Planning and Environmental Consultants

Appropriate Assessment Screening Report and Natura Impact Statement

Killoshulan Wind Farm



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1. INTRODUCTION

1.1 Background

MKO has been appointed to provide the information necessary to allow the competent authority to undertake an Article 6(3) Appropriate Assessment of Killoshulan Wind Farm, comprising 10 wind turbines and associated infrastructure in County Kilkenny, including an underground 110 kV grid connection to Ballyragget 110 kV substation.

Screening for Appropriate Assessment is required under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Where it cannot be excluded that a project or plan, either alone or in combination with other projects or plans, would have a significant effect on a European site then same shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives. A brief outline of the Appropriate Assessment process and the various stages associated with it (e.g. Screening for AA compared with undertaking a full AA) is provided in Section 1.4.1. The current project is not directly connected with, or necessary for, the management of any European Site. Consequently, the project has been subject to the Appropriate Assessment Screening process.

This Appropriate Assessment Screening Report has been prepared in accordance with:

- European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021)
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018) Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010)
- Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

The Natura Impact Statement (NIS) provided in Section 5 of this report has been prepared in accordance with:

- European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021)
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018)
- Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010)
- Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

1.2 References to Proposed Project

The Proposed Project will be known as Killoshulan Wind Farm and is referred to in this report as the 'Proposed Project'.

Section 1.1.1 of Chapter 1: Introduction, of the accompanying EIAR, provides a definition of the various project references. This report uses the same references. These project references are defined below;

- Where the 'Proposed Project' is referred to the entirety of the project for the purposes of this report. The Proposed Project is described in detail in Section 2.2 of this report.

- Where the 'Proposed Wind Farm' is referred to, this refers to turbines (Proposed Turbines) and associated foundations and hardstanding areas, including entrances and access roads, underground cabling, permanent meteorological mast, temporary construction compounds, turbine delivery accommodation works, spoil management areas, borrow pit, tree felling, site drainage, operational stage signage, battery energy storage system (BESS), biodiversity enhancement areas and all ancillary works and apparatus. The Proposed Wind Farm is described in detail in Section 2.3 of this report.
- Where the 'Proposed Grid Connection' is referred to, this refers to the Proposed 110kV Substation, all ancillary works and underground 110kV grid connection cabling connecting to the existing Ballyragget 110kV Substation, Co. Kilkenny, and all ancillary works and apparatus. The Proposed Grid Connection is described in detail in Section 2.4 of this report.
    - The 'Proposed 110kV Substation' refers to the new proposed onsite electricity infrastructure proposed within Frankford or Ballykieran townland, Co. Kilkenny comprising 2 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 110kV substation to the national grid.
    - The 'Proposed 110kV Underground Cabling' refers to new proposed 110kV underground electrical cabling connection from the 'Proposed 110kV Substation' to the existing 110kV Ballyragget substation, in the townland of Moatpark, approximately 1km north of Ballyragget, Co. Kilkenny. The underground electrical cabling route measures approximately 12.6km in length, the majority of which is located within the curtilage of the public road network.
- Where the 'Site' is referred to, this relates to the primary study area for this assessment, as delineated by the Proposed Project site in green as shown on Figure 2-1 and encompasses an area of approximately 796 hectares. Where the 'Proposed Wind Farm site' is referred to, this relates the study area without the corridor that encompasses the Proposed 110kV underground cabling route.

This report assesses the same boundary as the accompanying EIAR i.e. the EIAR Site Boundary and takes into account the combined impacts of these individual elements of the Proposed Project.

1.3 Statement of Authority

This report was prepared by Deepali Mooloo (MSc.) and Andrew McCarthy (BSc.) and reviewed by Pádraig Desmond (BSc.) and Caroline Kelly (MSc.). Multidisciplinary walkover surveys were carried out between May and July of 2026 by Deepali Mooloo, Pádraig Desmond and Andrew McCarthy. This is to ensure that the impact assessment presented in this NIS, and the baseline information upon which it depends, is as up to date as possible, robust and accurate. Dedicated aquatic surveys were conducted by Triturus Environmental Ltd. in January 2026, including otter assessment, were completed to inform the assessment. Bat survey scope development and project management was overseen by Aoife Joyce (BSc., MSc.). Bat surveys were undertaken by specialised MKO bat Ecologists. All surveyors have relevant academic qualifications and are competent in undertaking habitat and ecological assessments. Ecological surveys were undertaken in line with TII (2008) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). The survey dates and personnel are set out in Table 1-2 and the relevant technical appendices.

Aquatic surveys were undertaken by Triturus Environmental Ltd. ecologists Ross Macklin (BSc., HDip GIS, Dip IPM, MCIEEM, IFM) and Bill Brazier (BSc., MIFM).

Caroline Kelly

Caroline is a Senior Ecologist with MKO with over ten years' experience in ecological consultancy and is a Full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Caroline holds a BSc in Environmental Biology from University College Dublin (UCD) and an MSc in Applied Ecological Assessment from University College Cork (UCC). In addition, Caroline has completed an Advanced Diploma in Planning and Environmental Law from Kings Inns Dublin. Prior to taking up her position with MKO in June 2025, Caroline worked as a Principal Ecologist with Scott Cawley Ltd. Caroline has strong generalist field ecology skills and has undertaken a range of ecological surveys including habitat, bird (both breeding and wintering), invasive species and protected fauna surveys. She has strong technical reporting skills and has extensive experience in a range of ecological assessments including Appropriate Assessment and Ecological Impact Assessment. She has undertaken ecological assessments and surveys on a variety of project types (e.g. linear infrastructure projects, industrial, commercial, residential, recreational, tourism and renewable energy developments).

Pádraig Desmond

Pádraig is a Project Ecologist with MKO with six years post graduate ecological experience, five years of which have been in ecological consultancy. Pádraig holds a BSc (Hons) in Ecology and Environmental Biology from University College Cork. Pádraig took up his position with MKO in December 2021, prior to which he worked as a Junior Ecologist with Envirico. Through these consultancy roles Pádraig has gained excellent experience in producing ecological reports such as Natura Impact Statements, Ecological Impact Assessments, Biodiversity chapters, Invasive Species Management Plans, and Constraints Reports for a wide range of projects including small private developments to housing developments and renewable energy projects such as solar and wind farms. Prior to the above roles, Pádraig worked as a field ecologist for the Department of Conservation in New Zealand, where he developed a strong field-based skill set. Pádraig's key strengths and areas of expertise are in terrestrial ecology, including vegetation surveys, habitat identification, invasive species surveys, mammal surveys, Appropriate Assessment and Ecological Impact Assessment. Pádraig is also skilled in GIS.

Andrew McCarthy

Andrew McCarthy is a Practitioner ecologist with MKO with over 1 year' experience with the company as well as being an ecology intern during the summer of 2024. Andrew holds BA (Hons) in Ecology and Environmental Biology. Prior to taking up his position with MKO in September 2025, Andrew worked as an education officer in Fota Wildlife Park during the summer of 2023.Andrew's key strengths and areas of expertise are in bird identification and general ecology. Since joining MKO Andrew has been involved in a significant range of projects such as rhododendron mapping in killarney national park, , e-DNA surveys for white clawed cray fish and freshwater pearl mussel, kick sampling, multidisciplinary site walkovers, botanical surveys, mammal surveys and a wide range of bat and bird surveys.

Deepali Mooloo

Deepali Mooloo is an Ecologist at MKO, having joined the company in 2023 and is a Full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). She holds an M.Sc. (Hons) in Applied Coastal and Marine Management from University College Cork, where she specialized in spatial ecology, field skills, and drone photogrammetry. Deepali's expertise lies in ecology and field surveys, with experience in a range of multidisciplinary assessments. Since joining MKO, she has conducted walkover surveys, marsh fritillary surveys, mammal surveys, winter bird surveys, and botanical surveys, including detailed relevés of plant species in both coastal and terrestrial habitats. She is also skilled in habitat assessments, utilizing Fossitt's Guide to Habitats in Ireland and the ERICA database. Her professional experience includes preparing Appropriate Assessment Screening Reports (AASR), Feasibility Studies, Ecological Impact Assessments (EcIA), and Natura Impact Statements

(NIS). She is proficient in detailed habitat and ecological constraints mapping using QGIS and has expertise in cartography using both QGIS and ArcGIS. In 2024, Deepali successfully completed the Marine Mammal Observer Course with IDWG. She also has prior experience working in coastal and marine environments in Mauritius.

Ross Macklin

Ross Macklin BSc (Hons) Applied Ecology HDip GIS Dip IPM MCIEEM IFM is an environmental scientist specialising in freshwater and fisheries ecology. He studied a bachelor's degree in applied Ecology at UCC and later completed a higher diploma in Geographical Information Systems at UCC and a diploma in Integrated Pest Management at UCD. He is currently completing his PhD at UCC in fisheries ecology. Ross has an in-depth knowledge of all freshwater ecosystems and riparian corridors. He has undertaken river habitat, lake habitat, canal habitat and fisheries assessments in professional work for 20 years. His specialist freshwater experience lies in biological and physicochemical water quality analysis, fisheries ecology, riparian habitat assessments, habitat mapping, protected species, mammal surveys, geographical information systems, ecological design and invasive species. Ross has expert experience in identifying and assessing macrophyte plant, aquatic bryophytes, fish and macroinvertebrates from a variety of aquatic habitats. He routinely undertakes fisheries assessments, protected species surveys, invasive species surveys, river hydromorphology surveys, surface water management plans, CEMP, EcIA , EIAR and NIS reporting. He holds full national licences for freshwater pearl mussel (*Margaritifera margaritifera*), white-clawed crayfish (*Austropotamobius pallipes*) and amphibians inclusive of an open photography licence for numerous protected species. He has held over 300 section 14 licences for fisheries surveys spanning the breadth of Ireland.

Bill Brazier

Bill Brazier BSc (Hons)Applied Freshwater & Marine Biology, MIFM) is an aquatic, fisheries and mammalian ecologist with over 14 year's professional experience in Ireland. He is a senior ecologist at Triturus Environmental Ltd. and is completing a PhD in fish genetics at UCC. He has extensive experience in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as the areas of renewable energy developments, flood relief schemes, road schemes, invasive species management blueways/greenways, biodiversity projects and non-volant mammal monitoring. He specialises in aquatic ecology and fisheries ecology, inclusive of fisheries assessments, macrophytes, water quality, otter, freshwater pearl mussel, white-clawed crayfish and amphibians, holding full national licences for all of these species. Bill is one of Ireland's most experienced fisheries scientists having held over 250 Section 14 authorisation licences for fisheries related work.

Aoife Joyce

Aoife Joyce is a Project Director (Ecology) with 6 years' professional experience in ecological assessments and has completed CIEEM and BCI courses in Bat Impacts and Mitigation, Bat Tree Roost Identification and Endoscope training, Bat ID, Trapping and Handling and Kaleidoscope Pro Analysis. She is a graduate of Environmental Science (Hons.) at University of Galway, complemented by a first-class honours MSc in Agribioscience. Prior to taking up her position with MKO in 2019, Aoife held previous posts with Inland Fisheries Ireland and Treemetrics Ltd. She has a wide range of experience from bat roost identification, acoustic sampling, sound analysis, electrofishing, mammal and habitat surveying to GIS, soil and water sampling, Waste Acceptability Criteria testing, Environmental Impact Assessments (EIAs) and mapping techniques. Since joining MKO, Aoife has been involved in managing bat survey requirements for a variety of renewables planning applications, as well as commercial, residential and infrastructure projects. This includes scope development, project coordination, roost assessments, remote bat detector deployment, dawn and dusk bat detection surveys, bat handling, sonogram analyses, mapping, impact assessment, mitigation design inputs and report writing. Within MKO, she oversees the bat team and works as part of a wider multidisciplinary team to help in the production of ecological reports and assessments. Aoife is a Full member of the Chartered

Institute of Ecology and Environmental Management, a member of Bat Conservation Ireland and holds current Bat Roost Disturbance and bat photography licenses.

1.4 Methodology

1.4.1 Appropriate Assessment Process

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

There is no necessity to establish such an effect; it is merely necessary for the competent authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of Appropriate Assessment has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded. The threshold at this first stage is a very low one and operates as a trigger in order to determine whether Appropriate Assessment of a project is required. Therefore, where significant effects are likely, uncertain or unknown at screening stage, an AA of the project will be required.

Appropriate Assessment - This stage of the process is a focused and detailed examination, analysis and evaluation by the competent authority of the implications of the plan or project, either alone or in combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. Case law has established that such an Appropriate Assessment, to be lawfully conducted, must:

i. identify, in the light of the best scientific knowledge in the field, all aspects of the proposed project which may, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
ii. contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
iii. may only include a determination that the proposed 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 potential adverse 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 (assessment of alternative) and, if necessary, stage four (IROPI[1]).

1.4.2 Desk Study

The desk study undertaken for this assessment included a thorough review of the available ecological data associated with the European sites within the Likely Zone of Influence of the Proposed Project location. Sources of data included the following:

- Review of NPWS Conservation Objectives supporting documents, site synopsis, standard data forms and supporting documents for European Designated sites,
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA)[2],
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper[3],

[1] *IROPI - 'imperative reasons of overriding public interest', the test found in Article 6(4) of the Habitats Directive.*
[2] https://gis.epa.ie/EPAMaps/ *Accessed 10th of September 2026*
[3] https://maps.biodiversityireland.ie/Map *Accessed 10th of September 2026*

- Review of NPWS Article 17 metadata and GIS database[4]

1.4.3 Scoping and Consultation

MKO undertook a scoping exercise in January 2022 & May 2026 during preparation of this assessment.

Table 1-1 provides a list of the organisations consulted that raised points relating to biodiversity during the scoping process, and notes where scoping responses were received. In addition, MKO requested consultation with the National Parks and Wildlife Services (NPWS) to discuss the Proposed Project and to welcome any feedback they may have. This meeting was held online on the 09th of June 2026, where MKO presented an overview of the project to NPWS representatives, the surveys undertaken and the key findings, as well as European sites which are being considered in this report.

The key points of feedback relating to biodiversity are summarised below.

- **Concern:** NPWS highlighted the need for detailed botanical assessments within correct surveys season, and to classify habitats to IVC classifications to allows a more granular assessment.

  Response: Detailed relevés of habitats within the EIAR Site Boundary were undertaken and analysed using ERICA - Engine for Relevés to Irish Communities Assignment, which assigns vegetation data to communities defined by the Irish Vegetation Classification (IVC). Further detail in Appendix 6-1 of the accompanying EIAR.

- **Concern:** NPWS noted that mitigations from Atkinson *et al.* (2024) should be included should freshwater pearl mussel be downstream of the Proposed Project.

  Response: However, eDNA surveys showed no indication of downstream FWPM (see **Appendix 1**) and therefore, this added mitigation was not necessary to the assessment.

- **Concern:** NPWS highlighted the Loughans SAC which is a turlough southwest of the Proposed Wind Farm site. The NPWS said the Hydrology chapter alongside the NIS & Biodiversity chapter within the EIAR should show no significant impacts on the turlough or groundwater receptors.

  Response: Potential connectivity to this SAC was considered in Chapter 9: Hydrology & Hydrogeology of the accompanying EIAR. As discussed in Section 3.1.3 of this report, there is no surface water or groundwater connectivity to this SAC.

- **Concern:** The NPWS advised that a detailed hedgerow appraisal be carried out to identify ecological importance of each section. The purpose of this assessment is a more granular survey of the habitat by distinguishing higher importance sections (e.g., townland boundaries) with lower importance sections.

  Response: Detailed hedgerow appraisals were undertaken within the EIAR Site Boundary and are detailed in Appendix 6-1 of the accompanying EIAR.

Table 1-1 Organisations consulted with regard to biodiversity.

Consultee	Scoping Response Date	Scoping Response	Addressed in
An Taisce	None received.	No response	N/A

[4] https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17-gis-and-metadata-downloads *Accessed 10th of September 2026*

Consultee	Scoping Response Date	Scoping Response	Addressed in
Bat Conservation Ireland	None received	No response	N/A
BirdWatch Ireland	None received	No response	N/A
Department of Agriculture, Food and the Marine	27/09/2022 & 14/05/2026	Where felling of forestry is required, a felling licence will be required.	The tree felling activities required as part of the Proposed Project will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014, the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the wind farm be submitted with the felling licence applications; therefore, the felling licenses cannot be applied for until such time as planning permission is obtained for the Proposed Project.
Department of Communications, Climate Action and the Environment	07/11/2022 & 15/06/2026	Not applicable to Ecology	N/A
Department of Housing, Local Government and Heritage	23/09/2022 & 12/05/2026	Stated that the DAU represents the Department of Housing, Local Government and Heritage, coordinating responses/submission from National Parks and Wildlife Service, National Monuments Service, Underwater Archaeology Unit and Architectural Heritage. No further response.	NPWS also consulted, as discussed below
National Parks and Wildlife Service	12/05/2026	States that the DAU has forwarded the information to NPWS to review. No further response.	N/A
Environmental Protection Agency	None received	No response	N/A
Inland Fisheries Ireland (SouthEast)	30/09/2022	Stated that the project is located in the Nore catchment, within the area of three surface water bodies; Gorteenahilla_010, Nuenna_010 and Nuenna_020, all within the Barrow-Nore SAC. States that all bodies are at risk and have Poor, and Moderate WFD Status respectively. There should be no deterioration to ecological status and all surface water bodies that are determined to	Chapter 9: Hydrology & Section 6.5 of Chapter 6: Biodiversity

Consultee	Scoping Response Date	Scoping Response	Addressed in
		be less than good must be restored to at least good status. Stated that a comprehensive aquatic habitat map should be created and assessed, especially considering the Atlantic salmon and lamprey species. Stated instream works must only occur between 1 July and 30 September. Request that new water crossings be minimised and altered crossings must be upgraded. Stated Sustainable Drainage Systems (SuDS) ptinciples must be implemented. Recommends the inclusion of a CEMP, Emergency Response Plan (EMP) and a Surface Water Management Plan (SWMP).	
Irish Peatland Conservation Council	No response	No response	N/A
Irish Red Grouse Association - Conservation Trust	No response	No response	N/A
Irish Wildlife Trust	No response	No response	N/A
Kilkenny County Council	17/11/2022 & 07/07/2026	Includes a report that consists of responses from Transport Infrastructure Ireland, Irish Aviation Authority and Irish Water and the Kilkenny County Council Planning, Roads and Environment divisions.	N/A
The Heritage Council	No response	No response	N/A

1.4.4 Ecological Survey Methodologies

The following sections describe the methodologies followed to establish the baseline ecological condition of the Site and surrounding area.

A comprehensive survey effort of the biodiversity within the Site was undertaken to inform this assessment. Survey findings are provided in Section 3.2. The following sections fully describe the ecological surveys pertinent to this report that have been undertaken and provide details of the methodologies and guidance followed. Surveys were carried out on various dates in 2026. These are summarised in Table 1-2 below.

Table 1-2 Summary of surveys undertaken.

Survey Type	Dates
Multi-disciplinary walkover (incl. habitats)	26th, 27th and 28th of May 2026 14th and 17th of July 2026 7th of August 2026

Survey Type	Dates
Mammal survey	27th of May 2026 30th of July 2026
Aquatic surveys (including otter)	January 2026 (see **Appendix 1**)
Grid Connection and Turbine Delivery route	30th of July 2026 7th of August 2026

1.3.2.1 Ecological Multidisciplinary Walkover Surveys

Multi-disciplinary ecological walkover surveys were undertaken in May, July and August 2026 in accordance with the TII Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (TII, 2008). These surveys provided baseline data on the ecology of the Site and assessed whether further, more detailed, habitat or species-specific ecological surveys were required. The multi-disciplinary ecological walkover survey comprehensively covered the entire Proposed Project site.

Habitats were classified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Habitat mapping was undertaken in compliance with guidance set out in 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011). Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2019).

The walkover surveys were designed to detect any protected habitats or species, including any suitable habitat for protected species, that may occur in the vicinity of the Proposed Project. Incidental sighting/ observations of birds and additional fauna were noted during the survey.

1.4.4.1 Otter Survey

As part of the multidisciplinary walkover survey, a search for indications of otter was carried out within the Proposed Wind Farm. This search was conducted in order to determine the presence or absence of otter within the Site. This involved a search for all potential indications of otter, as per TII (2006) (spraint, tracks, couches, holts). The otter survey was conducted as per TII Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (TII, 2008). Following the results of the multidisciplinary surveys, no requirement for further, more detailed surveys for otter was identified.

In addition, targeted otter surveys were carried out by Triturus Environmental Ltd within the Site and along the Proposed 110kV Underground Cabling route (see Aquatic Baseline Report, **Appendix 1**).

1.4.4.2 Aquatic Surveys

Dedicated aquatic baseline surveys were undertaken by Triturus Environmental. The baseline assessment focused on aquatic ecology including fisheries and biological water quality, as well as protected aquatic species and habitats in the vicinity of the Proposed Wind Farm. Undertaken on a catchment-wide scale, the baseline surveys focused on the detection of freshwater habitats and species of high conservation value. These included surveys for white-clawed crayfish (*Austropotamobius pallipes*), freshwater pearl mussel (*Margaritifera margaritifera*) (eDNA only), macro-invertebrates (biological water quality) and fish species, inclusive of supporting nursery and spawning habitat. The surveys also documented macrophyte and aquatic bryophyte communities including Annex I habitat associations in the vicinity of the project. This holistic approach informed the overall aquatic ecological evaluation of each site in context of the Proposed Project and ensured that any habitats and species of high conservation value would be detected.

All surveys locations for the above are indicated in Plate 6-1.

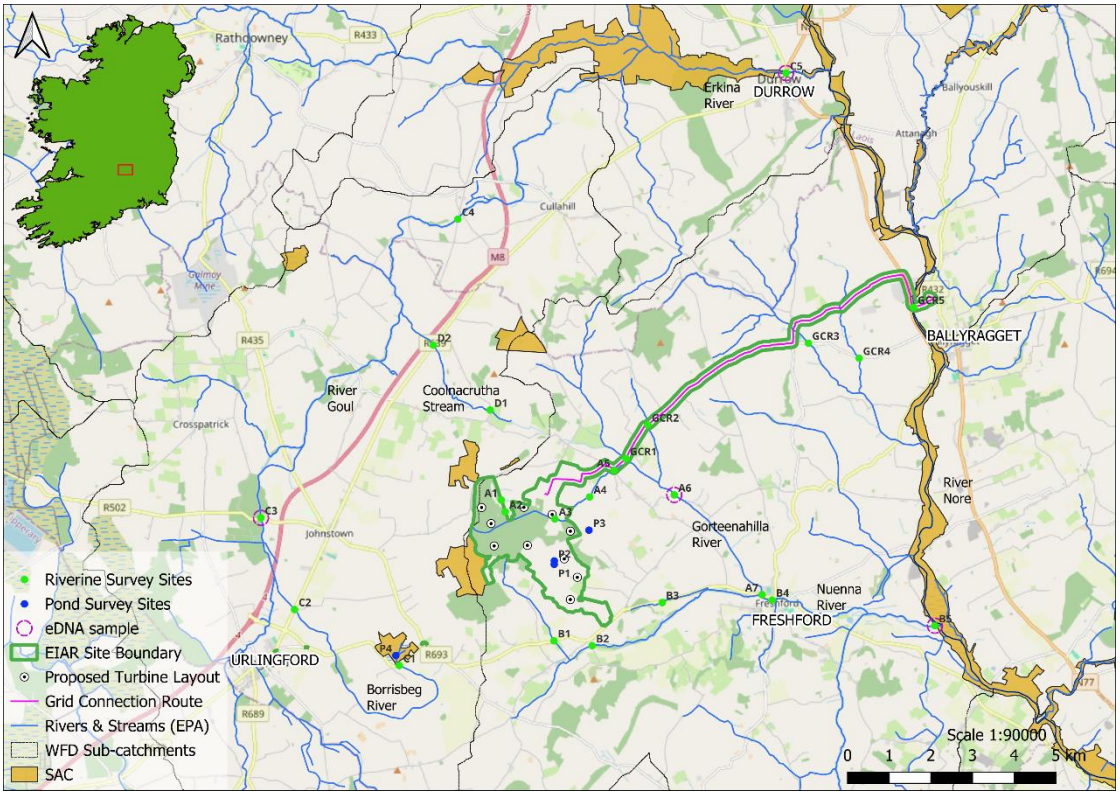


Plate 1-1 Aquatic survey locations

Full details of the methodology followed for the aquatic surveys as well as details of the locations of survey sites are provided in the Aquatic Baseline Report in **Appendix 1**.

1.4.4.3 Invasive Species Survey

During the multidisciplinary walkover surveys, a search for non-native invasive species was undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) and the First Schedule of the European Union (Invasive Alien Species) Regulations 2024 (S.I. No 374 of 2024). Where present, the extent and location of infestations was recorded, along with photographs.

1.4.4.4 Bird Surveys

Dedicated bird surveys were undertaken during the survey period October 2020 – September 2022, and October 2025 to August 2026, consisting of three breeding seasons (April – September) and three winter seasons (October – March). Note that the period October 2020 – September 2021 is surpassing five years, while October 2021 – September 2022 and October 2025 to August 2026 remain within the five-year period of relevance.

Full details of all bird surveys undertaken within the Proposed Wind Farm are provided in Chapter 7: Birds of the accompanying EIAR and those pertinent to this NIS are summarised below.

Based on the results of the desk study, consultation and reconnaissance site visits described in Sections 7.2.1 to 7.2.3 of Chapter 7: Birds, of the accompanying EIAR, the assemblage of bird species within the Proposed Wind Farm and the likely importance of the Proposed Wind Farm for these species were ascertained. Then, adopting a precautionary approach, a site-specific scope for ornithological surveys was devised. The data collected in the field surveys is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the Proposed Wind Farm.

Field surveys were undertaken during the survey period October 2020 – September 2022, and October 2025 to August 2026, consisting of three breeding seasons (April – September) and three winter seasons (October – March) forms the core dataset for the assessment of impacts on ornithology. In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with the guidance document 'Recommended bird survey methods to inform impact assessment of onshore wind farms' (SNH, 2017). The various ornithological surveys undertaken at the Proposed Wind Farm and hinterland are described in detail below.

1.4.4.4.1 Methodology

Vantage Point Surveys

Vantage point surveys were undertaken in accordance with SNH (2017) to monitor flight activity within the Proposed Wind Farm and to a 500m radius of the proposed turbine locations. Surveys were conducted from five fixed point vantage points with comprehensive coverage of the Proposed Wind Farm. The vantage point locations were selected by undertaking a viewshed analysis (described below) and confirmed by a reconnaissance visit and initial field surveys to ensure that the proposed turbine layout was entirely covered.

Viewsheds were calculated using the Visibility Analysis plugin (Version 1.8) over a raster digital elevation model (DEM) in QGIS (Version 3.28). Note that while the relevance of being able to view as much of the Proposed Wind Farm to ground level is acknowledged, the NatureScot guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds. Therefore, the viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view using the fewest possible number of vantage points. As no specific turbine model was confirmed at the outset of surveys, the viewsheds were based on a notional layer suspended 22m above the ground. The vantage point locations were tested for visibility coverage by creating a point 1.75m in height (to represent the height of the surveyor) on a map using 10m contours terrain data. The relative height of any surrounding landscape features (e.g. trees) and their effects on visibility was also accounted for in the analysis. The software produced 360° viewsheds 22m above ground level up to a 2km radius around the vantage points. These viewsheds were then cropped to a 180° arc representing the area visible to the surveyor.

Survey methodology followed SNH (2017). The surveyor collected data on bird observations and flight activity from the scanning arc of 180° to a 2km radius at the fixed vantage point locations for two 3-hour watches separated by a minimum 30-minute break (i.e., 6 hours total) per month. Surveys were conducted every month of the survey period and were scheduled to provide a minimum of 36 hours per winter or breeding season and spread over the full daylight period, including dawn and dusk watches, to coincide with the highest periods of bird activity (Table 1-3).

Table 1-3 Vantage point survey watch duration.

Survey Season and Number of Vantage Points	Effort per Vantage Point
Winter Season 2020/2021 (5 vantage points)	36 hours per vantage point
Breeding Season 2021 (5 vantage points)	36 hours per vantage point; 36 hours 10 minutes at VP4
Winter Season 2021/2022 (5 vantage points)	36 hours per vantage point
Breeding Season 2022 (5 vantage points)	36 hours per vantage point
Winter Season 2025/2026 (5 vantage points)	36 hours per vantage point

Breeding Season 2026 (4 vantage points)	36 hours per vantage point

Flight activity of target species was mapped and recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models for the Site. Bands were split into 0-15m, 15-25m, 25-200m and >200m. All flight activity within a height band 15-25m and 25-200m is considered to be within the Potential Collision Height (PCH) with regard to the turbine swept area. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat. Survey effort is presented in **Appendix 2**, including full details of dates, times and weather conditions for each survey.

Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine possible, probable or confirmed breeding bird activity within the Proposed Wind Farm and to a 500m radius. The methodology was based on Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021) for dense habitat. Transect routes were walked across different habitat complexes within the survey area, where access allowed. Using binoculars, the surveyor regularly scanned the surroundings of each transect for target species. All target species were mapped and breeding status was assigned following British Trust for Ornithology (BTO) breeding status codes (https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence). In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Breeding walkover surveys were conducted in daylight over four visits during the core breeding season months April to July. Survey effort is presented in **Appendix 2**, including full details of dates, times and weather conditions for each survey.

Breeding Raptor Surveys

Raptors include all harrier, falcon, buzzard, eagle, hawk, owl, kite and osprey species. Breeding raptor surveys were undertaken within 2km of the Ornithology Study Area to identify occupied territories and monitor their breeding success near or within the Ornithology Study Area. Survey methodology followed Hardey *et al.* (2013). Each breeding raptor location was surveyed once per month during the core breeding season between April and July.

Breeding raptor watches of 3 hours (supplemented by transects if necessary) were conducted during daylight at eight breeding raptor locations (BR1, BR2, BR2a, BR3, BR3b, BR4, BR5, and BR6b). All raptor species observed were recorded and mapped and breeding status was assigned following BTO breeding status codes. Surveyors did not approach nest sites to avoid disturbance.

Survey effort is presented in **Appendix 2**, including full details of dates, times and weather conditions for each survey.

Winter Walkover Surveys

Winter walkover surveys were undertaken to record the presence of bird species within the Proposed Wind Farm to a 500m radius, including areas between vantage point locations. The methodology follows described in Bibby *et al.* (2000) and Gilbert *et al.* (1998), combined with Common Bird Census methods (British Trust for Ornithology, 2021). Transect routes were walked across different habitat complexes within the survey area where access allowed. All target species were recorded and mapped. In addition, the presence of any non-target species was recorded to inform the evaluation of supporting habitat.

