PROPOSED FIRLOUGH WIND FARM

AND GREEN HYDROGEN PLANT

SCREENING FOR APPROPRIATE ASSESSMENT

AND

NATURA IMPACT STATEMENT

JUNE 2023

Prepared for

Mercury Renewables (Carrowleagh) Ltd.

by

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1 INTRODUCTION

BioSphere Environmental Services has been appointed by Mercury Renewables (Carrowleagh) Limited to prepare a report to inform screening for appropriate assessment and a Natura Impact Statement (NIS) for the proposed Firlough Wind Farm and Hydrogen Plant project in Counties Mayo and Sligo (the "**Project**"). For a full description of the Project please refer to **Chapter 2: Project Description** of EIAR.

The purpose of the report is to provide the information required to assist the competent planning authority to conduct an Article 6(3) Screening for Appropriate Assessment of the proposed Development and, if considered necessary, an Appropriate Assessment (AA).

Based on best available scientific knowledge, the potential impacts on European sites, both as a result of the Project alone, and in-combination with other plans and projects, are appraised in this report.

The requirements for "Appropriate Assessment" are set out *under Article 6 of the EU Habitats Directive (92/34/EEC)*, transposed into Irish law through the *European Union (Birds and Natural Habitats) Regulations 2011-2015* and the *Planning and Development Act, 2000* (as amended).

The assessment in this report is based on a desk study and various field surveys undertaken in period 2019 to 2023.

1.1 Regulatory Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna, better known as "The Habitats Directive", provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC) (better known as "The Birds Directive").

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (see below).

> "*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public"*

This provision has been implemented in the context of the planning code under article 177V of the Planning and Development Act, 2000, as amended.

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First the project should aim to avoid any negative impacts on the integrity of any European sites by identifying possible impacts early in the planning stage, and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point, where no adverse impacts on the integrity of any European sites remain. If the project is still likely to adversely affect the integrity of a European site, and no further practicable mitigation is possible, then project may only proceed if no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, in which case compensation measures are required to offset any remaining adverse effect.

1.2 Stages of the Appropriate Assessment Process

This Appropriate Assessment Report / Natura Impact Statement has been prepared in accordance with the following guidance:

- *Appropriate Assessment of Plans and Projects in Ireland.* Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government, 2010 revision;
- *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. European Commission Environment DG, 2021;
- *Managing Natura 2000 sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC.* Guidance issued by European Commission (21st November 2018).
- *Assessment of Plans and Projects in relation to Natura 2000 sites – (Revised) Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* Guidance issued by European Commission (28.9.2021 C(2021) 6913 final)
- *ANNEX to the Commission notice to the Assessment of Plans and Projects in relation to Natura 2000 sites – (Revised) Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC : Examples of Practices, Case Studies, Methods and National Guidance.* Issued by European Commission (28.9.2021 C(2021) 6913 final)
- OPR Practice Note PN01 Appropriate Assessment Screening for Development Management. March 2021.

There are up to four successive stages involved in the Appropriate Assessment process. The outcome at each stage determines whether the next stage in the process is required. The following describes each of the four stages:

Stage 1 – Screening

The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, alone and in-combination with other plans or projects, is likely to have significant effects on a Natura 2000 site in view of the site's conservation objectives.

There is no necessity to establish such an effect; it is merely necessary for the competent authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of Appropriate Assessment (AA) has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that are not likely to have a significant effect on a European site may be excluded from further assessment. The threshold at this first stage is a very low one and operates as a trigger in order to determine whether a Stage Two AA must be undertaken by the competent authority on the implications of the proposed development for the conservation objectives of a European site. Therefore, where significant effects are likely, uncertain or unknown at screening stage, a second stage AA will be required.

Stage 2 – Appropriate Assessment

A Stage Two AA is a focused and detailed examination, analysis and evaluation carried out by the competent authority (in this case, An Bord Pleanála) of the implications of the plan or project, alone and in-combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. Case law has established that such an Appropriate Assessment, to be lawfully conducted, in summary:

(i) must identify, in the light of the best scientific knowledge in the field, all aspects of the proposed development which can, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;

(ii) must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and

(iii) may only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of the identified potential effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three and, if necessary, stage four.

Stage 3 – Assessment of Alternatives

This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site.

Stage 4 – Imperative Reasons of Overriding Public Interest (IROPI)

This is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest [IROPI] for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage.

1.3 Statement of Authority and Project Team

This report was prepared by Dr Brian Madden and is informed by the ecological survey data and relevant technical reports which accompany the planning application and a comprehensive literature review.

Brian Madden (BA. Mod. Hons., Ph.D., MCIEEM) qualified in Natural Sciences from Trinity College Dublin in the early 1980s and earned a doctorate degree from the National University of Ireland in 1990 for research in peatland ecosystem processes. Brian has worked on a wide range of wind farm and energy related projects since the late 1990s, from the planning stage through to construction and post-construction monitoring. Examples of projects include Oweninny Wind Farm Phase 1 & Phase 2, Co. Mayo, Grousemount Wind Farm, Cos. Cork/Kerry, Castlepook Wind Farm, Co. Cork, Letteragh Wind Farm, Co. Clare, Eglish Wind Farm, Co Tyrone, and Carrickatane Wind Farm, Co. Derry.

The ecological surveyors and their role in the Firlough project are listed in Table 1 below.

Table 1: Personnel involved in Ecological Assessment for Project.

Project Team Member	Qualifications / Expertise	Role
Dr Brian Madden	BA. Mod. Hons., Ph.D., MCIEEM	Overall preparation of Chapter 5 Biodiversity and Chapter 7: Ornithology for EIAR. Habitat and Ornithological surveys
EirEco Environmental Consultants – Paul Murphy	MSc Environmental Science Diploma in Aquatic Biology, CEnv MCIEEM, Member of the Institute of Fisheries Management.	Aquatic field surveys and prepared Chapter 6: Aquatic Ecology chapter of EIAR.
Dr John Conaghan, Enviroscope Environmental Consultancy	BSc., PhD, MCIEEM	Habitat and flora surveys and baseline reporting
Mr John Curtin	BSc in Environmental Science, NUI Galway.	John carried out bat surveys at the project site and prepared the bat assessment for the Chapter 5: Biodiversity chapter of EIAR.

1.4 Data Sources to Carry Out Assessment

The assessment is supported by the following sources of data and information, including chapters of the accompanying EIAR:

- Review of relevant environmental databases including National Biodiversity Ireland Database

- Review of NPWS Site Synopses & Conservation Objectives for relevant European sites
- Review of NPWS (2019) The Status of EU Protected Habitats and Species in Ireland report
- Review of online web-mappers: National Parks and Wildlife Service (NPWS) & EPA
- Review of OS map and aerial photographs of the site and surroundings of the proposed project
- Review of other plans and projects within the area
- EIAR Chapter 2. Project Description prepared by Jennings O'Donovan
- EIAR Chapter 5. Terrestrial Ecology prepared by BioSphere Environmental Services
- EIAR Chapter 6. Aquatic Ecology prepared by EirEco
- EIAR Chapter 7. Ornithology prepared by BioSphere Environmental Services
- EIAR Chapter 8. Soils and Geology prepared by RSK Consultants
- EIAR Chapter 9. Hydrology and Hydrogeology prepared by RSK Consultants
- EIAR Volume IV (Appendix 2.1): Construction Environmental Management Plan (CEMP) prepared by Jennings O'Donovan
- EIAR Volume IV (Appendix 2.2): A Grid Route Assessment report and accompanying drawings prepared by TLI Group.

2 SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site;
2. Whether it is possible that the project may have a significant effect on a Natura 2000 site, either alone or in combination with other projects or plans, in view of the site's conservation objectives.

Screening involves the following:

i. Description of plan or project;
ii. Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives;
iii. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary;
iv. Screening Statement with conclusions.

2.1 Site Description

The Proposed Development associated with the Project is primarily located on two distinct sites which for the purposes of this AA Screening report and NIS are referred to as the Wind Farm Site and the Hydrogen Plant Site.

The site for the proposed Firlough Wind Farm is situated in the townland of Carrowleagh, northeast of the village of Bunnyconnellan, Co. Mayo, Irish Grid Reference (ITM): 536617, 821819 (see Figure 1). The site occupies an area of approximately 424 ha. The site for the proposed Hydrogen Plant is located in a rural setting and has an area of c. 6.5 ha, located in County Sligo in the townland of Carraun, adjacent to the Co. Mayo border. The Hydrogen Plant Site is situated approximately 6 km west of the Wind Farm Site. An underground 110 kV interconnector cable will connect the Wind Farm Substation to the Hydrogen Plant Substation.

The Wind Farm Site is situated within the lower north-western foothills of the Ox Mountains, adjacent to the county boundary between Mayo and Sligo. This is a landscape dominated by blanket bog and heath (of varying intactness and quality), commercial forestry and agricultural land mainly used for stock grazing. There are a number of established wind farms in the vicinity, including Carrowleagh Wind Farm and Carrowleagh Wind Farm Extension directly to the east / north-east, Black Lough Wind Farm (2.4 km north-east) and Bunnyconnellan Wind Farm (5 km south).

The Wind Farm Site elevations range from 120 m O.D. in the north-west to up to c.170 m O.D. in the south-east. The topography of the site is generally flat.

The mapped geological formation underlying both the Wind Farm Site and the Hydrogen Plant Site is classified as the Ballina Limestone Formation (Lower), which is comprised of Dark fine-grained limestone and shale (for full details see **Chapter 8: Soils and Geology** of EIAR). The primary soil type across the Wind Farm Site is blanket peat, much of which has been subject to turbary. Peat depth is generally shallow though localised pockets of deeper peat (up to 4 m) occur in places. Land underling the Hydrogen Plant Site is comprised of Peat Bog, though the site itself has been converted to pastoral land. Directly south of the proposed Hydrogen Plant Site, there is a remnant bog with peat depths ranging to a maximum of 1.9 m.

The Wind Farm Site is situated within both the Moy Catchment (Catchment ID: 34_01), which has an area of 2,110.72 km^2, and the Easky-Dunneil-Coastal Catchment (Catchment ID: 35_03), with an area of 359.52 km^2. Surface water runoff associated with the Wind Farm Site drain into two sub-catchments and/or three river sub-basins, or four no. rivers:

- Sub Catchment: Glenree_SC_010; River Sub Basins: Brusna (North Mayo)_020; Brusna (North Mayo)_010; and Glenree_020
- Sub Catchment: Easky_SC_010; River Sub Basin; Gowlan (Sligo)_010

Surface waters draining to the west of the Wind Farm Site eventually combine in the Moy River, from which waters eventually flow to Killala Bay and into the North Atlantic Ocean. Surface waters draining the eastern sector of the Wind Farm Site join the Easky River, which flows directly to the North Atlantic Ocean.

The site for the Hydrogen Plant drains to the Dooyeaghny River, which flows westwards and enters the River Moy Estuary at Castleconor.

The Hydrogen Plant Site is situated within the Moy Catchment, Surface water runoff associated with this element of the Project drain into one sub catchment and/or one river sub-basin, or 1 no. river;

- Sub Catchment: Leaffony_SC_010;
- River Sub Basins: Dooyeaghny_010, Cloonloughan_010

Ecologically, the Wind Farm Site is dominated by Cutover blanket bog (PB4 of Fossitt 2000). Peat cutting is ongoing and there is a network of established gravel bog tracks throughout the site. There are areas of uncut high bog remaining throughout the site, which are classified as Lowland blanket bog (PB3). Wet heath (HH3) has developed in cutover bog which has not been disturbed in recent decades. Other habitats which occur over small areas are Scrub (WS1), Conifer plantation (WD4) and Wet grassland (GS4) (latter two habitats confined to the access area in the westernmost sector of site. The Hydrogen Plant Site comprises Improved agricultural grassland (GA1). The Grid Connection Route and Interconnector Route are almost entirely along public roads. The roads typically are lined with low hedgerows (WL1) and grassy verges (GS2). The location of the loop-in with the existing overhead line is within an improved grassland field.

The options for the Turbines Delivery Routes, from the port of Killybegs, Co. Donegal and from Galway Port, Co. Galway, are along existing public roads (BL3).

A full description of the Habitats, Flora and Fauna associated with the Project is presented in **Chapter 5** of the accompanying EIAR.

