PROPOSED GARRANE GREEN ENERGY PROJECT,

COUNTY LIMERICK

SCREENING REPORT FOR APPROPRIATE ASSESSMENT

AND

NATURA IMPACT STATEMENT

06 August 2025

Prepared for

Garrane Green Energy Ltd

by

BioSphere Environmental Services

29 La Touche Park, Greystones, Co. Wicklow

Tel: 01 2875249 / 087 2309906; E-mail: maddenbio20@gmail.com

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1 INTRODUCTION

This Appropriate Assessment Screening Report and Natura Impact Statement has been prepared by Dr. Brian Madden of BioSphere Environmental Services on behalf of Garrane Green Energy Ltd. The purpose of the report is to provide the information required to assist the competent authority to undertake a Screening Assessment and, if considered necessary, an Appropriate Assessment (AA). The AA screening process will determine whether a proposed Wind Farm Project at Garrane, Co. Limerick, either individually or in combination with other plans and projects, is likely to have a significant effect on European sites in view of best and objective scientific knowledge and of those sites' conservation objectives. The AA process will determine whether the Project will adversely affect the integrity of a European site in view of its conservation objectives.

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

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

1.1 Regulatory Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended), better known as "The Habitats Directive", provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (2009/147/EC) (better known as "The Birds Directive").

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

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

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

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First the project should aim to avoid any adverse effects on European sites by identifying possible effects early in the planning stage, and designing the project in order to avoid such effects. Second, mitigation measures should be applied, if necessary, during the AA process to the point where no adverse effects on the integrity of site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, then it is rejected, unless in accordance with Article 6(4) of the Habitats Directive the project must be carried out for imperative reasons of overriding public interest ('IROPI test') and there are no alternative solutions. In such circumstances, compensation measures are required for any remaining adverse effect(s) in order to ensure that the overall coherence of Natura 2000 is protected.

1.2 Stages of the Appropriate Assessment (AA)

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

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

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

Stage 1 – Screening

The purpose of the screening stage is to determine, in view of best scientific knowledge, whether a plan or project, individually or in-combination with other plans or projects, is likely to have a significant effect on a European site in view of the site's conservation objectives.

A Stage 2 AA is required if it cannot be excluded, on the basis of objective scientific information following screening, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.

Stage 2 – Appropriate Assessment

A Stage Two AA determines whether the plan or project, individually or in-combination with other plans and projects, will adversely affect the integrity of a European site.

Stage 1 (Screening) is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

- o Whether a plan/project is directly connected to or necessary for the management of the site,
- o Whether a plan /project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, or includes mitigation measures for the purpose of avoiding or reducing adverse effects on an European Site, then the process requires a **Stage 2** Appropriate Assessment (AA), with preparation of a Natura Impact Statement (NIS). Screening is undertaken on the potential impact of the project, including the construction works. The greatest level of evidence and justification is needed in circumstances where the process ends at the screening stage on grounds of no potential impact on elements of conservation interest in the Natura 2000 site/s.

Stage 2. Appropriate Assessment considers whether the plan or project, alone or in combination with other projects or plans, will have an adverse effect on the integrity of a Natura 2000 site. Stage 2 requires preparation of a Natura Impact Statement. This is a scientific examination of the project and the relevant Natura 2000 sites, to identify any possible implications for the designated site in view of the site's conservation objectives, taking account of mitigation measures and cumulative effects arising from other projects undertaken in the catchment area, and should provide information to enable the competent authority to carry out a full assessment of the project impact on the Natura sites

Stage 3 – Assessment of Alternatives

This stage of the potential process arises where it is determined that a project would have an adverse effect on the integrity of a European site and examines alternative ways of achieving the objectives of the project or plan that avoid adverse effects on the integrity of the European site.

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

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

1.3 Statement of Authority and Project Team

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

The ecological personnel and their role in the Garrane Wind Farm project are listed in Table 1 below.

Table 1: Personnel involved in Terrestrial Ecological Assessment.

Project Team Member	Qualifications & Experience	Role
Dr Brian Madden, BioSphere Environmental Services	BA. Mod. (Hons), PhD, MCIEEM Brian graduated in Natural Sciences from the University of Dublin in 1984 and earned a Ph.D. degree in 1990 from the National University of Ireland for his research on ecosystem processes in raised bogs. Since 1994, Brian has been the principal ecologist with BioSphere Environmental Services. Brian has carried out botanical surveys and habitat assessments for most terrestrial habitats which occur on the island of Ireland. He is also an experienced ornithologist, with particular interests in birds of prey and wetland birds. He has published a range of peer-reviewed research papers. Examples of energy projects that Brian has been involved in include: Grousemount Wind Farm, Cos. Cork/Kerry, Oweninny Wind Farm Phases 1 & 2, Co. Mayo, Castlepook Wind Farm, Co. Cork, Letteragh Wind Farm, Co. Clare, Kiltumper Wind Farm Co. Clare, Eglish Wind Farm, Co Tyrone, Connemara 110kV Overhead Line Reinforcement Project (40 km from Barna to Maam Cross and to Screeb Bay in Connemara.	Preparation of EIAR Chapter 6; habitat assessment; terrestrial mammal survey
Dr John Conaghan, Enviroscope Environmental Consultancy	BSc, PhD, MCIEEM John has over 25 years' experience of working on botanical projects throughout Ireland. He is a habitat specialist, with particular expertise in peatland and wetland habitats, as well as rare plants. John has worked with Coillte on their LIFE funded habitat restoration programme - he regularly contributes this expertise to Species and Habitat Management Plans. Examples of energy projects that John has been involved in include: Oweninny Wind Farm Phases 1 & 2, Co. Mayo, The Galway Wind Park, Grousemount Wind Farm, Cos. Cork/Kerry, Castlepook Wind Farm, Co. Cork, BGE Corrib Gas Pipeline from Bellanaboy, Co. Mayo to Craughwell, Co. Galway.	Advisory role for habitat and botanical surveys; Rare plants
John Curtin, principal ecologist with Eire Ecology Ltd.	BSc in Environmental Science, NUI Galway, MCIEEM John has been carrying out bat surveys at wind farm sites since 2012 and has completed all standard training for such work through Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop. John holds the relevant licences for handling and photographing bats. Examples of energy projects that John has provided bat assessments for include Yellow River Wind Farm, Co. Offaly,	Implementation of Bat Survey for project, analysis of data and preparation of risk assessment and mitigation requirements

Project Team Member	Qualifications & Experience	Role
	Boggeragh Wind Farm, Co. Cork, Cappawhite B Wind Farm, Co. Tipperary, Glenmore Wind Farm, Co. Clare.	
Joe Adamson, Associate, BioSphere Environmental Services	B.Sc., M.Sc., MCIEEM Joe has over 15 years' experience working on mammals and birds throughout Ireland (and before that has worked in North America). He regularly carries out baseline surveys for wind farm projects and has worked on Grousemount Wind Farm, Cos. Cork/Kerry, Oweninny Wind Farm, Co. Mayo, Fir Lough Wind Farm, Co. Mayo and Yellow River Wind Farm, Co. Offaly.	Terrestrial mammal surveys; Report Input

1.4 Data Sources used to carry out the assessment

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

- Review of NPWS Site Synopses & Conservation Objectives for relevant European sites
- Review of NPWS (2019) The Status of EU Protected Habitats and Species in Ireland report
- Review of online web-mappers: National Parks and Wildlife Service (NPWS) & EPA
- Review of OS map and aerial photographs of the site and surroundings of the proposed Project
- Limerick County Development Plan 2023-2029.
- Review of other relevant plans and projects within the area including wind farms, as well as the IE licence associated with the Rathgoggan North WwTP (held by Kerry Ingredients (Ireland) Ltd) which includes discharge of treated effluent to the River Maigue.
- EIAR Chapter 2. Project Description prepared by Jennings O'Donovan & Partners
- EIAR Chapter 6. Biodiversity prepared by BioSphere Environmental Services
- EIAR Chapter 7. Aquatic Ecology prepared by AQUAFACT International Ltd. (APEM Group)
- EIAR Chapter 8. Ornithology prepared by RSK Biocensus
- EIAR Chapter 9. Soils and Geology prepared by RSK Consultants
- EIAR Chapter 10. Hydrology & Hydrogeology prepared by Hydro-Environmental Services Consultants
- EIAR Volume IV (Appendix 2.1): Construction Environmental Management Plan (CEMP) prepared by Jennings O'Donovan & Partners
- EIAR Volume IV (Appendix 2.2): A Grid Connection Route Assessment report and accompanying drawings prepared by BFA Consulting
- Review of Maigue Rivers Trust: Scientific reports and studies on the River Maigue

2 SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether appropriate assessment is necessary by examining:

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

Screening involves the following:

i. Description of plan or project;
ii. Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives;
iii. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of best and objective scientific knowledge
iv. Assessment of any combination effects with other plans and projects.
v. Screening Statement with conclusions.