Winter walkover surveys were conducted in daylight hours over four visits between October and March (i.e., four visits in winter 2021/2022 and four visits in winter 2025/2026). Survey effort is presented in **Appendix 2**, including full details of dates, times and weather conditions for each survey.

Hen Harrier Roost Surveys

Hen harrier roost surveys were undertaken within 2km of the Ornithology Study Area. These surveys aimed to identify active winter hen harrier roosts near or within the Ornithology Study Area. Survey methodology followed Gilbert *et al.* (1998) and O'Donoghue (2019). Each hen harrier vantage point was surveyed once per month during the winter season between October and March inclusive (in winters 2020/2021, 2021/2022 and 2025/2026).

Roost watches of 2-3 hours were conducted at four hen harrier vantage point locations from dusk until last visible light. Surveys were initially conducted at four locations (HHVP1, HHVP2, HHVP3a and HHVP4). Due to low suitability of roosting habitat at HHVP3a, this survey location was moved to HHVP3b in November 2020 and HHVP3 in December 2020, where it remained for the rest of the surveys. All hen harrier observations were recorded and mapped.

Breeding Kingfisher Survey

Breeding kingfisher surveys were undertaken to identify breeding kingfisher territories within the survey area by locating kingfishers or signs of nesting along river courses. The area surveyed was the Proposed 110kV Underground Cabling route at the River Nore crossing near Ballyragget to a 500m radius. Survey methodology followed Cummins *et al.* (2010): the surveyor walked along the river course with suitable breeding habitat searching for kingfisher, nest holes or suitable nesting banks during daylight hours. All such observations were recorded and mapped. This section of the river course was surveyed once per month during the breeding season in June and July 2026.

1.4.4.5 Other Fauna

Whilst additional targeted surveys for bats (Annex II), bird and mammal species, and habitat assessments were carried out to inform Chapter 6: Biodiversity within the EIAR, these were intended to provide a baseline for non-SAC/SPA populations/receptors and therefore, are not pertinent to this NIS.

1.5 Structure and Format of this Document

The structure and format of this NIS is set out below:

- **Section 1** provides an introduction, background information, methodology and statement of authority for the AASR and NIS.
- **Section 2** provides a full description of all elements of the Proposed Project.
- In **Section 3**, the characteristics of the receiving environment are fully described.
- In **Section 4**, a Stage 1 Appropriate Assessment Screening is undertaken to identify any European sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the Proposed Project.
- **Section 5** provides a detailed consideration of the European sites determined to be located within the Likely Zone of Influence and identifies the relevant qualifying features and how they may be affected in light of their conservation objectives.
- **Section 6** provides an assessment of the potential for adverse effects on the identified European sites as a result of the Proposed Project and in the absence of mitigation. This section also prescribes mitigation to robustly block any identified pathways for impact for effect.
- **Section 7** provides an assessment of residual effects taking into consideration the proposed mitigation.
- In **Section 8**, the potential in-combination effects of the Proposed Project on European sites, when considered in combination with other plans and projects, is assessed.
- A concluding statement is provided in **Section 9**.

2. DESCRIPTION OF PROPOSED PROJECT

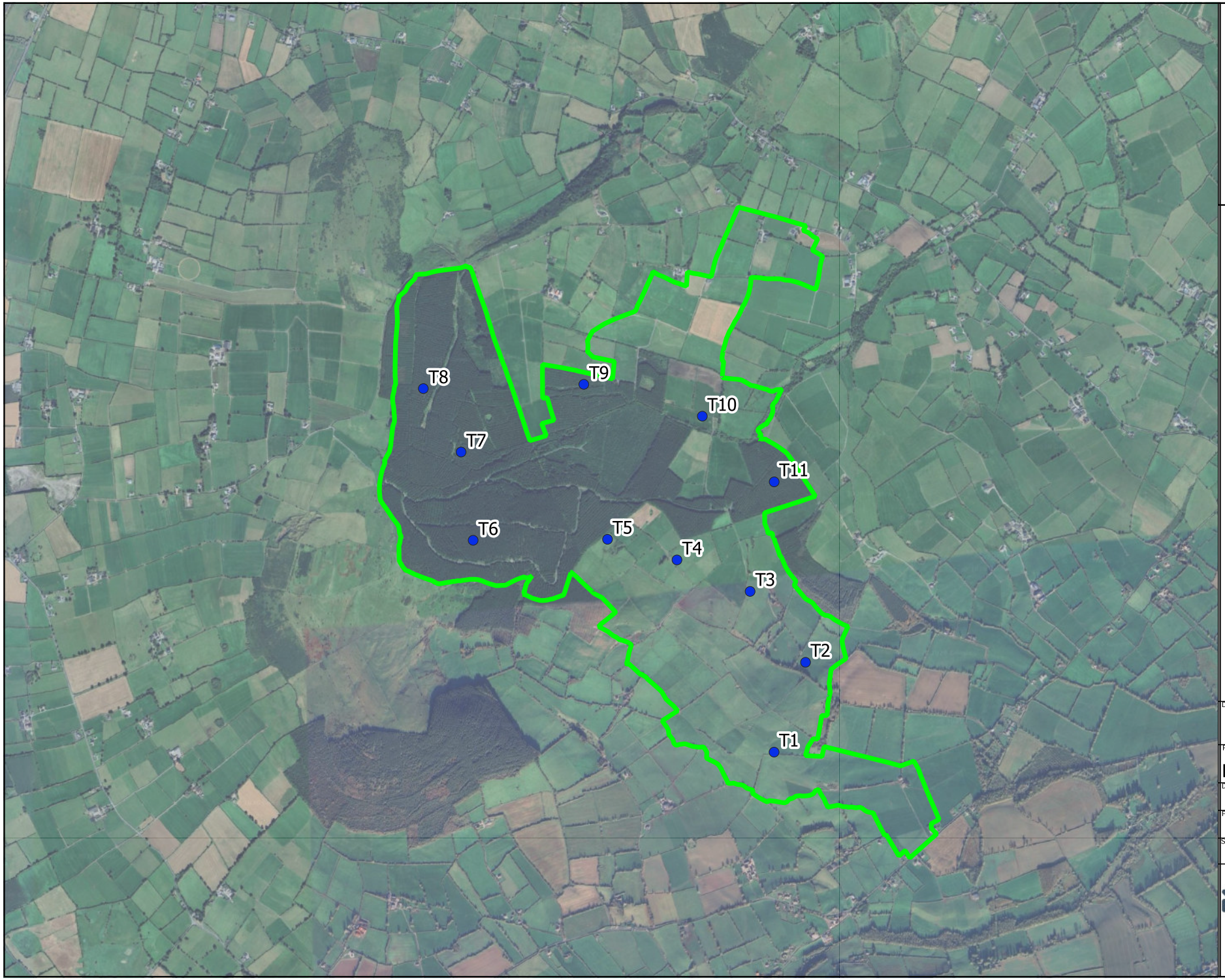
2.1 Site Location

The Proposed Wind Farm site is located in north County Kilkenny, in the vicinity of Freshford and east of Urlingford. The Site is mainly composed of commercial forestry and agricultural land. The location of the Proposed Wind Farm, the Proposed 110kV Underground Cabling route and the turbine delivery accommodation works is shown on Figure 2-1.

The Proposed 110kV Underground Cabling route comprises approximately 12.6km of underground 110kV electrical cabling between the Proposed 110kV Substation and the existing Ballyragget 110kV substation in the townland of Moatpark, County Kilkenny. The route is located principally within the public road corridor, with sections along farm tracks and agricultural land.

Temporary accommodation works will be required along the public road network to facilitate turbine component delivery. These works include a temporary access point onto the R693 Regional Road and accommodation works in the townlands of Urlingford, Mountfinn, Balief Lower, Balief Upper, County Kilkenny.

Land use within the Proposed Wind Farm is dominated by commercial forestry and agriculture. The Proposed 110kV Underground Cabling route follows existing roads, farm tracks and agricultural land. The turbine delivery route is predominantly within the existing public road network.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations

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N

Drawing Title

Site Location

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
ER	EM
Project No.	Drawing No.
260172	Figure 2-1
Scale	Date
1:30,000	02.04.2026

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2.2 Development Components of the Proposed Project

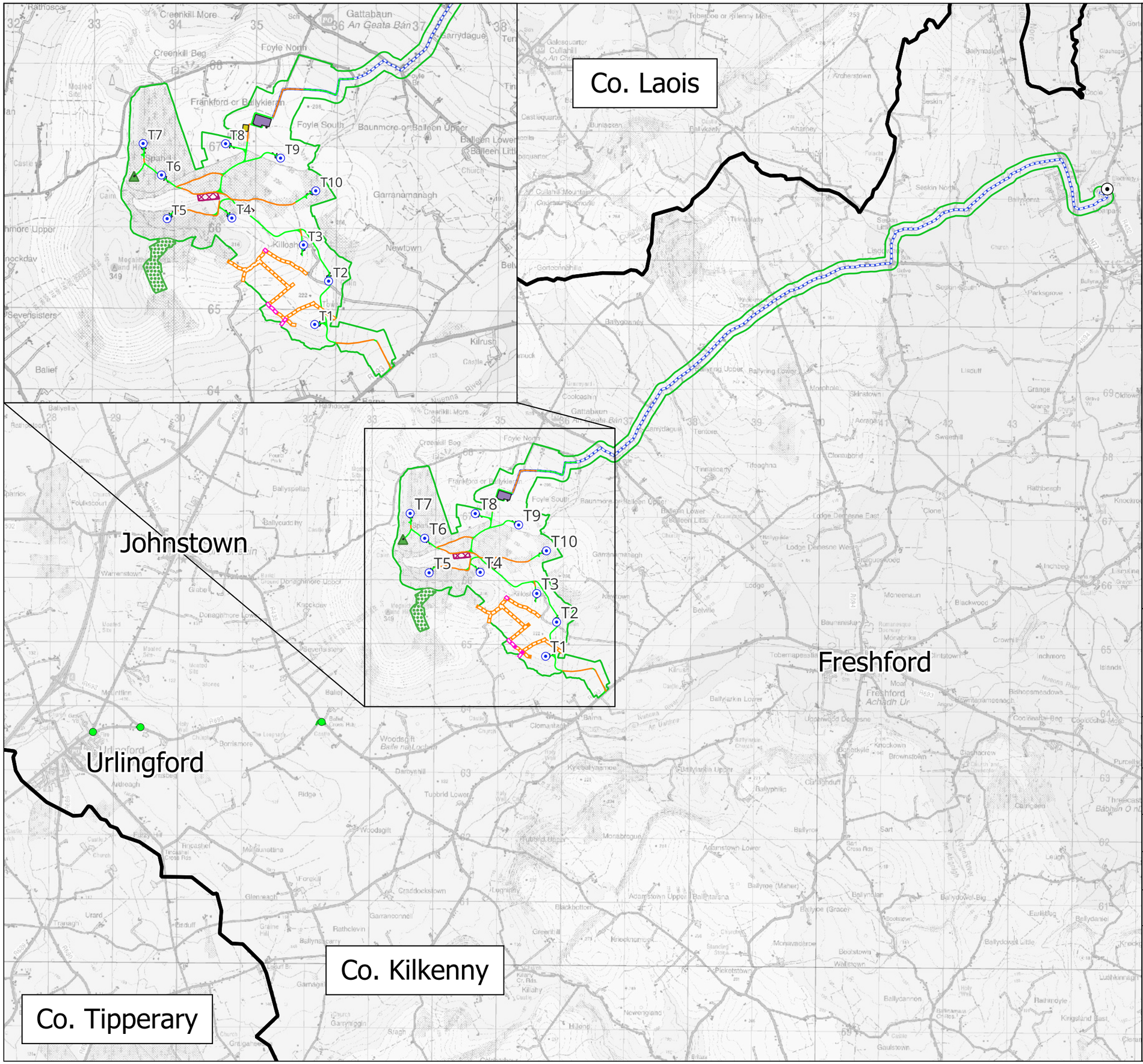
The Proposed Wind Farm will consist of the following:

i. *The construction of 10 no. wind turbines with an overall turbine tip height of 185 metres; a rotor blade diameter of 163 metres; and hub height of 103.5 metres, and a meteorological mast of 103.5m in height 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;*
ii. *Turbine and meteorological mast foundations, hard-standing and assembly areas;*
iii. *A 110kV substation compound (2 no. control buildings with welfare facilities, all associated electrical plant and equipment, security fencing, access gates, all associated underground cabling, wastewater holding tanks, rainwater holding tanks, site drainage and all ancillary works);*
iv. *Underground internal wind farm electrical cabling and communications cabling connecting the wind turbines to the proposed on-site 110kV electrical substation and associated ancillary works;*
v. *All works associated with the upgrade of the existing agricultural access off the R693 Regional Road (including the installation of fencing and steel gates) to serve as the main site entrance for the wind farm;*
vi. *The provision of 1 no. new access/egress point along the R693 Regional Road;*
vii. *The provision of 1 no temporary access/egress point along the L1805;*
viii. *Upgrade of existing tracks/roads and junctions and provision of new site access roads and junctions;*
ix. *2 no. temporary construction compounds with temporary offices and staff welfare facilities;*
x. *Accommodation works along the public road network in the townlands of Urlingford, Mountfinn, Balief Lower, Balief Upper, and Barna Co. Kilkenny to facilitate the delivery of turbine components and other abnormal loads;*
xi. *1 no. Borrow Pit;*
xii. *Spoil Management;*
xiii. *Site Drainage;*
xiv. *Tree Felling and hedgerow removal;*
xv. *Biodiversity Management and Enhancement Measures;*
xvi. *Operational stage site signage;*
xvii. *Battery Energy Storage System (BESS) and all associated electrical plant and equipment, security fencing, 2 no. static water storage tanks and a firewater retention tank, and all associated infrastructure and apparatus;*
xviii. *The provision of approximately 12km of underground electrical (110kV) and communications cabling from the proposed on-site 110kV electrical substation to the western boundary of the River Nore to facilitate a future connection to the national grid via the existing Ballyragget 110kV electrical substation;*
xix. *Provision of 17 no. joint bays, communication chambers and earth sheath links along the proposed underground electrical cabling route;*
xx. *Reinstatement of land, road and track surface above the proposed cabling trench; and*
xxi. *All related site works and ancillary development considered necessary to facilitate the proposed development, including landscaping and the reinstatement of land.*

The application is seeking a ten-year planning permission for development and a 35-year operational life from the date of commissioning of the entire wind farm.

All elements of the Proposed Project are provided in the list above, and described below, have been assessed as part of this report.

The full range of turbine options and dimensions of the Proposed Project have been assessed as part of this report. The layout of the Proposed Wind Farm is provided in Figure 2-2a and Figure 2-2b. Detailed site layout drawings of the Proposed Project are included in **Appendix 3** of this report.



Map Legend

- EIAR Site Boundary
- County Boundary
- Proposed Turbine
- Proposed Turbine Foundation
- Proposed Turbine Hardstanding
- Proposed New Roads
- Existing Roads to be Upgraded
- Proposed Borrow Pit
- Proposed Construction Compounds
- Proposed Spoil Management Area
- Proposed Met Mast Foundation
- Proposed Killoshulan Met Mast
- Proposed On-site 110kV Substation & BESS
- Proposed Grid Connection Route
- Ballyragget 110kV Substation
- Proposed Biodiversity Enhancement (Grassland)
- Proposed Hedgerow Bolstering
- Proposed New Hedgerows
- Proposed TDR Accom Areas

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Drawing Title

Proposed Project Layout (A)

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
EC	JF
Project No.	Drawing No.
260172	Figure 2-2a
Scale	Date
1:95,000	2026-10-08

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Map Legend

- EIAR Site Boundary
- County Boundary
- Proposed Turbine
- Proposed Turbine Foundation
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- Proposed Biodiversity Enhancement (Grassland)
- Proposed Hedgerow Bolstering
- Proposed New Hedgerows

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Drawing Title

Proposed Project Layout (B)

Project Title

Killoshulan Wind Farm

Drawn By	Checked By
EC	JF
Project No.	**Drawing No.**
260172	Figure 2-2b
Scale	**Date**
1:30,000	2026-10-08

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2.3 Detail of the Proposed Wind Farm

The following sections will describe each of the development components of the Proposed Wind Farm within this planning application in further detail, in the following order:

- *Wind Turbines*
- *Site Roads*
- *Site Underground Electrical and Communications Cabling*
- *Meteorological Mast*
- *Temporary Construction Compounds*
- *Watercourse/culvert crossings*
- *Biodiversity Enhancement and Management Plan*
- *Tree Felling*
- *Borrow Pit*
- *Spoil management*
- *Battery storage*

Detailed site layout drawings of the Proposed Project are included in **Appendix 3** of this report.

2.3.1 Wind Turbines

2.3.1.1 Turbine Locations

The Proposed Wind Farm turbine layout has been verified using industry standard wind farm design software and WindPro [Computational Fluid Dynamics and WindFarmer]) to maximise the energy yield from the Project Site, while maintaining sufficient distances between the Proposed Turbines to ensure turbulence and wake effects do not compromise turbine performance and to maintain the minimum setbacks from neighbouring properties as set out in the '*Wind Energy Development Guidelines for Planning Authorities'* (DoEHLG, 2006) (hereafter referred to as the 'Guidelines' (DoEHLG, 2006)) and the Draft Wind Energy Development Guidelines (December 2019) (hereafter referred to as the 'Draft 2019 Guidelines (DoHPLG, 2019)). The Grid Reference coordinates of the proposed turbine locations are listed in Table 2-1 below.

The final finished top of foundation level of the turbine foundations will be determined by the actual ground conditions at each proposed turbine location and may differ slightly from those levels listed in Table 2-1. Also, in accordance with the "Guidelines' (DoEHLG, 2006) micro-siting of the turbine positions may be required within the criteria set out in the guidelines.

Table 2-1 Proposed Wind Turbine Locations and Elevations

Turbine	ITM Coordinates		Existing Elevation (m OD)
	X (ITM)	Y (ITM)	
T1	635685	664858	204.5
T2	635853	665392	195
T3	635539	665835	240.5
T4	634654	666159	290.5

T5	633855	666146	317
T6	633782	666683	267.5
T7	633553	667069	298
T8	634570	667074	230.5
T9	635249	666901	222.5
T10	635686	666502	229.5

2.3.1.2 Turbine Type

Wind turbines use the energy from the wind to generate electricity. A wind turbine consists of four main components:

- Foundation unit
- Tower
- Nacelle (turbine housing)
- Rotor

The proposed wind turbines to be installed on the Site will have the following dimensions:

- Turbine Tip Height – 185 metres
- Hub Height – 103.5 metres
- Rotor Diameter - 163 metres.
- Blade length – 81.5 metres

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Proposed Wind Farm will be conventional three-blade turbines, that will be geared so the rotors of all turbines always rotate in the same direction.

The Proposed Turbines will be multi-ply coated to protect against corrosion. It is proposed that the turbines would be of a white, off-white or light grey colour to blend into the sky background. This minimises visual impact as recommended by the following guidelines on wind energy development:

- Wind Farm Development – Guidelines for Planning Authorities, (DoEHLG, 2006) (WEDG 2006)
- Draft Revised Wind Energy Development Guidelines (DoEHLG, 2019)
- The Influence of Colour on the Aesthetics of Wind Turbine Generators (ETSU, 1999).

2.3.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. Different turbine manufacturers use different shaped turbines foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier and a foundation area large enough to accommodate modern turbine models has been assessed in this EIAR. The turbine foundation transmits any load on the wind turbine into the ground. Where ground conditions do not favour the use of the excavate and replace method (gravity), piles (bored or driven) will be installed to formation level.

The maximum horizontal and vertical extent of the turbine foundation will be 25m and 3m respectively.

After the foundation level of each turbine has been formed on competent strata (i.e. bedrock or subsoil of sufficient load bearing capacity) or using piling methods, the "Anchor Cage" (anchors the first section of the turbine tower to the foundation) is levelled and reinforcing steel is then built up around and through the anchor cage. The outside of the foundation is shuttered with demountable formwork to allow the pouring of concrete and is backfilled accordingly with appropriate granular fill to finished surface level.

2.3.1.4 Hardstanding Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base. These will facilitate access, turbine assembly and turbine erection. The hard standing areas are used to accommodate cranes used in the assembly and erection of the turbine. These areas also allow for the offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations, once completed, by placing crushed stone over the foundation. The main body of the hard standing areas will measure 55m in length and 32m in width.

The precise sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers. All crane hardstand areas will be designed taking account of the loadings provided by the turbine manufacturer and will consist of a compacted stone structure. The crane hardstands will be constructed in a similar manner to the excavated Site roads.

The proposed hard standing areas for each individual turbine are shown as part of the detailed layout drawings included in **Appendix 3** and represent the maximum sizes required. However, the extent of the required areas at each turbine location may be optimised on-site within the parameters set out and assessed in this EIAR. This will depend on the turbine supplier's exact requirements.

These hard standing areas will be used as assembly areas for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly.

2.3.1.5 Assembly Area

Levelled assembly areas will be located on either side of the hard-standing area. These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. The extent of the area required for the assembly areas is shown on the detailed drawing in **Appendix 3**.

2.3.1.6 Power Output

Current and future wind turbine generator technology will ensure that the wind turbine model, chosen for the Proposed Project, will have an operational lifespan greater than the 35-year operational life that is being sought as part of the planning application. Each of proposed wind turbines will have a generating capacity of 6.2 MW. Turbines of the exact same make, model and dimensions can have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle. The exact power rating of the installed turbine will be designed to match the wind regime on the Proposed Wind Farm and will be determined by the selected manufacturer.

For the purposes of this application, a rated output of 6.2 MW has been chosen to calculate the power output of the proposed 10-turbine renewable energy development, which would result in an estimated installed capacity of 62 MW.

Assuming an installed capacity of 62 MW, the Proposed Wind Farm therefore has the potential to produce up to 158,591 MWh (megawatt hours) of electricity per year, based on the following calculation:

A x B x C = Megawatt Hours of electricity produced per year

where: A = ... The number of hours in a year: 8,760 hours

B = ... The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 29.2% is applied here[5].

C = ... Rated output of the wind turbines: 62 MW

The 158,591 MWh of electricity produced by the Proposed Wind Farm would be sufficient to supply approximately 49,560 Irish households with electricity per year, based on the average Irish household using 3.2 MWh of electricity[6] (this latest figure is available from the SEAI, Energy in Ireland, 2025 Report). For context, according to the latest Census 2022 data, there are 36,787 households located in Co. Kilkenny.

2.3.2 Site Roads

2.3.2.1 Road Construction Types

To provide access within the Proposed Wind Farm and to connect the wind turbines and associated, infrastructure, existing roads and tracks will need to be upgraded, and new access roads will need to be constructed. The road construction design has taken into account the following key factors:

1. *Buildability considerations;*
2. *Serviceability requirements for construction and wind turbine delivery and maintenance vehicles*
3. *Horizontal longitudinal and cross-fall gradient of the roads;*
4. *Minimisation of excavation arisings;*
5. *Making use of existing infrastructure where possible;*

Whilst the above key factors are used to determine the road design the actual construction technique employed for a particular length of road will be determined on the prevailing ground conditions encountered along that length of road.

It is proposed to upgrade approximately 4.5 km of existing site roads and tracks, and to construct approximately 9.1 km of new access road on the Site. Areas such as wide junctions and proposed hardstands will also be used as passing bays throughout the construction phase of the Proposed Wind Farm site.

Upgrade of Existing Access Roads or Tracks

As noted above, approximately 4.5 km of existing roads and access tracks will be upgraded as part of the Proposed Wind Farm construction phase. The existing tracks onsite were constructed using the excavate and replace construction technique, therefore proposed road widening will be founded on competent stratum.

[5] *SEAI, Energy in Ireland, 2025 Report https://www.seai.ie/sites/default/files/publications/Energy-in-Ireland-2025.pdf*
[6] *Central Statistics Office, Metered Electricity Consumption 2025* https://www.cso.ie/en/releasesandpublications/ep/p-mec/meteredelectricityconsumption2025/

Construction of New Roads

As noted above, approximately 9.1 km of new roads will be constructed in order to facilitate the Proposed Wind Farm. Due to the ground conditions, new access tracks proposed on site are proposed to be founded and located on competent stratum. The make-up of the founded access tracks is a stone thickness of c. 400mm.

2.3.3 Site Underground Electrical and Communications Cabling

Each turbine and the meteorological mast (refer to Section 2.3.4 below) will be connected to the on-site electricity substation via underground (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the onsite substation. The electricity and fibre-optic cabling connecting to the onsite substation compound will be run in cable ducts in the road or direct buried alongside the internal tracks approximately 1.2 metres beneath ground level to the top of the cable. The route of the cable will follow the access track to each turbine location and are illustrated on the site layout drawings included as **Appendix 3**, the exact number and configuration of cable may vary within the cabling trench. Plate 2-1 below shows two variations of a typical site cabling trench, one for off-road trenches and one for on-road trenches. The cabling may be placed on either side of the roads, on both sides of the road or within the road. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage.

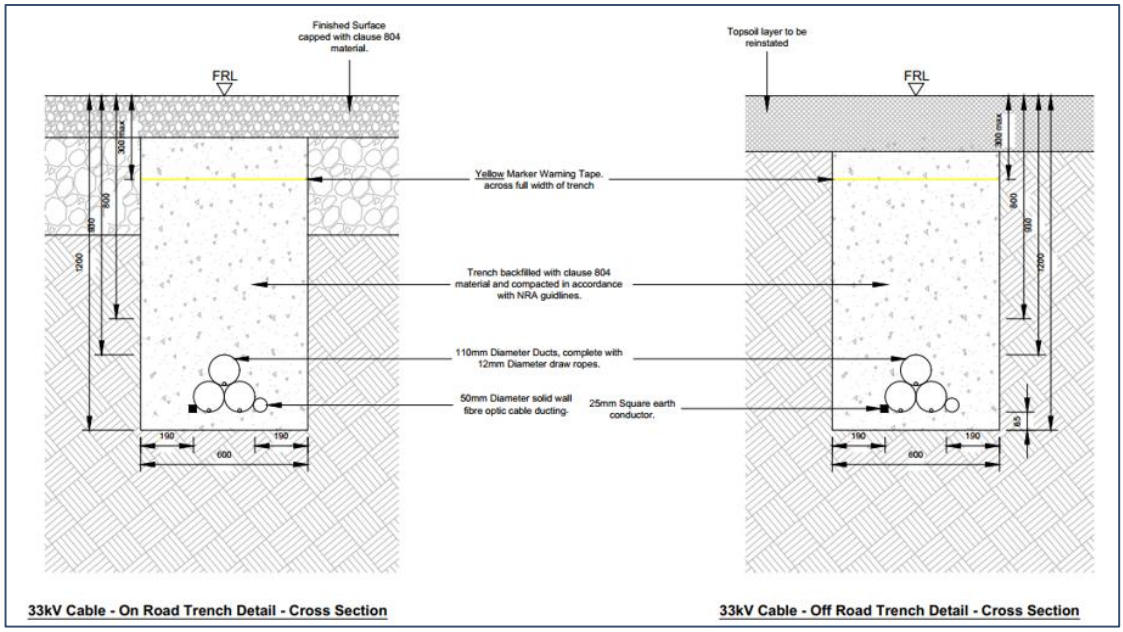


Plate 2-1 Cabling trench cross section detail.

Clay plugs (water flow barrier) will be installed at regular intervals along the length of the trenches where required to prevent the trenches becoming conduits for runoff water. Backfill material will be compacted in layers with approved engineer's specified material, which may be imported onto the Proposed Wind Farm site should sufficient volumes of suitable material not be encountered during the excavation phase of the proposed infrastructure.

2.3.4 Meteorological Mast

One meteorological (met) mast is proposed as part of the Proposed Wind Farm site. The met mast will be equipped with wind monitoring equipment at various heights. The proposed met mast will be located at N633443, E666664 (ITM) as shown on the Proposed Wind Farm layout drawing in Figure 2-2. The mast will be a free-standing slender lattice structure measuring 103.5 metres in height. The mast

will be constructed on a hard-standing area sufficiently large to accommodate the equipment that will be used to erect the mast.

2.3.5 Temporary Construction Compounds

Two temporary construction compounds will be located within the Proposed Wind Farm site. The primary construction compound will be located in the north of the Site, measuring approximately 5,410 square meters (m^2) in area, approximately 258m northeast of T8. The second construction compound will be located approximately 15m south of T2 measuring approximately 450 m^2.

The locations of the proposed temporary construction compounds are shown on the Proposed Project site layout drawing in Figure 2-2.

The temporary construction compounds will consist of temporary site offices, staff welfare facilities, construction materials storage and car-parking areas for staff and visitors.

Temporary toilets, located within staff portacabins, will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewaters being tankered off site by a permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank.

The temporary construction compounds will also include a bunded refuelling and containment area for the storage of oil, lubricants and site generators etc, and full retention oil interceptor.

Once the Proposed Wind Farm has been commissioned these compounds will be removed. These areas will be reinstated with previously excavated spoil, and either be reseeded or left to revegetate naturally.

Construction materials and turbine components will be brought directly to the proposed use and turbine locations following their delivery to the Proposed Wind Farm site.

2.3.6 Watercourse / Culvert Crossings

The Proposed Wind Farm site is extensively drained by a network of natural watercourses and manmade land drains. The majority of watercourses and manmade drains within the Proposed Wind Farm site drain into the EPA mapped Foyle South stream in the north and EPA mapped Clomantagh Lower steam in the southwest of the Proposed Wind Farm site. Each of these EPA mapped streams form part of the River Nore catchment.

To facilitate the construction of the Proposed Wind Farm roads, 3 no. watercourse crossings are required to cross the EPA mapped Foyle South stream. The following methodologies will be used:

- Clear Span watercourse crossing
- Flatbed over existing watercourse crossing

Detail of the EPA mapped watercourse crossing locations within the Proposed Wind Farm site are included in **Appendix 3**, with construction methodologies provided below.

In addition to the natural watercourses, there are manmade agricultural and forestry drains within the Proposed Wind Farm site, which will rerouted around the Proposed Wind Farm infrastructure and/or integrated into the proposed drainage design as required.

2.3.6.1 Clear Span Crossing

It is proposed to construct new clear span crossing at no. 3 locations where new watercourse crossings are required within the Proposed Wind Farm site. The construction methodology for these crossings have been designed to eliminate the requirement for in-stream works at these locations. The watercourse crossings will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland.

For the 3 no. clear span crossing proposed, abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material. Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing. Methods for clear span crossing are provided below.