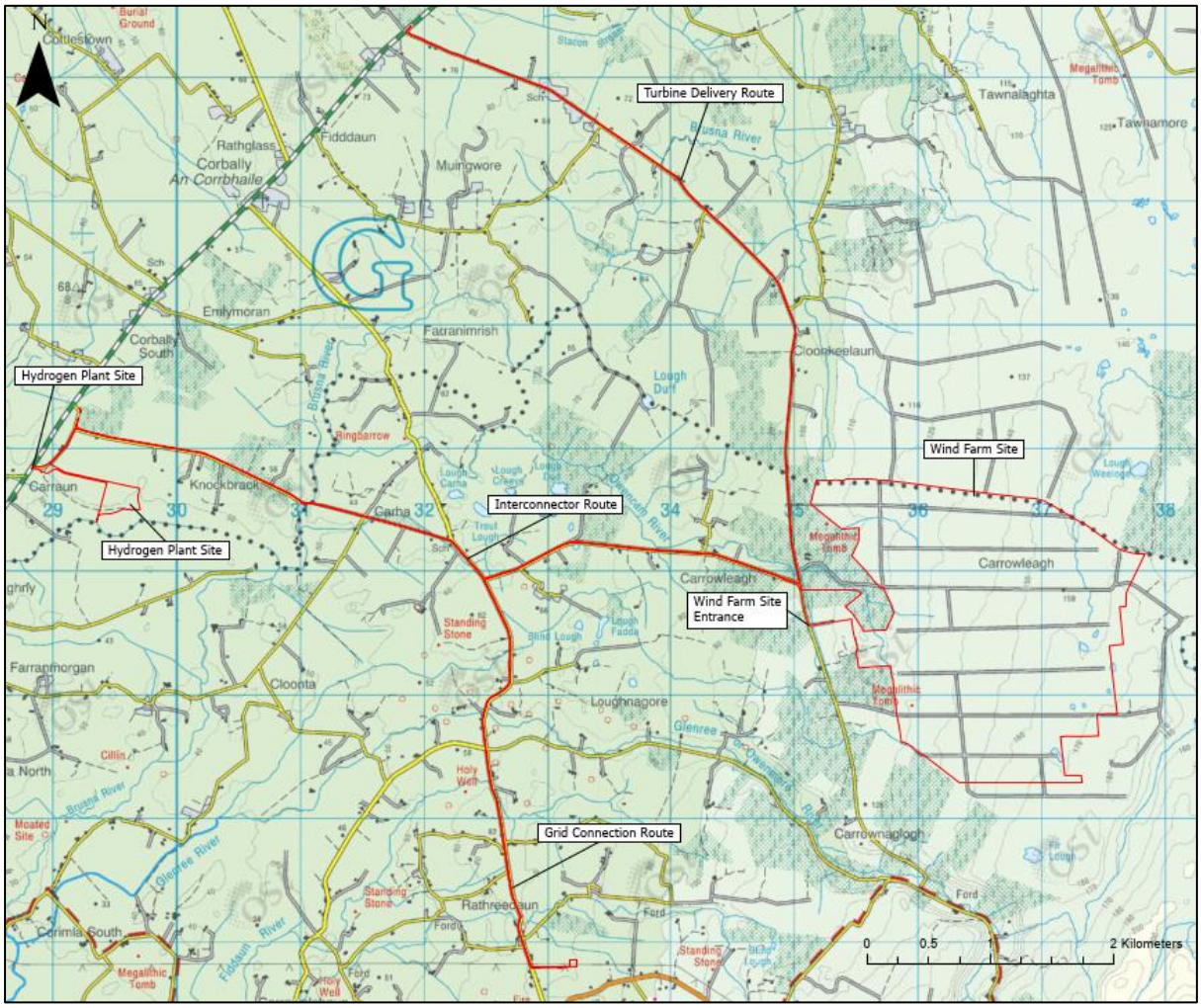

Figure 1: Location of sites for proposed Firlough Wind Farm and Hydrogen Plant. The Grid Connection and Interconnector Routes are also shown.

2.2 Overview of the Project

The Proposed Development will comprise the construction of 13 No. wind turbines (to be known as Firlough Wind Farm), an on-site 110 kV loop-in substation and all ancillary works and the construction of an underground Grid Connection via a looped connection between the Wind Farm Substation and the existing 110 kV overhead powerline north of Bunnyconnellan village, Co. Mayo. The Proposed Development will also include a Hydrogen Plant comprising 80 MW of modular alkaline electrolyser and all associated infrastructure including; compressors, cooling equipment, refuelling points, water abstraction, storage and processing, and the Hydrogen Plant Substation which will be connected to the Wind Farm via an underground electrical Interconnector. These elements constitute the "**Proposed Development"** as shown in **Figure 1**.

The Proposed Development will comprise of the following main components:

- Construction of 13 no. wind turbines with an overall ground to blade tip height of between 177 m and 185 m inclusive. The wind turbines will have a rotor diameter of between 149 m and 155 m inclusive and a hub height of between 102.5 m and 110.5 m inclusive.
- Construction of permanent crane hardstand areas and temporary laydown/storage areas and turbine foundations.
- Construction of new permanent internal Wind Farm Site access roads and the upgrade of existing internal bog tracks to include passing bays and all associated drainage infrastructure.
- Development of a site drainage network for the Wind Farm Site including sediment control systems.
- All associated underground electrical and communications cabling connecting the wind turbines to the Wind Farm Substation.
- Construction of a permanent on-site 110 kV wind farm electrical substation including two no. control buildings with welfare facilities, all associated electrical plant and equipment, security fencing and gates, all associated underground cabling, wastewater holding tank, and all ancillary structures and works.
- All works associated with the permanent connection of the wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable, in permanent cable ducts from the proposed permanent wind farm substation in the townland of Carrowleagh, and through the townlands of Carha, Carrownaglogh, Rathreedaun, Drumsheen and Bunnyconnellan West County Mayo into the existing 110 kV overhead line in the townland of Rathreedaun County Mayo, with two new 16 m high steel lattice loop-in/out masts at the connection point.
- Construction of a Wind Farm Site Temporary Construction Compound with associated temporary site offices, parking areas, welfare facilities and security fencing.
- Construction of a temporary construction materials storage area for use during construction of the Wind Farm.
- Forestry felling to facilitate construction and operation of the Wind Farm Substation and any onsite forestry replanting.
- Upgrade works on the section of the turbine delivery route which is common to both the Killybegs Turbine Delivery Route and Galway Turbine Delivery Route to include the following to facilitate the delivery of abnormal loads and turbine component deliveries:
- Improvement of the N59 and L-2604-0 junction in the townland of Ballymoghany, County Sligo to include for the temporary widening of it. The associated accommodation works will include the installation of new drainage pipes, the construction of a 1.2 m high concrete retaining wall and the erection of timber stock proof fencing and 2 no. agricultural gates.
- Localised widening of the L-2604-0 road in the townland of Cloonkeelaun, County Sligo. The associated accommodation works will include the construction of a 1.2 m high concrete retaining wall and the erection of concrete post and timber rail stock proof fencing and 2 no. agricultural gates.

- Localised widening of the L-2604-0, L-5137-0 and L-5137-9 local roads in the townlands of Ballymoghany, Muingwore and Cloonkeelaun County Sligo and Carrowleagh County Mayo to achieve a surfaced road width of 4.5 m.
- Localised widening of the L-5137-9, L-5136-0 and L-6612 roads in the townlands of Carraun and Knockbrack County Sligo, and Carha and Carrowleagh County Mayo to establish passing bays.
- Upgrade works on the Galway Turbine Delivery Route to include the following to facilitate the delivery of abnormal loads and turbine component deliveries;
  - Localised road widening at the N17/N5 roundabout in the townland of Ballyglass East County Mayo.
  - Localised road widening at the road junction with the N5 in the townland of Ballyglass East County Mayo.
  - Alterations to the embankments at the N5 junction with the L-5339 and L-1331 roads in the townland of Cloonmeen West County Mayo.
  - Localised road widening at the junction of the L-5339 and L-1331 in the townland of Lavy More County Mayo.
- Construction of a new Wind Farm Site entrance off the L-5137-9 in the townland of Carrowleagh County Mayo with the creation of a splayed entrance to facilitate the delivery of abnormal loads and turbine component deliveries.
- Construction of a Hydrogen Plant and an access road to it along with, upgrades to the L-6612-1 and the construction of a roundabout. The Hydrogen Plant includes the electrolyser building measuring 130 m by 110 m, and 16 m in height, and equipment, underground water storage tanks, drainage system, constructed wetlands, hydrogen dispensing station, tube trailer parking, water treatment building, fin fan coolers, fire water tanks, compressors, offices and welfare facilities and all ancillary equipment.
- Construction of a permanent on-site 110 kV Hydrogen Plant Substation in a compound of 3,520 m2 including 2 no. control buildings with welfare facilities, all associated electrical plant and equipment, security fencing and gates, all associated underground cabling, wastewater holding tank, and all ancillary structures and works.
- Abstraction of groundwater from 2 no. boreholes in the townland of Carraun County Sligo and pumping to the proposed hydrogen plant site and all associated ancillary works.
- Construction of a Hydrogen Plant Site Temporary Construction Compound with associated temporary site offices, parking areas, materials storage and security fencing for use during construction of the Hydrogen Plant Site.
- All works associated with the permanent connection of the Wind Farm to the Hydrogen Plant comprising a 110 kV underground cable in permanent cable ducts from the proposed, permanent, on-site wind farm substation, in the townland of Carrowleagh Co. Mayo and onto the townlands of Carha Co. Mayo, Knockbrack Co. Sligo and terminating in the Hydrogen Plant Substation in the townland of Carraun, Co. Sligo.

- Demolition of agricultural shed C and partial demolition of agricultural shed B in the townland of Carraun to facilitate the construction of the upgraded L-6612-1 and roundabout.

A 10-year planning permission and 40-year operational life from the date of commissioning of the Firlough Wind Farm is being sought.

A permanent planning permission is being sought for the Grid Connection, Hydrogen Plant and Hydrogen Plant Substation as these are to remain in place upon decommissioning of the Wind Farm. The Wind Farm Substation will become an asset of the national grid under the management of EirGrid.

The Proposed Development includes activities which are subject to an Industrial Emissions License from the Environmental Protection Agency. In addition, the Proposed Development relates to an establishment which falls within the requirements of the Major Accidents Directive and which will be subject to regulation from the Health and Safety Authority.

While the Project is primarily comprised of the Proposed Development the Project for the purpose of the EIA also includes the following elements for which development consent is not being sought at this time:

- Demolition of an existing dwelling and agricultural sheds D and E and the demolition of the remainder of shed B and construction of a new house and shed in the townland of Carraun.

In the North Mayo and Sligo region, the full renewable energy generation potential of the area cannot be realised due to physical shortcomings and restrictions in the electricity network. The Hydrogen Plant would provide a viable off-take and route to market for renewable energy that otherwise would have been lost due to these constraints. The Hydrogen Plant production capacity will be scaled up to a maximum 80 MW, to meet demand for green hydrogen in the Irish market. The physical infrastructure of the entire Hydrogen Plant, (i.e. buildings, roads, water treatment, cooling and fuelling, etc) will be built during a single construction phase with the modular electrolyser system installed in 5 MW batches. In terms of the split of electricity going to the grid and the Hydrogen Plant, the smallest initial batch of electrolyser capacity will be 10 MW (using 12-15% of electricity produced at the Wind Farm) and will produce a maximum of 4,000 kg of green hydrogen per day leaving 55 to 68 MW (84-87% and based on a turbine range of between 5 and 6 MW) of installed capacity of the Wind Farm dispatching to the electricity grid. This will be phased up to an 80 MW electrolyser producing a maximum of 31,200 kg of green hydrogen per day and consuming the whole output of the Wind Farm. The green hydrogen will be transported in tube trailers, at the lowest installed capacity the maximum number of tube trailers daily will be 11, at the maximum capacity this will be 26 (see section 2.6.6.12).

2.2.1 Wind Farm Grid Connection

Details of the Wind Farm grid connection are given in **Chapter 2: Project Description** (**section 2.6.12**) of EIAR.

The Wind Farm Substation will connect largely with underground cabling, with a minor section of works required in the vicinity of the Tie In towers to allow integration between the Firlough Wind Farm and transmission overhead line. The route of this underground Grid Connection is provided in **Figure 1.**

The overall length of the Grid Connection between the Wind Farm Substation and the existing Glenree – Moy 110 kV overhead line (OHL) is 6.65 km, of which 0.25 km is within the Wind Farm Site, 5.95 km is located along the public road corridor and the remaining 0.45 km is located off road in third party lands.

The Grid Connection infrastructure will consist of laying two 110 kV underground electricity circuits and associated infrastructure, horizontal directional drilling, and remedial works in the vicinity of pole sets 15 and 16 beneath the existing OHL, in the townlands of Rathreedane, Cahra, Kilbride and Glenree, Carrowleagh, Bunnyconnellan, Co. Mayo.

The Grid Connection will be constructed to the requirements and specifications (CDS-GFS-00-001-R1) of EirGrid. The electricity will be transmitted as a three-phase power supply meaning there will be three individual conductors in each cable circuit. The three conductors will be laid in separate ducts which will be laid in accordance with EirGrid functional specifications (CDS-GFS-00-001-R1) for 110 kV underground cables. The width of a 110 kV cable trench with a trefoil formation will be 600mm. The depth of the trench for 110 kV cables is 1,315 mm deep.

The cable ducts will accommodate one no. power cable per duct. The communications duct will accommodate a fibre cable to allow future communications between Firlough, Moy and Glenree. A concrete communication chamber will be installed at each mast location. Whilst the trench is open the ducts will be surveyed to accurately record the location of the buried cable for future identification and as-built records. The ducts will be installed, and the trench reinstated in accordance with the Local Authority and landowner requirements and then the electrical cabling/fibre cable is pulled through the installed ducts. Construction method statements and templates will be implemented to ensure that the UGC is installed in accordance with the correct requirements, materials, and specifications of ESBN and EirGrid.

Surface water run-off associated with this element of the Project drain into the Brusna River system. The Brusna River enters the Moy Estuary just north of Ballina town.

The proposed Grid Connection Route will include up to six surface water crossings which will require Horizontal Directional Drilling methodology.

