively. Their installation was complete by 4 November 2003 to help arrest the flow of peat down the SC7(b) tributary. Both are comprised of large, irregularly shaped limestone boulders, placed directly on the natural channel bedrock, with an indistinct flow pathway through each. They are both complete barriers to passage of all fish species (except eels, which can climb). The question of the effect of these structures has been raised in the IFI National Barriers Programme Report (IFI, 2023), which states that as well as preventing fish passage, they also interrupt the natural sediment dynamics of the Owendalulleegh River suggesting that "*Sediment starvation downstream of these structures may have significant river morphology, habitat forming and ecological consequences.*" Having spent many years (2011 – 2024) sampling and studying the various sub catchments and the main channel of the Owendalulleegh River, (Q-values, water chemistry, fish surveys, as set out in Section 7.3 of this rEIAR) an informed assessment can be made as to whether these structures *may or may not* have significant effects, as suggested by the IFI Barriers Report (2023).

Firstly, the affected channel (EPA name 'Derrybrien North', Segment Code 29_278) is a small tributary of the Owendalulleegh River, it is not the "*upper Owendalulleegh River"* as the IFI Barriers Report states. The affected channel (SC7(b) sub catchment - see Figure 7-3) is one of many small 1st/2nd order headwater streams that eventually feed into the Owendalulleegh main channel. Above the barrages, the Derrybrien North stream contributes just a fraction (approximately 4%) of overall drainage (by area) to the Owendalulleegh catchment upstream of Lough Cutra. There are numerous small and larger channels, including the main stem of the Owendalulleegh River, east of the SC7 sub catchment confluence, that contribute sediment to the Owendalluleegh system. There is, thus, no shortage of finer grades of substrate in the Owendalulleegh River itself. Moreover, there may not be a significant reduction in finer substrate grades in the Derrybrien North tributary either. This certainly seems to be the case in the middle to lower reaches of the tributary based on field observations which show these reaches to be naturally spatey and bedrock/cobble dominated with finer substrates beginning to settle out in the channel bed as the gradient decreases nearer the Owendalulleegh confluence. So, whilst the barrages are holding back a certain amount of fine material from the upper to middle reaches of the Derrybrien North tributary, there are two tributaries (represented by Sites O5A and O3) plus the main channel of the Owendalulleegh (represented by Site O7C), which adjoin downstream of Flaggy Bridge, each having no obstructions to the supply of finer materials to the system. The channels represented by Sites O5A and O3 (i.e., joining SC7 between Barrage 4 and the confluence with the Owendalulleegh River) also contribute finer substrate components to the Derrybrien North (SC7(d)) channel itself, meaning there is only a short reach (~650-700m) of this small, spate stream that has no upstream derived alternative supply of finer material, noting that finer material from the banks is still available for export. This short reach represents a tiny proportion of the entire accessible fluvial habitat for fish in the Owendalulleegh catchment and suggests that the potential loss in reproductive capacity of the

Derrybrien North (SC7(b)) tributary, and certainly the Owendalulleegh catchment as a whole, owing to continued presence of the barrages is likely to be minor, if not imperceptible.

In this regard it should also be noted that in the neighbouring tributaries SC7(c) represented by Site O5A and SC7(a) represented by Sites O3 and O3A, where there are no barriers to fish passage or to substrate movement, fish densities have always been found to be very low, suggesting that these tributaries make (and always have made) a relatively minor contribution to the overall salmonid reproductive capacity of the Owendalulleegh system, regardless of the damage caused by the peat slide in SC7(b). Furthermore, repeated electrofishing surveys for the current study (2008, 2014, 2019, 2022) have never captured a single fish of any species at or upstream of Flaggy Bridge, despite there being suitable habitat for trout reproduction (Site O5, Plate 7-8). This demonstrates that fish are not accessing as far as Flaggy Bridge, let alone upstream as far as Barrages 3 and 4.

There is strong evidence, therefore, that in the case of this tributary, removal of Barrages 3 and 4 would not add, certainly not in any significant way, to the number of fish produced each year given the presence of two natural (Rock Outcrops 1 and 2) and (at present) one artificial (Unnamed Bridge C) impediments to fish passage downstream of Flaggy Bridge (see Table 7-17).



Plate 7-8 Site O5, Derrybrien North stream (SC7(b)) upstream of Flaggy Bridge (24 August 2024)

Proposed Mitigation Measures

- None required

Residual Effects

Retention of Barrages 3 and 4 has no significant residual negative effect on fisheries productivity in either the SC7(b) sub catchment nor the Owendalulleegh system as a whole because fish currently fail to access even as far as Flaggy Bridge owing to two natural barriers and (at present) one artificial migration barrier between Flaggy Bridge and Owendalulleegh main channel. Barrages 3 and 4 have no negative effect on water quality and do not prevent the achievement of good status (Q4) or better, noting the stream is currently Q4-5 at Flaggy Bridge (Site O5) in surveys of 2019, 2022 and 2024, based on Q-values (**Table 7-12**). Retention of Barrages 3 and 4 may be causing a slight reduction in finer substrate mobilization downstream from the upper SC7(b) channel, but there are alternative sources of

finer substrates (gravels) from numerous other small tributaries adjoining both the SC7 sub catchment, i.e., SC7(c) and SC7(a) and the Owendalulleegh main channel, not to mention natural supply of bankside derived gravels from the SC7(d) channel banks, meaning the residual effect of Barrages 3 and 4 on the overall Owendalluleegh waterbody in terms of hydromorphology and trout supporting habitat is considered a permanent or long-term imperceptible negative.

Significance of Post Mitigation Effects

Permanent or long-term imperceptible negative.