Methodology

It is proposed to construct 3 no. new watercourse crossing (clear span bridge/culvert design) to facilitate the Proposed Wind Farm site infrastructure. The locations of these crossings are shown on the layout drawings included in **Appendix 3**. The clear-span watercourse crossing methodology presented below will ensure that no instream works are necessary. The standard construction methodology for the installation of a clear-span watercourse crossing is as follows:

- The access road on the approach either side of the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of each watercourse crossing.
- All drainage measures along the proposed road will be installed in advance of the works.
- A foundation base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required.
- Access to the opposite side of the watercourse for excavation and foundation installation will require the installation of a temporary pre-cast concrete or metal bridge across the watercourse to provide temporary access for the excavator. Plant and equipment will not be permitted to track across the watercourse.
- Once the foundation base has been completed, the pre-cast concrete clear-span structure will be installed using a crane which will be set up on the bank of the watercourse and will be lifted into place from the bank with no contact with the watercourse.
- Once the crossing is in position stone backfill will be placed and compacted against the structure up to the required level above the foundations.
- Underground cabling ducting will be contained within the road make-up of the proposed crossing.

The watercourse crossing will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

Confirmatory inspections of the proposed new watercourse crossing locations will be carried out by the Project Civil/Structural Engineer and the Project Hydrologist prior to the construction of the crossing.

2.3.6.2 Culvert Crossing

All new proposed culverts and proposed culvert upgrades at field drain crossings required for the Proposed Wind Farm will be suitably sized for the expected peak flows in the drains.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Wind Farm, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In all cases, culverts will be oversized to allow mammals to pass through the culvert. Culverts will be constructed as per the methodology detailed below. All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

Methodology

All new proposed culverts and proposed culvert upgrades at field drain crossings required for the Proposed Wind Farm will be suitably sized for the expected peak flows in the watercourse. Some culverts may be installed to manage drainage waters from works areas of the Proposed Wind Farm, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base but will have a minimum 900mm diameter. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

2.3.7 Biodiversity Enhancement and Management Plan

A Biodiversity Enhancement and Management Plan (BEMP) has been prepared for the Proposed Project to address habitat loss within the Proposed Wind Farm site and to deliver biodiversity enhancement measures across the wider Site.

The BEMP includes measures to strengthen the Site's linear habitat network through the planting of new native hedgerows and the enhancement of existing gappy or poor-quality hedgerows within the Proposed Wind Farm site. These measures will provide additional commuting and foraging habitat for bats, badgers and other protected fauna, while improving ecological connectivity across the Proposed Wind Farm site.

Important habitats within the Proposed Wind Farm site and close to the proposed works, including limestone pavement and associated species-rich grasslands, will be safeguarded against inadvertent encroachment or other impacts as a result of the construction of the Proposed Project.

Grassland areas within the Proposed Project site will also be managed to increase botanical diversity and, where conditions are suitable, to support the development of the priority Annex I habitat Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) (6210). Suitable areas for grassland management have been identified to the west of the Proposed Wind Farm site, adjacent to Spahill and Clomantagh Hill SAC (000849).

2.3.8 Tree Felling

As part of the Proposed Project, tree felling will be required within and around the development footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure.

Further details on tree felling required within and around development footprint on the Proposed Project site is detailed in both Chapter 4 and Chapter 6 of this EIAR.

Nearly half (45%) of the Proposed Wind Farm site comprises commercial forestry. A total of approximately 27.5 hectares of commercial forestry will be permanently felled as part of the Proposed Project along with existing treeline boundaries as detailed in Chapter 6, Section 6.5.3.2.1.

The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the Proposed Project be submitted with the felling licence application; therefore the felling licence cannot be applied for until such time as planning permission is obtained for the Proposed Project.

2.3.8.1 Forestry Replanting

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative site or sites. The Forest Service policy requires replacement or replanting on a hectare for hectare basis for the footprint of the infrastructure developments.

The estimated 27.5 hectares that will be permanently felled for the footprint of the Proposed Project infrastructure will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Project. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service.

The replacement of the approximately 27.5 hectares of forestry can occur anywhere in the State subject to licence. The replacement of forestry, felled as part of the Proposed Project, may occur on any lands, within the state, benefitting from Forest Service Technical Approval[7] for afforestation, should the Proposed Project receive planning permission. Under the Forestry Regulations 2017, all applications for licences for afforestation require the prior written approval (technical approval) of the Minister for Agriculture, Food and the Marine. Before the Minister can grant approval, he/she must first determine if the project is likely to have significant effects on the environment (for EIA purposes) and assess if the development, individually or in combination with other plans or projects is likely to have a significant effect on a European site (for Habitats purposes).

2.3.9 Borrow Pit

It is estimated that approximately 162,700 cubic metres (m^3) of stone material will be required to construct the Proposed Project (refer to Table 4-2 in Chapter 4: Description of the Proposed Project of the EIAR). It is intended to obtain the majority of materials for the construction of the Proposed Project from the proposed on-site borrow pit (engineer's specified material may be imported onto the Site should sufficient volumes of suitable material not be encountered during the excavation phase of the

[7] *All proposed forestry developments where the area involved is greater than 0.1 hectare must receive the prior written approval of the Forest Service. The application for approval is known as Pre-Planting Approval – Form 1.*

proposed infrastructure, to come from local licenced quarries). The proposed onsite borrow pit is located approximately 285m northwest of T4 and measures approximately 19,015m^2 in area.

Access to the borrow pit will be via the existing road running along the northern edge of the borrow pit. Post-construction, the borrow pit will be reinstated with excavated spoil. The borrow pit area will then be reseeded.

The extraction of material from the borrow pit is a construction phase activity only of the Proposed Project which will be a temporary operation run over a short period of time during the construction phase. The topsoil and subsoil will be stripped back and temporarily stockpiled using standard tracked excavators. Hardcore materials will be extracted from the borrow pit (and some turbine locations, if necessary), principally by means of rock breaking. Depending on the hardcore volume, blasting may also be used as a more effective rock extraction method, capable of extracting significant volumes of rock in a matter of milliseconds. Blasting will only be carried out after notifying any potentially sensitive receptors. These two rock extraction methods are discussed below. The processing and crushing of boulders may be required to achieve the grading requirements for use in construction.

2.3.10 Spoil Management Plan

The total estimated volume of spoil to be managed following excavations during the construction phase of the Proposed Project is approximately 133,000 m^3.

A portion of the excavated material will be used as fill for the creation of level works areas for construction. The remaining volume of spoil to be placed within the spoil management areas, within linear berms alongside sections of Proposed Wind Farm site roads (where appropriate, avoiding environmentally constrained areas) and through backfilling of the proposed borrow pit void.

It is proposed that some of the spoil generated by the proposed cabling trench will be removed and accommodated within the spoil management area or borrow pits within the Proposed Wind Farm site. The majority of excavated material from the Proposed 110kV Underground Cabling route will be transported to a Materials Recovery Facility (MRF). There is more than enough capacity to manage the total volume of spoil requiring management for both the Proposed Wind Farm and the Proposed 110kV Substation.

2.3.11 Battery Storage

A battery-based energy storage system (BESS) will be located immediately adjacent the Proposed 110Kv Substation. The BESS compound will have a footprint of approximately 4,000m^2. The BESS compound will include 10 no. Battery Storage modules and 10 no. transformers. Each battery storage module will measure 12.2m by 2.4m with a height of 2.6m.

Prior to installing the steel containers, clearance of the site area, levelling off the ground surface and creation of a hard stand will be undertaken. These containers and the adjacent infrastructure house the batteries, inverters, transformers, fire suppression equipment and associated electrical components. The containers will be mounted onto concrete plinth foundations. The containers shall be spaced to allow airflow around the containers, feeding their climate control systems.

In addition to the modular steel containers, other components of the development include:

- A grid transformer within the electrical compound;
- Above ground cable junction boxes/ cabling cabinets and cable racks/steel trunking facilitating the necessary electrical connections between containers;
- Underground ducting and cabling;
- A security fence around the perimeter of the compound;
- Communications equipment; and,

- Lightning protection poles,
- Fire suppression equipment,
- 2 no. Static Storage Tanks 250m^3,
- Underground Fire Water Retention Tank 500m^3.

The battery storage compound will operate continuously, linked to the Proposed 110kV Substation. A SCADA system will be provided that will allow for remote monitoring and operation of the Site by operations staff. The system will raise all alarms to the control centre and will allow staff to remotely monitor system performance. A Battery Management System (BMS) will monitor and control the battery modules and the whole facility will be monitored and operated remotely by means of an Energy Management System with regular visits made by security and/or maintenance personnel.

The modular enclosures of the BESS includes a comprehensive fire protection system with isolated containment zones, integrated fire suppression, deflagration panels, environmental sensors, and active ventilation. These features are designed to prevent, detect, and contain thermal events, minimizing damage and downtime. The enclosures have an IP55 rating, which means it is protected against dust ingress and low-pressure water jets from any direction, contributing to overall safety and durability.

In the unlikely event of a fire within the BESS compound water is the preferred suppression agent due to its immediate cooling capacity, availability, and ease of onsite storage and transport. Firewater from a lithium-ion BESS fire will pick up toxic and corrosive by-products such as hydrofluoric acid, heavy metals, electrolytes, plastics, etc. The fire-water retention design for this BESS compound will capture, contain, and hold contaminated runoff from the worst-credible fire scenarios while keeping it away from drains, groundwater, and off-site receptors. 2 no. firewater storage tanks, with a combined capacity of at least 500,000 litres shall be provided in the compound to assist fire fighters in a fire event. The provision of firewater stored on Site shall be subject to consultation with Kilkenny Fire Service. A firewater retention tank will also be provided above ground to provide the most effective and suitable measure for retaining firewater. The tank will be rendered impermeable by the use of an appropriate liner and integrity tested. All integrity testing of the tanks will be completed by a suitably qualified competent person and be in line with the Environmental Protection Agency's (EPA) guidance.

The fire water retention design for this BESS compound will capture, contain, and hold contaminated runoff from the worst credible fire scenarios while keeping it away from drains, groundwater, and off site receptors. After the fire, the retained water will be sampled, treated, or removed by licensed hazardous waste contractors.

The objectives of the fire water containment are to:

- Contain all firewater and contaminated rainfall from a worst-case BESS fire without uncontrolled release.
- Bund the compound so a single fire incident does not cause firewater to escape the boundary of the proposed BESS compound.
- Provide positive isolation of surface water drains (automatic/manual penstocks), defaulting to "closed on alarm."
- Be chemically compatible with expected contaminants (HF, metals, electrolytes, plastics by products) and allow safe sampling, treatment, and removal.

2.4 Detail of the Proposed Grid Connection

The following sections will describe each of the development components of the Proposed 110kV Underground Cabling route within this planning application in further detail, in the following order:

- *Proposed 110kV Substation*
- *Wind Farm Control Building*
- *Underground Grid Connection Cabling Route*

Detailed site layout drawings of the Proposed Project are included in **Appendix 3** of this report.

Proposed 110kV Substation

It is proposed to construct a 110kV electricity substation within the Proposed Wind Farm site, as shown in Figure 2-2. The Proposed 110kV Substation is located within agricultural pastural land and will be accessed via the Proposed Wind Farm access roads.

The footprint of the Proposed 110kV Substation compound measures approximately 23,665m^2 in area and will include 2 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the Proposed 110kV Substation to the national grid. The construction and exact layout of electrical equipment in the Proposed 110kV Substation will be to EirGrid Networks specifications.

The Proposed 110kV Substation compound will include steel palisade fencing (approximately 2.5 metre high or as otherwise required by EirGrid), and internal fences will also segregate different areas within the main substation. The onsite substation will remain in place as it will be under the ownership and control of EirGrid and will form a permanent part of the national electricity grid.

2.4.1 Substation Control Building

Two control buildings will be located within the Proposed 110kV Substation compound. The Independent Power Provider (IPP) Control Building will measure 20.1 metres by 10.6 metres and 6.1 metres in height. The Eirgrid Control Building will measure 25 metres by 18 metre and 8.4 metres in height.

The control buildings will include staff welfare facilities for the staff that will work on the Proposed Project site during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Project, there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Project does not necessitate a potable source. It is proposed to either harvest rainwater from the roofs of the buildings or, alternatively, install a groundwater well adjacent to the substation in accordance with the Institute of Geologists Ireland, *Guide for Drilling Wells for Private Water Supplies* (IGI, 2007). The well will be flush to the ground and covered with a standard manhole. A pump house is not required as an in-well pump will direct water to a water tank within the roof space of the control building. Bottled water will be supplied for drinking, if required.

It is not proposed to treat wastewater on-site. Wastewater from the staff welfare facilities in the control buildings will be managed by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants.

Such a proposal for managing the wastewater arising on site has become standard practice on wind farm sites, which are often proposed in areas where finding the necessary percolation requirements for

on-site treatment would be challenging and has been accepted by numerous Planning Authorities and An Coimisiún Pleanála as an acceptable proposal.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. Full details of the proposed tank alarm system can be submitted to the Planning Authority in advance of any works commencing on-site. The wastewater storage tank alarm will be part of a continuous stream of data from the Proposed Wind Farm turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), will be employed to transport wastewater away from the Proposed Project site.

2.4.2 Underground Grid Connection Cabling Route

A connection between the Proposed 110kV Substation and the national electricity grid will be necessary to export electricity from the Proposed Wind Farm. It is proposed to connect the Proposed Wind Farm to the national electricity grid via a Proposed 110kV Underground Cabling connection from the Proposed 110kV Substation to the existing 110kV Ballyragget substation, in the townland of Moatpark, approximately 1km north of Ballyragget, Co. Kilkenny. The Proposed 110kV Underground Cabling route measures approximately 12.6km in length, the majority of which is located within the curtilage of the public road network.

The exact location of the grid connection cabling within the curtilage of the public road network may be subject to minor modification following confirmatory site investigations, to be undertaken prior to construction of the proposed wind farm development. A Road Opening Licence will be sought from the Roads Authority i.e. Kilkenny County Council requiring all details to be confirmed before the licence is granted and work can commence.

The Proposed 110kV Underground Cabling route will originate at the Proposed 110kV Substation, in the townland of Frankford or Ballykieran, Co. Kilkenny, and run north and northeast for 1.4km within proposed new roads towards the L-1805 local road. The underground cabling route will then continue east along the L-1805 for approximately 440m before following the L-1804 southwest for 240m. The underground cabling route then follows the L-1806 east for 5.5km before turning north and travelling for 500m on the L-1807. The underground cabling route will turn east onto the L-5833 local road for 2.9km. From here it will join the N77 National Road in the townland of Ballyconra and travel south for 770m within the road corridor margins where possible. In the townland of Ballyconra, the underground cabling route will leave the public road and travel east through agricultural pastoral land for 60m before passing beneath the River Nore via a horizontal directional drilling mechanism. Upon re-surfacing on the eastern side of the River Nore within agricultural lands, the underground cabling route continues east 480m before turning north for 100m and entering into the existing Ballyragget 110kV Substation in the townland of Moatpark, Co. Kilkenny.

The underground electrical cabling route is detailed in the layout drawings in **Appendix 3** of this report.

2.4.2.1 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the ducting route generally between 500 to 800 metres intervals or as otherwise required by ESB/EirGrid and electrical requirements. Joint Bays are typically 2.5m x 6m x 1.75m pre-cast concrete structures installed below finished ground level.

Based on the separation distances outlined above, there are 17 no. joint bays proposed along the Proposed 110kV Underground Cabling route. There are no joint bays proposed within the Proposed Wind Farm access roads, 14 no. joint bays are proposed along the existing local road network, 1 no.

joint bays are proposed along the N77 national secondary road, and 2 no. joint bay is proposed within private 3rd party agricultural fields.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the Proposed 110kV Substation and the existing 110kV Ballyragget substation. Earth Sheath Link Chambers are also required approximately every second joint bay along the cable route. Earth Sheath Links are used for earthing and bonding cable sheaths of underground power cables, installed in a flat formation, so that the circulating currents and induced voltages are eliminated or reduced. Earth Sheath Link Chambers and Communication Chambers are located in close proximity to Joint Bays. Earth Sheath Link Chambers and Communication Chambers will be precast concrete structures with an access cover at finished surface level. The locations of the joint bays and chambers are shown on the site layout drawings included in **Appendix 3** of this report.

2.4.2.2 Watercourse and Service Crossings

There are 6 no. watercourse crossings, referenced on EPA/OSI mapping, located along Proposed 110kV Underground Cabling route. The construction methodology for the 6 no. EPA/OSI mapped watercourse crossings has been designed to eliminate the requirement for in-stream works at these locations. The various crossing methodologies to be employed along the Proposed Grid Connection underground cabling route include the following:

- Type A: Crossing using standard trefoil formation
- Type B Flatbed formation under
- Type C: Flatbed Formation over
- Type D: Horizontal Directional Drilling

A general description of the construction methods employed at watercourse crossings are described below.

Methodology

Type A: Crossing using standard trefoil formation

Where adequate cover exists above a culvert/service or where a new bottomless box culvert or clear-span structure has been installed at a sufficient depth, the standard ESB approved trefoil arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert. The cable trench will pass over the culvert in a standard trench.

Type B Flatbed formation under

Where cable ducts are to be installed under an existing watercourse or service crossing where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench, the depth of which will be determined by the location of the top of the obstacle or the depth of excavatable material under it. The ducts will be laid in this trench in a flatbed formation under the existing culvert/ service and will be encased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification.

Type C: Flatbed Formation over

Where cable ducts are to be installed over a culvert or service crossing where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the obstacle or the depth of excavatable material over it. The ducts will be laid in this trench in a flatbed formation over the existing culvert and will be encased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification.

Type D: Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) is a method of drilling under obstacles such as bridges, culverts, railways, watercourses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.

The HDD method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water is pumped through the centre of the drill rods to the reamer head and is forced in to void and enables the annulus which has been created to support the surrounding subsoil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the Site in the same manner as other subsoil materials associated with the drilling process to a licensed recovery facility.

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exits.

2.5 Site Activities

2.5.1 Environmental Management

All proposed activities on the site of the Proposed Project will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Project and is included in **Appendix 5** of this report.

The CEMP includes details of drainage, spoil management and waste management, and clearly outlines the mitigation measures and monitoring proposals that are required to be adhered to in order to comply with the environmental commitments. In the event planning permission is granted for the Proposed Project, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for approval.

2.5.2 Refuelling

Wherever possible, vehicles will be refuelled off-site, particularly for regular road-going vehicles. On-site refuelling of machinery will be carried out at designated refuelling areas at various locations throughout the Site. Heavy plant and machinery will be refuelled on-site by a fuel truck that will come to the Site as required on a scheduled and organised basis. 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.

2.5.3 Concrete Deliveries

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks. The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching.

Before leaving the Site, washing of the delivery truck will be minimised and restricted to designated wash out areas. Wash out will be restricted to the concrete lorry's chute only. Concrete trucks will be washed out fully at the off-site batching plant, where facilities are already in place.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. The residual liquids and solids will be removed off-site by an appropriately authorised waste collector for disposal at an authorised waste facility. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown in Plate 2-2 below.

The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents will be tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste.



Plate 2-2 Concrete washout areas

Alternatively, a Siltbuster-type concrete wash unit or equivalent (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) may be used. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site at an appropriate waste facility.

The risks of pollution arising from concrete deliveries will be further reduced by the following:

- Concrete trucks will not be washed out on the Site but will be directed back to their batching plant for washout.
- Site roads will initially be constructed with a subgrade and compacted with the use of a roller to allow concrete delivery trucks access all areas where the concrete will be needed. The final wearing course for Site roads will not be provided until all bases have been poured. No concrete will be transported around the Site in open trailers or dumpers so as to avoid spillage while in transport. All concrete used in the construction of turbine bases will be pumped directly into the shuttered formwork from the delivery truck. If this is not practical, the concrete will be pumped from the delivery truck into a hydraulic concrete pump or into the bucket of an excavator, which will transfer the concrete to the location where it is needed.
- The arrangements for concrete deliveries to the Site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout and discussing emergency procedures.
- Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the Site.

2.5.4 Concrete Pouring

Due to the volume of concrete required for each turbine foundation, and the requirement for the concrete pours to be continuous, deliveries are often carried out outside normal working hours in order to limit the traffic impact on other road users, particularly peak period school and work commuter traffic. Such activities are limited to the day of turbine foundation concrete pours, which are normally complete in a single day per turbine. The main pours will be planned days or weeks in advance.

Special procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These may include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.

- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

2.5.5 Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling/settlement ponds in the Proposed Wind Farm site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and temporary construction compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.

2.5.6 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. A wheel wash facility will be provided. The site roads, which will be formed before road-going trucks begin to make regular or frequent deliveries to the Site (e.g. with steel or concrete), will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt.

A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Project.

2.5.7 Waste Management

The CEMP, **Appendix 5** of this report, provides a waste management plan (WMP) which outlines the best practice procedures during the construction phase of the Proposed Project. The WMP has been produced in line with the following guidance *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* (EPA, 2021)[8]. The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Project. Disposal of waste will be a last resort.

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the Proposed Project to ensure that all contractors hired to remove waste from the Site have valid Waste Collection Permits to ensure that the waste is delivered to

[8] *EPA 2021 Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects. Available at: https://www.epa.ie/publications/circular economy/resources/CDWasteGuidelines.pdf*

a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

Prior to the commencement of the development, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

2.6 Access and Transportation

2.6.1 Site Entrances

Main Site Entrance

During the construction phase, the Proposed Wind Farm site will be accessed via an existing agricultural access point off the R693 Regional Road. The R693 runs along the southern boundary of the Proposed Wind Farm site in the townland of Barna, Co. Kilkenny. This access point will be upgraded and will be used as the main site entrance for HGVs and abnormal loads during the construction phase of the Proposed Wind Farm.

It is also proposed to access the Proposed 110kV Substation, during both the construction and operational phases of the Proposed Wind Farm, via this entrance.

This improved layout for an existing access junction located on the R693 will provide for all traffic generated during the construction and maintenance of all turbines. It is proposed that this junction will provide for the deliveries of the abnormally sized loads and general construction traffic, including staff car trips, during the construction phase, and for maintenance trips once the Proposed Project is operational.

The proposed access junction has been designed in accordance with TII DN GEO. 03060. The proposed junction includes a run-over area at the northeast corner of the junction to facilitate the delivery of the abnormally sized turbine loads. This area will require to be surfaced to accommodate the wheels of the abnormally sized loads. A short section of runover area is also proposed on the eastern side of the access adjacent to the junction. An additional area is identified to be cleared to facilitate overhang of the turbine blade transport vehicles. On completion of the delivery of the abnormally sized loads the temporary run-over areas will be closed off to traffic with the junction layout reduced in size to the standard junction layout described above.

Upon the completion of the turbine component delivery phase, the accommodation area will be covered with a layer of topsoil and reseeded. The trees and hedgerow that was removed during the turbine component delivery phase will be replanted.

The location of Proposed Wind Farm main site entrance is shown in **Appendix 3** of this report.

Temporary Site Access

It is proposed to access the Proposed 110kV Underground Cabling route during the construction phase via an additional entrance on the L1805. The intended use of this access point will be to facilitate the installation of the Proposed 110kV Underground Cabling route from the Proposed 110kV Substation to the local road network only. This site assess point will be closed following the construction phase.

This access point may be used during any phase of the Proposed Project for emergency vehicle access.

2.6.2 Turbine Delivery Route

It is envisaged that large wind turbine components will be delivered to the Proposed Wind Farm site, from the Port of Cork (Ringaskiddy) (other ports such as Galway Port or Shannon Foynes could also be used), via the N28 and N40 national primary road, the M8 Motorway, R639 regional road, L1857 local road followed by the R693.

From the Port of Cork (Ringaskiddy), the turbine component delivery vehicles will travel north via the N28 and N40 National Primary Roads before merging onto the M8 Motorway. At Junction 7 (Cashel), the vehicles will exit the M8 and travel northeast for approximately 28.7km on the R639. In Urlingford, Co. Kilkenny, the turbine component delivery vehicles will travel east for approximately 80m through an area of green space/parkland adjacent to Mount Finn Drive, in order to transition onto the L1857 Local Road. The turbine component delivery vehicles will travel east for approximately 710m along the L1857 before joining the R693. The vehicles will turn south onto the R693 and travel for approximately 8.4km to the proposed site entrance, turning north into the Site in the townland of Barna, Co. Kilkenny.

It is also envisaged that general construction traffic (including materials and staff) will travel to the Site via the public road network to the south of the Site.

2.6.2.1 Turbine Delivery Route Accommodation Areas

Road and junction widening are sometimes required along proposed TDRs to accommodate the large vehicles used to transport turbine components to Proposed Project sites. The proposed transport route for the Proposed Wind Farm has been the subject of a route assessment to determine if any works are required along its length. There are sections on the route where the vertical alignment may require specialist transport vehicles. It is proposed to use a clamp and dolly system for the turbine blade delivery. Plate 2-3 below shows an example of this type of blade adapter. These sections will be further considered by the appointed transport company following turbine procurement process.



Plate 2-3 Clamp and Dolly system

Minor temporary accommodation works will be required at various locations along the TDR on the national and regional road networks between the port of arrival in Cork and the Proposed Wind Farm site. These will be limited to temporary measures including overruns of roundabout islands and temporary relocation of some signs and street furniture.

Temporary accommodation works will be required at 4 no. locations along the TDR to facilitate the delivery of turbine components and other abnormal loads to the Proposed Wind Farm during the construction phase. Descriptions and locations of the proposed temporary accommodation works are reference below. The locations of the temporary accommodation works are shown on **Error! Reference source not found.** and these works are fully assessed as part of this EIAR.

The works described at Locations 1 through 4 below will facilitate the movement of the turbine component and other abnormal load delivery vehicles through these locations. Once the accommodation areas have been reinstated, they will only be used again in the very unlikely event that an oversized delivery is required for wind turbine maintenance purposes. The construction methodology for the accommodation areas will be similar to that of the proposed new site roads, as outlined in Section 2.3.2.

2.7 Decommissioning

The wind turbines proposed as part of the Proposed Project are expected to have a lifespan of approximately 35 years. Following the end of the operational life of the wind farm, the wind turbines may be retained and the operational life extended or replaced with a new set of turbines, subject to planning permission being obtained. In the event that neither of the above options are implemented, the Proposed Wind Farm will be decommissioned fully as agreed with the Planning Authority. The onsite substation will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid.

Upon decommissioning of the Killoshulan Wind Farm, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with a similar model of crane that was used for their erection. The turbine will likely be removed from site using the same transport methodology adopted for delivery to site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

The underground electrical cabling connecting the turbines to the Proposed 110kV Substation will be removed from the cable ducts. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.

Site roadways could be in use for purposes other than the operation of the Proposed Wind Farm by the time the decommissioning of the Proposed Wind Farm is to be considered, and therefore it may be more appropriate to leave the Site roads in situ for future use. It is envisaged that the roads will provide a useful means of transport as agricultural/forestry roads for the pastoral farming/commercial forestry on the Site.

The Proposed 110kV Underground Cabling and Proposed 110kV Substation will remain in place as it will be under the ownership and control of the ESB and Eirgrid.

A Decommissioning Plan has been prepared and included as Appendix 4-6 of the accompanying EIAR, which will be agreed with the local authority prior to any decommissioning. The plan provides details of the methodologies that will be adopted, throughout decommissioning, the environmental controls that will be implemented, the Emergency Response Procedure to be adopted, methods for reviewing compliance and an indicative programme of decommissioning works.

The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time.

As noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

> *"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".*

3. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

3.1 Hydrology

3.1.1 Regional and Local Hydrology

A regional hydrology map is shown in Figure 3-1.

The Site is located in the regional River Nore catchment within Hydrometric Area 15 of the South-Eastern River Basin District (SERBD). The River Nore flows in a southerly direction approximately 9km to the east of the Proposed Wind Farm site.

On a more local scale the Site is located in the Nore_SC_070 sub-catchment. Within the Nore_SC_070, the Proposed Wind Farm site and approximately 4.7km (of the total 12.5km) of the Proposed Grid Connection underground cabling are located within the Nuenna River catchment (Nuenna_010, Nuenna_020 and Gorteenahilla_010 sub-basins).

The Nuenna River flows in an easterly direction approximately 0.6km to the southeast of the Proposed Wind Farm site prior to merging with River Nore approximately 9km further downstream.

The remainder of Proposed 110kV Underground Cabling (7.8km) is located in the Lisdowney Stream (Nore_140) and Lismaine Stream (Nore_150) catchments which drain directly into the River Nore downstream of Ballyragget town.

3.1.2 Regional & Local Hydrogeology

The northern portion of the Proposed Wind Farm site (including proposed turbine locations T5 - T10, borrow pit, Proposed 110kVsubstation and BESS) is located in the Lisdowney Groundwater Body (GWB) which comprises Namurian Shales bedrock. According to WFD mapping the Lisdowney GWB has 'poorly productive' bedrock. Site investigation carried out on the northern portion of the Proposed Wind Farm site confirm the presence of mudstone and siltstone bedrock which is consistent with Namurian Shales.

The southern portion of the Proposed Wind Farm site (including proposed turbine locations T1 – T4) is located in the Durrow Groundwater Body (GWB) which comprises Dinantian Pure Bedded Limestones. According to WFD mapping the Durrow GWB is 'karstic'. Site investigations carried out on the southern portion of Proposed Wind Farm site confirm the presence of limestone bedrock at turbine locations T1 to T3, but mudstone bedrock was encountered directly below turbine location T4 (where the GSI have limestone mapped).

3.1.3 Hydrological connectivity to European Sites

Spahill and Clomantagh Hill SAC (Site Code:000849) is located immediately to the northwest and southwest of the Proposed Wind Farm site. Proposed Wind Farm site infrastructure is setback more than 0.3km from this designated site, with the closest turbine being T5 on the southwest of the Proposed Wind Farm site. On the northwest of the Proposed Wind Farm site, the closest turbine (T7) is setback 0.55km from the SAC.

Spahill and Clomantagh Hill SAC has no water dependent habitats. Nonetheless there is no hydrological or hydrogeological connectivity between the Proposed Wind Farm site and this SAC. To the southwest of the Proposed Wind Farm site, the SAC occupies the summit of Clomantagh Hill which

is higher in elevation than any of the adjacent Proposed Wind Farm site infrastructure. The Proposed Wind Farm site and the SAC are also separated by the Clomantagh Lower Stream catchment to the southwest.

To the northwest of the Proposed Wind Farm site, the SAC occupies an area of Spa Hill that is located within a separate surface water catchment (i.e. River Goul) to that of the Proposed Wind Farm infrastructure. There is no potential for surface water or groundwater flows towards the SAC to the northwest of the Proposed Wind Farm site. Also, please note the northwestern and southwestern portion of the Proposed Wind Farm site is underlain by mudstone and therefore there is no risk of karstification.