2.1 Description of the Project Site

The proposed Project is located in south Co. Limerick and just north of the Cork-Limerick County border. It lies approximately 2 km north of Charleville, Co. Cork, and just over 2 km south of the village of Bruree in Co. Limerick. The Wind Farm Site is situated within the townlands of Garrane and Garrose in the north and Ballynagoul and Creggane in the south. The Redline Boundary of the Wind Farm Site covers a total area of 158.75 ha. The Wind Farm Site is accessed via the N20 to the west and the L1537 to the east. The location of the wind farm site is shown in **Figure 1** and the Redline Boundary and layout is shown **in Figure 2.**

The Wind Farm Site is situated within a largely agricultural landscape, with pastoral farming of varying intensity carried out throughout the entire site. The Rathgoggan North Waste Water Treatment Plant lies immediately to the south of the site. This WwTP discharges treated effluent into the River Maigue, just north of its confluence with the Loobagh River. This facility includes various ponds or lagoons, which are nationally important for waterbirds (known as Charleville Lagoons, Crowe 2005).

Topography within the site is generally flat to gently undulating, ranging from approximately 58 m to 61 m AOD at the northern end, 63m to 73m AOD at the southern end with a gentle fall towards the River Maigue. According to the GSI online database, the proposed Project footprint for Garrane Wind Farm is immediately underlain by the following rock formations (see details in **Chapter 9: Soils and Geology**):

- Waulsortian Limestones – Massive unbeded limestones
- Visean Limestones – Undifferentiated limestones

- Ballysteen Formation – Dark muddy limestone, shale

Superficial soils present within the Red-line Boundary largely consists of lake (lacustrine) deposits and river deposits (alluvium). The northern and southern extents of the site are underlain by glacial till, with small pockets of gravels present elsewhere. No peat was recorded during any of the baseline assessments and all organic soils encountered were classified as Topsoil (see details in **Chapter 9: Soils and Geology**).

On a regional scale, the Wind Farm Site is located in the Shannon Estuary South surface water catchment within Hydrometric Area 24 of the Shannon River Basin District (for details of drainage see **Chapter 10: Hydrology and Hydrogeology).** Locally the Wind Farm Site is located within 3 no. WFD river sub-catchments of the Maigue River: The eastern section of the Site is within the Maigue_SC_020 river sub-catchment, the western section is within the Maigue_SC_010 river sub-catchment, whilst a very small area in the north of the Site is mapped in the Maigue_SC_040 river sub-catchment (see **Figure 3**).

Within the Maigue_SC_010 sub-catchment, the Site is mapped in the Charleville Stream_020 WFD river sub-basin. The Charleville Stream (EPA code) is a 2nd order stream which more or less dissects the Site, flowing from south to north before discharging into the Maigue River. Several other smaller watercourses are mapped by the EPA in this area (the Graigues Stream (EPA code_, the Creggane Stream (EPA code)). The Maigue River itself flows to the east under the N20 at Creggane Bridge and dissects the northwestern section of the Site. After flowing eastwards, it veers to the north downstream of the confluence with the Charleville and Graigues streams.

Within the Maigue_SC_020 sub-catchment, the Site is mapped in the Maigue_030 river sub-basin. The main drainage feature in this area is the Loobagh River which discharges into the River Maigue downstream of the Site and approximately 28 m north of T07. A small locally unnamed stream, also referred to by the EPA as the Loobagh, is mapped to flow along the northeastern boundary of the Site and approximately 80 m east of T04. This stream discharges into the River Maigue just south of the confluence of the River Maigue and the main River Loobagh.

Within the Maigue_SC_040 river sub-catchment, the Site is also mapped in the Maigue_030 WFD river sub-basin, with the River Maigue flowing to the north approximately 215 m east of T9.

Downstream of the Site, the Maigue River continues to the north, flowing through Bruree and Croom before becoming tidal at Adare, approximately 20 km northeast of the Site (straight line distance).

Ecologically, the area in which the Wind Farm Site is located is dominated by agricultural grassland, which varies from Improved agricultural grassland (GA1) to Neutral grassland (GS1) and Wet grassland (GS4) depending on intensity of current and recent management. The varying levels of management have resulted in marked differences in the grassland swards to the west (improved) and east (unmanaged) of the Charleville stream. The fields are mostly bounded by Hedgerows (WL1), which are typically of a low stature and often of

low species diversity due to the absence of recent management. Treelines (WL2) are also represented though are limited in their occurrence on site. Several mature poplar and willow tree standards are a feature of the site.

The watercourses within the study site are all classified as Depositing/lowland rivers (FW2). Drainage ditches (FW4), often of substantial depth and width, are associated with most of the field boundaries.

From a wider conservation perspective, the dominant ecological features of the region are the upland Ballyhoura Mountains complex to the south-southeast, the River Blackwater system to the south, and the River Shannon estuarine system to the north.

Figure 1: Location of Site for the Proposed Garrane Green Energy Project.

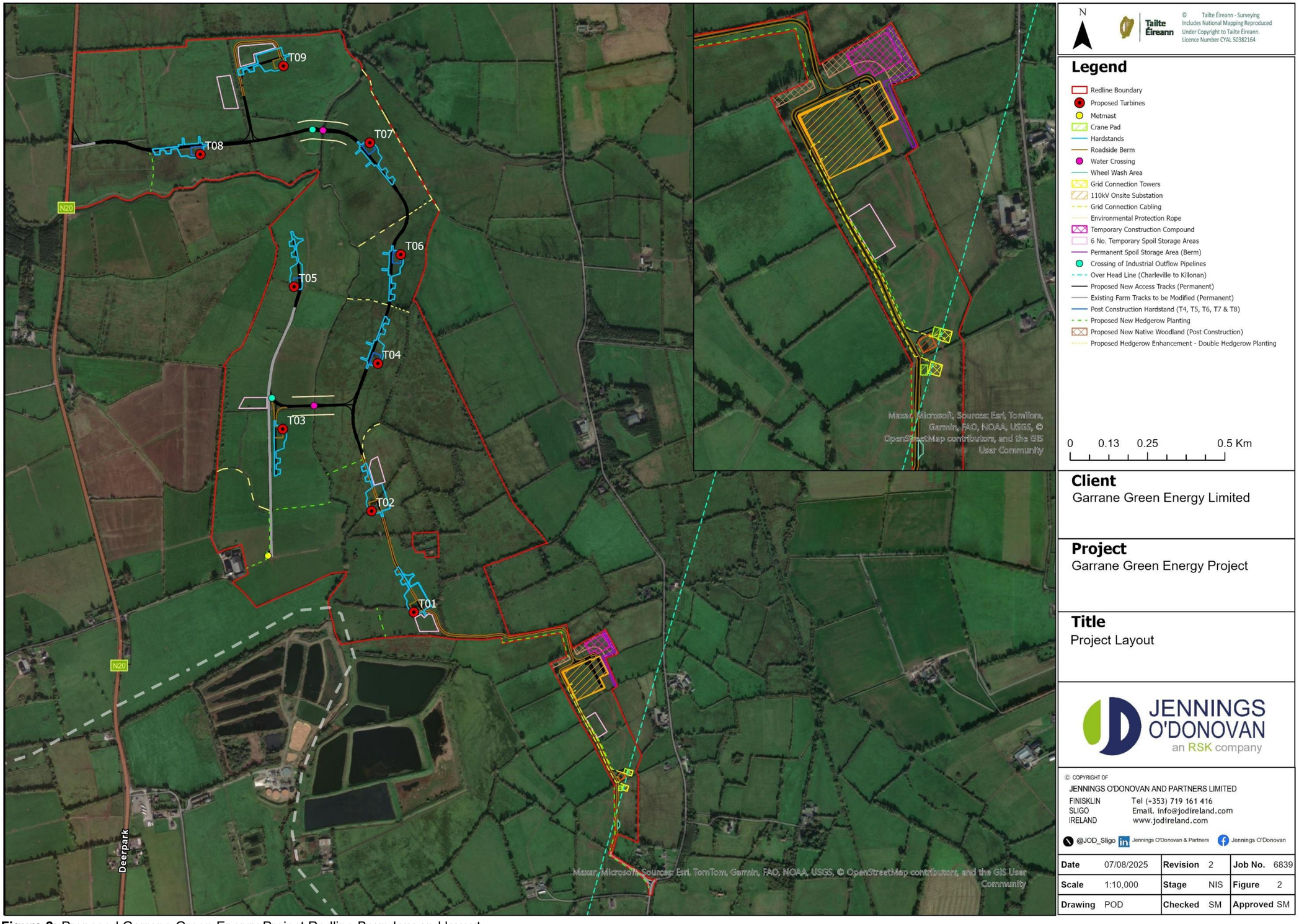


Figure 2: Proposed Garrane Green Energy Project Redline Boundary and layout.