7.4.5.4 Agannygal Substation Decommissioning Route Culvert

Pre-Mitigation Effects

A culvert is proposed to be replaced at Site OHL2A [ITM: 563549,697832] to facilitate the Prospective Development. That new culvert will remain *in-situ* in perpetuity forming part of the Coillte forestry access track network. The existing culvert (Plate 7-9) has collapsed/subsided and during rain events the Lough Atorick tributary flows over the access track. The EIAR for the Prospective Development describes that, with the implementation of mitigation, the effect of the culvert replacement will be negligible to slightly negative and temporary on account of the long sluggish, drained glide downstream (see Plate 7-6) which acts as a linear wetland where any temporary increases in suspended solids will settle out. This is not a salmonid channel, so the effect on fish sensitivity is neutral. Once the culvert is replaced, flows will no longer overtop the access track meaning a long-term reduction in a source of suspended solids from the track surface. In the event that eels are currently using this stream, the new culvert will help them access further upstream without having to travel overland.



Plate 7-9 Site OHL2A – existing (collapsed) culvert viewed upstream with drained stream flowing to Lough Atorick in foreground

Proposed Mitigation Measures

- No mitigation required

Residual Effects

Possible increase in easily accessible fluvial range for eels. Reduction in mobilization of suspended solids during rain events into the future.

Significance of Effects

Permanent positive compared to the current situation.

7.4.6 Water Framework Directive Implications

A detailed assessment of the implications of the Retained Development on Water Framework Directive (WFD) objectives for relevant directly and indirectly affected surface water bodies is contained in **Appendix 7-6.** 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.

7.4.7 Cumulative and In-Combination Effects

7.4.7.1 Cumulative Effects which have occurred

A number of projects and activities which are or were located within the same main river catchments as the Derrybrien Wind Farm project which could potentially have acted cumulatively with the wind farm project to impact aquatic ecology and fisheries by virtue of their proximity or size are listed here:

- Turbary activity.
- Wind farms in Slieve Aughty Mountains.
- Adjacent coniferous forestry plantations.
- Planting in lieu of felling on wind farm site.
- Overhead transmission lines.
- Gort Regional Water Supply Scheme.
- Sand extraction at Cloghvoley.
- Ballynakill Quarry.
- Coillte Quarry.
- Works to Beagh Bridge.

It is important to note at the outset that 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 and Tables 7-11 and 7-12), 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 impact assessment carried out for the proposed project has indicated either no or minimal impacts reaching the upper stations of these main channels as a result of the proposed works. Accordingly, any cumulative impacts that may arise from the Retained Development, after the Prospective Development (decommissioning) is complete would be expected to have no discernible effect on water quality or fisheries into the future.

Currently, the only activities occurring within the area drained by these channels that could give rise to cumulative effects on water quality or fisheries are forestry activities, in particular clear-felling, and turbary and these are discussed in the following paragraphs. There are no other proposed developments that could cumulatively interact with the Retained Development 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 excepted surface water zone of influence of the project.

7.4.7.1.1 Cumulative Effects of Turbary Activity that have occurred

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 turbary map Chapter 4, Figure 4-5). However, the existence of turbary rights provides no indication of the amount of peat extraction occurring. Indeed, it is estimated in Ireland that only around 10% of turbary owners actively exercise their right to extract peat (Renou-Wilson et al., 2011). Moreover, because it is estimated that more than 80% of peat extracted by rural contractors is privately traded (Fitzgerald, 2006, quoted in Renou-Wilson et al. (2011), it is difficult to know how much is extracted in any given year or in any given area of cut-over bog. 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. Therefore, unlike forestry activity where Coillte and the Forest Service keep detailed records of management activities, e.g., clearfelling, and re-planting, which in any case can also be tracked by aerial imagery, there is no coordinated record of the intensity or extent of peat extraction in the turbary plots. Moreover, depending on the drainage of individually active plots within a larger block of cutover bog, the connectivity of individual plots to surface water drainage and therefore the likelihood or otherwise of peat silt generated during peat extraction reaching rivers and streams is unknown. Furthermore, while the environmental impacts of every aspect of forestry management on surface waters have been researched widely and intensively in Ireland and elsewhere, there is very little research available on the impact of turbary on surface waters in Ireland. The only research available relates to the industrial scale extraction of peat in large midlands raised bog systems operated by Bord na Mona, much of it done in the 1960, 70's and 80's. Studies on small catchments with drained blanket peat bogs in the UK have shown that receiving waters are prone to higher suspended solids concentrations, especially in the winter months as well as greater amounts of fine particulate organic matter (FPOM) in the sediments and nitrogen loss caused by wet/dry cycling in drained peat. In the same areas the macroinvertebrate community had higher abundances of Chironimid midge larvae and Simuliid midge larvae, as well as lower representation of mayflies (Ephemeroptera), stone flies (Plecoptera) and caddis larvae (Trichoptera) i.e. more sensitive groups to peat silt. In areas where these drains have been blocked for several years it was noted that each of these trends was reversed, i.e., lower amounts of organic solids and greater representation of the more sensitive invertebrates (Ramchunder et al., 2012). These data suggest that if turbary were impacting on the receiving waters around Derrybrien Wind Farm, that a greater amount of deposited organic particulate matter (peat silt) would be recorded and impaired Q-values due to a lower representation of more sensitive groups. It is possible that if turbary were ongoing during and before the construction of the wind farm site it may have depressed the water quality at Sites O3 and O2 respectively, dropping it from High Status (Q4-5) to Good (Q4) or from Q4 (if started out as Good Status) to Moderate (Q3-4). Combined with suspended solids generated during the construction phase these conditions may have become more impaired, possibly falling to Q3 (poor Status) at these two sites. However, for that to have occurred the solids leaving the site due to both turbary and the construction would have had to have been considerable and bearing in mind that silt traps were placed on all the main outlets drains from the wind farm, this is unlikely to have arisen. It should be noted also that any cumulative impacts during construction would likely have dissipated before either of these tributaries (SC6) and (SC7(a)) reached the main channel of the Owendalulleegh, so the cumulative effect, had it occurred at all, could be described as **slight to moderate negative and temporary** in terms of potential impacts on macroinvertebrates and **slight negative and temporary** in terms of impacts on fish in the two affected channels.