Cullahill Mountain SAC, which is also not a water dependent habitat, is located 2.7km to the northwest of the Proposed Wind Farm site. The Proposed Wind Farm site and Cullahill Mountain SAC are separated by a tributary of the River Goul which runs in a valley to the northwest of the Proposed Wind Farm site.

The Loughans SAC (Site Code:000407), which is a turlough (karst) and a groundwater dependent ecosystem, is located approximately 2.7km to the southwest of the Wind Farm site.

However, for the reasons presented below, it can be assessed with certainty that there is no hydrological or hydrogeological connectivity between the Proposed Wind Farm site and The Loughans SAC:

- The Loughans SAC is located in a separate surface water catchment (i.e. River Goul) to that of the Proposed Wind Farm site;
- The closest proposed turbine (T5) is 3km away from the SAC and is underlain by mudstone bedrock (no potential for karstfication);
- The closest proposed turbine location underlain by potentially karstified limestone (T1) is 3.9km away;
- Groundwater level monitoring carried out in the limestone bedrock on the southern portion of the Proposed Wind Farm site shows a southeasterly gradient towards the Nuenna River (the SAC is located to the southwest);
- Groundwater dye tracing carried out by Walsh (2011) also shows a southeasterly groundwater flow direction from the Proposed Wind Farm site towards the Nuenna River;
- Groundwater level contour mapping by Dillon (2012) and Cawley (1990) show an easterly groundwater flow direction along the Nuenna River valley (the SAC is located to the west of the Nuenna River valley and within a separate catchment);
- The Clomantagh Lower Stream valley to the southwest of the Proposed Wind Farm site will act as a hydrogeological boundary between the Proposed Wind Farm site and the SAC.
- Groundwater flow in the Clomantagh Lower Stream valley discharges into the Nuenna River to the southeast of the Proposed Wind Farm (thereby preventing groundwater flowing south-westerly from the Proposed Wind Farm towards the SAC.

The River Barrow and River Nore SAC (Site Code:0002162) is located approximately 9km to the east and downstream of the Proposed Wind Farm site via the Nuenna River.

Also, the Proposed 110kV Underground Cabling under the River Nore near Ballyragget where horizontal directional drilling (HDD) will be employed to place the cable below the river channel to avoid any physical contact with the river or the River Barrow and River Nore SAC.

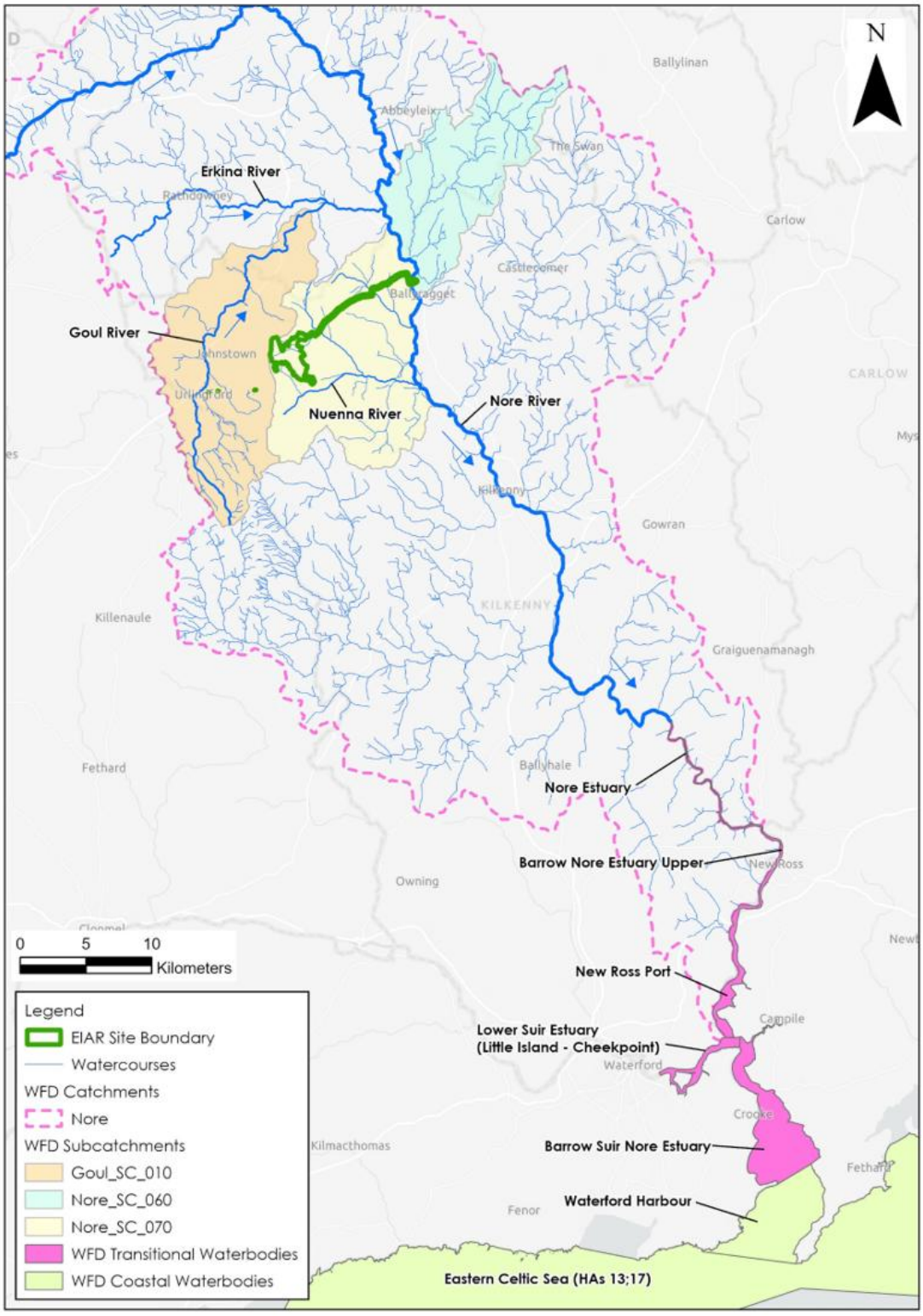


Figure 3-1 Regional and Local Hydrology (reproduced from Chapter 9 of the EIAR)

3.2 Results of Baseline Ecological Surveys

3.2.1 Descriptions of Habitats and Flora within the Proposed Wind Farm site

This section describes the habitats recorded within the Proposed Wind Farm site with associated Plates representative of the main habitats present. The majority of the Proposed Wind Farm site is located in an area dominated by commercial forestry and agriculture.

A total of 14 habitats, classified in accordance with Fossitt (2000), were recorded within the Proposed Wind Farm site and are listed in Table 3-1 below.

Table 3-1 Habitats recorded within the Proposed Wind Farm site.

Habitat Name	Fossitt Code
Conifer plantation	WD4
Improved agricultural grassland	GA1
Buildings and artificial surfaces	BL3
Wet grassland	GS4
Scrub	WS1
Hedgerows	WL1
Treelines	WL2
Stone walls and other stonework	BL1
Recolonising bare ground	ED3
Spoil and Bare Ground	ED2
Drainage ditches	FW4
Eroding/ upland rivers	FW1
Exposed calcareous rock	ER2
Dry calcareous and neutral grassland	GS1

Further, more detailed habitat mapping is provided in **Appendix 8.**

3.2.1.1 Habitats within the Proposed Wind Farm site

This section describes the habitats recorded within the Proposed Wind Farm site with associated Plates representative of the main habitats present. The majority of the Site is located in an area dominated by commercial forestry and agriculture.

Improved agricultural grassland (GA1)

Improved agricultural grassland (GA1) represents one of the principal habitats recorded within the Proposed Wind Farm site and occurs around several turbine locations and the borrow pit. Several fields within the Proposed Wind Farm site were classified as Improved agricultural grassland (GA1) (Plate 3-1 & Plate 3-2). This habitat was predominantly located within the southern and north-eastern portions of the Site.

The sward was dominated by perennial rye-grass (*Lolium perenne*), with frequent occurrences of Yorkshire fog (*Holcus lanatus*), sweet vernal-grass (*Anthoxanthum odoratum*), creeping bent (*Agrostis stolonifera*), red fescue (*Festuca rubra*), annual meadow-grass (*Poa annua*), cocksfoot (*Dactylis glomerata*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), dandelion (*Taraxacum officinale* agg.), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), broad-leaved dock (*Rumex obtusifolius*) and spear thistle (*Cirsium vulgare*).

These grasslands are subject to ongoing agricultural management and are used for both silage production and livestock grazing. Turbines 1, 2, 3, 4 and 9, together with their associated infrastructure, as well as the Proposed 110kV Substation and construction compounds, are proposed to be located within areas of Improved agricultural grassland (GA1).



Plate 3-1 Example of Improved agricultural grassland (GA1) within the Proposed Wind Farm site.



Plate 3-2 Example of Improved agricultural grassland (GA1) adjacent to Turbine 9 in the north of the Proposed Wind Farm site .

Wet Grassland (GS4)

Small areas of Wet grassland (GS4) were recorded both within and adjacent to fields of Improved agricultural grassland (GA1) (Plate 3-3). The habitat was generally dominated by rushes, particularly soft rush (*Juncus effusus*), jointed rush (*Juncus articulatus*) and floating sweet-grass (*Glyceria fluitans*). Yorkshire fog (*Holcus lanatus*), common bent (*Agrostis capillaris*), cuckooflower (*Cardamine pratensis*) and creeping buttercup (*Ranunculus repens*) were also abundant. Other herbaceous and grass species recorded frequently included meadow buttercup (*Ranunculus acris*), common sorrel (*Rumex acetosa*) and red fescue (*Festuca rubra*).



Plate 3-3 Wet grassland (GS4) habitat in the southeast area of the Proposed Wind Farm site.

Conifer plantation (WD4)

Conifer plantation (WD4) (Plate 3-4 and Plate 3-5) was the dominant habitat across several parts of the EIAR Site Boundary. It occurs throughout the central and north western portions of the Site. These forestry blocks were predominantly dominated by Sitka spruce (*Picea sitchensis*), with occasional Japanese larch (*Larix kaempferi*) recorded along plantation boundaries. The ground flora was generally sparse beneath the closed canopy and comprised predominantly bryophytes, including *Sphagnum* spp., together with occasional tamarisk moss (*Thuidium tamariscinum*), common sorrel (*Rumex acetosa*), meadow-grass (*Poa* spp.), bramble (*Rubus fruticosus* agg.), common nettle (*Urtica dioica*), elder (*Sambucus nigra*), Yorkshire fog (*Holcus lanatus*), bracken (*Pteridium aquilinum*), foxglove (*Digitalis purpurea*), creeping buttercup (*Ranunculus repens*), soft rush (*Juncus effusus*) and horsetail (*Equisetum* spp.).

Mature and sapling willow (*Salix* spp.) were frequently recorded along the boundaries of the conifer stands, while mature ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*) were also present. Moderate cover of ivy (*Hedera helix*) occurred on the trunks of mature broadleaved trees.

Turbines 4, 5, 6, 7, 8 and 10, as well as the met mast and borrow pit, are proposed to be located within this habitat type.

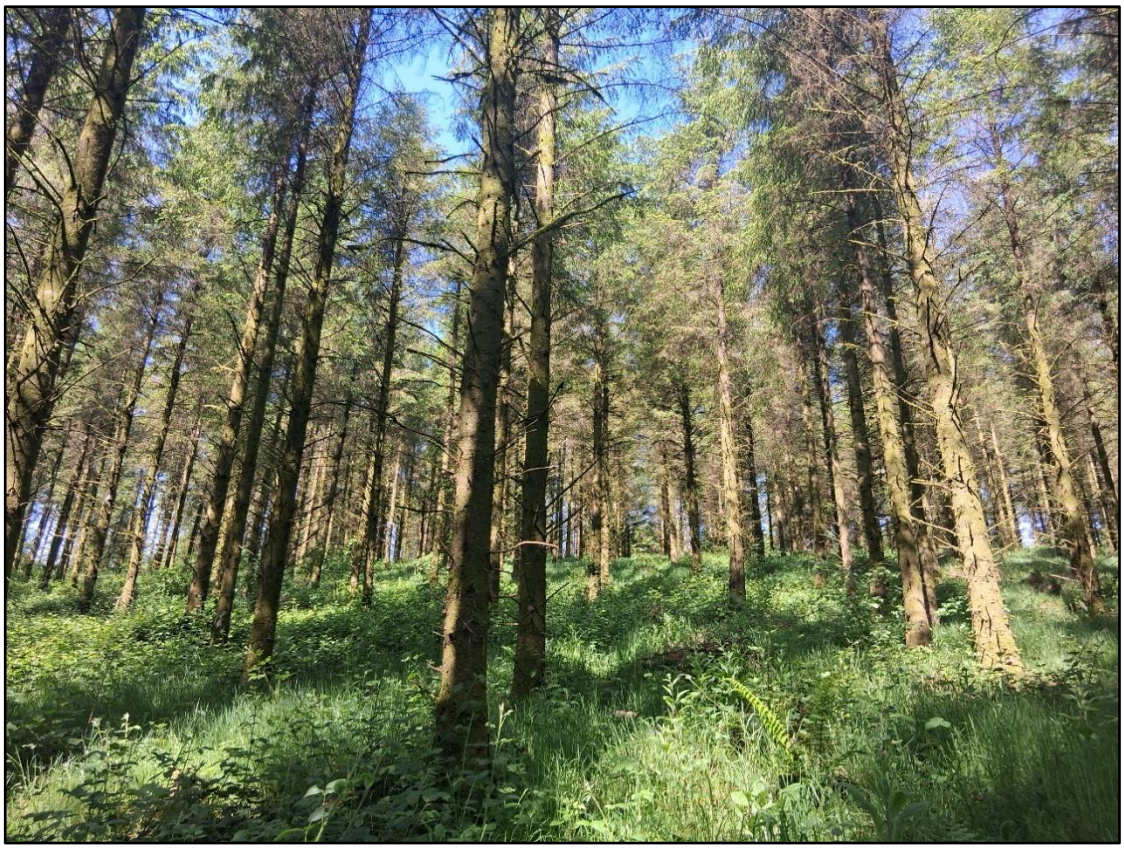


Plate 3-4 Example of Conifer plantation (WD4) habitat, dominant in Picea species, in the south of the Proposed Wind Farm site.



Plate 3-5 Example of Conifer plantation (WD4) habitat within which Turbine 4 is proposed.

Scrub (WS1)

Several areas of Scrub (WS1) (Plate 3-6) were recorded within the Proposed Wind Farm site, including an area located southeast of the proposed Turbine 4 location and within the proposed enhancement lands adjacent to the Spahill and Clomantagh Hill SAC (000849). The scrub habitat was predominantly dominated by hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*), with frequent occurrences of hazel (*Corylus avellana*), willow (*Salix* spp.), gorse (*Ulex europaeus*) and bramble (*Rubus fruticosus* agg.). Scrub (WS1) recorded within the proposed enhancement areas was encroaching into open grasslands and was dominated by gorse.

The ground flora was characterised by abundant common nettle (*Urtica dioica*), while creeping buttercup (*Ranunculus repens*) occurred frequently throughout the habitat. Other species recorded included herb-robert (*Geranium robertianum*), vetch (*Vicia* spp.) and dog-violet (*Viola* spp.).



Plate 3-6 Example of Scrub (WS1) habitat showing vegetation of bramble, willow. and gorse, establishing east of the EIAR Site Boundary.

Hedgerows (WL1)

An extensive network of Hedgerows (WL1) (Plate 3-7) occurs throughout the Proposed Wind Farm site, forming field boundaries around agricultural grasslands and bordering existing access roads. These Hedgerows (WL1) were predominantly dominated by hawthorn (*Crataegus monogyna*), gorse (*Ulex europaeus*) and bramble (*Rubus fruticosus* agg.). Other species frequently recorded within the hedgerows included blackthorn (*Prunus spinosa*), ash (*Fraxinus excelsior*) and holly (*Ilex aquifolium*).



Plate 3-7 Examples of Hedgerows (WL1) throughout EIAR Site Boundary.

Treelines (WL2)

Linear boundary features exceeding 5 m in height and comprising semi-mature to mature trees were classified as Treelines (WL2). Treeline habitat within the Proposed Wind Farm site (Plate 3-8) was predominantly composed of mature oak (*Quercus robur*) and hawthorn (*Crataegus monogyna*), with occasional sycamore (*Acer pseudoplatanus*) and ash (*Fraxinus excelsior*). An understorey of common shrub species, including hawthorn (*Crataegus monogyna*), ivy (*Hedera helix*) and bramble (*Rubus fruticosus* agg.), was occasionally present, particularly where the treelines were not directly adjacent to commercial conifer plantations.



Plate 3-8 Treeline (WL2) along a field boundary separating agricultural grasslands, located in the southwestern portion of the EIAR Site Boundary and within a proposed borrow pit location.

Stone walls and other stone works (BL1)

A small number of abandoned stone buildings categorised as Stone wall and other stone works (BL1) were recorded within the Conifer plantation (WD4) in the vicinity of the proposed Turbine 7 location. An example of such habitat is provided in Plate 3-9. Although these structures are no longer in use, they provide limited potential roosting, nesting and refuge opportunities for protected fauna, including bats and breeding birds, as well as shelter for small mammals. However, the buildings were largely open, exposed to light and weather, and exhibited a poor level of structural integrity, thereby reducing their suitability for use by protected species.



Plate 3-9 Example of Stone wall and other stone works (BL1) in the vicinity of Turbine 8.

Buildings and artificial surfaces (BL3)

In the southern section of the Proposed Wind Farm site, several buildings were recorded, comprising residential houses and farm sheds. These were classified as Buildings and artificial surfaces (BL3).

Recolonising bare ground (ED3) and Spoil and Bare Ground (ED2)

Existing forestry roads within the Proposed Wind Farm site were typically classified as a mosaic of Recolonising bare ground (ED3) and Spoil and Bare Ground (ED2) (Plate 3-10).

Vegetation colonising these areas comprised frequent bramble (*Rubus fruticosus* agg.), gorse (*Ulex europaeus*), grey willow (*Salix cinerea*), fireweed (*Chamaenerion angustifolium*), *Sphagnum* spp., common bent (*Agrostis capillaris*), marsh thistle (*Cirsium palustre*) and soft rush (*Juncus effusus*).

Occasional to rare species recorded within this habitat included coltsfoot (*Tussilago farfara*), false oat-grass (*Arrhenatherum elatius*), eyebright (*Euphrasia* spp.), oxeye daisy (*Leucanthemum vulgare*), clubmoss (*Lycopodium* spp.), perforate St John's-wort (*Hypericum perforatum*), common centaury (*Centaurium erythraea*) and common knapweed (*Centaurea nigra*). These species were typically confined to road verges and the margins of forestry tracks, particularly where the roads bordered conifer plantation.

Recolonising bare ground (ED3) is an early successional habitat that provides some ecological value by supporting pioneer plant communities. However, the habitat is common and widespread throughout the local and wider landscape and supports relatively low botanical diversity. Accordingly, it has been assessed as being of Local Importance (lower value).

Areas of Spoil and Bare Ground (ED2) were primarily associated with existing access tracks and forestry roads throughout the Proposed Wind Farm site (Plate 3-11). This habitat comprised compacted

mineral substrates with exposed gravel, crushed stone and locally disturbed soils resulting from existing forestry and site access infrastructure.

Where colonisation had occurred, vegetation was restricted to scattered ruderal and pioneer species established along road verges and track margins, while the majority of the habitat remained unvegetated. Small patches of grasses and common herbaceous species occasionally extended onto the track edges from adjacent habitats; however, these did not form a continuous vegetation cover.



Plate 3-10 Example of Recolonising bare ground (ED3) habitat within the Proposed Wind Farm site.



Plate 3-11 Example of Spoil and bare ground (ED2) habitat within the Proposed Wind Farm site.

Drainage Ditches (FW4)

A number of manmade ditches/drains were recorded across the Proposed Wind Farm site. These drains were associated with areas of coniferous forestry and along sections of the existing forestry access roads (see Plate 3-12). Most were deep and narrow (30-40cm wide) and devoid of any significant aquatic vegetation. Pondweed (*Potamogeton spp.*) was recorded on occasion. Overall, these drains were considered to be of relatively low ecological value given their narrow, deep, shaded nature and lack of aquatic vegetation.



Plate 3-12. Example of typical drain recorded throughout the Proposed Wind Farm site (within areas of forestry)

Eroding/ upland rivers (FW1)

The Foyle River (EPA code: 15F07) originates within the western section of the Proposed Wind Farm site and flows in an easterly direction (Plate 3-13). This watercourse flows through areas of Conifer plantation (WD4) and agricultural grasslands and is characteristic of a typical upland stream, comprising sections of glides, riffles and pools. The stream was typically approximately 0.8 m in width and up to 1 m in depth, with a cobble and gravel substrate and moderate flow conditions.

Riparian vegetation along the riverbanks included willow (*Salix* spp.), hazel (*Corylus avellana*), gorse (*Ulex europaeus*), hawthorn (*Crataegus monogyna*), ash (*Fraxinus excelsior*), blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus* agg.). The watercourse is culverted beneath the existing access road leading to the proposed location of Turbine 9.

All watercourses recorded within the Proposed Wind Farm site have downstream hydrological connectivity to the River Barrow and River Nore SAC and provide important foraging and commuting corridors for protected fauna, including mammals, birds and bats. Accordingly, Eroding/Upland Rivers (FW1) have been assessed as being of Local Importance (higher value), with the exception of the River Nore, which has been assessed as International Importance, as it is a designated SAC and SPA.



Plate 3-13 Example of the River Foyle, an Eroding/ upland river (FW1) habitat within the Proposed Wind Farm site.

Exposed Calcareous Rock (ER2) and Dry calcareous and neutral grassland(GS1)

A mosaic of Exposed Calcareous Rock (ER2) and Dry calcareous and neutral grassland (GS1), as classified in accordance with Fossitt (2000), was recorded southeast of the proposed location of Turbine 4. The habitat comprises exposed limestone pavement interspersed with shallow, free-draining calcareous soils supporting species-rich calcareous grassland (Plate 3-14 and Plate 3-15). The exposed limestone presented with typically glint and grike formation, with grikes filled with vegetated shallow soils. Clints were typically exposed with very shallow soils recorded on the surface in places only.

The intimate mosaic of exposed bedrock, thin calcareous soils and scattered scrub creates a structurally diverse habitat with considerably greater botanical diversity than the surrounding Improved Agricultural Grassland (GA1).

Based on the botanical species composition recorded during the survey, as detailed in Appendix 6-1 of the accompanying EIAR, the grassland component corresponds most closely to the GL3C *Festuca rubra–Plantago lanceolata* community under the Irish Vegetation Classification (IVC). This community is characteristic of species-rich calcareous grasslands occurring on limestone-derived substrates and is typified by a diverse assemblage of grasses, herbaceous species and bryophytes.

The vegetation is characterised by a diverse sward dominated by meadow buttercup (*Ranunculus acris*), sweet vernal-grass (*Anthoxanthum odoratum*) and Yorkshire fog (*Holcus lanatus*), with frequent occurrences of red fescue (*Festuca rubra*), common bent (*Agrostis capillaris*), sheep's fescue (*Festuca ovina*) and creeping bent (*Agrostis stolonifera*). The herb layer is well developed and includes common sorrel (*Rumex acetosa*), yarrow (*Achillea millefolium*), bird's-foot trefoil (*Lotus corniculatus*), mouse-ear hawkweed (*Pilosella officinarum*), white clover (*Trifolium repens*), lady's bedstraw (*Galium verum*), germander speedwell (*Veronica chamaedrys*) and creeping thyme (*Thymus polytrichus*), reflecting the calcareous and relatively nutrient-poor nature of the substrate. The bryophyte layer further enhances

the habitat's botanical diversity and includes *Brachythecium rutabulum*, comb moss (*Ctenidium molluscum*) and spear moss (*Calliergonella cuspidata*).

The grassland occurs in a mosaic with exposed limestone pavement and scattered scrub dominated by hazel (*Corylus avellana*), blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*), increasing structural diversity and providing a range of ecological niches. Occasional nutrient-demanding species, including creeping thistle (*Cirsium arvense*), broad-leaved dock (*Rumex obtusifolius*) and common nettle (*Urtica dioica*), were recorded in low abundance, indicating only minor localised nutrient enrichment.

The habitat mosaic exhibits an affinity with the Annex I Priority Habitat 8240 Limestone pavements, while the species-rich calcareous grassland component also exhibits characteristics consistent with Annex I Habitat 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*). However, this grassland does not conform to this Annex I grassland habitat as orchids and insufficient indicator species were recorded during the relevés as per guidelines set out in Martin *et al.* (2018). Nonetheless, the exposed limestone pavement, calcareous grassland and scattered scrub form a high-quality calcareous habitat mosaic of significant botanical and ecological value.



Plate 3-124 Example of Exposed Calcareous Rock (ER2) with Dry calcareous and neutral grassland (GS1) southeast of Turbine 4 within the Proposed Wind Farm site.



Plate 3-15 Further example of Exposed Calcareous Rock (ER2) with established hazel, blackthorn and hawthorn Scrub (WS1)

3.2.1.2 Habitats and Flora along the Proposed 110kV Underground Cabling route

The Proposed 110kV Underground Cabling route between the Proposed Wind Farm and the national electricity grid will be necessary to export electricity from the Proposed Wind Farm. It is proposed to connect the Proposed Wind Farm development to the national electricity grid via a 110kV underground electrical cabling connection to the existing 110kV Ballyragget substation in the townland of Moatpark. The underground electrical cabling route measures approximately 12.6km along the public road network, farm tracks and agricultural lands.

The Proposed 110kV Underground Cabling route will predominantly follow existing roads classified as Buildings and artificial surfaces (BL3) (Plate 3-16). The Proposed 110kV Underground Cabling route will also cross fields classified as Improved agricultural grassland (GA1) on occasion (Plate 3-17). These habitats have been assessed as Local Importance (lower value) only, given their low ecological value.

Habitats recorded adjacent to the Proposed 110kV Underground Cabling route included typical verge habitats such as Dry meadows and grassy verges (GS2), Hedgerows (WL1), Treelines (WL2), Improved agricultural grassland (GA1), Stonewalls and other stonework (BL1), Mixed broadleaved woodland (WD1) and Buildings and artificial surfaces (BL3).

The Proposed 110kV Underground Cabling includes 6 watercourse crossing sites located across one hydrological catchment and three hydrological sub-catchments. These comprised Eroding/ upland rivers (FW1) (Plate 3-18). Smaller watercourses were typically highly vegetated banks, comprised of Scrub (WS1) and Treeline (WL2) species such as bramble, willow, sycamore, and alder.

The construction of the Proposed Grid Connection will require Horizontal Directional Drilling (HDD) under the River Nore, which is designated as the River Barrow and River Nore SAC and the River

Nore SPA, and as such has been assessed as International Importance. This will require the temporary construction of the launch and receptor pits either side of the river. The location of the western compound is proposed to be within the hard shoulder of the N77 national road (Plate 3-19), classified as Buildings and artificial surfaces (BL3). The location of eastern compound is located within an agricultural field assessed as Improved agricultural grassland (GA1) which was dominated by perennial ryegrass.

Full details on watercourses along the Proposed 110kV Underground Cabling route are provided in the Aquatic Baseline Report in **Appendix 1**.

The Proposed 110kV Substation is located within an area of improved grassland, best classified as Improved agricultural grassland (GA1). This was dominated by perennial rye-grass (*Lolium perenne*), with frequent occurrences of Yorkshire fog (*Holcus lanatus*), soft rush (*Juncus effusus*) and creeping buttercup (Ranunculus repens), with occasional cuckoo flower (*Cardamine pratensis*), mouse ear chickweed (*Cerastium fontanum*), and meadow buttercup (*Ranunculus acris*).



Plate 3-16 Existing roadway corridor classified as Buildings and Artificial surfaces (BL3) with Grassy verges (GS2) and Hedgerows (WL1).



Plate 3-17 Example of Improved agricultural grassland habitat (GA1) and Hedgerow (WL1) habitat along the Proposed Grid Connection underground cabling route.



Plate 3-18 Example of Eroding/ upland rivers (FW1) along the Proposed Grid Connection underground cabling route.



Plate 3-19 The N77 within which the western HDD compound will be constructed for HDD works beneath the River Nore.

3.2.1.3 Habitats and Flora along the Proposed Turbine Delivery Route

It is envisaged that large wind turbine components will be delivered to the EIAR Site Boundary, from the Port of Cork (Ringaskiddy) (other ports such as Galway Port, Shannon Foynes or Dublin Port could also be used), via the N28 and N40 national primary road, the M8 Motorway, R639 and R693 regional roads followed by the L1857 local road.

The current proposed Turbine Delivery Route (TDR) for the Proposed Wind Farm is predominantly located within existing public road infrastructure. The TDR will travel along the road network to the southeast of the EIAR Site Boundary and will require minor accommodation works at four locations.

Where accommodation works are required along the proposed TDR, these points are delineated by similar habitat to that of the Proposed 110kV Underground Cabling route which predominantly contains Buildings and artificial surfaces (BL3), Dry meadows and grassy verges (GS2), Hedgerows (WL1), Treelines (WL2) and bordered by agricultural grasslands and amenity grasslands.

Hedgerow habitat was dominated by bramble (*Rubus fruticosus agg)*, and contained occasional occurrences of bracken, snowberry (*Symphoricarpos albus*), and willowherb (*Epilobium hirsutum*). Common species recorded within Treeline habitat included sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*), oak (*Quercus robur*), birch (*Betula* sp.) and beech (*Fagus sylvatica*).

3.2.2 Otter Surveys

Watercourses throughout the vicinity of the Proposed Wind Farm and along the Proposed 110kV Underground Cabling route were surveyed for signs of otter, including spraint, prints, trails, holts and couches.

No otter resting or breeding sites were recorded during the surveys undertaken for both the Proposed Wind Farm site and Proposed Grid Connection.

Despite widespread suitability at many survey sites in terms of foraging habitat, otter signs such as spraints were only recorded at 2 no. sites during the survey. These were identified on the Borrisbeg River at site C2 and the Coolnacrutta Stream at site D2. Further details are provided in **Appendix 1**.

Although no otter resting or breeding sites were recorded within the Site, the Site lies within the foraging range of otter from the River Nore, which is a Qualifying Interest of River Barrow and River Nore SAC [002162] and are likely to frequent the Site, at least on occasion.

3.2.3 Aquatic Surveys

Watercourses surveyed within the vicinity of the Proposed Wind Farm site consisted of *Eroding/Upland Rivers (FW1)*, with upland, headwater rivers profiles at various survey locations. The Site also contained wider, lowland stretches of watercourse, with varying degree of modification but overall high fisheries potential.

