Natura Impact Statement

Carrigeen Renewable Energy Development

DEC Ltd.

March 2026

Carrigeen Renewable Energy Development

Co. Roscommon

Natura Impact Statement

Document Stage	Document Version	Prepared by
Final	1	Pat Doherty MSc, MCIEEM

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1 INTRODUCTION

Doherty Environmental Consultants Ltd has been commissioned by Carraigin Power Ltd. (the Applicant) to undertake a Natura Impact Statement to inform an Appropriate Assessment (AA), to be completed by the competent authority under Article 6(3) of the EU Habitats Directive, Council Directive 92/43/EEC, as transposed into national legislation by *inter alia* Part XAB of the Planning and Development Act 2000 as amended (the "PDA 2000"), of a Project comprising:

- 11 turbine wind farm at Carrigeen, Co. Roscommon;
- Provision of grid connection route between the proposed wind farm site and the existing ESB substation at Flagford, Co. Roscommon,
- A Turbine Delivery Route (TDR) from the Galway Port to the Project site. Widening of the existing road corridor along the TDR, outside of the Wind Farm Site, will be required at 1 no. locations.

Figure 1.1 shows the location of the proposed Wind Farm Site; the location of the proposed Grid Connection route and the location of the 1 no. road widening area along the proposed TDR, which is in the vicinity of the N17/N5 junction at Charlestown. **Figure 1.2** shows the proposed wind farm layout, whilst **Figure 1.3** provides a plan view of the Grid Connection.

In accordance with Article 6(3) of the Habitats Directive, as transposed into Irish law by *inter alia* Part XAB of the PDA 2000, a screening exercise for Appropriate Assessment (AA) has been completed to assess whether it could or could not be excluded, on the basis of objective information, that the Project, either individually or in combination with other plans or projects, is likely to have a significant effect on any European Sites. The screening exercise for Appropriate Assessment was completed by DEC Ltd. on behalf of the Applicant and concluded, on the basis of objective information, that, in the absence of appropriate mitigation, it could not be excluded at the screening stage that the Project, individually or in combination with other plans or projects, will have a significant effect on four number European Sites, namely the:

Cloonashanville Bog SAC

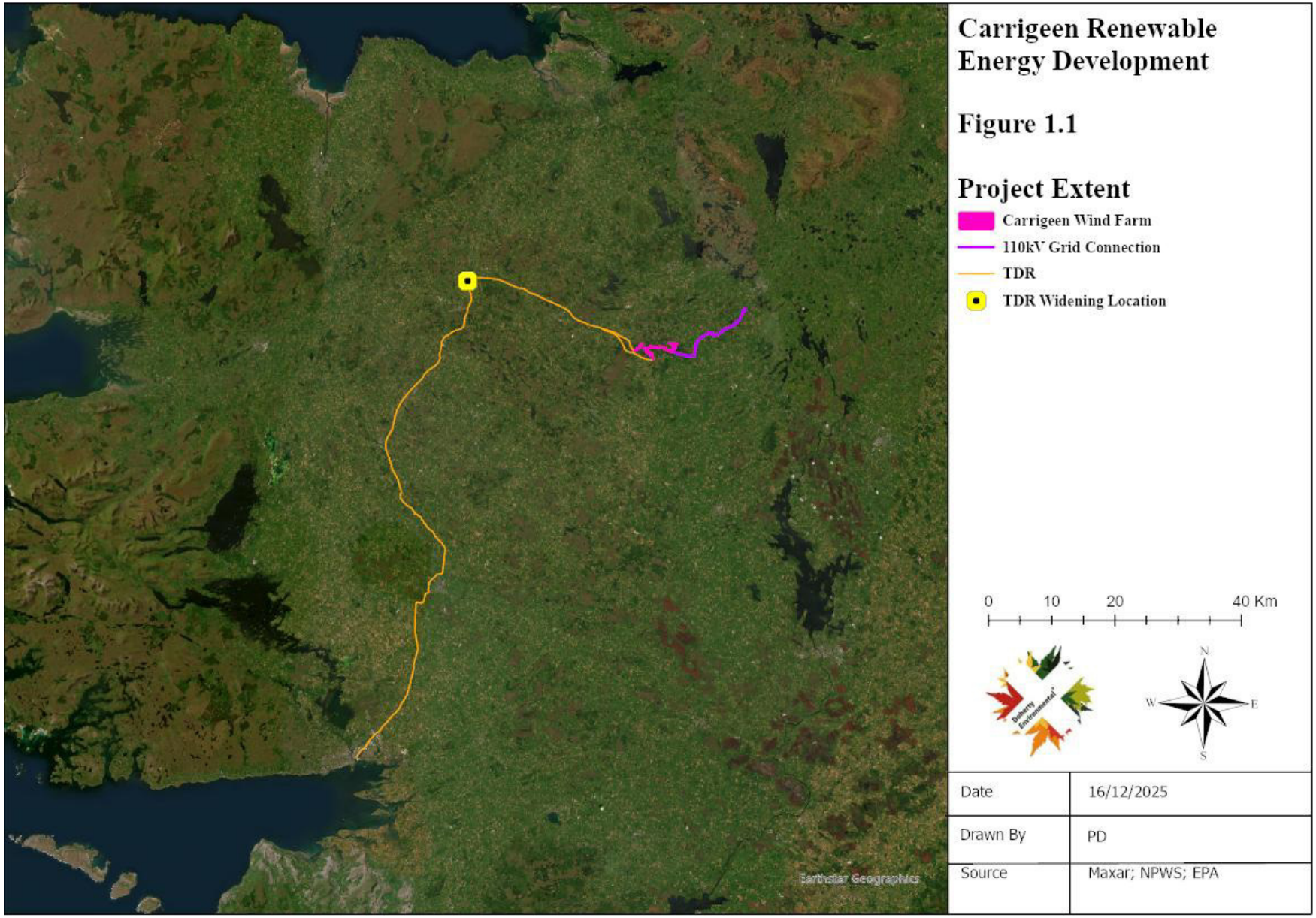
Bellanagare Bog SPA

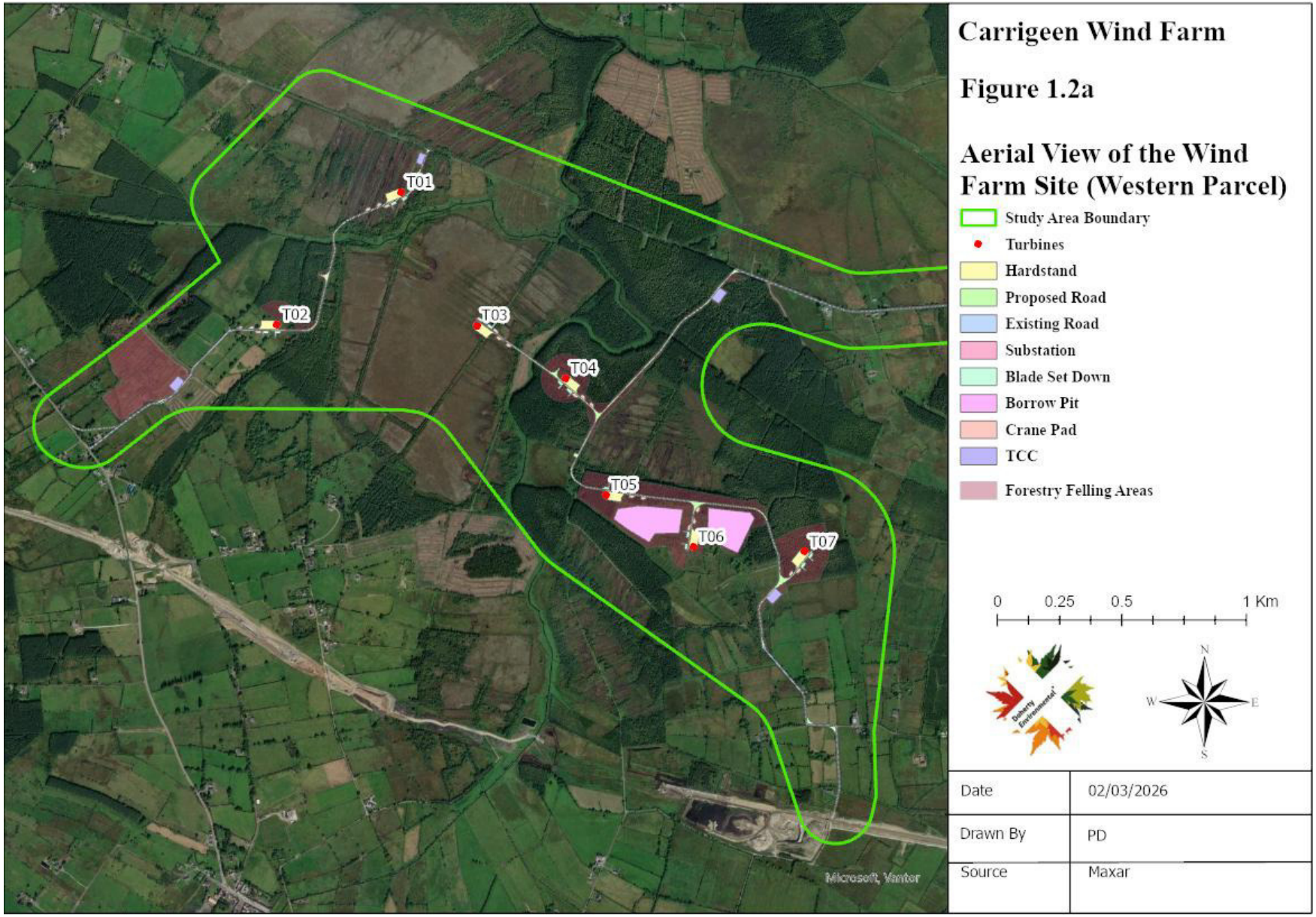
Lough Gara SPA

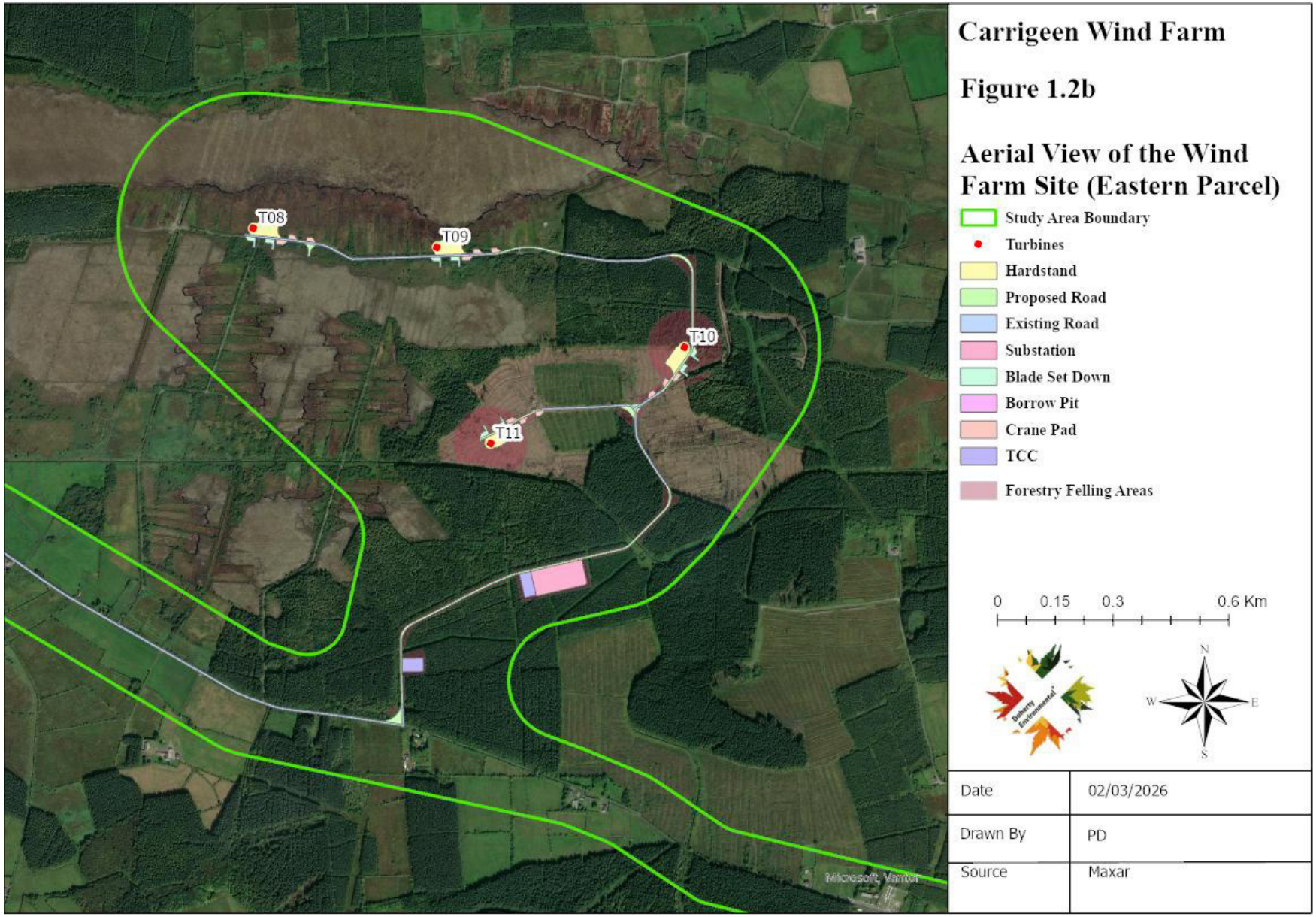
River Moy SAC

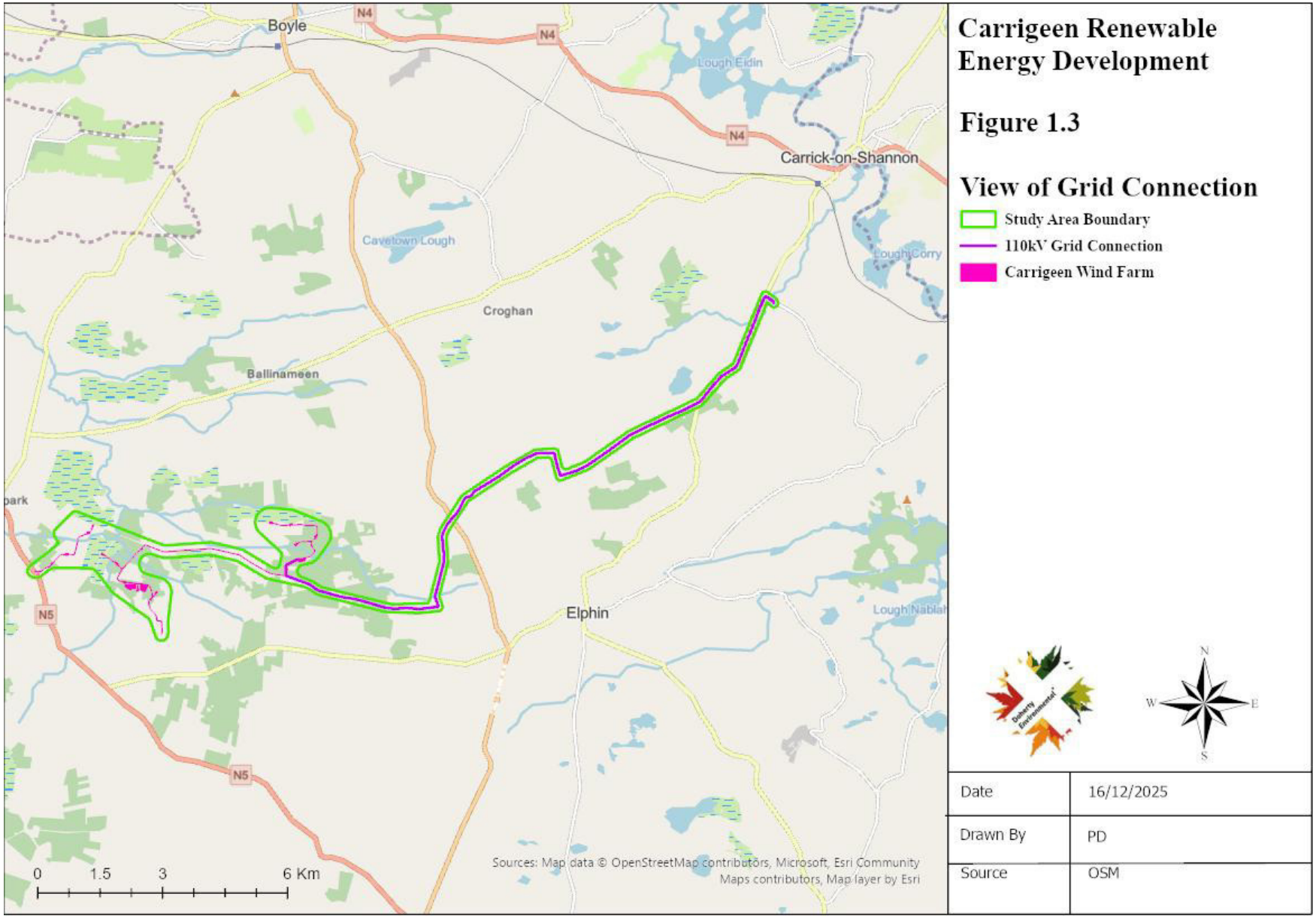
The location of these four no. European Sites with respect to the Project are shown on **Figure 1.4** and **Figure 1.5**. The screening exercise was informed by a highly precautionary approach. Such an approach was adopted to ensure consistency with the extremely low threshold for triggering likely significant effects as determined in both European and Irish case law. On the basis of that conclusion, it has been determined that AA is required in order to assess the implications of the Project for the above three listed European Sites. In accordance with Section 177T of the PDA 2000, a Natura Impact Assessment (NIS) of the project has been prepared in order to assist the competent authority, in this case An Coimisiún Pleanála, in carrying out its AA. This NIS provides an examination, analysis and evaluation of the likely impacts from the Project, both individually and in combination with other plans and projects, in view of best scientific knowledge and the conservation objectives of the European Sites concerned.

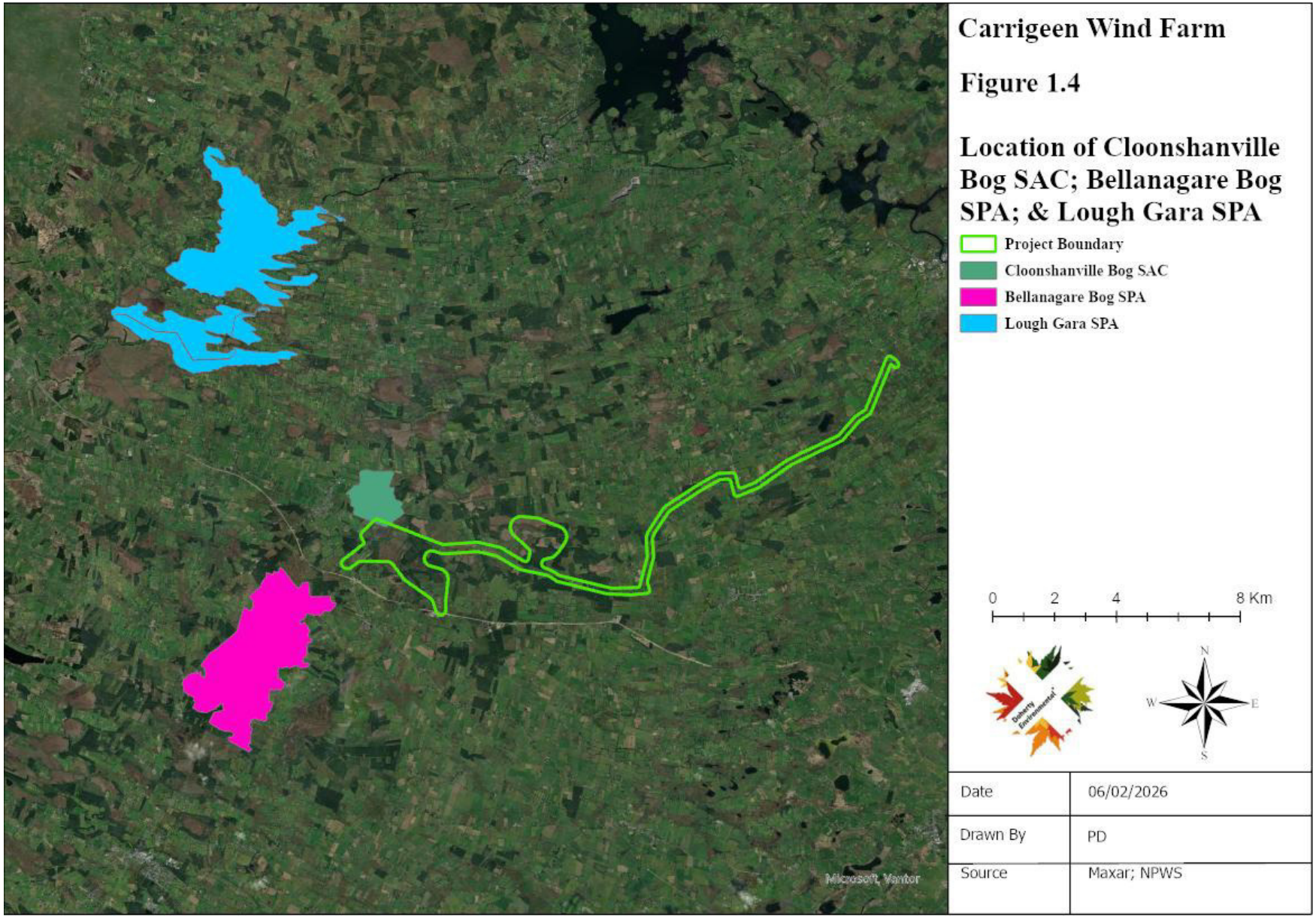
It also prescribes appropriate mitigation to ensure that the Project will not adversely affect the integrity of those sites identified as being at risk of adverse effects. Finally, it provides complete, precise and definitive findings, which are capable of removing all reasonable scientific doubt as to the absence of adverse effects on the integrity of the European sites concerned.

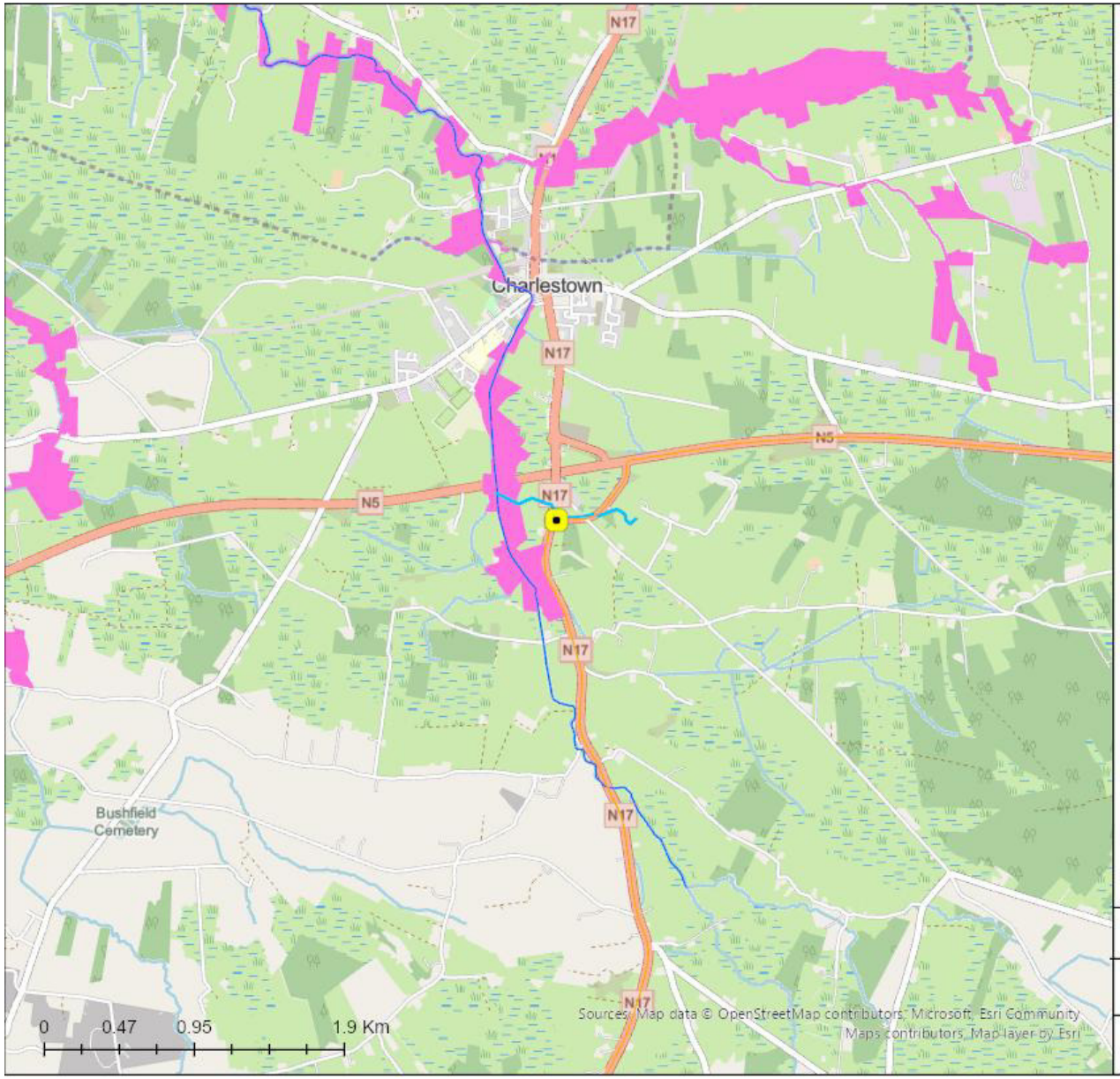

Carrigeen Renewable Energy Development
Figure 1.1
Project Extent
Carrigeen Wind Farm
110kV Grid Connection
TDR
TDR Widening Location
0
10
20
40 Km
N
W
E
S
Earthstar Geographics
Date
16/12/2025
Drawn By
PD
Source
Maxar; NPWS; EPA


T01
T02
T03
T04
T05
T06
T07
Microsoft, Vantor
Carrigeen Wind Farm
Figure 1.2a
Aerial View of the Wind Farm Site (Western Parcel)
Study Area Boundary
Turbines
Hardstand
Proposed Road
Existing Road
Substation
Blade Set Down
Borrow Pit
Crane Pad
TCC
Forestry Felling Areas
0 0.25 0.5 1 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar


T08
T09
T10
T11
Microsoft, Vantor
Carrigeen Wind Farm
Figure 1.2b
Aerial View of the Wind Farm Site (Eastern Parcel)
Study Area Boundary
Turbines
Hardstand
Proposed Road
Existing Road
Substation
Blade Set Down
Borrow Pit
Crane Pad
TCC
Forestry Felling Areas
0 0.15 0.3 0.6 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar


Boyle
N4
N4
N4
Lough Eidin
Carrick-on-Shannon
Cavetown Lough
Lough Corry
Croghan
Ballinameen
park
N5
N5
Elphin
Lough Nabla
0
1.5
3
6 Km
Sources: Map data © OpenStreetMap contributors, Microsoft, Esri Community Maps contributors, Map layer by Esri
Carrigeen Renewable Energy Development
Figure 1.3
View of Grid Connection
Study Area Boundary
110kV Grid Connection
Carrigeen Wind Farm
N
W
E
S
Date
16/12/2025
Drawn By
PD
Source
OSM


Carrigeen Wind Farm
Figure 1.4
Location of Cloonshanville Bog SAC; Bellanagare Bog SPA; & Lough Gara SPA
Project Boundary
Cloonshanville Bog SAC
Bellanagare Bog SPA
Lough Gara SPA
0
2
4
8 Km
N
W
E
S
Date
06/02/2026
Drawn By
PD
Source
Maxar; NPWS
Microsoft, Vantor



Carrigeen Renewable Energy Development

Figure 1.5

River Moy SAC in Vicinity of TDR Works at N17/N5 Roundabout Charlestown

- TDR
- TDR Widening Location
- River Moy SAC
- Non-EPA Mapped Stream
- Charlestown/Mullaghanoe Stream

N
W E
S

Date	02/03/2026
Drawn By	PD
Source	Maxar; NPWS; EPA

1.1 STATEMENT OF AUTHORITY

This Natura Impact Statement has been prepared by Mr. Pat Doherty BSc., MSc, MCIEEM, of DEC Ltd. Mr. Doherty is a consultant ecologist with over 20 years' experience in completing ecological impact assessments and environmental impact assessments. Pat has been involved in the completion of assessment reports for proposed developments and land use activities under the EIA Directive and Article 6 of the Habitats Directive since 2003 and 2006 respectively. He has extensive experience completing such reporting for projects located in a variety of environments and has a thorough understanding of the biodiversity issues that may arise from proposed land use activities. Pat was responsible for completing one of the first Appropriate Assessment reports for large scale infrastructure developments in Ireland when he prepared the Appropriate Assessment for the N25 New Ross Bypass in 2006/07. Since then, Pat has completed multiple examinations of both plans and projects in Ireland. He has completed Natura Impact Statements for national scale plans such as Ireland's CAP Strategic Plan and National Seafood Development Plan and regional and county scale plans including County Development Plans, Local Area Plans, Tourism Strategies and Climate Action Plans. Pat has completed multiple Natura Impact Statements for a range of development types that include large scale infrastructure developments in sectors such as transport and energy as well as industrial, commercial and residential developments.

Pat has completed focused certified professional development training in Appropriate Assessment as well as in a range of ecological survey techniques and assessment processes. Training has been completed for National Vegetation Classification (NVC) and Irish Vegetation Classification (IVC) surveying, bryophyte survey for habitat assessment and identification, professional bat survey and assessment training, mammal surveying and specific training for bird and bat survey techniques. Ongoing training has been completed by approved training providers such as CIEEM, British Trust for Ornithology, the Botanic Gardens and the Field Studies Council.

2 METHODOLOGY

2.1 GUIDANCE

This NIS has been undertaken in accordance with National and European guidance documents: Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities (DEHLG 2010) and *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats directive*

92/43/EEC. The following guidance documents were also adhered to during the preparation of this NIS:

- A guide for competent authorities. Environment and Heritage Service, Sept 2002. Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (2010). DEHLG.

- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance of the Provisions of Article 6(3) and (4) of the Habitats Directive 92/42/EED. European Commission (2021).

- Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission (2018).

The information provided in this NIS is also guided by European and Irish case law guiding the approach to Stage 2 Appropriate Assessment. It is noted that the consideration of impacts provided in Section 6 of this NIS has been undertaken in the absence of any regard to construction phase best practice measures and operation phase design measures that aim to safeguard the receiving environment and European Sites from potential adverse impacts.

2.1.1 Background to Habitats Directive Article 6 Assessments

The EC (2021) guidelines outline the stages involved in undertaking an assessment of a project under Article 6(3) and 6(4) of the Habitats Directive. The assessment process comprises the three stages outlined below. This NIS presents the findings of an examination, analysis and evaluation of the project to inform a Stage 2 Appropriate Assessment of the project.

- Stage 1 – Screening: This stage defines the proposed project, establishes whether the proposed project is necessary for the conservation management of the European Site and assesses the likelihood of the project to have a significant effect, alone or in combination with other plans or projects, upon a European Site.

- Stage 2 – Appropriate Assessment: If a plan or project is likely to have a significant affect an Appropriate Assessment must be undertaken. 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 Project 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 project 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 – This stage of the process is governed by Article 6(4) and arises where adverse effects on the integrity of a European site cannot be excluded and where the developer considers that the plan or project is necessary for imperative reasons of overriding public interest. This is only possible if there are no alternative solutions, the imperative reasons of overriding public interest are duly justified, and if suitable compensatory measures are adopted to ensure that the overall coherence of the European Sites is protected.

2.1.2 Stage 2: Appropriate Assessment

The EC Guidance Assessment Criteria for a Stage Two Appropriate Assessment provides the following steps:

1. the collection of information on the project and on the European Sites concerned;
2. An assessment of the implications of the project in view of the site's conservation objectives, individually or in combination with other plans or projects;
3. An evaluation as to whether the project can have adverse effects on the integrity of European Sites;

4. The consideration of mitigation measures (including their monitoring).

This NIS addresses each of these items, through the following sections provided below.

2.2 SCIENTIFIC INVESTIGATIONS

A range of scientific site investigations have been completed for the project and these are relied upon in this Natura Impact Statement. The primary investigations include ecological field surveys, ornithological field surveys, hydrological field surveys and geotechnical field surveys.

Desk-based investigations were completed to identify pathways connecting the Project to European Sites. Datasets used to assist with the desk-based investigations include:

- NPWS European Sites and site-specific conservation objectives datasets;
- EPA Rivers and Lakes dataset;
- EPA surface water catchment and sub-catchment datasets;
- NPWS Article 17 Habitats and Species datasets;
- OSI Geohive and OSI Historic townlands online mapping portal;
- National Biodiversity Data Centre (NBDC) online mapping portal; and
- NPWS Protected Species Dataset for the Project site and surrounding area.

The ecological field surveys that have been completed include:

- Habitats and vegetation surveys and mapping at the Project site
- Ornithological surveys which included non-breeding season and bird species vantage point surveys, transect surveys and hinterland surveys completed between the breeding season of 2022 and the breeding season of 2025, amounting to 4 no. breeding seasons and 3 no. non-breeding seasons.
- Bat surveys over spring, summer and autumn during the 2025 bat activity seasons.

- Aquatic surveys including habitat assessment, fish habitat suitability assessment surveys, biological water quality surveys and physio-chemical water sampling.

Detailed hydrological investigations were completed at the Project site between September 2024 and February 2025.

Detailed hydrological and geotechnical surveys were also completed at the Wind Farm Site between September 2024 and February 2025.

The methods used during the completion of these site investigations are described in full in Chapter 6, 7, 8, 9, 10 and 11 of the EIAR (Jennings O'Donovan, 2026).

3 PROJECT DESCRIPTION

3.1 PROJECT OVERVIEW

The Project will consist of the provision of the following:

- 11 no. Wind Turbines with an overall turbine tip height of 185m, turbine hub height of 103.5m, and rotor blade diameter of 163m, a meteorological mast with a height of 30 metres, and associated foundations and hardstanding areas, and subsequent decommissioning of the wind turbines and meteorological mast, following a thirty five year operational life from the date of full commissioning of the wind turbines;

- A 110kV substation compound (Including control buildings (591 Sq. m) with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, storage containers, underground wastewater holding tank, site drainage and all ancillary works);

- Underground electrical (110kV) and communications cabling from the proposed 110kV Onsite Substation to the existing Flagford 220kV substation in the townland of Flagford (including joint bays, communication chambers, earth sheath links, and ancillary works along the underground electrical cabling route). This cabling route is primarily located within the public road corridor;

- Underground electrical (33kV) and communications cabling connecting the Wind Turbines and meteorological mast to the proposed 110kV Onsite Substation;

- 6 no. Temporary Construction Compounds (including site offices and welfare facilities (with a floor area of 405 Sq. m)).

- Junction accommodation works to facilitate turbine delivery and construction access to the Wind Farm Site, including the upgrade of an existing site entrances off the N5 national road, and the construction of new site access roads off the L-1217 and L-56421 local roads;

- Upgrade of existing Site Access Roads and provision of new Site Access Roads, junctions and hardstand areas (including upgrade of 3.6km of the L-1217, 660m of the L-56402, 360m of the L-5642, 480m of the L-56421, 210m of the L-56492 and 85m of the L-56491 local roads);

- 2 no. Borrow Pits;
- Peat & Spoil Management;
- Site Drainage;
- Tree felling and vegetation removal;
- Operational stage site signage;
- Biodiversity Enhancement measures and;
- All ancillary works and apparatus.