2.2.2 Interconnector

An underground 110 kV interconnector cable will connect the Wind Farm Substation to the Hydrogen Plant Substation in order to conduct electricity from the Wind Farm to the Hydrogen Plant for

electrolysis. Full details of the interconnector route and construction are given in **EIAR Chapter 2: Project Description** (section 2.6.6.14). Briefly, it is 8.2 km in length of which 7.2 km is located along the public road corridor, 0.44 km is in the Wind Farm Site along existing roads and the remaining 0.52 km is located off road in third party lands. It runs in a westerly direction from the Windfarm Substation and the first 2.7 km follows the route of the Grid Connection, it will be located in the same trench in this section.

The UGC works will consist of the installation of ducts in three excavated trenches. The trenches will accommodate power cables enclosed within HDPE ducts with a minimum separation distance of 880 mm between power circuits. A fibre communications cable will also be installed to allow communication between the Wind Farm and Hydrogen Plant. The interconnector requires 1 no. Horizontal Directional Drilling (HDD) to enable crossing under an existing watercourse (Brusna River). The trenching, joint bay and HDD methodology is the same as the Grid Connection and details can be found in EIAR Chapter 2 (sections 2.6.12, 2.6.13 and 2.6.14).

2.2.3 Turbine Delivery Route(s) and Construction Haulage Route

The Donegal Turbine Delivery Route (TDR) starts at the port of Killybegs, County Donegal and utilises the N56, N15, N59 and the Stockane road to the Wind Farm Site.

It is intended that the port of entry for the large turbine components will be Killybegs Port, County Donegal and will utilise the N56, towards Donegal, turning onto the N15 south towards Sligo Town by-passing Ballyshannon and Bundoran and Sligo Town. The route will then turn westwards onto the N59 through Ballisodare and continue towards Ballina. The route will turn towards Stockane along Stockane road for 6.4 km to the proposed Wind Farm Site entrance.

Temporary works will be required to accommodate the delivery of the turbine components. These temporary works are included as part of this application and are located in the townlands of Ballymoghany and Cloonkeelaun. The proposed Killybegs TDR crosses a number of watercourses though will not require modifications to the existing crossings.

The Galway Turbine Delivery Route will utilise Galway Port. From there the components will be transported to the N83 some 3.0 km north of the harbour. The route primarily follows the national road network namely the N83, N17, N5, N4 and N59 before turning left onto the local road L2604 towards the Site entrance.

The portion of both Killybegs Turbine Delivery Route and Galway Turbine Delivery Route coming off the N59 will cross a number of watercourses (as presented in **Chapter 9, Figure 9.6c** of EIAR):

- Bellawaddy_020: **TDR WCC1** - (ITM: 532337.0, 826153.5)
- Bellawaddy_010: **TDR WCC2** - (ITM: 533267.9, 825695.6)
- Brusna (North Mayo)_010: **TDR WCC3** - (ITM: 533913.4, 825282.7)

- Brusna (North Mayo)_020: **TDR WCC4** - (ITM: 535009.4, 821949.8)

It is assumed that no upgrade works will be necessary on these river crossings.

The portions of both route options which require road upgrades are within the River Moy Catchment. No works are required on the portions of either of the route options which pass through any other river catchment.

The Construction Haulage Routes will utilise the L6612 and L1102 to facilitate the delivery of materials.

2.2.4 Decommissioning

A Decommissioning Plan accompanies the EIAR (**Appendix 2.1**). There follows an overview of the decommissioning process.

The Developer is applying for consent for an operational period of 40 years for the Wind Farm. It is intended that all above ground components and underground cabling (ducting left in-situ) will be removed from the Wind Farm Site as part of the decommissioning of the Firlough Wind Farm. The following elements are included in the decommissioning phase:

- Wind turbines dismantling and removal off the Wind Farm Site
- Underground cabling removal, including along Interconnector Route and Grid Connection Route (ducting left in-situ)
- Turbine Foundation backfilling following dismantling and removal of wind turbines (any excavated material, will be re-instated / foundations that protrude above ground level will be backfilled with soil)
- Transport Route Accommodation Works

Prior to wind turbine removal, due consideration will be given to any potential impacts arising from these operations. Potential impacts are likely to be similar to that of the construction phase, to an equal or lesser extent. Some of the potential issues could include:

- Potential disturbance by the presence of cranes, HGVs, and personnel on-site
- Time of year and timescale (to be outside sensitive periods).

Prior to the decommissioning work, a comprehensive plan will be drawn up and submitted to An Bord Pleanála for written agreement. The plan will take account of the findings of the EIAR for the present project and the contemporary best practice at that time, to manage and control the component removal and ground reinstatement.

It is the intention that the Hydrogen Plant will continue operations indefinitely. The source of electricity for the Hydrogen Plant would change upon the decommissioning of the Wind Farm and be changed to one of the following options;

- Subject to planning consents, the repowering of Firlough Wind Farm.

- Reinforced electricity network with a corporate Power Purchase Agreement with a green electricity producer.
- Connection to an offshore wind power generator off the west coast.

If these alternatives are not viable then the process equipment would be decommissioned; all plant, machinery and equipment will be emptied and dismantled to be sold or recycled or, where these are not possible, disposed of through a licensed waste contractor. If required, all machinery will be cleaned prior to removal and all necessary measures implemented to prevent the release of contaminants. All waste will be removed from the facility and recycled wherever possible, disposal operations will be controlled by licensed waste contractors. The buildings and infrastructure would be retained and repurposed.

2.3 Method and Identification of Relevant European Sites

The approach to screening is likely to differ somewhat between plans and projects, depending on scale and on the likely effects, but the following should be included (following the "Guidance for Planning Authorities", Department of Environment, Heritage and Local Government):

1. Any Natura 2000 sites within or adjacent to the plan or project area.
2. Any Natura 2000 sites within the likely zone of impact of the plan or project. 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 with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects.
3. Natura 2000 sites that are more than 15 km from the plan or project area depending on the likely impacts, and the sensitivities of the ecological receptors, bearing in mind the precautionary principle. In the case of sites with water dependent habitats or species, and a plan or project that could affect water quality or quantity, for example, it may be necessary to consider the full extent of the upstream and/or downstream catchment.

The "Guidance for Planning Authorities" notes the following in section 3.2.3 "Natura 2000 Sites":

> *"The second stage (of the AA Screening process) is an examination of what Natura 2000 sites might be affected. These sites should be identified and listed, bearing in mind the potential for a plan or project, whether it is within or outside a Natura 2000 site, to have direct, indirect or cumulative effects, and taking a precautionary approach so that a site is included if doubt exists".*

For the Project, all European Sites that could potentially be affected were identified using a Source-Pathway-Receptor conceptual model for environmental management risk assessment. To provide context for the assessment, European Sites within a distance of 15 km surrounding the development

site are shown on **Figure 2**. Information on these sites with regard to their conservation objectives and connectivity to the Project is provided in **Table 2**.

While the site for the proposed Hydrogen Plant, which is connected to the Wind Farm Site by the Interconnector, is approximately 6 km west of the site proposed for the wind farm, it is not considered plausible that the construction and operation of the Hydrogen Plant and the associated Interconnector, could have effects on designated sites to the west of the River Moy system (which receives drainage from the Hydrogen Plant and Interconnector route). Similarly, the Grid Connection route is not considered to have the potential to cause impacts on designated sites to the west of the River Moy system.

Sites that were further away from the proposed development were also considered and no realistic Source-Pathway-Receptor chain for significant effect was identified for any European Site that was further than 15 km from the study site. The considered sites were:

- Knockalongy and Knockachree SAC (code: 001669)
- Lackan Saltmarsh and Kilcummin Head SAC (code: 000516)
- Lough Conn and Lough SPA (code: 0004228)

A total of six European sites are identified where consideration is given for the potential of the proposed Project to impact on their qualifying interests and/or Special Conservation Interests. These sites are listed in **Table 2** and mapped in **Figure 2.** The six sites are:

- Ox Mountains SAC (code 000365)
- Lough Hoe Bog SAC (code 001890)
- Lough Nabrickleagh Bog SAC (code 00106)
- River Moy SAC (code 002315)
- Killala Bay/Moy Estuary SAC (code 000364)
- Killala Bay/Moy Estuary SPA (code 002041)

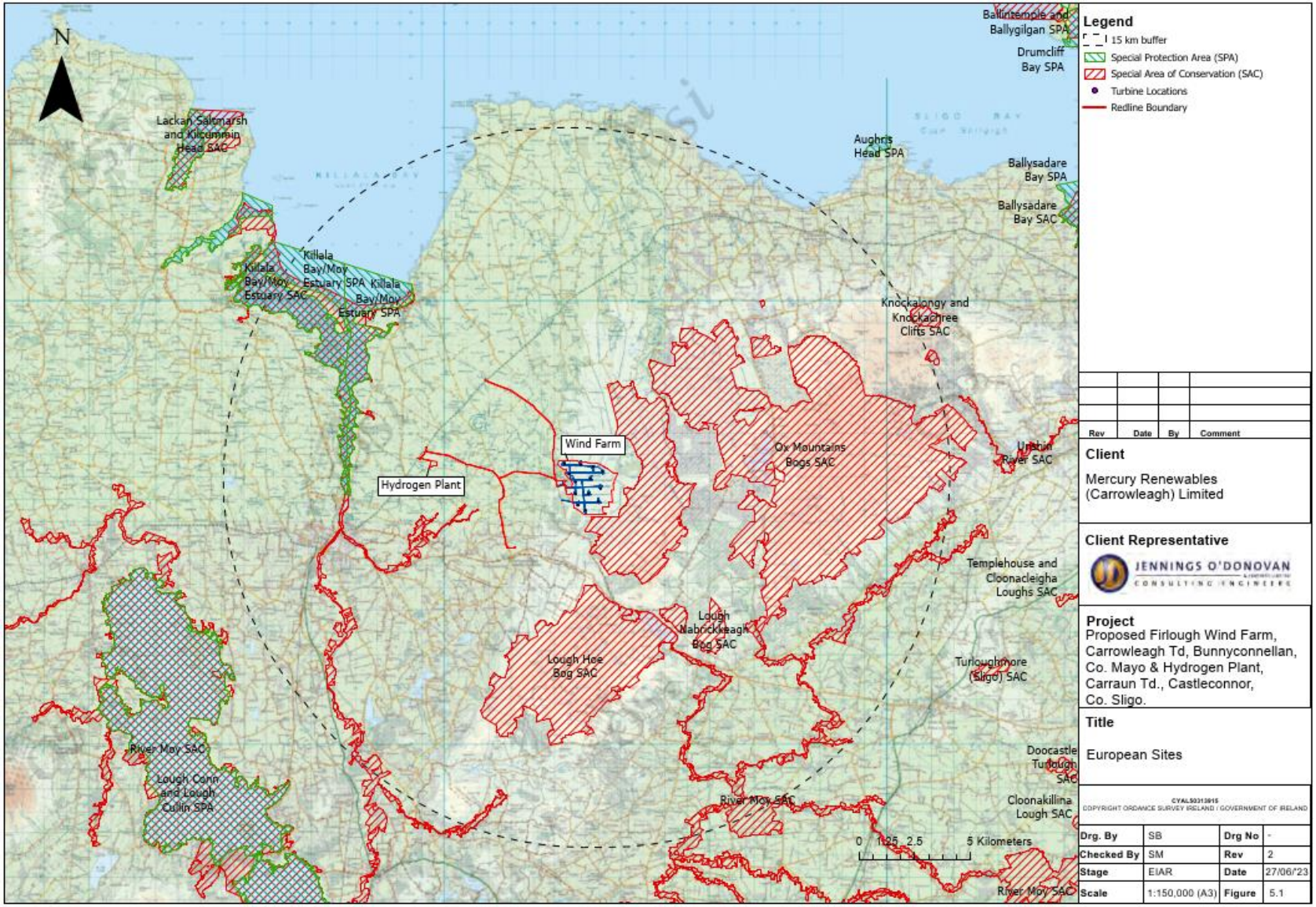

Figure 2. Locations of European designated sites within a 15 km radius of the proposed Firlough Wind Farm Site.

Table 2. Relevant European sites, reasons for designation, distances from Project Area and summary of connectivity.

European Site	Reasons for designation (information correct as of 2nd May 2023) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	SPECIAL AREAS OF CONSERVATION	
Ox Mountains SAC (site code 002006)	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Natural dystrophic lakes and ponds [3160] Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the Rhynchosporion [7150] Vertigo geyeri (Geyer's Whorl Snail) [1013] Saxifraga hirculus (Marsh Saxifrage) [1528] According to this SAC's site Conservation Objectives document: NPWS (2013) Conservation Objectives: Ox Mountains SAC, Version 1.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, for each of the listed QIs, the Conservation Objective is to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.	The southernmost boundary of the Wind Farm Site is approximately 100 m from the SAC (which extends to the southern bog track). Between the wind farm site boundary and the SAC there is cutover blanket bog, which provides ecological continuity between the two locations. A tributary of the Gowlan River rises in the northeast sector of the site and runs northwards. Approximately 2.5 km downstream of the wind farm site, the tributary enters the SAC and flows for a distance of c.3 km through the SAC. The Hydrogen Plant Site, which is connected to the Wind Farm Site by an Interconnector, is approximately 7.5 km westwards of the SAC. The Grid Connection Route drains to tributaries of the Brusna River. The Turbine Delivery Route has no connectivity with the SAC. It is concluded that (i) there is ecological and hydrological connectivity between the Wind Farm Site and the SAC, and (ii) there is no connectivity between the Hydrogen Plant Site and the SAC, or the Interconnector Route and Grid Connection Route and the SAC, or the TDR and the SAC.