Description of Peat Disturbance in Turbary Plot 161

A site visit on 9th June 2020 was made to Derrybrien Wind Farm to assess effects of a localised peat disturbance in one of the turbary plots (#161). The minor peat slide here is examined in detail in Chapter 8 (Land, Solis and Geology), which concluded that it was not initiated by activities on the wind farm itself, but likely the impact of saw cutting, mechanical excavation and associated drainage of peat plots as part of turbary rights. Furthermore, the risk of a peat failure due to mechanical peat extraction is independent of the wind farm activities and has not been exacerbated by the development of the wind farm.

The small peat slide in Plot 161 is situated 125 m NNW of Turbine 38 and 160m SE of Turbine 34. The disturbance was 60m along its longest axis, i.e., SSE-NNW and at widest, 40m across its southern, downslope base. In total the affected area is 0.2ha. It is characterised by roughly 12-15 curved, parallel tears in the peat surface running east-west across the plot. The tears are about 2-3m apart and about 1-2m wide, where the surface vegetated layer has been prised apart and the underlying peat cleft (Figure 7-15, Plate A). Some of these had water collected in the base and there is evidence of loose peat silt having collected in the bases (Figure 7-15, Plate B). Immediately north of where these tears appear in the peat surface the remaining 65m of the plot showed no sign of failure. However, the surface vegetative cover has all but disappeared, eroded by constant machinery movements associated with spreading the extruded sods to dry flat or in small piles (Figure 7-15, Plate C). This surface may be subject to peat silt loss during intense rainfall. Machinery pressure and the absence of a vegetative cover on this part of the plot may have contributed to its destabilisation. Adjoining turbary plots are separated by drains running parallel to their long axes and the one on the eastern side of the affected site adjoining the failed section appears to have been widened and peat excavated out of it. The peat disturbance scars were still visible in August 2024.

Residual Effect on Downstream Water Quality – Turbary Plot 161

At the base of the affected plot, there is an east-west running drain which carries runoff drainage from the plot itself and from the adjoining inter-plot drains running perpendicular to it. Drainage from the plot that enters this drain splits in the centre of the plot, one half flowing west and one half flowing east. At the base of the adjoining turbary plot to the east, where it joins this east-west drain, a large rectangle of peat cutting has been excavated up to the eastern-flowing section of the drain (Figure 7-15, Plate D). The east-flowing drain continues for about 210m in a narrow channel with a gravel base denoting running water when the drain is active (Figure 7-15, Plate E) and at the end of that run (ITM 560725, 705195) it turns at right angles to the south to join the trackside drain beside Turbine 41. From there it flows east along the northern edge of the track for 540m down past Turbine 46 to the bottom south eastern corner of the turbary area where it flows under the track in a SSE direction (ITM 561350, 704990) forming the eastern head-water branch of SC7(a) which contains the O3 and O3A survey sites.

The western flowing runoff from the affected turbary plot is more sluggish with a soft, peat bottomed channel (Figure 7-15, Plate F), which flows 270m westward where it joins a drain coming from the west and the resulting flow turns south in a highly eroded channel with much bedrock along its base which emerges beside Turbine 35. From there it flows under the track (ITM 56041, 704885) south east into the forestry immediately below the track where it shortly joins another drain flowing from the west and the resultant channel emerges into a 17ha plot of recently clear-felled forestry where it forms the western head-water branch of SC7(a). A kick-sample was taken on 9th June 2020 at a point (Site O3B) in this stream about 310m downstream of the wind farm boundary at (ITM: 561814, 702025), which returned a high status rating (Q4-5) (**Appendix 7-1, Table A7-1.4**). The substrate was mobile, coarse and free of peat silt, with a mixture of riffle and pool habitats, and no in-stream vegetation (Figure 7-15, Plate G). This stream continues for another 1km where it joins the eastern branch of SC7(a) and the combined flow continues for another 4.7km before joining the SC7(d) channel, 0.67km upstream of the Owendalulleegh main channel. A kick-sample was taken at about 600m upstream of this latter

confluence (Site O3C), i.e., close to the base of SC7(a) where the rating was also Q4-5, high status. The channel, which was just over a metre wide, showed signs of cattle access below the kick-sample point. Water was clear and the coarse, stable substrate surface was silt free, although a small amount of peaty silt rose when the substrate was disturbed during kick-sampling. There was patchy, heavy cover of moss and liverwort on the substrate (Figure 7-15, Plate H).

The peat slide appears to have initiated at some time between April 2015 and July 2018, based on historical aerial photographs from Google Earth and the OSI Geohive online portal, and had extended by 2020. The likelihood is that over the weeks or months since its appearance, peat silt had mobilised from the exposed peat tears during periods of intense rainfall. These will have flushed out in the east and west drain at the base of the disturbance entering the two main upper branches of the SC7(a) sub catchment, as described above. The impact of this appears to have been minimal, based on the results of the two kick-samples referred to above. In the case of the one at O3B at the head of the catchment there would seem to have been no local impact, given the high-status result obtained. While the upper site (O3B) is likely to be too torrential and unstable to be important for trout spawning, the lower site at O3C will be used by trout in places. Overall, the impact of this event is thought to have given rise to an indirect slight negative temporary cumulative effect resulting in a low-level diffuse addition of peat silt to the affected SC7(a) watercourse, barely perceptible, if at all, in terms of biological water quality with no significant effect on fisheries further downstream where the channel has naturally low productivity, supporting just small numbers of trout, e.g., at Site O3.



Figure 7-15 Peat Disturbance in Turbary Plot in Wind Farm Site

A = disturbance showing peat tears, B = shows close-up of peat tear with water, C = badly eroded surface of turbary plot upslope of peat disturbance, D = shows peat excavation rectangle at base of turbary plot adjoining and east of disturbance area plot, E = eastern section of east-west drain shoring eroding base, F = east-west drain western section showing deposited peat in base, G = substrate at Q-rating survey site (O3B) and H = photo of stream at O3C Q-rating survey area.