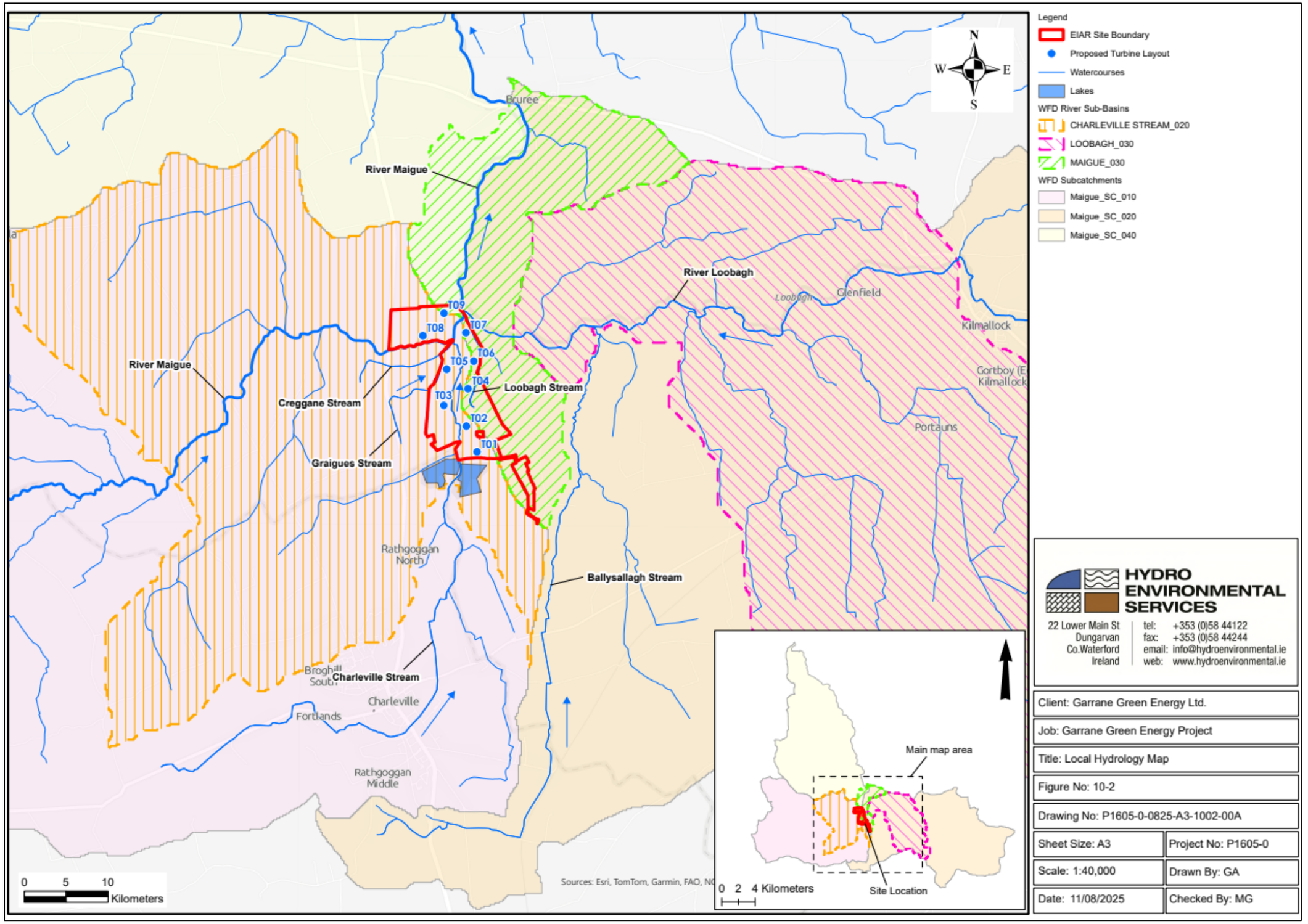


Figure 3: Local hydrology map (from EIAR Chapter 10).

2.2 Overview of the Proposed Project

Planning Permission is being sought by Garrane Green Energy Ltd for the construction of 9 No. Wind Turbines, a permanent meteorological mast, a permanent on-site 110kV Substation with a 'loop in' grid connection to the existing 110kV OHL between Charleville and Killonan, all ancillary works and localised works along the Turbine Delivery Route. A detailed description of the proposed Project has been included in the **EIAR Chapter 2: Project Description**. The main components of the Project are as follows:

- Erection of 9 No. wind turbines with a tip height of 170m. The wind turbines will have a rotor diameter of 150m and a hub height of 95m.
- Upgrade of existing Access Tracks and construction of new permanent Access Tracks, permanent turbine hardstand areas and turbine foundations.
- Construction of two new bridge crossings on-site, one over the River Maigue and one over the Charleville Stream.
- Upgrade of existing site drainage network and installation of new site drainage.
- Wind Farm Internal Cabling connecting the wind turbines to the electrical substation.
- Construction of a permanent on-site AIS 110kV Substation, with a 'loop in' Grid Connection to the existing 110kV overhead line between Charleville and Killonan, including two single-storey control buildings with welfare facilities, all associated electrical plant and equipment, security fencing, gates, signage, all associated underground cabling, private well for water supply, wastewater holding tank, and all ancillary structures and works.
- Construction of a permanent double circuit 110kV underground cable and two steel cable interface masts to connect to the existing overhead line.
- Erection of a permanent 60m Meteorological Mast for monitoring wind speeds.
- Construction of a Temporary Construction Compound for use during construction.
- Upgrade of the existing entrance on the N20 (Site Entrance 1) (to be used for abnormal loads and turbine component delivery) and upgrade of an existing site entrance on the L1537 (Site Entrance 2) (to be used for all construction traffic except for abnormal loads and turbine component delivery).
- 6 No. temporary spoil storage areas and 1 No. permanent spoil storage area.
- Biodiversity enhancement and improvements associated with the Project.
- Landscaping, fencing and all associated ancillary works.

Wind Farm

A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought in respect of the wind farm turbines only.

2.2.1.1 Grid Connection

The Project includes the works required to connect to the national grid via the existing 110kV Overhead lines that run through the Site.

Connection will be sought from the national electricity network operators by application to the transmission operator Eirgrid. Possible grid connection options for the proposed Project were assessed, and it was found that a 'loop in' Grid Connection to the existing 110kV OHL between Charleville substation and Killonan substation was the most viable option. Grid connection options are assessed in Chapter 3: Alternatives.

The Grid Connection can be summarised as follows:

- Underground ducting Grid Connection from the on-site 110kV Substation to the lattice end masts (as shown on Drawing No. 3337-SUIR-SS-DR-C-2411) with a 'loop in' Grid Connection to the existing 110kV OHL between Charleville substation and Killonan substation.

The power generated by each wind turbine will be transmitted via underground Wind Farm Internal Cabling to the new 'loop-in' Substation. The Wind Farm internal cabling network will be installed in trenches 0.6m wide by 1m in depth and there will be 4,700m of Wind Farm internal cable trenching (giving a surface area of 2,820m²). The underground cable (UGC) will be located fully within the Redline Boundary, within or alongside the proposed Access Tracks.

Excavated material derived from trenching will be stored upgradient of the trench excavations (where relevant). Spoil will be temporarily stored in the temporary spoil storage areas shown on Figure 2 above. Where any spoil cannot be used for reinstatement and landscaping works it will be permanently stored in the permanent spoil storage area located at the back of the 110kV substation. This is further detailed in the Spoil Management Plan in Appendix 2.1: Construction Environmental Management Plan and fully assessed in Chapter 9: Soils and Geology.

A permanent planning permission is being sought for the Grid Connection and the Substation as these will become an asset of the national grid under the management of ESB & EirGrid and will remain in place upon decommissioning of the wind farm.