Q-value scores calculated for the survey sites in the vicinity of the wind farm ranged from Q2-3 -Poor to Q3-4 -Moderate, Q4 -Good and Q4-5 - High.

There were no positive results for freshwater pearl mussel or crayfish plague eDNA at any of the wind farm survey locations. Positive results for white-clawed crayfish eDNA were found at site B5 the Nuenna River, site C3 on the River Goul and site C5 on the River Erkina, a freshly deceased juvenile crayfish (likely predated by an otter) was recorded at site C5 on the River Erkina at Durrow Bridge indicated the presence of this species at or upstream of these locations.

No evidence of regular kingfisher roosting was recorded during the surveys and no kingfisher burrows were identified at any survey location at the time of survey. However, Kingfisher were recorded seven times during the breeding kingfisher surveys. Five of these records were within the Proposed 110kV Underground Cabling route, while a further two records were approximately 800 m from the Proposed 110kV Underground Cabling route. All records were more than 8.8 km from the Proposed Wind Farm site. On this basis, there is no population of ecological significance using the Proposed Wind Farm site.

Watercourses surveyed along the Proposed 110kV Underground Cabling comprised stretches of Eroding/Upland River (FW1) and Depositing/Lowland River (FW2), with varying degrees of modification. The detailed results are provided in the Aquatic Baseline Report.

Five sites along the Proposed 110kV Underground Cabling route offered the highest quality potential fisheries habitat along the grid connection route, as well as the best potential commuting and foraging habitat for otter. No otter signs, holts or couches were identified along the Proposed 110kV Underground Cabling route at the time of survey.

The locations, methodologies and results of all aquatic surveys undertaken for the Proposed Project are included in the Aquatic Baseline Report provided in **Appendix 1**.

3.2.4 Invasive Species

During field surveys, a search for Invasive Alien Species (IAS) listed under the 'Third Schedule' of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) and the 'First Schedule' of the European Union (Invasive Alien Species) Regulations 2024 (S.I. 374 of 2024) was conducted.

No invasive species listed on the Third Schedule or First Schedule were recorded within the EIAR Site Boundary or along the Proposed 110kV Underground Cabling route.

3.2.5 Bird Surveys

Bird species recorded during the multidisciplinary walkover surveys, of both the Proposed Wind Farm site and the Proposed 110kV Underground Cabling route, were typically an assemblage of common species typical of agricultural and rural environments.

The Proposed 110kV Underground Cabling route crosses the River Nore SPA. Kingfisher was not recorded at watercourses surveyed within the Proposed Wind Farm site, and no kingfisher burrows were identified at the survey locations.

At the River Nore crossing, no kingfisher nesting burrows were recorded within the surveyed area. The assessment identified limited sub-optimal nesting habitat close to the crossing. The crossing will be completed by horizontal directional drilling.

The potential effects on kingfisher are disturbance during construction and a reduction in prey availability or foraging habitat quality if water quality deteriorates.

No evidence indicates that the Proposed Wind Farm site provides significant *ex-situ* habitat for an SCI population associated with another SPA. The European-site assessment therefore focuses on the River Nore SPA and its kingfisher population.

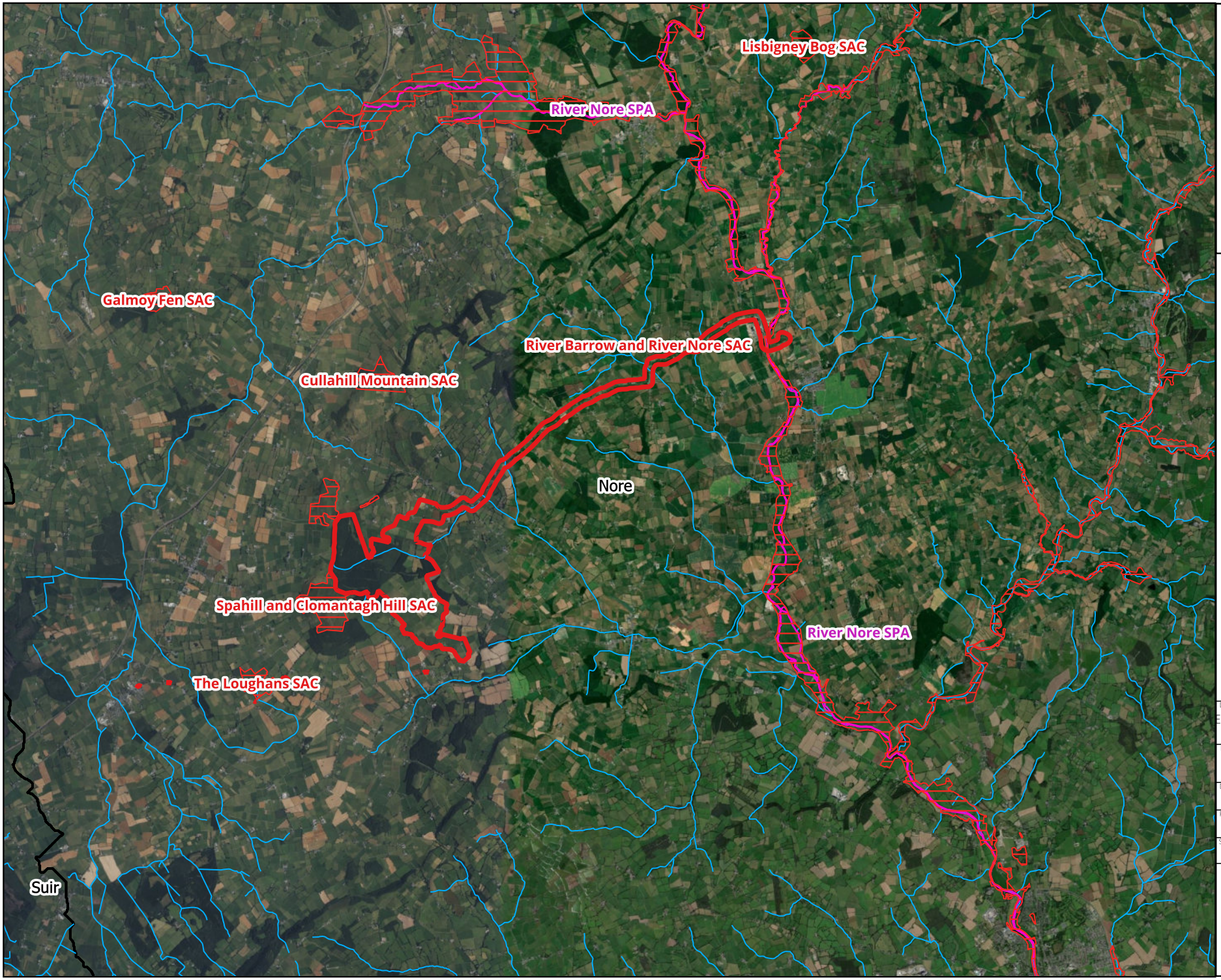
The Proposed 110kV Underground Cabling route is predominantly within existing roads. The River Nore crossing is the location at which direct spatial interaction with the River Nore SPA occurs and is assessed further in this NIS.

4. STAGE 1 - APPROPRIATE ASSESSMENT SCREENING

4.1 Identification of Relevant European sites

The following methodology was used to establish any European sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the Proposed Project:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie).
- All European sites that could potentially be affected were identified using a source-pathway - receptor model. To provide context for the assessment, European sites surrounding the Proposed Project are shown on Figure 4-1. Information on these sites according to the site-specific conservation objectives is provided in Table 4-1.
- The catchment mapping was used to establish or discount potential hydrological connectivity between the Site and any European sites. The hydrological catchments are also shown in Figure 4-1.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, the Scottish Natural Heritage (SNH) Guidance, '*Assessing Connectivity with Special Protection Areas* (SPA)' (2016) was consulted. This document provides guidance in relation to the identification of connectivity between Proposed Project and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects.
- Table 4-1 provides details of all relevant European sites as identified in the preceding steps and assesses the potential for likely significant effects on each.
- The assessment considers any likely direct or indirect impacts of the Proposed Project, both alone and in combination with other plans and projects, on European sites by virtue of criteria including the following: size and scale, land-take, distance from the European site or key features of the site, resource requirements, emissions, excavation requirements, transportation requirements and duration of construction, operation and decommissioning were considered in this assessment.
- The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report.
- Where potential pathways for Likely Significant Effect are identified, the site is included within the Likely Zone of Influence and further assessment is required within the NIS.
- The potential for the Proposed Project to result in cumulative impacts on any European sites in combination with other plans and projects was considered in the assessment that is presented in Table 4-1. Plans and projects considered include those that are listed in **Appendix 4**.



Map Legend

- Killoshulan WF Boundary
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- WFD Hydrological Catchments
- WFD River Waterbodies

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Drawing Title
European Designated Sites within the Likely Zone of Influence

Project Title
Killoshulan WF

Drawn By	Checked By
AMc	DM
Project No.	Drawing No.
260172	Figure 4-1
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Table 4-1 Identification of European sites within the Likely Zone of Influence.

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
Special Areas of Conservation (SAC)				
Spahill and Clomantagh Hill SAC (000849) Approx. distance from Proposed Wind Farm site: **0 m** (Borders Proposed Wind Farm site to the north and east) Approx. distance from Proposed 110kV Underground Cabling route: **3.0 km** Approx. Hydrological Distance from the Site **0 km**	› Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]	Detailed conservation objectives for this site (Version 1, November 2021, were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protectedsites/conservation_objectives/CO000849.pdf	The Proposed Project is located entirely outside this designated European site and therefore, no potential exists for direct effects. While this SAC is located adjacent to the Proposed Project site, there are no works anticipated within approx. 300m of the SAC and the SAC is buffered by existing mature forestry. Therefore, there is no potential for direct effects as a result of encroachment or works and resulting habitat loss/degradation. No Qualifying Interest (QI) habitats of this SAC were recorded within or adjacent to the Proposed Project and therefore, there is no potential for direct *ex-situ* effects on the QI habitat of this European site. The potential for significant indirect effects on this SAC was also considered. The Qualifying Interests (QIs) of the SAC comprise terrestrial habitats only. Therefore, considering the terrestrial nature of the QIs and the intervening distance between the works associated with the Proposed Project site and the SAC, no potential pathway for significant indirect effects on this European site was identified.	**No**

Accessed at <https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives>

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
			No pathway for likely significant effect on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. This SAC is not within the Likely Zone of Influence of the Proposed Project. Therefore, it is not considered further in this assessment.	
The Loughans SAC (000407) Approx. distance from Proposed Wind Farm site **2.6 km** Approx. distance from Proposed 110kV Underground Cabling route: **5.8 km** Approx. Hydrological Distance from the Site: **no direct hydrological connectivity**	› Turloughs [3180]	Detailed conservation objectives for this site (Version 1, December 2020), were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000407.pdf	There will be no direct effects on this SAC, as the Proposed Project is located entirely outside the boundary of the designated site. The potential for indirect effects was also considered. As detailed in Section 3.1.3, there is no surface water or groundwater connectivity between the Proposed Wind Farm site or the Proposed Grid Connection and this SAC. While there will be accommodation works associated with the proposed TDR approx. 110m from this SAC, these works are minor, short term and require no excavations. Given the absence of surface water or groundwater connectivity between the Proposed Project and this SAC, no potential for significant indirect effects have been identified. **No pathway for likely significant effect on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. This European site is not within the Likely Zone of Influence of the Proposed Project. Therefore, it is not considered further in this assessment.**	**No**

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
Cullahill Mountain SAC (000831) Approx. distance from Proposed Wind Farm site: **2.6 km** Approx. distance from Proposed 110kV Underground Cabling route: **3.0 km** Approx. Hydrological Distance from the Site: **no hydrological connectivity**	› Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]	Detailed conservation objectives for this site (Version 1, November 2021, were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protectedsite/conservation_objectives/CO000831.pdf	The Proposed Project is located entirely outside this designated European site and therefore, no potential exists for direct effects. No Qualifying Interest (QI) habitats were recorded within or adjacent to the Proposed Project and therefore, there is no potential for direct *ex-situ* effects on the QI habitat of this European site. The potential for significant indirect effects on this SAC was also considered. The Qualifying Interests (QIs) of the SAC comprise terrestrial habitats only. Therefore, considering the terrestrial nature of the QIs and the intervening distance between the Proposed Project site and the SAC, no potential pathway for significant indirect effects on this European site was identified. **No pathway for likely significant effect on this European site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. This European site is not within the Likely Zone of Influence of the Proposed Project. Therefore, it is not considered further in this assessment.**	**No**
River Barrow and River Nore SAC (002162)	› Estuaries [1130]	Detailed conservation objectives for this site (Version 1, June 2025,	There is potential for direct effects as the Proposed 110kV Underground Cabling route component of the Proposed Project crosses the River Nore which forms part of this SAC. There is no potential for direct effects as a	**Yes**

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
Approx. distance from Proposed Wind Farm site: **7.3 km** Approx. distance from Proposed 110kV Underground Cabling route: **0 km** Approx. Hydrological Distance from the Site: **0 km**	› Mudflats and sandflats not covered by seawater at low tide [1140] › Reefs [1170] › *Salicornia* and other annuals colonising mud and sand [1310] › Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] › Mediterranean salt meadows (*Juncetalia maritimi*) [1410] › Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] › European dry heaths [4030] › Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] › Petrifying springs with tufa formation (*Cratoneurion*) [7220]	were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protectedsites/conservation_objectives/CO002162.pdf	result of the Proposed Wind Farm as this is located entirely outside of this SAC. The river Nore will be crossed by means of horizontal direction drilling (HDD). While this avoids the necessity of works within the SAC boundary, and the potential for significant effects as a result of habitat loss, there is potential for direct effects on water quality as a result of frack out during these works, potentially resulting in direct impacts on aquatic QIs of the SAC. Furthermore, taking a precautionary approach, the potential exists for direct effects on otter, a QI species of this SAC, as a result of direct disturbance during the construction decommissioning phases of the Proposed Project. The potential for indirect effects was also considered. Hydrological connectivity exists between the Proposed Project and this SAC via mapped WFD watercourses, namely the Nuenna_10, Gorteenahilla_10, Lisdowney_010 and Nore_140 watercourses. Therefore, a potential pathway for significant indirect effects on the aquatic QIs of this SAC was identified. In the absence of mitigation, there is potential for deterioration of water quality within the SAC through the runoff or percolation of pollutants to connected watercourses during the construction, operational and decommissioning phases of the Proposed Project.	

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
	› Old sessile oak woods with *Ilex and Blechnum* in the British Isles [91A0] › Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] › *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] › *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] › *Austropotamobius pallipes* (White-clawed Crayfish) [1092] › *Petromyzon marinus* (Sea Lamprey) [1095] › *Lampetra planeri* (Brook Lamprey) [1096] › *Lampetra fluviatilis* (River Lamprey) [1099] › *Alosa fallax fallax* (Twaite Shad) [1103] › *Salmo salar* (Salmon) [1106]		**A complete source-pathway-receptor chain was identified. Therefore, in the absence of mitigation, there is potential for the Proposed Project to result in likely significant effects on this European site. This European site is considered to be within the Likely Zone of Influence of the Proposed Project and further assessment is required.**	

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
	› *Lutra lutra* (Otter) [1355] › *Vandenboschia speciosa* (Killarney Fern) [6985]			
Galmoy Fen SAC (001858) Approx. distance from Proposed Wind Farm site: **6.7 km** Approx. distance from Proposed 110kV Underground Cabling route: **8.4 km** Approx. Hydrological Distance from the Site: **no connectivity**	› Alkaline fens [7230]	Detailed conservation objectives for this site (Version 1, July 2019), were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001858.pdf	The Proposed Project is located entirely outside this designated European site and therefore, no potential exists for direct effects. No Qualifying Interest (QI) habitats were recorded within or adjacent to the Proposed Project and therefore, there is no potential for direct *ex-situ* effects on the QI habitat of this European site. The potential for indirect effects was also considered. While the Proposed Project and this SAC are partially situated within the same sub-catchment, (Goul_SC_010) the SAC is located upstream of the Proposed Project site, and no direct hydrological connectivity exists. Additionally, this SAC is located in a separate groundwater catchment to the Proposed Project, the Shanahoe and Lisdowney, respectively. Given the intervening distance between the sites and the absence of any direct hydrological connectivity, no pathway for indirect effects was identified. **No potential for likely significant effects on this European site has been identified, either alone or in combination with other plans or projects,**	**No**

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
			and in the absence of mitigation measures. This European site is therefore not considered to be within the Likely Zone of Influence of the Proposed Project and is not considered further in this assessment.	
Lisbigney Bog SAC (000869) Approx. distance from Proposed Wind Farm site: **14.0 km** Approx. distance from Proposed 110kV Underground Cabling route: **6.1 km** Approx. Hydrological Distance from the Site: **no connectivity**	› Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] › *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016]	Detailed conservation objectives for this site (Version 1, December 2021, were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000869.pdf	The Proposed Project is located entirely outside this designated European site and therefore, no potential exists for direct effects. No Qualifying Interest (QI) habitats or species were recorded within or adjacent to the Proposed Project and therefore, there is no potential for direct *ex-situ* effects on the QI habitat of this European site. The potential for significant indirect effects on this SAC was also considered. The Proposed Project and this SAC are located within separate sub-catchments, and the SAC is located upstream of the Proposed Project site, Therefore, no hydrological connectivity exists between the Proposed Project site and this SAC. Additionally, this SAC is located in a separate groundwater catchment to the Proposed Project, the Durrow and Lisdowney, respectively. Given the intervening distance and the absence of any direct hydrological connectivity, no pathway for indirect effects was identified. **No potential for likely significant effects on this European site has been identified, either alone or in combination with other plans or projects, and in the absence of mitigation measures. This European site is therefore**	**No**

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
			not considered to be within the Likely Zone of Influence of the Proposed Project and is not considered further in this assessment.	
Special Protection Area (SPA)				
River Nore SPA (004233) Approx. distance from Proposed Wind Farm site: **7.3 km** Approx. distance from Proposed 110kV Underground Cabling route: **0 km** Approx. Hydrological Distance from the Site: **0 km**	› Kingfisher (*Alcedo atthis*) [A229]	Detailed conservation objectives for this site (Version 1, July 2024), were reviewed as part of the assessment and are available at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004233.pdf	There is potential for direct effects as the Proposed 110kV Underground Cabling route component of the Proposed Project crosses the River Nore which forms part of this SPA. There is no potential for direct effects as a result of the Proposed Wind Farm as this is located entirely outside of this SPA. The River Nore will be crossed by means of horizontal direction drilling (HDD). While this avoids the necessity of works within the SPA boundary, and the potential for significant effects as a result of habitat loss, there is potential for direct effects on water quality as a result of frack out during these works, potentially resulting in direct impacts on supporting kingfisher, the single SCI of this SPA, habitat. While no significant supporting breeding habitat for kingfisher was recorded where the Proposed 110kV Underground Cabling route will cross the SPA, taking a precautionary approach, there is potential for significant effects to this SPA as a result of disturbance during the construction and decommissioning phases of the Proposed Project. With regards to collision risk, no kingfisher nor significant supporting habitat was recorded within the Proposed Wind Farm site and therefore,	**Yes**

European sites and distance from Proposed Project	Qualifying Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie[9] on the 14/07/2026)	Conservation Objectives	Identification of Source-Pathway-Receptor chain	Potential for Likely Significant Effects (LSEs)
			there is no potential for significant effects as a result of collision risk with the proposed turbines. The potential for indirect effects was also considered. Hydrological connectivity exists between the Proposed Project and this SPA via mapped WFD watercourses, namely the Nuenna_10, Gorteenahilla_10, Lisdowney_010 and Nore_140 watercourses. Therefore, a potential pathway for significant indirect effects on supporting kingfisher habitat within the SPA was identified. In the absence of mitigation, there is potential for deterioration of water quality within the SPA through the runoff or percolation of pollutants to connected watercourses during the construction, operational and decommissioning phases of the Proposed Project. **A complete source-pathway-receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Project to result in likely significant effects on this European site. The European site is considered to be within the Likely Zone of Influence of the Proposed Project and further assessment is required.**	

4.2 Appropriate Assessment Screening Conclusion

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Project, individually or in combination with other plans and projects, would be likely to have a significant effect on the following:

- River Barrow and River Nore SAC (002162)
- River Nore SPA (004233)

As a result, an Appropriate Assessment of the Proposed Project is required. Information to enable the competent authority to carry out an AA of the Proposed Project is presented in Section 5 of this report.

5. STAGE 2 – NATURA IMPACT STATEMENT (NIS)

The potential for likely significant effects on the following European sites in the absence of any mitigation, individually or cumulatively with other plans or projects, was identified in the preceding section:

- River Barrow and River Nore SAC (002162)
- River Nore SPA (004233)

The following sections consider each European site individually to:

1. Provide the results of any additional survey work that was necessary to inform an impact assessment.
2. Determine which individual qualifying features have the potential to be adversely affected by the Proposed Project.
3. Provide information with regard to the Conservation Objectives and site-specific pressures and threats for those qualifying features that have the potential to be adversely affected.

5.1 River Barrow and River Nore SAC (002162)

The potential for impacts on this SAC was identified in Section 4.1 above. The identified pathways for effect consisted of the following:

- Deterioration of water quality via direct impacts resulting from potential 'frack out' associated within the HDD works crossing the River Nore.
- Deterioration of water quality via the indirect runoff or spillage of pollutants during construction as the Proposed Project being hydrologically connected to this SAC.
- Direct disturbance/displacement to QI species which may utilising suitable habitat within the River Nore during the construction phase.

The Site-Specific Conservation Objectives (SSCOs) document and Natura 2000 Data Form for this designated site were reviewed during this assessment and can be found at the following online locations:

SSCOs: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf . Accessed the 9th of October 2026.

Natura 2000 Data Form:
https://natura2000.eea.europa.eu/Natura2000/sdf/#/sdf?site=IE0002162&release=62 Accessed the 9th of October 2026

Table 5-1 below lists the qualifying features of this European site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.1 Identification of Individual Qualifying Interest species with the Potential to be Affected.

Table 5-1 Assessment of potential effects on Qualifying features of the River Barrow and River Nore SAC.

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
[1016] Desmoulin's whorl snail *Vertigo moulinsiana*	To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC.	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be by Horizontal Directional Drilling (HDD). Desmoulin's whorl snail is a terrestrial species associated with vegetation of wetland habitats often bordering waterbodies such as canals, ditches lakes and rivers (Long and Brophy, 2019[10]). Both habitats within which the launch pits are situated provide unsuitable habitat for this QI species *Vertigo moulinsiana* and as such there is no potential for direct impacts on this QI species (e.g. loss of occupied sites within the SAC, population density etc.). Given this QI species is terrestrial in nature potential indirect impacts associated with deterioration of water quality within the SAC as a result of the Proposed Project would have no effect on this terrestrial QI species. **No further assessment is required.**	No
[1029] Freshwater pearl mussel *Margaritifera margaritifera*	To restore the Favourable conservation condition of the Freshwater pearl mussel	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by	**Yes**

[10] https://www.npws.ie/sites/default/files/publications/pdf/IWM104_0.pdf

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
	(*Margaritifera margaritifera*) in River Barrow and River Nore SA	Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. The current distribution of freshwater pearl mussel (FWPM) populations for which this SAC is designated, as shown on Map 8 of the SSCOs for this SAC, are located within the Nore_SC-050 and the Barrow_SC_140 sub-catchments. The Proposed Project is located entirely within the Nore_SC_070 sub-catchment. Therefore, there is no direct hydrological connectivity to populations of FWPM. Furthermore, as per the findings of targeted aquatic surveys no freshwater pearl mussel eDNA was detected in watercourses downstream of the Proposed Wind Farm site (see Aquatic Baseline Report, **Appendix 1**). These results were considered evidence of the species' absence within and downstream of the survey area. Furthermore, this species has declined significantly in recent years and is now confined to areas upstream of the Erkina River confluence at Durrow, according to NPWS and Triturus data. It has recently been concluded that freshwater pearl mussel are no longer present in the River Nore downstream of the Erkina River confluence (Sweeney, 2022). However, taking a precautionary approach and considering that the conservation objective for this species is to restore its favourable conservation status within the SAC, the specific conservation targets relate to water quality and the maintenance of its host fish species, particularly the maintenance of sufficient juvenile salmonids to host glochidial larvae. A deterioration in water quality within the SAC could undermine these conservation targets and prevent the Freshwater pearl mussel from regaining favourable conservation status within the SAC. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
[1092] White-clawed crayfish *Austropotamobius pallipes*	To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Surveys undertaken as part of the Proposed Project, specifically eDNA surveys detected white-clawed crayfish via eDNA sampling at site B5 the Nuenna River, site C3 on the River Goul and site C5 on the River Erkina (See **Appendix 1** for Aquatic Baseline Report), each of which are located downstream of the Proposed Project. This QI species is therefore considered to be within the ZoI of the Proposed Project. A deterioration in water quality as a result of the Proposed Project would have the potential to undermine the conservation objectives for this species within the SAC. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	**Yes**
[1106] Atlantic salmon (*Salmo salar*) (only in fresh water)	To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Surveys undertaken as part of the Proposed Project identified that Atlantic salmon were recorded from a total of 6 no. sites on the Gorteenahilla River (A6, GCR1), Nuenna River (B4, B5), River Goul (C4) and the River Erkina (C5), each of which are located downstream of the Proposed Project. Salmonid densities were typically low to medium, with the highest numbers	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
		present on the Nuenna River and River Erkina (See Aquatic Baseline Report, **Appendix 1**). GCR1, A6, B4 and B5 are located downstream of the Proposed Wind Farm. This QI species is therefore considered to be within the ZoI of the Proposed Project. A deterioration in water quality as a result of the Proposed Project would have the potential to undermine the conservation objectives for this species. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	
[1095] Sea lamprey *Petromyzon marinus*	To restore the favourable conservation condition of Sea lamprey in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Surveys undertaken as part of the Proposed Project found that lamprey habitat within the survey area was typically restricted by the higher-energy conditions at many sites. However, *Lampetra* sp. ammocoetes were recorded at low densities at a total of 6 no. sites: the Gorteenahilla River (A6), Nuenna River (B5), River Erkina (C5), Coolnacrutta Stream (D2), and Lisdowney Stream (GCR3), each of which are located downstream of the Proposed Project. The species was also detected in the River Goul through eDNA sampling (See Aquatic Baseline Report, **Appendix 1**). Therefore, taking a precautionary approach this QI is considered to be within the ZoI of the Proposed Project. A deterioration in water quality, in particular from silt laden runoff, could have the potential to undermine the conservation objectives for this species in particular in relation to extent and distribution of spawning habitat. This species requires clean gravels to spawn.	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
		A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.	
[1096] Brook lamprey *Lampetra planeri*	To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Surveys undertaken as part of the Proposed Project found that lamprey habitat within the survey area was typically restricted by the higher-energy conditions at many sites. However, *Lampetra* sp. ammocoetes were recorded at low densities at a total of 6 no. sites: the Gorteenahilla River (A6), Nuenna River (B5), River Erkina (C5), Coolnacrutta Stream (D2), and Lisdowney Stream (GCR3), each of which are located downstream of the Proposed Project. The species was also detected in the River Goul through eDNA sampling (See Aquatic Baseline Report, **Appendix 1**). The SSCO for the SAC don't specify where this QI species may be present within the SAC. The overall conservation objective is to restore favourable conservation status of this QI. Therefore, taking a precautionary approach this QI is considered to be within the ZoI of the Proposed Project. A deterioration in water quality, in particular from silt laden runoff, could have the potential to undermine the conservation objectives for this species in particular in relation to extent and distribution of spawning habitat. This species requires clean gravels to spawn. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
[1099] River lamprey *Lampetra fluviatilis*	To restore the favourable conservation condition of River lamprey in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Surveys undertaken as part of the Proposed Project found that lamprey habitat within the survey area was typically restricted by the higher-energy conditions at many sites. However, *Lampetra* sp. ammocoetes were recorded at low densities at a total of 6 no. sites: the Gorteenahilla River (A6), Nuenna River (B5), River Erkina (C5), Coolnacrutta Stream (D2), and Lisdowney Stream (GCR3), each of which are located downstream of the Proposed Project. The species was also detected in the River Goul through eDNA sampling (See Aquatic Baseline Report, **Appendix 1**). The SSCO for the SAC don't specify where this QI species may be present within the SAC. The overall conservation objective is to restore favourable conservation status of this QI. Therefore, taking a precautionary approach this QI is considered to be within the ZoI of the Proposed Project. A deterioration in water quality, in particular from silt laden runoff, could have the potential to undermine the conservation objectives for this species in particular in relation to extent and distribution of spawning habitat. This species requires clean gravels to spawn. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	**Yes**
[1103] Twaite shad *Alosa fallax*	To restore the favourable conservation condition of Twaite	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
	shad in the River Barrow and River Nore SAC	works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). The Proposed Project is hydrologically linked to the River Barrow and River Nore SAC. Surveys undertaken as part of the Proposed Project did not detect this species. The SSCO for this species note that regular breeding has been confirmed in the River Barrow in recent years, but not in the Nore. The overall conservation objective is to restore favourable conservation status of this QI. Therefore, taking a precautionary approach to this QI, it is considered to be within the ZoI of the Proposed Project. A deterioration in water quality could have the potential to undermine the conservation objectives for this species in particular in relation to water quality (oxygen levels) and maintenance of suitable spawning habitat (gravels free of fines material and algal growth which can be exacerbated due to deterioration on water quality. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	
[1355] Otter *Lutra lutra*	To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. No suitable habitat for otter was recorded within the Proposed Wind Farm site. Despite widespread suitability at multiple survey sites along and downstream of the Proposed 110kV Underground Cabling route in terms of foraging habitat, otter signs (spraint sites) were only recorded at 2 no. sites during the surveys undertake. These were identified on the Borrisbeg River at site C2 and the Coolnacrutta Stream at site D2. No breeding (holts) or resting (couch) areas were identified in the vicinity of the Proposed Project.	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
		However, given that the Proposed 110kV Underground Cabling route crosses the SAC, as well as several watercourses in close proximity to the SAC, and talking a precautionary approach, there is potential for adverse effects on otter, as a result of disturbance/displacement, during the construction and decommissioning phases of the Proposed Project. There is potential for construction works to result in the run-off of silt and other pollutants such as hydrocarbons and cementitious material into watercourses downstream of the Proposed Wind Farm and along the Proposed 110kV Underground Cabling route. This has the potential to impact on the conservation objectives for this species in particular in relation to fish biomass, for example degradation in water quality could impact on prey resource for otter. **A complete source-pathway-receptor chain for adverse effects on this species was identified as such this species is considered further in the assessment.**	
[6985] Killarney fern Vandenboschia speciosa	To maintain the favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC	The Proposed Project is located outside the SAC as such there is no potential for direct impacts on this QI species. As per Map 7 of the SSCOs for this SAC, the nearest known location of this QI species is located approx. 40.6km southeast of the Proposed Project. Given this QI species is terrestrial in nature potential indirect impacts associated with deterioration of water quality within the SAC as a result of the Proposed Project would not have an effect on this QI species. **No further assessment is required.**	No
[3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC.	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
	the River Barrow and River Nore SAC	As per the SSCOs for this SAC, the full distribution of this habitat and its sub-types within the SAC is currently unknown. Therefore, taking a precautionary approach, the potential for significant effects on this QI habitat cannot be excluded. A deterioration in water quality, in particular from silt laden runoff, could have the potential to undermine the conservation objectives for this QI habitat which requires the substratum to be free from fine sediment. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified as such this habitat is considered further in the assessment.**	
[1130] Estuaries	To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Although the Proposed Project site is hydrologically linked to the SAC, the known extent of this QI habitat is located over 37km downstream, as per SSCOs of the SAC. Given the hydrological separation distance between the Proposed Project and this QI, and the attenuating and diluting property of the intervening River Nore, any changes in water quality resulting from the Proposed Project would not have the potential to undermine any of the conservation objectives for this QI habitat. **No further assessment is required.**	No
[1140] Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of the Mudflats and sandflats not covered	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by	No