The Onsite Substation and Grid Connection will be under the ownership of ESB Networks and will form a permanent part of the national grid infrastructure, which will not be decommissioned with the wind farm at the end of its operational life.

3.1.1 Wind Turbine Generator

The proposed Wind Turbines will be of typical modern design and will be a three-bladed, rotor up wind of the tower, variable speed, pitched blade regulated machine. Wind Turbine appearance will be a matt non-reflective finish in a white, off-white or grey colour. Each of the 11 proposed Wind Turbines shall have a foundation-to-tip height of 185m.

The proposed Wind Turbines will have a circular based tower, sitting on reinforced concrete foundations. The Wind Turbine tower will support the nacelle, rotor hub, and rotor blades. Commercial wind turbine towers are made of steel or a hybrid of steel and concrete. The components within the nacelle are mainly metal (steel, copper, aluminium, etc.) with a

metal/plastic/glass-reinforced plastic (GRP) body, The blades can be made of a matrix of glass-fibre reinforced polyester or wood-epoxy or similar composite materials.

Each Wind Turbine will have a generator with a capacity of up to c.5.7MW. The Wind Turbines may be direct drive machines or may contain a gearbox. The final Wind Turbine will be chosen in a competitive tendering process as part of the Project financing process, after all necessary consents have been secured but will adhere to the parameters set out in **Table 3.1**.

Table 3.1: Wind Turbine Parameters

Wind Turbine Parameter	Assessment Envelope
Blade Tip Height	185m
Rotor Diameter	163m
Hub Height	103.5m

3.1.2 Turbine Foundation and Turbine Hardstands

The Turbine Hardstand is designed to accommodate the delivery, laydown, and assembly of turbine components (in particular, rotor assembly) prior to turbine lifting and assembly. The Turbine Hardstands are needed to support the cranes during turbine construction, operational and maintenance and for decommissioning. The Turbine Hardstands will be constructed and used to facilitate Turbine Foundation construction, such as steel reinforcement delivery and pouring of concrete.

The total Turbine Hardstands area will be c.45,435m^2 and includes the main crane hardstand, the component set down area, the assist crane hardstands and the vehicle parking. These areas will consist of hardcore material topped with crushed stone.

Construction of the Turbine Hardstand and met mast hardstand will require the excavation of soils, the laying of a geotextile material on the formation surface and placing engineered stone and a top dressing.

The Turbine Foundations will be made of steel reinforced concrete, c.27.2m in diameter and have a depth of c 3.5m. The final Turbine Foundation design will depend on the turbine type and will be decided by the structural engineers at detailed design stage. The central part of the foundation (plinth) as seen on **Drawing No. 6575-JOD-CGWF-XX-DR-C-0501**, will be c.6m in diameter and will be raised from the main Turbine Foundation below ground level.

The area around and above the Turbine Foundation will be backfilled with compacted stone or crushed rock to a minimum specific density as this acts as additional ballast on top of the finished wind turbine foundation.

Confirmatory site investigations will be undertaken post consent to confirm that conditions do not vary from those encountered when initial investigations took place. This will confirm that the mitigation measures to be implemented remain accurate in protecting the environment. All proposed Wind Turbines, with the exception of T1 and T3, are expected to be traditional gravity foundations. These are concrete structures that depend on their own weight to achieve sufficient stability against overturning and sliding.

Turbine Foundations will need to be taken down to a level where the underlying soil or rock can bear the weight of a structure without shifting or compressing. This will be done by excavating through the peat / soil, subsoil and rock where necessary (depending on the various geological locations).

The proposed Wind Turbines T1 & T3 will likely require piled foundations, comprising rotary bored piles into bedrock supporting the concrete base slab with a central upstand to support the tower. A typical piled foundation for turbines such as that proposed use approximately 20 No. 10m long piles bored at least 3m into intact limestone bedrock. Piled foundation bases will be approximately 21m in diameter with detailed foundation design being dictated by the local ground conditions. The construction methodology for the turbine foundations is detailed the **CEMP** (provided under separate cover with the planning application documentation). The arrangement is shown on Drawing No. **6575-JOD-CGWF-XX-DR-C-502.** The foundations for each individual Wind Turbine will be designed by the appointed designer.

After the foundation level of each Wind Turbine has been formed, the bottom section of the turbine tower or cage reinforcing steel is then built up around and through the foundation insert or bolt cage and the outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete.

The method of construction for a gravity Turbine Foundation is described as follows:

- Set out Turbine Foundations and required finish levels etc.
- Construct formation and/or supporting structures.
- Construct drainage as required.
- Provide a minimum of 100mm concrete blinding.
- Place bottom mat of steel reinforcing.
- Place Turbine Foundation base insert or bolt cage.
- Fix cable ducting and foundation earthing.
- Complete reinforcing steel.
- Fix shuttering to base sidewalls.
- Fix ducts and earthing wires between insert and walls of base.
- Carry out any corrective works as directed by Engineer.
- Check weather conditions and schedule concrete deliveries.
- Place concrete and take quality control slumps and cubes.
- Concrete surface finishing.
- Apply curing and protection of concrete.
- Strip formwork.
- Placing of any earthing wires around and over the base.
- Backfill base sides and place overburden.

- Confirm that cube results are satisfactory[1].

- Grout the top flange.

The method of construction specific for the piled foundation is described as follows:

- Excavate approximately 300mm to 500mm of topsoil and install approximately 500mm of crushed stone, compacted in two layers to form a stable platform used to support the piling rig during drilling.

- Set out pile locations.

- Construct piles by drilling vertical holes of approximately 900 mm in diameter to a minimum depth of 3 m into bedrock and installing steel reinforced cage and structural concrete.

- Excavate the footprint of the turbine foundation including working width for formwork and duct installation to formation level.

- Construct 100 mm thick concrete blinding layer.

- Prepare top of piles for connection to foundation reinforcement

- Once formation level, pile preparation and concrete binding is in place, the methodology will be the same construction methodology as outlined for gravity turbine foundations above.

3.1.3 Access to the Wind Farm Site

There are 5 proposed site entrances. The site entrances are shown on EIAR Figure 2.2.

Site entrance 1 on the existing N5 and site entrance 1a on the L56402 will be constructed to facilitate the delivery of the Wind Turbine components to Wind Turbines T1 and T2. The site

[1] Concrete cubes made during the pouring of the base are crushed to confirm that the required concrete strength has been reached.

entrances will allow abnormal load vehicles to leave the N5 at site entrance 1 and join the L56402 at site entrance 1a to access Wind Turbines T1 and T2 and avoid the existing N5 / L56402 junction which is not suitable for abnormal load vehicles. The existing N5 is a 6.0m wide Type 3 single carriageway with hard strips and grass verges. The N5 runs between Longford and Westport and currently has a 100km/h speed limit classification at the proposed site entrance 1. Existing traffic volumes on the N5 were obtained from the TII traffic counter on the N5 located to the east of Frenchpark near site entrance 1. The results from the automatic traffic counter show that in 2025 the N5 had an annual average daily traffic (AADT) of 6,471 vehicles with 10.6% HGV traffic. The realignment of the N5 between Ballaghaderreen to Scramoge is due to open in 2026 and the section of the N5 at site entrance 1 will become a regional / local road with reduced traffic volumes and reduced speed limit. Site entrance 1 on the N5 will be used by abnormal load vehicles during Wind Turbine delivery, general construction traffic will use the existing N5 / L56402 junction to access the Wind Farm Site. The L56402 is typically a 3.0m wide single carriageway with grass verges and has a 60km/h speed limit classification. Existing traffic volumes on the L56402 are calculated from the classified traffic counts carried out by JOD on 12th December 2025 at the N5 / L56402 junction. Using the methodology from TII publication PE-PAG-02039 to calculate the AADT from short period traffic counts, the resulting AADT on the L56402 is calculated from the recorded traffic counts. The L56402 local road has an AADT of 57 vehicles at its junction with the N5 which equates to a two-way traffic flow of approximately 4 vehicles during peak hour traffic periods with 0% HGV traffic recorded during the survey period. The L56402 is currently used for forestry operations and will be used by HGV's for haulage of construction materials and components to the Wind Farm Site.

Site entrances 2, 3 and 5 will be constructed on the L1217 local road. Site entrance 2 will be a new entrance and site entrances 3 and 5 will be constructed at existing forestry entrances which will be upgraded for construction and Wind Turbine delivery traffic. The L1217 runs between the R361 regional road at Frenchpark to the L1216. The L1217 is typically a 3.0m wide single carriageways with grass verges and has a 60km/h speed limit classification. The L1217 local road will be used by wind farm construction, operations and Decommissioning traffic to access the Project. Existing traffic volumes on the L1217 are calculated from the classified traffic counts carried out by JOD on 12th December 2025 at the L1216 / L5601 junction. Using the methodology from TII publication PE-PAG-02039 to calculate the AADT from short period traffic counts, the resulting AADT on the L1217 is calculated from the recorded traffic counts. The L1217 local road has an AADT of 128 vehicles at its junction with the L5601 which equates to a two-way traffic flow of approximately 9 vehicles during peak hour traffic periods with 0% HGV traffic recorded during the survey period. The L1217 is currently used for forestry

operations and will be used by HGV's for haulage of construction materials and components to the Wind Farm Site.

Site entrance 4 on the L56421 will be a new entrance constructed to access Wind Turbines T3 to T11 of the Project. Access to site entrance 4 will be from the new N5 / L5642 priority junction using the L5642 and L56421 local roads. The L5642 and L56421 local roads are typically 3.0m wide single carriageways with grass verges and have a 60km/h speed limit classification. The L5642 and L56421 local roads will be used by wind farm construction, operations and Decommissioning traffic to access the Project.

Further details of site entrances are set out in EIAR Chapter 16: Traffic and Transportation.

3.1.4 Turbine Delivery Route

It is proposed that the Wind Turbine nacelles, tower hubs, turbine towers, and rotor blades will be landed at Galway Port from their country of origin. From there they will be transported to the Wind Farm Site via the L5048, R339, N83, N17 and N5 to the upgraded site entrances.

The delivery of the Wind Turbines will require co-ordination with a number of statutory bodies including Galway, Mayo and Roscommon County Councils, An Garda Síochána, and Transport Infrastructure Ireland (TII); and delivery details are set out in EIAR **Chapter 16: Traffic and Transportation**.

A trial run will be undertaken prior to delivery of Wind Turbine components, this will include assessment of vertical alignment of the road network. If the vertical alignment is not sufficient for the length of the blade delivery vehicles, a dolly type vehicle can be utilised.

Enabling works required along the Galway Port route are set out in **Table 3.2.**

Temporary accommodation requirements will be required to accommodate the delivery of the Wind Turbine components. The works locations are outlined in **Table 3.2**.

Table 3.2: Enabling Works for Galway Port Turbine Delivery Route

Location	ITM (Easting)	ITM (Northing)	Works Required
R339 / R338 Junction	531128	726314	1. Bollards to be temporarily removed from central island.
R339 / L5034 Junction	531745	726697	1. Traffic lights to be temporarily relocated 2. Lighting Column to be temporarily relocated 3. Lighting Column to be temporarily relocated 4. Vegetation to be trimmed 5. Lighting Column and pole to be temporarily relocated
R336 / L5034 Junction	531798	727007	1. Lighting column on inside of bend to be temporarily relocated 2. Loadbearing area to be constructed 3. Vegetation to be trimmed for load oversail
N17 / N83 Junction, Tuam	541634	751131	1. Lighting column to be temporarily removed 2. Sign to be temporarily removed 3. Signs to be temporarily removed from splitter island 4. Vegetation to be trimmed
N17 / N83 Junction, Tuam (West)	543806	754103	1. Lighting column to be temporarily removed 2. Road sign to be temporarily removed on central island 3. Road sign on splitter island to be temporarily removed at two locations 4. Sign in verge to be temporarily removed
N17 Milltown	540584 540073	762895 763383	1. Signs and bollards to be temporarily removed from central island at two locations.
N17 Ballindine	536890 536742	769010 769299	1. Signs and bollards to be temporarily removed from central island at four locations. 2. Bollards to be temporarily removed from central islands at two locations
N17 / N5 Roundabout, Charlestown	547918	800434	1. Road widening in verge 2. Road widening / Foothpath strengthening 3. 2 no. Lighting columns to be temporarily removed 4. Signs to be temporarily removed from islands at two locations 5. Vegetation to be trimmed
N5 Junction, Charlestown	548388	800815	1. Flexible bollards to be temporarily removed from slip road 2. Flexible bollards to be temporarily removed from N5 3. Lighting column to be temporarily removed 4. Sign to be temporarily removed from splitter island 5. Sign to be temporarily removed from verge 6. Vegetation to be removed 7. Oversail in third party lands
Realigned N5 to Existing N5, Frenchpark	569070	793015	1. Temporary access road to be constructed between realigned N5 and existing N5

Location	ITM (Easting)	ITM (Northing)	Works Required
Site Entrance 1, N5	574150	789496	1. Site Entrance 1 - New site entrance on the existing N5 constructed to accommodate the swept path of abnormal vehicles.
Realigned N5 / L5642 Junction	577210	787922	1. Road widening at junction for abnormal load vehicles
L5642 & L56421 Local Roads	577220	788280	1. Road widening in third party lands
Site Entrance 3, L56421	576818	790119	1. Site Entrance to be Constructed on L56421 2. Vegetation to be trimmed for load oversail
Site Entrance 4, L1217	576938	788599	1. Site Entrance to be Constructed on L1217 with overrun area for abnormal load vehicles 2. Vegetation to be removed for oversail
Site Entrance 5, L1217	580207	789375	1. Site Entrance to be Constructed on L1217 with overrun area for abnormal load vehicles 2. Vegetation to be removed for oversail

Abnormal loads for the Project will be shipped to Galway Port. The Wind Turbine components will be transported on the public road network using abnormal load vehicles between the landing port and site entrance 1 or site entrance 4 on the N5. The site entrances are shown on **Figure 1.2a** and **Figure 1.2b**.

The delivery of the Wind turbines will require co-ordination with the Council's Roads Department, An Garda Siochána, TII and Motorway Operators. Efforts will be made to avoid peak times such as school drop off times, church services, peak traffic times where it is considered this may lead to unnecessary disruption, and abnormal loads may travel at night and outside the normal construction times as may be required by An Garda Síochána. The process has been set out in the Traffic Management Plan (TMP) **Appendix 16.2** which will be implemented in full and will be further developed prior to the commencement of construction by the Contractor. The proposed TDR is shown on **Figure 1.1**.

All material deliveries will have a maximum axle load of 12 tonnes per axle and a maximum gross vehicle weight of 139 tonnes. The vehicle weights do not exceed 180 tonnes and are therefore not subject to a Category 3 structural assessment as defined in Section 1.3 of DN-STR-03001 published by TII for exceptional abnormal loads.

3.1.5 Construction Haul Routes

3.1.5.1 Machinery Access for Felling

For the proposed commercial forestry felling activities, it is intended that much of the existing commercial forest track infrastructure will be utilised. The Wind Turbine layout seeks to maximise use of the commercial forestry access tracks already present. Where there is already a track there will be less intrusion and disturbance to the soil and surrounding trees. Some widening and building up of the existing track network will be required which will minimise impacts on habitats compared to the construction of new forest tracks. These upgraded tracks will also be used for access for removal of the felled timber.

3.1.6 Site Access Roads

Site Access Roads refers to the internal road structure to facilitate the construction, operation and decommissioning of the Project. The Site Access Roads layout follows the existing commercial forestry access tracks into the Wind Farm Site as far as possible and avoids environmental constraints. Every effort has been made to minimise the length of track necessary.

Site Access Roads will be upgraded and constructed to provide a running width of 5m but may be wider at bends. The proposed Site Access Roads construction detail is shown on Drawing No. **6575-JOD-CGWF-XX-DR-C-401**-and **6575-JOD-CGWF-XX-DR-C-TBC402** for Access Track Construction Details (provided under separate cover as part of the planning drawings) and the Site Access Roads are shown in **Figure 1.2a** and **Figure 1.2b.**

The Site Access Roads within the floodplain will be finished at existing ground level during the construction phase and track edges will be marked out using snow poles. During the operational phase, the roads will be set to the 1 in 20-year flood level. In the event of a flood event, the maximum flooded depth along access roads will be between 200 and 400mm. Site Access Roads will be marked with snow poles to allow for emergency vehicular access. A length of c.6,382m of existing Site Access Roads will be upgraded for the Project to minimize land take.

There will also be c.5,325m of new Site Access Roads required for the Project. These Site Access Roads will be excavated to firm bearing strata and constructed using rock from the Turbine Foundation excavations, the onsite Borrow Pits, or from imported quarry stone. Site

Access Roads are shown on **Figure 1.2a** and **Figure 1.2b**. Sections of the new Site Access Roads will be of a floating road construction type. Site Access Roads across peat greater than 1m deep will be floated using layers of geosynthetic materials and aggregates. Site Access Roads on peat less than 1m deep will generally be constructed using traditional cut and fill methodology.

There are five proposed crossings of rivers and natural streams along the internal Site Access Roads, and 1 proposed crossing along the L1217 local road, where the Internal Cabling runs from the western portion to join up with the Onsite Substation on the eastern portion. All major crossings are clear span bridges and minor watercourse crossings will be culverts. The bridges will be constructed with reinforced concrete and will join to the gravel Site Access Roads. The bridges will range from 600mm to 2000mm in width. Further to consultation with Inland Fisheries Ireland (IFI), the proposed crossings have been designed in accordance with Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, 2016.

The surface of the Site Access Roads will be maintained during the construction phase. All imported stone to the Wind Farm Site will have undergone appropriate quality testing to Transport Infrastructure Ireland (TII) specifications.

3.1.7 Permanent Met Mast

EirGrid's grid code[2] requires an independent assessment of wind farm performance. One such requirement is that all wind farms with an installed capacity of greater than 10MW are required to supply continuous, real-time weather data for the wind farm location. The data required is the wind speed and wind direction, air temperature and air pressure. The data required for the Project will be provided by a dedicated Permanent Meteorological (Met) Mast measuring 30m in height (location as detailed in **Figure 1.2a**).

The Permanent Met Mast will be located in the western portion of the Wind Farm Site as detailed in **Figure 1.2a**. It will be a free-standing lattice type structure. The Permanent Met Mast foundation will be 4.5m by 4.5m, with a depth of approximately 2.25m. It will be designed and constructed similarly to the Turbine Foundations. It will encompass a cast-in insert or bolts

[2] EirGrid (15 December 2021). EirGrid Grid Code Version 10

to connect to the bottom of the met mast and reinforced bar structural elements. The area around and above the foundation will be backfilled with compacted crushed rock. The Permanent Met Mast will be linked to the Onsite Substation via buried Internal Cabling for power and communication. It will be required for the full operational duration of the Project.

3.1.8 Onsite Substation

It is proposed to construct a 110kV electricity Onsite Substation within the Wind Farm Site, as shown on **Figure 1.2b** (the Onsite Substation). The Onsite Substation will connect to the national grid at the existing Flagford 220kV substation via c.17.5km of 110kV underground electricity cabling. Electricity transmitted between the Wind Turbines and the Onsite Substation on the Wind Farm Site will be at a voltage of 33kV. Voltage will be stepped up to 110kV within the Onsite Substation for onward transmission via the Grid Connection.

The Onsite Substation will serve two main functions:

- provide housing for switchgear, control equipment, monitoring equipment, and storage space necessary for the proper functioning of the wind farm

- allow for metering and for switchgear to connect to the National grid

The construction and electrical components of the Onsite Substation will be to EirGrid specifications. The substation compound area will measure c.8,527m2 and will be constructed from engineered stone material using similar construction techniques for the Turbine Hardstands. The overall compound will be enclosed by a 2.6m high palisade fence and will contain 2 no. control buildings, ancillary equipment, including the transformers, switch gear, fault protection, metering, car parking and other ancillary elements necessary for the operation of the Project.

The control building will contain an ESB room, control room, switchgear room, small store, an office and toilet. The control components will include metering equipment, switchgear, the central computer system and electrical control panels. A spare parts store and workshop will also be located in the control building. The control building will be a single story pitched roof structure with traditional rendered finishes. The appearance and finish of the control building will be similar to an agricultural building with a slated roof and nap plaster finish. It will have a suitably sized footpath around it and an adjacent parking area. The final finish of the control building will be an off-white or grey colour

3.1.9 Internal Cabling

Each Wind Turbine will be connected to the Onsite Substation on site via underground Medium Voltage (MV) 33kV cables. Fibre-optic cables will also connect each wind turbine to the wind turbine control system located within control building 2 in the Onsite Substation. The electrical and fibre-optic cables running from the turbines to the Onsite Substation will be laid in cable ducts approximately 1.2m below the ground surface within the Site Access Roads and/or their verges.

3.1.10 Grid Connection

Connection will be sought from the grid system operator by application to EirGrid. It is proposed that the Onsite Substation will connect to the existing Flagford 220kV substation via 110kV underground electricity cabling. The cables will connect into existing infrastructure within the confines of the existing Flagford 220kV substation and its compound. The proposed Grid Connection will be constructed to the requirements and specifications (CDS-GFS-00-001-R13) of EirGrid.

3.1.10.1 The Grid Connection route

The proposed route of this Grid Connection is provided in **Figure 1.3.** The overall length of the Grid Connection between the substation and the existing Flagford 220kV AIS substation is c.17.5km which is located primarily within the public road corridor.

It is proposed that the Grid Connection route will exit the Onsite Substation east onto the Local Road L-1217 travelling for approximately 3.7km before turning north onto the L-5650. While travelling along the L-5650 the route crosses the N61, the route then continues in a northeasterly direction along the L-5650, L-6019, L-600, R368 and L-1034 for 11.5km before reaching Flagford 220kV Substation.

3.1.10.2 Cable Ducts

The electricity will be transmitted as a three-phase power supply meaning there will be three individual conductors. The three conductors will be laid in separate ducts. The width of a

[3] https://www.eirgridgroup.com/site-files/library/EirGrid/110kV-Underground-Cable-Functional-Specification-General-Requirements.pdf

110kV cable trench with a trefoil formation will be 600mm. The depth of the trench for 110kV cables is approximately 1.3m. Separate ducts will be provided within the trench for fibre optic communications.

The following is a summary of the typical main activities for the installation of ducts:

- Confirmatory drawings for all existing services will be obtained from ESB Networks, Gas Networks Ireland, Eir, Local Authorities, Irish Water and other utility operators.

- Preparation and approval of necessary Risk Assessments and Method Statements (RAMS)

- Immediately prior to construction taking place, the area where excavation is planned will be surveyed by CAT or GPR scan (sub-surface survey technique to locate any below-ground utilities) and all existing services will be verified. Temporary warning signs will be erected.

- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.

- Where necessary, a silt fencing filtration system will be installed on all existing drainage channels before and for the duration of the cable construction to prevent contamination of any watercourse.

- A 13-tonne rubber tracked 360-degree excavators will be used to excavate the trench to the dimensions of 600mm wide by 1.3m deep.

- Once the trench is excavated, a 65mm depth base layer of sand (in road trench) or concrete (off road trench) will be installed and compacted. All concrete will be offloaded directly from the concrete truck into the trench.

- uPVC ducts will be installed on top of the compacted base layer material in the trench.

- Once the ducts are installed, couplers (a device used for joining pipes) will be fitted and capped to prevent any dirt entering the unjointed open end of the duct.

- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to record the exact location of the ducts.

- The co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.

- When ducts have been installed in the correct position on the trench base layer, sand (in road trench) or concrete (off road trench) will be carefully installed in the trench around the ducts so as not to displace the duct and compacted.

- Timber spacer templates will be used during installation so that the correct cover of duct surround material is achieved above, below and at the sides of the duct in the trench.

- A red cable protection strip will be installed above the layer of material surrounding the duct and for the full length of the cable route.

- A layer of concrete (in road) or excavated material (off road) will be installed on top of the duct as a surround material to a level 300mm below the finished surface level.

- Yellow marker warning tape will be installed for the full width of the trench, and for the full length of the cable route, 300mm from the finished surface level.

- The finished surface of the road will then be reinstated and finished with a bituminous layer. For off-road sections of the Grid Connection Route, the trenches will be reinstated with the related excavated material.

- Precast concrete cable joint bays will be installed within the excavated trench at set intervals.

- The joint bays will be backfilled and the surface above will be finished with a bituminous layer. The cable joint bays will be opened a second time during cable pulling and jointing, after which the finished surface above the joint bays will be reinstated again to its original condition.

- When trenching and ducting is complete, the installation of the Grid Connection cable will commence between the Onsite Substation and the existing 220kV substation at Flagford.

- The underground cabling will be pulled through the installed ducts from a cable drum set up at one joint bay and using a winch system which is set up at the next joint bay.

- The cables will be jointed together within the precast concrete Joint Bay.

- The surface above each cable joint bay will be finished with a bituminous layer to the satisfaction of the Local Authority / TII as appropriate and as good as the pre-existing condition

3.1.10.3Joint Bays

Joint Bays are pre-cast concrete chambers along the Grid Connection route where individual lengths of cables will be joined to form one continuous cable. A joint bay is constructed in a pit. Each joint bay typically will be 6m long x 2.5m x 2.3m deep. A reinforced concreted slab will be constructed on top of the bay.

The joint bay locations have been dictated by suitable terrain and access to facilitate the operation of cable pulling equipment at any phase of the development and future operation of the installation in accordance with the EirGrid specifications (CDS-GFS-00-001-R1). Final joint bay locations will be determined by the electrical designer. Communication chambers, which are similar to small manholes, will be installed at the joint bay locations to facilitate connection of fibre-optic communication cables which run parallel to the electricity ducts.

3.1.11 Horizontal Directional Drilling Works

Figure 1.3 shows details of the Grid Connection and the locations of the HDD crossings, there are 8 no. watercourse crossings along the Grid Connection route, 3 of which will be HDD crossings. Directional drilling is the practice of drilling holes in a non-vertical direction for the laying of ducts which contain cables beneath features such as watercourse and this is what is proposed to traverse watercourse crossings. The directional drilling commences at the launch pit which is the entry point for pipes and ducts to be placed. Pipes and ducts are brought through the drilled hole to a receiving pit on the opposite side of the hole to the launch pit. The crossings will comprise 4 x 110 mm High Performance Polyethylene (HPPE) pipes/ducts each

directionally drilled. Two separate excavations will be made to a depth of 2 metres to accommodate the directional drilling launch and reception pits in the road on either side of the crossing (no third-party lands either side of the road are anticipated to be required). Spoil arisings will be loaded onto trucks for disposal off-site as soil is excavated. The excavation launch and reception pits will be reinstated using compacted layers of crushed stone on completion of drilling and jointing operations.

The Drill head will be placed in the open excavation (launch pit) and it will be guided in by the operator for the first 1-2 metres. A series of drill rods will be connected to the head as it travels further along the shaft.

The drill position is always known to the operator and the drill can be manoeuvred in 3 planes / axis. A surveyor will monitor drilling works to ensure that the modelled stresses and collapse pressures are not exceeded. A drilling lubricant will be required, and this will be delivered directly to the drill head by hydraulics. The lubricant will be chemically inert bentonite slurry mixture which lubricate the drill head and remove the drilled earth and stone. Once the conduit is completed, the drill head is exposed at the reception pit and removed. Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit pit and will pull a drill pipe back through the bore to the entry side. The drill rods are connected to the duct pipe and the drill is reversed pulling the pipe back through the conduit.

A spoil volume of 5 m^3 will be excavated for each 100 m run of 4 pipes. This spoil will be largely subsoil material. This material will exit the launch pit within the bentonite slurry mixture. A mobile bunded tank will be located next to the launch pit into which the material/slurry mixture will be pumped.

3.1.12 Borrow Pits

Two Borrow Pits will be constructed as part of the Project, as per **Figure 1.2a** above, and **Drawings No. 6575-JOD-CGWF-XX-DR-C-0407 and 6575-JOD-CGWF-XX-DR-C-0408** for cross sections view of each Borrow Pit (provided under separate cover as part of the planning drawings)**.** The Borrow Pits will be located in the western portion of the Wind Farm Site. It is estimated that the Borrow Pits will provide 240,000m^3 excavated material to provide fill for the Site Access Roads, Turbine Hardstands, upfill to Turbine Foundations and the Temporary Construction Compounds. The Borrow Pits will be excavated only as required. Where rock and fill material is available from the excavation of Turbine Foundations this

material will be used first. The use of on-site Borrow Pits will reduce the need to transport material to the Wind Farm Site.

Site investigation borehole logs indicate that bedrock is relatively unweathered at each site investigation borehole location at the Wind Farm Site. Unconfined Compressive Strength results indicate the bedrock underlying the Wind Farm Site is considered weak. Where rock is seen as unsuitable, rock will be imported from local quarries. When the Borrow Pits are no longer required, they will be reinstated using any surplus inert material such as peat and subsoil from the Wind Farm Site, allowed to restore naturally and made secure using permanent stock proof fencing.

The rock will be extracted from the proposed Borrow Pits using two main methods, rock breaking and rock blasting. The primary method will be rock breaking.

3.1.12.1Rock Breaking

Weaker rock will be extracted using a hydraulic excavator and a ripper. Where stronger rock is encountered and cannot be extracted using an excavator, then rock breaking equipment will be employed. This will typically involve the use of a 40-60 tonne 360-degree hydraulic excavator with a rock breaker. The rock breaker is supported by a smaller 30-40 tonne rock breaker which breaks the rock down further for feeding into the rock crusher machine. The larger rock breaker breaks out the rock in a progressive manner from the Borrow Pit and the smaller rock breaker breaks it down further.

The broken-down rock is loaded into mobile crusher using a wheeled loading shovel machine and crushed down into the correct grade for use in the construction of Site Access Roads, Turbine Hardstands, and Temporary Construction Compounds.

3.1.13 Onsite Drainage

The existing surface water runoff is contained within natural and artificial drainage channels that include stream and river waterbodies, drainage ditches, and other minor natural and artificial manmade drainage features.

Drainage measures will be provided to attenuate runoff, guard against soil erosion, soil compaction, and safeguard local water quality.

A buffer zone of at least 50m will be in place for major watercourses. Where this is not possible for example, at the 5 watercourse crossings where Site Access Roads will be constructed or at the 3 horizontal directional drilling sites along the Grid Connection route**.**

Sustainable Drainage System (SuDS) principles namely separation of overland flow from construction areas, the mimicking of diverted overland flow around construction areas and treatment trains to treat water from construction areas, will all be employed. Associated controls are listed below:

Source controls for surface water

- Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems. Detailed plates and figures of these can be found in the CEMP Appendix 2.1 of the EIAR.

- Maintaining small working areas; covering stockpiles with geotextiles to protect against water erosion and runoff in rainy weather, and/or cessation of works in certain areas during wet and windy weather.

In-line controls for surface water

- In line controls are controls which are directly applied to the surface water body including interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds and/or temporary pumping chambers.

Treatment systems for surface water:

- Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbusters.

When heavy rainfall is predicted works will be suspended or scaled back.

It is proposed that all drainage will be left in place upon completion of the construction phase.

3.1.14 Temporary Construction Compounds & Temporary Works Area

Up to six Temporary Construction Compounds are proposed. These will be constructed and established upon commencement of the construction phase. The proposed location for the individual Temporary Construction Compounds are shown in **Figure 1.2a** and **Figure 1.2b**. The compounds will be used as a secure storage area for construction materials and to contain temporary site accommodation units for staff welfare facilities. The compounds will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel facilities.

An area within the compound will be used for the storage of fuel and oils and this will be suitably bunded and the bund will be lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table. Double protection containers / equipment will be used along with drip trays and details are included in the CEMP, provided under separate cover with the planning application documentation.

During the construction phase, water will be supplied by water bowser. The maximum wastewater production is estimated to be the same as the maximum water consumption (2,000 litres per day)[4]. The project will include an enclosed wastewater management system at the temporary compounds capable of handling the demand during the construction phase with 80-100 construction workers on site at peak. A holding tank is proposed for wastewater management. Wastewater will be removed off-site weekly, by a licensed wastewater disposal company and disposed at an appropriate licenced facility.

3.1.15 Spoil Management

Excavated material can be used onsite in several ways. Suitable excavation material can be used onsite for reprofiling and landscaping or it can be permanently reposited onsite. Excess material will be re-used offsite.

[4] Table 3 of the EPA WW treatment Manual (Treatment systems for Small Communities, Business, Leisure Centres and Hotels), Environmental Protection Agency, 1999. Quarry (excluding canteen) best reflects a construction site.
[Available online: https://www.epa.ie/publications/compliance--enforcement/wastewater/EPA_water_treatment_manual_-small-comm_business.pdf]

Excavated material for reuse and for permanent repository onsite will be managed in accordance with the Spoil Management Plan contained as part of the CEMP, provided under separate cover within the EIAR.

3.1.15.1 Spoil Quantities

The quantities of spoil likely to be generated at the Wind Farm Site have been calculated by Whiteford Geoservices Ltd. and checked by Jenning O'Donovan & Partners. It is estimated that that based onsite surveys, the amount of spoil predicted to be generated during construction of the Wind Farm is approximately 352,314 m^3. **Management Plan No. 4: Spoil Management**, to the **CEMP** (provided under separate cover), contains the calculation of spoil volumes and how spoil will be managed onsite. Volumes are based on the site investigations undertaken to date, i.e. peat probing and trial pit excavations.

3.1.15.2 Landscape & Reinstatement

Topsoil and surface vegetation excavated during the construction works will be used to reinstate exposed areas around site infrastructure such as slopes or graded ground. Reinstatement and reprofiling of, and around, infrastructure will be carried out during the construction phase as outlined in the **Management Plan 4: Spoil Management**, to the **CEMP**, (provided under separate cover). All areas subjected to reinstatement will be fenced with stock-proof fencing to prevent livestock disturbance until vegetation has become established. A requirement as a minimum that any fencing posts are set in concrete and that the fencing is of a large animal stock proof material.

All excavated material will be permanently reposited onsite. Repository areas include areas. Excavated material for reuse onsite and for permanent repository onsite will be managed in accordance with **Management Plan 4: Spoil Management**, to the **CEMP**, (provided under separate cover).

Berms will generally consist of side cast topsoil, covered with peat, maintaining a distance of c. 5 m from the Site Access Roads and site infrastructure. These berms will be 5 m wide at base; 2 m at top; 2 m high. Berm storage and permanent spoil repository areas shall have side slopes battered back to a safe angle of repose not exceeding 60 degrees to the horizontal. These areas will be compacted, further helping to reduce any potential for slippage. Spoil repository areas will be tapered to the existing ground level.

3.2 CONSTRUCTION

The first phase of the Project will comprise the construction phase. This phase will begin with site preparation works and will be complete when the Wind Turbines are built and ready for commissioning, and when all wastes have been removed from the Wind Farm Site. For this Project, it is envisaged that the construction phase will last approximately 18 months. An indicated construction programme is set out at **Table 3.3**.