European Site	Reasons for designation (information correct as of 2nd May 2023) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
Lough Hoe Bog SAC (site code: 00633)	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Blanket bogs (* if active bog) [7130] Vertigo geyeri (Geyer's Whorl Snail) [1013] Austropotamobius pallipes (White-clawed Crayfish) [1092] According to this SAC's site Conservation Objectives document: NPWS (2017): Conservation Objectives: Lough Hoe SAC, Version 1. Department of Culture, Heritage & the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The Wind Farm Site is approximately 2.5 km northwards of the SAC. The two areas are separated by extensive forestry, agricultural lands and heath/bog of varying quality. There are no ecological or hydrological linkages between the site of the Wind Farm and the SAC. The Hydrogen Plant Site is approximately 8 km northwest of the SAC. There are no ecological or hydrological linkages between the site of the Hydrogen Plant, and the Interconnector Route, and the SAC. The Grid Connection Route drains to tributaries of the Brusna River. The Turbine Delivery Route has no connectivity with the SAC. It is concluded that there is no ecological or hydrological connectivity between any component of the Project and the SAC.
Lough Nabrickleagh Bog SAC (site code: 00634)	Blanket bogs (* if active bog) [7130] According to this SAC's site Conservation Objectives document: NPWS (2019) Conservation Objectives: Lough Nabrickleagh Bog SAC, Version 1. Department of Culture, Heritage & the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The Wind Farm Site is located approximately 7 km northwest of the SAC. The Hydrogen Plant Site, and the Interconnector Route, is approximately 13 km northwest of the SAC. The Turbine Delivery Route has no connectivity with the SAC. It is concluded that there is no ecological or hydrological connectivity between the any

European Site	Reasons for designation (information correct as of 2nd May 2023) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
		component of the Project and the SAC.
River Moy SAC (site code: 002298)	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) [6510] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Alkaline fens [7230] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355] According to this SAC's site Conservation Objectives document: NPWS (2016): Conservation Objectives: River Moy SAC, Version 1. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The western sector of the Wind Farm Site is drained by tributary streams of the Owencam River and the Glenree River, both of which join the Brusna River. The lower reaches of the Glenree and Brusna system, to the confluence with the Moy Estuary, is within the River Moy SAC (for approximately 6 km). The Hydrogen Plant Site is approximately 3 km northeast of the SAC. There are no ecological or hydrological linkages between the site of the Hydrogen Plant and the SAC. The Interconnector Cable Route and the Grid Connection Route cross various tributaries of the Brusna River. The Turbine Delivery Route is hydrologically linked to the River Moy SAC. It is concluded that there is hydrological connectivity between (i) the Wind Farm Site and the SAC, (ii) the Interconnector and Grid Connection routes and the SAC, and (iii) the TDR, There is no connectivity between the Hydrogen Plant Site and the SAC.
Killala Bay / Moy Estuary SAC (site code: 00458)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] 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] Embryonic shifting dunes [2110]	The Wind Farm Site is approximately 9.5 km east of the SAC, while the Hydrogen Plant Site is approximately 3.5 km eastwards of the SAC. Hydrological linkages exist between the Wind Farm Site and the SAC via the

European Site	Reasons for designation (information correct as of 2nd May 2023) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] Vertigo angustior (Narrow-mouthed Whorl Snail) [1014] Petromyzon marinus (Sea Lamprey) [1095] Phoca vitulina (Harbour Seal) [1365] According to this SAC's site Conservation Objectives document: NPWS (2012), Conservation Objectives for Killala Bay/Moy Estuary SAC [00458]. Version 1.0. Department of Arts, Heritage and the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	Brusna/Glenree River system which receives drainage from the wind farm site and enters the SAC at the northern outskirts of Ballina town. A hydrological link exists between the Hydrogen Plant Site and the SAC via the Dooyeaghny River, which enters the SAC at Castleconor. The Interconnector Cable Route and the Grid Connection Route cross various tributaries of the Brusna River, which enters the Moy Estuary just above Ballina town. . The Turbine Delivery Route is hydrologically linked to the Killala Bay / Moy Estuary SAC. It is concluded that there is hydrological connectivity between (i) the Wind Farm Site, (ii) the Hydrogen Plant Site, (iii) the Interconnector and Grid Connection routes, and (iv) the TDR and the SAC.
	SPECIAL PROTECTION AREAS	
Killala Bay / Moy Estuary SPA (site code: 004036)	Ringed Plover (Charadrius hiaticula) [A137] Golden Plover (Pluvialis apricaria) [A140] Grey Plover (Pluvialis squatarola) [A141] Sanderling (Calidris alba) [A144] Dunlin (Calidris alpina) [A149] Bar-tailed Godwit (Limosa lapponica) [A157] Curlew (Numenius arquata) [A160] Redshank (Tringa totanus) [A162] Wetland and Waterbirds [A999] According to this SPA's site Conservation Objectives document: NPWS 2013, Conservation Objectives: Killala Bay/Moy Estuary SPA 004036. Version 1.0, Department of Arts, Heritage, and the Gaeltacht, for each of the listed SCIs, the Conservation Objective is to maintain the favourable conservation condition of the species for which the SPA	The Wind Farm Site is approximately 9.5 km east of the SPA, while the Hydrogen Plant Site is approximately 3.5 km eastwards. Hydrological linkages exist between the Wind Farm Site and the SPA via the Brusna/Glenree River system which receives drainage from the wind farm site and enters the Moy estuary approximately 2 km upstream of the SPA. A hydrological link exists between the Hydrogen

European Site	Reasons for designation (information correct as of 2nd May 2023) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	has been selected.	Plant Site and SPA via the Dooyeaghny River, which enters the SPA at Castleconor. The Interconnector Cable Route and the Grid Connection Route cross various tributaries of the Brusna River, which enters the Moy Estuary on the northern outskirts of Ballina town and approximately 2 km upstream of the SPA. The Turbine Delivery Route is hydrologically linked to the Killala Bay / Moy Estuary SPA. The Wind Farm Site and the Hydrogen Plant Site do not provide suitable habitats to support the SCIs of the SPA. It is concluded that there is hydrological connectivity between (i) the Wind Farm Site, (ii) the Hydrogen Plant Site, (iii) the Interconnector and Grid Connection routes, and (iv) the TDR and the SPA.

2.4 Assessment of Potential for Impacts and Significant Effects

As noted, a total of six European sites are identified where consideration is given for the potential of the proposed project to impact on their qualifying interests and/or Special Conservation Interests. These sites are listed in **Table 2** and mapped in **Figure 2**.

The assessment of potential impacts considers all scenarios within the range of turbine parameters proposed for the Development as shown in **Table 3** below. Ecologically, the different turbine parameters are relevant to collision risk to birds and bats, and in the respective assessments the worse-case scenario is assumed. For habitats loss, the impact assessment is based on the largest turbine foundation diameter.

Table 3: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	177 m to 185 m
Rotor Diameter	149 m to 155 m
Hub Height	102.5 m to 110.5 m
Turbine Foundations	22 m to 25.5 m

There follows an evaluation of each of the six sites (as summarised in **Table 2**) in respect of the potential for effects on the qualifying interests/SCIs as a result of the proposed project during construction, operational and decommissioning phases.

2.4.1 Ox Mountains SAC

The southeast sector of the Wind Farm Site is in proximity to the SAC. The boundary of the SAC extends to the southernmost bog track, which is an estimated 100 m south of the Wind Farm Site boundary (see **Figure 3**). The section of the SAC which extends to the bog track includes some cutover blanket bog. Turbine T1 is at a distance of approximately 270 m to the northwest of the SAC boundary, with cutover bog and drainage channels between T1 and the SAC. As the existing drainage channels will already be reducing water levels in the adjoining bog, the impact of excavations or any new drain at T1 location will be bound by the existing impact of the previously inserted drains associated with peat cutting activities at the site. It is concluded that the construction works at the T1 location, or any of the construction works associated with the Project, do not have the potential to have hydrological effects on the blanket bog (both cutover and intact) within the SAC.

As noted in **Table 2,** a tributary of the Gowlan River rises in the northeast sector of the site and runs northwards. Approximately 2.5 km downstream of the wind farm site, after passing through a conifer plantation the tributary enters the SAC and flows for a distance of c.3 km through the SAC within an area dominated by blanket bog (though associated bog and heath habitats are also present).

Should the tributary stream carry contaminants from the Wind Farm Site (in absence of mitigation) during construction, operational and/or decommissioning phases, there is a theoretical possibilitythat the blanket bog Attribute: 'Ecosystem function: soil nutrients' (see Conservation Objectives Report for site), could be affected adversely were the stream to be in flood and affect the pH and nutrient status of adjoining bog.

It is noted that there is no ecological connectivity between the Ox Mountains SAC and the Hydrogen Plant and Interconnector Route, as well as the Grid Connection Route and the Turbine Delivery Route.

As the conservation objectives of the identified European site could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the Project, *i.e.* mitigation measures. Therefore, as the risk of potential significant effects on this European site cannot be ruled out, **Section 3** of this report provides information to allow the competent planning authority to carry out appropriate assessment for the proposed Project.

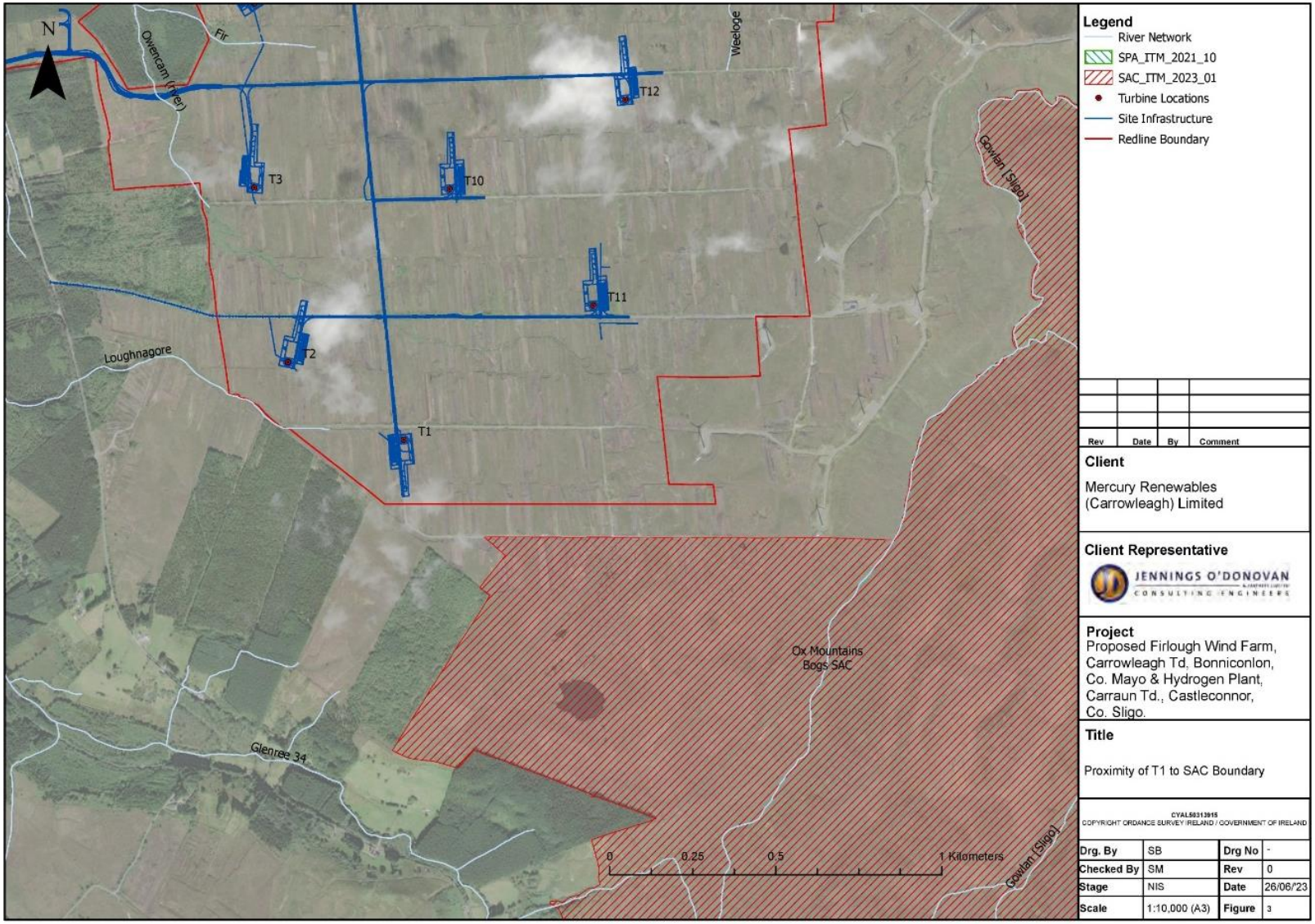

Figure 3. Image showing proximity of the southern sector of the Wind Farm Site to the Ox Mountains SAC.