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
	by seawater at low tide in the River Barrow and River Nore SAC	Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Although the Proposed Project site is hydrologically linked to the SAC, the known extent of this QI habitat is located over 50 km downstream, as per SSCOs of the SAC. Given the hydrological separation distance between the Proposed Project and this QI, and the attenuating and diluting property of the intervening River Nore, any changes in water quality resulting from the Proposed Project would not have the potential to undermine any of the conservation objectives for this QI habitat. **No further assessment is required.**	
[1310] *Salicornia* and other annuals colonizing mud and sand	To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site, the Proposed 110kV Underground Cabling route crosses this SAC. However, no instream works are required as part of the Proposed 110kV Underground Cabling route. Only minor cabling installation works are proposed within the public road, and the crossing of the SAC will be undertaken by Horizontal Directional Drilling (HDD). All watercourses in the vicinity of the Proposed Project are hydrologically connected to this SAC. Although the Proposed Project site is hydrologically linked to the SAC, the known extent of this QI habitat is located over 50 km downstream, as per SSCOs of the SAC. Given the hydrological separation distance between the Proposed Project and this QI, and the attenuating and diluting property of the intervening River Nore, any changes in water quality resulting from the Proposed Project would not have the potential to undermine any of the conservation objectives for this QI habitat. **No further assessment is required.**	No

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
[1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC	According to Map 5 in the SSCO for this SAC, the closest example of this QI habitat to the Proposed Project site is in excess of 70 km downstream. While the SSCOs also state that further areas of this habitat that have not been surveyed maybe present within the SAC, given the hydrological distance downstream of potential supporting locations for this habitat i.e. estuarine tidal areas, there is no potential for adverse effects on this QI habitats, as a result of the Proposed Project. **No further assessment is required.**	No
[1410] Mediterranean salt meadows (*Juncetalia maritimi*)	To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC	According to Map 5 in the SSCO for this SAC, the closest example of this QI habitat to the Proposed Project site is in excess of 68 km downstream. While the SSCOs also state that further areas of this habitat that have not been surveyed maybe present within the SAC, given the hydrological distance downstream of potential supporting locations for this habitat i.e. estuarine tidal areas, there is no potential for adverse effects on this QI habitats, as a result of the Proposed Project. **No further assessment is required.**	No
[4030] European dry heaths	To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site the Proposed 110kV Underground Cabling route crosses this SAC. However, this QI habitat was not recorded within the Proposed Project site during any surveys undertaken and therefore, there is no potential for direct habitat loss of this QI, as a result of the Proposed Project. Additionally, given the nature of this QI habitat, there is no potential for indirect effects, as a result of the Proposed Project.	No

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
		No further assessment is required.	
[6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC	As per the SSCOs of this this SAC, the extent of this QI habitat has not been mapped. However, QI habitat was not recorded within the Proposed Project site during any surveys undertaken and therefore, there is no potential for direct habitat loss of this QI, as a result of the Proposed Project. However, given that the Proposed Project is hydrological connected to this SAC and that this QI habitat is influenced by surface water quality, particularly in terms of vegetation composition, there is potential for significant effects on this habitat, as a result of the Proposed Project, via deterioration of water quality. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified as such this habitat is considered further in the assessment.**	Yes
[7220] * Petrifying springs with tufa formation (*Cratoneurion*)	To maintain the favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion*) in the River Barrow and River Nore SAC	The full extent of this QI habitat within the SAC is currently unknown. However, as per Map 6 of the SSCOs the nearest known record for this QI habitat is located in excess of 34km from the Proposed Project site. This habitat was not recorded within the study area. As per guidance (SEPA, 2024) a buffer of 250m is required from sensitive ground water dependant habitats where excavations will exceed 1m, and 100m where excavations will not exceed 1m. Based on best available data for this habitat within the SAC and the separation distance from the works associated with the Proposed Project (well in excess of 250m) direct impacts to this QI habitat as a result of the Proposed Project can be excluded. The Proposed Wind Farm site is located within the same hydrological sub-catchment (Nore_SC_070) and groundwater catchment (Lisdowney) as the SAC. Potential hydraulic connections via groundwater flow exist over a generally long distance (kilometres), i.e. the regional groundwater flow towards the River Nore. However, large volumes of concrete will be required associated with construction of turbine foundations, therefore taking a precautionary approach potential impacts on ground water quality were also considered.	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
		Therefore, a pathway for indirect effects on this QI habitat of the SAC exist in the form of water quality deterioration and habitat degradation via ground water pathways. **A complete source-pathway-receptor chain for adverse effects on this habitat was identified as such this habitat is considered further in the assessment.**	
[91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	To restore the favourable conservation condition of Old oak woodland with *Ilex* and *Blechnum* in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site the Proposed 110kV Underground Cabling route crosses this SAC. However, this QI habitat was not recorded within the Proposed Project site during any surveys undertaken and therefore, there is no potential for direct habitat loss of this QI, as a result of the Proposed Project. Additionally, given the nature of this QI habitat, there is no potential for indirect effects, as a result of the Proposed Project. **No further assessment is required.**	No
[91E0] * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in the River Barrow and River Nore SAC	While the Proposed Wind Farm is located outside of this designated site the Proposed 110kV Underground Cabling route crosses this SAC. However, this QI habitat was not recorded within the Proposed Project site during any surveys undertaken and therefore, there is no potential for direct habitat loss of this QI, as a result of the Proposed Project. Additionally, given the nature of this QI habitat, there is no potential for indirect effects, as a result of the Proposed Project.	No

Qualifying feature	Conservation Objective (NPWS, Version 2, June 2025)	Rationale	Potential for Adverse Effects Yes/No
		No further assessment is required.	

5.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form[11] for the River Barrow and River Nore SAC the site-specific threats, pressures and activities with potential to impact on the European site were reviewed and considered in relation to the Proposed Project. These are provided in Table 5-2 below.

Table 5-2 Site-specific threats, pressures and activities for the River Barrow and River Nore SAC (002162)

Negative Impacts	
Rank	Threats and Pressures (* Items in bold are of relevance to the Proposed Project)
High	Agricultural intensification
High	Pollution to surface waters (limnic, terrestrial, marine & brackish)
High	Modifying structures of inland water courses
High	Dykes and flooding defence in inland water systems
High	Erosion
Low	Removal of hedges and copses or scrub
Low	Sand and gravel quarries
Low	Port areas
Low	'Industrial or commercial areas
Low	Intensive fish farming, intensification
Low	Netting
Low	'Leisure fishing
Medium	Intensive cattle grazing
Medium	Forest and Plantation management & use
Medium	Use of fertilizers (forestry)
Medium	Forestry activities not referred to above
Medium	Peat extraction
Medium	Fishing and harvesting aquatic resources
Medium	Invasive non-native species
Medium	Human induced changes in hydraulic conditions
Medium	Dredging/ removal of limnic sediments
Medium	Water abstractions from surface waters

[11] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=IE0002162

Negative Impacts	
Rank	Threats and Pressures (* Items in bold are of relevance to the Proposed Project)
Medium	Reduction in migration/ migration barriers
Medium	Changes in abiotic conditions

As potential impacts on water quality within this European Site have been identified, the Proposed Project, in the absence of mitigation, can potentially contribute to the existing threats and pressures of this SAC.

5.1.2.1 Relevant Special Conservation Interests

[1029] Freshwater pearl mussel Margaritifera margaritifera

According to the Article 17 Report (NPWS, 2019), the overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Deteriorating', unchanged since the 2013 assessment.

The current distribution of the freshwater pearl mussel mapped habitats (as per Map 8 of the SSCOs for this SAC) is hydrologically connected to the Proposed Project at the location where the HDD crossing is proposed. No freshwater pearl mussel eDNA was detected in the vicinity of the Proposed Wind Farm site (see Aquatic Baseline Report, **Appendix 1**). These results were considered evidence of the species' absence within the survey area. Furthermore, this species has declined significantly in recent years and is now confined to areas upstream of the Erkina River confluence at Durrow, according to NPWS and Triturus data. It has recently been concluded that freshwater pearl mussel are no longer present in the River Nore downstream of the Erkina River confluence (Sweeney, 2022).

However, the SSCOs for this species is to restore the favourable conservation status of the species within the SAC and specific conservation targets for this species relate to water quality and the maintenance of their host fish species, specially to maintain sufficient juvenile salmonids to host glochidial larvae. Deterioration in water quality within the SAC would undermine both of these conservation objectives in particular and prevent the Nore freshwater pearl mussel for regaining favourable conservation status within the SAC.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI species, as per the SSCOs of the SAC, are provided in Table 5-3.

Table 5-3 Targets and attributes associated with the site-specific conservation objectives for Freshwater pearl mussel

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution: Ballymurphy	Restore distribution at 3.91km. See map 8	No, the Proposed Project will not undermine this target.
Distribution: Mountain	Restore distribution at 9.45km. See map 8	No, the Proposed Project will not undermine this target.
Distribution: Nore	Restore distribution at 21.13km. See map 8	**Yes** - deterioration in water quality and habitat degradation could impact on host fish species, resulting in reduction in overall distribution

Population size: Ballymurphy	Restore Ballymurphy population to at least 1,000 adult mussels	No, the Proposed Project will not undermine this target.
Population size: Mountain	Restore Mountain population to at least 4,000 adult mussels	No, the Proposed Project will not undermine this target.
Population size: Nore	Restore Nore population to at least 5,000 adult mussels	**Yes -** deterioration in water quality and habitat degradation could impact on host fish species which could prevent this target being achieved.
Population structure: recruitment	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	**Yes -** deterioration in water quality and habitat degradation could impact on host fish species which could prevent this target being achieved.
Population structure: adult mortality. Ballymurphy	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	No, the Proposed Project will not undermine this target.
Population structure: adult mortality. Mountain	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	No, the Proposed Project will not undermine this target.
Population structure: adult mortality. Nore	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	**Yes -** deterioration in water quality and habitat degradation could impact on host fish species which could prevent this target being achieved.
Suitable habitat: extent	Restore suitable habitat in more than 3.91km in the Ballymurphy, 5.3km in the Mountain and 16.72km in the Nore system (see map 8) and any additional stretches necessary for salmonid spawning	**Yes -** deterioration in water quality and habitat degradation could impact on host fish species, silt laden run-off could also impact on salmonid spawning grounds (habitat degradation) which could prevent this target being achieved.
Suitable habitat: condition	Restore condition of suitable habitat	**Yes -** deterioration in water quality and habitat degradation could impact on host fish species, silt laden run-off could also impact on salmonid spawning grounds (habitat degradation) which could prevent this target being achieved.
Water quality: Macroinvertebrates and phytobenthos (diatoms)	Restore water quality macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	**Yes** - deterioration in water quality could impact prevent this target being achieved.
Substratum quality: Filamentous algae (macroalgae), macrophytes (rooted higher plants	Restore substratum quality- filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	**Yes** - deterioration in water quality could result in increased algae in the system.

Substratum quality: sediment	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	**Yes** - construction of the Proposed Project has the potential to result in silt-laden run-off in the absence of mitigation.
Substratum quality: oxygen availability	Restore to no more than 20% decline from water column to 5cm depth in substrate	**Yes -** deterioration in water quality could impact prevent this target being achieved.
Hydrological regime: flow variability	Restore appropriate hydrological regimes	No, the Proposed Project will not undermine this target.
Host fish	Maintain sufficient juvenile salmonids to host glochidial larvae	**Yes -** deterioration in water quality and habitat degradation, including smothering of spawning grounds could impact on host fish species which could prevent this target being achieved.
Fringing habitat: area and condition	Restore the area and condition of fringing habitats necessary to support the population	**Yes -** deterioration in water quality and habitat degradation, including smothering of spawning grounds could impact on host fish species which could prevent this target being achieved.

[1092] White-clawed crayfish Austropotamobius pallipes

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Deteriorating'.

White-clawed crayfish was detected via eDNA sampling at site B5 the Nuenna River, site C3 on the River Goul and site C5 on the River Erkina. No crayfish eDNA was detected at any of the other sites.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI species, as per the SSCOs of the SAC, are provided in Table 5-4.

Table 5-4 Targets and attributes associated with the site-specific conservation objectives for White-clawed Crayfish.

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution	No reduction from baseline. See Map 7 of the site-specific conservation objectives document.	**Yes -** deterioration in water quality and habitat degradation could result in reduced distribution of this species.
Population structure: recruitment	Juveniles and/or females with eggs in at least 50% of positive samples	**Yes -** deterioration in water quality and habitat degradation could result in reduced distribution of this species.
Negative indicator species	No alien crayfish species	No, the Proposed Project will not undermine this target.

Disease	No instances of disease	No, the Proposed Project will not undermine this target.
Water quality	At least Q3-4 at all sites sampled by EPA	**Yes -** deterioration in water quality could undermine this target.
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

[1106] Atlantic salmon (Salmo salar)

According to the Site Synopsis document for the River Barrow and River Nore SAC (NPWS, 2016[12]), the freshwater stretches of the River Nore main channel is a designated salmonid river.

Surveys undertaken as part of the Proposed Project identified that salmonids were present from a total of 6 no. sites on the Gorteenahilla River (A6, GCR1), Nuenna River (B4, B5), River Goul (C4) and the River Erkina (C5). Salmonid densities were typically low to medium, with the highest numbers present on the Nuenna River and River Erkina (See Aquatic Baseline Report, **Appendix 1**). GCR1, A6, B4 and B5 are located downstream of the Proposed Wind Farm. This QI species is therefore present within the ZoI of the Proposed Project. A deterioration in water quality as a result of the Proposed Project would have the potential to undermine the conservation objectives for this species.

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this species is 'Inadequate' and the overall Conservation Trend is 'Stable'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI Species, as per the SSCOs of the SAC, are provided in Table 5-5.

Table 5-5 Targets and attributes associated with the site-specific conservation objectives for Atlantic Salmon

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	No - Proposed Project will not result in any barriers to movement
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold	**Yes -** deterioration in water quality and habitat degradation as a result of silt-

[12] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002162.pdf

	value. Currently set at 17 salmon fry/5 min sampling	laden run-off and other pollutants could undermine this target.
Out-migrating smolt abundance	No significant decline	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Water quality	At least Q4 at all sites sampled by EPA	**Yes -** deterioration in water as a result of silt-laden run-off and other pollutants could undermine this target.

[1095] Sea lamprey Petromyzon marinus

According to the SSCO document for the River Barrow and River Nore SAC (NPWS, 2011a), artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Juveniles burrow in areas of fine sediment in still water and lampreys spawn in clean gravels. Surveys undertaken as part of the Proposed Project did not record Lamprey ammocoetes (*Lampetra sp.)* at any of the aquatic survey locations during targeted electro-fishing. The SSCO for the SAC don't specify where this QI species may be present within the SAC, taking a precautionary approach this species could be present downstream of the Proposed Project.

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Stable'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI Species, as per the SSCOs of the SAC, are provided in Table 5-6.

Table 5-6 Targets and attributes associated with the site-specific conservation objectives for Sea lamprey.

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution	Access to all watercourses down to first order streams	**No** - Proposed Project will not result in any barriers to movement
Population structure of juveniles	At least three age/size groups present	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

Juvenile density in fine sediment	Juvenile density at least 1/m²	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Availability of juvenile habitat	More than 50% of sample sites positive	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

[1096] Brook lamprey Lampetra planeri

According to the SSCO document for the River Barrow and River Nore SAC (NPWS, 2011a), artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Juveniles burrow in areas of fine sediment in still water and lampreys spawn in clean gravel.

Surveys undertaken as part of the Proposed Project did not record Lamprey ammocoetes (*Lampetra sp.)* at any of the aquatic survey locations during targeted electro-fishing. The SSCOs for the SAC don't specify where this QI species may be present within the SAC, taking a precautionary approach this species could be present downstream of the Proposed Project.

River and brook lamprey are indistinguishable as larvae. The inability to distinguish between river lamprey and brook lamprey larvae, and the challenges associated with sampling for adult river lamprey, means that an evaluation of their actual range and population size cannot be undertaken (NPWS, 2019). The overall Conservation Status for this species is therefore assessed as 'Unknown' (NPWS, 2019).

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI Species, as per the SSCOs of the SAC, are provided in Table 5-7.

Table 5-7 Targets and attributes associated with the site-specific conservation objectives for Brook lamprey.

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution	Access to all watercourses down to first order streams	No - Proposed Project will not result in any barriers to movement
Population structure of juveniles	At least three age/size groups of brook/river lamprey present	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Availability of juvenile habitat	More than 50% of sample sites positive	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

[1099] River lamprey Lampetra fluviatilis

According to the SSCO document for the River Barrow and River Nore SAC (NPWS, 2011a), artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Juveniles burrow in areas of fine sediment in still water and lampreys spawn in clean gravel.

Surveys undertaken as part of the Proposed Project did not record Lamprey ammocoetes (*Lampetra sp.)* at any of the aquatic survey locations during targeted electro-fishing. The SSCO for the SAC don't specify where this QI species may be present within the SAC, taking a precautionary approach this species could be present downstream of the Proposed Project.

River and brook lamprey are indistinguishable as larvae. The inability to distinguish between river lamprey and brook lamprey larvae, and the challenges associated with sampling for adult river lamprey, means that an evaluation of their actual range and population size cannot be undertaken (NPWS,2019). The overall Conservation Status for this species is therefore assessed as 'Unknown' (NPWS, 2019).

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI Species, as per the SSCOs of the SAC, are provided in Table 5-8.

Table 5-8 Targets and attributes associated with the site-specific conservation objectives for River lamprey

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution: extent of anadromy	Greater than 75% of main stem and major tributaries down to second order accessible from estuary	No -Proposed Project will not result in any barriers to movement
Population structure of juveniles	At least three age/size groups of brook/river lamprey present	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Availability of juvenile habitat	More than 50% of sample sites positive	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

[1103] Twaite shad Alosa fallax

According to the SSCO document for the River Barrow and River Nore SAC (NPWS, 2011a) in some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Regular breeding has been confirmed in the River Barrow in recent years, but not in the Nore. According to the Site Synopsis document for the River Barrow and River Nore SAC (NPWS, 2016), this site is one of only a handful of spawning grounds in the country for Twaite Shad. Surveys undertaken as part of the Proposed Project did not detect this species.

Surveys undertaken as part of the Proposed Project did not record this species, however, taking a precautionary approach this species could be present downstream of the Proposed Project.

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Stable'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI Species, as per the SSCOs of the SAC, are provided in Table 5-9.

Table 5-9 Targets and attributes associated with the site-specific conservation objectives for Twaite shad

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary	No -Proposed Project will not result in any barriers to movement
Population structure: age classes	More than one age class present	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning habitats	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden

		run-off and other pollutants could undermine this target.
Water quality: oxygen levels	No lower than 5mg/l	**Yes** - deterioration in water quality could undermine this target.
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	**Yes** - deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

[1355] Otter Lutra lutra

According to the SSCO document for the River Barrow and River Nore SAC (NPWS, 2011a), otter distribution based on 1980/81 survey findings, is 88% in SACs. Current range in south-east estimated at 73% (Bailey and Rochford, 2006 cited in NPWS, 2019). Despite widespread suitability at many survey sites in terms of foraging habitat, otter signs (spraint sites) were only recorded at 2 no. sites during the current survey. These were identified on the Borrisbeg River at site C2 and the Coolnacrutta Stream at site D2 a as outlined in Aquatic Baseline Report (see **Appendix 1**). No otter' signs were recorded within the Proposed Wind Farm or Proposed 110kV Underground Cabling route.

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this species is 'Favourable'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI Species, as per the SSCOs of the SAC, are provided in Table 5-10.

Table 5-10 Targets and attributes associated with the site-specific conservation objectives for Otter

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Distribution	No significant decline	**Yes** - deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target (reduced prey availability)
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along river banks / around ponds	No -Proposed Project will not result in any reduction in otter habitat
Extent of marine habitat	No significant decline. Area mapped and calculated as 857.7ha	No -Proposed Project will not result in any reduction in otter habitat

Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 616.6km	No -Proposed Project will not result in any reduction in otter habitat
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 2.6ha	No -Proposed Project will not result in any reduction in otter habitat
Couching sites and holts	No significant decline	No -Proposed Project will not result in any loss of couching or resting sites
Fish biomass available	No significant decline	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target (reduced prey availability)

[3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

According to the SSCO document for the River Barrow and River Nore SAC (NPWS, 2011a), the full distribution of this habitat and its sub-types in this site is currently unknown.

According to the Site Synopsis document for the River Barrow and River Nore SAC (NPWS, 2025), Floating river vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include water-starworts (*Callitriche* spp.), Canadian Pondweed (*Elodea canadensis*), Bulbous Rush (*Juncus bulbosus*), water-milfoils (*Myriophyllum* spp.), the pondweed *Potamogeton* x *nitens*, Broad-leaved Pondweed (*P. natans*), Fennel Pondweed (*P. pectinatus*), Perfoliated Pondweed (*P. perfoliatus*) and crowfoots (*Ranunculus* spp.).

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this habitat is 'Inadequate' and the overall Conservation Trend is 'Deteriorating'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI habitat, as per the SSCOs of the SAC, are provided in Table 5-11.

Table 5-11 Targets and attributes associated with the site-specific conservation objectives for Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

Attribute	Target	Potential for Proposed Project to Undermine Conservation Objective Target
Habitat area	Area stable or increasing, subject to natural processes	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.
Habitat distribution	No decline, subject to natural processes	**Yes -** deterioration in water quality and habitat degradation as a result of silt-

		laden run-off and other pollutants could undermine this target.
Hydrological regime: river flow	Maintain appropriate hydrological regimes	No, changes to hydrological regime as a result of the Proposed Project will not occur
Hydrological regime: groundwater discharge	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation	No, changes to hydrological regime as a result of the Proposed Project will not occur
Substratum composition: particule size range	The substratum should be dominated by large particles and free from fine sediments	**Yes -** deterioration in water quality and habitat degradation as a result of silt-laden run-off and other pollutants could undermine this target.

[6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

The full extent of this QI habitat within the SAC is currently unknown (NPWS, 2019). However, as per SSCOs, it is considered to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slowflowing stretches of river the nearest known record for this QI habitat is located in excess of 34km from the Proposed Project site.

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this habitat is 'Bad' and the overall Conservation Trend is 'Deteriorating'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI habitat, as per the SSCOs of the SAC, are provided in Table 5-12.

Table 5-12 Targets and attributes associated with the site-specific conservation objectives for Hydrophilous tall herb fringe communities

Attribute	Target	
Habitat distribution	No decline, subject to natural processes	**Yes -** deterioration in water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Habitat area	Area stable or increasing, subject to natural processes	**Yes -** deterioration in water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Hydrological regime: flooding depth/height of water table	Maintain appropriate hydrological regimes	No, changes to hydrological regime as a result of the Proposed Project will not occur

Vegetation structure: sward height	30-70% of sward is between 40 and 150cm in height	**Yes -** deterioration in ground water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Vegetation composition: broadleaf herb: grass ratio	Broadleaf herb component of vegetation between 40 and 90%	**Yes -** deterioration in ground water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Vegetation composition: typical species	At least 5 positive indicator species present	**Yes -** deterioration in water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam (*Impatiens glandulifera*), monkeyflower (*Mimulus guttatus*), Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*)	**Yes -** deterioration in water quality as a result of silt-laden run-off and other pollutants could undermine this target.

[7220] * Petrifying springs with tufa formation (Cratoneurion)

The full extent of this QI habitat within the SAC is currently unknown (NPWS, 2019). However, as per Map 6 of the SSCOs the nearest known record for this QI habitat is located in excess of 34km from the Proposed Project site.

According to the Article 17 Report (NPWS 2019), the overall Conservation Status for this habitat is 'Bad' and the overall Conservation Trend is 'Deteriorating'.

Taking a precautionary approach, there is potential for this QI habitat downstream of the Site to be subject to a deterioration in water quality as a result of the Proposed Project.

The targets and attributes for this QI habitat, as per the SSCOs of the SAC, are provided in Table 5-13.

Table 5-13 Targets and attributes associated with the site-specific conservation objectives for Petrifying springs with tufa formation

Attribute	Target	
Habitat area	Area stable or increasing, subject to natural processes.	**Yes -** deterioration in ground water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Habitat distribution	No decline	**Yes -** deterioration in ground water quality as a result of silt-laden run-off and other pollutants could undermine this target.

Hydrological regime: height of water table; water flow	Maintain appropriate hydrological regimes	No, changes to hydrological regime as a result of the Proposed Project will not occur
Water quality	Maintain oligotrophic and calcareous conditions	**Yes -** deterioration in ground water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Vegetation composition: typical species	Maintain typical species	**Yes -** deterioration in ground water quality as a result of silt-laden run-off and other pollutants could undermine this target.

5.2 River Nore SPA (004233)

The potential for impacts on this SPA was identified in Section 4.1. The identified pathways for effect include the following:

- Deterioration of water quality via direct impacts resulting from potential 'frack out' associated within the HDD works crossing the River Nore.
- Deterioration of water quality via the indirect runoff or spillage of pollutants during construction as the Proposed Project being hydrologically connected to this SPA.
- Direct disturbance/displacement to the single SCI species which may utilising suitable habitat within the River Nore during the construction phase.

The Site-Specific Conservation Objectives (SSCOs) document and Natura 2000 Data Form for this designated site were reviewed during this assessment and can be found at the following online locations:

SSCOs: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004233.pdf Accessed the 10th of July 2026

Natura 2000 Data Form:
https://natura2000.eea.europa.eu/Natura2000/sdf/#/sdf?site=IE0004233&release=62 Accessed the 10th of July 2026

Table 5-14 below lists the qualifying features of this European site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.2.1 Identification of Individual Qualifying Interest species with the Potential to be Affected.

Table 5-14 Assessment of potential effects on Qualifying features of the River Nore SPA.

Qualifying feature	Conservation Objective (NPWS, Version 1, July 2024)	Rationale	Potential for Adverse Effects Yes/No
[A229] Kingfisher (*Alcedo atthis*)	To maintain the Favourable conservation condition of Kingfisher in River Nore SPA.	There will be no direct effects from the Proposed Wind Farm, as it is located outside this designated site. Only minor cabling installation works are proposed within the public road, and the crossing of the SPA will be undertaken by Horizontal Directional Drilling (HDD). The Proposed 110kV Underground Cabling route works will mainly be confined to the existing road network and will involve minor works over a short period, broadly analogous to existing activities in the general area, including farm machinery, roadworks and vehicle movements. No instream works are proposed as part of the Proposed 110kV Underground Cabling route, as all watercourse crossings will be undertaken by HDD, with the launch pits located within the N77 road verge and agricultural lands outside the River Nore SPA boundary. Kingfisher surveys carried out at the Proposed Grid Connection crossing point confirmed that there were no nesting burrows within the survey area, which extended to a 500 m radius of the proposed crossing point. The majority of the bank habitat within the survey area was assessed as unsuitable nesting habitat for kingfisher, and no burrows were recorded at these locations. However, Kingfisher were recorded using the River Nore in proximity to the Proposed 110kV Underground Cabling route during surveys undertaken in June and July 2026. No population of ecological significance was identified within the Proposed Wind Farm site and, accordingly, the potential for direct effects arising from habitat loss or collision risk on the SCI population associated with the SPA has been ruled out. Furthermore, no breeding burrows were recorded along the surveyed section of the River Nore. However, taking a precautionary approach, given there the proposed HHD works are located in close proximity to this SPA, there is potential for adverse effects on this SCI species as a result of disturbance or displacement, as a result of construction.	**Yes**

Qualifying feature	Conservation Objective (NPWS, Version 1, July 2024)	Rationale	Potential for Adverse Effects Yes/No
		With regards potential noise related disturbance effects, sudden loud noises in a quiet environment have the greatest potential to cause disturbance (Cutts et al., 2013[13]). The noise levels associated with the plant required for HDD activities are deemed a moderate to low noise stimulus as per Cutts et al. criteria (2013). It should also be noted that the duration of HDD works is predicted to be approx. 2 weeks. Therefore, disturbance associated with HDD works would be temporary in nature. No kingfisher burrows were recorded in the vicinity of the proposed HDD works. However, were new burrows to be established within the 100m of the proposed works area prior to construction works commencing there is potential for disturbance, as a result of the generation of noise related to the proposed HDD works, to kingfisher utilising these burrows. The Proposed Wind Farm and Proposed Grid Connection are hydrologically connected to the SPA through groundwater and surface water pathways. Following the precautionary principle, pollutants entering surface water through runoff or percolation during the construction, operational or decommissioning phases of the Proposed Project could result in a deterioration in water quality within the SPA. In the absence of mitigation, deterioration in water quality has the potential to result in habitat degradation and reduced prey availability, which could have implications for maintaining the favourable conservation status of this SCI species. **A complete source-pathway-receptor chain for adverse effects on the SCI species of the SPA is therefore identified and assessed further in this NIS.**	

[13] https://gat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/filer_public/8f/bd/8fbdd7e9-ea6f-4474-869f-ec1e68a9c809/11367.pdf

5.2.1.1 Site Specific Pressures and Threats

As per the Natura 2000 Data Form for the River Nore SPA the site-specific threats, pressures and activities with potential to impact on the European site were reviewed and considered in relation to the Proposed Project. These are provided in Table 5-15 below.