Table 3.3: Indicative Construction Programme

Activity	Month																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Site Establishment /Felling and Fencing	X	X	X																		
Site Access Roads Upgrade & Construction		X	X	X	X	X	X														
Onsite Substation & Temporary Compound Construction		X	X	X	X	X	X	X													
Onsite Substation Electrical Works									X	X	X	X	X	X	X	X	X				
Onsite Substation Commissioning																X	X				
Excavation & Construction of Turbine Foundations & Hardstands		X	X	X	X	X	X	X	X	X	X										
Internal Cabling Installation										X	X	X	X	X	X	X					
Turbine Delivery and Erection												X	X	X	X	X					
Grid Connection						X	X	X	X	X	X	X	X	X	X	X	X				
Energisation																		X			
Turbine Commissioning																			X	X	X
Site Restoration																		X	X	X	X

3.2.1 Construction and Environmental Management Plan (CEMP)

A CEMP is appended to the EIAR in **Appendix 2.1.** The CEMP includes an Emergency Response Plan, Spoil Management Plan, Surface Water Management Plan, Water Quality Management Plan and a Waste Management Plan. The CEMP includes all the mitigation measures recommended within the EIAR and the NIS. A summary of the mitigation measures is included in **Chapter 22** of the EIAR.

The CEMP provides a commitment to mitigation and monitoring, and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental commitments of the Project will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, such that there will be a robust mechanism in place for their implementation. The CEMP addresses the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases. An Environmental Manager / Ecological Clerk of Works (ECoW) with appropriate experience having completed a similar role will be appointed for the duration of the construction phase so that the CEMP is effectively implemented.

The following sections describe key activities which, if unmitigated against, may cause harm or nuisance to the public.

3.2.2 Refuelling

Vehicles will be refuelled off-site where possible. For vehicles that require refuelling on-site, refuelling will be carried out at designated refuelling areas at various locations throughout the Wind Farm Site. Heavy plant and machinery will be refuelled on-site by a fuel truck that will come to the Wind Farm Site as required on a scheduled and organised basis. Other refuelling will be carried out using mobile double skinned fuel bowser. The fuel bowser will be parked on a level area on-site when not in use. All refuelling will be carried out outside designated watercourse buffer zones. Only designated trained and competent operatives will be authorised to refuel plant on-site. Mobile measures such as drip trays and fuel absorbent mats will used during refuelling operations as required. All plant and machinery will be equipped with fuel absorbent material and pads to deal with any event of accidental spillage.

3.2.3 Concrete

There will be no concrete batching on the Wind Farm Site. Rather, it will be transported to the Wind Farm Site as it is required. Dedicated bunded areas will be created to cater for concrete wash-out and will be within the Temporary Construction Compounds. 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 Wind Turbine locations will be planned in advance and proposed mitigation measures are detailed in **Chapter 11** of the EIAR.

3.2.4 Dust Suppression

During periods of dry and windy weather there is potential for dust to become friable and cause nuisance to nearby residences and users of the local road network. Damping down will be required in this instance to see that dust does not become friable. This is most likely to occur during periods of dry and/or windy weather. This requires wetting the material and ensuring water is supplied at the correct levels for the duration of the work activity.

To reduce mud and debris from getting onto the local road network, a wheel wash facility will be employed at exiting points on-site which will wash mud and debris from vehicles egressing the Site.

Where rock is sourced from off-site HGVs entering the Wind Farm Site carrying rock will be covered to prevent dust generation. A road sweeper will be available for use in case of any mud or debris making it onto the public road network.

3.2.5 Construction Hours

The Project will have approximately 80-100 construction workers during the peak of the construction phase. Working hours for construction will be from 07:00 to 19:00 Monday-Saturday. It should be noted that during the Wind Turbine erection phase, operations will need to take place outside those hours with concrete pours commencing at c.05:00hrs, to facilitate Turbine Foundation. Hours of working for Turbine Foundation construction will be agreed with Roscommon County Council prior to the commencement of Turbine Foundation construction. A detailed Traffic Management Plan will be implemented during the construction phase. This

shall be agreed during the planning compliance stage with the Planning Authority so that strict controls described therein are in place with all suppliers coming to the Wind Farm Site.

3.2.6 Construction Turbine Assembly

Once on the Wind Farm Site, the Wind Turbine components will follow a detailed route and plan to minimise manoeuvring. Components will be placed on Turbine Hardstands prior to assembly, additional minor hardstand fingers will be provided to lay the turbine blades across once delivered. One large crane will be required for erecting the Wind Turbines, assisted by a smaller crane. The same number of cranes will also be required for maintenance during the operational phase.

The towers will be delivered in sections, and work on assembly will not start until a suitable weather window is available, e.g., wind gust speed threshold of less than $6ms^{-1}$. The bottom tower section will be bolted onto the concrete foundations. The lower-mid tower section will then be lifted into position and bolted to the bottom tower section. The upper-mid tower section is then bolted to the lower-mid section. Finally, the top tower section will be lifted into position and bolted to the upper-mid tower section. Three methods can be used to attach the blades:

1. The blades can be attached to the nacelle and hub on the ground. The hub and blades are then lifted as one. The nacelle of a wind turbine houses the drive train and other tower-top components. The hub of the Wind Turbine connects the blades to the main shaft and ultimately to the rest of the drive train.

2. The hub can be attached to the nacelle and the two blades attached to the hub while the nacelle is on the ground – the "bunny lift". The nacelle is then lifted into position and the third blade lifted into place separately. This requires manoeuvring of several components on the ground and usually the repositioning of cranes.

3. Lifting the nacelle and hub as one unit, as described above and then attaching the blades one at a time, rotating the hub between lifts. The blade lifting operations do not require repositioning of the crane.

The most appropriate method will be decided by the lifting contractor and the turbine manufacturer, prior to Wind Turbine erection.

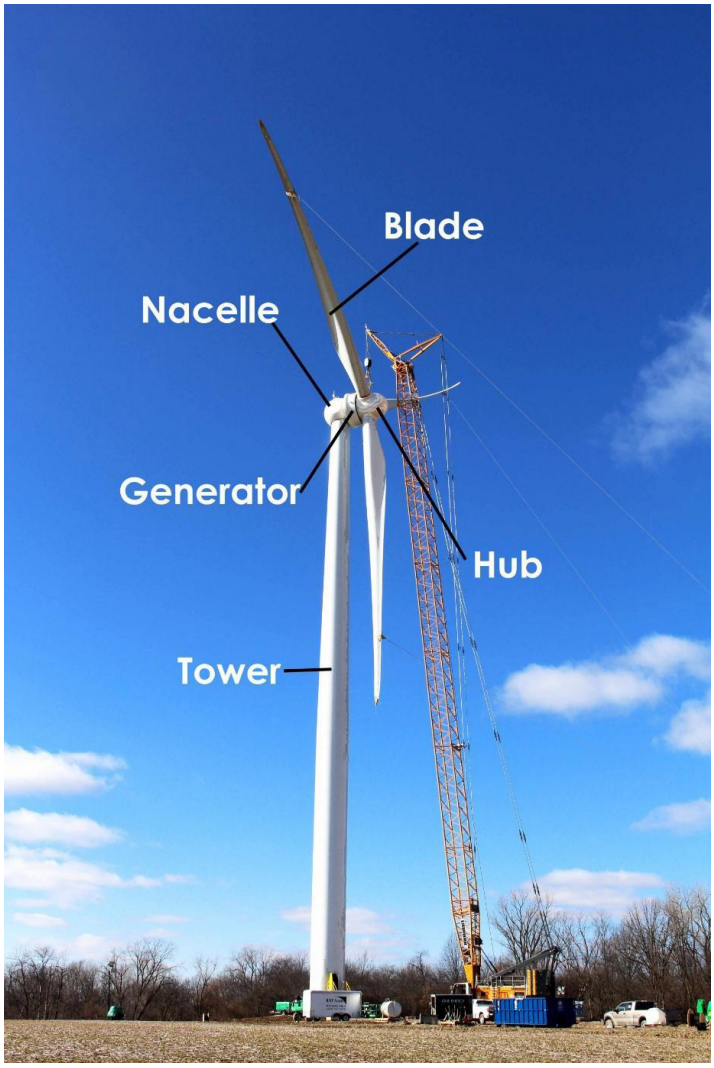


Plate 3.1: Turbine components

3.2.7 Construction Traffic

It is estimated that during civil construction 8,983 fully loaded Heavy Goods Vehicle trips will be required for the Project. This breaks down to 499 loads per month or an average of 16loads per day.

It is anticipated that a maximum of 164 HGV vehicles (328 HGV movements) will visit the Wind Farm Site on a daily basis during the period. The peak traffic will occur on 11 days during the 9 month period between months 2 to 10 when Turbine Foundations are poured. Concrete pours for individual Turbine Foundations will generate 120 HGV arrivals (240 HGV movements).

3.2.8 Reinstatement & Monitoring

Following completion of construction, all plant and machinery will be removed from the Wind Farm Site. The temporary works/assembly areas needed for the construction period will be reinstated using the original spoil material removed and stockpiled close to the location from where it was excavated. Stockpiles will be restricted to less than 2m in height and located outside of the surface water buffer zones. All stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW).

The on-site installed drainage network will be left in place. This will be monitored on a quarterly basis to see that it is operating to its stated design purpose. Water monitoring on nearby natural watercourses will be undertaken during and post construction to determine if any pollution has migrated off-site, and if so, implement measures to rectify the impact.

3.2.9 Construction Supervision & Monitoring

The construction activities will be monitored by a Geotechnical Engineer, a qualified archaeologist and an ECoW. The Geotechnical Engineer will be contracted for the detailed design phase and their services retained throughout the construction and reinstatement phases. The Geotechnical Engineer will oversee all earthworks and excavation activities and monitor for issues such as ground stability, water ingress into excavations etc. Roles and responsibilities are further detailed in the **EIAR Appendix 2.1**; CEMP.

Daily monitoring of excavations by the Geotechnical Engineer will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken.

The ECoW will be employed prior to the commencement of the construction phase to monitor and review the pollution control measures and working practices during construction and have input into site remediation. The ECoW will have stop work authority if, for example, a sensitive habitat feature is encroached upon or there is the possibility of silt/pollution runoff to natural watercourses.

The archaeologist will have responsibility for ensuring that potential archaeological features are protected and will also have stop work authority should any be discovered during excavations. If any potential archaeological features are discovered, the archaeologist will inform the National Monuments Service (NMS).

A Water Quality Management Plan has been prepared as part of the CEMP and will be implemented prior to commencement of construction. Regular inspections of the installed drainage system will be undertaken, especially after heavy rainfall events, to check blockages and see that there is no build-up of standing water in any part of the system where is it not designed to be.

Excess build-up of silt will be removed at check dams, attenuation/settlement ponds or any other drainage feature by scraper or excavator and under the supervision of the ECoW.

During the construction phase, field testing and laboratory analysis of a range of parameters with relevant regulatory limits and Environmental Quality Standards will be undertaken for each watercourse close to the site, and specifically following heavy rainfall events (i.e., weekly, monthly and event based).

The CEMP for the Project sets out the proposed site organisation, sequencing of works, methodologies, mitigation measures and monitoring measures.

The local road network near the Wind Farm Site, used to transport construction materials, will be monitored during construction, so that any damage caused by construction traffic associated with the project can be identified and repaired. Any required monitoring programme will be agreed with the local authority, prior to the commencement of any construction works. Ready mix concrete and rock will be sourced from local quarries and monitoring may also be undertaken on the route as required.

3.2.10 Construction Sequencing

It is envisaged that the following will be the sequence of construction for the Project:

1. Site preparation including felling and drainage
2. Site Access Roads
3. Temporary Construction Compounds and welfare facilities
4. Turbine Hardstands
5. Turbine Foundations

6. Internal Cabling

7. Installation of the Grid Connection

8. Delivery and erection of Wind Turbines

9. Commissioning and energisation

The Onsite Substation will be constructed in parallel with Turbine Hardstands, Turbine Foundations and Internal Cabling works.

The first step will be to prepare the Wind Farm Site for construction. This will include key-hole felling of some commercial forestry and implementing the designed drainage measures. The Site Access Roads will then be constructed and/or upgraded. The next step will be to construct the Temporary Construction Compounds and welfare facilities. The next step will be to prepare the areas of the Site where site infrastructure is to be located by marking out the construction works corridor, the relevant environmental buffer zones.

Following the site preparation, construction of the Turbine Hardstand areas for the 11 No. Wind Turbines will occur. The 11 No. Turbine Foundations will then be excavated and foundations constructed using reinforcing bar (rebar) and imported concrete. No concrete batching will take place on site.

Following the construction of the Turbine Foundations, internal cable ducting from the turbine locations to the Onsite Substation will be laid in trenches along the constructed Site Access Roads.

The Grid Connection will then be constructed. There will be c.17.5km of trenches for the Grid Connection to Flagford 220kV substation. The ducts will be installed in an excavated trench which will be 650mm wide and 1.3m deep.

The last step will be to erect the 11 No. Wind Turbines on the foundations using two cranes. Commissioning and testing of the turbines can then proceed

3.2.11 Construction Employment

It is estimated that up to 80-100 direct and indirect jobs could be created during the construction phase of the Project. It is not expected that all of these jobs will be based at the Site.

3.3 COMMISSIONING

Wind farm commissioning can take in the region of three months to complete from the erection of the final Wind Turbine to the commercial exportation of power to the national grid. It involves electrical and mechanical testing and control measures to check that the wind farm will perform and export power to the national grid, as designed and commissioning engineers working through an entire schedule of SCADA (Supervisory Control and Data Acquisition).

3.4 OPERATION & MAINTENANCE

During the operation of the wind farm, the turbine manufacturer, the wind farm operator, or a service company will carry out regular maintenance of the Wind Turbines, Onsite Substation and all other site infrastructure. Monthly routine inspection and preventative maintenance visits will be necessary to provide for the smooth and efficient running of the wind farm. This will occur over one day with one vehicle attending the Wind Farm Site. In addition, operation and monitoring activities will be carried out remotely with the aid of computers connected via a telephone broadband link.

3.5 DECOMMISSIONING

The Applicant is applying for a consent for a period of up to 35 years for the operation of the wind farm. The full description of the decommissioning is as follows:

- Removal of 11 No. Wind Turbines and above ground concrete plinths.

- Removal of all associated underground electrical and communications cabling connecting the Wind Turbines to the Onsite Substation (ducting is to remain *in-situ)*.

All other elements of the Project will remain in-situ. The Site Access Roads and associated drainage systems will serve ongoing commercial forestry and agriculture activity in the area. All other hard surfaced areas will be allowed to revegetate naturally. Based on the experience

of the project team monitoring operational wind farm sites throughout the country, the approach of allowing these areas to revegetate naturally has proven to be very successful.

Cranes of similar size to those used for construction will disassemble each Wind Turbine using the same Turbine Hardstands. The towers, blades and all above ground components will be removed from site and reused, recycled, or disposed of in a suitably licenced facility.

Wind Turbines will be cut on site so as to fit on articulated trucks, therefore allowing the use of the civil construction delivery routes for removal.

Potential impacts will be similar to that of the construction phase, albeit to a lesser extent and are described in each chapter of this EIAR.

A Decommissioning plan is included as part of the CEMP in **EIAR Appendix 2.1**. Prior to the Decommissioning works, a plan will be submitted to the planning authority for written agreement. The plan will take account of contemporary best practice.

4 DESCRIPTION OF THE PROJECT SITE

4.1 LOCATION OVERVIEW

The Wind Farm Site is located within an agricultural, peatland and commercial forested landscape, between Frenchpark and Elphin, in Co. Roscommon. The nearest centre of population to the site is the small village of Frenchpark, which is located along the R361 regional road and is c.2.1km to the north of the closest Wind Turbine (T2). The small village settlement of Ballinagare is located c.2.2km to the south-west of T5, and Ballinameen c.3.4km to the north-east of T8. The Wind Farm Site is located c.12km north-east of Castlerea and c.16km south-west of Carrick-on-Shannon

The Project covers an area of c.1,040ha. The principal land use in the general area consists of agricultural pasture grazing land, peat harvesting and commercial forestry.

The proposed route of Grid Connection will connect the proposed Onsite Substation to the existing Flagford 220kV AIS substation. The proposed Grid Connection route is c.17.5km in length which is located entirely within the public road corridor.

It is proposed that the Grid Connection route will exit the Onsite Substation east onto the local road L1217 travelling for approximately 3.7km before turning north onto the L5650. While travelling along the L5650 the route crosses the N61, the route then continues in a north-easterly direction along the L5650, L6019, L600, R368 and L1034 for 11.5km before reaching Flagford 220kV Substation.

4.2 TOPOGRAPHY

Maximum ground levels within the Wind Farm Site are on lands in the vicinity of proposed turbine T11 (c. 79m OD). The lowest ground levels are in the vicinity the proposed access into the Wind Farm Site from the north (L1217) (c. 65m OD).

4.3 SOILS & GEOLOGY

According to the GSI online database, the Wind Farm Site is immediately underlain by the following rock formations (see details in **Chapter 10: Soils and Geology**):

- Boyle Sandstone Formation: sandstone, siltstone and black mudstone
- Ballymore Limestone Formation: dark, fine grained limestone and shale
- Croghan Limestone Formation: dark, cherty limestone and shale

The Wind Farm Site is underlain by the following superficial soil types:-

- Cut-over raised Peat or Topsoil
- Glacial Tills derived mainly from limestone rocks

The bedrock occurring along the Grid Connection consists of the Croghan Limestone Formation: dark, cherty limestone and shale and the Bricklieve Formation – Interbedded Limestones and calcareous shales

The Grid Connection route is underlain by the following superficial soil types:-

- Cut-over raised Peat or Topsoil

- Glacial Tills derived mainly from limestone rocks

- Alluvium, within river valley bottoms.

4.3.1 Peat Depths

Peat probing of the Wind Farm Site was completed as part of the Soils and Geology assessment of the Project (see EIAR Chapter 10, Jennings O'Donovan, 2026). A total of 2,386 no. peat probes were undertaken during multiple phases of fieldwork undertaken in 2024 and 2025.

The results of these peat thickness measurements are given in the table below.

Table 4.1: Peat Depth Distribution by Category

Peat Depth Category (m)	Number of Survey Points	Sufficient to influence ground stability
A – Absent or Negligible (0-0.5m)	1069 (44.8%)	Unlikely
B – Shallow (0.5-2.0m)	605 (25.3%)	Likely
C – Moderately Deep (2.0-3.0m)	263 (11.0%)	Very likely
D – Deep (3.0-4.0m)	132 (5.5%)	Very likely
E– Very Deep (>4.0m)	318 (13.3%)	Very likely

4.3.2 Landslide Susceptibility

According to Geological Survey of Ireland (GSI) mapping, Landslide Susceptibility within the Wind Farm Site and along the Grid Connection is LOW or LOW (INFERRED) risk. GSI also holds records of historic landslides and records two landslide events between 6km and 8km south west of the Wind Farm Site.

Within the Wind Farm Site ground slopes are either flat or of a very low angle and, consequently, potential for natural soil movement is also considered to be low.

4.3.3 Peat Landslide Hazard

A Peat Landslide Hazard Assessment (PLHA) for the site was carried out as part of the Soils and Geology Assessment for the Project (see EIAR Chapter 10, Jennings O'Donovan, 2026) and has been identified as a potential risk on the Wind Farm Site.

This PLHA has determined that peat landslide hazard is moderate without mitigation. The walkover survey and subsequent site investigations confirm the presence of peat soils within the Wind Farm Site.

The maximum peat thickness encountered at the Wind Farm Site infrastructure is detailed in the table below.

Table 4.2: Summary of Peat Thickness at the Main Structures

Structure	Peat Thickness (m)	Peat Thickness Likely to Influence Stability?
T1	4.5	Very Likely
T2	0.7	Likely
T3	4.5	Very Likely
T4	1.6	Likely
T5	0.4	Likely
T6	1.2	Likely
T7	1.6	Likely
T8	2.2	Very Likely
T9	2.0	Likely
T10	1.8	Likely
T11	0.6	Likely
ONSITE SUBSTATION	2.0	Likely

The following schedule summarises the relevant hazard ranking, applicable post-mitigation, to the main infrastructure at the Wind Farm Site:

Table 10.9B: Post-mitigation Determination of Peat Landslide Hazard Ranking

Infrastructure Element Considered	Post-mitigation Peat Landslide Hazard Ranking	Hazard Classification
Turbine T1	HR=9	LOW
Turbine T2	HR=2	NEGLIGIBLE
Turbine T3	HR=8.5	LOW
Turbine T4	HR=3	NEGLIGIBLE
Turbine T5	HR=1.5	NEGLIGIBLE
Turbine T6	HR=1.5	NEGLIGIBLE
Turbine T7	HR=3	NEGLIGIBLE
Turbine T8	HR=3	NEGLIGIBLE
Turbine T9	HR=3	NEGLIGIBLE
Turbine T10	HR=3	NEGLIGIBLE
Turbine T11	HR=3.75	NEGLIGIBLE
Onsite Substation	HR=3	NEGLIGIBLE

A similar assessment for the Site Access Road network similarly yielded hazard ranking following mitigation to range from **NEGLIGIBLE** to **LOW**.

4.4 HYDROLOGY

On a regional scale, the entirety of the Project lies within the Shannon catchment. The Wind Farm Site lies within the Breedoge_SC_010 WFD river sub-catchment. The Grid Connection route passes through the Breedoge_SC_010, Owenur_SC_010, and Shannon [Upper]_SC_030 WFD river sub-catchments. The sub-catchments relevant to the TDR where works are proposed outside of the Wind Farm Site are the Corrib_SC_010 and Moy_SC_030. The sub-catchments in which the Project is located are further delineated into river sub-basins. The Wind Farm Site is located across three sub-basins; Carricknabraher_020 (IE_SH_26C020200) to the west, Breedoge_010 (IE_SH_26B090300) in the central section, and Mantua_010 (IE_SH_26M010200) to the east. The Grid Connection route is located within the Mantua_010, Kinard_010 (IE_SH_26K070500), and Killukin_020 (IE_SH_26K020700). The river sub-basins relevant to the TDR where works are proposed outside the Wind Farm Site, are the Terryland_010 and Charlestown Stream_010.

The latest (2019 – 2024) Water Framework Directive water quality status reported for the watercourses flowing through and draining the Wind Farm Site are as follows:

Table 3.4: Water Framework Directive water quality status (2019-2024)

River	Water Quality Status
Carricknabraher River	At Risk
Breedoge River	Not at Risk
Mantua River	Review
Kinard Stream	Not at Risk
Killukin Stream	At Risk
Charlestown Stream	At Risk

The WFD classification data available from Catchments.ie indicates the Carricknabraher_020, Mantua_010, and Killukin_020 river sub-basins have been assigned a status less than 'Good' due to ecological / biological (invertebrate) elements of the WFD classification.

4.5 HYDROGEOLOGY

The Project is underlain by 4 no. groundwater bodies as defined by EPA mapping. The western section of the Wind Farm Site is underlain by the Potentially Dependent Groundwater Waterbodies GWDTE-Bellanagare Bog (SAC000592) (IE_SH_G_241), GWDTE-Cloonshanville Bog (SAC000614) (IE_SH_G_067) as well as the Castlerea Bellanagare (IE_SH_G_054), and Carrick on Shannon (IE_SH_G_048) groundwater bodies.

The eastern section of the Wind Farm Site and the Grid Connection are underlain by the Carrick on Shannon (IE_SH_G_048) groundwater body. The characteristics of the groundwater bodies are summarised in the following sections.

GWDTE-Bellanagare Bog is in an intermediate / western raised bog underlain by low-permeability muddy Carboniferous limestone with a clayey limestone till subsoil; the peat surface is highly dependent on diffuse rainfall recharge and shallow groundwater feeding numerous flushes, springs and small streams. Groundwater flow is largely shallow and local — emerging as seepages/flushes and discrete spring/rise features across the bog — so groundwater levels are naturally high within the peat.

GWDTE-Cloonshanville Bog is a raised bog with extensive flush features; its hydrology is dominated by near-surface groundwater/peat water tables sustained primarily by direct rainfall recharge and impeded by peat/underlying low-permeability deposits. The central flush system shows localized groundwater emergence (diffuse seepage) rather than deep regional flow. Kelly (1995) described Cloonashanville Bog SAC as being located in a groundwater discharge zone,

with the water table lowered due to extensive drainage works in the area around Lough Gara. Electric conductivity in shallow cut away drains bounding the high bog is low and not indicative of groundwater contact. Deeper drains at the west of the bog intercept the groundwater table and EC values are consistently higher at this location. Little runoff from the bog is believed to infiltrate to the water table since subsoils are generally of low permeability at depth. Kelly (1995) also noted that the bog lies in a regional discharge zone where drainage has lowered the warte table. This has caused a former lake in the east to dry out with Kelly et al. (1995) suggesting that the bog is now located in a regional recharge area.

Castlerea Bellanagare GWB is classed as a shallow / poorly productive bedrock area overlain locally by till and peat in places near bogs. Groundwater in this GWB is generally of limited transmissivity (poorly productive bedrock), with recharge dominated by rainfall infiltration and groundwater contributions to nearby streams and drinking-water source protection zones.

Carrick on Shannon GWB is a karstified limestone aquifer with complex, shallow flow systems and strong connections to surface water. Recharge occurs via rainfall and swallow holes, leading to rapid water-level fluctuations. The aquifer is unconfined, highly vulnerable, and discharges to springs, turloughs, and rivers feeding the Shannon catchment.

4.6 BIODIVERSITY

4.6.1 European Sites

The proposed Wind Farm Site is not located within any European Sites. The proposed TDR does not occur within any European Sites. The Grid Connection route does not intersect any European Sites.

The Study Area Boundary over sails the Cloonashanville Bog SAC, whilst the nearest point of the infrastructure associated with the Project to this SAC is located approximately 125m to the east, southeast of the boundary. The nearest SPA to the Project is the Bellanagare Bog SPA, located approximately 1km to the southwest of the EIAR Boundary.

4.6.2 Habitats

The habitats occurring at the proposed Wind Farm Site are dominated by conifer plantation, which accounts for approximately 46% of the land cover. Large stands of mature commercial plantation are located within and surrounding both the eastern and western parcels of the Wind

Farm Site. Some areas of conifer plantation have been recently felled with felling operations being undertaken during 2024 and 2025.

Raised bog habitats occur in both the eastern and western parcels of the Wind Farm Site. The best remaining examples of raised bog habitat occurring at the site are located to the east of T03 and northwest of T8. Aside from these areas the raised bog habitat occurring in the has been subject to long-term historical and current turbary.

Grassland habitats in the form of improved agricultural grassland and wet grassland occur within the proposed Wind Farm Site. Improved agricultural grassland is limited to the east of the Wind Farm Site in the vicinity of the proposed Wind Turbine T2. The majority of the wet grassland habitat occurring at the site is located within the western parcel and is characterised by dense and species-poor Juncus effusus dominated swards. Areas of more diverse wet grassland habitat occur along the riparian fringes of the Carricknabraher River, at the northwestern extent of the EIAR Boundary and to the east of the proposed Wind Turbine T7.

Broadleaved woodland habitats in the form of scrub and wet woodland along with hedgerows occur within the Wind Farm Site. The hedgerow habitat is mainly restricted to the area surrounding the proposed Wind Turbine T2. Pockets of wet woodland habitat occur towards the west of the site in areas of cutover raised bog. Pockets of scrub occur throughout the Wind Farm Site.

4.6.3 Fauna

4.6.3.1 Bats

In general, the landscape that the Wind Farm Site is a part of, has been classified at low to moderate suitability for bats.

Eight species of bats have been recorded as present at the Wind Farm Site during the bat surveys. All are listed as ‘Least Concern’ on the Irish Red List, and Annex IV of the EU Habitats Directive.

No lesser horseshoe bats have been recorded to rely on the proposed Wind Farm Site.

4.6.3.2 Non-volant mammals

Irish hare was observed at the proposed Wind Farm Site during field surveys and evidence indicating the presence of red deer was also observed. No evidence indicating the presence of badgers was observed during field surveys.

No otter holts or couches were observed along the watercourses draining the proposed Wind Farm Site. The fisheries resource of the main watercourses draining the proposed Wind Farm Site (i.e. the Carricknabraher, Breedoge and Mantua Rivers) have been found to be limited with low numbers of salmonids recorded, an absence of lamprey species and dominance of generally pollution tolerant species such as minnow, stickleback and stone loach. The limited fisheries resource is in turn likely to limit the potential for these stretches of watercourse to be relied upon by otters. No otter holts or couches were recorded along the main rivers draining the Wind Farm Site. Notwithstanding this, otters have been observed foraging along the Breedoge River during field surveys whilst spraints and slides were also observed along this river as well as the Carricknabraher River and the Mantua River.

No evidence of non-volant mammals was recorded at any of the proposed widening areas along the TDR.

No otter holts, couches or field signs were observed along the watercourses crossed by the proposed Grid Connection route between the Wind Farm Site and the ESB substation at Flagford.

One disused sett was recorded within the Wind Farm Site to the west of the proposed Wind Turbine T1.

4.6.3.3 Birds

Bird data gathered and surveys completed for the Project recorded a total of 53 species, 7 of which are Red-list status under the BoCCI (Gilbert et al., 2021). These include grey wagtail, kestrel, lapwing, meadow pipit, redwing, snipe and swift. A further 15 Amber-listed species were observed. A total of three Annex I species were recorded as part of the baseline bird data compilation and/or as part of the baseline ornithological surveys completed for the project. Threse three species comprise: Greenland white-fronted geese, Hen Harrier and Whooper Swan. Historical records are held for Greenland White-fronted Geese. This species, which was historically associated with the Bellanagare Bog and is the qualifying interest for which this bog is designated as an SPA, was not recorded during baseline ornithological surveys.

Greenland White-fronted Geese have not been recorded at Bellanagare Bog SPA or the wider surrounding area in the recent past. Historical records for Hen Harrier and Whooper Swan are held for the wider area surrounding the Wind Farm Site and both of these species were observed during baseline ornithological surveys.

Table 4.1 lists the bird species that have been identified as key ornithological receptors for the assessment of ornithological impacts (see EIAR Chapter 8). The sensitivity of species as outlined on **Table 4.1** are as per Chapter 8 of the EIAR.

Table 4.1: Key Ornithological Receptors

Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low / Very Low Sensitivity
Greenland White-fronted Geese	Hen harrier	Kestrel	Buzzard
	Whooper Swan	Grey Wagtail	Starling
		Meadow Pipit	Cormorant
		Redwing	Heron
		Snipe	House Martin
		Swift	House Sparrow
			Lesser Black-backed Gull
			Linnet
			Mallard
			Skylark
			Teal
			Willow Warbler

4.6.3.4 Invertebrates

No marsh fritillary were recorded at the proposed Wind Farm Site during field surveys. However, a record for the presence of marsh fritillary larvae, recorded on the 21st March 2019, is held for a location within the Wind Farm Site boundary, approximately 360m to the south of the proposed infrastructure footprint between T3 and T4.

5 EUROPEAN SITES

Likely significant effects to three European Sites were identified during the screening for Appropriate Assessment. The potential for likely significant effects to occur to these European Sites is based upon the potential impacts that could arise as a result of the Project, the presence of pathways connecting the source of impact to qualifying features of interest of these three European Sites and the sensitivity of these qualifying features of interest to these impacts. The three European Sites identified as occurring within the zone of influence of the Project and their

qualifying features of interest are listed in **Table 5.1** below. The qualifying features of interest of each of these European Sites that are connected via pathways to the Project and are located within its zone of influence are highlighted in yellow in **Table 5.1**.

Table 5.1: European Sites and relevant qualifying features of interest (highlighted in yellow) within the zone of influence of the Project

European Sites	Distance	Qualifying features of interest	Pathway	Source
Cloonashanville Bog SAC	0km – Intersected by the EIAR Boundary	Active raised bogs [7110]	NA – EIAR Boundary overlaps SAC boundary	Project – EIAR Boundary overlap
		Degraded raised bogs still capable of natural regeneration [7120]	NA – EIAR Boundary overlaps SAC boundary	Project – EIAR Boundary overlap
		Depressions on peat substrates of the Rhynchosporion [7150]	NA – EIAR Boundary overlaps SAC boundary	Project – EIAR Boundary overlap
		Bog woodland [91D0]	NA – EIAR Boundary overlaps SAC boundary	Project – EIAR Boundary overlap
Bellanagare Bog SPA	1km west	Greenland White-fronted Geese	mobile species pathway	Greenland White-fronted Geese foraging range from key wintering sites is 8 km. This SPA is located 1km to the west and so falls within the 8km buffer range of this SPA
Lough Gara SPA	5.8km to the north	Greenland White-fronted Geese	mobile species pathway	Greenland White-fronted Geese foraging range from key wintering sites is 8 km. This SPA is located 1km to the west and so falls within the 8km buffer range of this SPA
		Whooper Swan	mobile species pathway	Whooper Swan foraging range from key wintering sites is 5 km. This SPA is located 5.8km to the north and proximity between foraging range and the wind farm site a potential for a functional mobile species pathway is identified
River Moy SAC	170m to the west of TDR Works at N17/N5	Lowland hay meadows (Alopecurus pratensis,	Terrestrial habitat – no pathway	

European Sites	Distance	Qualifying features of interest	Pathway	Source
	Roundabout or 450m downstream	Sanguisorba officinalis) [6510]		
		Active raised bogs [7110]		
		Degraded raised bogs still capable of natural regeneration [7120]	Terrestrial habitat – no pathway	N/A
		Depressions on peat substrates of the Rhynchosporion [7150]	Terrestrial habitat – no pathway	N/A
		Alkaline fens [7230]	Terrestrial habitat – no pathway	N/A
		Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Terrestrial habitat – no pathway	N/A
		Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	Terrestrial habitat – no pathway	N/A
		Austropotamobius pallipes (White-clawed Crayfish) [1092]	Hydrological pathway	TDR Works at N17/N5 Roundabout
		Petromyzon marinus (Sea Lamprey) [1095]	Hydrological pathway	TDR Works at N17/N5 Roundabout
		Lampetra planeri (Brook Lamprey) [1096]	Hydrological pathway	TDR Works at N17/N5 Roundabout
		Salmo salar (Salmon) [1106]	Hydrological pathway	TDR Works at N17/N5 Roundabout
		Lutra lutra (Otter) [1355]	Hydrological pathway	TDR Works at N17/N5 Roundabout

5.1 CLOONASHANVILLE BOG SAC

A baseline description of Cloonshanville Bog is provided in this Section. The baseline information for the SAC is sourced from the Cloonashanville Bog SAC NPWS Site Synopsis; the Cloonashanville Bog SAC report for the Raised Bog Monitoring and Assessment Survey 2013; and the Cloonashanville Bog SAC conservation objectives supporting document – raised bog habitats (2016)

It is located approximately 2 km east of Frenchpark in Co. Roscommon. The eastern boundary of the site is the Breedoge River, while the southern is the Frenchpark/Elphin road. The bog developed in a shallow basin in a groundwater discharge zone and is underlain by low-permeability, clayey limestones. The regional water table has been lowered, but evidence of groundwater inputs are seen on and around the high bog.

Cloonshanville has been classified as a western raised bog (Cross, 1990) and geomorphologically as a ridge river bog (Kelly et al. 1995). The high bog is broadly rectangular in shape with a small extra lobe in the south-east, separated from the main lobe of the bog by a drain and a track. To the east, the bog retains its original boundary, the River Breedoge.

An area of calcareous fen (called Carragnabraher on Ordnance Survey six-inch maps), which occupies the site of a former lake, adds to the overall ecological interest of the SAC as such fen areas are rarely encountered in association with raised bog systems. This fen was partially planted with Pinus contorta, which has been since felled to waste by Coillte as part of a raised bog restoration project (Derwin, 2008).