2.2.1.2 Turbine Delivery Route (TDR)

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed at the port of Foynes, County Limerick. From there, they will be transported to the Site via the N69, M20 and N20 to the upgraded Site Entrance 1 (refer to **Figure 4**). There are six locations along the proposed Turbine Delivery Route (TDR) where temporary accommodation requirements are needed in over-run areas. An additional location (Location 7) is within the Redline Boundary of the Project.

A TDR option from the Port of Galway was also assessed for the delivery of turbine blades only, which includes temporary accommodation works at 11 no. locations.
Further information on the TDR routes is outlined in detailed within Chapter 2, Section 2.5.5, Table 2.6 and Table 2.7 and also detailed in Appendix 17.2.

Watercourse Crossings

There are 2 no. watercourse crossings required to facilitate access to proposed turbines T7 and T3 (see **Figure 2** above). Water Crossing 1 (WC01) is located on the Maigue River on the Access Track northwest of T7 and Water Crossing 2 (WC02) is located on the Charleville (Stream) on the Access Track east of T3. Both crossings will be a clear span bridge type construction.

The methodology for the crossings WC01 and WC02 is outlined in Chapter 2, Section 2.5.6. Further details of the proposed bridge construction methodology are contained in the CEMP in Appendix 2.1 and Appendix 2.3 Bridge Construction Method Statements.

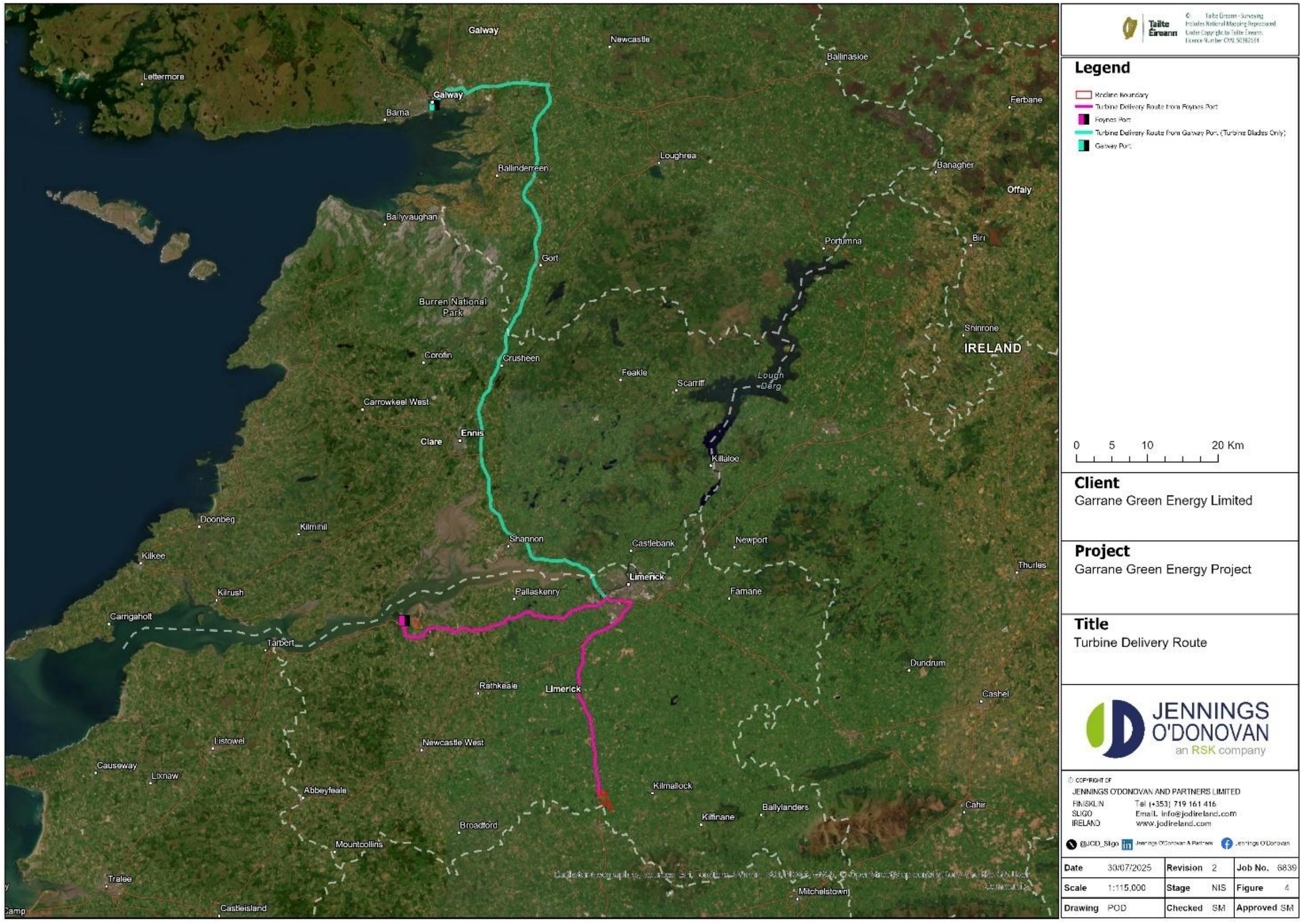


Figure 4: Map Showing the Proposed Turbine Delivery Routes from Foynes Port and Galway Port to the Site Entrance.

2.3 Method and Identification of Relevant European Sites

In accordance with the European Methodological Guidance (see **section 1.2** above), consideration is given to all European sites that could potentially be affected by the proposed project.

The "Appropriate Assessment of Plans & Projects - Guidance for Planning Authorities" (Department of Environment, Heritage and Local Government 2009) notes the following in section 3.2.3 "Natura 2000 Sites":

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

The approach to screening is likely to differ somewhat between plans and projects, depending on scale and on the likely effects, but the following should be included:

1. *Any Natura 2000 sites within or adjacent to the plan or project area*
2. *Any Natura 2000 sites within the likely zone of impact of the plan or project. A distance of 15 km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al. 2006). For projects, the distance could be much less than 15 km, and in some cases less than 100 m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects.*
3. *Natura 2000 sites that are more than 15 km from the plan or project area depending on the likely impacts and the sensitivities of the ecological receptors, bearing in mind the precautionary principle. In the case of sites with water dependent habitats or species, and a plan or project that could affect water quality or quantity, for example, it may be necessary to consider the full extent of the upstream and/or downstream catchment."*

The OPR Practice Note PN01 document provides as follows in relation to the identification of relevant European Sites (pg.11), *inter alia*:

> "Applications within or immediately adjacent to a European site"
> All proposed development located either partially or wholly within or immediately adjacent to a SAC or SPA should be easily identifiable from examining GIS mapping. These European sites should be automatically selected for consideration in the screening exercise.
>
> "Identification of other European sites"
> The identification of European sites within a 15km zone has become common practice in screening projects for AA. However, this approach is not based on the S-P-R model and should not be used for projects. Few projects have a zone of influence this large, but some more complex projects may require a greater zone of investigation.

Instead, the zone of influence of a project should be considered using the Source-Pathway-Receptor model. This should avoid lengthy descriptions of European sites, regardless of whether they are relevant to the proposed development, and a lack of focus on the relevant European sites and issues of importance.

Following the above-mentioned Guidance documents, for the proposed Project all European Sites that could possibly be affected were identified using a Source-Pathway-Receptor conceptual model for environmental management risk assessment. As well as designated SAC and SPA sites, candidate and/or proposed SAC and SPA sites were considered.

It is noted first that the proposed Project is not within, or adjacent to, any designated European site.

Catchment mapping was used to establish or discount potential hydrological connectivity between the site of the proposed Project and any European Sites. The hydrological catchments and European Sites are shown in **Figure 5,** and http://webgis.npws.ie/npwsviewer/ for online mapping. European Sites that were further away from the proposed Project were also considered. Information on the sites with regard to their conservation objectives and connectivity to the proposed Project area is provided in **Table 2**.

In the absence of any specific European or Irish guidance in relation to SPA's, 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 the proposed Project and Special Protection Areas. The guidance takes into consideration the core and maximum 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.

The nearest designated European site to the Wind Farm Site is the Blackwater River (Cork/Waterford) SAC, which is at a distance of approximately 6.4 km to the south. The other sites are at distances of between 9 km (Ballyhoura Mountains SAC) and 14.7 km (Glen Bog SAC).