Table 5-15 Site-specific threats, pressures and activities for the River Nore SPA (004233)

Negative Impacts	
Rank	Threats and Pressures (* Items in bold are of relevance to the Proposed Project)
Medium	Port areas
Medium	Landfill, land reclamation and drying out, general

As potential impacts on water quality within this European Site have been identified, the Proposed Project, in the absence of mitigation, can potentially contribute to the existing threats and pressures of this SPA.

5.2.1.2 Relevant Special Conservation Interests

[A229] Kingfisher (*Alcedo atthis*)

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher (NPWS, 2011b[14]). Kingfisher is currently on the Amber-list (medium conservation concern) in the Birds of Conservation Concern in Ireland 2020-2026 (Gilbert and Lewis (2021).

During breeding kingfisher surveys undertaken once per month in June and July 2026 along this section of the River Nore, Kingfisher were recorded on seven occasions. Five of these records occurred within 500 m of the Proposed 110kV Underground Cabling route crossing of the River Nore, while a further two records occurred approximately 800 m from the crossing. All observations were located more than 8.8 km from the Proposed Wind Farm site.

No nesting burrows were recorded within the survey area, including at the locations where Kingfisher were observed. Therefore, no population of ecological significance was identified using the Proposed Wind Farm site. However, the survey results confirm that Kingfisher use the River Nore in proximity to the Proposed 110kV Underground Cabling route crossing.

Taking a precautionary approach, there is potential for deterioration of supporting habitat for this species downstream of the Site via a deterioration in water quality as a result of the Proposed Project. There is also potential for disturbance effects on this SCI.

The targets and attributes for this SCI Species, as per the SSCOs of the SPA, are provided in Table 5-16.

[14] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004233.pdf

Table 5-16 Targets and attributes associated with the site-specific conservation objectives for Kingfisher

Attribute	Target	
Population size	No significant decline in the long term	**Yes**, deterioration of water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Productivity rate	Sufficient productivity to maintain the population trend as stable or increasing	**Yes**, deterioration of water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Spatial distribution of territories	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation	**Yes**, deterioration of water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Extent and quality of nesting banks and other suitable nesting features	Sufficient area of high quality nesting habitat to support the population target	No, the Proposed Project will not undermine this target.
Forage spatial distribution, extent, abundance and availability	Sufficient number of locations, area of suitable forage habitat and available forage biomass to support the population target	**Yes**, deterioration of water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Water quality	Both biotic (i.e. Q-value) and abiotic indices reflect overall good-high quality status	**Yes**, deterioration of water quality as a result of silt-laden run-off and other pollutants could undermine this target.
Barriers to connectivity	No significant increase	No, the Proposed Project will not undermine this target.
Disturbance to breeding sites	Disturbance occurs at levels that do not significantly impact upon breeding Kingfisher	No, the Proposed Project will not undermine this target.

6. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

This section of the NIS assesses the potential effects of the Proposed Project on the identified relevant Qualifying Interests/Special Conservation Interests. This assessment is undertaken in the absence of any mitigation and in respect of the conservation objectives of the European Site/s. The Conservation Objectives each of the European Sites assessed were reviewed on the 14th of October 2026. The Conservation Objectives for these sites are available at the following locations:

- River Barrow and River Nore SAC (002162) https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf
- River Nore SPA (004233) https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004233.pdf

Following the initial impact assessment, mitigation is prescribed where necessary to avoid adverse effects on the Conservation Objectives of the relevant QIs/SCIs.

6.1 Potential for Direct Effects on the European Sites

The Proposed 110kV Underground Cabling route component of the Proposed Project intercepts the River Barrow and River Nore SAC and the River Nore SPA. Taking a precautionary approach, the potential for disturbance/displacement of the QIs/SCIs of these Sites as a result of the construction phase of the Proposed Project is considered below.

6.1.1 Disturbance/Displacement

6.1.1.1 Construction Phase

Otter

No resting or breeding sites for otter were recorded during the multidisciplinary walkover or dedicated aquatic surveys, as discussed in Section 3.2.2, Section 3.2.3 and **Appendix 1**. However, the River Nore, which the Proposed Grid Connection crosses, as well as watercourses in close proximity to the Site provide suitable foraging, resting, and breeding habitat for otter. There is, therefore, potential for disturbance/displacement to populations of otter designated under the River Barrow and River Nore SAC during the construction phase of the Proposed Project.

Kingfisher

No resting or breeding sites for kingfisher were recorded during the multidisciplinary walkover or dedicated bird surveys, as discussed in Section 3.2.5 and in **Appendix 2**. However, the River Nore, which the Proposed Grid Connection crosses, as well as watercourses in close proximity to the Site provide suitable foraging, resting, and breeding habitat for kingfisher. Furthermore, this species was recorded foraging on the River Nore. There is, therefore, potential for disturbance/displacement to populations of kingfisher designated under the River Nore SPA during the construction phase of the Proposed Project.

Kingfisher are dependent on riparian habitats for foraging and breeding, with breeding pairs potentially utilising stretches of watercourse extending up to 4km from their nesting sites (O'Clery and Lusby, 2015). Construction activities at the River Nore crossing during the breeding season could result in

noise, vibration and increased human activity, potentially causing temporary disturbance for foraging kingfisher at the affected section of the river. Where nesting kingfisher occur within the surrounding river corridor, disturbance associated with construction activities could temporarily restrict access to suitable foraging habitat within their established territories. This may potentially affect their ability to provision dependent young.

Mitigation

Mitigation by Avoidance

There are no instream works proposed as part of the Proposed Project. Where watercourse crossings are required, methods such as clear span and horizontal directional drilling (HDD) will be employed to remove the necessity of instream works, thereby avoiding potential disturbance effects on otter or kingfisher.

Additional mitigation

Otter

Otter is predominantly crepuscular in nature and are unlikely to be adversely impacted by the proposed works as a result of disturbance/displacement. Works will be mostly confined to daytime hours, thus minimizing potential disturbance related impacts to the species. The NPWS Threat Response Plan for Otter NPWS (2009) acknowledges that "Little evidence has come to light in recent studies to suggest that disturbance by recreation is a significant pressure." It also identifies that Otter is known to travel significant distances from streams and lakes in search of new territory and feeding areas.

Channin (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to Otters (Jefferies, 1987), (Durbin, 1993), (Green & Green, 1997). The report also describes successful breeding in towns, under ferry terminals and under the jetties of one of Europe's largest oil and gas terminals at Sullom Voe in North Scotland.

Irish Wildlife Manual No 23 (National Otter Survey of Ireland 2004/2005) found no significant relationship between disturbance and otter occurrence. In addition, no significant difference in otter presence was found between sites with and without recreational activity. It also states, "the lowest percentage occurrence was found at the sites with the lowest recorded disturbance". Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of Otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between Otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey & Rochford, 2006).

A precautionary pre-construction survey and the measures below will address the possibility that otter use of the works area changes before construction. These measures apply to the River Barrow and River Nore SAC otter population.

A pre-construction otter survey will verify that no new breeding or resting site has become established and will confirm the status of the recorded holt before works commence.

- A pre-commencement otter survey shall be undertaken in accordance with standard best practice guidance prior to the commencement of site works.
- Should the surveys identify the presence of an otter holt, the following measures will be undertaken.

    - A National Parks and Wildlife Service and a derogation licence will be applied for (although compliance with such a licence has not been relied on in this assessment).

- No works will be undertaken within 150m of any holts at which breeding females or cubs are present.
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance will also not take place within 15m of such holts, except under licence (TII, 2006).
- All of the above works will be undertaken or supervised by an appropriately qualified ecologist.

Kingfisher

To minimise the potential for disturbance to breeding kingfisher, construction works at the River Nore crossing will be undertaken outside bird nesting season (1st of March to 31st of August inclusive). In addition, targeted kingfisher surveys will be undertaken at the Proposed Grid Connection crossing of the River Nore if the works are to commence here between February and September. This precautionary period accounts for early courtship and the potential for multiple/late broods.

In addition, the following mitigation measures will be implemented as general disturbance measures:

- Works will commence outside the bird nesting season (1st of March to 31st of August inclusive). Any requirement for construction works to run into the subsequent breeding season following commencement will be informed by pre-construction bird surveys.
- The removal of woody vegetation will be undertaken in full compliance with Section 40 of the Wildlife Act 1976 – 2022. Where sections of woody vegetation are removed for the purposes of the junction and road upgrades, these will be replaced with suitable hedge/tree species which are common in the local context.
- During the construction phase an Ecological Clerk of Works will monitor noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time). Selection of plant items will be considered in relation to disturbance of birds. All plant and equipment for use will comply with the European Communities (Noise Emission By Equipment For Use Outdoors) Regulations, 2001, as amended (SI 632/2001). Plant machinery will also be turned off when not in use.
- Silt fences will be installed as an additional water protection measure around existing watercourses.
- A pre-construction bird survey at the Proposed Wind Farm and the River Nore will be organised to ensure that any sensitive nest sites in the works area are identified and disturbance to these are avoided.
- If winter roosting or breeding activity of birds of high conservation concern (including breeding kingfisher at the River Nore) is identified, the roost or nest site will be located and no works shall be undertaken within a species-specific disturbance buffer in line with industry best practice (e.g., Goodship and Furness, 2022). No works shall be permitted within the buffer until it can be demonstrated that the birds are no longer dependent on the roost/nest. In addition, the foraging routes of breeding kingfisher at the River Nore will be monitored and if works are found to interfere with adults provisioning dependent young, works will cease within a species-specific buffer of foraging routes until it can be demonstrated that the nest is no longer occupied.

Residual adverse effects:

Following the successful implementation of the above listed mitigation measures, there will be no potential for residual adverse effects on QIs/SCIs of European sites as a result of disturbance/ displacement during construction.

6.1.1.2 Operational Phase

The operational phase of the Proposed Project will not result in any potential for adverse effects on any European site, as a result of disturbance/displacement. No significant supporting habitat for otter was identified within the Proposed Wind Farm site, which will typically be unmanned with just occasional

requirement for maintenance works. Regards the Proposed 110kV Underground Cabling route, once this has been constructed, it will be located entirely underground with minimal requirement for maintenance works.

No further assessment required, with regards operational phase impacts as a result of disturbance/ displacement, is required.

6.1.1.3 Decommissioning Phase

The decommissioning phase of the Proposed Project will not result in any potential for adverse effects on any European site, as a result of disturbance/displacement. Potential for direct adverse effects on European sites as a result of disturbance/displacement is restricted to the Proposed 110kV Underground Cabling route, which will be permanent development as it will form part of the national grid. No further assessment required, with regards decommissioning phase impacts as a result of disturbance/ displacement, is required.

6.2 Potential for Indirect Effects on European sites

6.2.1 Deterioration of Water Quality

Watercourses within the Proposed Wind Farm site and along the Proposed 110kV Underground Cabling route have downstream connectivity to the River Barrow and River Nore SAC and River Nore SPA. Six crossing locations occur along the Proposed 110kV Underground Cabling route, including the River Nore crossing, which will be completed by means of horizontal directional drilling.

Whilst no instream works are proposed as part of the Proposed Project, taking a precautionary approach, the proposed works have the potential to cause deterioration in surface water quality during the construction, operational and decommissioning phases of the Proposed Project due to the potential release of pollutants, including suspended solids and hydrocarbons, which, in the absence of mitigation could potentially affect downstream aquatic habitats and supporting faunal wetland habitat of the following QIs/SCIs:

River Barrow and River Nore SAC (000036)

- [1029] Freshwater Pearl Mussel *Margaritifera margaritifera*
- [1092] White-clawed Crayfish *Austropotamobius pallipes*
- [1310] Salicornia and other annuals colonising mud and sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [1095] Sea Lamprey *Petromyzon marinus*
- [1096] Brook Lamprey *Lampetra planeri*
- [1099] River Lamprey *Lampetra fluviatilis*
- [1103] Twaite Shad *Alosa fallax fallax*
- [1106] Salmon *Salmo salar*
- [1355] Otter *Lutra lutra*
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- [7220] Petrifying springs with tufa formation (*Cratoneurion*)*

River Nore SPA (001021)

- [A229] Kingfisher *Alcedo atthis*

Mitigation by Design

The project design has followed the basic principles outlined below to eliminate the potential for adverse effects on QI and SCI receptors:

- Sensitive hydrological features have and will be avoided where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains).
- Hard standing areas have been designed to the minimum size necessary to accommodate the turbine model that is selected to reduce potential impacts on water quality.

6.2.1.2 Construction Phase Mitigation

The construction phase of the Proposed Project will involve, clear-felling, excavations and earth moving and creation/upgrading of watercourse crossing, which create the potential for pollution in various forms, i.e. the generation of suspended solids and the potential for spillage of fuels associated with the refuelling of excavation machinery.

Surface water and groundwater provide potential pathways to the River Barrow and River Nore SAC and River Nore SPA. Chapter 9 of the accompanying EIAR prescribes detailed mitigation measures to be implemented to ensure that no impacts on any hydrological receptor occurs during the construction phase of the Proposed Project. Those pertinent to mitigating adverse effects on European Sites are highlighted below.

6.2.1.2.1 *Potential Effects from Clear Felling*

Proposed Mitigation Measures

All felling operations will conform to current best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and DAFM guidance documents, including the specific guidelines listed below, to ensure that felling, planting and other forestry operations result in minimal potential negative effects to the receiving environment.

- Forestry Standards Manual (Forest Service, 2015)
- Environmental Requirements for Afforestation (Forest Service, 2016a)
- Land Types for Afforestation (Forest Service, 2016b)
- Forest Protection Guidelines (Forest Service, 2002)
- Forest Operations and Water Protection Guidelines (Coillte, 2013)
- Forestry and Water Quality Guidelines (Forest Service, 2000b)
- Forestry and the Landscape Guidelines (Forest Service, 2000c)
- Forestry and Archaeology Guidelines (Forest Service, 2000d)
- Forest Biodiversity Guidelines (Forest Service, 2000e)
- Forests and Water, Achieving Objectives under Ireland's River Basin Management Plan 2018-2021 (DAFM, 2018)
- Coillte Planting Guideline SOP
- A Guide to Forest Tree Species Selection and Silviculture in Ireland (Horgan et al., 2003)
- Management Guidelines for Ireland's Native Woodlands. Jointly published by the National Parks & Wildlife Service (Cross and Collins, 2017)
- Native Woodland Scheme Framework (Forest Service, 2018)
- Code of Best Forest Practice (Forest Service, 2000)

Mitigation by Avoidance:

There is a requirement in the Forest Service Code of Practice and in the FSC Certification Standard for the installation of buffer zones adjacent to aquatic zones at planting stage. Minimum buffer zone widths recommended in the Forest Service (2000) guidance document *"Forestry and Water Quality Guidelines"* are shown in Table 6-1.

Table 6-1 Minimum Buffer Zone Widths (Forest Service, 2000)

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10 m	15 m
Steep	(15 – 30%)	15 m	20 m
Very steep	(>30%)	20 m	25 m

During the Proposed Wind Farm construction phase a self-imposed buffer zone of 50 metres will be maintained for the Foyle South Stream where possible.

Mitigation by Design:

Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods which are set out as follows:

- Machine combinations (i.e., handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;
- Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (approximately 0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and will avoid being placed at right angles to the contour;
- Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground;
- All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone;
- Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled;
- Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting.

Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall;
- Timber will be stacked in dry areas, and outside a local 50 metre watercourse buffer. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off;
- Checking and maintenance of roads and culverts will be on-going through the felling operation;
- Refuelling or maintenance of machinery will not occur within 50m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required;
- A permit to refuel system will be adopted;
- Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors;
- Crossing of streams will not be permitted;
- Trees will be cut manually from along streams and using machinery to extract whole tree; and,
- Travel only perpendicular to and away from stream.

Silt Traps:

Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner.

Drain Inspection and Maintenance:

The following items shall be carried out during pre-felling inspections and after:
- Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;
- Inspection of all areas reported as having unusual ground conditions;
- Inspection of main drainage ditches and outfalls. During pre-felling inspections the main drainage ditches shall be identified. Ideally the pre-felling inspection shall be carried out during rainfall;
- Following tree felling all main drains shall be inspected to ensure that they are functioning;
- Extraction tracks near drains need to be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground;
- Culverts on drains exiting in the Site will be unblocked; and,
- All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Surface Water Quality Monitoring:

Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The ‘before’ sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The “during” sampling will be undertaken once a week or after rainfall events. The ‘after’ sampling will comprise as many samplings as necessary to demonstrate that water quality has returned to pre-activity status
(i.e., where an impact has been shown).

Criteria for the selection of water sampling points include the following:

- Avoid man-made ditches and drains, or watercourses that do not have year-round flows, i.e. avoid ephemeral ditches, drains or watercourses;
- Select sampling points upstream and downstream of the forestry activities;

- It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry;
- Where possible, downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from the second (this allows demonstration of no impact through dilution effect or contamination by other land-uses where impact increases at third downstream location relative to second downstream location); and,
- The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed.

Also, daily surface water monitoring forms will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection.

6.2.1.2.2 *Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in surface Waters (Proposed Project)*

Mitigation by Avoidance

The key mitigation measure during the construction phase of the Proposed Wind Farm is the avoidance of sensitive aquatic areas where possible. All of the key areas of the Proposed Wind Farm infrastructure are actually significantly away from the 50m delineated buffer zones with the exception of proposed new roads, 3 no. proposed crossings on the Foyle South Stream.

Additional control measures, which are outlined further on in this section, will be undertaken at these locations within buffers.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operated effectively. The proposed buffer zone will:

- Avoid physical damage to watercourses, and associated release of sediment;
- Avoid excavations within close proximity to surface water courses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

Mitigation by Design:

- Source controls:
    - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
    - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-Line controls:
    - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, 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, temporary pumping chambers, or other similar/equivalent or appropriate systems.

- Treatment systems:
    - Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

It should be noted for the northern portion of the Proposed Wind Farm site is that an extensive network of forestry agricultural drains already exist, and these will be integrated and enhanced as required and used within the Proposed Project drainage system. The integration of the existing drainage network and the Proposed Project network is relatively simple. The key elements being the upgrading and improvements to water treatment elements, such as in line controls and treatment systems, including silt traps, stilling ponds and buffered outfalls.

The main elements of interaction with existing drains will be as follows:

- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the Proposed Project drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion;
- Silt traps will be placed in the existing drains upstream of any streams where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through stilling ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls which will be numerous over the Site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the Site; and,
- Drains running parallel to the existing roads requiring widening will be upgraded, widening will be targeted to the opposite side of the road. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

Pre-commencement Temporary Drainage Works

Prior to the commencement of new road/hardstand (or road upgrades) the following key temporary drainage measures will be installed:

- All existing dry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using temporary check dams/silt traps;
- Clean water diversion drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing drains that have surface water flows and also along existing roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the 50m watercourse and 10m drain buffer zones such as at watercourse crossings.

Water Treatment Train:

A final line of defence will be provided by a water treatment train such as a “Siltbuster”. If the discharge water from construction areas fails to be of a high quality during regular inspections, then a filtration treatment system (such as a ‘Siltbuster’ or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase.

Silt Fences:

Silt fences will be emplaced within drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to water courses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be placed within drains down-gradient of all construction areas inside the 50m hydrological buffer zones.

Silt Bags:

Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, the majority of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats Sediment entrapment mats, consisting of coir or jute matting, will be placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

Settlement Ponds:

The Proposed Wind Farm infrastructure footprint has been divided into drainage catchments (based on topography, outfall locations, and catchment size) and stormwater runoff rates based on the 10-year return period rainfall event were calculated for various catchment areas in order to size the settlement ponds.

The 10-year return period rainfall event is a recommendation of the IFI relating to other recent wind farm projects (i.e. Cahermurphy Wind Farm, Co. Clare - Planning Ref P20/658).

The location and dimensions of proposed settlement ponds are shown on the Proposed Wind Farm site drainage plan drawings (**Appendix 6**).

Level Spreaders and Vegetation Filters:

The purpose of level spreaders is to release treated drainage flow in a diffuse manner, and to prevent the concentration of flows at any one location thereby avoiding erosion. Level spreaders are not intended to be a primary treatment component for development surface water runoff. They are not stand-alone but occur as part of a treatment train of systems that will reduce the velocity of runoff prior to be released at the level spreader. In the absence of level spreaders, the potential for ground erosion is significantly greater than not using them.

Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. In fact, vegetation filters are ultimately a positive consequence of not discharging directly into watercourses which is one of the mitigation components of the drainage philosophy. This makes use of the natural vegetation of the Site to provide a polishing filter for the Wind Farm drainage prior to reaching the downstream watercourses.

Again, vegetation filters are not intended to be a single or primary treatment component for treatment of works area runoff. They are not sand-alone but are intended as part of a treatment train of water quality improvement/control systems (i.e. source controls®check dams®silt traps®settlement ponds®level spreaders ®silt fences®vegetation filters).

Pre-emptive Site Drainage Management

The works programme for the entire construction stage of the Proposed Project will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily basis at the Site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts). These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and;
- Consultancy Service: Met Eireann provides a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest.

Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests either of the following is likely to occur:

- >10 mm/hr (i.e., high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.
- Prior to works being suspended the following control measures will be completed:
- Secure all open excavations;
- Provide temporary or emergency drainage to prevent back-up of surface runoff; and,
- Avoid working during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.

Management of Runoff from the Spoil Management area:

It is proposed that excavated spoil will be used for landscaping where required. The excess material will then be placed in 1 no. Spoil Deposition Area (SDA).

The SDA is located outside of 50m watercourse buffers and also outside of 30m karst feature buffers (enclosed depressions and sink holes).

During the initial construction of deposition area, silt fences, straw bales and biodegradable geogrids will be used to control surface water runoff from works areas.

Where applicable, the vegetative top-soil layer of the soil and spoil management areas will be rolled back to facilitate placement of excavated spoil, following which the vegetative-top soils layer will be reinstated. Where reinstatement is not possible, spoil management areas will be sealed with a digger bucket and seeded as soon possible to reduce sediment entrainment in runoff.

Drainage from spoil storage areas will ultimately be routed to an oversized swale and a number of stilling ponds with appropriate storage and settlement designed for a 1 in 10-year return period before being discharged to the on-site drains.

Subsoil reinstatement areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff. Once re-vegetated and stabilised subsoil reinstatement areas will no longer be a potential source of silt laden runoff.

Timing of Site Construction Works:

Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place and operational for all subsequent construction works.

Monitoring:

An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.

Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be carried out on a daily basis.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse and specifically following heavy rainfall events (as per the CEMP included in **Appendix 5** of this report).

6.2.1.2.3 *Potential Impacts on Groundwater Levels During Excavations (Proposed Project)*

No potential for adverse effects on any European Site via Impacts on Groundwater Levels During Excavations

No mitigation required.

6.2.1.2.4 *Potential Impacts from Excavation Dewatering and Potential Impacts on Surface Water Quality (Proposed Project)*

Proposed Mitigation Measures:

Management of excavation inflows and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:

- Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;
- The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a silt bags or silt buster;

- There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur;
- Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken;
- At the turbine locations adequately sized settlement ponds will be constructed to treat pumped water prior to discharge into a local manmade drain;
- A mobile 'Siltbuster' or similar equivalent specialist treatment system can be made available at turbine locations for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as final line of defence if needed.

6.2.1.2.5 *Potential Release of Hydrocarbons During Construction and Storage (Proposed Project)*

Proposed Mitigation Measures:

Mitigation measures proposed to avoid release of hydrocarbons at the Site are as follows:

- On site re-fuelling of machinery will be carried out using a dedicated fuel truck. The fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- On-site refuelling will be carried out by trained personnel only;
- A permit to fuel system will be put in place;
- Fuels stored on site will be minimised. Fuel storage areas if required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be included within the Construction and Environmental Management Plan (**Appendix 5**). Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.

6.2.1.2.6 *Potential Impacts from Groundwater and Surface Water Contamination from Wastewater Disposal (Proposed Project)*

Proposed Mitigation Measures:

- It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site.

6.2.1.2.7 *Potential Impacts from Release of Cement-Based Products*

Proposed Mitigation Measures:

- No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute

cleaning water will be undertaken at lined cement washout ponds located outside of Clomantagh/Killoshulan Group Water Scheme ZoC;
- Weather forecasting will be used to plan dry days for pouring concrete; and,
- The pour site will be kept free of standing water and plastic covers will be ready in case of a sudden rainfall event.

6.2.1.2.8 Potential Impacts from Morphological and Hydrological Effects due to New Watercourse Crossing Works (Proposed Wind Farm)

Proposed Mitigation Measures:

- All proposed 3 no. new stream crossings will be bottomless or clear span structures and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no direct impact on the stream at the proposed crossing location;
- Where the proposed cable route follows an existing road or road proposed for upgrade, the cable will pass over or below the culvert within the access road;
- All guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland15 is incorporated into the design of the proposed crossings;
- As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI);
- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase. There will be no batching or storage of cement allowed in the vicinity of the crossing construction areas; and,
- All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

6.2.1.2.9 Potential Hydrological Effects on Designated Sites (Proposed Project)

Drainage mitigation measures for surface water quality protection during the construction phase are summarised again below: (Please refer to Sections above for the full description of these measures and how they will be applied).

- The proposed mitigation measures which will include 50m buffer zones for avoidance of sensitive hydrological features (streams and rivers);
- 30m karst feature buffers;
- Pre-construction drainage control measures;
- Robust drainage control measures (i.e. interceptor drains, swales, settlement ponds and treatment trains such as Siltbuster) will ensure that the quality of runoff from Proposed Project areas will be very high;
- Best practice measures with regard use of oils, fuels (discussed above) and cement-based compounds; and,
- Mitigation relating to HDD works are presented in Section 6.2.1.2.13 below which will be applied during the River Nore crossing,

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

6.2.1.2.10 Potential effects from Turbine Delivery Route Works (Wind Farm)

No potential for adverse effects on any European Site as a result of accommodation works associated with the TDR.

No mitigation required.

6.2.1.2.11 Potential Effects of Construction Works on the WFD Status of Downstream Waterbodies (Proposed Project)

Proposed Mitigation Measures:

Comprehensive surface water mitigation and drainage controls are outlined in Section 6.2.1.2.1 (Felling of Coniferous Plantations), Section 6.2.1.2.2 (Earthworks), Section 6.2.1.2.4 (Excavation Dewatering), Section 6.2.1.2.5 (Hydrocarbons), Section 6.2.1.2.7 (Cement-based Products) and Section 6.2.1.2.8 (Morphological Changes to Watercourses). These will ensure the protection of surface water quality and flows in all downstream receiving watercourses.

6.2.1.2.12 Potential Impacts from Use of Siltbuster and Impacts on Downstream Surface Water Quality (Proposed Project)

Mitigation Measures:

Measures employed to prevent overdosing and potential chemical carryover:

- The siltbuster system comprises an electronic in-line dosing system which provides an accurate means of adding reagents, as a result the risk of over dosing is minimised;
- Continued monitoring and water analysis of pre and post treated water by means of an inhouse lab and dedicated staff, means the correct amount of chemical is added by the dosing system;
- Dosing rates of chemical to initiate settlement is small, being in the order of 2-10 mg/L and the vast majority of the chemical is removed in the deposited sediment;
- Final effluent not meeting the discharge criteria is recycled and retreated, which has a secondary positive effect of reducing carryover; and,
- Use of biodegradable chemical agents can be used at very sensitive sites (i.e. upstream of SACs).

6.2.1.2.13 Potential Impacts on Surface Water Quality Effects of the Proposed Grid Connection Earthworks and Watercourse Crossings (Grid Connection)

Proposed Mitigation Measures:

Pre-commencement Temporary Drainage Works:

Prior to the commencement of Proposed 110kV Substation, cable trenching or access road works the following key temporary drainage measures will be installed:

- All existing roadside drains (where present) that intercept the proposed works area will be temporarily blocked down-gradient of the works using check dams/silt traps;
- Culverts, manholes and other drainage inlets (where present) will also be temporarily blocked; and,
- A double silt fence perimeter will be placed along the road verge on the down-slope side of works areas that are located inside a watercourse 50m buffer zone

The following mitigation measures are proposed for the underground cabling watercourse crossing works:

- No stock-piling of construction materials will take place along the grid route;
- No refuelling of machinery or overnight parking of machinery is permitted in this area;
- No concrete truck chute cleaning is permitted in this area;
- Works will not take place at periods of high rainfall, and will be scaled back or suspended if heavy rain is forecast;
- Local road drainage, culverts and manholes will be temporarily blocked during the works;
- Machinery deliveries will be arranged using existing structures along the public road;
- All machinery operations will take place away from the stream and ditch banks, apart from where crossings occur. Although no instream works are proposed or will occur;
- Any excess construction material will be immediately removed from the area and sent to a licenced waste facility;
- No stockpiling of materials will be permitted in the constraint zones;
- Spill kits will be available in each item of plant required to complete the stream crossing; and,
- Silt fencing will be erected on ground sloping towards watercourses at the stream crossings if required.

Fracture Blow-out (Frac-out) Prevention and Contingency Plan for HDD:

- The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e. Clear Bore Drilling Fluid or similar will be used);
- The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage;
- One or more lines of silt fencing will be placed between the works area and the adjacent river;
- Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility;
- Adequately sized skips will be used where temporary storage of arisings are required;
- The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse;
- This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur, then drilling will be immediately stopped;
- Any frac-out material will be contained and removed off-site;
- The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and,
- If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location.

6.2.1.2.14 *Biodiversity Management and Enhancement Plan (BMEP)*

No potential for adverse effects on any European Site as a result of the proposed enhancement works.

No mitigation required.

6.2.1.3 Residual adverse effects on water quality from Construction

Following the successful implementation of the above listed mitigation measures, there is no potential for significant residual adverse effects on water quality/habitat degradation of European sites as a result deterioration of water quality during the construction of the Proposed Project.

6.2.1.4 Operational Phase

The following pathways for which deterioration of water quality within European Sites may occur during the operational phase of the Proposed Project have been identified:

- Removal of Vegetation Cover and Progressive Replacement of Natural Surface with Low Permeability Surfaces (Proposed Project)
- Runoff Resulting in Suspended Solids Entrainment in Surface Waters

As discussed above, a potential pathway for adverse effects on European sites, taking a precautionary approach, was identified due to downstream hydrological connectivity from the Site. Each of the above pathways are assessed below, with mitigation prescribed to ensure no significant impacts on water quality during operation. Full details on mitigations are detailed in the drainage drawings in **Appendix 6** and are summarised below.