A large flush area occurs in the centre of the bog dome. The main body of the flush supports an extensive area of Betula dominated bog woodland, a priority Annex I habitat in its own right and an extremely rare Irish woodland type. The woodland is well-developed structurally and contains a diverse range of plant species. It is dominated by birch (Betula sp.), with some willow (Salix sp.) occurring also, and with an understorey of tussocky Purple Moor-grass (Molinia caerulea). Bogmyrtle (Myrica gale) occurs in places.

Much of the uncut high bog has been impacted by drainage associated with past peat cutting around the edges and afforestation on the high bog. As part of a Coillte EU LIFE restoration project, the forestry on the high bog has been removed and drains blocked (Derwin 2008). Positive results of these management measures are reported by Fernandez et al. (2014a, b).

The majority of the uncut high bog is dominated by degraded raised bog. However, a significant area of active bog occurs in the central and northern part of the bog. In the wettest areas hummock/pool systems have developed and it is here that Rhynchosporion vegetation is best represented.

There are three areas of conifer plantation on the peat along the margins of the site. These were planted within the past 25 years. In places the trees have not grown well, and in these areas there is still a significant understorey of typical raised bog plants. It is likely that bog vegetation

would regenerate well in these areas following tree removal and the implementation of some restoration measures such as drain blocking. The Breedoge River, which marks the eastern boundary of the site, adds habitat diversity and is of some importance for waterfowl, including Mallard and Snipe.

5.1.1 Description of Qualifying Feature of Interest

5.1.1.1 Active Raised Bog

The current area of Active Raised Bog at Cloonshanville Bog is 20.11 ha (13.74% of the high bog), which is a decrease of 8.18 ha since 1994. Raised bog vegetation communities are grouped into a series of community complexes and these complexes are then amalgamated into a series of ecotopes characterised by different physical characteristics using the approach outlined by Kelly & Schouten (2002). The main ecotopes that are representative of an active raised bog community complex include:

- Central ecotope – this ecotope is indicative of good quality active raised bog and is present at Cloonashanville Bog SAC

- Sub-central ecotope – this ecotope is indicative of good quality active raised bog and is present at Cloonashanville Bog SAC.

- Active flushes and soaks ecotope – this wet ecotope is dominated by Sphagnum and is associated with active raised bog and as such is listed as an active raised bog ecotope. This ecotope is present at Cloonashanville Bog SAC.

- Bog woodland ecotope – this is an actively peat forming ecotope that overlaps with active raised bog habitat. It is listed as an active raised bog ecotope and is present at Cloonashanville Bog SAC.

Active Raised Bog at Cloonashanville Bog SAC comprises 4 ARB ecotopes: central ecotope; sub-central ecotope; active flushes and Bog Woodland. The extent and distribution of these ecotopes are shown on **Figure 5.1**. The nearest example of an active raised bog ecotope to the Project is c. 410m to the northwest of the Project.

Central ecotope occurs at one location (see **Figure 5.1**) towards the northwest of the SAC. The central ecotope is comprised of one community complex type, complex 14. Typical features of

this complex type include a hummock, hollow and pool (>20% cover) with occasional lawns, a high cover of Sphagnum with cery soft to quaking ground conditions. Within the central ecotope of Cloonashanville Bog interconnecting pools comprised 34 to 50% of the area, and total Sphagnum cover ranged from 51 to 75%. Sphagnum cuspidatum dominated the pools, with S. denticulatum very rarely also present. S. papillosum and S. pulchrum lawns fringed the pools, above which rose low hummocks of S. capillifolium and S. austinii. The oceanic species Pleurozia purpurea and Racomitrium lanuginosum were present. Calluna vulgaris and Eriophorum vaginatum were the most abundant vascular plants. Water appeared to flow through the complex towards the southwest in the direction of a steep face bank.

Sub-central ecotope occurs thirteen locations, mapped as Sc1 to Sc15 (see **Figure 5.1**). Five main community complex types are associated with the sub-central ecotope. Complex 9/7+P, characterised by hummocks and hollows with pools (>10% cover), lower Sphagnum cover and soft to very soft and occasional quaking ground is widespread and dominated Sc3, Sc8, Sc12 and Sc6. These area are characterised by 34 to 50% cover of regular pools dominated by Sphagnum cuspidatum with some Eriophorum angustifolium interspersed with hummocks of S. capillifolium occupied by Calluna vulgaris and E. vaginatum.

In large parts of Sc6 and Sc15, a poorer-quality variant with higher cover of Narthecium ossifragum was mapped as 9/7/6+P, which is characterised by frequent (11-25% cover) Sphagnum cuspidatum dominated pools, high interpool areas dominated by Calluna that were relatively dry and firm underfoot. Complex 10/4 was the dominant complex type in Sc1, Sc4, Sc5, Sc11 and the eastern parts of Sc8 and Sc15. This complex is characterised by hummocks and hollows with pools (<10% or absent), frequent to abundant Sphagnum and very soft. Pools in this complex were very small and infrequent, but Sphagnum cover reached 51 to 75%. Hummocks of Calluna, Sphagnum austinii, S. fuscum, S. capillifolium and Hylocomium splendens were interspersed with lawns of S. pulchrum and S. papillosum. Near flush FY (see **Figure 5.1**), western and flush species, such as Schoenus nigricans and Molinia caerulea are present. Sc4 was a poorer variant of this type. Complex 10/6 is found in Sc9 and Sc10 in the southeast lobe of the site. This complex is characterised by low hummocks of Sphagnum capillifolium, and more rarely S. austinii and S. fuscum, interspersed with S. cuspidatum in hollows and occasional small pools. Lawns of S. papillosum were frequent and the oceanic species Pleurozia purpurea and Racomitrium lanuginosum were occasional. Narthecium ossifragum and Calluna vulgaris were the most abundant vascular plants. In these areas, water flowed to the west towards a double drain and track.

Two newly regenerating areas adjacent to clearfelled plantations, Sc13 and Sc14, consisted of complex 9/10. Pools were rare in this complex, which was characterised by vigorous new growth of Sphagnum. In Sc13, the main species were S. capillifolium, S. papillosum and S. magellanicum; in Sc14, the majority of Sphagnum cover comprised S. papillosum, S. magellanicum and S. pulchrum. Otherwise, Calluna vulgaris, Eriophorum vaginatum and E. angustifolium were the most characteristic species. Complex 9/7/10 was very rare and occurred in Sc3. This complex is characterised by hummock and hollows with pools absent, frequent to abui Sphagnum on soft to very soft ground.

A large central flush with several arms bisects the site. The section north of the main area of bog woodland (BW1) was active and was mapped as flush FY1 (**Figure 5.1** for location). It was characterised by abundant Molinia caerulea with hummocks of Sphagnum capillifolium interspersed with S. fallax. Scattered birch (Betula pubescens) saplings were present with overall cover of 4 to 10%. West of BW1 was a quaking mat of S. palustre that graded into a Sphagnum cuspidatum pool. Arms of the flush mapped as FY2 and FY4 were also active. These included a flush type dominated by Sphagnum with S. fallax and S. palustre under tall, abundant Calluna and Myrica gale. This graded into a Molina caerulea dominated community with Menyanthes trifoliata, Comarum palustre, Succisa pratensis and Myrica gale on quaking peat. Bog Woodland although considered to be part of the Active Raised Bog is described separately below.

5.1.1.2 Degraded Raised Bog

The extent of degraded raised bog occurring at Cloonashanville Bog SAC, as set out in the Raised Bog Monitoring and Assessment Programme (NPWS, 2013) was 126.23 Ha, representing c. 86.26% of the high bog at the SAC. The 2016 conservation objectives supporting document identifies the extent of the degraded raised bog habitat that is or has potential to be representative of this Annex 1 qualifying habitat of the SAC. This area is shown on **Figure 5.2.** The extent of this area (45.2Ha) was estimated using hydrological modelling based on LIDAR data. The 45.2Ha area was further refined to a smaller area of 22.6Ha by estimating the area that could be restored by blocking drains on the high bog. The nearest are of degraded raised bog identified as potential active raised bog is c. 280m to the northwest of the Project.

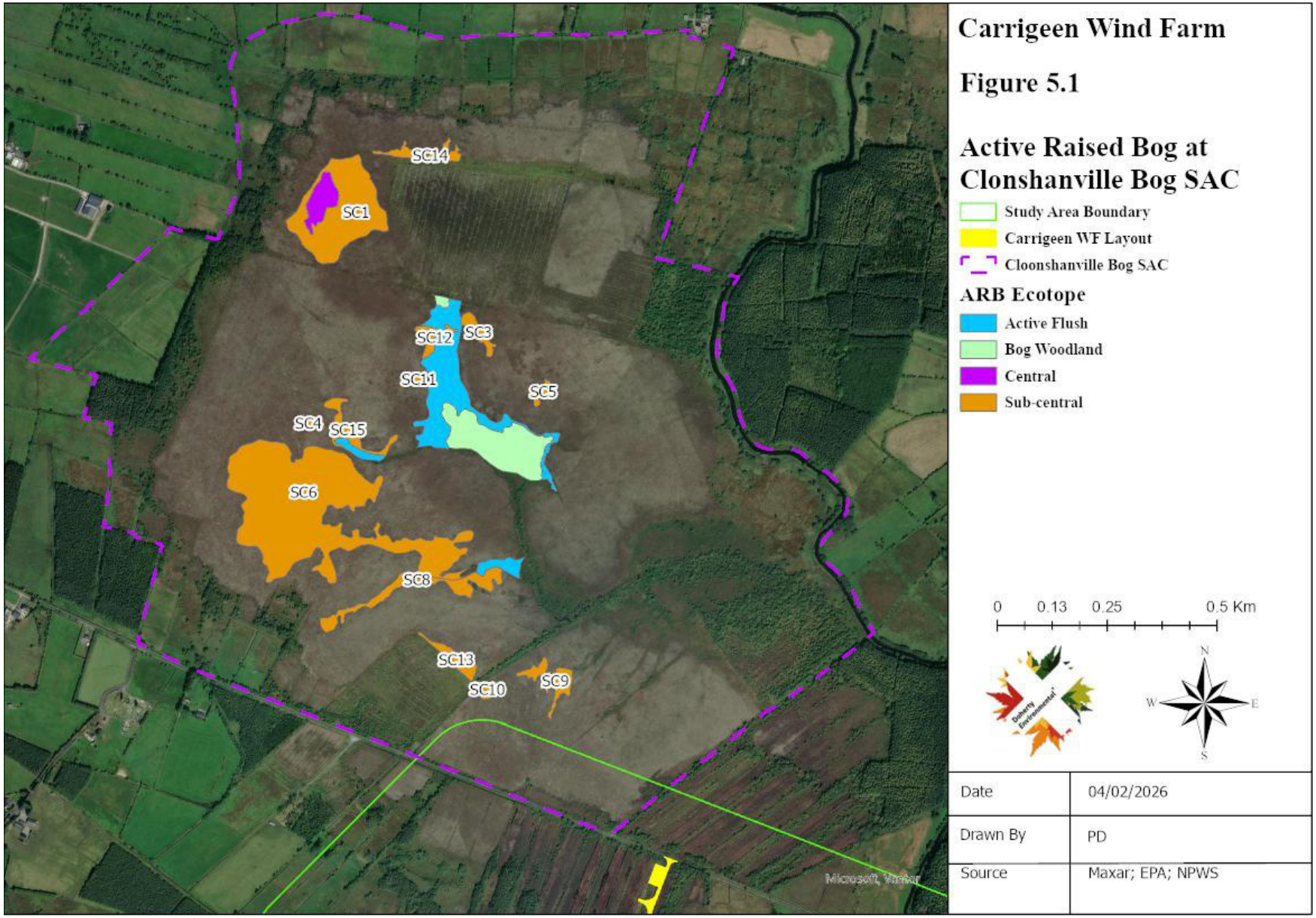
The main ecotopes that are representative of an degraded raised bog community complex include:

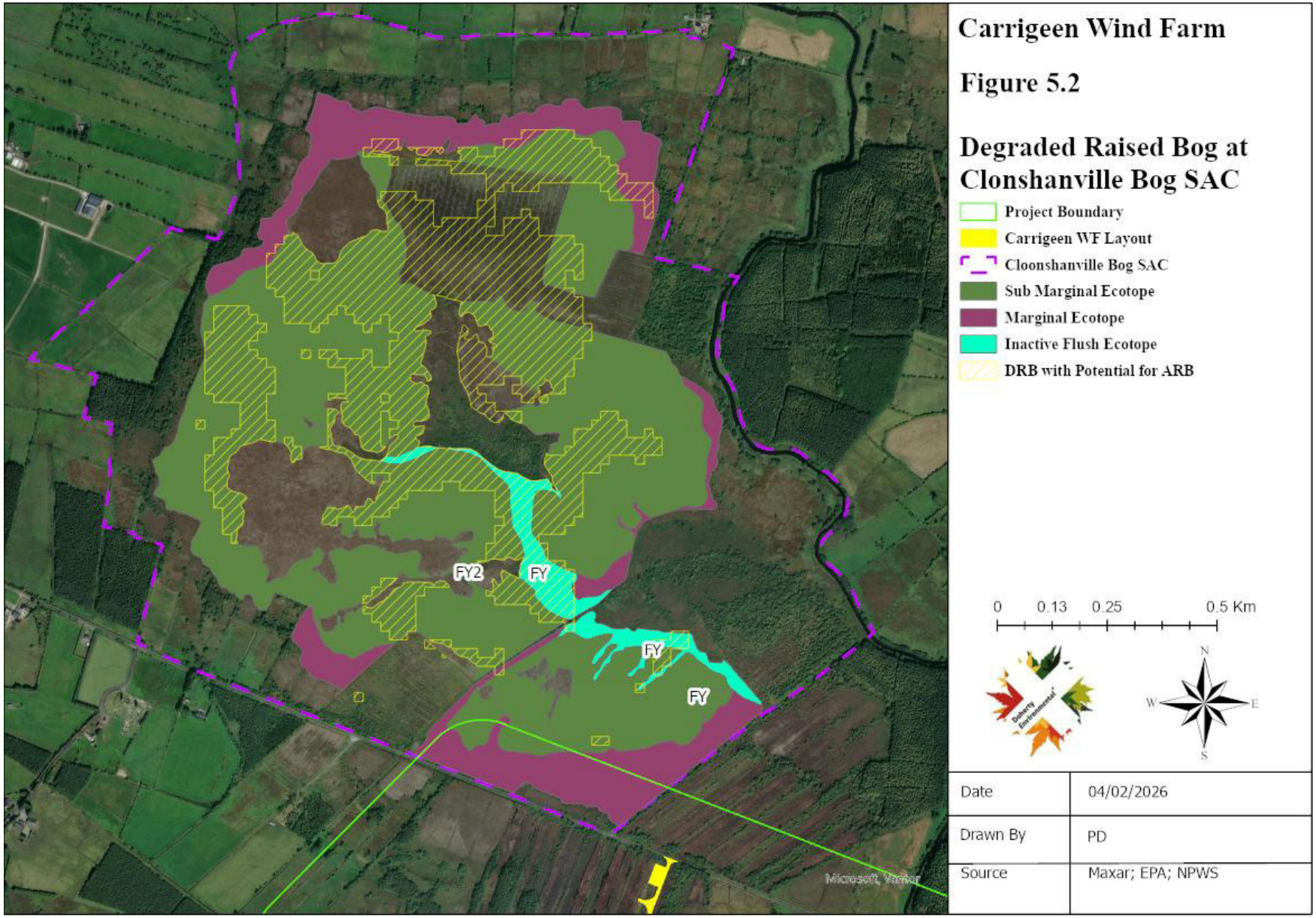
- Sub-marginal ecotope – this is a drier ecotope that is not peat accumulating. The extent of sub-marginal ecotope is shown on **Figure 5.2**. The extent of this ecotope identified as Potential Degraded Raised Bog is also shown on **Figure 5.2**

- Marginal ecotope. This ecotope forms part of the layer labelled Potential Degraded Raised Bog on **Figure 5.2**. The extent of sub-marginal ecotope is shown on **Figure 5.2**. The extent of this ecotope identified as Potential Degraded Raised Bog is also shown on **Figure 5.2**

- Inactive flushes (see **Figure 5.2** for location of inactive flush)

Although some areas of Degraded Raised Bog have a relatively well-developed Raised Bog flora, they are affected by water loss to varying degrees, and are usually devoid of permanent pools. The sub-marginal ecotope features the most developed micro-topography within Degraded Raised Bog. The most widespread sub-marginal community complex found across the entire high bog was complex 9/7. This complex is characterised by hummocks and hollows with pools absent, frequent Sphagnum and soft peat. Microtopography of this complex at Cloonashanville Bog SAC is dominated by low hummocks and hollows whilst pools are absent.


SC14
SC1
SC12
SC3
SC11
SC5
SC4
SC15
SC6
SC8
SC13
SC10
SC9
Carrigeen Wind Farm
Figure 5.1
Active Raised Bog at Clonshanville Bog SAC
Study Area Boundary
Carrigeen WF Layout
Cloonshanville Bog SAC
ARB Ecotope
Active Flush
Bog Woodland
Central
Sub-central
0 0.13 0.25 0.5 Km
N
W
E
S
Date 04/02/2026
Drawn By PD
Source Maxar; EPA; NPWS


Carrigeen Wind Farm
Figure 5.2
Degraded Raised Bog at Clonshanville Bog SAC
Project Boundary
Carrigeen WF Layout
Cloonshanville Bog SAC
Sub Marginal Ecotope
Marginal Ecotope
Inactive Flush Ecotope
DRB with Potential for ARB
FY2
FY
FY
FY
0 0.13 0.25 0.5 Km
N
W
E
S
Date 04/02/2026
Drawn By PD
Source Maxar; EPA; NPWS

The nearest point of the sub-marginal ecotope to the Project infrastructure is c. 255m to the north. This area of sub-marginal ecotope has not been identified as part of the degraded raised bog qualifying habitat of the SAC.

Marginal ecotope forms narrow bands around parts of the high bog edge and is widest along the north and the southeastern edge. Complex 3/6/7 was the most common being characterised by hummock and hollow vegetation and lawns of Narthecium ossifragum. Typically found on relatively steep slopes, Calluna and Carex panicea were the most abundant species, usually also with frequent Narthecium ossifragum, although this varied across the site. The nearest point of marginal ecotope to the Project infrastructure is c. 130m to the northwest. This area of marginal bog has not been identified as part of the degraded raised bog qualifying habitat of the SAC.

The central flush running through the site was inactive (flush FY – see **Figure 5.1** and **Figure 5.2**) south of the main body of bog woodland (Bw1). Tall, leggy Calluna and Eriophorum vaginatum dominated the vegetation, which also included the characteristic species Myrica gale and Phragmites australis. Some parts of the flush were characterised by Molinia rather than Phragmites. Sphagnum fallax was sometimes present in the flush. A deep channel with flowing water and flanked by shrubby Salix cinerea ssp. oleifolia and young Betula pubescens formed the centre of the flush. Flush FX was located on the edge of the site, southwest of Sc6. Molinia and Calluna dominated this flush. The nearest point of the inactive flush ecotope to the Project infrastructure is c. 360m to the north. This area of inactive flush ecotope has not been identified as part of the degraded raised bog qualifying habitat of the SAC.

5.1.1.3 Depressions on Peat Substrate of the Rhynchosporion

Rhynchosporion vegetation is widespread on Cloonshanville Bog. As such it is not mapped as defined polygon areas in the conservation objectives mapping for the SAC. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. In these areas, the Rhynchosporion vegetation occurs within Sphagnum hollows and along Sphagnum pool edges and on lawns. Typical plant species include Rhynchospora alba, Sphagnum cuspidatum, S. papillosum, Drosera anglica and Narthecium ossifragum. R. alba was also found within degraded raised bog, but always associated with wet features such as hollows, water seepage zones and relict pools.

5.1.1.4 Bog Woodland

Bog Woodland is found at two locations on the high bog at Cloonshanville Bog (Bw1 and Bw2 – see **Figure 5.1**) and it covers 2.17 ha. The main section of bog woodland (Bw1) was

dominated by Betula pubescens with some Salix cinerea ssp. oleifolia, S. aurita and the hybrid S. ×multinervis. Canopy height at the centre ranged from 10-12 m, and the woodland includes some large, mature individual birch. The area of tall woodland was narrow in places and fringed by lower, more open woodland that graded very gradually into active flush with scattered birch saplings. The understorey was very wet, with hollows and pools of Sphagnum fallax and S. cuspidatum. Drier mounds of S. palustre, Polytrichum commune and Hylocomium splendens occurred in between. Molinia caerulea was the dominant understorey vascular plant, with Dryopteris dilatata, D. carthusiana, Juncus effusus, Carex rostrata, Succisa pratensis and Potentilla (Comarum) palustre also present. Sphagnum squarrosum was recorded here in 2012 and in 1994 (Kelly et al., 1995). The smaller, northern section of bog woodland (Bw2) consisted of a birch stand with c. 40% cover of Betula pubescens and canopy height of c. 5 m. There was a very sparse shrub layer of Myrica gale and Calluna vulgaris. The field layer included abundant to frequent Eriophorum vaginatum, Empetrum nigrum, Aulacomnium palustre, Sphagnum palustre, S. capillifolium and Pleurozium schreberi. Occasionally occurring were Vaccinium myrtillus, Agrostis canina, Sphagnum fimbriatum and Mnium hornum.

5.1.2 Documented Threats and Pressures

The land use activities that have been identified as negatively impacting the status of raised bog habitats at Cloonashanville Bog SAC comprise:

Peat extraction

Peat extraction resulted in the loss of 0.03Ha of high bog during the period 2004 – 2010, with further cutting during 2010/2011 resulting in loss. No peat extraction at Cloonashanville Bog SAC has been undertaken since 2011.

Drainage

The Cloonashanville Bog SAC site report for the Raised Bog Monitoring and Assessment Project identified artificial drainage features within the SAC. A total of 6 no. drains were identified as functional drains resulting in the uncontrolled loss of water from the high bog. An additional 8 no. drainage features were identified as having reduced functional drains. A further 5 no. drains were identified as not have a functional role in water loss from the SAC.

Since the publication of the Raised Bog Monitoring and Assessment Project, the Cloonashanville Bog SAC Restoration Plan (NPWS, 2023) has been published. This plan has

identified the measures required to minimise water loss from the raised bog habitats of the SAC via artificial drainage. Map 2 of the restoration plan is reproduced as **Figure 5.3** below and illustrates the features of the plan that will manage drainage at the bog.

Invasive Alien Species

Tree saplings are frequent on the clearfelled conifer plantations, and a large number of these are lodgepole pine (Pinus contorta) in addition to native species. Unless controlled, they are likely to mature and spread in the drier parts of the clearfells and perhaps drier parts of the undisturbed high bog. A *Rhododendron ponticum* seedling was noted in clearfell. More recently Japanese Knotweed has been recorded along the local road bounding the SAC to the south.

5.2 BELLANAGARE BOG SPA

Bellanagare Bog is a large bog situated 6 km north-north-east of Castlerea in Co. Roscommon. It is classified as a western, or intermediate, raised bog, because is shows features of both raised bog and blanket bog. The bog is underlain by muddy Carboniferous limestone with a low permeability. The sub-soil is predominantly of clayey limestone till. The site lies in an upland area at the top of a surface catchment divide. The surface of the bog is undulating and the peat is concentrated on ridges, with flushes occurring in between. A number of streams, including the Frances River, rise on the site. The bog is traversed by several tracks. A large section of the site is in state ownership.

The high bog at Bellanagare is predominantly comprised of degraded raised bog. This habitat tends to be drier that the active bog areas and species such as Crossleaved Heath (Erica tetralix), Heather (Calluna vulgaris), Common Cottongrass (Eriophorum angustifolium), Bog Asphodel, Carnation Sedge and Deergrass tend to be the most frequent and conspicuous. Indicator species of midland raised bogs such as Bog-rosemary (Andromeda polifolia) and the bog moss S. magellanicum are present, though they are not as common as in raised bogs further east in the country. The cover of bog mosses is relatively low in areas of degraded bog and there are few wet pool areas.

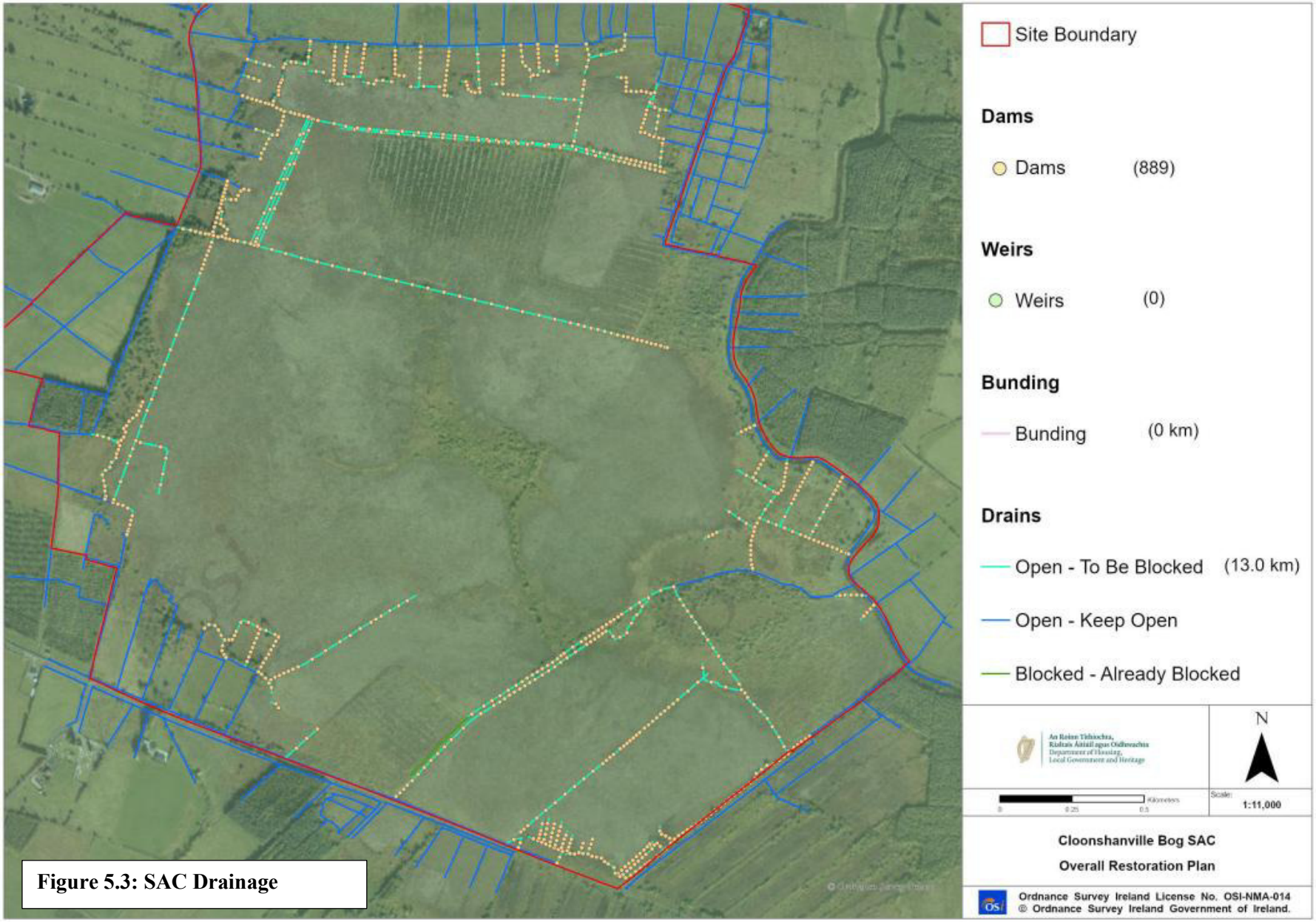


Figure 5.3: SAC Drainage

5.2.1 Description of Special Conservation Interest Bird Species

5.2.1.1 Greenland White-fronted Geese

The national population of wintering Greenland White-fronted Goose in Ireland has declined by 13% from 1985 - 2018 (EEA, 2019). It is understood that the Bellanagare Bog SPA was used by birds from the Lough Gara flock of Greenland White-fronted Goose (see Burke et al., 2014), which declined by 77% in population size between 1994/95 - 2022/23 (NPWS, 2025). Greenland White-fronted Goose has not been recorded using the SPA in recent decades, which coincides with a general shift by this species from foraging on peatland sites to grassland sites (Burke et al., 2014; NPWS internal files). The Lough Gara flock now primarily uses Lough Gara and its adjacent agricultural grasslands. The noted population trend and shift in habitat use may be related to weather and/or land-cover conditions (Schindler et al., 2024).

This species is a grazer, feeding on a wide range of vegetation. Key forage materials include roots, tubers (such as potatoes), shoots (such as winter wheat), stolons, rhizomes, leaves (such as grasses), and seed such as (spilled) grain. Key habitats include peat bogs (including raised bogs and blanket bogs), grasslands (such as wet grassland, callows, semi-improved grassland, and intensive grassland), arable stubble, winter cereal fields, coastal grasslands, and occasionally salt marsh.

Overnight roosting habitat mainly consists of permanent waterbodies, such as lakes, estuaries, bays, and other open waterbodies. When roosting in waterbodies, this species can roost on above-water features such as sandbanks. Roosting is a critical ecological requirement for the over-wintering population. Daytime roosting is also a common behaviour, where birds minimise activity levels to conserve energy, while benefitting from the vigilance of other flock members.

5.3 LOUGH GARA SPA

Lough Gara is located on the Co. Sligo/Roscommon border south-west of the Curlew Mountains and between the towns of Boyle and Ballaghaderreen. Lough Gara is used regularly by an internationally important population of Greenland White-fronted Goose (mean peak of 510 individuals over the five winters 1995/96 to 1999/2000). An internationally important population of Whooper Swan also uses the site (mean peak of 321 for the 5-year period 1994/95 to 1998/99), with high numbers present in the winter of 1996/97 (peak of 654). A range of other species occurs, including Great Crested Grebe (16), Mute Swan (38), Wigeon (593), Teal (44),

Mallard (157), Shoveler (18), Pochard (41), Tufted Duck (49), Goldeneye (20), Golden Plover (270), Lapwing (75) and Lesser Black-backed Gull (172) - all figures are mean peaks for the two winters 1995/96 to 1996/97. is of high ornithological importance principally on account of the internationally important populations of Greenland White-fronted Goose and Whooper Swan that are associated with the lake. The occurrence of these species, along with Golden Plover, is of particular note as they are listed on Annex I of the E.U. Birds Directive. Lough Gara is a Ramsar Convention site and a Wildfowl Sanctuary.

5.3.1 Description of Special Conservation Interest Bird Species

5.3.1.1 Whooper Swan

The national population of Whooper Swan wintering in Ireland has increased in the long term, with a 40% population increase from 1991 - 2015 (Lewis et al., 2019). During the baseline assessments to inform SPA designation, 321 Whooper Swan were estimated to be using this SPA (5 year mean of peak counts for baseline period 1995/96 - 1999/2000; see NPWS, 2013). A population of 105 Whooper Swan was estimated to be using Lough Gara SPA in recent years (4 year mean of peak counts from the Irish Wetland Bird Survey (I-WeBs) monitoring for the period 2017/18 - 2021/22; note: the count for the 2020/21 period was taken from Burke et al., 2021). This represents an estimated population decrease of 68% since the baseline period. This trend is in contrast to the national trend.

This species feeds on a wide range of aquatic and terrestrial vegetation. Key forage materials include: leaves, with significant consumption of grasses; seeds, including spilled grain; roots; tubers, including potatoes; shoots, including those from winter wheat and other cereals. Key foraging habitats are grasslands (including wet grassland, semi-improved grassland, and intensive grassland), arable stubble, winter cereals, rivers, lakes, turloughs and other wetland habitats.

Overnight roosting habitat consists primarily of permanent waterbodies, such as rivers, lakes, turloughs, lagoons and other open waterbodies. Roosting is a critical ecological requirement for the wintering population. Daytime roosting is also a common behaviour, where birds minimise activity levels to conserve energy, while benefitting from the vigilance of other flock members.

The wintering population can make extensive use of suitable habitats in important areas outside the SPA, for foraging and roosting.

5.3.1.2 Greenland White-fronted Geese

During the baseline assessments to inform SPA designation, 510 geese were estimated to be using this SPA (5 year mean of peak counts for baseline period 1994/95 - 1998/99; see NPWS, 2013). A population of 118 geese were estimated to using the SPA in recent years (5 year mean of peak counts 2018/19 - 2022/23 from Greenland Whitefronted Goose annual census reports see Fox et al., 2019, 2020, 2021, 2022 and 2023). This represents a 77% decline in the SPA population since the baseline period which is significantly greater than the national trend.

The wintering population can make extensive use of suitable habitats in important areas outside the SPA, for foraging and roosting. The extent, availability and quality of these supporting habitats may be of importance for the resilience of the SPA population. Suitable supporting habitats include those highlighted in the attributes for foraging and roosting habitat. Some important feeding sites used by the geese at Lough Gara fall outside the SPA, including: grasslands at Derrybeg, Ross and Rathtermon, as well as grasslands at the upper lake and Callow Lake (Burke et al., 2018).

5.4 RIVER MOY SAC

This site comprises almost the entire freshwater element of the River Moy and its tributaries including both Loughs Conn and Cullin. The system drains a catchment area of 805 sq. km. Most of the site is in Co. Mayo, though parts are in west Sligo and north Roscommon. The section of this SAC most proximate to the Project is the Mullaghanoe River. The Mullaghanoe River forms part of the River Moy SAC from its upper stretches to the south of Charlestown to its confluence with the River Moy in the townland of Bellancurra, west of Charlestown. The nearest point of the Mullaghanoe River section of the River Moy SAC to the TDR widening location is approximately 450m downstream.

No qualifying habitats of the SAC occur along the Mullaghanoe River section of the SAC. The Mullaghanoe River is known to support populations of lamprey species, with Brook, River and Sea lamprey being recorded along this watercourse (O'Connor, 2004). While no records for the presence of white-clawed crayfish are held for the main channel of the Mullaghanoe River downstream of the widening location, this species has been recorded from an upstream tributary of the Mullaghanoe River to the east of the widening location. The presence of white-clawed crayfish at this location suggests that this species is likely to be present along the Mullaghanoe River downstream of the widening location. The Mullaghanoe River is also representative of

an excellent salmonid watercourse, supporting healthy stocks of Atlantic salmon as well as brown trout.

5.5 CONSERVATION OBJECTIVES

5.5.1 Generic Conservation Objectives

Generic conservation objectives have been published for the Cloonashanville Bog SAC, Lough Gara SPA, Bellanagare Bog SPA and the River Moy SAC. The generic conservation objective for these European Sites is to maintain and/or restore the favourable conservation condition of the qualifying habitats and qualifying species for which these sites have been designated.

Favourable conservation status of wetland habitats is achieved when:

- its natural range, and area it covers within that range, are stable or increasing
- the conservation status of its typical species is favourable

The favourable conservation status of these species will be achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future.
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The generic conservation objectives for Cloonashanville Bog SAC seek to **restore** favourable conservation condition of active raised bog, degraded raised bog, depressions of Rhynchosporion; and **maintain** the favourable conservation condition of bog woodland.

The generic conservation objectives for Bellanagare Bog SPA seek to **restore** favourable conservation condition of Greenland White-fronted Geese in Bellanagare Bog SPA.

The generic conservation objectives for Lough Gara SPA seek to **restore** favourable conservation condition of Whooper Swan and Greenland White-fronted Geese in Lough Gara SPA.