- Blackwater River (Cork/Waterford) SAC (code: 002170)
- Ballyhoura Mountains SAC (code: 002036)
- Tory Hill SAC (code: 000439)
- Glen Bog SAC (code: 001430)
- Kilcolman Bog SPA (code: 004095)

An additional two sites, the Lower River Shannon SAC (code: 002165) (approximate 20 km distance from the Site) and the River Shannon and River Fergus Estuaries SPA (code: 004077) (approximate 25 km distance from the Site), are considered in this assessment as they have hydrological connectivity with the Proposed Project Site via the River Maigue (see **Figure 6**).

All seven European Sites are listed in **Table 2**, along with the reasons for designation, the distance from the proposed Project and whether any linkages or connectivity exist between the two locations.

Table 6.3: Relevant European sites, reasons for designation, distances from Project Area and summary of connectivity.

European Site	Reasons for designation (information correct as of 1st August 2025) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	SPECIAL AREAS OF CONSERVATION	
Blackwater River (Cork/Waterford) SAC (site code 002165)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] 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] 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] 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] Lutra lutra (Otter) [1355] Trichomanes speciosum (Killarney Fern) [1421] According to this SAC's site Conservation Objectives document: NPWS (31 July 2012) Conservation Objectives: Blackwater River (Cork/Waterford) SAC, Version 1.0. Department of Arts, Heritage and the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain or	The Redline boundary of the proposed Project, which includes the grid connection, as well as the section of the TDR where is approximately 6.4 km north of the SAC (closest straight-line distance). The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary). There is no ecological connectivity, such as wetland or woodland corridors, between the Project site and the SAC. There is no hydrological connectivity between the wind farm site and the SAC. It is concluded that there is no ecological or hydrological connectivity between the proposed Project and the SAC.

European Site	Reasons for designation (information correct as of 1st August 2025) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.	
Lower River Shannon SAC (site code: 002165)	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] *Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Lampetra fluviatilis (River Lamprey) [1099] Salmo salar (Salmon) [1106] Tursiops truncatus (Common Bottlenose Dolphin) [1349] Lutra lutra (Otter) [1355]	The Redline boundary of the proposed Project, which includes the grid connection, is approximately 20 km south-southeast of the SAC (closest straight-line distance). The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary). There is ecological connectivity between the Wind Farm Site and the SAC via the River Maigue system. The proposed Project drains to the River Maigue, a main tributary of the River Shannon. The SAC extends to the N69 at Ferry Bridge. Hence, the proposed Project Site is hydrologically linked with the SAC via the River Maigue. It is concluded that there is ecological and hydrological connectivity between the proposed Project and the SAC.

European Site	Reasons for designation (information correct as of 1st August 2025) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	According to this SAC's site Conservation Objectives document: NPWS (7 August 2012), Conservation Objectives for Lower River Shannon SAC [002165]. Version 1.0. Department of Arts, Heritage and the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	
Tory Hill SAC (site code: 000439)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Alkaline fens [7230] According to this SAC's site Conservation Objectives document: NPWS (3 August 2018): Conservation Objectives: Tory Hill SAC, Version 1. Department of Culture, Heritage and the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The Wind Farm Site is located approximately 11 km north of the SAC. The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary). The Redline boundary of the proposed Project, which includes the grid connection, is approximately 14.4 km south of the SAC (closest straight-line distance). There is no ecological connectivity, such as wetland or natural grassland corridors, between the Project Site and the SAC. There is no hydrological connectivity between the Project Site and the SAC. It is concluded that there is no ecological or hydrological connectivity between any aspect of the Project and the Tory Hill SAC.
Glen Bog SAC (site code: 001430)	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0 According to this SAC's site Conservation Objectives document: NPWS (28 November 2017), Conservation Objectives for Glen Bog SAC [001430]. Version 1.0.	The Redline boundary of the proposed Project, which includes the grid connection, is approximately 14.7 km southwest of the SAC (closest straight-line distance). The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary).

European Site	Reasons for designation (information correct as of 1st August 2025) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	Department of Culture, Heritage and the Gaeltacht, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	There is no ecological connectivity, such as wetland or woodland corridors, between the Project Site and the SAC. There is no hydrological linkages between the Project Site and the SAC. It is concluded that there is no ecological or hydrological connectivity between the Project Area and the SAC.
Ballyhoura Mountains SAC (site code: 002036)	Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130] According to this SAC's site Conservation Objectives document: NPWS (18 August 2016), Conservation Objectives for Ballyhoura Mountains SAC [002036]. Version 1.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, for each of the listed QIs, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The Redline boundary of the proposed Project, which includes the grid connection, is approximately 9 km northwest of the SAC (closest straight-line distance). The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary). There is no ecological connectivity, such as peatland corridors, between the Project Site and the SAC. There is no hydrological connectivity between the Project Site and the SAC. It is concluded that there is no ecological or hydrological connectivity between the Wind Farm Project Area and the SAC.
	SPECIAL PROTECTION AREAS	
Kilcolman Bog SPA (site code: 004095)	Whooper Swan (Cygnus cygnus) [A038] Teal (Anas crecca) [A052] Shoveler (Anas clypeata) [A056] Wetland and Waterbirds [A999] According to this SPA's site Conservation Objectives	The Redline boundary of the proposed Project, which includes the grid connection, is approximately 14.1 km north-northwest of the SPA (closest straight-line distance). The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary).

European Site	Reasons for designation (information correct as of 1st August 2025) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	document: Conservation Objectives Series: Kilcolman Bog SPA [004095]. Version 1.0, 24th January 2025, Department of Housing, Local Government and Heritage, for each of the listed SCIs, the Conservation Objective is to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. In recognition of wetland habitat, the Conservation Objective is: To maintain or restore the favourable conservation condition of the wetland habitat in Kilcolman Bog SPA as a resource for the regularly occurring migratory waterbirds that utilise these areas.	There is no ecological connectivity, such as wetland corridors, between the Project Site and the SPA. There is no hydrological connectivity between the Project Site and the SPA. While the improved grassland could potentially support feeding whooper swans, the bird surveys (Chapter 8) recorded only a single whooper swan feeding within the Site on one date (March 2023), one record of a flying bird over the south-west sector of Site (November 2022) and two other records of whooper swans flying off-site. The study concluded that the habitat within the Site is not considered to be of value for whooper swan or any other waterbird species. The study also concluded that there was no evidence of connectivity between the Kilcolman Bog SPA and the Site. It is concluded that there is no ecological or hydrological connectivity between the Wind Farm Project Area and the SPA.
River Shannon and River Fergus Estuaries SPA (site code: 004077)	Cormorant (Phalacrocorax carbo) [A017] Whooper Swan (Cygnus cygnus) [A038] Light-bellied Brent Goose (Branta bernicla hrota) [A046] Shelduck (Tadorna tadorna) [A048] Wigeon (Anas penelope) [A050] Teal (Anas crecca) [A052] Pintail (Anas acuta) [A054] Shoveler (Anas clypeata) [A056] Scaup (Aythya marila) [A062] Ringed Plover (Charadrius hiaticula) [A137] Golden Plover (Pluvialis apricaria) [A140] Grey Plover (Pluvialis squatarola) [A141] Lapwing (Vanellus vanellus) [A142]	The Redline boundary of the proposed Project, which includes the grid connection, is approximately 25 km south-southeast of the SPA (closest straight-line distance). The Turbine Delivery Route requires habitat removal (other than tree pruning) only at the access point to the site on the N20 (which is within the Redline boundary). There is ecological connectivity between the Project Site and the SPA via the River Maigue system. While improved grassland within the Site could potentially support herbivorous waterfowl, including whooper swans, baseline bird surveys (EIAR Chapter 8) showed that such species do not frequent the Site. Further, the distance between the Site and the SPA (c.25 km) is beyond the

European Site	Reasons for designation (information correct as of 1st August 2025) (*denotes a priority habitat)	Distance from Project Area and summary of connectivity
	Knot (Calidris canutus) [A143] Dunlin (Calidris alpina) [A149] Black-tailed Godwit (Limosa limosa) [A156] Bar-tailed Godwit (Limosa lapponica) [A157] Curlew (Numenius arquata) [A160] Redshank (Tringa totanus) [A162] Greenshank (Tringa nebularia) [A164] Black-headed Gull (Chroicocephalus ridibundus [A179] Wetland and Waterbirds [A999] According to this SPA's site Conservation Objectives document, Conservation Objectives Series: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0, 17th September 2012, Department of Arts, Heritage and the Gaeltacht), for each of the listed SCIs, the Conservation Objective is to maintain the favourable conservation condition of the species for which the SPA has been selected. In recognition of wetland habitat, the Conservation Objective is: To maintain or restore the favourable conservation condition of the wetland habitats in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly-occurring migratory waterbirds that utilise these areas.	normal commuting range of wetland birds (SNH 2017). It is concluded that the Site is not utilized by any of the SCIs of the SPA. The proposed Project drains to the River Maigue, a main tributary of the River Shannon. The SPA extends to the Ferry Bridge along the N69, where the River Maigue is tidal. Hence, the proposed Project Site is hydrologically linked with the SPA via the River Maigue. It is concluded that there is ecological and hydrological connectivity between the Proposed Project and the SPA.