2.4.2 Lough Hoe Bog SAC

The Wind Farm Site is approximately 2.5 km northwards from the SAC. The two locations are separated by extensive commercial forestry, agricultural land (often wet grassland fields) and bog/heath of varying quality. The R294 road runs north of the SAC.

It is concluded that there is no ecological or hydrological connectivity between the two locations.

It is noted that there is no ecological connectivity between the Lough Hoe Bog SAC and the Hydrogen Plant and Interconnector Route, as well as the Grid Connection Route, and the Turbine Delivery Route.

As it is considered that the qualifying interests of the SAC would not be affected in any way by the proposed Project, either in the construction, operational or decommissioning phases, it is concluded that there is no potential for effects on this SAC and further assessment is not required.

2.4.3 Lough Nabrickleagh Bog SAC

The Wind Farm Site is approximately 7 km north-westwards from the SAC. The two locations are separated by the high ground of the Ox Mountains SAC, as well as commercial forestry and agricultural land. The R294 road runs north of the SAC.

It is concluded that there is no ecological or hydrological connectivity between the two locations.

It is noted that there is no ecological connectivity between the Lough Nabrickleagh Bog SAC and the Hydrogen Plant and Interconnector Route, as well as the Grid Connection Route, and the Turbine Delivery Route.

As it is considered that the qualifying interest of the SAC, *i.e*. blanket bog, would not be affected in any way by the proposed Project, either in the construction, operational or decommissioning phases, it is concluded that there is no potential for effects on this SAC and further assessment is not required.

2.4.4 River Moy SAC

The Wind Farm Site has connectivity with the River Moy SAC as drainage from part of the site is to the Brusna River system. Similarly, hydrological connectivity exists between the River Moy SAC and the Interconnector Route and Grid Connection Route, as well as the Turbine Delivery Route, as tributaries of the Brusna River are crossed by these routes. The Hydrogen Plant Site drains direct to the River Moy Estuary and does not have connectivity with the River Moy SAC.

Potential construction phase effects, and to a lesser extent the operational and decommissioning phase effects, relate to the release of suspended solids/nutrients, cementitious materials and hydrocarbons into the drainage network arising from the works.

As the conservation objectives of the identified European site could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project, *i.e*. mitigation measures. Therefore, as the risk of potential significant effects on this European site cannot be ruled out, **Section 3** of this report provides information to allow the competent planning authority to carry out appropriate assessment for the proposed development.

2.4.5 Killala Bay / Moy Estuary SAC

The Wind Farm Site has connectivity with the SAC as drainage from part of the site is to the Brusna River system, which enters the SAC just north of Ballina town. The Interconnector Route and the Grid Connection Route, also drain to the Brusna River system. The Turbine Delivery Route has hydrological connectivity with the SAC. Also, the Hydrogen Plant Site has connectivity with the SAC as drainage is to the Moy Estuary via the Dooyeaghny River.

Potential construction phase, and to a lesser extent decommissioning phase, effects relate to the release of suspended solids/nutrients, cementitious materials and hydrocarbons into the drainage network arising from the works.

As the conservation objectives of the identified European site could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project, i.e. *mitigation measures*. Therefore, as the risk of potential significant effects on this European site cannot be ruled out, **Section 3** of this report provides information to allow the competent planning authority to carry out appropriate assessment for the proposed development.

2.4.6 Killala Bay / Moy Estuary SPA

The Wind Farm Site has connectivity with the SPA as drainage from part of the site is to the River Brusna system, which enters the Moy Estuary approximately 2 km upstream of the SPA. The Interconnector Route and the Grid Connection Route also drain to the Brusna River system. The Turbine Delivery Route has hydrological connectivity with the SAC. Also, the Hydrogen Plant Site has connectivity with the SPA as drainage is to the Moy Estuary via the Dooyeaghny River.

Potential construction phase, and to a lesser extent the operational and decommissioning phase, effects relate to the release of suspended solids/nutrients, cementitious materials and hydrocarbons into the drainage network arising from the works.

As the conservation objectives of the identified European site could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project, *i.e.* mitigation measures. Therefore, as the risk of potential significant effects on this European site cannot be ruled out, **Section 3** of this report provides information to allow the competent planning authority to carry out appropriate assessment for the proposed development.

2.4.7 Overview of potential for significant effects on European sites in absence of mitigation

The present assessment has shown objectively that for two of the European sites identified in **Table 2** there are no realistic Source-Pathway-Receptor linkages and hence there is no potential for effects on the Qualifying Interests as a result of the proposed Project. These sites are:

- Lough Hoe Bog SAC (code 00633)
- Lough Nabrickleagh Bog SAC (code 00634)

It is considered that these two European sites can be screened out and are excluded from further assessment.

In the absence of mitigation, likely or possible significant effects on four of the European sites listed in **Table 2** could not be excluded during the construction, operational and/or decommissioning stages of the proposed development:

- Ox Mountains SAC (code 000365)
- River Moy SAC (code 002315)
- Killala Bay/Moy Estuary SAC (code 000364)
- Killala Bay/Moy Estuary SPA (code 002041)

As it is considered that the risk of likely or possible significant effects on these European sites cannot be ruled out, and that there is potential for effects on their Qualifying Interests or Special Conservation Interests as a result of the Project, they are subject to further consideration in **Section 3** of this report.

3 NATURA IMPACT STATEMENT

The assessment for screening for appropriate assessment presented in **Section 2** concludes that in the absence of mitigation, likely or possible significant effects on European sites may arise as a result of the proposed development on 4 no. European sites, as follows:

- Ox Mountains SAC (code 000365)
- River Moy SAC (code 002315)
- Killala Bay/Moy Estuary SAC (code 000364)
- Killala Bay/Moy Estuary SPA (code 002041)

The following assessments consider, in absence of mitigation, the potential of the Project to cause effects on the qualifying interests or the Special Conservation Interests either directly or indirectly.

3.1 Potential for Effects on Ox Mountains SAC

While the southeast sector of the Wind Farm Site at Firlough is in proximity to the SAC, there is a distance of approximately 100 m from site boundary to the SAC boundary, with the nearest turbine, T1, at a distance of 270 m to the northwest of the SAC boundary (see **Figure 3**). On this basis, it is certain that the proposed project does not have potential to have direct impacts, such as disturbance to habitats or species, to any part of the Ox Mountains SAC.

Also, as noted in **section 2.4.1**, the construction works at the T1 location, which is within 270 m of the SAC, do not have the potential to have hydraulic effects on the blanket bog (both cutover and intact) within the SAC.

The assessment for AA Screening (**Section 2**) identified hydrological connectivity between the Wind Farm Site and the Ox Mountains SAC via a tributary of the Gowlan River which rises in the northeast sector of the site. After leaving the site, the tributary stream flows for approximately 2.5 km towards the SAC and then for c.3 km within the SAC. This area of the SAC is dominated by blanket bog. Should the tributary stream carry contaminants from the Wind Farm Site (in absence of mitigation) during construction works, and to a lesser extent operational and decommissioning phase activities, there is a theoretical possibly that the blanket bog, and associated peatland habitats, could be affected adversely were the stream to be in flood and affect the pH and nutrient status of adjoining bog.

The significance of a subsequent effect on the qualifying interests within the designated site would vary depending on the type of pollutant, as well as the magnitude and duration of the event. As the conservation objectives of identified Natura 2000 sites could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project, *i.e.* mitigation measures.

A review of the Conservation Objectives for the Ox Mountains SAC indicates that the relevant qualifying interests which conceivably could be affected by the input of pollutants to the blanket bog system are as listed below. This is based on the given attribute and target for each habitat or species, as well as the distribution of the habitats and species within the designated sites (all such information is contained within the Conservation Objectives for the site).

Ox Mountains SAC

Wet heaths [4010]

Blanket bogs (*if active only) [7130]

Depressions on peat substrates of the Rhynchosporian [7150]

It is noted that the other qualifying peatland and lake habitats (as listed in **Table 2**), along with *Saxifragus hirculus*, occur associated with the larger expanses of blanket bog within the site. Also, *Vertigo geyeri* is known from only one location elsewhere within the SAC.

Table 4: Ox Mountains SAC: Attributes and Targets associated with identified Habitats and Species potentially affected by water pollution.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
Wet heaths **Blanket bogs** **Rhynchosporian vegetation**	Ecosystem function: soil nutrients	Maintain soil nutrient status within natural range.	Throughout site

In the absence of mitigation, the significance of an effect on the above listed qualifying interests of the SAC by contaminants derived from activities associated with the wind farm project entering the Gowlan tributary stream, which passes through the SAC, would depend on the type of pollutant, as well as the magnitude and duration of a pollution event. Also of relevance would be the status of water flow in the river at the time.

The deposition of pollutants, and especially cementitious materials, and nutrients, into peatland soils along the river channel could alter nutrient status and pH of the peat soil. Such an effect would potentially be Significant.

3.2 Potential for Effects on River Moy SAC

It is noted that the proposed Project does not have potential to have direct impacts, such as disturbance to habitats or species, to any part of the River Moy SAC.

However, as noted in the assessment for AA Screening (**section 2.4.4** above), the construction phase, and to a lesser extent the operational and decommissioning phases, have the potential to cause negative effects to receiving watercourses and ultimately relevant qualifying interests of the River Moy SAC site.

The assessment for AA Screening identified hydrological connectivity between the Wind Farm Site and the River Moy system. **Chapter 6: Aquatic Biodiversity** and **Chapter 9: Hydrology & Hydrogeology** of the EIAR, provide detailed accounts of the drainage of the project area and connectivity with the River Moy system. Briefly, surface water drainage from the central and western sectors of the Wind Farm Site is direct to tributary streams of the Glenree / Brusna river system. These streams flow westwards for approximately 6 km before reaching the designated portion of the Brusna River. In addition, the Interconnector Route, the Grid Connection Route and the Turbine Delivery Route cross tributaries which flow into the designated section of the Brusna River. For the Interconnector Route, there are four watercourse crossings, one of which will require Horizontal Directional Drilling (HDD). For the Grid Connection Route, there are six watercourse crossings, four of which will require HDD. ,

The principal potential construction phase effects of the development relate to the release of suspended solids/nutrients, cementitious materials and hydrocarbons into the drainage network arising from all construction related site works including the access road network, turbine bases and associated hardstands, sub-station building and peat repository areas. Unmitigated, the construction or upgrading of watercourse crossings poses a high level of risk and potentially significant effects on receiving waters. In addition, the HDD process requires drilling fluid (consisting of polymers and bentonite) to assist with lubricating and mobilising drill arisings during the drilling process and to promote sealing and stabilising of the borehole – should such substances enter the watercourse there is a risk to aquatic biota (see details in **Chapter 9: sections 9.4.5.5 & 9.4.5.14**).

There is a risk of nutrient release as a result of the clear-fell of conifers required for the site of the substation.

In the unlikely event of a peat stability issue at the Wind Farm Site during the construction and/or operational and decommissioning phases of the project, there is risk of substantial amounts of peat entering local watercourses which have connectivity to the River Moy system. The risk of landslides occurring on the site as a result of the proposed project has been assessed by RSK (see **Chapter 8: Soil and Geology** in EIAR and specifically **Appendix 8.1** "**Peat Slope Stability Risk Assessment**").

Peat depth across the Wind Farm Site is generally shallow with the exception of minor isolated pockets of moderately deep and deeper peat delineated by shallow subsoils and/or bedrock at or near the surface. **Chapter 8: Soils and Geology** notes that the Factor of Safety (Adjusted) at peat probe locations is generally Acceptable, with the exception of marginally stable/unstable point locations associated with moderately deep peat.

The Risk Ranking (Distance) (Scenario B) at peat probe locations is generally Very Low to Low with the exception of elevated risks at locations associated with deeper peat, and/or close proximity to sensitive receptors – the turbines in the elevated risk category are T2, T3, T4 & T13. Elevated peat stability risks also exist at the sites proposed for the substation and the materials storage area.

While the risk of significant peat landslide events occurring at the Wind Farm Site is low given the flat nature and depth of peat, the Site also possesses a degree of elevated risk in terms of subsoil stability.

Subsoil, or till, landslide events are generally characterised as relatively isolated in comparison to the fluid nature of peat landslides. None the less, a significant movement of subsoils at the site, if intercepted by the downgradient surface water network at the site can have similarly devastating consequences to that of a significant peat landslide.

The potential for soil stability issues to arise during the construction phase of the wind farm development is largely dependent on vehicular movement and operation during excavation works, or vehicular movements over areas with an increased or severe slope incline, and likely in combination with severe weather conditions. In terms of peat, potential impacts to hydrology can also play a large role in stability issues.

Soil stability issues brought about by excavation or vehicular movement activities on site have the potential to lead to open excavation side wall collapse, which in turn would potentially compromise ground stability in the vicinity of the works, thus increasing the effective footprint of the proposed development.

There is also potential for effects on watercourses during the operational phase due to on-site operational activities at the Wind Farm Site. The risk of pollutants entering local watercourses with connectivity to the River Moy SAC during the operational phase of the wind farm could arise primarily through soil run-off from unvegetated surfaces, spillages of hydrocarbons and other chemicals, and potential peat slippage (as discussed above).