The generic conservation objectives for Annex 2 freshwater species of the River Moy SAC seek to **maintain** favourable conservation condition of white-clawed crayfish, sea lamprey, brook lamprey and otter.

5.5.2 Site-Specific Conservation Objectives

Site-specific Conservation Objectives for the Cloonashanville Bog SAC. Bellanagare Bog SPA, Lough Gara SPA and the River Moy SAC have been published by the NPWS (NPWS, 2016a; 2016b 2025a; 2025b). The SSCOs for the qualifying features of interest of these European Sites are set out in detail in Section 6 below where the conservation objectives are used to facilitate an examination of the Project's potential to undermine these objectives and thereby result in adverse effects to the conservation objectives of these European Sites.

5.5.3 Documented Threats & Pressures

The NPWS have documented threats and pressures to the Cloonashanville Bog SAC, Lough Gara SPA and Bellanagare Bog SPA in their Natura 2000 Data Return Form for these European Sites. The threats and pressures to these European Sites have been ranked in terms of low, medium and high impacts. The low, medium to high impact threats and pressures are as follows:

- C01.03 Peat extraction (low impact)
- J02.07 Drainage (high impact)
- I01 Invasive alien species (low impact)

The documented threats and pressures for the River Moy SAC are as follows:

- Agricultural intensification (high impact)
- Diffuse pollution to surface water due to agricultural and forestry activities (high impact)
- Forest planting on open ground (high impact)
- Non-native invasive species (high impact)
- Use of fertilisers for forestry (high impact)
- Aerodrome, helipport (Medium impact)
- Peat extraction (Medium impact)

6 EXAMINATION OF IMPACTS

The following subsections provide an examination of the impacts that could arise as a result of the elements of the Project during the construction, operation and decommissioning phases and adversely affect the European Sites and relevant qualifying features of interest occurring within the zone of influence of the Project.

6.1 CLOONASHANVILLE BOG SAC

6.1.1 Direct Impacts – Overlapping Redline boundary

The Project EIAR Boundary overlaps the Cloonashanville Bog SAC. However, this is an arbitrary boundary prepared for the purposes of the planning application. No elements of the Project are proposed to be undertaken within the Cloonashanville Bog SAC. The nearest infrastructure element of the Project to the SAC boundary is located approximately 125m to the south. As such there will be no potential for the Project to result in direct impacts, in the form of habitat loss or damage, to the SAC and its qualifying feature of interest.

6.1.2 Indirect Impacts

The indirect impacts associated with the project that have been identified as requiring further examination as part of this Natura Impact Statement comprise:

Groundwater impact;

Air Emission Impact; and

Spread of non-native invasive species.

6.1.2.1 Groundwater Impacts

As noted in **Section 4.5** above the Water Framework Directive Cycle 2 report for the Catchment Upper Shannon – Sub-catchment Boyle_SC_010 lists the Cloonashanville Bog as a potentially dependent groundwater body. Kelly et al. (1995) have described limited groundwater interaction with the raised bog habitats at Cloonashanville Bog, with such interactions only being reported at deeper artificial drains in cutaway to the west of the bog. They described the

bog as being located in a regional discharge zone where past drainage has already lowered the water table.

As detailed in **Section 5.1** above Cloonashanville Bog SAC is comprised of a number of raised bog ecotopes. The active raised bog and degraded raised bog habitats of the SAC are representative of ombrotrophic habitats that are fed by rainwater and are not influenced by groundwater. Rather, as described by the NPWS (2025) they are generally isolated from the local groundwater table. Given the ombrotrophic nature of these habitats, along with the already drained water tables underlying the bog and the absence of any interaction between these habitats and groundwater (as reported by Kelly et al., 1995) these habitats are not susceptible to changes in local groundwater levels or flow rates etc and will not be susceptible to indirect impacts as a result of excavations and works at the nearest point of the Project, comprising the Site Access Roads.

In contrast central and sub-central ecotopes and the degraded raised bog ecotopes, the raised bog active flush and associated bog woodland habitat can be associated with soligenous influence. Whilst Kelly et al. (1995) nor Fernandez (2014) did not describe any specific interaction between these habitats of Cloonashanville Bog and underlying groundwater and described associated vegetation that is not particularly representative of elevated nutrient or mineral concentration, in general terms it is noted that active flush habitat of raised bog can display an increase in nutrient supply. The source of such nutrients can be derived from concentrated surface flows or groundwater influence. For the purposes of this Natura Impact Statement, and adopting a worst-case scenario, the flush habitat of the SAC are considered to be influenced by groundwater.

The nearest point of the active flush habitat to the Project infrastructure is c. 365m to the north. The elements of the project that will be construction at this location will be the proposed Site Access Road and the Temporary Construction Compound. Both will be positioned to the south of the existing local road that separates the project from the Cloonashanville Bog SAC to the north. The road is bounded either side by a deep cut drain, c. 2m below the road surface.

For the Temporary Construction Compound the only excavations required will be associated with the grading of the surface to form a flat surface. The underlying peat will not be excavated to bedrock level. A geo-textile support membrane will be laid out over the peat substrate with hardcore being laid out over the membrane to provide the temporary foundation for the compound.

For the section of Site Access Road in the wider vicinity of the SAC (i.e. between the local road and the Carricknabraher River) it is proposed to construct this using a floated road design. The approach to the construction of the floated road is similar to that described for the Temporary Construction Compound above with the cutaway surface peat being graded to a flat surface so that geo-membranes can be laid out to support the road formation. As such this section of access road will not require the excavation of peat to bedrock level and below and will not have the potential to result in any changes to groundwater levels and flows.

In terms of nearest area of project excavations to bedrock level to the SAC, this will occur at the proposed Wind Turbine T3 hardstand, approximately 830m to the south of the SAC. The position of this Wind Turbine is separate from the SAC by the Carricknabraher River, extensive cutaway and the local road with associated deep drainage ditches. It is considered that excavations at the T3 location will not have the potential to alter groundwater levels and flows interacting with flush habitat of the SAC to the north.

6.1.2.2 Air Emission

The main potential source of effects on air quality during construction is dust. There is potential for the generation of dust from excavations and from construction including construction of Site Access Roads, Turbine Hardstands and the trenches for the cable ducting for the Grid Connection. It is noted that construction works in the vicinity (e.g. 500m buffer) of the Cloonashanville Bog SAC will be restricted to the section of floated Site Access Road to the south of the local road, the Temporary Construction Compound and the T1 turbine and associated hardstand.

Potentially dust generating activities are as follows:

Earth moving and excavation plant and equipment for handling and storage of soils and subsoils.

Transport and unloading of stone materials for Site Access Road construction.

Vehicle movements over dry surfaces such as Site Access Roads and public roads.

Friable dust cannot remain airborne for a very long time. The distance it can travel depends on the particle sizes, disturbance activities and weather conditions. Larger dust particles tend to travel shorter distances than smaller particles. Particle sizes greater than 30µm will generally deposit within approximately 100m of its source, while particles between 10-30µm travel up to

approximately 250-500m and particle sizes of less than 10µm can travel up to approximately 1km[5]. Notwithstanding these distances the Institute for Air Quality Management provide guidelines (IAQM, 2024) for the distances over which ecologically sensitive sites, such as SACs, could be at risk from dust emissions. These guidelines set out the potential impact to ecological receptors at varying distances. Assuming that the Cloonashanville Bog SAC and its associated raised bog habitats are representative of high sensitive receptors the potential impact of dust deposition will range from high at distances less than 20m to medium at distances less than 50m. The potential for impact at distances greater than 50m is considered to be low.

Given that the nearest point of the SAC to the Project infrastructure is c. 125m it is considered to lie outside the zone of influence of impact of dust emissions generated during the construction phase. As such any construction phase dust emissions generated by the Project will not have the potential to result in adverse effects to the status and conservation objectives of the SACs qualifying habitats.

It is noted that, notwithstanding the finding set out above a series of mitigation measures will be implemented for the control of dust generation and emission during the construction phase. These measures are set out in Section 7.

6.1.2.3 Spread of Non-Native Invasive Plant Species

Non-native invasive plant species in the form of Japanese Knotweed and *Rhododendron ponticum* occur in the wider are surrounding the Project. In the event that the Project results in the spread of these species, their establishment, especially than of *Rhododendron ponticum*, which is more likely to successfully grow on raised bog habitat, will have the potential to undermine the status and conservation objectives of raised bog qualifying habitat of the SAC. Measures are set out in Section 7 below that aim to avoid the dispersal of non-native invasive plant species during the construction phase.

[5] Department of the Environment, Transport and the Regions, (2000). Controlling and mitigating the environmental effects of minerals extraction in England. Available at: https://cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/17716/17720/17723/42130142312.PDF [Accessed 18th June 2025].

6.2 LOUGH GARA SPA

The impacts associated with the Project that have been identified as requiring further examination as part of this Natura Impact Statement comprise:

Impacts to Greenland White-fronted Geese;

Impacts to Whooper Swan;

Surface water impact;

6.2.1 Greenland white-fronted geese

The zone of sensitivity for Greenland white-fronted geese is 8km (SNH, 2016). The western parcel of the proposed Wind Farm Site is located within the potential foraging zone of the Greenland white-fronted geese population associated with the Lough Gara SPA. The pathway that was listed during the screening of Greenland white-fronted geese as having potential to connect the Project to this species relates to a mobile species pathway. Given that the nearest distance between this SPA and the Project is approximately 5.8km there will be no potential for other pathways, such as noise, air etc. to connect the Project to the Greenland white-fronted geese population.

Published fatality rates for Greenland white-fronted geese at operational wind farm sites are low, with one fatality of a bean/Greenland white-fronted geese from a review of 46 wind farm sites across Europe (Hoetker et al., 2006). This species was not recorded during the baseline ornithological field surveys for the Project and was not recorded within the 500m turbine buffers at rotor swept heights, and thus the effective collision risk for this species is zero. The ornithological assessment (EIAR Chapter 8) has identified the collision risk posed by the Project as long-term imperceptible effect.

The ornithological assessment for the Project noted that no Greenland white-fronted geese were observed using the Wind Farm Site and that this species does not breed in Ireland, and as such there will be no habitat loss impact on the species.

6.2.2 Whooper Swan

The zone of sensitivity for Whooper Swan is less than 5km (SNH, 2016). The western parcel of the Wind Farm Site is located just beyond the potential foraging zone of the Whooper Swan population associated with the Lough Gara SPA. The pathway that was listed during the screening of Whooper Swan as having potential to connect the Project to this species relates to a mobile species pathway. Given that the nearest distance between this SPA and the Project is approximately 5.8km there will be no potential for other pathways, such as noise, air etc. to connect the Project to the Whooper Swan population.

Published fatality rates for Whooper Swan at operational wind farm sites are low, with studies completed by Fijn et al. (2012), Rees (2012), Gove (2012) and a review by Whitfield & Urquhart (2015) indicating low rates of mortality to swans as a result of turbine collision. This species was recorded a total of three times during the baseline ornithological field surveys for the Project with one number flight being recorded within the 500m turbine buffers at rotor swept heights. The ornithological assessment (EIAR Chapter 8) has identified the collision risk posed by the Project to Whooper Swan to be representative of a long-term imperceptible effect.

The ornithological assessment for the Project noted that no Whooper Swans were observed using the Wind Farm Site and the wider 2km surrounding area and as such there will be no habitat loss impact on the species.

6.2.3 Surface Water Impacts

6.2.3.1 Hydraulic Loading

The Project has the potential to result in increased volumes of runoff during the operational phases of the wind farm relative to baseline conditions. This is a function of the progressive excavation and removal of vegetation cover and replacement with hardstanding surfaces (effectively or assumed impermeable) associated with Turbine Hardstands and Site Access Roads and the installation of constructed drainage around the wind farm footprint and thus removing the hydraulic absorption/buffer control from areas of hardstand within the Wind Farm Site.

Increased runoff, or an increased hydrological response to rainfall has the potential to exacerbate flooding events and exacerbate flooding and erosion within the Wind Farm Site. This in turn will have the potential to generate increased rates of suspended solids within waters

draining the Wind Farm Site and for their conveyance downstream to the Lough Gara SPA. Further discussion of the release of suspended solids are set out below.

6.2.3.2 Release of Suspended Solids

6.2.3.2.1 Ground Instability & Failure

No pre-mitigation high hazard for ground instability/failure has been identified at any of the wind farm infrastructure components. A pre-mitigation medium hazard for ground instability and slope failure has been identified at the following locations:

Table 6.1: Medium Level Pre-mitigation Determination of Peat Landslide Hazard Ranking

Infrastructure Element Considered	Pre-Mitigation Peat Landslide Hazard Ranking
Wind Turbine T1	MEDIUM
Wind Turbine T3	MEDIUM
Site Access Road from site entrance 1 to T1	MEDIUM
Site Access Road from T1 to T2	MEDIUM
Site Access Road from site entrance 3 to T4	MEDIUM
Site Access Road from T4 to T5	MEDIUM
Site Access Road from site entrance 5 to Onsite Substation	MEDIUM
Site Access Road from Onsite Substation to T11	MEDIUM

Table 6.2 provides an examination of the risks to the wetland habitats of the Lough Gara SPA associated with a ground instability/failure event at the above rated medium hazard infrastructure components.

It is noted that the pre-mitigation hazard of ground instability and slope failure at all other components of the wind farm infrastructure have been identified as negligible to low and as such are not expected to pose a risk of sediment release to drains and watercourses downstream. It is further noted that the post-mitigation hazard ranking for all these other infrastructure components have been identified as negligible (see **Table 7.1**), further ensuring the absence of risk of release of contaminants to receiving drainage waters.

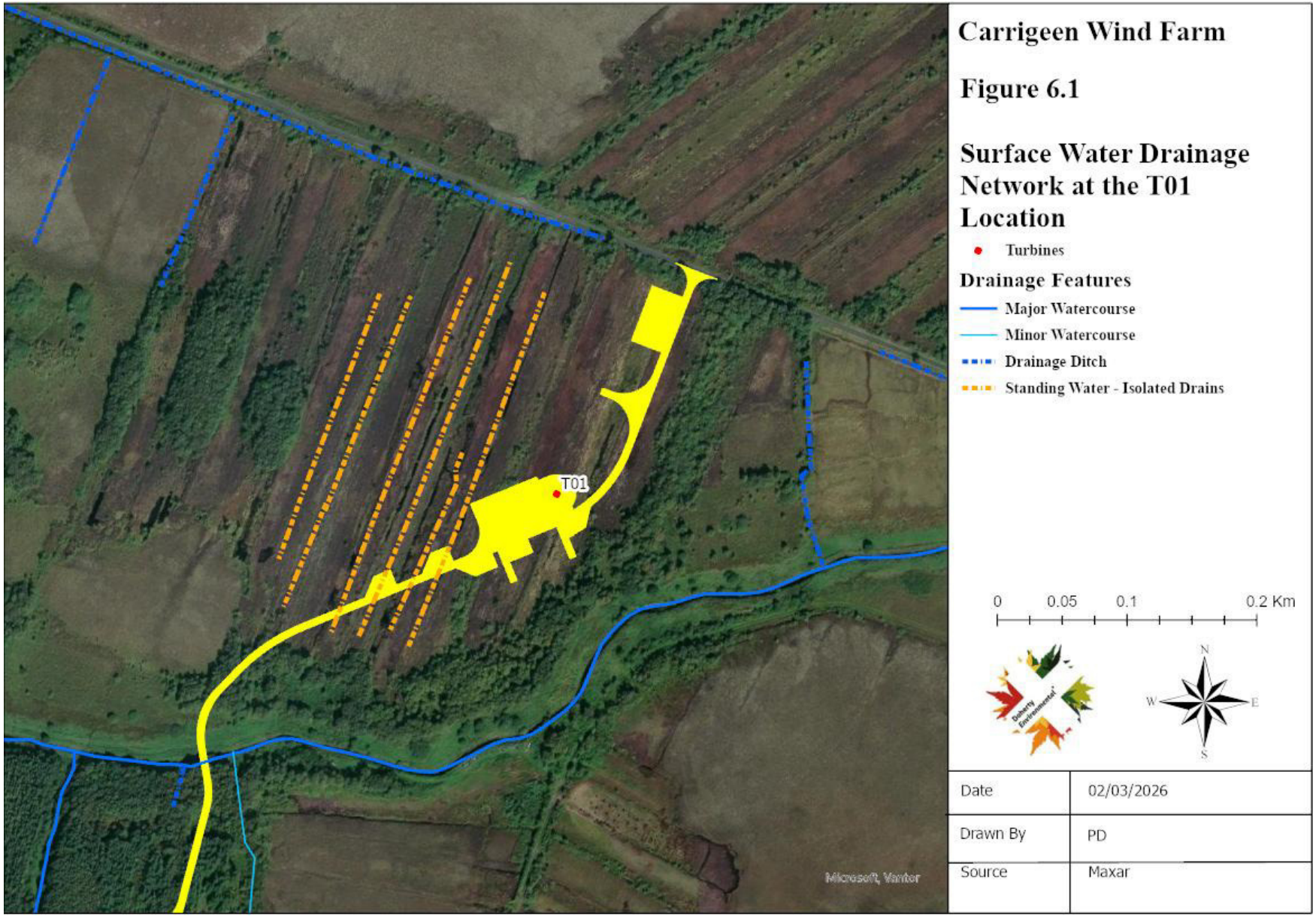
Table 6.2: Examination of Ground Instability & Failure Hazard to Lough Gara SPA Wetland Habitat

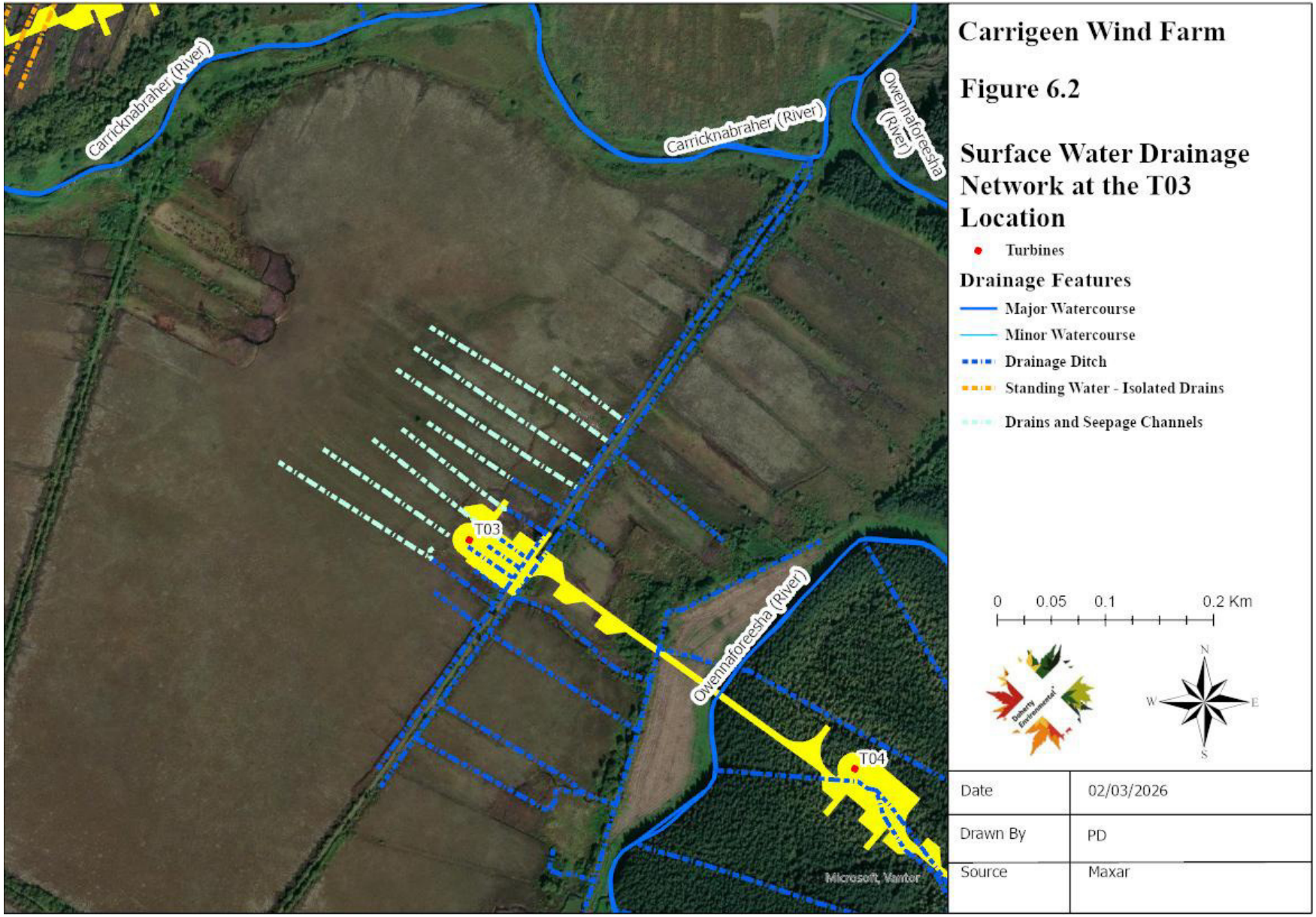
Infrastructure Component	Examination	Potential adverse effect to wetland habitat downstream
Wind Turbine T1	There are no drainage features that connect the T1 and Turbine Hardstand to the Carricknabraher River wider surface water drainage network. Isolated drains occur in cutover raised bog cells that do not connect into the wider surface water drainage network (see **Figure 6.1**). the Carricknabraher River is buffered from the T01 and hardstand by greater than 60m with existing cutover raised bog cells occurring to the south. As such in the event of ground instability/failure there will be no potential for the mobilisation and transport of peat downstream to the wetland habitats of Lough Gara SPA.	No
Wind Turbine T3	There are existing drainage ditches draining cutover raised bog at the T3 and associated Turbine Hardstand location and draining uncut raised bog to the west (see **Figure 6.2**). These drains feed an existing access track side drain which flows north and discharges into the Carricknabraher River. There is a pathway between the Carricknabraher River and the wetland habitats of the Lough Gara SPA. Whilst the depositing nature of the Carricknabraher River to the north of the T3 and associated Turbine Hardstand will limit its potential to	Yes

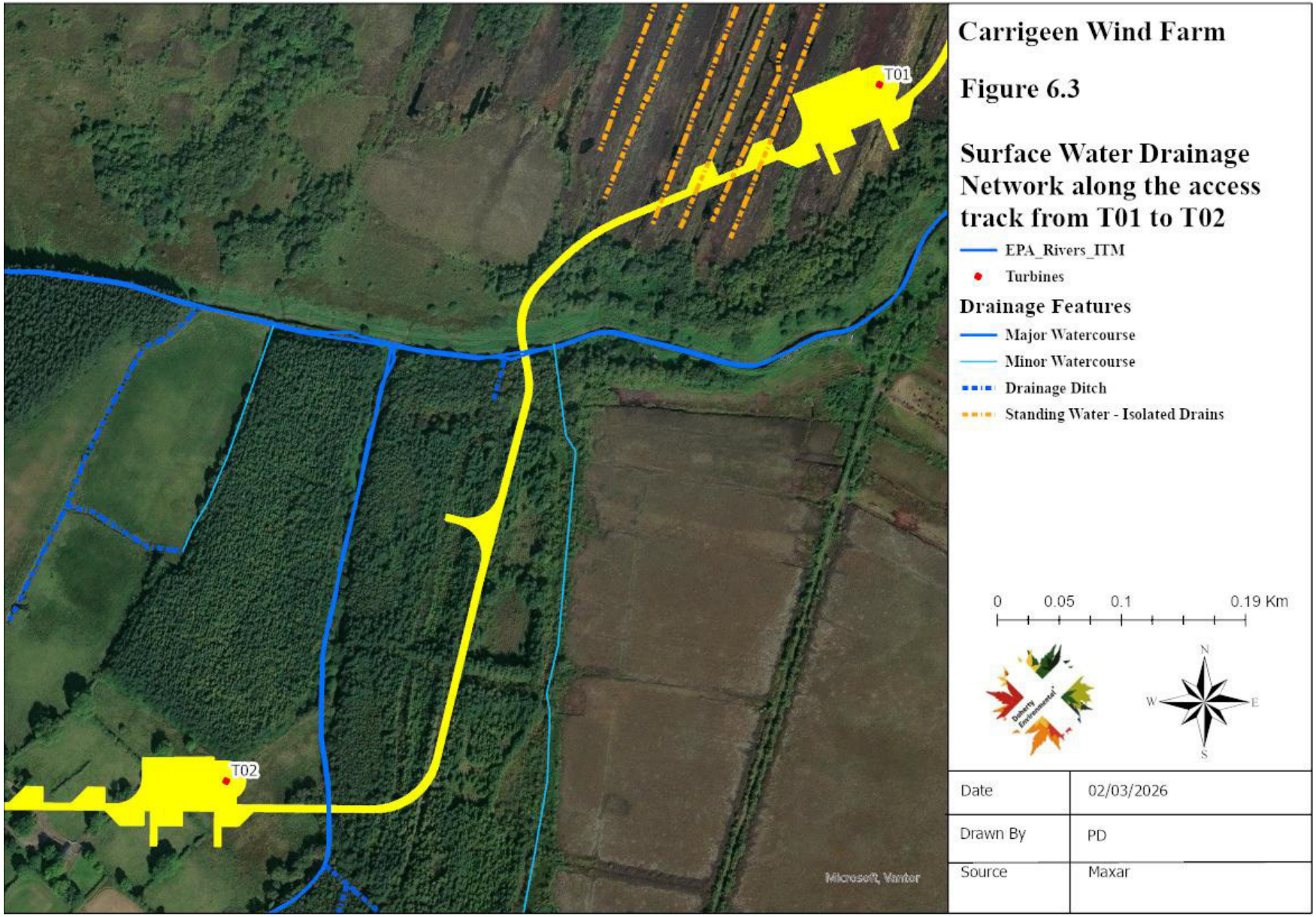
Infrastructure Component	Examination	Potential adverse effect to wetland habitat downstream
	transport peat sediment influxes (in the event of ground instability/failure) at distances downstream to the Lough Gara SPA, the presence of the pathway connecting the T3 and associated Turbine Hardstand to the wetland habitat of the SPA and the associated medium ground instability/failure hazard to the wetland habitat of the SPA requires mitigation.	
Site Access Road from site entrance No. 1 to T1	The examination set out for T1 above applies to this component of the wind farm infrastructure	No
Site Access Road from T1 to T2	The section of the site access road to T1 is examined in relation to Wind Turbine T1 above. The Carricknabraher River and existing drainage ditches are crossed by the section of access track between T1 and T2 (see **Figure 6.3**). There is a pathway between the Carricknabraher River and the wetland habitats of the Lough Gara SPA. Whilst the depositing nature of the Carricknabraher River along this access track section will limit its potential to transport peat sediment influxes (in the event of ground instability/failure) at distances downstream to the Lough Gara SPA, the presence of the pathway connecting this section of access track to the wetland habitat of the SPA and the associated medium ground instability/failure hazard requires mitigation.	Yes
Sie Access Road from site entrance No. 3 to T4	A major tributary of the Owennaforeesha River and existing drainage ditches are crossed by the Site Access Road to T4 (see **Figure 6.4**). The tributary and drainage ditches discharge into the Owennaforeesha River. There is a pathway between the Owennaforeesha River and the wetland habitats of the Lough Gara SPA. Whilst the depositing nature of the Owennaforeesha River to the west of the Site Access	Yes

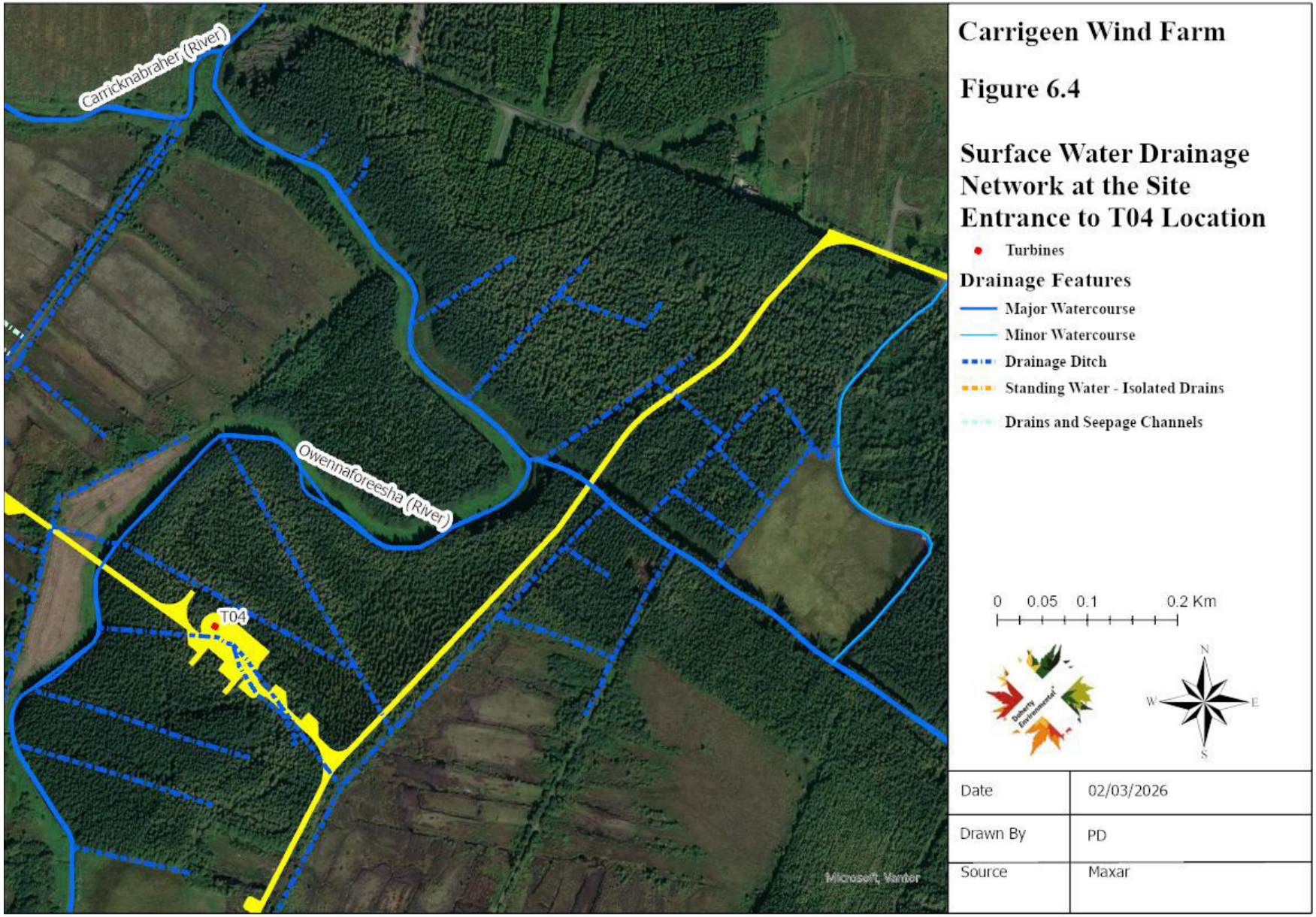
Infrastructure Component	Examination	Potential adverse effect to wetland habitat downstream
	Road to T4 will limit its potential to transport peat sediment influxes (in the event of ground instability/failure) at distances downstream to the Lough Gara SPA, the presence of the pathway connecting this section of Site Access Road to the wetland habitat of the SPA and the associated medium ground instability/failure hazard requires mitigation.	
Site Access Road from T4 to T5	Existing drainage ditches are crossed by the Site Access Road from T4 to T5 (see **Figure 6.5**). The drainage ditches drain to a minor tributary of the Owennaforeesha River which in turn discharges into the Owennaforeesha River. There is a pathway between the Owennaforeesha River and the wetland habitats of the Lough Gara SPA. Whilst the depositing nature of the Owennaforeesha River to the west of the Site access Road will limit its potential to transport peat sediment influxes (in the event of ground instability/failure) at distances downstream to the Lough Gara SPA, the presence of the pathway connecting this section access track to the wetland habitat of the SPA and the associated medium ground instability/failure hazard requires mitigation.	Yes
Site Access Road from site entrance 5 to Onsite Substation	There are no drainage features that connect the section of access road between the site entrance 5 and the substation to the Breedoge River wider surface water drainage network. The Breedoge River is located to the northeast of this section of the access road (see below and **Figure 6.1**). As such in the event of ground instability/failure there will be no potential for the mobilisation and transport of peat downstream to the wetland habitats of Lough Gara SPA.	No

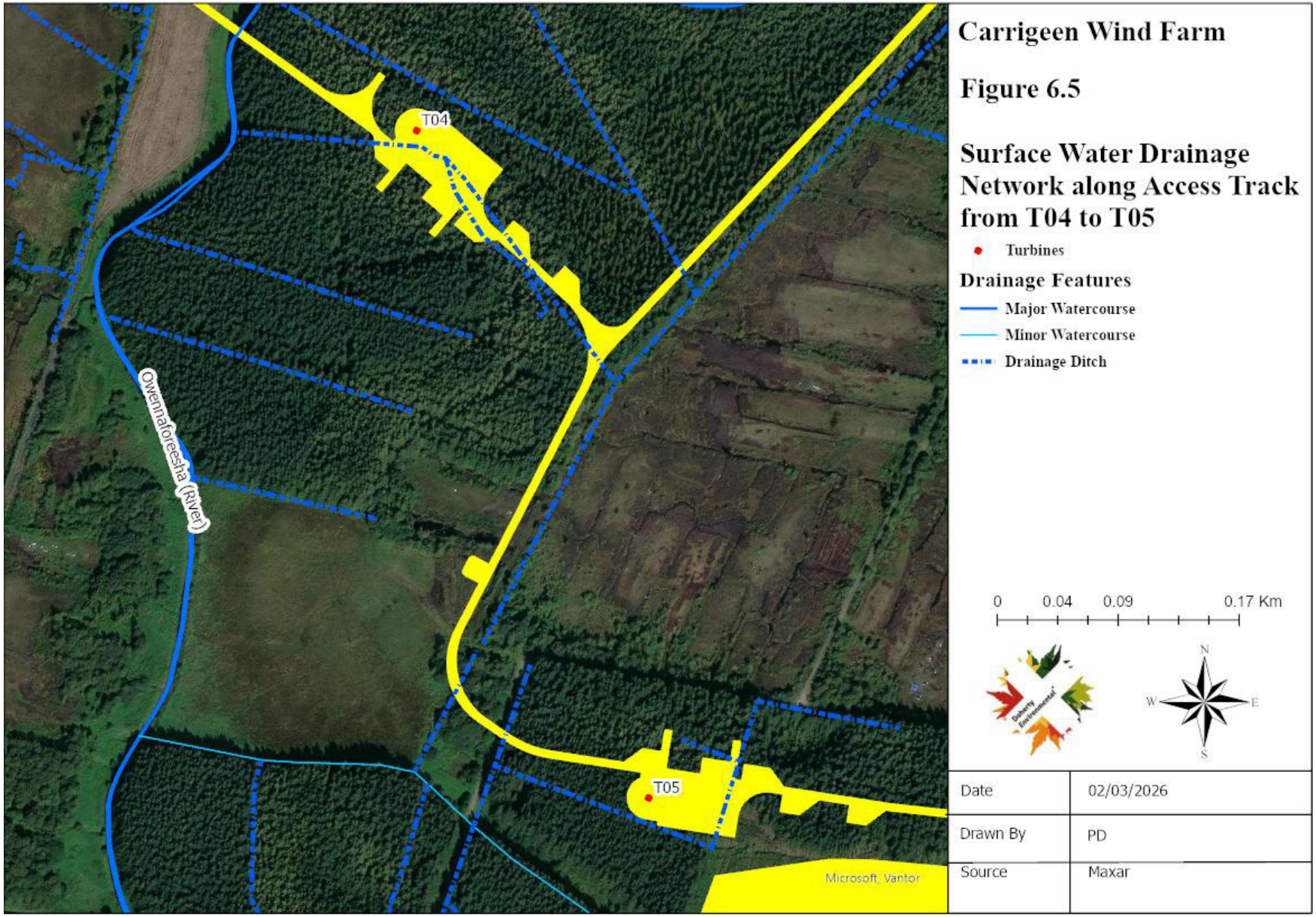
Infrastructure Component	Examination	Potential adverse effect to wetland habitat downstream
Site Access Road from the Onsite Substation to T11	The Breedoge River is crossed by the Site Access Rod from the Onsite Substation to T11 (see **Figure 6.6**). There is a pathway between the Breedoge River and the wetland habitats of the Lough Gara SPA. Whilst the depositing nature of the Breedoge River will limit its potential to transport peat sediment influxes (in the event of ground instability/failure) at distances downstream to the Lough Gara SPA, the presence of the pathway connecting this section of Site Access Road to the wetland habitat of the SPA and the associated medium ground instability/failure hazard requires mitigation.	Yes