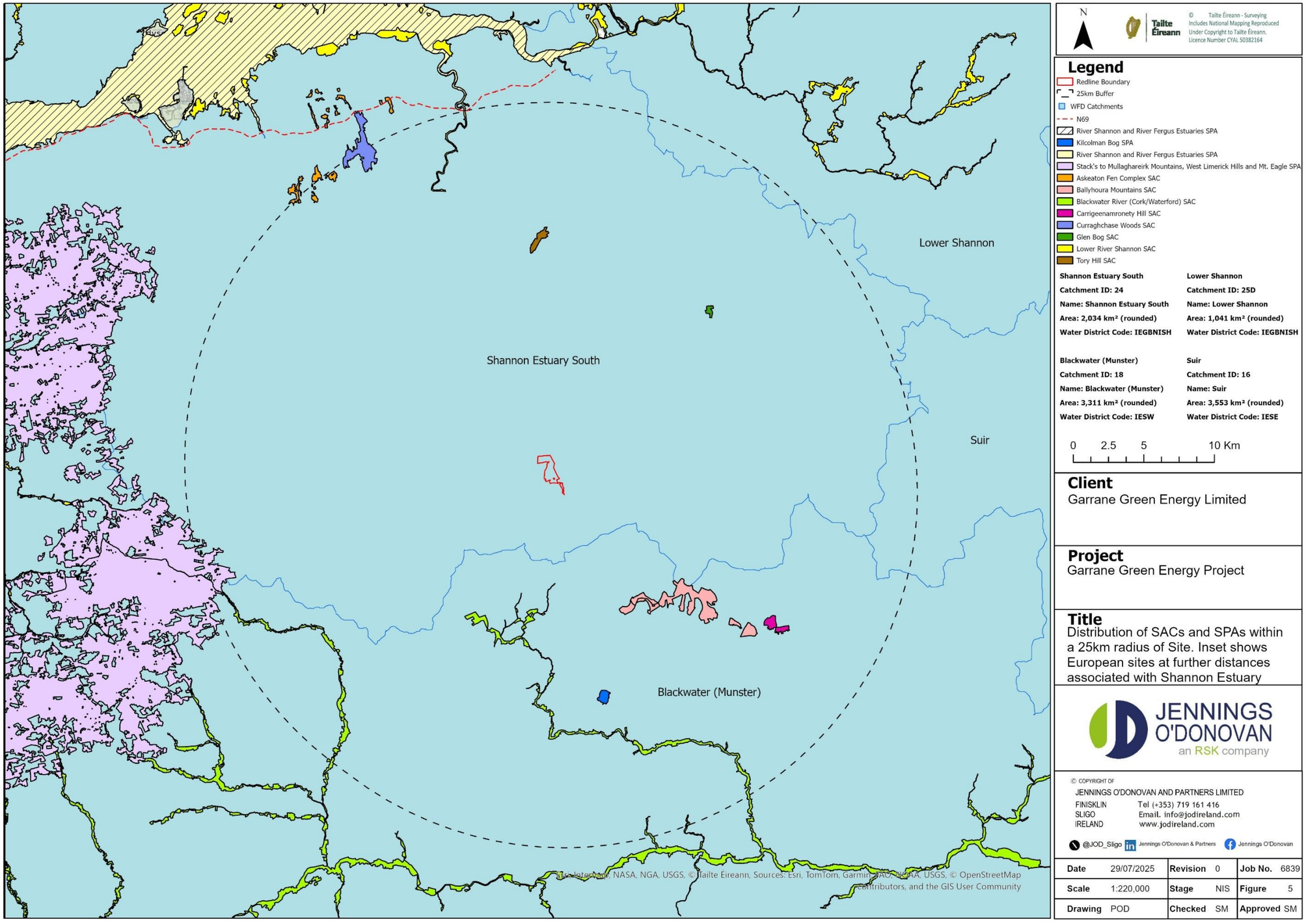
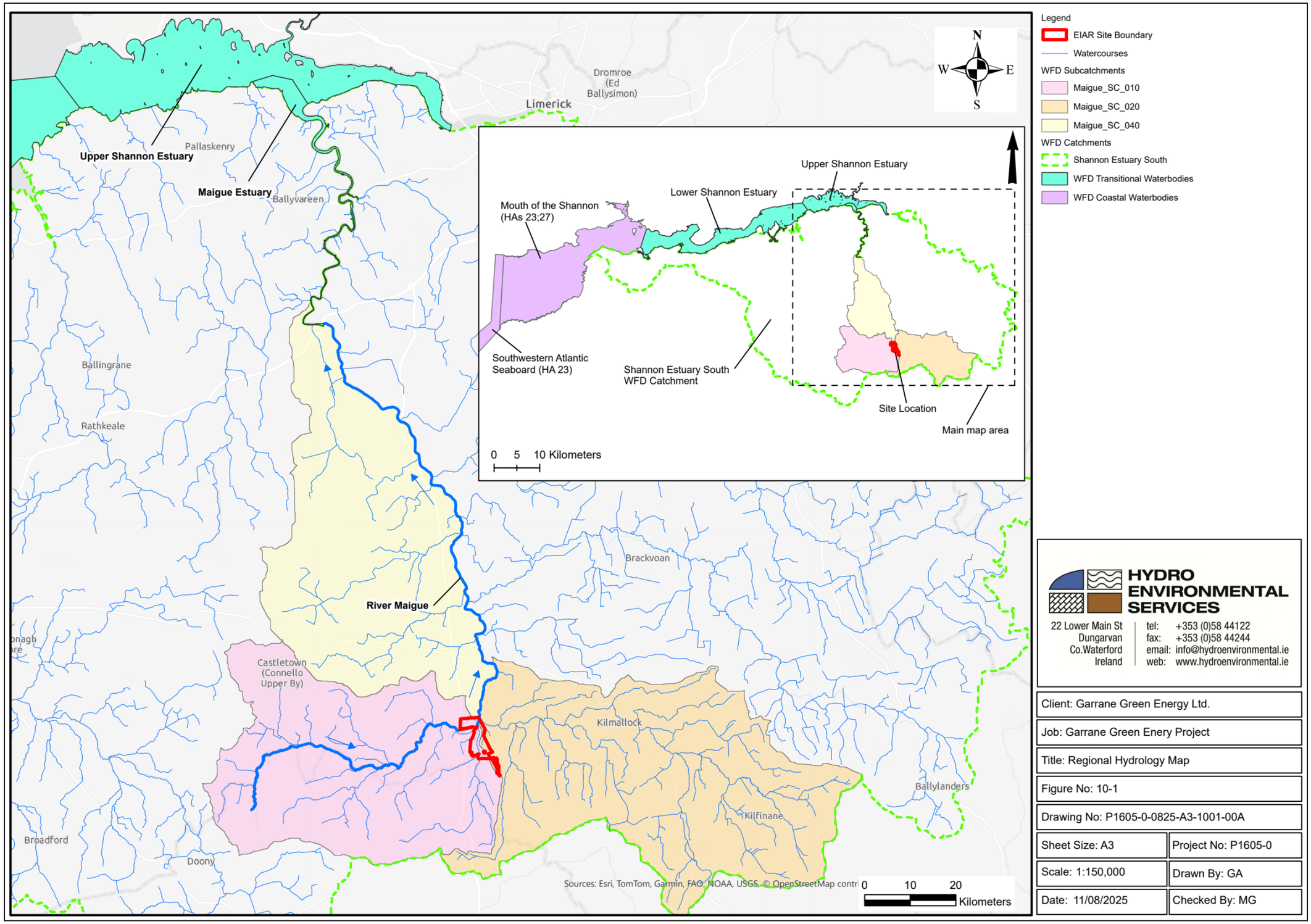


Figure 5: Locations of European sites within a 15 km radius of the Site for the proposed Garrane Wind Farm. **S**ites at further distances associated with the Shannon Estuary are also shown.



HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co.Waterford
Ireland
tel: +353 (0)58 44122
fax: +353 (0)58 44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Garrane Green Energy Ltd.	
Job: Garrane Green Enery Project	
Title: Regional Hydrology Map	
Figure No: 10-1	
Drawing No: P1605-0-0825-A3-1001-00A	
Sheet Size: A3	Project No: P1605-0
Scale: 1:150,000	Drawn By: GA
Date: 11/08/2025	Checked By: MG

Figure 6: Regional hydrology map showing connectivity between the Project Site and the Shannon Estuary (from EIAR Chapter 10).

2.4 Potential for Impacts and Significant Effects in Absence of Mitigation

As noted, a total of seven European sites are identified where assessment is required of the potential for the proposed project to impact on their qualifying interests and/or Special Conservation Interests. These sites are listed in **Table 2** above and mapped in **Figure 5**.

The assessment of potential impacts considers and assesses the proposed turbine model. The turbine parameters can be seen in **Table 3**.

Table 3: Turbine Parameters

Turbine Parameter	Assessment Envelope
Turbine Blade Tip Height	170 m
Rotor Diameter	150 m
Hub Height	95 m

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

It can be shown with full scientific certainty that for four of the seven identified sites, there is no ecological or hydrological connectivity with the proposed Project, *i.e.* no Source to Receptor pathway exists. These four sites are:

- Ballyhoura Mountains SAC (code: 002036)
- Blackwater River (Cork/Waterford) SAC (code: 002170)
- Tory Hill SAC (code: 000439)
- Glen Bog SAC (code: 001430)

Therefore, it is concluded there is no potential for impacts and significant effects on these sites in view of the Site-Specific Conservation Objectives of these sites. It follows that the proposed Project cannot contribute to any in-combination effects on these four sites when considered with other plans and projects. It is concluded that no further assessment is required for these four sites and that they can be 'screened-out'.

Kilcolman Bog SPA is located at a distance of approximately 14 km from the Project area. With such geographical separation there is no ecological connectivity between the two locations. As Kilcolman Bog is situated within a different water catchment from the Project area, there is no hydrological connectivity.

Whooper swan was recorded infrequently within the 2020 – 2024 survey period (full details are given in Chapter 8 of EIAR). The whooper swan hinterland surveys within 5 km of the proposed Project Site (maximum normal foraging distance) recorded two encounters, comprising a group of 11 birds flying north of the Site and

a record of a whooper swan present at Charleville Lagoons. One record was also recorded during the 2022/23 transect surveys of two individuals flying towards Charleville Lagoons from the south-west of the Site in November 2022 and one individual foraging on grassland within the Site in March 2023. No whooper swans were recorded during any of the other baseline ornithological surveys. Despite potentially suitable foraging habitat (i.e. improved grassland) being present, considering the low level and locations of species activity throughout the survey period and during the extensive survey effort from the various baseline surveys, the Site is not considered to be of particular value to whooper swan. Also, as the distance of approximately 14 km between the Site and the SPA is beyond the normal foraging distance of less than 5 km for whooper swan (SNH 2016), it can be concluded with a high degree of certainty that the proposed wind farm site is well outside the range of the population of whooper swan associated with the SPA.

The baseline bird surveys recorded teal and shoveler (SCIs of the SPA) infrequently flying over the site or adjoining areas and it was considered likely that these observations were of birds associated with Charleville Lagoons to the south of the Site. The wind farm site does not provide suitable habitat for these duck species. Also, the distance between the Site and the SPA (c. 14 km) would be significantly more than the regular commuting distances for these species. It can be concluded with a high degree of certainty and beyond reasonable scientific doubt that the proposed wind farm Site is well outside the range of the populations of teal and shoveler associated with the SPA.

Therefore, it is concluded there is no potential for impacts and significant effects on this site in view of the conservation objectives of the Kilcolman Bog SPA. It follows that the proposed Project cannot contribute to any in-combination effects on this site when considered with other plans and projects. It is concluded that no further assessment is required for this site and that it can be 'screened-out'.

Hydrological connectivity exists via the River Maigue between the Garrane Green Energy Project area and the Shannon Estuary system, and hence the **Lower River Shannon SAC** and the **River Shannon and River Fergus Estuaries SPA** (both sites extend over a similar geographical area). Construction and decommissioning phase activities, and to a lesser extent operational phase activities, have the potential to cause significant effects to receiving watercourses and associated aquatic life and ultimately relevant qualifying interests (QIs) and Special Conservation Interests (SCIs) of the above-mentioned European sites.

Further assessment of these two sites is therefore required and it follows that there may be potential for the proposed Project to result in in-combination effects. The potential for effects on these sites is addressed in the NIS component of the present document.

2.5 AA Screening Concluding Statement

On the basis of objective and best scientific information, it is concluded that in the absence of mitigation, likely or possible significant effects on two of the European sites listed in **Table 2** (and below) could not be excluded during the construction, operational and/or decommissioning stages of the proposed Project:

- Lower River Shannon SAC

- River Shannon and River Fergus Estuaries SPA

As a result, it is respectfully submitted that the competent authority should carry out an Appropriate Assessment (AA) in respect of the Proposed Project. A Natura Impact Statement has been prepared to assist with the AA.

For five sites within the identified zone of influence (as listed in **Table 2**), no pathway was identified between the site for the proposed Project (Source), including the Grid Connection Route and the Turbine Delivery Route, and the relevant European site (Receptor). These five sites are:

- Ballyhoura Mountains SAC (code: 002036)
- Blackwater River (Cork/Waterford) SAC (code: 002170)
- Tory Hill SAC (code: 000439)
- Glen Bog SAC (code: 001430)
- Kilcolman Bog SPA (code: 004095)

Therefore, it is concluded beyond reasonable scientific doubt, and in view of the best available scientific knowledge, that there is no potential for likely significant effects on the above listed five sites or their qualifying interests or the Special Conservation Interests of the above listed five sites as a result of the proposed Project when considered individually or in combination with other plans and projects.

Accordingly, it is concluded that no further assessment is required for these five sites and that they can be 'screened-out'. It is noted that measures intended to avoid or reduce the harmful effects of the proposed Project on European sites, *i.e.* "mitigation measures", have not been taken into account in this screening stage appraisal.

3 NATURA IMPACT STATEMENT

The assessment for screening for Appropriate Assessment presented in Section 2 concludes that in the absence of mitigation, likely significant effects may arise as a result of the proposed Garrane Green Energy Project on two European sites, as follows:

- Lower River Shannon SAC
- River Shannon and River Fergus Estuaries SPA

Such effects could arise during the Construction, Operational and Decommissioning phases of the Project.

The following assessments consider, in absence of mitigation, whether the Project will adversely affect the integrity of the European sites either directly or indirectly alone and in-combination with other plans and projects.

3.1 Potential for Direct Effects on European Sites

The two identified European sites are both associated with the River Shannon estuary system and are at considerable distances (hydrological flow-paths of approximately 25 km for SAC & 34.5 km for SPA) from the Site of the Garrane Green Energy Project.

On the basis of geographical separation, there is no potential for direct effects, such as disturbance of habitats and/or species, on these European sites during any of the phases of the proposed Project.

3.2 Potential for Indirect Effects on European Sites – Water Quality

The assessment for AA Screening (Section 2) identified hydrological connectivity between the Garrane Wind Farm Project area and the Shannon Estuary system (and hence the associated designated European sites under consideration here).

Chapter 10: Hydrology & Hydrogeology of the EIAR, provides a detailed account of the drainage of the Project area and connectivity with the Shannon estuarine system via the Maigue River.

It is noted that Maigue River only becomes designated (as SAC) near Adare, where the river becomes tidal. Estuarine waters can be considered to be less susceptible to potential effects that freshwaters due to the saline nature of these waters and the large volume of water.

The main potential effects on the hydrological environment will occur during the construction phase. Potential effects during the operational and decommissioning phases will be considerably less.

Construction phase

Construction phase activities have the potential to cause adverse effects to receiving watercourses and associated aquatic life and ultimately the relevant qualifying interests (QIs) and Special Conservation Interests (SCIs) of the above listed European sites.

The principal potential construction phase effects of the proposed Project could arise from the following (see EIAR **Chapter 10: section 10.5.2** for full details):

- Release of suspended solids (and associated nutrients) to drains and surface water discharge routes during earthworks for wind farm infrastructure including site entrances, access tracks, upgrades to existing access tracks, turbine base/hardstanding construction, substation compound, construction compound constructions, met mast construction and wind farm internal cabling and grid connection excavations

- Release of cementitious materials from construction works throughout the site, and particularly at turbine bases and the substation compound, into the drainage system and hence to local watercourses. Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative effects on water quality and associated aquatic life.