6.2.1.4.1 *Progressive Replacement of Natural Surface with Lower Permeability Surface*

Proposed Mitigation by Design:

The proposed drainage philosophy outlined in **Appendix 6** states that runoff control and drainage management are key elements in terms of mitigation against impacts on surface water bodies. Two distinct methods will be employed to manage drainage water within the Proposed Project. The first being 'keeping clean water clean' and the second involving the collection of any drainage waters from work area and to route them towards stilling ponds prior to controlled diffuse release over vegetated surfaces. The second method relates to proposed design measures that will prevent road surface and other hardstand areas acting as preferential flowpaths. All development site runoff will be collected, attenuated, treated and then released in a diffuse and regular manner that does not significantly change the natural drainage regime/hydrology of the Site.

The operational phase drainage system of the Proposed Project will be installed and constructed in conjunction with the road and hardstanding construction work as described below and as shown on the drainage drawings (**Appendix 6**):

- Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it will be re-distributed over the ground by means of a level spreader;
- Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the Site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- On steep sections of access road transverse drains ('grips') will be constructed in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- Settlement ponds will be designed in consideration of the greenfield runoff rate.

These measures will ensure all surface water runoff from upgraded roads and new road surfaces (including hardstands and turbine base areas) will be captured and treated prior to discharge/release.

Settlement ponds, check dams and buffered outfalls will prevent roads acting as preferential flowpaths by providing attenuation and water quality treatment.

6.2.1.4.2 *Runoff Resulting in Suspended Solids Entrainment in Surface Waters*

Proposed Mitigation Measures:

The mitigation measures outlined in Section 6.2.1.2.13 will ensure all surface water runoff from upgraded roads and new road surfaces (including hardstand and turbine base areas) will be captured and treated prior to discharge/release. Settlement ponds, checks dams and buffered outfalls will prevent roads acting as preferential flowpaths by providing attenuation and water quality treatment.

It is proposed that bedrock from off-site sources will be used to construct the sub-base layer of proposed upgraded and new access roads, hardstand areas and turbine base areas. Once installed the subbase layer will be overlain by a clean capping layer of high-grade stone material which will be sourced from local quarries also.

6.2.1.5 Residual adverse effects from Operation

Following the successful implementation of the above listed mitigation measures, there will be no potential for significant residual adverse effects on water quality/habitat degradation of European sites as a result of deterioration of water quality during the operation of the Proposed Project.

6.2.1.6 Decommissioning Phase

The potential impacts associated with decommissioning of the Proposed Project will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works. The proposed decommissioning of the Proposed Project is detailed in Section 2.7.

During decommissioning, it will be possible to reverse or at least reduce some of the potential effects caused during construction, and to a lesser extent operation, by rehabilitating constructed areas such as turbine bases and hard standing areas. This will be done by covering with peatland vegetation/scraw or poorly humified peat to encourage vegetation growth and reduce run-off and sedimentation.

The Site roadways will be kept and maintained following decommissioning of the turbine infrastructure, as these will be utilised by ongoing forestry works and by local farmers.

The electrical cabling connecting the Site infrastructure to the Proposed 110kV Substation will be removed, while the ducting itself will remain in-situ rather than excavating and removing it, as this is considered to have less of a potential environmental impact, in terms of soil exposure, and thus on the possibility of the generation of suspended sediment which could enter nearby watercourses.

The turbines will be removed by disassembling them in a reverse order to their erection. This will be completed using the same model cranes as used in their construction. They will then be transported off-site along their original delivery route. The disassembly and removal of the turbines will not have an impact on the hydrological/hydrogeological environment at the Site.

Other impacts such as possible soil compaction and contamination by fuel leaks will remain but will be of reduced magnitude than the construction phase because of the smaller scale of the works and reduced volumes on-site.

As noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological

advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is, therefore:

"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".

Some of the impacts will be avoided by leaving elements of the Proposed Project in place where appropriate. The Proposed 110kV Substation will be retained by EirGrid as a permanent part of the national grid. The turbine bases will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

No significant effects on the hydrological and hydrogeological environment are envisaged during the decommissioning stage of the Proposed Project.

The potential impacts associated with decommissioning of the Proposed Project will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

6.2.1.7 Residual adverse effects from Decommissioning:

Following the successful implementation of the above listed mitigation measures, there will be no potential for residual adverse effects on water quality/habitat degradation of European sites as a result of deterioration of water quality during decommissioning of the Proposed Project.

7. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for residual adverse effects on each of the individual relevant Qualifying Features of the Screened In European sites, following the implementation of mitigation, is assessed in this section of the report.

Based on the above, in view of best scientific knowledge, on the basis of objective information, there is no potential for adverse effect on the identified QIs/SCIs and their associated targets and attributes, or on any European site. Potential pathways for effect have been robustly blocked through measures to avoid impacts and the incorporation of best practice/mitigation measures into the project design.

Taking cognisance of measures to avoid impacts and best practice/mitigation measures incorporated into the project design which are considered in the preceding section, the Proposed Project will not have an adverse effect on the integrity of any European site.

The Proposed Project will not prevent the QIs/SCIs of European sites from achieving/maintaining favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive. A definition of Favourable Conservation Status is provided below:

> *'Favourable conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2; The conservation status will be taken as 'favourable' 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.'*

'Favourable conservation status of a habitat is achieved when:

- *It's natural range, and 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.'*

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Project will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European site.

8. ASSESSMENT OF CUMULATIVE EFFECTS

A search and review in relation to plans and projects that may have the potential to result in in-combination impacts on European sites was conducted. This assessment focuses on the potential for in-combination effects on the European sites where potential for adverse effects was identified in Section 5 of this report. This included a review of online Planning Registers, development plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects. A list of the projects considered is provided in **Appendix 5**.

8.1 Plans

The following Plans have been reviewed and taken into consideration as part of this assessment:

- Kilkenny City and County Development Plan 2021-2027
- Kilkenny Biodiversity Action Plan 2025-2030
- Ireland's 4th National Biodiversity Action Plan 2023-2030
- Regional Spatial & Economic Strategy for the Southern Region, Project Ireland 2040

The review focused on policies and objectives that relate to European sites. Policies and objectives relating to the conservation of Annex I habitats were also reviewed. No potential for in-combination effects with the Proposed Project has been identified, and the Proposed Project is in compliance with the relevant objectives of the Plans.

In addition, the Appropriate Assessments carried out for these Plans have been reviewed, where available. Relevant available reports for these plans, where available, can be found at the following locations:

- https://www.kilkennycoco.ie/eng/services/planning/development-plans/city-and-county-development-plan/vol1-master-ccdp-2-11-2021.pdf
- https://kilkennycoco.ie/eng/publications/council_publications/kilkenny-biodiversity-action-plan-2025-2030.pdf
- https://www.npws.ie/sites/default/files/files/4th_National_Biodiversity_Action_Plan.pdf
- https://southernassembly.ie/wp-content/uploads/2025/02/Regional_Spatial__Economic_Strategy_for_the_Southern_Region_LOW_RES.pdf?utm_source=chatgpt.com

The relevant plan-level Appropriate Assessment documents conclude that implementation of the plans will not adversely affect the integrity of European sites where their mitigation and protective objectives are applied. No adverse in-combination effect with the Proposed Project is identified.

8.2 Assessment of Projects

The plans and projects considered include those listed in **Appendix 4**. The residual construction, operational and decommissioning impacts of the Proposed Project are considered cumulatively with other plans and projects. Particular focus has been placed on those plans and projects that are in closest proximity to the Proposed Project and those that could potentially result in impacts on SCI bird species, surface water, groundwater and QI habitats and species.

8.2.1 Other Projects within the Hydrological Sub-catchment

As the Proposed Project is hydrologically connected to several European sites, which have been considered in this NIS, the potential for cumulative impacts on hydrology has been considered.

Cumulative Effects with Agriculture

Agricultural practices such as the movement of soil and the addition of fertilizers and pesticides can lead to nutrient losses and the entrainment of suspended solids in local surface watercourses. This can have a negative effect on local and downstream surface water quality.

In an unmitigated scenario the Proposed Project would have the potential to interact with these agricultural activities and contribute to a deterioration of downstream surface water quality through the emissions of elevated concentrations of suspended solids and ammonia.

However, the mitigation measures detailed in Section 6.2 of this report for the construction, operation and decommissioning phases of the Proposed Project will ensure the protection of downstream surface water quality.

For these reasons, there will not be a significant cumulative effect associated with agricultural activities.

Cumulative Effects with Commercial Forestry

The most common water quality problems arising from forestry relate to the release of sediment and nutrients to the aquatic environment and impacts from acidification. Forestry works can also give rise to modified stream flow regimes caused by associated land drainage.

However, the mitigation measures detailed for the construction, operation and decommissioning phases of the Proposed Project will ensure the protection of downstream surface water quality.

For these reasons there will not be a significant cumulative effect associated with commercial forestry activities.

Cumulative Effects with One Off Housing Developments

A detailed cumulative assessment has been carried out for all planning applications (granted and awaiting decisions) within the cumulative assessment area described above.

The projects identified comprise individual dwellings, alterations to existing dwellings and agricultural buildings. Their scale, location, timing and pathways to the screened-in European sites were considered. No adverse in-combination effect is predicted, subject to completion of the final **Appendix 4** planning-register review.

Cumulative Effects with Other Wind Farm Developments

The wind farm developments identified in the cumulative assessment are An Cnoc Wind Farm, Ballincurry Wind Farm, Ballybay Wind Farm, Bruckana Wind Farm, Gurteen Lower Single Wind Turbine, Lisdowney Wind Farm, Lisheen Wind Farm I, Lisheen Wind Farm II, Lisheen Wind Farm III, Foyle Wind Farm, Foyle Wind Farm Extension, Ballynalacken Wind Farm, Briskalagh Wind Farm, Farranrory Wind Farm, Gathabawn Wind Farm, Littleton Wind Farm, Seskin Renewables Wind Farm.

The available assessments report no significant residual effects on European sites following mitigation. The Proposed Project will implement project-specific water-quality, HDD, otter and kingfisher mitigation. No additional or different pathway for adverse in-combination effects has been identified.

The Proposed Project will not adversely affect the integrity of the River Barrow and River Nore SAC or River Nore SPA in combination with these wind farm developments.

Table 8-1 Wind farm developments considered in the in-combination assessment

Wind Farm	Planning Status	Number of Turbines	Separation Distance (to EIAR Site boundary)	County
An Cnoc Wind Farm	Existing	5	c. 9.77 km	Co. Tipperary
Ballincurry Wind Farm	Existing	2	c. 18.23 km	Co. Tipperary
Ballybay Wind Farm	Existing	6	c. 8.01 km	Co. Kilkenny
Bruckana Wind Farm	Existing	14	c. 10.37 km	Co. Kilkenny
Gurteen Lower Single Wind Turbine	Existing	1	c. 13.36 km	Co. Tipperary
Lisdowney Wind Farm	Existing	4	c. 0.31 km	Co. Kilkenny
Lisheen Wind Farm I	Existing	18	c. 11.15 km	Co. Tipperary
Lisheen Wind Farm II	Existing	12	c. 10.39 km	Co. Tipperary
Lisheen Wind Farm III	Existing	8	c. 9.43 km	Co. Kilkenny
Foyle Wind Farm	Existing	4	c. 9.77 km	Co. Kilkenny
Foyle Wind Farm Extension	Permitted	3	c. 9.05 km	Co. Kilkenny
Ballynalacken Wind Farm	Permitted	12	c. 4.32 km	Co. Kilkenny
Briskalagh Wind Farm	Permitted	7	c. 9.88 km	Co. Kilkenny
Farranrory Wind Farm	Permitted	9	c. 12.93 km	Co. Tipperary
Gathabawn Wind Farm	Proposed	12	c. 0.44 km	Co. Kilkenny
Littleton Wind Farm	Proposed	11	c. 12.61 km	Co. Tipperary
Seskin Renewables Wind Farm	Proposed	8	c. 0.65 km	Co. Laois and Co. Kilkenny

Ballincurry Wind Farm

This existing wind farm consists of 2 no. turbines and is c. 18.23 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Ballincurry Farm was considered. The conclusion of the NIS for Ballincurry Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Ballincurry Wind Farm, there is no potential for significant cumulative effects.

Gurteen Lower Single Wind Turbine

This existing wind farm consists of 1 no. turbine and is c. 13.36 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Gurteen Lower Single Wind Turbine was considered. The conclusion of the NIS for Gurteen Lower Single Wind Turbine Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Gurteen Lower Single Wind Turbine Wind Farm, there is no potential for significant cumulative effects.

Foyle Wind Farm Extension

This permitted wind farm[16] comprises 3 no. turbines and is c. 9.05 km from the EIAR Site Boundary. The NIS for the Foyle Wind Farm Extension was reviewed as part of this assessment. The AA Screening for the project identified no likely significant effects from the proposed wind farm alone, due to its distance from the River Barrow and River Nore SAC, the small scale of the project and the application of standard water quality protection measures. Given the distance from the Proposed Project, the absence of hydrological connectivity and the non-significant residual adverse effects predicted for the Proposed Project, there is no potential for cumulative adverse effects on any European sites.

Ballynalacken Wind Farm

This wind farm consists of 12 no. turbines and is c. 4.32 km from the EIAR Site Boundary. The site of the Ballynalacken Wind Farm and that of the Proposed Project are both hydrologically linked to the River Barrow and River Nore SAC and River Nore SPA. The NIS for the Ballynalacken Wind Farm project[17] was reviewed as part of this assessment. The AA Screening for the project identified potential for likely significant effects on the River Nore SPA (disturbance and reduction in water quality effects on Kingfisher) and River Barrow and River Nore SAC (reduction in water quality from release of suspended solids and/or other pollutants into the surface water system). As such the potential for in-combination effects with the Proposed Project specifically in relation to the River Barrow and River Nore SAC were initially identified (construction related impacts on water quality). However, with the implementation of mitigation measures outlined within this NIS and the mitigation measures outlined within the NIS for the Ballynalacken Wind Farm no potential for in-combination effects were identified.

Briskalagh Wind Farm

This wind farm[18] consists of 7 no. turbines and is c. 9.88 km from the EIAR Site Boundary. Both the Briskalagh Wind Farm site and the Proposed Project are hydrologically connected to the River Barrow and River Nore SAC and the River Nore SPA. The NIS for the Briskalagh Wind Farm project was reviewed as part of this assessment. The AA Screening identified the potential for likely significant effects on the River Nore SPA. A pathway for indirect effects on kingfisher, an SCI species of the SPA, was identified through deterioration in water quality via surface-water pathways during construction of the Proposed Project. The AA Screening also identified the potential for indirect effects on the QI species and habitats of the River Barrow and River Nore SAC through deterioration in water quality and habitat degradation via surface-water and groundwater pathways during construction and operation of the Proposed Project. Accordingly, the potential for in-combination effects with the Proposed Project was initially identified, specifically in relation to construction-related effects on water quality within the River Barrow and River Nore SAC. However, with implementation of the mitigation measures set out in this NIS and in the NIS for the Briskalagh Wind Farm, no potential for in-combination effects was identified.

Farranrory Wind Farm

This wind farm consists of 9 no. turbines and is c. 12.93 km from the EIAR Site Boundary. Both the Farranrory Wind Farm site and the Proposed Project are hydrologically connected to the River Barrow and River Nore SAC and the River Nore SPA. The NIS for the Farranrory Wind Farm project was reviewed as part of this assessment. The AA Screening identified the potential for likely significant effects on the River Nore SPA. A pathway for indirect effects on kingfisher, an SCI species of the SPA,

[16] https://planning.kilkennycoco.ie/AppFileRefDetails/16666/0
[17] https://www.pleanala.ie/publicaccess/EIAR-NIS/322069/Volume%20E%20-%20Appropriate%20Assessment%20Report%202025/Appropriate%20Assessment%20(AA)%20Report%202025.pdf *(Accessed 10/06/2025)*
[18] *https://planning.kilkennycoco.ie/AppFileRefDetails/2560003/0*

was identified through deterioration in water quality via surface-water pathways during construction of the Proposed Project. The AA Screening also identified the potential for indirect effects on the QI species and habitats of the River Barrow and River Nore SAC through deterioration in water quality and habitat degradation via surface-water and groundwater pathways during construction and operation of the Proposed Project. Accordingly, the potential for in-combination effects with the Proposed Project was initially identified, specifically in relation to construction-related effects on water quality within the River Barrow and River Nore SAC. However, with implementation of the mitigation measures set out in this NIS and in the NIS for the Farranrory Wind Farm, no potential for in-combination effects was identified.

Gathabawn Wind Farm

This wind farm consists of 12 no. turbines and is c. 0.44 km from the EIAR Site Boundary. Both the Gathabawn Wind Farm site and the Proposed Project are hydrologically connected to the River Barrow and River Nore SAC and the River Nore SPA. The NIS for the Gathabawn Wind Farm[19] project was reviewed as part of this assessment. The AA Screening identified the potential for likely significant effects on the River Nore SPA. A pathway for indirect effects on kingfisher, an SCI species of the SPA, was identified through indirect loss, reduction or loss of connectivity of wetland or other suitable habitat via reductions in water quality, reduction in prey item species. The AA Screening also identified the potential for indirect effects on the QI species and habitats of the River Barrow and River Nore SAC through deterioration in water quality and habitat degradation via surface-water and groundwater pathways during construction and operation of the Proposed Project. Accordingly, the potential for in-combination effects with the Proposed Project was initially identified, specifically in relation to construction-related effects on water quality within the River Barrow and River Nore SAC. However, with implementation of the mitigation measures set out in this NIS and in the NIS for the Gathabawn Wind Farm, no potential for in-combination effects was identified.

Littleton Wind Farm

This wind farm consists of 11 no. turbines and is c. 12.61 km from the EIAR Site Boundary. Both the Littleton Wind Farm site and the Proposed Project are hydrologically connected to the River Barrow and River Nore SAC and the River Nore SPA. The NIS for the Littleton Wind Farm project[20] was reviewed as part of this assessment. The AA Screening identified the potential for likely significant effects on the River Nore SPA. A pathway for indirect effects on kingfisher, an SCI species of the SPA, was identified through disturbance and habitat damage due to potential degradation in water quality during construction. The AA Screening also identified the potential for indirect effects on the QI species and habitats of the River Barrow and River Nore SAC through deterioration in water quality and sedimentation via surface-water pathways during construction of the Proposed Project and potential disturbance to otter during construction. Accordingly, the potential for in-combination effects with the Proposed Project was initially identified, specifically in relation to construction-related effects on water quality within the River Barrow and River Nore SAC. However, with implementation of the mitigation measures set out in this NIS and in the NIS for the Littleton Wind Farm, no potential for in-combination effects was identified.

Seskin Renewables Wind Farm

Seskin Renewables Wind Farm[21][22] comprises 8 no. turbines and is located c. 0.65 km from the EIAR Site Boundary. Both the Seskin Renewables Wind Farm site and the Proposed Project are hydrologically connected to the River Barrow and River Nore SAC and the River Nore SPA. The NIS

[19] *https://gathabawnwindfarmplanning.ie/wp-content/uploads/2026/09/Appropriate-Assessment-Report.pdf*
[20] *https://www.littletonwindfarmplanning.ie/wp-content/uploads/sites/53/2026/06/Natura_Impact_Statement.pdf*
[21] *https://planning.kilkennycoco.ie/AppFileRefDetails/2560418/0*
[22] *https://eplanning.ie/ePlan/AppFileRefDetails/2560414/15?localAuthorityId=15*

for the Seskin Renewables Wind Farm project was reviewed as part of this assessment. The AA Screening identified the potential for likely significant effects on the River Nore SPA. A pathway for indirect effects on kingfisher, an SCI species of the SPA, was identified through disturbance and deterioration in water quality via surface-water pathways during construction of the Proposed Project, potentially resulting in habitat degradation and reduced prey availability. The AA Screening also identified the potential for indirect effects on the QI species and habitats of the River Barrow and River Nore SAC through deterioration in water quality and habitat degradation via surface-water and groundwater pathways during construction and operation of the Proposed Project. Accordingly, the potential for in-combination effects with the Proposed Project was initially identified, specifically in relation to construction-related effects on water quality within the River Barrow and River Nore SAC. However, with implementation of the mitigation measures set out in this NIS and in the NIS for the Seskin Renewables Wind Farm, no potential for in-combination effects was identified.

An Cnoc Wind Farm

This wind farm consists of 5 no. turbines and is approx. 9.77 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Cnoc Wind Farm was considered. The conclusion of the NIS for Cnoc Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Cnoc Wind Farm, there is no potential for significant cumulative effects.

Ballybay Wind Farm

This wind farm consists of 6 no. turbines and is approx. 8.01 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Ballybay Wind Farm was considered. The conclusion of the NIS for Ballybay Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Ballybay Wind Farm, there is no potential for significant cumulative effects.

Bruckana Wind Farm

This wind farm consists of 14 no. turbines and is approx. 10.37 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Bruckana Wind Farm was considered. The conclusion of the NIS for Bruckana Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Bruckana Wind Farm, there is no potential for significant cumulative effects.

Lisdowney Wind Farm

This wind farm[23] consists of 4 no. turbines and is approx. 0.31 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Lisdowney Wind Farm was considered. The conclusion of the NIS for Lisdowney Wind Farm was that there would be no residual significant effects on biodiversity with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Lisdowney Wind Farm, there is no potential for significant cumulative effects.

Lisheen Wind Farm I

This wind farm consists of 18 no. turbines and is approx. 11.15 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Lisheen I Wind Farm was considered. The conclusion of the NIS for Lisheen I Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no

[23] *https://planning.kilkennycoco.ie/AppFileRefDetails/081511/0*

potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Lisheen I Wind Farm, there is no potential for significant cumulative effects.

Lisheen Wind Farm II

This wind farm consists of 12 no. turbines and is approx. 10.39 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Lisheen II Wind Farm was considered. The conclusion of the NIS for Lisheen II Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Lisheen II Wind Farm, there is no potential for significant cumulative effects.

Lisheen Wind Farm III

This wind farm consists of 8 no. turbines and is approx. 9.43 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Lisheen III Wind Farm was considered. The conclusion of the NIS for Lisheen III Wind Farm was that there would be no residual adverse effects on European sites. Given the lack of residual effects predicted as a result of the Proposed Project and Lisheen III Wind Farm, there is no potential for significant cumulative effects.

Foyle Wind Farm

This wind farm consists of 4 no. turbines and is approx. 9.77 km from the EIAR Site Boundary. The potential for the Proposed Project to result in significant cumulative effects when assessed alongside Foyle Wind Farm was considered. The conclusion of the NIS for Foyle Wind Farm was that there would be no residual adverse effects on European sites with the implementation of mitigation measures outlined in the report. In additional, this is an existing wind farm and therefore the is no potential for cumulative impacts during construction. Given the lack of residual effects predicted as a result of the Proposed Project and Foyle Wind Farm, there is no potential for significant cumulative effects.

8.2.2 Proposed 110kV Underground Cabling route

As per the assessment of residual adverse effects in Section 7 of this report, the Proposed Project will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European Site. Therefore, there is no potential for cumulative effect as a result of the Proposed Project in-combination with the above-mentioned projects.

8.3 Conclusion of Assessment of Cumulative Effects

Following the assessment above, the Proposed Project will not adversely affect the integrity or conservation objectives of any European site when considered alone. With the prescribed mitigation in place, it will not contribute to an adverse in-combination effect with other plans or projects.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Project.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative impacts have been identified with regard to any European Site.

9. CONCLUDING STATEMENT

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Proposed Project do not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Project, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

BIBLIOGRAPHY

Bailey, M. and Rochford J. (2006) Otter Survey of Ireland 2004/2005. Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J. (2013). Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford, UK.

Birds Directive (2009/47/EC) – http://ec.europa.eu/environment/nature /legislation/birdsdirective /index _en.htm

Blumstein DT, Anthony LL, Harcourt R, Ross G. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? Biological Conservation 110:97–100.

Blumstein DT, Fernández-Juricic E, Zollner PA, Garity SC. 2005. Inter-specific variation in avian responses to human disturbance. Journal of Applied Ecology 42:943–953. Blumstein DT 2006b. The multi-predator hypothesis and the evolutionary persistence of antipredator behaviour. Ethology 112: 209–217.

Bowers Marriott, B. (1997) Practical Guide to Environmental Impact Assessment: A Practical Guide. Published by McGraw-Hill Professional, 1997, 320 pp.

Chandler, J.R. (1970) A Biological Approach to water Quality Management. Water Poll. Cont. 69:415-421.

Chanin, P. (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive 79/409/EEC as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).

CIEEM (2013) Technical Guidance Series – Competencies for Species Survey: Otter.

CIEEM (2018) Institute of Ecology and Environmental Management Draft Guidelines for Ecological Impact Assessment.

Crowe, O., Wilson, J., Aznar, I. and More, S.J. (2009). A review of Ireland's waterbirds, with emphasis on wintering migrants and reference to H5N1 avian influenza. Irish Veterinary Journal 62, 800–811.

Crowe, O. (2005) Ireland's Wetlands and their Waterbirds: Status and Distribution. BirdWatch Ireland, Rockingham, Co. Wicklow.

Del Hoyo, J., Elliott, A., and Sargatal, J. 1996. Handbook of the Birds of the World, vol. 3: Hoatzin to Auks. Lynx Edicions, Barcelona, Spain.

Delibes, M., Macdonald, S.M. & Mason, C.F. (1991) Seasonal marking, habitat and organochlorine contamination in otters (Lutra lutra): a comparison between catchments in Andalucía and Wales. Mammalia 55: 567-578

DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. DEHLG, Dublin.

DoEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Revision, February 2010. Department of the Environment, Heritage and Local Government. Durbin, L. (1993) Food and habitat utilisation of otters (Lutra lutra L.) in a riparian habitat-the River Don in north-east Scotland. PhD thesis, University of Aberdeen.

EC (2018) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.

EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2006) Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg.

EC (2007a) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2007b) Interpretation Manual of European Union Habitats. Version EUR 27. European Commission, DG Environment.

EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements. Environmental Protection Agency.

EPA (2003) Advice Notes on current practice in the preparation of Environmental Impact Statements. Environmental Protection Agency.

EPA website: http://www.epa.ie.

European Communities (Conservation of Wild Birds) Regulations, 1985, SI 291/1985 & amendments – http://www.irishstatutebook.ie.

European Communities (Environmental Impact Assessment) Regulations, 1989 to 2001.

European Communities (Natural Habitats) Regulations, SI 94/1997, SI 233/1998 & SI 378/2005 – http://www.irishstatutebook.ie.

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Dublin: The Heritage Council.

Glover HK, Weston MA, Maguire GS, Miller KK, Christie BA. 2011. Towards ecologically meaningful and socially acceptable buffers: Response distances of shorebirds in Victoria, Australia, to human disturbance. Landscape and Urban Planning 103:326–334.

Green, J. and Green, R. (1997). Otter Survey of Scotland 1991-1994. The Vincent Wildlife Trust, London.

Guay P-J, McLeod EM, Taysom AJ, Weston MA. 2014. Are vehicles 'mobile bird hides'? A test of the hypothesis that 'cars cause less disturbance' The Victorian Naturalist 131:150–155.

Habitats Directive (92/43/EEC).

Holloway, Steve. "Winter distribution and disturbance of wildfowl and waders on Findhorn Bay." BTO Research Report (1997).

Jefferies DJ (1987). The effects of angling interests on otters with particular reference to disturbance. In: Maitland PS & Turner AK (eds). Angling and Wildlife in Fresh Waters. Institute of Terrestrial Ecology, Grange-over-Sands, 23–30.

Jiang, Y. and Møller, A.P., 2017. Antipredator escape distances of common and threatened birds. Behavioral Ecology, 28(6), pp.1498-1503.

Knapton, R. W., Petrie, S. A. & Herring, G. Human disturbance of diving ducks on Long Point Bay, Lake Erie. Wildlife Society Bulletin28, 923-930 (2000).

Livezey, K.B., Fernández-Juricic, E. and Blumstein, D.T., 2016. Database and metadata of bird flight initiation distances worldwide to assist in estimating human disturbance effects and delineating buffer areas. Journal of Fish and Wildlife Management 7, pp.1-11

Mason, C.F. & Macdonald, S.M. (1986) Otters: ecology and conservation. Cambridge University Press, Cambridge.

McCorry, M. (2007) The Saltmarsh Monitoring Project 2006. Unpublished Report to NPWS.

McCorry, M. and Ryle, T. (2009). Coastal Monitoring Project 2004 – 2006. Unpublished Report to NPWS.

McGuinness, D., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland. Guidance Document. Birdwatch Ireland.

Møller AP. 2008b. Flight distance and blood parasites in birds. Behavioural Ecology 19:1305–1313.

Møller AP. 2008c. Flight distance and population trends in European birds. Behavioural Ecology 19:1095–1102.

Møller AP, Erritzøe J. 2010. Flight distance and eye size in birds. Ethology 116:458–465.

Murphy, D.F. (2004) Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.

NPWS (2008) The Status of EU Protected Habitats and Species in Ireland. Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC.

NPWS of the DEHLG (2008) The Report on Status of Habitats and Species in Ireland: Technical Reports and Forms.

NPWS (2009) Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

NPWS Protected Areas Site Synopses and maps available on http://www.npws.ie/en/ProtectedSites/.

NPWS (2025). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Domhnall Finch, Aoife Delaney, Fionnuala O'Neill and Deirdre Lynn

O'Clery, M., & Lusby, J. (2015). The Kingfisher Nest Box Project in Duhallow - An assessment of current nest box sites and future recommendations (Unpublished).

Pease, M. L., Rose, R. K. & Butler, M. J. Effects of human disturbances on the behavior of wintering ducks. Wildlife Society Bulletin33, 103-112 (2005).

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Scottish Natural Heritage (SNH) (July 2013) Assessing Connectivity with Special Protection Areas (SPA)

Smit CJ, Visser GJM. 1993. Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area. Wader Study Group Bulletin 68:6–19.

TII (2004) Environmental Impact Assessment of National Road Schemes – A Practical Guide, National Roads Authority, Dublin.

TII (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (1 ed.). Dublin: National Roads Authority.

TII (2005) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. Dublin: National Roads Authority.

TII (2006) A Guide to Landscape Treatments for National Road Schemes in Ireland. Dublin: National Roads Authority.

TII (2006) Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post-Construction of National Road Schemes. Dublin: National Roads Authority.

TII (2006). Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. National Roads Authority, Dublin.

TII (2008). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Dublin: National Roads Authority.

Therivel R. (2009) Workshop Material on the Habitats Directive Assessment of Plans Levett-Therivel Sustainability Consultants on behalf of the Heritage Council, Kilkenny.

Water status data available on http://www.epa.ie and http://www.wfdireland.ie

Wildlife Act 1976 and Wildlife (Amendment) Act 2000.

Weston MA, McLeod EM, Blumstein DT, Guay P-J. 2012. A review of flight-initiation distances and their application to managing disturbance to Australian birds. Emu 112:269–286.