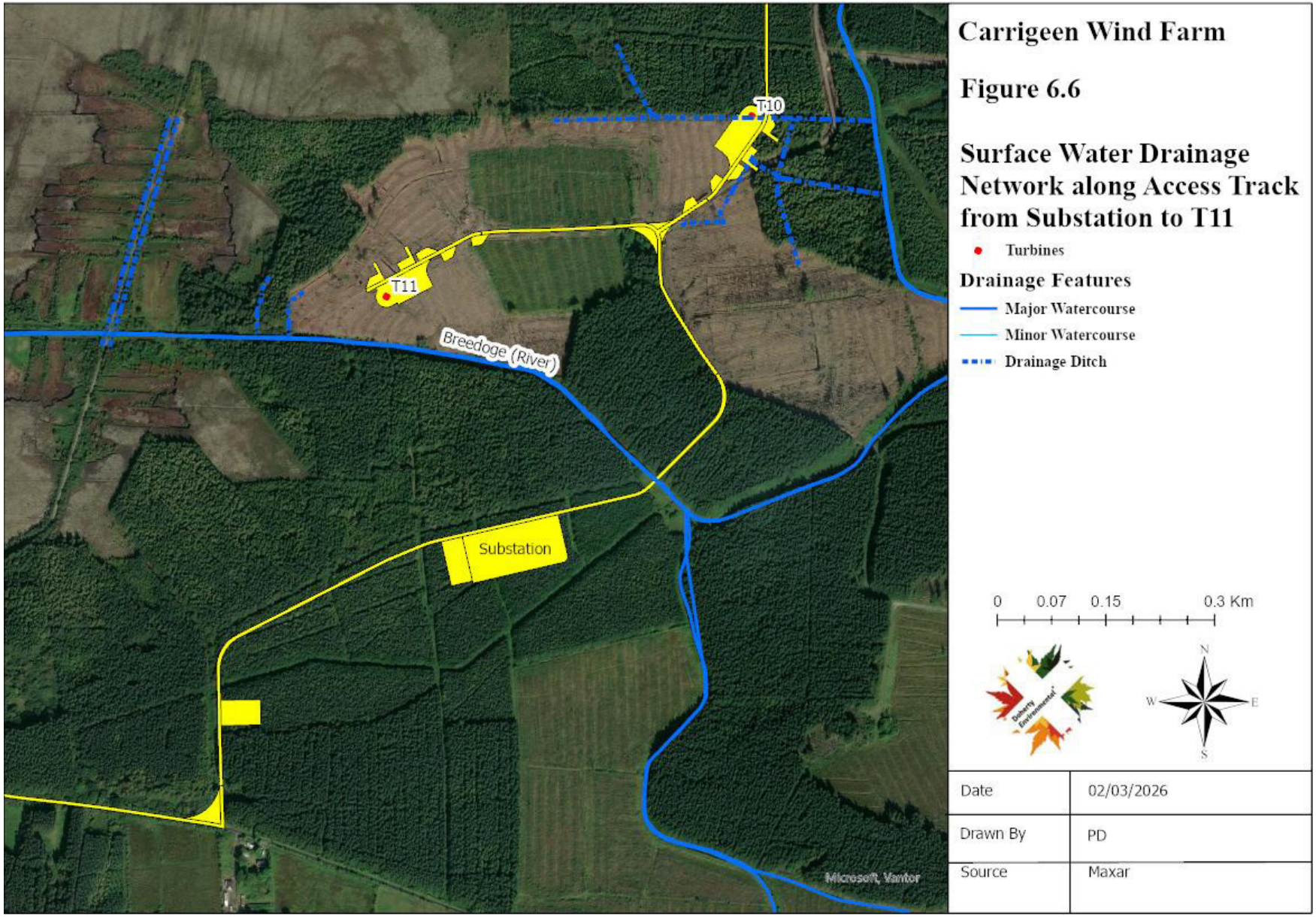

T01
Microsoft, Vantor
Carrigeen Wind Farm
Figure 6.1
Surface Water Drainage Network at the T01 Location
Turbines
Drainage Features
Major Watercourse
Minor Watercourse
Drainage Ditch
Standing Water - Isolated Drains
0 0.05 0.1 0.2 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar


Carrigeen Wind Farm
Figure 6.2
Surface Water Drainage Network at the T03 Location
Turbines
Drainage Features
Major Watercourse
Minor Watercourse
Drainage Ditch
Standing Water - Isolated Drains
Drains and Seepage Channels
Carricknabraher (River)
Carricknabraher (River)
Owennaforeesha (River)
Owennaforeesha (River)
T03
T04
0 0.05 0.1 0.2 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar
Microsoft, Vantor


T01
T02
Microsoft, Vantor
Carrigeen Wind Farm
Figure 6.3
Surface Water Drainage Network along the access track from T01 to T02
EPA_Rivers_ITM
Turbines
Drainage Features
Major Watercourse
Minor Watercourse
Drainage Ditch
Standing Water - Isolated Drains
0 0.05 0.1 0.19 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar


Carrigeen Wind Farm
Figure 6.4
Surface Water Drainage Network at the Site Entrance to T04 Location
Turbines
Drainage Features
Major Watercourse
Minor Watercourse
Drainage Ditch
Standing Water - Isolated Drains
Drains and Seepage Channels
Carricknabraher (River)
Owennaforeesha (River)
T04
0 0.05 0.1 0.2 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar
Microsoft, Vantor


T04
T05
Owennaforeesha (River)
Microsoft Vantor
Carrigeen Wind Farm
Figure 6.5
Surface Water Drainage Network along Access Track from T04 to T05
Turbines
Drainage Features
Major Watercourse
Minor Watercourse
Drainage Ditch
0 0.04 0.09 0.17 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar


T10
T11
Breedoge (River)
Substation
Microsoft, Vantor
Carrigeen Wind Farm
Figure 6.6
Surface Water Drainage Network along Access Track from Substation to T11
Turbines
Drainage Features
Major Watercourse
Minor Watercourse
Drainage Ditch
0 0.07 0.15 0.3 Km
N
W
E
S
Date 02/03/2026
Drawn By PD
Source Maxar

6.2.3.2.2 Earthworks

Earthworks associated with the construction phase of the wind farm will require forestry felling and the denuding of surface vegetation within the Wind Farm Site. In the absence of an appropriate design and mitigation measures, such activities will have the potential to generate silt-laden runoff from the works area and for this runoff to be discharged via site drainage ditches and watercourse to the Carricknabraher River and downstream to Lough Gara SPA.

Earthworks and excavations associated with the construction phase of the wind farm and the proposed Grid Connection will have the potential to generate particulate/silt-laden runoff from the works area and for this runoff to be discharged via surrounding watercourses to the Lough Gara SPA. The degree to which inorganic solids are entrained in runoff is related to the particle sizing of the soil components. Smaller inorganic particles (e.g., clay) will be easily entrained and will remain in suspension for a longer period than larger particles (silt / sand) and will require lower flow rates and longer retention rates to settle out of the water column when given the opportunity.

Runoff contaminated with suspended solids will add turbidity to the receiving surface water body. Nutrients that are associated with the solids (inorganic nutrients such as phosphorus and organic such as hydrocarbons, and sewage if present) can lead to eutrophication of the water environment.

The degree to which inorganic solids are entrained in runoff is related to the particle sizing of the soil components. Smaller inorganic particles (e.g. clay) will be easily entrained and will remain in suspension for a longer period than larger particles (silt / sand), and will require lower flow rates and longer retention rates to settle out of the water column when given the opportunity.

Release of suspended solids can be attributed to enhanced nutrient enrichment. This is highly dependent on the type of soil, for example; peat released in water will disintegrate and most of the constituents of the peat material (carbon) will eventually dissolve in to the water column and / or be consumed by micro-organisms. However, peat and other soils / subsoils will contribute varying degrees of loading of various compounds and nutrients, including Nitrogen (N) and Phosphorous (P) compounds, which are attributed to Nutrient Enrichment, or excessive loading of N and P in waters leading to eutrophication and potentially profound adverse impacts on ecological attributes

6.2.3.3 Release of Hydrocarbons

Plant equipment and vehicles associated with excavation, material transport, and construction activities introduce the risk of hydrocarbon (fuel and oil) spillages and leaks, particularly in relation to regular refuelling which in turn implies the requirement of a fuelling station or will be supplied by fuel tanker scheduled to refuel the plant machinery directly. Similar to suspended solids arising from excavation activities, hydrocarbons accidentally introduced to the environment will likely be intercepted by surface water networks associated with the construction of the Project.

Hydrocarbons are a pollutant risk due to their toxicity to all flora and fauna organisms. Hydrocarbons chemically repel water and sparingly dissolve in water. The majority of hydrocarbons are light non-aqueous phase liquids (L-NAPL's) which means that they are less dense than water and therefore float on the water's surface (whether surface water or groundwater). Hydrocarbons adsorb ('stick') onto the majority of natural solid objects they encounter, such as vegetation, animals, and earth materials such as soil.

From a land and soils perspective, the naturally occurring chemical in crude oil and gasoline products-Polycyclic Aromatic Hydrocarbons or (PAHs), can burn most living organic tissue, such as vegetation, due to their volatile chemistry. From a hydrological standpoint, they are also a nutrient supply for adapted micro-organisms, which can deplete dissolved oxygen at a rapid rate and thus kill off water-based vertebrate and invertebrate life.

Potential incidents or accidental release of contaminants will likely be short lived or temporary, however the potential impacts to downstream receptors such as the wetland habitats at Lough Gara can be long lasting, or permanent.

6.2.3.4 Release of Construction or Cementitious Materials

Construction works associated with the Project has the potential to result in the accidental spillage or deposition of construction waste into soils and in turn impact on surface water runoff, or accidental spillages directly intercepted by drainage or surface water networks associated with the Wind Farm Site.

Depending on the material in question, the introduction of such materials can lead to a local change in hydrochemistry and impact on sensitivities such as ecology. For example, the introduction of cementitious material (concrete/cement/lean mix etc.) can lead to changes in

soil and water pH, and increased concentrations of sulphates and other constituents of concrete. Fresh or wet concrete is a much more significant hazard when compared to old or set concrete which is considered inert in comparison, however it should also be noted that any construction materials or non-natural materials deposited, even if inert, are considered contaminants.

Surface water runoff coming into contact with concrete structures will be impacted to a degree. However, water percolating through lean mix will be impacted significantly.

6.2.3.5 Release of Wastewater or Sanitation Contaminants

Temporary sanitation facilities will be provided at the Temporary Construction Compounds during the construction phase. The presence of these facilities will introduce the potential for the accidental leakage of wastewater or sanitation chemicals associated with wastewater sanitation onto soils, and into the local receiving sub-catchment and downstream to the Lough Gara SPA during the construction phase of the Project.

Wastewater and wastewater sanitation chemicals are pollutant risks due to their potential impact on the ecological productivity or chemical status of surface water systems, and toxicity to water-based flora and fauna.

The level of risk posed by such facilities is dependent on the condition and upkeep of the facilities that are put in place, and the chemical agents used if applicable.

The potential impacts associated with wastewater sanitation is the potential for sanitation chemicals, particularly related to porta-loos, accidentally spilling or leaking and being intercepted by surface water drainage features and in turn surface water networks associated with the Project. Please refer to **Section 7** for associated mitigation measures.

6.2.3.6 Horizontal Directional Drilling Rigs & Working Areas

Three of the crossings required along the proposed Grid Connection route (WC01, WC05, WC07) will be crossed using horizontal directional drilling.

A methodology for the completion of horizontal directional drilling has been prepared for the Project and is provided as part of Chapter 2 of the EIAR (Jennings O'Donovan, 2026). The following provides a brief overview of the horizontal directional drilling to inform the identification of potential adverse impacts associated with this element of the Project.

Drill rigs and working areas will be required for horizontal directional drilling under the watercourse crossings along the Grid Connection route. The drill rigs and working areas will be established in the vicinity of watercourse, a minimum distance of 20m from the watercourse corridor in order to achieve the required angle for drilling. To permit the horizontal drilling, pits will be excavated at either end of the crossing so that the entry point (the launch pit) and an exit point (the reception pit) are at the required depth for the borehole to be drilled. As the drilling head for horizontal directional drilling can be steered, large pits will not be required, and it is estimated that the pits will be 1m x 1m x 2m. The sides of the pits will be battered back to prevent slippage. There will be no requirement for sheet piling.

The provision of rigs, pits, associated spoil arisings and the presence of site operatives will result in the denuding of existing surfaces at the pit locations. These excavations will create the potential for the generation of silt-laden surface runoff to adjacent watercourses. In the event that such runoff is entrained in surface water runoff and conveyed to receiving watercourses it will present a risk of sedimentation and perturbations to water quality. The release of sediment associated with pit excavations will have greatest potential for impact to water quality at the crossing of watercourses. It is noted that the pits for the watercourse crossing will be located approximately 20m from the riverbanks, which provides for a buffer zone between the pits and the watercourse.

6.3 BELLANAGARE BOG SPA

The impacts associated with the Project that have been identified as requiring further examination as part of this Natura Impact Statement comprise:

Impacts to Greenland White-fronted Geese

Groundwater impact;

Air Emission Impact; and

Spread of non-native invasive species.

6.3.1 Greenland White-fronted Geese

The zone of sensitivity for Greenland white-fronted geese is 8km (SNH, 2016). The western parcel of the proposed Wind Farm Site is located within the potential foraging zone of the Greenland white-fronted geese population associated with the Lough Gara SPA. The pathway

that was listed during the screening of Greenland white-fronted geese as having potential to connect the Project to this species relates to a mobile species pathway. Given that the nearest distance between this SPA and the Project is approximately 1km there will be no potential for other pathways, such as noise, air etc. to connect the Project to the Greenland white-fronted geese population.

Published fatality rates for Greenland white-fronted geese at operational wind farm sites are low, with one fatality of a bean/Greenland white-fronted geese from a review of 46 wind farm sites across Europe (Hoetker et al., 2006). This species was not recorded during any of the baseline ornithological field surveys for the Project and was not recorded within the 500m turbine buffers at rotor swept heights, and thus the effective collision risk for this species is zero. The ornithological assessment (EIAR Chapter 8) has identified the collision risk posed by the Project as long-term imperceptible effect.

The ornithological assessment for the Project noted that no Greenland white-fronted geese were observed using the Wind Farm Site and that this species does not breed in Ireland, and as such there will be no habitat loss impact on the species.

6.3.2 Groundwater Impacts

As noted in **Section 4.5** above the Water Framework Directive Cycle 2 report for the Catchment Upper Shannon – Sub-catchment Boyle_SC_010 lists the Bellanagare Bog as a potentially dependent groundwater body with shallow groundwater feeding numerous flushes, springs and small streams. Groundwater flow is largely shallow and local — emerging as seepages/flushes and discrete spring/rise features across the bog — so groundwater levels are naturally high within the peat.

The nearest point of Bellanagare Bog to the Project is c. 1.3km to the southwest. The elements of the Project that will be construction at this location will be the proposed Site Access Road leading to Wind Turbine T02. Both will be positioned to the north of the new N5 national road scheme.

For the section of Site Access Road to Wind Turbine T2 it is proposed to construct this using a floated road design. The approach to the construction of the floated road will comprise the grading of grassland habitat to a flat surface so that geo-membranes can be laid out to support the road formation. As such this section of access road will not require the excavation of peat

and soil substrate to bedrock level and below and will not have the potential to result in any changes to groundwater levels and flows.

In terms of nearest area of project excavations to bedrock level to the SPA, this will occur at the proposed Wind Turbine T2 hardstand, approximately 2.2km to the northeast of the SPA. The position of this turbine is separate from the SPA by the new N5 national road, extensive cutaway and other local roads. It is considered that excavations at the Wind Turbine T2 location will not have the potential to alter groundwater levels and flows interacting with raised bog habitat of the SPA/SAC to the south.

6.3.3 Air Emission

The main potential source of effects on air quality during construction is dust. There is potential for the generation of dust from excavations and from construction including construction of Site Access Roads, Turbine Hardstands and the trenches for the cable ducting for the Grid Connection. It is noted that construction works in the vicinity (e.g. 500m buffer) of the Bellanagare Bog SPA will be restricted to the section of floated access road to the south of the local road and the Temporary Construction Compound.

Potentially dust generating activities are as follows:

Earth moving and excavation plant and equipment for handling and storage of soils and subsoils.

Transport and unloading of stone materials for Site Access Road construction.

Vehicle movements over dry surfaces such as Site Access Roads and public roads.

Friable dust cannot remain airborne for a very long time. The distance it can travel depends on the particle sizes, disturbance activities and weather conditions. Larger dust particles tend to travel shorter distances than smaller particles. Particle sizes greater than 30µm will generally deposit within approximately 100m of its source, while particles between 10-30µm travel up to approximately 250-500m and particle sizes of less than 10µm can travel up to approximately

1km[6]. Notwithstanding these distances the Institute for Air Quality Management provide guidelines (IAQM, 2024) for he distances over which ecologically sensitive sites, such as SACs, could be at risk from dust emissions. These guidelines set out the potential impact to ecological receptors at varying distances. Assuming that the Bellanagare Bog SPA and its associated raised bog habitats are representative of high sensitive receptors the potential impact of dust deposition will range from high at distances less than 20m to medium at distances less than 50m. The potential for impact at distances greater than 50m is considered to be low.

Given that the nearest point of the Bellanagare Bog SPA to the Project is c. 1.3km it is considered to lie outside the zone of influence of impact of dust emissions generated during the construction phase. As such any construction phase dust emissions generated by the Project will not have the potential to result in adverse effects to the status and conservation objectives of the SPAs qualifying features of interest.

It is noted that, notwithstanding the finding set out above a series of mitigation measures will be implemented for the control of dust generation and emission during the construction phase. These measures are set out in Section 7.

6.3.4 Spread of Non-Native Invasive Plant Species

Non-native invasive plant species in the form of Japanese Knotweed and *Rhododendron ponticum* occur in the wider are surrounding the Project. In the event that the Project results in the spread of these species, their establishment, especially than of *Rhododendron ponticum*, which is more likely to successfully grow on raised bog habitat, will have the potential to undermine the status and conservation objectives of raised bog qualifying habitat of the Bellanagare Bog SPA. Measures are set out in Section 7 below that aim to avoid the dispersal of non-native invasive plant species during the construction phase.

[6] Department of the Environment, Transport and the Regions, (2000). Controlling and mitigating the environmental effects of minerals extraction in England. Available at: https://cumbria.gov.uk/elibrary/Content/Internet/538/755/1929/17716/17720/17723/42130142312.PDF

6.4 RIVER MOY SAC

The impacts associated with the Project that have been identified as requiring further examination as part of this Natura Impact Statement relate to potential surface water impacts to the Mullaghanoe River section of the River Moy SAC.

In the interest of the avoidance of repetition it is noted that the description of potential impacts to surface water and water quality set out in **Sections 6.2.3.1** to **6.2.3.5** are also applicable to the Mullaghanoe River.

The implications of such surface water and water quality effects to the Annex 2 freshwater species of the River Moy SAC are set out in the following sub-sections.

6.4.1 Qualifying Fish Species

The discharge of contaminated surface water runoff to the Mullaghanoe River will have the potential to result in negative impacts to invertebrates, plant life and on all life stages of salmonid and lamprey fish. The potential adverse effects of contaminated runoff to fish species including salmon, lamprey and twaite shad include:

- The settlement of silt on spawning redds resulting in the infilling of intra-gravel voids and the smothering of eggs and newly hatched fish.

- The settlement of silt on riverbeds can smother and displace macroinvertebrates, reducing the prey resource for fish species.

- Suspended solids can settle in pool and riffle habitats resulting in a reduction in the availability and quality of rearing habitat for fish.

- Silt-laden runoff can result in a reduction in transparency, impairing the ability of fish and otters to find food.

- Suspended solids can abrade or clog salmonid fish gills. Whilst high concentrations of suspended solids are required to clog fish gills, small concentrations can result in abrasion to gills, which can in turn create the potential for infection.

6.4.2 White-clawed Crayfish

The threats and pressures to white-clawed crayfish in Ireland relate to the spread of pathogens and invasive crayfish species (NPWS, 2019b). The NPWS (2019b) do not list negative impacts to water quality of freshwater bodies as a pressure or threat to this species, however they do include water quality as an attribute defining the favourable conservation status of this species and have set a biological water quality target of a minimum of Q3-4 for the white-clawed crayfish population of the River Moy SAC. Demers & Reynolds (2002) suggested that white-clawed crayfish can occur in water that is rated as moderately polluted, while Holdich (2003) pointed to poor water quality as a limiting factor in achieving the favourable conservation status of this species. Overall, it is considered that any perturbations to water quality as a result of the project will have the potential to undermine the favourable conservation condition of crayfish within the SAC.

6.4.3 Otters

The main pressure affecting this species in Ireland is pollution, particularly from organic pollution resulting in fish kills and accidental deaths as a result of road traffic and fishing gear (NPWS, 2019b). The NPWS also list diffuse and point source pollution of freshwaters as a likely indirect impact to otters through changes in prey abundance. However, the NPWS conclude that these threats are considered to produce local impacts only and are not of significance for the national otter population. Nevertheless, such impacts have the potential to be of local significance in the context of a population supported by an SAC river catchment. As such in the event of pollution, arising from construction activities to suitable otter foraging habitat, the potential will exist for indirect impacts to the conservation status of otters within the SAC, by way of reductions in the abundance of prey species.

No otter breeding or resting sites are located in the vicinity of the Project, and none were identified as occurring within 150m of the TDR widening location, which represents the area in which such sites (i.e. natal holts, holts and couches) are susceptible to disturbance (NRA, 2009). The absence of breeding and resting site in the form of holts and couches within 150m of the TDR widening location will eliminate the potential for the project to result in disturbance to such sites.

The construction works associated with the TDR widening location has the potential to result in short-term disturbance to otters that use the stretch of the Mullaghanoe River for foraging. This disturbance may relate to noise, visual disturbance, the presence of site operatives.

However, this disturbance effects is considered to be of low significance for otters given the low fisheries value of the non-EPA mapped watercourse occurring adjacent to the widening location and the presence of this watercourse immediately adjacent to the N5 national road.

6.5 IN-COMBINATION EFFECTS

6.5.1 In-Combination Effects with Other Projects

In terms of other projects there are no recently consented significant projects (i.e. within the last 5 years – 2021 – 2026) or significant live planning application projects in the vicinity of the Project. Those that do occur within the area surrounding the Project relate to small scale projects associated with amendments to residential dwellings; the construction of residential dwellings; and the construction of farm sheds.

The minor projects that have been consented in the vicinity of the Project all occur in the vicinity of the Grid Connection route. These are listed below (travelling in sequence from west to east along the Grid Connection) and an examination of potential cumulative effects between these other projects and the Project is provided for each.

Planning Reference 2254. This project relates to the construction of a new 5-bay slatted cattle shed. It is located in the townland of Ballyroddy immediately to the south of the Grid Connection.

Planning Reference 2454. This project relates to the renovation and extension of an existing dwelling in the townland of Ballyroddy, to the south of the Grid Connection.

Planning Reference 2560377. This project relates to the extension of an existing dwelling in the townland of Lisgarve, to the south of the Grid Connection.

Planning Reference 21235. This project relates to the construction of a new 3-bay slatted cattle shed. It is located in the townland of Corbally West immediately to the south of the Grid Connection.

Each of the above projects have been subject to screening for Appropriate Assessment by the planning application and it has been determined by the Planning Authority that these projects do not have the potential, alone or in-combination with other plans or projects, to result in likely significant effects to European Sites. On the basis of the Planning Authority determinations for

these projects, it is concluded that the current Project will not have the potential to combine with these other projects to result in cumulative negative effects to European Sites.

6.5.2 In-Combination Effects with N5 Ballaghaderreen to Scramoge Road Project

At the time of writing construction works for this national road project were underway and well progressed having commenced in November 2023. The road project is schedule for full completion in late 2027. Given the construction timeline for this road project, overlapping of the construction phase of the current Project and this road project will arise.

The Natura Impact Statement completed for the N5 road project assessed the potential for the operation phase of this road to result in adverse effects, alone or in-combination with other plans or projects, to European Sites. The Natura Impact Statement identified the potential for the operation phase of the road project to result in negative effects to water quality with potential for downstream impacts to hydrologically connected European Sites. Mitigation measures have been set out in the N5 Natura Impact Statement aim to avoid the potential for impacts to water quality during the operation phase. It was concluded that provided all mitigation measures set out in the N5 Natura Impact Statement are implemented in full the operation phase of this national road project will not have the potential alone or in-combination with other plans or projects to result in adverse effects to European Sites. On the basis of the N5 Natura Impact Statement conclusions and the subsequent Appropriate Assessment determination for this project, it is concluded that the current Project will not have the potential to combine with the operation phase of the N5 national road project to result in cumulative negative effects to European Sites.

6.5.3 In-Combination Effects with Other Wind Farm Projects

The ornithological assessment for the Project (EIAR Chapter 8) examined the potential for cumulative impacts to bird species to arise during the construction phase of the Project. This assessment examined the potential for the Project to combine with other wind farms within a 20km distance to result in cumulative impacts. This 20km distance is considered to be adequate for the purposes of this Natura Impact Statement and the examination of the potential for the Project to combine with other wind farm sites in the wider surrounding area to result in cumulative adverse construction phase impacts. This consideration is, in turn, based on the fact that this 20km area encompasses the foraging area of the special conservation interest bird

species of the SPAs that have been identified as occurring within the zone of influence of the Project.

The wind farms identified in this 20km area are listed in **Table 6.3.**

Table 6.3: Consented & Operational Wind Farms within 20km of the proposed Wind Farm Site

Wind Farm	Status	No. of Turbines	Approximate Distance to the Site Boundary (km)	Direction from the Wind Farm Site
Largan Hill	Operational	9	16	Northwest
Leam Wind Farm	Consented	2	7	Northwest
Sliabh Bawn Wind Farm	Operational	20	20	Southeast
Islandmore Wind Farm	Proposed	13	17	Northwest
Riverstown Single Wind Turbine	Consented	1	19	Southeast
Ballyfeeny Green Energy Project	Proposed	6	19	East
Roosky Wind Farm	Operational	2	13	West

The ornithological assessment found that based on the evidence available in addition to the fact that there is a significant distance to many of these wind farms, the lack of migration paths during survey, along with the results of hinterland surveys undertaken for the Project, any cumulative effects on birds during the construction phase would be a Long-term Imperceptible Cumulative Effect. This cumulative effect is not representative of an adverse cumulative effect to the SPAs occurring within the zone of influence of the Project.

6.5.4 In-Combination Effects During the Operation Phase

It is anticipated that, in the absence of mitigation, the key cumulative impacts upon European Sites during the operation of the Project will relate to the European Sites and relevant receptors occurring downstream of the Project. In the absence of an adequate operational phase drainage

design, the drainage at the Wind Farm Site could exacerbate peatland erosion within the vicinity of the proposed infrastructure and the loss of sediment to downstream aquatic receptors such as Lough Gara SPA. Under such a scenario the potential will exist for the operation phase of the Project to combine with other sources of water pollution in the surrounding sub-catchment areas to result in adverse effects to the conservation status of these lake habitats and the waterbird species supported by them.

The ornithological assessment (EIAR Chapter 8) also examined the potential for cumulative effects to birds during the operation phase of the Project with the other seven listed wind farm site listed in **Table 6.3** above. Direct effects on avifauna during operation which may be cumulatively added to by other existing pressures or proposed developments include collision related mortality, ongoing disturbance/displacement, and barrier effect. Flight height or the flight heights which birds habitually use along either migration or local flight paths is an influencing factor in determining whether the Project will combine with additional wind farms to produce additive, synergistic or antagonistic effects.

These effects include increased Barrier Effect (potentially obstructing migratory flightpaths), increased collision risk (through combined mortality in susceptible species) and increased disturbance to birds utilising foraging grounds whilst on migration.

This examination concluded that in view of the distances of these seven other wind farm sites in relation to the proposed Wind Farm Site, the lack of migration paths during surveys, along with the results of hinterland surveys undertaken for the Project, the cumulative collision risk on any avian receptors is considered negligible. Furthermore, studies have found that local wintering birds will habituate to the presence of turbines and therefore avoid collision (Langston & Pullan, 2004). Cumulative collision mortality combined with other wind farm developments is predicted to be a Long-term Imperceptible Cumulative Effect.

As such given the Long-Term Imperceptible Cumulative Effect with other wind farm site in the wider surrounding area there will be no potential for adverse cumulative effect to the SPAs occurring within the zone of influence of the Project during the operational phase.

6.5.5 In-Combination Effects During the Decommissioning Phase

Given that the decommissioning phase of the Project will not take place until the termination of the operation phase of the Project it is not possible at this time to identify other plans or projects with which activities associated with the decommissioning phase could combine to

result in adverse effects to European Sites. Notwithstanding this, it is noted that the activities associated with the decommissioning phase will be similar to those that will be required for the construction phase and will have the potential to result in similar impacts. With respect to the European Sites occurring in the zone of influence of the Project, these impacts will relate to pollution of receiving watercourses and lake habitat of Lough Gara occurring downstream of the Project. The potential effects of pollution derived from construction phase and decommissioning phase activities have been set out in **Section 6**. In the event that other land use activities occurring within the local receiving sub-catchments are known to, or have the potential to, result in threats or pressures to this catchment during the decommissioning phase, then the potential will exist for this phase of the Project to combine with these other sources of pollution to result in cumulative adverse effects to the conservation status of the Lough Gara SPA downstream of the Project. It is noted that mitigation measures are set out in Section 7 below and their full implementation will provide safeguards such that the decommissioning phase of the Project will not have the potential to combine with other land use activities that pose a threat/pressure to the water quality of the local receiving sub-catchments catchment and the Lough Gara SPA downstream during this phase of the Project.

6.5.6 In-Combination Effects with Existing Threats and Pressures to European Sites

As per **Section 5.4.3** above the existing threats and pressures to the Cloonashanville Bog SAC, Lough Gara SPA and Bellanagare Bog SPA have been documented by the NPWS. These are listed below with an examination of the Project's potential to combine with these threats and pressures to result in cumulative adverse effects.

C01.03 Peat extraction (low impact) – the Project will not exacerbate the effects of past peat extraction at Cloonashanville Bog SAC. Peat excavations at the Project site will not result in any further peat extraction at this SAC or the SPAs in the wider surrounding area. Furthermore, the proposals for habitat management associated with the Project will have the potential to contribute to the restoration of raised bog in the wider area and offset the impacts of historic peat extraction.

J02.07 Drainage (high impact) – as per **Section 6.1, 6.2 & 6.3** above Project will not result in any further drainage of the Cloonashanville Bog SAC of the SPAs in the wider surrounding area. Drainage associated with the Project will not result in any further drainage of this SAC or the SPAs. Furthermore, the proposals for habitat management associated with the Project will

have the potential to retard drainage and water loss from raised bog habitats contribute to the restoration of raised bog in the wider area and offset the impacts of historic drainage.

I01 Invasive alien species (low impact) – as per **Section 6.1, 6.2 & 6.3** and **Table 6.4,** in the absence of appropriate safeguards, the Project will have the potential to contribute towards the spread of non-native invasive plant species that could increase the threat of this pressure to the raised bog habitats of the Cloonashanville Bog SAC.

6.6 EXAMINATION OF EFFECTS TO CONSERVATION OBJECTIVES

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. The maintenance of habitats and species of the Cloonashanville Bog SAC, Lough Gara SPA and Bellanagare Bog SPA at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when:

- its natural range, and the area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

A NIS is required to assess the potential for impacts to the integrity of a European Site, with respect to the site's structure and function and its Conservation Objectives. The structural and functional elements of a European Site to maintain the favourable conservation status of qualifying features of interest are embedded into the list of detailed site-specific conservation objectives (SSCO) attributes and targets for each of the site's interest features. As such, a European Sites' SSCOs represent the parameters against which a project's potential to adversely affect the integrity of a European Sites should be considered.

Table 6.4 lists the Conservation Objectives attributes and targets for each of qualifying features of interest of the Cloonashanville Bog SAC; Bellanagare Bog SPA and Lough Gara SPA and examines how the project, in the absence of mitigation, will have the potential to result in adverse effects to these attributes and targets.