For the River Moy SAC, a review of the Conservation Objectives indicates that the relevant qualifying interests which conceivably could be affected by the input of pollutants to the system are as listed below. This is based on the given attribute and target for each habitat or species, as well as the distribution of the habitats and species within the designated sites (all such information is contained within the Conservation Objectives for the site).

River Moy SAC

Petromyzon marinus (Sea Lamprey) [1095]
Lampetra planeri (Brook Lamprey) [1096]
Salmo salar (Salmon) [1106]
Lutra lutra (Otter) [1355]

It is noted that none of the seven qualifying habitats for the SAC (as listed in **Table 2**) have a presence along the Glenree / Brusna rivers. Also, the NPWS Conservation Objectives for the site does not list white-clawed crayfish from the Glenree / Brusna rivers.

Table 5: River Moy SAC: Attributes and Targets associated with identified Habitats and Species potentially affected by water pollution.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
Sea Lamprey **Brook Lamprey**	Extent and distribution of spawning habitat	No decline in extent and distribution of spawning habitat. [Lampreys require clean gravels for spawning]	Rivers
Salmon	Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes. [Salmon spawn in clean gravels]	Main rivers
	Water quality	At least Q4 at sites sampled by EPA	
	Fish biomass available	No significant decline	Rivers

In the absence of mitigation, the significance of an effect on the above listed qualifying interests of the SAC by contaminants derived from activities associated with the wind farm project entering the Glenree/ Brusna river system would depend on the type of pollutant, as well as the magnitude and duration of a pollution event. Aquatic invertebrate communities and aquatic macrophytes can be affected by sediment loading which reduces both the biotic diversity and the food resource for fish populations through direct toxicity to fish and invertebrates, and also indirectly affecting top predators such as otter through a reduction in prey availability. Suspended solids often hold nutrients such as phosphorus that can result in eutrophication and reduced oxygen levels, which can affect aquatic communities.

As the conservation objectives of the River Moy SAC could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project, *i.e.* mitigation measures.

3.3 Potential for Effects on Killala Bay / Moy Estuary SAC and SPA

The Killala Bay / Moy Estuary SAC and SPA have similar geographical areas. However, the SAC extends northwards from the most northern bridge in Ballina town, while the SPA commences approximately 2 km further north at Quignalecka.

It is noted that the proposed Project does not have potential to have direct impacts, such as disturbance to habitats or species, to any parts of the Killala Bay / River Moy SAC or Killala Bay / River Moy SPA.

As discussed in the assessment for AA Screening (**Section 2**), hydrological connectivity has been identified between:

(i) the Wind Farm Site, the Interconnector Route, the Grid Connection Route and the Turbine Delivery Route, and the Killala Bay / River Moy estuarine system via the Glenree / Brusna river system, which drains much of the area in the vicinity of the Wind Farm Site and enters

the Moy system on the northern outskirts of Ballina – the confluence point is within the SAC and c.2 km upstream of the SPA;

(ii) the Hydrogen Plant Site and the Killala Bay / River Moy estuarine system via the Dooyeaghny River, which drains the local area and enters the Moy estuary at Castleconor – the confluence point is within both the SAC and the SPA.

As discussed above for the River Moy SAC (**section 3.2**), construction phase activities have the potential to cause adverse effects to receiving watercourses. This is also the case for the decommissioning phase activities though to a lesser extent. While there is limited potential for adverse effects on local watercourses during the operational phase of the Wind Farm, there is significant potential for adverse effects on local watercourses (namely the Dooyeaghny River) and ultimately the Killala Bay / Moy Estuary SAC and SPA during the operational phase of the Hydrogen Plant.

The principal potential construction phase effects of the Project relate to the release of suspended solids/nutrients, cementitious materials and hydrocarbons into the drainage network arising from all construction related site works including the access road network, turbine bases and associated hardstands, sub-station building and peat repository areas. Unmitigated, the construction or upgrading of watercourse crossings poses a high level of risk and potentially significant effects on receiving waters. There is a risk of nutrient release as a result of the clear-fell of conifers required for the site of the Wind Farm Substation.

The operational phase of the Wind Farm and the Hydrogen Plant has potential to have adverse effects on local watercourses which drain to the Killala Bay / River Moy estuarine system.

While a wind farm is not a recognised source of pollution, some chemicals and hydrocarbons will be stored on site. Without adequate storage facilities and proper handling of such substances, leakage to local watercourses via on-site drains is a possibility. Also, disturbed peat surfaces since the construction works could generate suspended solids during wet periods. Contaminants from the Wind Farm Site which enter local watercourses (which drain westwards) could ultimately be deposited within the Killala Bay / River Moy estuarine system.

There is a larger risk associated with the Hydrogen Plant Site than the Wind Farm Site, as there will be a relatively large volume of various chemicals stored on the Hydrogen Plant Site, including hydrogen itself but also hydrocarbons and chemicals including the following (full details of the operation of the Hydrogen Plant are given in **Chapter 2: Project Description)**:

- Potassium hydroxide (KOH) for the electrolysis process (lye),
- Sodium bisulphite for de-chlorination of mains water, should it be used for process,
- Antiscalant used to prevent/reduce scaling of water treatment equipment,
- Glycol for coolant.

As all chemicals used in the Hydrogen Plant Site will be stored in bunded facilities in accordance with specified legislation (Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 to 2021), the risk of accidental spillage or release is minimised.

It is noted that potassium hydroxide and glycol are used only in the closed-loop electrolysis process and will not enter the wastewater stream. As the source water for the Hydrogen Plant will be groundwater or rainwater, this should be free of chemicals or dangerous substances. Sodium bisulphate will only be used if mains water is used in the process which would require de-chlorination. In large quantities sodium bisulphite can depress pH and dissolved oxygen, causing mortality of fish (Ryon et al, 2002). However, expected levels of treatment that would be required are at most 5 mg/l (5ppm), typically 2-3 mg/l. Sodium bisulphite is regularly used in the treatment of drinking water supplies and is a non-hazardous solution commonly used as a waste water dechlorination agent. While high concentrations will contribute to elevated chemical oxygen demand in aquatic environments, but it is subject to rapid biological decomposition (Product Data Sheet).

Antiscalants will be used in small quantities to prevent/reduce scaling of water treatment equipment and therefore is likely to occur in the waste water stream. While the specific Antiscalant to be used has not been identified, most antiscalants are proprietary organic man-made polymers. These products are considered non-hazardous as defined by the US Occupational Safety and Health Act regulations.

It is also noted that the wastewater arising from the Hydrogen Plant will be treated through constructed wetlands and regulated discharge rates before being discharged to the Dooyeaghny River to the south of the Hydrogen Plant.

As with all fuels, the production and handling of hydrogen has an inherent degree of risk. Health and Safety has therefore been a key consideration in design of the hydrogen production facility. Through the adoption of best practice principles, the mitigation of hazards through design, and the following of relevant guidance and regulations, the Hydrogen Plant will be designed and operated to reduce the risk of industrial accidents. It is noted that preparation of a Major Accident Prevention Policy has begun for the Hydrogen Plant Site. **EIAR Chapter 16: Major Accidents and Natural Disasters** identifies, classifies and evaluates the risks associated with the operation of the Hydrogen Plant. In the absence of mitigation there is a risk that contaminants released in the event of an industrial accident could enter local watercourses (Dooyeaghny River) and ultimately the Killala Bay/Moy Estuary SAC and the Killala Bay/Moy Estuary SPA.

The release of the above-mentioned chemicals due to a fire or explosion, or any other major accident or natural disaster, could have significant environmental impacts and cause contamination or impact air quality and potentially local watercourses. The potential environmental effects in the absence of mitigation by the release of contaminants from the Hydrogen Plant are detailed in **Chapter 16** (**section 16.3.2.10 Contamination**) of the EIAR.

Ultimately the relevant Qualifying Interests and Special Conservation Interests of the Killala Bay/ River Moy SAC and SPA respectively could be affected adversely by the entry of pollutants derived from the Wind Farm Site during the construction, operational and decommissioning phases and from the Hydrogen Plant Site during the construction and operational phases (assuming the plant is not dismantled).

For the SAC and the SPA sites, a review of their conservation objectives indicates that the relevant qualifying interests and Special Conservation Interests (SCIs) which conceivably could be affected by the input of pollutants to the estuarine system are as listed below. This is based on the given attribute and target for each habitat or species, as well as the distribution of the habitats and species within the designated sites (all such information is contained within the Conservation Objectives for the sites).

Killala Bay/Moy Estuary SAC

Estuaries [1130]

Mudflats and sandflats not covered by seawater at low tide [1140]

Petromyzon marinus (Sea Lamprey) [1095]

It is noted that none of the other qualifying habitats for the SAC (as listed in **Table 2)** would be affected by contaminants potentially carried to the estuarine waters as a result of the Project (both Wind Farm & Hydrogen Plant) as these are largely located above the high tide mark. Also, *Vertigo angustior* is confined to one location of marsh habitat near Killanly, while the possible input of contaminants would not affect the breeding or haul-out sites of *Phoca vitulina*.

Table 6: Killala Bay/Moy Estuary SAC: Attributes and Targets associated with identified Habitats and Species potentially affected by water pollution.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
Estuaries	Community distribution	Conserve the following community types in a natural condition: Muddy sand to fine sand dominated by Hydrobia ulvae, Pygospio elegans and Tubificoides benedii community complex; Estuarine muddy sand dominated by Hediste diversicolor and Heterochaeta costata community complex; and Fine sand dominated by Nephtys cirrose community complex.	Entire estuarine component of site
Mudflats and sandflats not covered by seawater at low tide	Community distribution	Conserve the following community types in a natural condition: Muddy sand to fine sand dominated by Hydrobia ulvae, Pygospio elegans and Tubificoides benedii community complex; Estuarine muddy sand dominated by Hediste	Entire intertidal estuarine component of site.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
		diversicolor and Heterochaeta costata community complex; and Fine sand dominated by Nephtys cirrose community complex.	
Sea Lamprey	Juvenile density in fine sediment.	Juvenile density at least 1/m^2.	Estuary Note: Important juvenile habitat identified immediately downstream of Ballina.

Killala Bay / Moy Estuary SPA

Ringed Plover (Charadrius hiaticula) [A137]

Golden Plover (Pluvialis apricaria) [A140]

Grey Plover (Pluvialis squatarola) [A141]

Sanderling (Calidris alba) [A144]

Dunlin (Calidris alpina) [A149]

Bar-tailed Godwit (Limosa lapponica) [A157]

Curlew (Numenius arquata) [A160]

Redshank (Tringa totanus) [A162]

Black-headed Gull (Chroicocephalus ridibundus) [A179]

It is noted that the possible input of contaminants to the estuary as a result of the proposed project would not affect the Habitat Area (single Attribute) of the qualifying interest Wetlands [A999].

Table 7: Killala Bay/Moy Estuary SPA: Attributes and Targets associated with identified Habitats and Species potentially affected by water pollution.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
Ringed Plover **Golden Plover** **Grey Plover** **Dunlin** **Bar-tailed Godwit** **Curlew** **Redshank**	Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by the listed species other than that occurring from natural patterns of variation.	Entire estuarine component of site

In the absence of mitigation, the significance of an effect on the above listed Qualifying Interests of the SAC and Special Conservation Interests of the SPA by contaminants, derived from activities associated

with the Project, entering the estuarine system would depend on the type of pollutant, as well as the magnitude and duration of a pollution event. Aquatic invertebrate communities and aquatic macrophytes can be affected by sediment loading which reduces both the biotic diversity and the food resource available for bird populations through direct toxicity to invertebrates. Suspended solids often hold nutrients such as phosphorus that can result in eutrophication and reduced oxygen levels, which can affect aquatic communities.

As the conservation objectives of the two identified Natura 2000 sites could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the Project, *i.e.* mitigation measures.

3.4 Mitigation Measures During Construction Phase

3.4.1 Maintenance of Water Quality

The objective of the mitigation measures is to avoid, minimise and control contaminated run-off entering drains and local watercourses and potentially the identified European sites which are hydrologically linked to the project site. The achievement of this objective is outlined in the following sections, with details in the accompanying EIAR (**Chapter 6: Aquatic Ecology & Chapter 9: Hydrology and Hydrogeology**).

All of the described measures are focused on preventing contaminated water from entering local watercourses which are linked to European sites. When in force, the mitigation measures will be monitored to ensure their efficacy. Should a failure in the mitigation occur, immediate action will be taken in accordance with the site-specific Emergency Plan (**CEMP – Management Plan** 1).

3.4.1.1 Mitigation by Avoidance

The greatest risk of adverse impacts on the aquatic environment will occur during the construction phase of the development. Key to minimising this risk has been the siting of all turbine locations and other key infrastructure at a minimum set-back from watercourses (65 m).

Of particular note is that the project will avail of the existing internal road network (with appropriate upgrades), with the need for only one new section of internal access road, as well as a new access road into the site.

3.4.1.2 Mitigation by Design

Drainage measures have been developed to protect all receiving waters from potential impacts during the construction of the Development in the catchments of the Wind Farm Site and the Hydrogen Plant Site. These measures are aimed at preventing sediments or other pollutants from entering watercourses through the containment and treatment on-site of all surface water run-off from areas of works. The appointed contractor will have appropriately qualified environmental personnel to ensure compliance during the

construction stage with all mitigation measures, planning conditions and legislative requirements related to the maintenance of water quality. An Ecological Clerk of Works (ECoW) will be appointed by the contractor as part of the environmental team for the duration of the project.