7.4.7.1.2 Cumulative Effects with other Wind Farms in Slieve Aughty Mountains

The Sonnagh Wind Farm

This wind farm is a small development of 9 turbines situated on high ground immediately east of Lough Belsrah about 3.4 km north west of the Derrybrien Wind Farm. Part of the site drains into the upper tributaries of the Boleyneendorrish River at a point upstream of B3 and EPA B1, the latter coinciding with B5 in the current study (see Figure 7-1). Biological water quality results at both sites have recorded High Status (Q4-5 or Q5). The EPA B1 site results returning High Status results consistently for over 2 decades up to 2018 with a drop to Good Status (Q4) for the first time in 2019 (Table 7-11, Section 7.3.4). The same year (2019) a Q rating of Q4-5 was recorded in the present study at B3, i.e. upstream of the EPA B1 site and downstream of the confluence of the Sonnagh Wind Farm tributary indicating that there has been a neutral cumulative impact from this project on aquatic habitats in the Boleyneendorrish.

Keelderry Wind Farm

The site of this proposed wind farm is situated 3.5 km west of the Derrybrien Wind Farm. The project was abandoned in 2007 after the access tracks to the turbine sites were completed. The site drains to a small catchment due west of SC9 which joins the main channel of the Owendalulleegh immediately upstream from EPA O3. Other than 2003 and 2006 after the peat slide at Derrybrien, Site EPA O3 site has always been at high status, including continuous high status from 2009 to the present, hence there has been a neutral cumulative impact between the current project and Keelderry Wind Farm.

7.4.7.1.3 Cumulative Effects with Forestry in Wind Farm Sub catchments

There is a degree of uncertainty attached to some of the Coillte data for the period 2000-2006 in terms of felling activity in each of the sub catchments draining from the wind farm site. This is because, although there is data in relation to which forestry block was to be felled in any given year, from time-to-time felling proceeded either earlier or later than the dates shown on harvesting plans and it wasn't easy to confirm the exact year trees were felled. The following analysis is a combination of hind-cast felling data available from more recent digitised Coillte maps, with the caveats mentioned above, as well as an examination of Google Earth imagery from 2006, 2011, 2015, 2018, 2020, 2021 and 2022 and OSI aerials photos from 2000 and 2005.

In the period 2000 to 2005 there was either very limited clearfelling in most of the sub catchments to which substantial portions of the Derrybrien Wind Farm drain or if there was substantial felling, then the wind farm on-site felling in the same sub catchment was quite limited, thereby reducing any potential for cumulative impacts in either scenario. In SC9, for example, while there was extensive felling within the Coillte forestry blocks between 2003 and 2006 (~66ha) particularly in 2005/2006, during the construction phase of the wind farm, only around 2ha was felled within the wind farm site that drained to the SC9 sub catchment, so effectively any cumulative impact was likely to have been imperceptible negative to neutral and certainly not significant. Throughout SC7(c), no off-site Coillte felling took place, during the 2000-2005 period, so no cumulative impact would have arisen, for example at Site O5A. A small amount of Coillte felling did occur in SC7(b) between 2000 and 2005. However, any cumulative impact would have been completely masked by the 2003 peat slide in the same catchment. During the same period no off-site felling took place in sub catchment SC7(a), so no cumulative impact would have arisen. In SC6, although there was extensive Coillte off-site felling, there was very little in that portion of the wind farm site, therefore again, effectively no cumulative impact would have occurred. In SC5 in the Duniry catchment, while there was a significant amount of Coillte off-site felling between 2000-2005, within the same window there was only a tiny portion of felling in the NE corner of the wind farm, therefore any cumulative impact would have been negligible. There was

no Coillte off-site felling in SC3 and SC4 between 2000 and 2005 and while there was around 19ha felled in SC2 in the same period, an examination of the OSI aerial photo for 2005 indicates that it occurred at least one year but probably more, prior to the on-site felling within the same sub catchment, so that any cumulative impact would have been slight to moderate locally, persisting for at most one to two years and taking the form of a drop in ecological status from High status to Good status at B2, an effect unlikely to have persisted for more than one or two years. This can be described as a slight, negative impact of localised and temporary to short-term duration. SC1, which is the largest of the sub catchments draining the wind farm, registered a large area of off-site felling in the period 2000-2005 including a significant amount that would have coincided with the on-site felling. It is likely therefore that some cumulative effects would have occurred at the time, which would most likely have resulted in a slight drop in Q-ratings at B4. From EPA data it can be seen however, that immediately downstream on the main channel of the Boleyneendorrish that High Status (Q4-5) was maintained at the time (Table 7-11, Section 7.3.4), so that any cumulative impact that may have occurred owing to indirect water quality effects (nutrient, suspended solids) would have been confined to the smaller tributaries, and if they did occur they were slight to moderate negative, localised, and temporary to short-term in duration.

The effects of turbulence felling at Derrybrien Wind Farm (2016-2018) were described above (Section 7.4.3.1) which showed that the indirect impact on downstream water quality was slight negative and temporary with effects confined to the smaller headwater tributaries in terms of temporary decline in biological water quality. There was no impact on water quality and macroinvertebrate communities of the main channel sites of the Owendalulleegh and Boleyneendoorish rivers, which have both maintained high status (Q5/Q4-5) since at least 2009 to the present.