Table 6.4: Examination of Potential Impacts to the Conservation Objectives of qualifying features of interest/special conservation interests

No. Ref	Attribute	Target	Assessment	Mitigation Required
Active raised bog; Degraded raised bog; and Depressions of the Rhynchosporion of Cloonashanville Bog SAC				
1	Habitat area	Restore area of active raised bog to 44.0ha, subject to natural processes	The Project will not result in the loss of any area of raised bog habitat. As per Section 6.1 above the Project will not have the potential to result in indirect impacts to the raised bog habitats off the SAC.	No
2	Habitat distribution	Restore the distribution and variability of active raised bog across the SAC.	All elements of the Project are located outside of the Cloonashanville Bog SAC and are buffered from the SAC boundary by c. 125m and buffered from the nearest area of raised bog qualifying habitat by c. 280m to the northwest. Given this buffer distance and the findings of Section 6.1 above, the Project will not have the potential to result in any changes to the distribution and variability of active raised bog, degraded raised bog or depressions of the Rhynchosporion throughout the bog habitat.	No
3	High bog area	No decline in extent of high bog necessary to support the development and maintenance of active raised bog	As per the findings set out for attribute no. 2 above the Project will not have the potential to result in the decline of high bog area within the SAC.	No
4	Hydrological regime: water levels	Restore appropriate water levels throughout the site	The Project will not have the potential to undermine the targets of this attribute. The Project will not result in any new drainage within	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
			the SAC. As per the findings of Section 6.1 the Project will not result in any indirect effects that could result in drainage of the bog.	
5	hydrological regime: flow patterns	Restore, where possible, appropriate high bog topography, flow directions and slopes. See map 4 for current situation	As per the findings set out for attribute no. 4 above the Project will not have the potential to undermine the targets of this attribute.	No
6	Transitional areas between the high bog and adjacent mineral soils (including cutover areas)	Restore adequate transitional areas to support/protect active raised bog and the services it provides	As per the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No
7	Vegetation quality: central ecotope; active flush, soaks, bog woodland	Restore 22.0ha of central ecotope/active flush/soaks/bog woodland as appropriate	The Project is bufffered from the areas of active raised bog habitat by a minimum distance of 400m. In view of this separation distance and the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No
8	Vegetation quality: microtopographical features	Restore adequate cover of high quality microtopographical features	Given the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No
9	Vegetation quality: bog moss (Sphagnum) species	Restore adequate cover of bog moss (Sphagnum) species to ensure peat-forming capacity	Given the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
10	Typical ARB flora	Restore, where appropriate, typical active raised bog flora	Non-native invasive plant species occur in the wider surrounding area. These include *Rhododendron ponticum* and Japanese Knotweed, with the former in particular having the potential to infest areas of raised bog habitat. The construction phase of the Project will have the potential to function as a vector in the spread of these species. In the event that the Project does contribute to the spread of such species, the potential will exist for the Project to undermine the targets of this attribute.	Yes
11	Typical ARB fauna	Restore, where appropriate, typical active raised bog fauna	Given the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No
12	elements of local distinctiveness	Maintain features of local distinctiveness, subject to natural processes	Given the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No
13	Negative physical indicators	Negative physical features absent or insignificant	Given the findings set out in Section 6.1 above the Project will not have the potential to undermine the targets of this attribute.	No
14	Vegetation composition: native negative indicator species	Native negative indicator species at insignificant levels	Non-native invasive plant species occur in the wider surrounding area. These include *Rhododendron ponticum* and Japanese Knotweed, with the former in particular having the potential to infest areas of raised bog habitat. The construction phase of the Project will have the potential to function as a vector in the spread of these species.	Yes

No. Ref	Attribute	Target	Assessment	Mitigation Required
15	Vegetation composition: non-native invasive species	Non-native invasive species at insignificant levels and not more than 1% cover	non-native invasive plant species occur in the wider surrounding area. These include Rhododendron ponticum and Japanese Knotweed, with the former in particular having the potential to infest areas of raised bog habitat. The construction phase of the Project will have the potential to function as a vector in the spread of these species.	Yes
16	Air quality: nitrogen deposition	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	The Project will not generate nitrogen emissions and will not have the potential to undermine the targets of this attribute.	No
17	Water quality	Water quality on the high bog and in transitional areas close to natural reference conditions	The Project is located down gradient and downstream of the high bog and transitional areas of the SAC and will not have the potential to result in declines in natural reference conditions in these areas. It is noted that the Project will have potential to undermine water quality in receiving surface water bodies (i.e. rivers and lakes) downstream that are un-related to the raised bog habitat of the SAC and mitigation measures are set out in Section 7 below to prevent perturbations to water quality.	No mitigation measures required for qualifying habitat Mitigation measures are set out in Section 7 for the protection of un-related river and lake water quality
Bog woodland of the Cloonashanville Bog SAC				
18	Habitat area	Area stable or increasing, subject to natural processes.	The Project will not result in the loss of any area of raised bog habitat. As per Section 6.1 above the Project will not have the	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
			potential to result in indirect impacts to the raised bog habitats off the SAC.	
19	Habitat distribution	No decline, subject to natural processes.	All elements of the Project are located outside of the Cloonashanville Bog SAC and are buffered from the SAC boundary by c. 125m and buffered from the nearest area of raised bog qualifying habitat by c. 280m to the northwest. Given this buffer distance and the findings of Section 6.1 above, the Project will not have the potential to result in any changes to the distribution and variability of active raised bog, degraded raised bog or depressions of the Rhynchosporion throughout the bog habitat.	No
20	vegetation composition: positive indicator species	Birch (Betula pubescens), bog moss (Sphagnum species) and at least five other species present	See attribute no. 21 below. In the event that the Project results in the spread of non-native invasive species, particularly Rhododendron ponticum, the potential will exist for wind blown seed to establish in this woodland habitat.	Yes
21	Vegetation composition: negative indicator species	Both native and non-native invasive species absent or under control. Total cover should be less than 10%	Non-native invasive plant species occur in the wider surrounding area. These include Rhododendron ponticum and Japanese Knotweed, with the former in particular having the potential to infest areas of raised bog habitat. The construction phase of the Project will have the potential to function as a vector in the spread of these species.	Yes

No. Ref	Attribute	Target	Assessment	Mitigation Required
22	Woodland structure: cover and height of birch	A minimum 30% cover of birch (Betula pubescens) with a median canopy height of 4m	As per attribute 21 above in the event that the Project contributes to the spread of non-native invasive plant species, the potential will exist for it to undermine the target of this attribute.	Yes
23	Woodland structure: dwarf shrub cover	Dwarf shrub cover not more than 50%	As per attribute 21 above in the event that the Project contributes to the spread of non-native invasive plant species, the potential will exist for it to undermine the target of this attribute.	Yes
24	Woodland structure: ling cover	Ling (Calluna vulgaris) cover not more than 40%	As per attribute 21 above in the event that the Project contributes to the spread of non-native invasive plant species, the potential will exist for it to undermine the target of this attribute.	Yes
25	Woodland structure: bryophyte cover	Bryophyte cover at least 50%, with bog moss (Sphagnum spp.) cover at least 25%	As per attribute 21 above in the event that the Project contributes to the spread of non-native invasive plant species, the potential will exist for it to undermine the target of this attribute.	Yes
26	Woodland structure: tree size classes	Each size class present	As per attribute 21 above in the event that the Project contributes to the spread of non-native invasive plant species, the potential will exist for it to undermine the target of this attribute.	Yes
27	Woodland structure: senescent and dead wood	Senescent or dead wood present	The Project will not have the potential to result in changes to the extent of senescent or dead wood present.	No
Greenland white-fronted geese of Lough Gara SPA & Bellanagare Bog SPA				
28	Winter population trend	Long term winter population trend is stable or increasing	Greenland white-fronted geese were not recorded using the Wind Farm Site during the non-breeding season. The effects of habitat loss to Greenland white-fronted geese as a result of the Project was	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
			assessed to be representative of a long-term and imperceptible effect. The collision risk posed by the Project has been assessed to be representative of a long-term imperceptible effect, whilst the potential for disturbance during the construction or decommissioning phase and the operation phase was found to be not significant over the temporary to short-term or long-term time scales. The potential for a barrier effect to Greenland white-fronted geese during the operation phase of the wind farm was assessed to be representative of a imperceptible long-term effect. Given these findings of the ornithological assessment, the Project will not have the potential to result in any long-term decline in the population trend of Greenland White-fronted Geese for the wintering population of the Lough Corrib SPA and Bellanagare Bog SPA.	
29	Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	The Project will not result in a decline in any area of suitable habitat relied upon by Greenland white-fronted geese and as such will not have the potential to undermine the target for this attribute.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
30	Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	No Greenland white-fronted geese sites occur at or in the vicinity of the Project and as set out under attribute no. 28 and 29 above the Project will not have the potential to result in disturbance to Greenland white-fronted geese at their wintering sites. As such the Project will not have the potential to undermine the target for this attribute.	No
31	Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	As set out under attribute no. 28 above the Project will not have the potential to result in a barrier to connectivity and use of wintering sites for Greenland white-fronted geese. As such the Project will not have the potential to undermine the target for this attribute.	No
32	Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage	As set out under attribute no. 28 and 29 above the Project will not have the potential to result in a reduction in the spatial distribution, extent and abundance of foraging for Greenland white-fronted geese and will not undermine the targets for this attribute.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
		biomass to support the population target		
33	Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population target	No Greenland white-fronted geese roost sites occur at or in the vicinity of the Project and the Project will not have the potential to result in a reduction of or disturbance to roost sites for this species.	No
34	Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	No Greenland white-fronted geese have been found to rely on the Wind Farm Site and the surrounding 1km area (which is representative of the maximum extent of the zone of disturbance for Greenland White-fronted Geese (see Goodship & Furness, 2021)) are not representative of ecologically important areas for Greenland white-fronted geese outside the boundary of the Lough Gara SPA or Bellanagare Bog SPA. As such there will be no potential for the Project to undermine the target for this attribute.	No
Whooper Swans of the Lough Gara SPA				
35	Winter population trend	Long term winter population trend is stable or increasing	Whooper Swans were not recorded using the Wind Farm Site during the non-breeding season, whilst a total of 3 no. flights were recorded during the baseline ornithological surveys. The effects of habitat loss to Whooper Swan as a result of the Project has been assessed to be representative of a long-term and imperceptible effect. The collision	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
			risk posed by the Project to Whooper Swan has been assessed to be representative of a long-term imperceptible effect, whilst the potential for disturbance during the construction or decommissioning phase and the operation phase was found to be representative of a temporary to short-term imperceptible effect and a long-term imperceptible effect respectively. The potential for a barrier effect to Whooper Swan during the operation phase of the wind farm was assessed to be representative of a imperceptible long-term effect. Given these findings of the ornithological assessment, the Project will not have the potential to result in any long-term decline in the population trend of Whooper Swans of the Lough Gara SPA.	
36	Winter spatial distribution	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target	The Project will not result in a decline in any area of suitable habitat relied upon by Whooper Swan and as such will not have the potential to undermine the target for this attribute.	No
37	Disturbance at wintering site	The intensity, frequency, timing and duration of disturbance	No Whooper Swan sites occur at or in the vicinity of the Project and as set out under attribute no. 35 above the Project will not have the potential to result in disturbance to Whooper Swan at their wintering	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
		occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution	sites. As such the Project will not have the potential to undermine the target for this attribute.	
38	Barriers to connectivity and site use	The number, location, shape and area of barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA	As set out under attribute no. 35 above the Project will not have the potential to result in a barrier to connectivity and use of wintering sites for Whooper Swan. As such the Project will not have the potential to undermine the target for this attribute.	No
39	Forage spatial distribution, extent and abundance	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	As set out under attribute no. 35 and 36 above the Project will not have the potential to result in a reduction in the spatial distribution, extent and abundance of foraging for Whooper Swan and will not undermine the targets for this attribute.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
40	Roost spatial distribution and extent	Sufficient number of locations, area and availability of suitable roosting habitat to support the population targe	No Whooper Swan roost sites occur at or in the vicinity of the Project and the Project will not have the potential to result in a reduction of or disturbance to roost sites for this species.	No
41	Supporting habitat: area and quality	Sufficient area of utilisable habitat available in ecologically important sites outside the SPA	No Whooper Swan have been found to rely on the Project site and surrounding 1km area (which exceeds the maximum extent (i.e. 600m) of the zone of disturbance for Whooper Swan (see Goodship & Furness, 2021)) and are not representative of ecologically important sites for Whooper Swan outside the boundary of the SPA. As such there will be no potential for the Project to undermine the target for this attribute.	No
Annex 2 freshwater species of the River Moy SAC				
Lamprey species				
42	Distribution (extent of anadromy for sea lamprey) &/or barriers to movement	Access to all watercourses down to first order streams for brook lamprey. Greater than 75% of main stem length of rivers	Activities associated with the construction phase of the Project will not have the potential to undermine this attribute in terms of the creation of physical barriers to the movement of lamprey.	No.

No. Ref	Attribute	Target	Assessment	Mitigation Required
		accessible from the estuary.		
43	Population structure of juveniles	At least three age/size groups present	The preferred spawning habitat for lamprey is gravel-dominated substratum typical of eroding watercourses, examples of which are located along the Mullaghanoe River downstream of the TDR widening location. After hatching the larvae swim or are washed downstream and settle in areas of preferred juvenile habitat, which consist of muddy, sandy silt substrate. The juvenile stage of the lifecycle of lamprey species is generally restricted to depositing freshwater and estuarine environments where the substratum supports areas of sandy silt. Such habitats are considered to be located a significant distance downstream of the TDR widening location. Suitable spawning habitat for lamprey species are present along the stretch of the Mullaghanoe River downstream of the TDR widening location and lamprey species are known to spawn along this stretch of the river. In the event of negative impacts to lamprey spawning habitat a short distance downstream of the TDR widening location, such as those impacts outlined in Section 6.4 above, the potential will exist for indirect impacts to the later life-cycle juvenile stage of this species with consequent effects for population structure. As	Yes

No. Ref	Attribute	Target	Assessment	Mitigation Required
			such in the absence of appropriate measures to safeguard water quality at the non-EPA mapped stream adjacent to the TDR widening location and the Mullaghanoe River downstream, the Project will have the potential to undermine this attribute. Measures are set out in Section 7 below that aim to avoid such negative impacts to water quality.	
44	Juvenile density in fine sediment	Mean catchment juvenile density of at least 2/m^2 for brook lamprey and 1/m^2 for sea lamprey	As set out for attribute no. 43 above in the event of negative impacts to lamprey spawning habitat, the potential will exist for an indirect and temporally delayed impact to the density of juveniles occurring within suitable juvenile habitat downstream. Such an impact will be derived from a reduction in suitable spawning habitat and lamprey larvae moving downstream to juvenile habitats.	Yes
45	Extent and distribution of spawning habitat	No decline in distribution and extent of spawning beds.	The works at the TDR widening location will have the potential to generate perturbed surface water runoff. The discharge of such waters to the Mullaghanoe River will have the potential to undermine the condition of lamprey spawning habitat at and downstream of the widening location. Lamprey species show a preference for gravel-dominated substratum for spawning and the release of silt to such habitat will clog pore spaces and undermine the status of such habitat to support spawning lamprey.	Yes

No. Ref	Attribute	Target	Assessment	Mitigation Required
46	Availability of juvenile habitat	More than 50% of sample sites positive	Given that the location of suitable juvenile habitat for lamprey are located a significant distance downstream in depositing and/or estuarine sections of the SAC the potential for the project to result in negative impacts to the availability of this habitat will not arise.	No
White-clawed crayfish				
47	Distribution	No reduction from baseline.	In the event that the TDR widening works causes pollution to the Mullaghanoe River, it could undermine the status of this waterbody to support crayfish. As such in the absence of appropriate measures to safeguard water quality at the non-EPA mapped stream adjacent to the TDR widening location and the Mullaghanoe River downstream, the Project will have the potential to undermine this attribute. Measures are set out in Section 7 below that aim to avoid such negative impacts to water quality.	Yes
48	Population structure: recruitment	Juveniles and/or females with eggs in all occupied tributaries.	In the event that the construction phase of the TDR widening works causes pollution to the Mullaghanoe River it will have the potential to undermine the population structure of crayfish occurring within this waterbody at and downstream of the project site.	Yes
49	Negative indicator species	No alien crayfish species.	The Project will not have the potential to result in the introduction of alien crayfish species. The Project will not result in any instream works or the use of any machinery watercraft etc instream that could result in the spread of these non-native invasive species.	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
50	Disease	No instances of disease.	As per attribute no. 49 the Project is not predicted to have the potential to result in the spread of crayfish disease within the catchment.	No
51	Water quality	At least Q3-4 at all sites sampled by EPA.	In the event that the TDR widening works causes pollution to the Mullaghanoe River, it will have the potential to adversely affect water quality downstream.	Yes
52	Habitat quality: heterogeneity	No decline in habitat heterogeneity or habitat quality.	In the event that the construction works associated with the TDR widening location results in the discharge of silt-laden surface water to the Mullaghanoe River, it will have the potential to undermine crayfish habitat heterogeneity.	Yes
Atlantic salmon				
53	Distribution (extent of anadromy	100% of river channels down to second order from the estuary.	Activities associated with the construction works at the TDR widening location will not have the potential to undermine this attribute in terms of the creation of physical barriers to the movement of Atlantic salmon.	No
54	Adult spawning fish	Conservation limit consistently exceeded	The potential risks to water quality will have the potential to undermine the numbers of adult spawning fish at spawning habitat along the Mullaghanoe River downstream of the TDR widening location.	Yes
55	Salmon fry abundance	Maintain or exceed 0+ fry mean catchment wide abundance	The TDR widening works potential to undermine the targets for this attribute will be mediated by construction generated pollution impacts comprising contaminated surface water discharges to the	Yes

No. Ref	Attribute	Target	Assessment	Mitigation Required
		threshold value. Currently set at 17 salmon fry/5 min sampling.	Mullaghanoe River during works associated with the TDR widening location.	
56	Out-migrating smolt abundance	No significant decline	The TDR widening works potential to undermine the targets for this attribute will be mediated by construction generated pollution impacts comprising contaminated surface water discharges to the Mullaghanoe River during works associated with the TDR widening location.	Yes
	Number and distribution of redds	No decline in numbers or distribution	The TDR widening works potential to undermine the targets for this attribute will be mediated by construction generated pollution impacts, particularly the potential release of silt-laden runoff, to the Mullaghanoe River and the spawning habitat supported by this river. Salmon redds require high levels of dissolved oxygen and low levels of siltation. Excess silt on the river bed will reduce oxygen levels in redds and decrease the suitability of river beds to support spawn.	Yes
57	Water quality	At least Q4	In the event that the TDR widening works causes pollution to the Mullaghanoe River as a result of contaminated surface water runoff from areas of construction works associated with TDR widening location, it will have the potential to adversely affect water quality of these waterbodies.	Yes
Otter				

No. Ref	Attribute	Target	Assessment	Mitigation Required
58	Distribution	No significant decline	Negative effects to water quality as a result of project activities will have the potential to affect the otter foraging resource of the Mullaghanoe River, which in turn will have the potential to displace otters from areas suffering from poor water quality within the SAC. Such effects will have the potential to adversely affect the distribution of this species within the SAC. As such in the absence of appropriate measures to safeguard water quality at the non-EPA mapped stream adjacent to the TDR widening location and the Mullaghanoe River downstream, the Project will have the potential to undermine this attribute. Measures are set out in Section 7 below that aim to avoid such negative impacts to water quality.	Yes
59	Extent of terrestrial habitat	No significant decline	The Project will not result in the loss of any terrestrial habitat used by otters. There will be no loss of instream habitats or riparian habitats relied upon by otters.	No
60	Extent of marine habitat	No significant decline	As per attribute no. 58 above negative impacts to water quality will have the potential to undermine the potential for the Mullaghanoe River downstream of the project site to support otters.	Yes
61	Extent of freshwater habitat (river)	No significant decline	As per attribute no. 58 above negative impacts to the water quality of Mullaghanoe River will have the potential to undermine its potential to support otters.	Yes
62	Couching sites and holts	No significant decline	No breeding or resting places for otters occur within 150m of the TDR widening location. This 150m distance represents the distance	No

No. Ref	Attribute	Target	Assessment	Mitigation Required
			at which otter holts and the otters using them are susceptible to disturbance effects (NRA, 2009). Given the absence of holts and the low fisheries value of the non-EPA mapped stream adjacent to the widening location works area the Project will not have the potential to undermine the targets for this attribute.	
63	Fish biomass	No significant decline	As per attribute no. 58 above the project will have the potential to undermine the water quality of the Mullaghanoe River. Any adverse impacts to the water quality of the river will have the potential to result in a decrease in fish biomass (i.e. through mortalities resulting from a pollution event) and undermine the target for this attribute.	Yes
64	Barriers to connectivity	No significant increase	Activities associated with the construction phase of the Project will not have the potential to undermine this attribute. The Project is located outside of the Mullaghanoe River, will not result in instream works and will not result any barriers to the movement of otters throughout the SAC.	No

7 MITIGATION MEASURES

The mitigation measures required to safeguard European Site qualifying features of interest from adverse effects have been identified in Section 6 above and relate to mitigating the potential for the Project to result in the spread of non-native invasive plant species as well as measures to prevent perturbations to water quality and downstream effects to wetlands of the Lough Gara SPA. Whilst the Annex 1 habitats of the Cloonashanville Bog SAC have been identified as lying outside the zone of impact of air emissions generated during the construction phase of the project, measures are also outline for the control of dust emissions during the construction phase.

Targeted mitigation measures are provided to safeguard against the potential adverse effects to the qualifying features of interest identified as requiring mitigation in **Table 6.2** above. The measures to be implemented to prevent spread of non-native invasive plant species, protect the water quality, instream habitats and associated wetlands downstream of the Project and prevent dust emissions are outlined in the following sub-sections. These measures shall be implemented by the contractor appointed for the construction and decommissioning phase, in consultation with the appointed Ecological Clerk of Works (ECoW) so that the sensitive receptors of these European Sites are safeguarded and pathways connecting the project site to these receptors are eliminated as potential impact pathways.

The Ecological Clerk of Works (ECoW) will be appointed to supervise the works and to ensure that all biodiversity receptors are protected during the construction and decommissioning phase. The ECoW will be appointed to ensure that habitat restoration and enhancement activities are implemented as planned, and to advise on any environmental or ecological aspect of the works. The ECoW will inspect habitat and ditches/water courses during the construction phase and during habitat restoration works and will be in charge of water quality monitoring throughout the construction phase. The ECoW will be the first point of contact with the Planning Authority, namely Roscommon County Council for all matters relating to ecology and biodiversity.

All operation phase mitigation measures will be required to be implemented by site management during the operation phase of the Project. A project ecologist will be appointed for the operation phase to supervise the ongoing implementation, management and monitoring of peatland habitat management and enhancement measures. These measures are set out in the Habitat Management Plan (provided as part of the EIAR) and will be implemented throughout the lifetime of the Project.

7.1 MEASURES TO PREVENT THE INTRODUCTION OF NON-NATIVE INVASIVE SPECIES

7.1.1 Site Hygiene

7.1.1.1 Cleaning of Plant & Equipment Prior to Arrival On site

Prior to use on site, the Contractor's vehicles and equipment must be thoroughly cleaned. High-pressure steam cleaning, with water > 40 degrees C, is recommended for vehicles and equipment where reasonably feasible. Many roadside garages provide these facilities. If it is not possible to steam clean the equipment, a normal power hose must be used. After cleaning, a visual inspection of the equipment will be carried out to ensure that all adherent material and debris has been removed.

Cleaning should not be undertaken on the site or near watercourses. Each field vehicle must carry a 'disinfection box'. This should contain Virkon Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves must be worn when using any disinfectant solution.

It is recommended to apply disinfectant to the undercarriage and wheels of any vehicles used after cleaning, if the vehicles have been used in streams or rivers (this does not apply to vehicle or machinery use in wetlands or peatland areas). Disinfectants must be used strictly in accordance with the manufacturer's instructions. They must be disposed of safely, and never close to open waters such as drains etc.

Footwear should be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards if used in streams or rivers. This does not apply to footwear for use in wetlands or peatland areas. Please note that it is not intended that any vehicles will enter water courses in the course of the construction or operation of the Project. Accordingly, this measure is precautionary only. Disinfectants must be used strictly in accordance with the manufacturer's instructions. They must be disposed of safely and never close to open waters such as drains etc.

7.1.1.2 Cleaning and Decontaminating Vehicles and Equipment Onsite

Pre cleaning Methods

Brushing (Physical Removal)

Used in conjunction with another physical removal method such as vacuuming, or when in the field, this method is moderately effective in removing the majority of plant material from equipment and gear. Brushing will remove most surface soil, plant material, and foreign matter. If there is a nap to fabric, such as upholstery or carpeting, brush with the nap rather than against it. Brushing against the nap could further embed small seeds into the material.

A combination of soft and stiff bristles of varying length is recommended for use on carpeting or components made of rubber, nylon, or plastic. Bristles of medium length and stiffness are desired for removal of soil and other matter from fabrics and upholstery. Stiff bristles are recommended for the tread of wheels that become encrusted with soil and mud. Metal bristles may also be used to remove soil or concrete in treads, but heavier wear and tear to the equipment will result.

High-pressure compressed air blasting may be used to assist soil removal.

Follow up with vacuuming, high-pressure air blasting, or high-pressure wash is recommended, as applicable.

Vacuuming (Physical Removal)

Vacuuming equipment with a brush attachment is suggested to remove most loose particle matter, but care should be taken because small seeds may become further embedded in materials. To prevent contained plant and soil matter from being re-deposited or re-dispersed following the cleaning process, collected matter should be double bagged and disposed of in a sanitary landfill. Follow up with water washing, high-pressure air blasting, or high-pressure wash is recommended as applicable.

Water Washing with High-Pressure Wash and With or Without Thermal Treatment

General water washing with high-pressure wash or thermal treatment is the most effective method for removing residual foreign materials, although small and embedded seeds are capable of

persisting. Where known invasive materials are present, wastewater can be treated or filtered, and the waste materials double bagged and disposed of in a sanitary landfill.

High-Pressure Wash

Improvement in the design of high-pressure washing makes it the most effective means of cleaning heavily soiled and contaminated items. Not all items are capable of withstanding the pressure of this treatment, and it should only be used where applicable.

There are many models of high-pressure washers, from simple hand-held nozzles to laser guided, robotic control systems. In some cases, containment and operation sheds are portable. The water systems can be fresh or recycled and use hot or cold water.

Selecting a Wash down Location

To avoid re accumulation of soil on cleaned vehicles, a paved area for washing, off-loading, and staging vehicle cleaning operations, with paved roads between should be used. This type of facility will often not be a viable option for activities in remote areas. Elevating the washing area enables cleaning personnel to access the underside of vehicles and equipment, where contaminants are otherwise difficult to reach.

Water runoff, potentially carrying soil, seeds, animals and petroleum contaminants, must be managed with the use of berms or other containment. Silt fence installed along perimeters of work areas can also aid in preventing spread of contaminated materials outside of the washdown location.

The area must be large enough to safely accommodate all vehicles and personnel before, during, and after cleaning operations.

7.1.1.2.1 Best Management Practice

Do not locate the cleaning site adjacent to storm water drains that allow untreated effluent to enter surface water bodies.

General Considerations:

- Set up the best staging area possible for cleaning operations. A paved area with accommodations to elevate vehicles or otherwise allow easy access to the undersides of vehicles and equipment is the best setting. Otherwise, using geotextile access and exit areas, bermed water recovery areas, and portable vehicle lifts are the next best option.
- Equipment of all types should be cleaned at the location of last use. If this is not possible, arrange for cleaning at a facility that is specially designed for equipment cleaning.
- Preclean equipment that contains heavy accumulations by hand to reduce water demand.
- Make pressurized water available with pressure and nozzles capable of removing all soil and debris.
- Recapture invasive materials by using fine-mesh filters and dispose of invasives in a manner that ensures no spread. Do not allow wash waters to flow into storm drains because these drains often directly flow untreated into surface water bodies.
- At remote sites, install silt fence or otherwise contain materials left behind. Monitor sites closely and eradicate exotic species.
- Clean vehicles and equipment thoroughly and ensure that they remain clean when leaving the site. Follow up cleaning operations with final inspections.
- Clean, drain, and dry all equipment.

Plant Inspection

All plant leaving site will be inspected to ensure it is clean. A record of all inspections will be maintained by the main contractor's site agent.

Inspections will focus on identifying the presence or otherwise of fragment in the following locations of plant equipment.

Rubber Tyred Vehicles

- Crevices in upper surface and panels
- Tyres, rims
- Spare tyre mounting area.
- Bumpers

- Front and rear quarter panels
- Around and behind grills
- Bottom of radiator vent openings
- Brake mechanisms
- Transmission
- Stabiliser bar
- Shock absorbers
- Front and rear axles
- Beds
- Suspension units
- Exhaust systems
- Light casings and mirrors

Tracked Vehicles

- Crevices in upper surface and panels
- Top of axles and tensioners
- Support rollers
- Between rubber or gridded areas
- Beneath bumpers
- Hatches

- Under casings
- Grills
- Beneath seats
- Beneath floor mats
- Upholstery
- Beneath foot pedals
- Inside folds of gear shift cover

7.2 GROUND INSTABILITY/FAILURE HAZARD

With regard to the proposed Project design, the principles or risk management and best practice has been followed and will continue to be implemented as follows:

The primary mitigation measure employed has been the design of the Project in terms of locating the Wind Turbines, Site Access Roads, Permanent Spoil Storage areas and other site infrastructure on level ground, well buffered from watercourse (with the exception of watercourse crossings).

In order to reduce the impacts on geology, hydrogeology and slope stability, infrastructure has also been positioned within areas of thinner organic soils / soft ground and lower slope gradients away from designated watercourses and other sensitive features. Extensive work has already been undertaken for the design stage to apply risk avoidance by design which has included the following:

Peat probing to screen for the presence of peat or other organic soil deposits across the site and layout.

Excavation of trial pits and undertaking of geophysical surveys to establish overburden and bedrock characteristics.

Relocation and micro-siting of Wind Turbines, Turbine Hardstands, Site Access Roads and other infrastructure based on the site assessments and geotechnical assessments in order to reduce ground risk associated with the proposed Project.

The works have been designed and checked by geotechnical engineers, who are suitably qualified and experienced in excavation and earthworks design and construction methodologies.

Where the construction footprint for the Project coincides with water courses, no permanent storage of spoil will be undertaken. Temporary storage will be limited to the period of construction only and scheduled to coincide with optimal annual weather conditions.

Prior to commencement of construction works at structures in the proximity of sensitive waterbodies and Site Access Road crossing watercourses, appropriate pollution prevention arrangements will be put in place to prevent contaminated surface water run-off from construction activities entering these watercourses, other water bodies or the existing underground pipeline.

Given that the works comprise a sizeable proportion of excavation and earthworks, suitably qualified and experienced geotechnical personnel will be engaged on site to supervise the works.

The Contract will require programming of the works such that earthworks are not scheduled during severe weather conditions or at times of prolonged high rainfall.

7.2.1 Construction Phase

The following sections outline appropriate mitigation measures to avoid or reduce the potential effect of the Project during the construction phase.

7.2.1.1 Prevention of Ground Instability/Failure

Application of the following procedures will have the effect of reducing the hazard with respect to ground stability:

1. Excavated spoil will not be deposited on the down slope or up slope edges of the adjacent topsoil. This spoil will instead be deposited on the two flanks either side of

the excavation (where gradient is least) and spread in such a way as to limit the surcharge pressure on sensitive topsoils.

2. The Turbine Hardstand areas surrounding the Turbine Foundations will be designed in a manner such that crane loadings can be transferred directly onto the competent strata underlying any sensitive mineral soils. In order to facilitate these works it will be necessary to undertake limited excavations. To ensure effective sidewall support during these operations the contractor will adopt an approved engineering solution (such as a suitable bracing system or other method) to maintain sidewall stability at all times.

3. Movement can often occur during or following severe rainstorm events, particularly when following a prolonged dry spell. Extra vigilance will be maintained at such times, during construction.

4. All slopes are to be regularly checked, during the construction and operational phases, for development of tension cracks, which are indicative of slope movement.

5. Method statements will be followed at all times. Where modification is required, this will be agreed by the supervising engineer.

6. Slopes will not be undercut or excavations left unsupported for periods in excess of 24 hours. Excavations are to be backfilled as soon as practicable. Excavation and filling operations shall be coordinated to minimise the time an excavation remains opened.

7. Pore water pressure within excavations should be kept low at all times by draining deliberate or intentional sumps at regular intervals. This is to prevent ponding of water within excavations which can in turn increase hydraulic heads locally and potentially lead to instability.

8. The potential for soil movement will be monitored regularly during the construction and operational phases by means of regular site visits and assessments, by a suitably qualified and experienced professional.

9. Only experienced and competent contractors will be appointed to conduct the construction works.

10. Low ground bearing pressure machinery shall be used for transport of construction materials in sensitive areas, where ground conditions dictate its requirement.

11. Construction at less sensitive areas will be completed first to allow suitable construction practices to be established before works commence in the more difficult areas.

12. Sufficient time should be allowed to conduct the works in a safe and timely manner.

The application of specific mitigation measures, as detailed in the following table, will use targeted measures to reduce peat landslide hazard to an acceptable level of significance.

Table 7.1: Peat Landslide Hazard – Specific Mitigation Measures

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
Main Structures				
T01	Minor watercourse within 200m	MEDIUM	The T01 location is not connected to the wider surface water drainage network. Isolated drains in cut cells are present but do not connect to flowing drains in the surrounding area. The works at T01 will be designed to maintain its isolation from the surrounding surface water drainage network and prevent connectivity to this network. No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the continued absence of connectivity to the wider surface water drainage network will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T02 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP)	LOW

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
T02	Minor watercourse within 100m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Carricknabraher River tributary to the east of T02 will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T02 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
T03	Minor watercourse within 500m	MEDIUM	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. In order to maintain current baseline water table levels in the degraded raised bog to the west, northwest and southwest of T03 temporary interlocking corrugated sheeting (of material type used for peatland drain-blocking) will be installed into the peat in a semi-circular area along the boundary of the construction footprint at T03. This will maintain hydrology within the bog to the west. The interlocking corrugated sheeting will be removed upon completion of works at the T03 location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and existing access track to the north of T03 and the Carricknabraher River to the north will be undertaken by a suitably qualified	LOW

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			geotechnical engineer. Surface water generated at the T03 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP)	
T04	Minor watercourse within 200m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Owennaforeesha River to the west will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T04 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP)	NEGLIGIBLE
T05	Minor watercourse within 500m	NEGLIGIBLE	Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the minor stream tributary of the Owennaforeesha River to the south will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T05 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
T06	Forestry, agricultural lands & bogland habitat	NEGLIGIBLE	Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the minor stream tributary of the Owennaforeesha River to the south will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T06 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
T07	Forestry, agricultural lands & bogland habitat	NEGLIGIBLE	Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the minor stream (EPA name Tonaknick Stream) to the east will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T07 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
T08	Minor watercourse within 500m	LOW	Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Breedoge River to the south will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T08 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
T09	Minor watercourse within 500m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Breedoge River to the south will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T09 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
T10	Forestry, agricultural lands & bogland habitat	NEGLIGIBLE	Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes the minor stream (EPA name Tonaknick Stream) to the east will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T10 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
T11	Minor watercourse within 100m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the minor stream (EPA name Breedoge River to the south will be undertaken by a suitably qualified geotechnical engineer.	NEGLIGIBLE

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			Surface water generated at the T11 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	
SUBSTATION	Minor watercourse within 200m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Breedoge River to the east will be undertaken by a suitably qualified geotechnical engineer. Surface water generated at the T08 location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
Access Track Network				
Site entrance 1 to T01	Minor watercourse within 100m	MEDIUM	As per turbine T01 above.	LOW
T01 to T02 and to site entrance 2	Crosses minor watercourse	MEDIUM	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal.	LOW

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Carricknabraher River crossed by this section of proposed access track will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along the proposed access track location will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP)..	
Site entrance 3 to T04	Minor watercourse within 100m	MEDIUM	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Owennaforeesha River, crossed by this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	LOW
T04 to T03	Minor watercourse within 200m	MEDIUM	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal.	LOW

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Owennaforeesha River, crossed by this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	
Spur at T04 to T05	Minor watercourse within 500m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Owennaforeesha River tributary, crossed by this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	LOW
Spur at T05 to Spur at T07	Minor watercourse within 100m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the minor watercourse	LOW

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			tributaries of the Owennaforeesha River, to the south of and crossed by this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	
Site entrance 4 to T07	Forestry, agricultural lands & bogland habitat	LOW	No construction will be undertaken during either storm or high rainfall conditions. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the minor watercourse tributary of the Owennaforeesha River, crossed by this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	NEGLIGIBLE
Site Entrance 5 to Substation	Crosses minor watercourse	MEDIUM	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed.	LOW

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations and slopes will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	
Substation to T11	Crosses minor watercourse	MEDIUM	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal. Only low pressure plant machinery will be employed. Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the Breedoge River, crossed by this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	LOW
Spur at T11 to T08	Minor watercourse within 100m	LOW	No construction will be undertaken during either storm or high rainfall conditions. Peat faces will be directly supported at excavation location. Where peat faces are to remain exposed these will be battered back to at least 45 degrees to horizontal.	NEGLIGIBLE

Infrastructure Element	Main Receptor Risk	Pre-Mitigation Hazard	Significance Extent Context Probability	Post-Mitigation Hazard
			Staff induction procedure will contain a dedicated section in relation to avoidance of the hazard of peat landslide. Regular surveillance of works, excavations, slopes and the EPA-named Runnacocka Stream to the east of this section of the proposed access track, will be undertaken by a suitably qualified geotechnical engineer. Surface water generated along this section of proposed access track will be managed and treated as per the measures set out in Sections 7.9 to 7.11 below and as per the Surface Water Management Plan (provided under separate cover as part of the CEMP).	