The mitigation measures have been incorporated into a Construction and Environmental Management Plant (CEMP) for the development which includes Construction Method Statements for key works. The CEMP has been developed using the Institute of Environmental Management and Assessment (IEMA) Practitioner "*Environmental Management Plans*", Best Practice Series, Volume 12, December 2008. The CEMP includes a Surface Water Management Plan (SWMP), a Water Quality Monitoring Plan and Watercourse Crossing Plan (WQMP) and a Waste Management Plan (WMP). The CEMP, SWMP, WQMP and WMP will require mandatory adherence by all parties involved in the construction of the Development (including any sub-contractors) in order to protect water quality within the study area. The development of the mitigation measures and all method statements for watercourse crossings follows all relevant guidance and current best practice.

The use of Sustainable Drainage Systems (SuDS) on site will minimise risk to watercourses from sedimentation during the construction and operational phases of the proposed development.

Surface water management measures will be put in place concurrently during the development of the various infrastructure. The measures entail the following key elements which are described in detail within the Surface Water Management Plan (**Appendix 2.1, CEMP**):

- Open Constructed drains for development run-off collection and treatment;
- Collection Drains for upslope "clean" water collection and dispersion;
- Filtration Check Dams to reduce velocities along sections of road which run perpendicular to contours;
- Settlement Ponds, Settlement Lagoons and Buffered Outfalls to control and store development runoff to encourage settlement prior to discharge at Greenfield runoff rates.

There will be no direct site run-off to watercourses during the construction phase with all outflows from drainage via settlement ponds from which treated surface water is released by diffuse overland flow at appropriate locations. To reduce the amount of silt laden water to be treated, clean water drains will be created upstream of the works area to divert water away from construction areas, thereby lessening the volume of water to be treated onsite.

De-watering of excavations, where required, will be through filtered 'silt socks' / dewatering bags or a '*Siltbuster'* or similar system, prior to discharge. Excavations will be kept to the absolute minimum for the specific task and undertaken on a 'just in time' basis to minimise the extent of silty water generated and requiring treatment prior to discharge.

Work on the three required watercourse crossings, which require culvert upgrades or extensions, will be carried out during dry conditions between July and September.

A comprehensive vegetation restoration programme will be implemented on disturbed peat surfaces to minimise the risk of run-off from bare peat surfaces post-construction (details in **Chapter 5, Section 5.5.2.2 of EIAR**). This will involve the replacement of saved sods of the surface bog vegetation or piles of surface peat (containing rhizomes, seeds etc.) which will have been removed at the commencement of works and stored. Reseeding of bare surfaces with a suitable seed mix (as recommended by the project ecologist) may supplement the above in some places.

3.4.1.3 Mitigation by Reduction

Implementation of the following specific measures will ensure the protection of water quality in local watercourses and will ensure that contaminated water does not reach the identified European sites which have hydrological connectivity with the proposed development area.

This is a summary of the principal required mitigation measures, with full details being presented in the EIAR (**Chapter 9: Hydrogeology and Hydrology**) and the Construction Environmental Management Plan.

- No works will take place within the 65 m buffer zone of watercourses except for construction of the required watercourse crossings and road upgrades.
- Site compounds and Soil storage areas will be located at a minimum distance of 65 m from any watercourse. All drainage from these facilities will be directed through a settlement pond with appropriate capacity and measures to provide spill containment.
- Sediment traps or settlement ponds will be provided at all outfalls during construction. Total suspended solid levels in all waters discharging to any watercourse shall not exceed 25 mg/l (Inland Fisheries Ireland, 2016)[1]. All construction site run-off will be channelled through a stilling process to allow suspended solids to settle out and through a spill-containment facility prior to discharge.
- Daily monitoring of all sediment traps and settlement ponds will be undertaken by the Contractor and supervised by the Environmental Manager to ensure satisfactory operation and/or maintenance requirements.
- The storage of oils, hydraulic fluids, etc., will be undertaken in accordance with current best practice for oil storage (Enterprise Ireland, BPGCS005).
- The pouring of concrete, sealing of joints, application of water-proofing paint or protective systems, curing agents, etc., will be completed in the dry to avoid pollution of the freshwater environment.
- Vehicles will be refuelled off-site where possible. For vehicles that require refuelling on-site, fuels will be stored in the temporary construction compound and bunded to at least 110% of the storage capacity of fuels to be stored. Refuelling will take place via a mobile

[1] Inland Fisheries Ireland (2016) *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*.

double skinned fuel bowser. The bowser will be a double axle refuelling trailer which will be towed to the refuelling locations by a 4x4 vehicle. The 4x4 will carry, a drip tray, spill kit and absorbent mats in case of any accidental spillages. Only designated competent personnel will refuel plant and machinery on the Site.

- All machinery operating on water course crossings will be steam-cleaned in advance of works and routinely checked to ensure no leakage of oils or lubricants occurs. All fuelling of machinery will be undertaken on dry land.
- Instream works shall be undertaken during the period 1st July to 30th September as required by Inland Fisheries Ireland Guidance (2016) to avoid accidental damage or siltation of spawning beds, and unless otherwise specified by IFI during consultations in advance of works.
- Culverting works will be undertaken in dry conditions and in low flow conditions on drains that do not run dry. This will be within the summer period during periods of dry stable weather.
- During the culvert installation and associated construction work, double silt fences shall be emplaced immediately downgradient and downstream of the construction area for the duration of the construction phase.
- There will be no concrete batching on the Wind Farm Site. Rather, it will be transported to the Site as it is required. A dedicated, bunded area will be created to cater for concrete wash-out. This will be for the wash-out of the chutes only after the pour. Concrete trucks will then exit the Site and return to the supply plant to wash out the mixer itself. The main concrete pours at the turbine locations will be planned in advance and proposed mitigation measures are summarised as follows (full details in EIAR **Chapter 9: Hydrology and Hydrogeology**):

    1. Avoiding large concrete pours, for Turbine Foundations for example, on days when heavy or prolonged rainfall is forecast, i.e., 25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or rainfall depth greater than monthly average in seven days (prolonged heavy rainfall over a week). Concrete pouring will be avoided during a period in which a Met Éireann Status Red weather event has been implemented.
    2. Ensuring that all concrete pour areas are dewatered prior to pouring concrete and while the concrete is curing.
    3. Making covers available so that areas can be covered if heavy rain arrives during the curing process which will prevent runoff of concrete which has a high pH.

- In the unlikely event of any incidents of pollution to watercourses, immediate steps will be undertaken to resolve the cause of the pollution and mitigate against the impact of

pollution, following the advice set out in, the site-specific Emergency Response Plan (**CEMP-Management Plan 1**).

3.4.2 Soil Stability

3.4.2.1 Mitigation by Avoidance and Good Practice

Mitigation to avoid or minimise the risk of peat and/or soil movement at the Wind Farm Site will be achieved through avoidance at design stage, good practice throughout the construction period, and monitoring through the construction and operational phases. Full details for mitigation are presented in the EIAR (**Chapter 8: Soils and Geology**) and the Construction Environmental Management Plan.

It is noted that areas of the Wind Farm Site of potentially high risk (GSI landslide susceptibility) in terms of peat and slope stability have been avoided by the construction footprint of the proposed wind farm. Vehicular movements, and especially cranes, during the construction and decommissioning phases will be limited to the footprint of the Development.

The following are key measures which will be adhered to throughout the construction phase of the project:

- All Site excavations and construction will be supervised by a geotechnical engineer/engineering geologist.
- The Contractor's Methodology Statement and Risk Assessment will be in line with the Construction Environmental Management Plan and will be reviewed and approved by a suitably qualified geotechnical engineer/engineering geologist prior to commencement of Site operations.
- Particular attention and pre-construction assessment and mitigation planning will be given to works associated with proximal geo-hazards, including for example T2, T3 and T13 which are above particularly sensitive areas of the site.
- Any excavations that have the potential to undermine the up-slope component of a peat and / or unstable subsoil slope will be sufficiently supported by buttress, frame or rampart to resist lateral slippage. In such excavations, the groundwater level (pore water pressure) will be kept low at all times (excavation dewatering) to avoid ground stability risks (subsidence) associated with peat and careful attention will be given to the existing drainage and how structures might affect it. Draining water from the construction area will be done through advanced dewatering techniques.
- In areas of saturated peatlands, prior to excavation, drains will be established to effectively drain grounds prior to earthworks.
- Due to peat's fluid-like properties, all peat excavated will be immediately removed from sloping areas. Peat will be carefully managed particularly when in temporary storage. Draining of stockpiled peat, in a controlled manner is recommended with a view to reducing the weight and mobility of the material, therefore reducing risk in terms of localised stability. Similar measures will be applied to the management of subsoil arisings at the site.

- Relatively high impact construction activities (e.g., excavations, movement of soils / subsoils / rock) will be limited to the spring to autumn period as this period is considered to be the optimal seasonal period in terms of likely rainfall conditions, low soil moisture deficit (SMD), and relatively stable pore water pressure conditions (not withstanding excessive human interference of pore waters). However, it should also be noted that the hypothesis of the spring to autumn period being optimum in terms of dry metrological conditions is based on 30 year average data, and in reality 30 year max rainfall events are observed to be significant throughout the year over the 30 year period (**EIAR Chapter 9 - Hydrology and Hydrogeology**). Therefore, considering the variability of metrological conditions and the potential for significant events to occur at any stage of the year, the construction phase will be limited to favourable meteorological conditions. Construction activities will not occur during periods of sustained significant rainfall events, or directly after such events (allowing time for work areas to drain excessive surface water loading and discharge rates reduce).

3.4.2.2 Emergency Response

Mitigation measures as outlined in the previous sections will reduce the potential for stability issues arising during the initial decommissioning and construction phases of the Project. However, there remains a low risk of stability issues arising, particularly at a localised scale.

Emergency responses to potential stability incidents will be established and form part of the CEMP before construction works initiate. The following potential emergencies and respective emergency responses are addressed in brief.

- Peat stability issues at a localised scale during excavation works – In the event that soil stability issues arise during construction activities, all ongoing construction activities at the particular area of the Site will cease immediately, the assigned geotechnical supervisor will inspect and characterise the issue at hand, corrective measures will be prescribed.
- Significant peat or slope stability issues during construction activities – In the unlikely event that soil and slope stability issues arise during construction activities, all ongoing activities in the vicinity will cease immediately, operators will evacuate the area by foot, the assigned geotechnical supervisor will inspect and characterise the issue at hand, corrective measures will be prescribed.

Considering the highly dynamic nature of peat or soil stability issues at any particular site, it is important to establish an equally dynamic yet robust framework to follow in the event of an incident. Establishment of an emergency framework will follow relevant guidance to initially qualify any incident (by on site competent geotechnical engineer) and risk assess the area, and to then apply initial measures and design a complete emergency / contingency plan in line with an established structured emergency response. Relevant guidance includes:

- Forestry Commission, Scotland (2006) Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume / Low Cost Roads Over Peat

- CIRIA (2006) Control of water pollution from linear construction projects. Site guide (C649)).

Emergency response will prioritise isolating and containing any materials which is being or will be intercepted by the established drainage network or receiving surface water network. Emergency materials and equipment requirements will be identified, incorporated in the CEMP, and will be managed with a view to being easily accessible and readily available.

On-site training and toolbox talks will ensure any response to any potential incident is escalated quickly and efficiently.

3.4.3 Horizontal Directional Drilling

As noted in **section 3.2** above, during the HDD processes along the Interconnector and Grid Connection routes there is a risk of leakages of drilling fluids which can have toxic effects on aquatic biota (depending on the type of lubricant used).

It is noted that for this Project, 'Clearbore' or a similar environmentally friendly drilling fluid product will be used during the HDD process. Clearbore is produced using free flowing polymers and is designed to instantly break down and become chemically destroyed in the presence of small quantities of calcium hypochlorite. At normal usage, the product is not toxic to aquatic organisms and is biodegradable (see details in **Chapter 9: section 9.4.5.14**).

Full details for mitigation during the HDD process are given in **Chapter 9: section 9.5.2.6**.

3.5 Measures During Operational Phase

3.5.1 Wastewater Discharges

Wastewater/sewerage from the staff welfare facilities at the Wind Farm Site will be collected and held in a sealed storage holding tank, fitted with a high-level alarm. The high-level alarm is a device installed in the storage tank that is capable of sounding an alarm during a filling operation when the liquid level nears the top of the tank. Chemicals are likely to be used to reduce odours.

All wastewaters will be emptied periodically and taken off-site by a licensed waste collector to the local wastewater sanitation plant in Ballina for treatment. There will be no on-site treatment of wastewater. A wastewater or sewerage leakage is not anticipated in a properly managed Site.

The wastewater from the Hydrogen Plant entails an appropriate level of treatment to remove or neutralise the potential pollutants within the wastewater prior to discharge of the water to the receiving watercourse. The final trade effluent entering the Dooyeaghny River will be subject to a discharge licence from the EPA and all parameters will be within the defined limits set by the licence.

There are two wastewater streams from the Hydrogen Plant:

- Hydrogen process wastewater
- Welfare (toilets, canteen etc).