7.4.7.1.4 *Compensation Planting in Lieu of Felling on Wind Farm Site*

Coillte planted forestry in Counties Roscommon and Tipperary to compensate for construction phase forestry fell on the Derrybrien Wind Farm site. These comprised six planting areas, three in Co. Roscommon in the Upper River Shannon Catchment and three in Co. Tipperary in the Lower Shannon Catchment. Those in the Upper Shannon Catchment are not situated in a water-based SAC, nor are they close enough to any downstream. The Co. Tipperary sites are either in or very close to the Lower Shannon SAC. Neither set of plantings can have any cumulative impacts on the Derrybrien Wind Farm project. The Roscommon sites are more than 128 km upstream of the northern end of the Lough Derg (Shannon) Special Protection Area (SPA) (004058) and 135 km upstream of where the Duniry River reaches North East Shore Lough Derg SAC (002241), as well as 185 km upstream of where the Bleach River eventually joins the Lower Shannon in Lough Derg. The Co. Tipperary sites in the Bilboa River catchment discharge to the Lower River Shannon via the Mulkear River which at that point is more than 35 km downstream of where the Bleach River (Lough Atorick catchment) eventually joins Lough Derg near Scarriff and 53km downstream of where the Duniry River eventually joins the Lough Derg NE Shore SAC, and 19 km downstream of the Lough Derg (Shannon) SPA (004058). Thus, while all the sites are connected eventually to the River Shannon catchment, they are all too far from each other to possibly have a cumulative effect.

All the Co. Roscommon plantings (Table 7-23) are on or adjoining 1st order streams and two flow into channels that have been extensively drained/straightened downstream (Oldtown and Brackloon). Moreover, one of the plantings, Ardcocoran, is almost 3.8 km from the 1st order channel that it most likely eventually drains to. The drains around that plot seem to blind-end after short distances and it's difficult to be certain the direction of eventual flow but based on contours on the OSI Discovery series maps and EPA online mapping, it seems to be into Lough Gara in Co. Sligo. All three plantings are on mineral soils so the risk of phosphorus leaching in relation to planting is likely to have been low. Moreover, the flat terrain reduced the risk of solids erosion also. Overall impact from these works is assessed as having been imperceptible or slight in terms of water quality and imperceptible in terms of fisheries.

Two of the three Co. Tipperary plantings (Folimahonmore and Coonmore) are either bordering (Folimahonmore) or partly overlapping with the Lower Shannon SAC boundary (Coonmore), while the Knocknabansha plot is 2.4 km upstream of the SAC boundary. The Lower Shannon SAC is designated for the Annex II species freshwater pearl mussel (*Margaritifera margaritifera*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*), otter (*Lutra lutra*) and Atlantic salmon (*Salmo salar*). Of these, the pearl mussel doesn't occur in the Bilboa and it is less likely that either river lamprey or the sea lamprey occur that far up the system or are scarce there due to barriers to migration further downstream. Salmon are the most plentiful Annex II species in the main channel of the Bilboa adjoining the Coonmore forestry plots, with brook lamprey also likely to occur. Salmon are almost certainly absent from the 1st order stream adjoining the other two plots, but brook lamprey could be present.

Knocknabansha and Folimahanmore plantings are adjoining or bordering 1st order streams, while the Coonmore planting (both plots) are bordering a 4th order river (the Bilboa) one set back 10-15m from the edge the other with a 35m broadleaf edge. One of the Coonmore plots (the larger one) has 20% of its area over blanket peat, which would have resulted in increased leaching of soluble phosphorus if fertilisation occurred during planting time. However, the fact that any drainage arising would have entered a 4th order channel, means that it would have had minimal impact on the ecology of that channel, which was High Status at the time. The first order stream bordering Folimahonmore plot flowed a further 0.25km to join a second order stream which flowed a further 0.31 km to reach the main 4th order channel of the Bilboa, 0.7 km upstream of the smaller and more upstream Coonmore plot. It would have had no negative impact on the main channel of the Bilboa and no more than imperceptible to slight impacts on the water quality of the two lower order streams given that there was only a low risk of phosphorus leaching during the planting, as the soils are mineral. The Knocknabansha re-planting is over 90% mineral soil and 10% blanket peat. The 1st order stream within the site was Poor Status (Q3) (see Table 7-23) before the planting and the adjoining 1st order stream was Moderate Quality (Q3-4), so any impact arising would be expected to have been slight at worst and more likely would have been masked by the existing impaired quality. It would have had no negative impact on the SAC, a further 2.2 km downstream.

Table 7-23 Coillte Compensation Planting Areas Roscommon and Tipperary - associated SAC, water quality and potential impact evaluation

Townland	Nearest Stream	Proximity to SAC	Q-Value	Aquatic Impacts
Ardcorcoran	Upper Shannon Catchment. Unnamed 1st order stream, 3.8km to the west. RWB code: IE_SH_26B080100. Segment Code:26_3726 EPA. Name: Ardolana	No water-based SACs (flows to Lough Gara, Co. Sligo)	None evaluated	No nearby drainage except forestry and land drains
Oldtown	1st order stream. Head of River Bella catchment – marks northern boundary. RWB code: IE_SH_26B090300 (Segment code: 26_1213)	No water-based SACs (flows to Lough Gara, Co. Sligo)	4.9km d/s Derryragh Bridge (drained 2nd order stream) EPA code: RS26B020400 1992 (Q4), 2017 (Q3-4), 2023 (Q4)	Imperceptible negative impact on this 1st order stream with most of the site very flat and to the south of the stream. Low opportunity for solids run-off and very low risk of phosphorus leaching from mineral soils.