7.2.1.2 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) has been prepared for the Project and is provided under separate cover with the planning application documentation. The CEMP defines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the proposed Project.

The CEMP sets out the key environmental management measures associated with the construction, operation and Decommissioning of the Project, to ensure that during these phases of the Project, the environment is protected, and any potential impacts are minimised.

The CEMP will be developed further at the construction stage, on the appointment of the main contractor to the Project to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned and shall be submitted to the planning authority prior to the commencement of the construction phase.

The CEMP will incorporate the mitigation of potential effects to land, soils and geology from the proposed Project outlined in the following sections.

7.2.1.3 Erosion, Degradation & Soil Sealing

The Project will be constructed in a phased manner in order to reduce the potential effects of the Project on the soils and geology. Phased construction reduces the amount of open, exposed excavations at any one time, lowering the risk of compaction and reducing soil exposure to degradation.

To further mitigate against the compaction of soil at the Wind Farm Site, prior to the commencement of any earthworks, the work corridor will be demarcated, and machinery will stay within this corridor so that soils outside the work area are not damaged or suffer degradation.

Excavations will then be conducted from Site Access Roads as they are constructed in order to reduce the compaction of soft or otherwise sensitive ground.

The amount of exposed ground and soil stockpiles will also be kept to a minimum and any stockpiles in place for an extended period of time will be allowed to re-vegetate naturally.

7.2.1.4 Subsoil & Bedrock Removal

Construction of the Project will result in the removal of soils in parts of the site to facilitate excavation for the construction of Site Access Roads and Turbine Hardstands for the Wind Turbines within a competent stratum suitable for the emplacement of foundations.

Ground conditions vary across the Wind Farm Site with mineral soils and peat of varying depths and competence present. At the proposed Wind Turbine bases the excavation depth required is anticipated to be a maximum of 5.00m to a suitable bearing stratum. For Site Access Roads and Turbine Hardstands this is expected to be average 1.45m and consequently less significant.

Excavation volumes will also be minimised by the use of piled foundations for Wind Turbines T1 and T3.

One of the primary mitigation measures employed at the preliminary design stage was the minimisation of volumes of excavated overburden deposits to be exported off site. In the case of the construction of the Project, all excavated overburden will either be re-used or retained on-site for reinstatement purposes during the Decommissioning phase.

This will include:

- Use of suitable site-won material (mineral soils consisting predominantly of sands and gravels) as general fill in the construction of Site Access Roads, Turbine Hardstands and in reinstatement around Turbine Foundations.

- Surplus overburden will be re-used on site in the form of landscaping and for raised bog habitat reinstatement purposes.

- Residual surplus overburden will also be stored in raised bog habitat reinstatement areas as per the Biodiversity Enhancement and Management Plan (BEMP) (see EIAR Chapter 6, Jennings O'Donovan, 2026) and at the Permanent Spoil Storage areas as identified on Figure 1.2a & 1.2b.

Surplus overburden deposits excavated during the course of the works will be treated and stored, for the duration of the Project as per the approach set out in the BEMP ((see EIAR Chapter 6, Jennings O'Donovan, 2026) and CEMP (provided under separate cover with the planning application documentation).

7.3 WIND FARM SITE EARTHWORKS

Mitigation measures to avoid the potential for adverse impacts arising from earthworks and management of spoil will comprise:

- Management of excavated material will adhere to the measures related to the management of temporary stockpiles as set out in Section 7.3 below.

- No permanent or semi-permanent stockpiles will remain on the Wind Farm Site during the construction, decommissioning or operational phase of the Project. Any surplus spoil remaining at the end of the construction phase will be taken off site and disposed of at a licence waste facility.

- Construction activities will not be carried out during periods of sustained heavy rainfall events[7], or directly after such events. This will allow sufficient time for work areas to drain excessive surface water loading and discharge rates to be reduced.

- Following heavy rainfall events, and before construction works recommence, the Wind Farm Site will be inspected to confirm that conditions are suitable for construction activities to recommence.

- An emergency response plan (ERP) has been prepared as part of the CEMP (**Appendix 2.1**) for the Project, both of which are provided under separate cover as part of the planning application documentation associated with the EIAR. All measures outlined in the ERP will be implemented throughout the construction phase of the Project. This plan includes for 24-hour advance meteorological forecasting linked to a trigger-response system. When a pre-determined rainfall trigger level is exceeded such as a very heavy rainfall at >25mm/hr, planned responses will be undertaken. These responses will include cessation of construction until the storm event, including storm runoff has ceased.

[7] As per the Met Office National Meteorological Library and Archive Fact Sheet 3 – Water in the atmosphere (Met Office, 2012) a heavy rainfall event for: rain (other than in showers) is assigned to an event where rates of accumulation are greater than 4mm/hour; and for rain showers is assigned to an event where rates of accumulation are >10mm/hour.

- Sediment fencing will be erected along proximal and paralleling areas of watercourses, occurring within the proposed Wind Farm Site, channels and drains spanned by the works to reduce the potential for sediment laden run-off to reach sensitive receptors.

- No direct flow paths between stockpiles and watercourses will be permitted at the Wind Farm Site.

- Excavated material will be backfilled and transported to the spoil storage area as soon as is reasonably practicable to prevent long duration storage at the Wind Farm Site which increases the risk of adverse effects on aquatic environments.

- All mitigation measures related to surface water quality will be implemented before excavation works commence.

7.4 TEMPORARY STOCKPILE MANAGEMENT FOR WIND FARM SITE WORKS

Whenever possible, soil and rock will be re-used on the Wind Farm Site immediately, thereby reducing the need for double handling, which will also reduce the requirement to stockpile soils. Generally excavated rock will be used immediately for Site Access Road construction. Whenever possible stockpiles will be avoided. Where stockpiling is required, it will be stored in the designated Temporary Construction Compounds. Stockpiles will be covered to prevent wind blown spread of material.

7.5 EXCAVATION REQUIREMENTS FOR THE PROPOSED GRID CONNECTION ROUTE

The following mitigation measures will be implemented during excavations for the proposed Grid Connection route:

- The timing of Grid Connection cable laying will be carried out during metrologically dry seasons/periods.

- An Ecological Clerk of Works (ECoW) will be onsite in order to lessen environmental disruption and ensure site integrity is maintained. The ECoW will also be responsible for routine environmental monitoring and report writing.

- excavated material will be temporarily stockpiled adjacent to the section of trench, with appropriate material used as backfill.

- Excess/unsuitable material will be immediately removed and disposed of at a licenced waste disposal facility.

- Appropriate siltation measures, as per the measures set out in the subsequent sections below will be put in place prior to excavations.

- Stockpiles will be temporarily stored a minimum of 25m back from rivers/streams on level ground with a silt barrier installed at the base.

- For all Grid Connection trenching along the local road, any unsuitable backfill material excavated will be immediately taken away from the works area in trucks and disposed of under license to an authorised waste disposal facility. This will prevent any contaminated run-off to roadside drains during heavy rainfall.

7.6 EXCAVATION DEWATERING REQUIREMENTS FOR THE WIND FARM SITE

The following mitigation measures will be implemented for dewatering activities at the Wind Farm Site:

- Areas of subsoils to be excavated will be drained ahead of excavation works. This will reduce the volumes of water encountered during excavation works and will therefore reduce the volume of water that is required to be dewatered whilst excavations are being carried out.

- Engineered drainage and attenuation features outlined in the Surface Water Management Plan attached in **Appendix 11.2** of the EIAR will be established ahead of excavation works.

- Dewatering pumping rates will be controlled by an inline gate valve or similar infrastructure which will facilitate a reduction of loading on the receiving environment, thus enhancing the attenuation and settlement of suspended solids.

- The direct discharge of dewatered loads to surface waters will not be permitted under any circumstances.

- All dewatering will follow a strict procedure of pumping to a settlement tank and then to a dewatering bag, or settlement ponds prior to discharging to receiving environment for overland flow.

- Geofabric lined settlement ponds will buffer the run-off discharging from the drainage system which will reduce the hydraulic loading to watercourses. Settlement ponds will be designed to reduce flow velocity to 0.3 m/s at which velocity silt settlement generally occurs. In areas of the Wind Farm Site where the placement of settlement ponds is not feasible, other mitigation measures described below will be implemented

- Check Dams will be constructed across drains and will reduce the velocity of run-off which will, in turn, promote settlement of solids upstream of potential surface water receivers. An additional benefit of check dams is that they will reduce the potential for erosion of drains. Rock filter bunds may be used for check dams, wood or hay bales can also be used if properly anchored. It is recommended that multiple check dams are installed, particularly in areas immediately down gradient of construction areas.

- Overland flow paths of the final dewatered discharge will be maximised to the greatest practical extent to avoid prematurely draining to drainage channels or surface waters. This approach will allow for enhanced settling out of suspended solids entrained in the run-off.

- All pumps, tanks, settlement ponds, dewatering bags and check dams used in the dewatering process will be regularly inspected and maintained as necessary to ensure surface water run-off is appropriately treated.

- Sediment fencing will be installed up gradient of water courses which may receive the final overland flow.

- The final treated dewatered discharge will be directed towards heavily vegetated areas to allow for further natural filtration of suspended solids.

- A programme of water quality monitoring will be implemented during the construction phase which is outlined in detail in CEMP presented as **Appendix 2.1** of the EIAR.

- No extracted or pumped water will be discharged directly to the surface water network associated with the Wind Farm Site (this is in accordance with Local Government (Water Pollution) Act 1977 as amended).

- Any discharges of sediment treated water will meet the requirements of the Surface Water Regulations 2009, as amended.

7.7 WATERCOURSE CROSSINGS

7.7.1 Wind Farm Site

At the Wind Farm Site, the Project will result in the crossing of 5 no. major watercourses and 1 no. minor watercourse no. new watercourse crossing will be constructed. The following measures provide for the planning and consideration of these watercourses as part of the overall approach to watercourse crossings to ensure potential impacts are adequately mitigated.

The following design measures have been implemented for the watercourse crossing to ensure any potential impacts of the proposed watercourse crossing are minimised:

- The design of the proposed crossing and a method statement for the proposed construction will be agreed in advance with Inland Fisheries Ireland (IFI)

- Crossings have been designed to minimise, in so far as practical, the disturbance or alteration of water flow, erosion and sedimentation patterns and rates

- Vehicles and plant used in the construction of the proposed crossing will only be refuelled at the Wind Farm Site's bunded and designated refuelling area, no refuelling will be permitted within 50m of any watercourse at the Wind Farm Site

- To mitigate against the potential risk of accidental leaks or spillages from plant and equipment the following measures will be implemented: Multiple spill kits will be maintained on the Wind Farm Site at all times within the cabs of vehicles and placed strategically at environmentally sensitive locations across the Wind Farm Site. Spill

kits will be routinely inspected to ensure that they are fully stocked with oil absorbent booms and pads at all times. Oil absorbent booms will be installed downstream of channel crossing work areas within 25m of the works location prior to the commencement of works.

7.7.2 Grid Connection Route

There are 8 no. watercourse crossings along the Grid Connection route, 3 of which will be HDD crossings. The mitigation measures to be implemented during horizontal directional drilling are set out in **Section 7.8** below.

7.8 HORIZONTAL DIRECTIONAL DRILLING

The following mitigation measures to reduce potential impacts associated with horizontal directional drilling (HDD) will be implemented:

- Clearbore, which is not toxic to aquatic organisms and is biodegradable will be the drilling fluid used.
- Mud mixing will be monitored to suit the ground conditions encountered.
- The drilling fluids will be constantly monitored, any changes required to the mix will be performed on site by a specialised HDD Contractor upon consultation with the drilling fluid supplier and ECoW.
- Mud testing equipment will be available at all times during drilling operations to monitor key mud parameters.
- All equipment will be carefully checked on a daily basis by the Site Supervisor prior to use to ensure plant and machinery is in good working order with no leaks or potential for spillages.
- Spill kits, including an appropriate hydrocarbon boom will be available on the site in the event of any unforeseen hydrocarbon spillages and all staff shall be trained in their use.

- All plant, materials and wastes will be removed from site following the HDD works.

- The launch pit will be reinstated to the original land surface condition and the normal duct trench will continue from this point.

- Should any dewatering be required, it will be carried out in accordance with the CEMP provided in **Appendix 2.1** of the EIAR.

- Test pits and boreholes will not be located directly on, or extend through, the proposed alignment, as these weak points may serve as conduits where inadvertent fluid returns or frac outs could occur. At least a 3m offset will be provided between the boreholes and pipe alignment.

The following measures will be implemented at launch and receptor pits to ensure that the excavation, preparation and works undertaken at these pits do not pose a risk to the water quality of watercourses to be crossed via horizontal directional drilling:

- All launch pits and reception pits for horizontal directional drilling under watercourses will be buffered back from watercourses at a minimum distance of 20m.

The location of the launch and receptor pits a minimum distance of 20m from the watercourses will provide sufficient buffering between the reception pit and the river to ensure that there is no potential for the discharge of silt-laden or otherwise contaminated materials from the reception pit to the river.

All spoil arisings from all launch pits and reception pits at the proposed Grid Connection route watercourse crossings will be stored in bunded areas to prevent the runoff of silt-laden runoff from the spoil to watercourses. All spoil material will be reused to reinstate the launch pits and reception pits.

Pumps will be available at the launch and receptor pits. The pumps will be powered by diesel fuel and will be stored in a secure bunded area. The pumps will be used to pump any standing water from the pits during works. A lay flat will be positioned within the pit and pooling surface water will be pumped from the pit via the lay flat over adjacent vegetated surfaces. Under no circumstances will the lay flat outfall be directed to an existing drainage ditch or the watercourse being crossed via horizontal directional drilling. The discharge of the surface water to vegetated

ground will allow for discharge to ground and will retard overland flows in the direction of the watercourse being crossed.

Continuous monitoring of drilling fluid/mud pressure will be undertaken by the drill technician during all drilling. The drill technician in turn will be supervised by the drill supervisor and all horizontal directional drilling will be monitored by the project Ecological Clerk of Works (ECoW). The continuous monitoring will ensure that in the event of a change in pressure due to a blockage the technician will be immediately alerted to this change and will cease drilling operations. This will prevent drill fluid/mud from breaking out through an alternative path of least resistance and will prevent such materials from breaking out to the river. The avoidance of a breakout depends primarily on the experience of the drilling personnel and reliable, accurate drilling records interpreted in relation to the geotechnical information available. The drilling personnel will be suitably qualified and experienced to complete the works. Boreholes will be completed at all HDD locations as part of the Site Investigations works to be completed during the detailed design phase. Trends during the pilot drilling will be monitored and tracked so as to maximise the chances of accurately establishing a point where the formation is causing drilling fluid losses. The volume of drilling mud entering and returning from the bore will be constantly monitored by the drill operating staff. Staff will be especially vigilant for any loss of volume of drill mud returns, which would indicate the escape of drilling mud from the bore.

At the location a number of measures can be implemented as follows:

- Pump drilling fluid with a higher density into the formation.

- Circulate and pump organic lost circulation materials (LCM) into the loss zone to physically seal the fracture. Lost circulation occurs when drilling fluid, flows into one or more geological formations instead of returning to the launch area.

- Grout the loss zone; and/or

- Launch a packer before the loss zone. A packer is a mechanical device sent down the hole to the area of concern. It is designed for blocking the system for sealing grout to set.

All of the above options will be prepared and made available for application during the HDD works.

All equipment will be carefully checked on a daily basis by the Site Supervisor prior to use to ensure plant and machinery is in good working order with no leaks or potential for spillages. In order to minimise any risk of pollution in the first instance. Spill kits, including an appropriate hydrocarbon boom will be available on the site in the event of any unforeseen hydrocarbon spillages and all staff shall be trained in their use.

In addition to the supervision of drilling the project ECoW will be required to supervise the set-up and reinstatement of all launch pits and reception pits at all watercourse crossings to ensure that all measures required to protect water quality and instream habitats are properly implemented.

In addition to the horizontal directional drilling method provided under separate cover, a detailed method statement for the crossing of watercourses will be prepared in advance of all crossings and will be submitted to the NPWS and IFI for agreement prior to the commencement of works.

All drilling fluids and spent drill mud will be prepared and returned within a closed drilling train. All spent mud will be discharged from the closed drilling train to an impermeable bunded container and will be removed from site for disposal at an appropriately licenced facility.

All fuels, lubricants and hydraulic fluids for equipment used during horizontal directional drilling will be stored in securely bunded containers and will not be carried to within 10m of any watercourse.

All measures detailed in the SWMP and CEMP prepared for the Project to protect water quality will be implemented during horizontal directional drilling works.

An Emergency Response Plan has been prepared as part of the project's CEMP and all measures detailed therein will be implemented in the event of an emergency.

7.9 RELEASE & TRANSPORT OF SUSPENDED SOLIDS

The following mitigation measures will be implemented at the Wind Farm Site during the construction and decommissioning phase to prevent the release and transport of silt-laden surface water runoff:

- Collector drains and soil berms will be implemented to direct and divert surface water runoff from construction areas such as temporary stockpiles into established settlement ponds, buffered discharge points and other surface water runoff control infrastructure. This planning and placement of these control measures will be of fundamental importance, especially for the areas where works within the 50m buffer zone of surface waters and significant drainage features.

- Sediment control fences will be implemented significantly upgradient of potential receiving waters and as part of the drainage network. Sediment control fences will also be established upgradient of the Wind Farm Site's pre-existing natural and artificial drains in addition to degraded areas of peat that are likely to receive surface water runoff. This practice will reduce the potential for elevated suspended solids entrained in surface water runoff to discharge to surface waters.

- Multiple silt fences will be used in drains discharging to the surface water network. This will be especially important for the areas where works occur within the 50m buffer zone of surface waters and significant drainage features.

- A dedicated silt fence will be established along all sections of the Site Access Roads that are within the 50m buffer zone of watercourses.

- The drainage, attenuation and other surface water runoff management systems will be installed prior to the commencement of construction activities. Whenever possible, drainage and attenuation control measures will be installed during seasonally dry conditions to limit the potential for sediment laden run-off to discharge to surface waters during the installation of these measures.

- Surface water runoff will be discharged to land via buffered drainage outfalls that will contain hardcore material of similar composition to the geology of the bedrock at the Wind Farm Site. This mitigation measure will promote the capture and retention of suspended sediment.

- Buffered drainage outfalls also promote sediment percolation through vegetation in the buffer zone, reducing sediment loading to adjacent watercourses and avoiding direct discharge to the watercourse.

- Buffered drainage outfalls will be placed outside of the 50m buffer zone and will not be positioned in areas with extensive erosion and degradation.

- A high number of discharge points will be established to decrease the loading on any one particular outfall. Discharging at regular intervals mimics the natural hydrology by encouraging percolation and by decreasing individual hydraulic loadings from discharge points.

- A CEMP has been developed which will mandate regular inspections and maintenance of pollution control measures. Contingency measures outlining urgent protocols to repair or backup any breaches of designed mitigation measures are also incorporated into the CEMP (**Appendix 2.1** of the EIAR).

- In the event that mitigation measures are failing to reduce suspended solids to acceptable levels, construction works will cease until remediation works are completed.

- Fine solids or colloidal particles are very slow to settle out of waters. Therefore, coagulant or flocculant will be used as appropriate to promote the settlement of finer solids prior to discharging to surface water networks. Flocculant gel blocks can be placed in drainage channels. These are passive systems that are self-dosing, self-limiting and are environmentally friendly. Flocculant gel blocks bind elevated levels of silt and associated contaminants into masses that are easily separated, captured and then removed from the water.

- Surface water runoff controls will be checked and maintained on a daily basis. Check dams and settlement ponds will be maintained and emptied prior to the build-up of excessive sediment. The frequency of maintenance and emptying will be dictated by levels of sediment accumulation.

The adoption of precautionary principles and the implementation of mitigation measures listed above will ensure that the risk of elevated suspended solids to surface waters is low. This in turn will ensure that potential risks to sensitive receptors is also low. Nevertheless, should a significant discharge of suspended solids to surface waters occur, the absence of immediate proximity to designated sites and the assimilative capacity of the localised surface waters will act as a natural hydrological buffer in terms of suspended solids loading. Should such a discharge occur, the dilution and retention time of suspended solids in the localised surface

water network will reduce potential impacts on highly sensitive downstream designated sites. It should be noted that this natural mitigation measure is not to be adopted as a first principle and will not be relied upon to prevent adverse impacts on designated sites.

A detailed design of required drainage, collector drainage, stilling ponds and other listed mitigation infrastructure is contained in the Surface Water Management Plan contained in **Appendix 11.2** of the EIAR.

7.10 RELEASE OF HYDROCARBONS

The following mitigation measures will be implemented during all construction and decommissioning phase works for the Project to prevent the release and transport of hydrocarbons to receiving surface waters:

- Refuelling of vehicles will be carried out off site to the greatest practical extent. This refuelling policy will mitigate the potential for impacts by avoidance. Due to the remote location nature of the Wind Farm Site, it is unlikely that implementation of this refuelling policy will be practical in all circumstances. In instances where refuelling of vehicles on Wind Farm Site is unavoidable, a designated and controlled refuelling area will be established at the Wind Farm Site. The designated refuelling area will enable low risk refuelling and storage practices to be carried out during the works. The designated refuelling area will contain the following attributes and mitigation measures as a minimum requirement:
    - The designated refuelling area will be located a minimum distance of 50m from any surface waters or site drainage features.
    - The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the Wind Farm Site.
    - The bunded area will be drained by an oil interceptor that will be controlled by a pent stock valve that will be opened to discharge storm water from the bund.
    - Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis.

- Any oil contaminated water will be disposed of at an appropriate oil recovery plant or licensed tip site.
- Any minor spillage during this process will be cleaned up immediately.
- Vehicles will not be left unattended whilst refuelling.
- All machinery will be checked regularly for any leaks or signs of wear and tear.
- Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner.

Notwithstanding the management of refuelling and fuel storage at the designated refuelling area, the potential risk of hydrocarbon spills from plant and equipment or other general chemical spills at other areas of the Wind Farm Site remains. To mitigate against potential spills at other areas of the Wind Farm Site, the following mitigation measures will be implemented:

- Oil absorbent booms and spill kits will be available adjacent to all surface water features associated with the Project. The controls will be positioned downstream of each construction area and at principal surface water drainage features. Oil booms deployed will have sufficient absorbency relative to the potential hazard.
- Spill kits will also be available at construction areas such as at turbine erection locations, the temporary site compound, on-site substation, spoils storage areas and met mast location etc.
- Spill kits will contain a minimum of oil absorbent pads, oil absorbent booms, oil absorbent granules, and heavy-duty refuse bags for collection and appropriate disposal of contaminated matter.
- Should an accidental spill occur during the construction or operational phase of the Project, such incidents will be addressed immediately. This will include the cessation of works in the area of the spillage until the issue has been resolved.

- Spill kits will be kept in each vehicle at the Site and will be readily available to all operators.

- No materials, contaminated or otherwise will be left on the Wind Farm Site.

- Suitable receptacles for hydrocarbon contaminated materials will also be available at the Wind Farm Site.

- A detailed spill response plan is provided as part of the CEMP.

Implementation of the above mitigation measures will significantly reduce the risk of hydrocarbon contamination being released to the surface water network. Nevertheless, the potential risk cannot be entirely eradicated. Therefore, precautionary measures and emergency response protocols have been prepared and are provided as part of the CEMP.

7.11 RELEASE OF CEMENTITIOUS MATERIALS

The following mitigation measures will be implemented during all construction and decommissioning phase works for the Project to prevent the release and transport of cementitious material to receiving surface waters:

- The procurement, transport and use of any cement or concrete will be planned fully in advance and supervised by appropriately qualified personnel at all times.

- Vehicles transporting cement or concrete to the Wind Farm Site will be visually inspected for signs of excess cementitious material prior to being granted access to the Wind Farm Site. This will prevent the likelihood of cementitious material being accidentally deposited on the Site Access Roads or elsewhere at the Wind Farm Site.

- Drivers of such vehicles will be instructed to ensure that all vehicles are washed down in a controlled environment prior to the departure of the source site, such as at concrete batching plants.

- Precast concrete will be used wherever possible. However, the use of pre-cast concrete is not viable option for large structures such as Turbine foundations and so concrete will be delivered to the Wind Farm Site.

- Concrete will not be poured during periods of rainfall or if any kind of precipitation is forecast. This policy will limit the potential for freshly poured concrete to adversely impact on surface water runoff.

- Raw or uncured waste concrete will be disposed of by removal from the Wind Farm Site.

- Washout of concrete trucks shall be strictly confined to the batching facility and shall not be located within the vicinity of watercourses or drainage channels. Only the chutes will be cleaned prior to departure from the Wind Farm Site and this will take place at a designated area at the Temporary Construction Compounds.

- Spill kits will be readily available to site personnel, and any spillages or deposits will be cleaned up as soon as possible and disposed of appropriately.

- Pouring of concrete into standing water within excavations will be avoided.

- Excavations will be prepared before pouring of concrete by pumping standing water out of excavations to the buffered surface water discharge systems in place.

- Any surplus concrete will not be stored or deposited anywhere on the Wind Farm Site and will be returned to the source location or disposed of appropriately at a suitably licensed facility.

- Any required shuttering installed to contain the concrete during pouring will be fully secured around its perimeter to minimise any potential for leaks.

7.12 WATER QUALITY MONITORING

The following water quality monitoring will be implemented to mitigate against potential impacts on the surface water receiving environment:

- A programme of water quality monitoring outlining the selected parameters and monitoring frequency will be agreed with Inland Fisheries Ireland and Roscommon County Council prior to the commencement of construction.

- In order to assist in the detection of any deviations from the baseline hydrochemistry conditions at the Wind Farm Site, regular periodic monitoring of the Wind Farm Site's surface waters will be carried out prior to and during construction.

- It is proposed that a programme of operational phase water quality monitoring is also implemented at a monitoring frequency agreed with Roscommon County Council in order to aid the detection of any potential operational phase impacts on surface water quality.

- As a minimum requirement, field measured parameters such as pH, conductivity, total dissolved solids (TDS), temperature, dissolved oxygen (DO) and turbidity will be included in the water quality monitoring programme. The results will be compared to the applicable EQS to determine if adverse impacts on water quality are occurring.

- Water quality will be monitored for trace metal concentrations prior to, during and after the construction phase.

- Water quality monitoring locations will include both upstream and downstream points relative to the works locations. The locations of the water quality monitoring points will be flexible and will be moved as the construction phase progresses so that monitoring points remain representative of the most likely construction impact receptor points.

- The watercourses within and adjacent to the proposed spoil storage area will be included within the water quality monitoring programme.

- The downstream monitoring locations will be positioned as close as possible downstream of the works location and another positioned further downstream. This approach will allow for an assessment of the dilution of potential contaminations (if present) as the distance from the point of diffuse source location increases.

- Watercourses which do not have year-round flows such as artificial drains, ditches or ephemeral streams will be avoided as water quality monitoring locations.

- During the construction phase, daily visual inspections of excavations, dewatering procedure, settlement ponds, silt traps, buffered outfalls and drainage channels etc. will

be carried out by a suitably qualified person. Any excess build-up of sediment at settlement ponds, drains or at any other drainage features that may decrease the effectiveness of the drainage feature will be promptly removed.

- During the construction phase of the Project, all development areas will be monitored on a daily basis for evidence of groundwater seepage, water ponding and wetting of previously dry spots.

- Following the completion of the construction phase, inspection of silt traps, buffered outfalls and drainage channels will be periodically inspected during maintenance visits to the Wind Farm Site when the operational phase water quality monitoring will also be carried out.

- The proposed watercourse crossings discussed in **Section 3.2** will be monitored daily during construction and during each site visit during the operational phase. The water course crossings will be monitored in terms of their impacts (if any) on the receiving watercourses and in terms of their structural integrity to identify any signs of erosion or potential for sediment release.

- It is proposed that a handheld turbidity meter is available at the Wind Farm Site to accurately measure the quality of water discharging from the Wind Farm Site. The meter will be maintained and calibrated frequently.

- A detailed inspection and monitoring regime to be agreed with Inland Fisheries Ireland and Roscommon County Council will be included in the CEMP.

- Any discharges of sediment treated water will meet the requirements of the Surface Water Regulations 2009, as amended.

7.13 EMERGENCY RESPONSE

Mitigation measures outlined in the previous sections of this NIS will significantly reduce the potential for contamination of surface water or groundwater associated with the Project. Nevertheless, as is the case with all construction projects, a risk of accidental chemical spillages, sediment overloading of control measures or leaks of contaminants from plant or equipment remains a possibility. Emergency response procedures to potential contamination

incidents have been prepared as part of the CEMP and will be implemented at the Wind Farm Site prior to the commencement of the construction phase. The following is a non-exhaustive list of potential emergencies and respective emergency responses:

- Spill or leak of hazardous substances (less than 20 litres);
    - All spill incidents will be dealt with immediately as they arise
    - Spill kits will be prepared and available in vehicles associated with the construction phase of the Project
    - Spill kits will also be prepared and made available at primary work areas such as at the proposed Wind Turbine, Turbin Hardstand, Onsite Substation, Permanent Met Mast and Temporary Construction Compound locations
    - Disposal receptacles for hydrocarbon contaminated materials will also be available at the Wind Farm Site
- Major spill of hazardous or toxic substance off Site or to environmentally sensitive areas:
    - Immediate escalation measures will be implemented for all major spill events
    - Escalation measures may include installation of temporary sumps or drains to control the flow or migration of hydrocarbons or other chemicals
    - Attempts to be made to limit or contain the spill using sandbags to construct a bund wall, use of absorbent material, temporary sealing of cracks or leaks in containers, use of geotextile or silt fencing to contain the spill
    - Excavation and disposal of contaminated material will be immediately carried out following any such incidents
    - Evacuation procedures will be implemented to remove non-essential personnel from the area

- Data gathering and an investigation will commence immediately after the emergency is contained

- If a significant hydrocarbon spillage does occur, the contractor on behalf of the Applicant will have an approved and certified clean-up consultancy available on 24-hour notice to contain and clean-up the spill

- All major spills of this nature will be reported to Roscommon County Council immediately following such instances.

- Flooding of low-lying areas of the Wind Farm Site:

  - Immediately remove all chemicals, fuels and other hazardous substances from low lying areas of the Wind Farm Site

  - Immediately remove plant and equipment from low lying areas

  - Recover materials washed from the Wind Farm Site including sediment and other waste

  - Review and address the potential for excess water entering the Wind Farm Site

  - Review and maintain erosion and sedimentation controls.

- Spills of cementitious material:

  - Cement / concrete contamination incidents will be cleaned up immediately as they arise

  - Spill kits will also be established at key construction areas and they will also be readily available in the cabs of plant and equipment

  - Suitable receptacles for cementitious materials will also be available at the Wind Farm Site.

7.14 HYDRAULIC LOADING DURING THE OPERATION PHASE

The Project will lead to an increase in impermeable surface area through the construction of hard stand areas within the Wind Farm Site. This in turn will have the potential to increase hydraulic loading by surface water runoff. The potential for changes in surface water runoff to arise with resultant negative effects to receiving watercourses downstream have been identified as an effect of imperceptible significance (see EIAR Chapter 11, Jennings O'Donovan, 2026).

It is further noted that design mitigation will be implemented to control and manage surface water runoff generated from the Wind Farm Site footprint so that runoff rates are controlled to greenfield rates. This will be achieved through the implementation of SuDS features as described in Section 3.1.14 Onsite Drainage above.

8 EVALUATION OF MITIGATION MEASURES

The mitigation measures and environmental safeguards outlined above for the construction phase of the Project are taken from established best practice guidelines that have been successfully implemented for a wide range of project-level infrastructural developments. These measures have undergone extensive and rigorous monitoring for their effectiveness at development sites where they have previously been applied to ensure adverse environmental impacts are avoided.

It is further noted that the range of mitigation measures outlined in this NIS and the associated EIAR to avoid impacts to European Site receptors occurring within the zone of influence of the project have been successfully implemented for a range of other wind farm development projects in Ireland.

The results of this monitoring and the proposal of these measures as standard best practice guidelines is based upon their high degree of success in ensuring negative environmental impacts are avoided.

The best practice guidance that have informed the mitigation measures and environmental safeguards proposed in this NIS and that will be adhered to throughout the construction, operation and decommissioning of the Project include:

- The Good Practice Guidance notes proposed by EA/SEPA/EHS:

- GPP 1: Understanding your environmental responsibilities - good environmental practices
- GPP 2: Above ground oil storage tanks
- GPP 3: Use and design of oil separators in surface water drainage systems
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
- GPP 5: Works and maintenance in or near water
- GPP 6: Working at construction and demolition sites
- GPP 7: Safe storage - The safe operation of refuelling facilities
- GPP 8: Safe storage and disposal of used oils
- GPP 13: Vehicle washing and cleaning
- GPP 19: Vehicles: Service and Repair
- GPP20: Dewatering underground ducts and chambers
- GPP 21: Pollution incident response planning
- GPP 22: Dealing with spills
- GPP 26 Safe storage - drums and intermediate bulk containers
- GPP 27: Installation, decommissioning and removal of underground storage tanks
- CIRIA Environmental Good Practice on Site.
- CIRIA Control of Water Pollution from Construction Sites. Technical Guidance C648.
- CIRIA SuDS Manual Technical Guidance C697.
- Development on Unstable Land. Department of Environment (DOE), UK.

9 CONCLUSION

This Natura Impact Statement presents an analysis of the potential for the Project to result in adverse impacts to the Cloonashanville Bog SAC and its qualifying features of interest. An evaluation of the potential impacts that could arise as a result of the Project to these qualifying features of interest and their conservation objectives has been completed. The Project has been

identified as having the potential to result in adverse effects to the relevant qualifying features of interest of the Cloonashanville Bog SAC.

The potential for the Project to result in adverse effects to the qualifying features of interest and undermine the conservation objectives of the Lough Gara SPA and Bellanagare Bog SPA has also been undertaken as part of this Natura Impact Statement. None of the conservation objectives relating to the special conservation interest bird species of these two SPAs have been found to be at risk from adverse effects as a result of the Project. The potential for the Project to result in adverse effects to water quality with downstream effects to the wetland habitat of Lough Gara SPA has been identified. The potential for the Project to result in adverse effects to water quality with downstream to the Annex 2 freshwater species of the River Moy SAC, arising from works at the N17/N5 roundabout widening location has also been identified.

A range of mitigation measures have been prescribed that, once implemented in full, will remove the risk of adverse effects posed by the Project to these qualifying features of interest for the Cloonashanville SAC, the Bellanagare Bog SPA, the Lough Gara SPA, and the River Moy SAC.

Based upon the information provided in this NIS, it is the considered view of the authors of this NIS that it can be concluded by An Coimisiún Pleanála that the Project will not, alone or in-combination with other plans or projects, result in adverse effects to the integrity and conservation status of European Sites in view of their Conservation Objectives and on the basis of best scientific evidence and there is no reasonable scientific doubt as to that conclusion.

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