The two wastewater streams will initially be dealt with separately. Welfare wastewater will be run through a septic tank, and then through a welfare constructed wetland (WCW). The WCW will be positioned in the northeast corner of the Hydrogen Plant Site and will be approximately 80 m^2 to facilitate the required retention time of c. 12 days to adequately treat the welfare effluent loading prior to discharge. The outfall of the WCW will then be combined with hydrogen process wastewater in storage. The hydrogen process wastewater, which will include water treatment reject, non-chemical rinse/ drains and the oil/water separator discharge, will be collected in a sump prior to discharge to the process constructed wetlands (PCW). The PCW will achieve a minimum of 6 days retention time prior to discharge to the Dooyeaghny River.

Subject to the above, the nature and quality of the proposed discharge of trade effluent will meet all surface water Environmental Quality Standards (EQS) and is therefore considered not to pose a risk to water quality within the receiving watercourse.

3.5.2 Mitigation for Major Hazard Event

Health and Safety protocols for the safe storage and handling of chemicals at the Wind Farm Site and the Hydrogen Plant Site are outlined in **Chapter 2 (section 2.6.6.2**). While there is a considerably larger risk associated with the Hydrogen Plant Site than with the Wind Farm Site, both components have been assessed in terms of potential environmental effects.

Chapter 16 (section 16.2.3.2) identifies, classifies and evaluates the risk associated with a major hazard event. It is noted that a risk management programme, ATEX Assessment and Safety Management System will be in place for the Project, and an Emergency Response Plan will be produced for the Hydrogen Plant Site

Given the higher risk posed at the Hydrogen Plant Site, a Quantitative Risk Assessment and Major Accidents Prevention Policy has been formed as part of the application. A person is required to be onsite of the Hydrogen Plant 24/7. Further on-site Quantitative Risk Assessments (QRA) will be prepared as the Hydrogen Plant progresses towards construction, into and during operations. **Chapter 16** of EIAR outlines the potential major accidents arising from the project and how they are mitigated for. The Major Accidents Prevention Policy stipulates the protocols to be followed to lower the risk of such an event occurring. HAZID workshops will aim to foresee hazards and implement. Emergency Response plans are discussed in detail in the Major Accidents Prevention Policy for the Hydrogen Plant.

All liquid chemicals will be stored in a bunded area on the Hydrogen Plant Site and will be subject to requirements of the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 to 2021 (as amended) and compliance with the requirements of REACH, *i.e.,* European Communities Regulation 1907/2006 for the Regulation, Evaluation, Authorisation and Restriction of Chemicals. Chemicals will be managed in accordance with European Chemicals Agency's Guidance for

Downstream Users (2014). Final selection of bulk chemicals will be subject to an assessment of trace elements to ensure that they are within acceptable limits. Storage of large volumes of oils and other hazardous substances will have a secondary containment such as a bund to prevent hydrocarbon contamination to land/water. Waste oils and other chemicals, including oil rags/wipes will be disposed of as hazardous waste. Operational staff will receive training on the handling, containment, use, and disposal requirements for all potentially polluting products on the Hydrogen Plant Site.

Chemicals accidentally introduced to the environment will be intercepted by drainage and surface water networks associated at the Hydrogen Plant Site. Storm water systems will include oil water interceptors. In line storage throughout wastewater treatment process will facilitate buffering flow and discharge rates. This includes a wastewater storage tank, sized c.1500 m^3 which will achieve the ability to stop discharging completely. If firewater run-off cannot be treated on site to reach acceptable levels it will be pumped out and tankered off-site to a licenced disposal facility.

While storage of chemicals on the Wind Farm Site will be limited to minor quantities of hazardous materials used for maintenance purposes, these will be housed in the site compound within a secure bunded COSSH store for the operational phase of the project.

The implementation of mitigation through design, avoidance principles, choice of best alternatives for location of works, pollution control measures, surface water drainage measures and other preventative measures have been incorporated into the project design in order to minimise potential significant adverse effects on major accidents and disasters at the Wind Farm Site and especially the Hydrogen Plant Site.

The Quantitative Risk Assessment concluded that the Hydrogen Plant location is acceptable. The Preliminary Hazard Analysis reports includes safety requirements as mitigation for each hazard identified. This mitigation, along with implementation of the Major Accident Prevention Policy (MAPP), means that the Significance of the environmental impact arising from the vulnerability of the Hydrogen Plant to Major Accidents and Natural Disasters has been assessed as an Imperceptible, long-term effect.

3.5.3 Soil Stability

As there is a low risk of stability issues arising at the Wind Farm Site, particularly at a localised scale, there is a need for vigilance in the post-construction phase of the proposed development. It is recommended that the site is monitored at a reasonable frequency during the operational phase of the proposed development. The frequency of monitoring during the operational phase will be conducted at a high frequency, *i.e.* weekly, during the initial year of operation, and will reduce, *i.e.* monthly, gradually over the following year (Year 2 of operation) minimum, or until site conditions are observed to be stable.

3.6 Mitigation Measures During Decommissioning Phase

Decommissioning of the Project will be scheduled to take place after the proposed 35 year lifespan of the project. A preliminary Decommissioning Plan accompanies the present planning application (see **Appendix 2.1 in EIAR**).

Potential impacts on European sites from the decommissioning phase of the Project are likely to be broadly similar to construction phase impacts, in terms of potential surface water quality impacts from ground disturbance, refuelling and the storage of potentially hazardous materials onsite. The implementation of all mitigation measures detailed for the construction phase will be adopted as relevant during the decommissioning phase to ensure all such impacts are avoided.

When the final Decommissioning Plan is prepared prior to decommissioning and presented as a standalone document, all drainage management measures, which will include maintenance of the operational drainage measures, will be included in that document, as required. However, it should be noted that by the time decommissioning is undertaken after the planned 35 year lifespan of the Project, the areas within the Wind Farm Site will have re-vegetated resulting in a resumption of the natural drainage management that will have existed prior to any construction. It is not anticipated that the decommissioning phase will interrupt this restored drainage regime in any way with the works proposed. As a minimum measure, areas where freshly placed soil material as part of turbine foundation reinstatement work will be surrounded by silt fencing if deemed necessary until the area has naturally revegetated.

Restoration of the Wind Farm Site following decommissioning of infrastructure will require the prior establishment of the new baseline conditions at the site which will have developed over the intervening 35 years life of the project. These studies will inform any modification or additional sensitivities that may need to be factored in restoration and site-specific measures.

The distribution of designated European sites, as well as their Qualifying Interests or Special Conservation Interests, at the time of decommissioning will be reviewed (as this may differ from the situation in 2023).

3.7 Analysis of "In-combination" Effects

The Habitats Directive requires competent authorities to make an appropriate assessment of any plan or project which is likely to have a significant effect alone or in-combination with other plans and projects.

There are eight wind farms within 20 km[2] of the Firlough proposed development (see **Table 8** and **Figure 4**), comprising a total of 65 turbines. The Carrowleagh Wind Farm and Carrowleagh Extension Wind Farm occur immediately to the east and north-east respectively of the Firlough Wind Farm Site. Also to the north are the Cloonkeelaun and Stockane Wind Farms. The other wind farm projects are

[2] A distance of 20 km is taken as a precautionary distance for potential in-combination effects to occur – such a distance is beyond the normal foraging range of bird species associated with SPAs.

located at distances between 2.4 km and 12.6 km from the Firlough site. The Firlough Wind Farm will add a further 13 turbines to the total of 65 turbines in the 20 km review zone.

An inventory of permitted projects within the vicinity of the Project has been compiled (see **Appendix 2.3, Chapter 2**). There projects received planning permission between 2015 and 2022. Most of the projects are domestic scale developments or agricultural related developments and no potential pathways to European sites are identified. Potentially relevant projects which have received planning permission are:

Planning Ref. Sligo 16422 granted on 11/07/2017 for a grid connection from permitted wind farm at Tawnamoe, Sligo to the Sligo/Mayo county boundary on County Road L-2604-39. Consists of a 20kV connection cable over 10.4 km, including 2.52 km overhead line

All of the wind farm and other projects will have been assessed by the competent authority for potential adverse effects on relevant European sites. As it has been demonstrated in this report that the Project, with mitigation in place, will not have adverse effects on the integrity of any European sites it can be concluded that there is no pathway for it to act in-combination with other plans and projects to give rise to in-combination cumulative effects on an European site.

Table 8: Wind Farms within 20 km of the Proposed Development at Firlough.

Planning Ref.	Location (Townland)	No. of Turbines	Distance from the Proposed Development
17/93 11/379	Black Lough Wind Farm	6	2.4 km north-east
06/3861	Carrowleagh Wind Farm	13	Adjacent wind farm
10235 15466	Carrowleagh Wind Farm Extension	4	Adjacent wind farm
08/617	Bunnyconnellan Wind Farm	12	5 km South
04/1010	Ounagh	3	7.5 km to the south-east
97/469 (10)	Kingsmountain Wind Farm	10	12 km north-east
03/619	The Dunneill Wind Farm	13	12 km north-east
02/816	Lacken Wind Farm	3	12.6 km north-west
22/161	Stokane Wind Turbine	1	2.5 km north

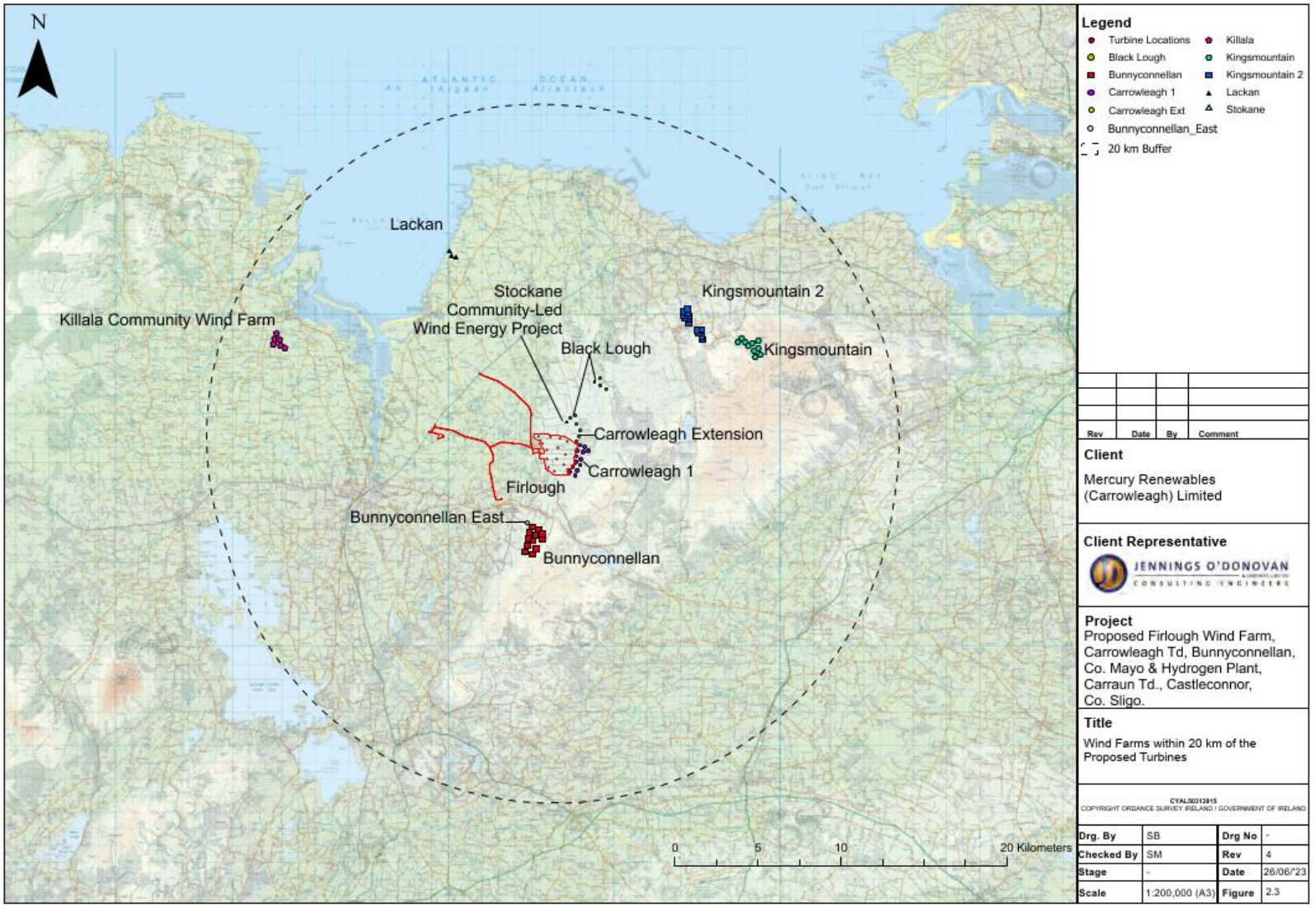

Figure 4: Distribution of wind farm sites within a 20 km distance of the proposed Firlough Wind Farm.

4 CONCLUSION

This Natura Impact Statement has considered the potential impacts of the proposed Project on the integrity of 6 no. identified European sites.

For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the Project which, by itself or in combination with other plans or projects, which may affect the relevant European Sites have been considered.

The NIS contains information that An Bord Pleanála, as competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which the Bord is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Project on the integrity of the relevant European sites.

In conclusion, in the light of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the proposed development will not adversely affect the integrity of any of the European sites concerned.

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