Townland	Nearest Stream	Proximity to SAC	Q-Value	Aquatic Impacts
				Downstream site currently Q4 (Good), meets WFD objective
Brackloon	Unnamed 1st order stream. RWB code: IE_SH_26B090300 (Segment code: 26_2279)	No water-based SACs (flows to Lough Gara, Co. Sligo)	Nearest Q-rating station = 2.3km downstream in an area of very dense forestry and extensive turf cutting. Station name = 100m u/s Breedoge confl. EPA Code: RS26O040200: 1999 (Q4), 2002 (Q4-5), 2005 (Q4), 2008 (Q4), 2011 (Q3), 2023 (Q4).	Imperceptible to slight negative impact on this 1st order stream. Low risk of solids run-off and very low risk of phosphorus leaching from mineral soils on low gradient site. Good or high-status d/s around time of planting, deteriorating later (unlikely associated with planting) - currently Good (Q4)
Knocknabansha	Unnamed (1st order), RWB code: IE_SH_25B030800	2.2km u/s of Lower Shannon SAC	Station: Br SE of Loughbrack. EPA Code: RS25B030004. (1st order stream - Q3 in 1999	Imperceptible negative impact on this tiny, sluggish drainage network. No effects on SAC qualifying interests. Water quality already Poor to Moderate at the time. Fluctuating Good to Moderate status since, at nearest downstream monitoring station
			Station: Bridge in Kilcommon, EPA Site Code: RS25B030010. 2nd order stream 4.5km d/s: 1999 (Q3-4), 2002 (Q3-4), 2005 (Q4), 2018 (Q3-4), 2023 (Q3-4)	
Foilmahonmore	Unnamed (1st order) RWB code: IE_SH_25B030080 (Segment Code: 25_2577)	Directly adjoining Lower Shannon SAC	Nearest station: Bilboa - SE of Cappaharoe (3.2km d/s) 4th order. EPA Code:RS25B030050. 1996 (Q4-5).	Imperceptible to slight negative impact on water quality in adjoining 1st order stream. No impact on SAC qualifying interests. Water quality consistently High status in the relevant before and after the planting period at downstream stations
			Next station (11.4km d/s) = Br u/s Blackboy Bridge (5th order river) EPA Code: RS25B030080. 1999 (Q5), 2005 (Q4-5), 2018 (Q4-5), 2021 (Q4)	
Coonmore (Large Compartment 24.3 ha)	Bilboa River (4th order) RWB Code IE_SH_25B030080	Directly adjoining Lower	Nearest station: Bilboa - SE of Cappaharoe (0.86km d/s) 4th order. EPA Code: RS25B030050. 1996 (Q4-5).	Imperceptible negative impact. large 4th order river network. No effects

Townland	Nearest Stream	Proximity to SAC	Q-Value	Aquatic Impacts
	(Segment code: 25_1922)	Shannon SAC	Next station (9.1km d/s) = Br u/s Blackboy Bridge (5th order river) EPA Code: RS25B030080. 1999 (Q5), 2005 (Q4-5), 2018 (Q4-5), 2021 (Q4) IFI Recorded high densities of salmon at this station in 2009	on SAC qualifying interests. Water quality consistently High status before and after the relevant planting period.
Coonmore (Small compartment 14.26ha)	Bilboa River (4th order) RWB Code: IE_SH_25B030080. Segment code: 25_1910	Directly adjoining Lower Shannon SAC	Nearest station: Bilboa - SE of Cappaharoe (1.5 d/s) EPA Code: RS25B030050: 1996 (Q4-5) 4th order. Next station (9.7km d/s) = Br u/s Blackboy Bridge (5th order river) EPA Code: RS25B030080. 1999 (Q5), 2005 (Q4-5), 2018 (Q4-5), 2021 (Q4) IFI Recorded high densities of salmon at this station in 2009	Imperceptible negative impact on this large 4th order river. network. No effects on SAC qualifying interests. Water quality consistently High status before and after planting

7.4.7.1.5 *Overhead Transmission Lines*

Moneypoint - Oldstreet 400kV OHL

This line was constructed prior to the Derrybrien Project so that no cumulative impact could have occurred during construction. The ground below the line had to be lowered between structure 28A and 29 to facilitate the stringing of the Derrybrien – Agannygal 110kV OHL which required localised earth movements. This is addressed in Construction Phase Effects Section 7.4.2.3 (OHL & Agannygal Substation and associated works). The line was refurbished in 2020 and 2021 when the structures will be repaired and repainted. The concrete shear blocks, which are the above-ground concrete structures holding the feet of the pylons, will be re-capped, the structure foundations will not be touched. The two structures nearest the OHL corridor are 120 m and 280 m respectively away from the small stream that drains to the Owendalulleegh River from the central part of the OHL corridor. Moreover, they are readily accessible from nearby forest tracks which minimised potential for ground damage causes by tracking of works vehicles. Overall, the likelihood is that this operation had a neutral to imperceptible negative impact on surface waters and no cumulative impacts with the Derrybrien Project.

Ennis – Shannonbridge 110 kV Line

Ennis - Shannonbridge line was installed in 1952 with some further structures installed in 1968. The Derrybrien Wind Farm Project connected into this line. Specifically, the construction of Agannygal Substation resulted in the line being split into two circuits: Agannygal - Shannonbridge (Galway West) and Agannygal - Ennis (Galway West).

Agannygal Substation with its control room in a palisade fenced compound and all associated works and services connecting into National Grid on the Ennis- Shannonbridge (Galway West) 110kV line, including removal of approximately 1.3 km of pre-existing conductor on the pre-existing Ennis-Shannonbridge line and replacement with 2 spans emanating from Agannygal Substation comprising: End mast and Agannygal-Shannonbridge line span (approximate length 0.7 km): End mast and

Agannygal-Ennis line span (approximate length 0.6 km). These works would have been integral to the construction of the Agannygal Substation and therefore the cumulative impacts would be the same as the construction impacts described under the heading Installation of Structures in Section 7.4.2.3 (Construction Phase: 2003-2006).

Ennis-Shannonbridge Line Reinstatement

When the Derrybrien-Agannygal 110kV OHL is ultimately removed, reinstatement of the Ennis-Shannonbridge 110kV Overhead Line will be required, involving 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 utilised 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 the work would take less than a month to undertake. These activities have the potential to cause some localised ground damage in and around the affected structures. However, this will be a diffuse impact in the main and given the paucity of surface water drainage channels in the area is likely to have a worst, a slight, negative and temporary impact on the water quality in small drains between the Agannygal Substation and Lough Atorick, with no effects at all on water-based SAC's farther downstream (Lower Shannon SAC and Lough Derg SPA) by virtue of the great intervening distances involved.

7.4.7.1.6 *Sand Extraction at Cloghvoley*

Planning permission was granted for a sand extraction site (GCC Ref. Ref. 08/1664) located at Cloghvoley 4.5 km to the south-east of the Project in May 2008 after the Derrybrien Project was constructed. On inspection of the planning files, there is no indication that there was historic activity that could have coincided with the construction stages of the Derrybrien Wind Farm Project. The quarry is within the catchment of the very upper reaches of the main channel of the Owendalulleegh River about 4 km upstream of Site O7C. However, there is no direct stream or drain connection between the quarry and the river. Even if the assessment allows for the possibility of some suspended solids contamination, for example in overflow water from the quarry during times of very heavy rainfall, the significant distance between it and the nearest point in the Owendalulleegh River which receives drainage from the wind farm i.e. at the base of SC6, i.e. 2.5 km downstream, would indicate that there was no cumulative impact between the two projects. Furthermore, the Owendalulleegh River has maintained high status (Q5/Q4-5) since 2009 to the present indicating no negative cumulative effects of sand extraction at Cloghvoley.

7.4.7.1.7 *Quarry at Ballynakill*

Ballinakill Quarry is operated by Ballinakill Quarries Ltd at Cregg on the R353. The quarry was registered under Section 261 of the Planning and Development Act 2000 (as amended) ((ref QY 6). In October 2013, An Bórd Pleanála granted a substitute consent for works and operations undertaken prior to August 2012 (Ref. 07.SU0038). Planning permission was granted in December 2018 for the quarry extension (GCC Ref:18/687). An examination of the EIS for the project indicates that the quarry is within the drainage area of the Ballinlough Stream (River Waterbody Code: IE_SH_25B150300) draining ultimately to Lough Derg in the River Shannon catchment. Only a very small portion of the northeastern corner of the wind farm, covering ~0.6 % of its entire area drains via the Duniry River towards Lough Derg. This low drainage contribution, combined with the very large distance between the wind farm and Lough Derg would indicate that there was no cumulative effects between the wind farm project and the Ballynakill Quarry development.

7.4.7.1.8 *Coillte Quarry*

There is a registered quarry just east of the junction between the R353 and Black Road, to the south-east of the Derrybrien Wind Farm site. The reference number for the site is QRY62 and this is a quarry that was accepted as being post-1964 but without the benefit of planning. Documents in relation to quarry registration were submitted to GCC in April 2005 by Coillte, the site owners. It is a relatively small (1.8 ha aggregate quarry with an extraction area of 1.3 ha), the aggregate being used for forest road repairs. The area where the quarry is situated shows no surface drainage channels on historical 6 inch:1mile map for the area nor is there any indication from aerial photos of the area. The downslope over-ground distance between the quarry and the nearest stream, SC7(a) between sites O3 and O6A, is just over 500 m through forestry and damp grassland/blanket peat. Given that the material being quarried was predominantly coarse, the likelihood of any suspended solids from the site reaching any of the wind farm drainage streams is considered to have been extremely low. For that reason, it is considered extremely unlikely that there would have been any significant cumulative effects between the quarry and the wind farm project.

7.4.7.1.9 *Works to Beagh Bridge*

The privately owned four-span Beagh Bridge at the outlet of Lough Cutra underwent a structural assessment by ESBI in August 2004. This followed on from the temporary erection of straw bale filter barriers on the upstream face of the bridge in the aftermath of the peat slide to capture and filter any suspended sediment that may have transported from the peat slide area. Evidence of damage and deterioration to two of the three intermediate piers was highlighted although it was deemed by ESBI engineers at the time that the peat slide most likely could not have caused or contributed to this damage. ESBI recommended in their assessment report that all river flow be diverted away from these piers. The recommendations were addressed in January 2005 and left the pier foundations in what was deemed by ESBI as being in better condition than prior to the initial assessment. Given the nature and scale of the remedial works at Beagh Bridge and the fact that they were undertaken in 2005, the potential for cumulative impacts with the wind farm project is considered neutral.

7.4.7.2 Potential Future Cumulative Effects

7.4.7.2.1 *Cumulative Effects of Prospective Development*

The Prospective Development, with all recommended mitigation measures implemented, will have slightly negative, temporary and not significant effects on biological water quality and fisheries - confined, if/where they do occur, within localised upper reaches of small tributaries, but with neutral effects on high ecological status of the main receiving rivers: Owendalulleegh and Boleyneendoorish. There will be imperceptible to neutral effects on the Duniry and Lough Atorick / Bleach catchment streams.

Effects on water quality, aquatic habitats and fish arising from the proposed decommissioning phase of the Project (the 'Prospective Development') are dealt with comprehensively in the accompanying Environmental Impact Assessment Report (EIAR) for the Derrybrien Wind Farm Development Decommissioning Project. The Prospective Development EIAR identified potential effects on the aquatic environment, 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 has been reduced through mitigation measures set out in Chapter 7, Section 7.4.2 of the EIAR for the Prospective Development. Of importance during the Prospective

Development is careful adherence to the proposed methods and mitigation for access routes for the decommissioning of 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 (2) the route involving fording of the Owendalulleegh from the south to access polesets 23 and 25 and angle mast 24.

It is important to note that the decommissioning proposal, as prescribed in the EIAR for the Prospective Development, 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. The latter would require extensive excavation, earth movement, soil redistribution and reinstatement that could, under a worst case scenario, such as the peat slide that occurred during construction of these elements in October 2003, give rise to profound and very significant negative effects on water quality, macroinvertebrates and fish populations and overall waterbody status in either or both of the Owendalulleegh and Bolyneedoorish which are the main receiving catchments.

7.4.7.2.2 Cumulative Effects of Retained Development

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 7.3.4 and Table 7-11 and Table 7-12), which demonstrate that land-use activity, including the windfarm, the OHL and the substations 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. Accordingly, any cumulative impacts that may arise from the Retained Development, after the Prospective Development (decommissioning) is complete would be expected to have a permanent neutral or slightly positive effect on water quality or fisheries into the future.

7.5 Monitoring

During the Prospective Development and for a period of 2 years after its completion, Q-value monitoring will be undertaken annually during the May to September period at the following sites on the tributaries and rivers of Owendalulleegh and Boleyneendoorish catchments (as the principal drainage catchments for the Project): Sites O1, O3A, O5, O5A, O7C, O7, O10, B3, B4, B5, OHL1.

Electrofishing surveys will be conducted at Sites O5, O5A and O6 in the year that the Prospective Development commences and again on one occasion in the 2-year period following its completion. This will add to the body of fisheries data for the SC7 sub catchment that was affected by the 2003 peat slide and has several fish migration barriers (natural rock outcrops and Forestry Culvert) that are of concern to IFI but are unrelated to the project.

7.6 Conclusion

The slight negative effects arising from the construction of the Derrybrien Wind Farm and the installation of the 7.8 km OHL and Agannygal Substation took the form of diffuse suspended solid loss owing to ground damage associated with excavations and construction traffic movements and with nutrient loss from tree felling on upland blanket peat. The main impacts from these activities were confined to the small headwater streams draining the wind farm site itself and took the form of a **slight negative, not significant, temporary to short term, reversible** effect on biological water quality locally, all of which was likely to have reversed within 12 to 24 months of the wind farm's commissioning in 2006. These impacts would not have given rise (on their own) to any decline in the ecological status of the main channels of the rivers draining the site, namely the Owendalulleegh, Boleyneendorrish and

main channels of the rivers draining the site, namely the Owendalulleegh, Boleyneendorrish and Duniry rivers. Moreover, they would have had no negative impact on the ecological status of Lough Cutra.

Notwithstanding the above, the occurrence of a large peat slide in late 2003, combined with the associated on- and off-site remedial measures to control it, had **very significant to profound, short-term, negative, and reversible** impacts on the riverine habitats all along the SC7(b) and SC7(d) channel from the wind farm as far as the confluence with the main channel of the Owendalulleegh and for the first 1-2 km or so of that channel below the confluence of SC7. Beyond that point, in effect for most of the remaining 16 to 17 km of the main channel of the Owendalulleegh, the impact on the riverine habitats can be described as **moderate, negative, short term and reversible** because their physical nature was not appreciably altered and the main physical damage was caused to instream aquatic plants (mainly aquatic liverworts and mosses) and owing to the build-up of peat silt and woody debris as well as increased levels of sand in slower flowing stretches. These latter effects were reported at the time to clearly diminish with distance downstream, until close to the outlet to Lough Cutra they were barely perceptible. In terms of water quality, the impact of the 2003 peat slide on the SC7(b) and SC7(d) tributaries can be described as **profound negative, short term and reversible**, while those on the main channel of the Owendalulleegh as being **significant to very significant, negative, short-term and reversible**. As reported at the time, the peat slide led to a very large fish kill involving 6 species and was particularly detrimental in terms of numbers of brown trout and stone loach. This impact can be described as **very significant to profound, negative and short-term** but has proved from repeated electrofishing results for the current study (conducted between 2011 and 2022) to be reversible. The impact is therefore classified as 'short-term' because it is likely that the population would have fully recovered within 6-7 years at most, assisted by immigration of fish from unaffected side tributaries and from the main channel of the Owendalulleegh upstream of the confluence of SC7 where the full range of age classes would have been present in late October 2003. Older trout from Lough Cutra running up the Owendalulleegh in subsequent years to spawn may also have contributed to the recovery. Stone loach are likely to have recovered first, probably within 2-3 years, then trout within 3-5 and probably lamprey last, 6-7 years due to the longer growth period of their larval stages. Eel, which do not reproduce in fresh waters would have been replaced through immigration from the marine environment, which would occur annually.

The ongoing operation of the wind farm and the OHL (2006-2022) followed by the ceased operation phase (2022 to present) has had no significant negative impacts on the surface receiving waters, with any impacts occurring being **slightly negative, temporary and not significant** and confined, if/where they did occur, to the upper reaches of small tributaries, primarily in relation to small amounts of site maintenance and turbulence felling.

Furthermore, throughout the operation and ceased operation phases, there has been a **long-term neutral** effect on biological water quality of the main receiving rivers: Owendalulleegh and Boleyneendoorish, with high status (Q5/Q4-5) maintained on both channels throughout these phases of the Project, providing evidence of the benign nature of the presence of the Project between 2009 and 2024 in terms of ecological status of waterbodies.

Similarly, the Prospective Development, with all recommended mitigation measures implemented, will have **slightly negative, temporary and not significant** effects on biological water quality and fisheries that are likely to be confined, if/where they do occur, to localised upper reaches of small tributaries, but with **neutral** effects on high ecological status of the main receiving rivers: Owendalulleegh and Boleyneendoorish. With their very small drainage proportion, there will be imperceptible to neutral effects on the Duniry and Lough Atorick / Bleach catchment streams.

The effect of the retained elements, including those associated with the windfarm, OHL, substations and off-site features (associated with the 2003 peat slide) will mainly be **permanent neutral to slightly**

positive as they do not represent significant sources of deleterious emissions to surface waters and will (and have) become gradually naturalised into the residual environment further reducing suspended solids export from the site as well as gradually increasing amelioration of peak flows from the Project area as the site revegetates into the future. Regarding Barrages 3 and 4, at worst a permanent or **long-term imperceptible, not significant negative** effect is predicted in terms of slightly reduced sediment supply locally in Derrybrien North tributary SC7(b) and SC7(d) (impoundment effect) with no significant impact arising on fisheries (habitat or numbers) of these sub catchments or the Owendalulleegh catchment as a whole. This is because there are existing fish passage barriers that already prevent fish (other than eels) reaching these structures in the first instance, i.e., repeated electrofishing surveys have proven that fish do not access even as far as Flaggy Bridge, which is ~350m downstream of Barrage 4 and ~550m downstream of Barrage 3.