- Release of hydrocarbons from accidental spillage during refuelling of construction plant with petroleum hydrocarbons and/or from the accumulation of small spills of fuels and lubricants during routine plant use. Hydrocarbons can cause significant pollution risk to groundwater, surface water and associated aquatic ecosystems.

While the hydrological flow-paths between the Site and the SAC and SPA are considerable (approximately 25 km and 34.5 km respectively) there exists some potential during the construction phase for adverse effects on the Lower River Shannon SAC and/or the Shannon and Fergus River Estuaries SPA. Mitigation will therefore be implemented to minimise or eliminate any such risks and will ensure that there will be no adverse effect on the integrity of either of the European sites.

According to Geological Survey of Ireland (GSI) mapping, Landslide Susceptibility within the Application Site is LOW or LOW (INFERRED) risk. Within the Application Site ground slopes are either flat or of a very low angle and, consequently, potential for natural soil movement is also considered to be low. For this reason, a Peat Landslide Hazard has been screened out for the Application Site.

Operational phase

During the operational phase, the potential for silt-laden runoff is much reduced compared to the construction phase. At this stage, all permanent drainage controls will be in place and the disturbance of ground and excavation works will be complete. However, disturbed soil surfaces since the construction works could generate suspended solids during wet periods, which could flow in run-off to drains and ultimately local watercourses.

It is noted that the Project has been designed to minimise the potential effects of the operation of the wind farm within the flood zone. Of particular relevance is that all spoil storage areas, which are a potential source of run-off in the early post-construction phase, are located above the 1 in 1,000-year flood level (see **Chapter 10: section 10.6.2.1** of EIAR). It is noted that spoil waste stored in the spoil deposition areas will continue to be monitored for stability on a regular basis during the operational phase (see **Chapter 9: section 9.5.29** of EIAR). This monitoring will check for early indications of movement such as the development of cracks, minor slippage and / or localised subsidence. Where identified, remediatory actions will be taken to repair any failure and restore the integrity of the deposition area.

Bespoke design measures, detailed in **Chapter 10, section 10.6.1.3** and in the Site Specific Flood Risk Assessment (**Appendix 9.1)** of EIAR, have been incorporated into the Project to ensure that the infrastructure is not at significant risk of flooding and to ensure that the Project does not significantly affect the downstream flood risk.

Some minor maintenance works may be completed, such as maintenance of site entrances, internal roads and hardstand areas. These works, while likely of a minor scale and at infrequent intervals, could result in the release of suspended solids to surface water and could result in an increase in the suspended sediment load, which could affect the water quality in local watercourses.

During such maintenance works there is a small risk associated with the release of hydrocarbons from site vehicles. However, no refuelling works will be undertaken on site during the operational phase.

While an operational wind farm is not a recognised source of pollution, some chemicals and hydrocarbons will be stored on site. Without adequate storage facilities and proper handling of such substances, leakage to local watercourses via on-site drains is a possibility.

Even in an unmitigated scenario the potential for effects during the operational phase on the Lower River Shannon SAC and/or the Shannon and Fergus River Estuaries SPA are limited due to the following:

- The length of the hydrological flowpaths between the Site and the SAC (c. 25 km) and SPA (c.34.5 km).
- The SAC and SPA are associated with the Maigue River Estuary, which contains saline water and is less vulnerable to effects than freshwater.
- The significant volumes of water within the estuary limit the potential for effects (though it is noted that the Project does not in any way rely upon the dilution or assimilative capacity provided by any downstream watercourse).

Decommissioning phase

Upon decommissioning, the wind turbines will be dismantled and all above ground components will be removed off-site for recycling. The potential effects associated with decommissioning will be similar to those associated with construction but of a much-reduced magnitude due to the reduced scale of the proposed decommissioning works in comparison to construction phase works. Turbine foundations will remain in situ and will be covered with earth and allowed to revegetate. Site roads will continue to be used as farm tracks

and will therefore not be removed. The underground cables will be cut and tied and the ducting will be left in place. The Substation will also be permanently left in situ.

Excavation and removal of this infrastructure could result in considerable disturbance to the local environment in terms of disturbance to underlying soils and an increased sedimentation and an increased possibility of contamination of local groundwater.

Prior to the Decommissioning work, a comprehensive plan will be drawn up that takes account of the findings of this EIAR and the contemporary best practice at that time, to manage and control the component removal and ground reinstatement.

However, 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*".

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, and hence on the European sites downstream of the Site, are envisaged during the decommissioning phase of the Project.

Overview of potential effects on European sites from contaminated water

Should contaminated water enter the local watercourses during the construction, operational and/or decommissioning phases, the significance of a subsequent effect on the qualifying interests/special conservation interests within the two European sites would vary depending on the type of pollutant, as well as the magnitude and duration of the event. As the conservation objectives of identified European sites could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed Project (*i.e*. mitigation measures).

For the identified SAC and SPA sites, a review of their conservation objectives indicates that the relevant Qualifying Interests and Special Conservation Interests (SCIs) which conceivably could be affected by the input of pollutants to the estuarine system are as listed below. This is based on the given attribute and target for each habitat or species, as well as the distribution of the habitats and species within the designated sites (all such information is contained within the Conservation Objectives for the sites - https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives). Other qualifying interests are either localised to specific areas of the SAC (such as freshwater pearl mussel confined to the Cloon River only) or are above the influence from tidal waters (such as vegetated sea cliffs and Molinia meadows).

Lower River Shannon SAC

Estuaries [1130]

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

Coastal lagoons [1150]

Large shallow inlets and bays [1160]

Reefs [1170]

Salmo salar (Salmon) [1106]

Tursiops truncates (Bottlenose Dolphin) [1349]

Lutra lutra (Otter) [1355]

Table 4: Lower River Shannon SAC: Attributes and Targets associated with identified Habitats and Species potentially affected by water pollution.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
Estuaries	Community distribution	Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal sand to mixed sediments with gammarids community complex; Subtidal sand to mixed sediment sediment with Nucula nucleus community complex; Subtidal sand to mixed sediment with Nephtys spp. Community complex; Fucoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone dominated subtidal reef community.	Entire estuarine component of site
Mudflats and sandflats not covered by seawater at low tide	Community distribution	Conserve the following community types in a natural condition: Intertidal sand with Scolelepis squamata and Pnotocrates spp. community; and Intertidal sand to mixed sediments with polychaetes, molluscs and crustacean community complex.	Entire estuarine component of site.
Coastal lagoons	Water quality: Molybdata Reactive Phosphorus (MRP)	Annual median MRP within natural ranges and less than 0.1 mg/L	Various estuarine locations
	Water quality: Dissolved Inorganic Nitrogen (DIN)	Annual median DIN within natural ranges and less than 0.15 mg/L	
Large shallow inlets and bays	Community distribution	Conserve the following community types in a natural condition: Intertidal sand with Scolelepis squamata and Pnotocrates spp. community; Intertidal sand to mixed sediments with polychaetes, molluscs and crustaceans	Outer estuarine and bay area

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
		community complex; Subtidal sand to mixed sediment sediment with Nephtys spp. Community complex; Fucoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone dominated subtidal reef community; and Laminarian dominated community complex.	
Reefs	Community distribution	Conserve the following community types in a natural condition: Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone dominated subtidal reef community; and Laminarian dominated community complex.	Estuarine and bay area
Salmon	Out-migrating smolt abundance	No significant decline. Note: Smolt abundance can be negatively affected by a number of impacts such as estuarine pollutants	Estuary
Bottlenose Dolphin	Location and hectares	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be preserved in a natural condition.	Estuary and bay
Otter	Fish biomass available	No significant decline	Estuarine shoreline & estuarine component of River Maigue up to Adare

River Shannon and River Fergus Estuaries SPA

Cormorant (Phalacrocorax carbo) [A017]

Whooper Swan (Cygnus cygnus) [A038]

Light-bellied Brent Goose (Branta bernicla hrota) [A046]

Shelduck (Tadorna tadorna) [A048]

Wigeon (Anas penelope) [A050]

Teal (Anas crecca) [A052]

Pintail (Anas acuta) [A054]

Shoveler (Anas clypeata) [A056]

Scaup (Aythya marila) [A062]

Ringed Plover (Charadrius hiaticula) [A137]

Golden Plover (Pluvialis apricaria) [A140]

Grey Plover (Pluvialis squatarola) [A141]

Lapwing (Vanellus vanellus) [A142]

Knot (Calidris canutus) [A143]

Dunlin (Calidris alpina) [A149]

Black-tailed Godwit (Limosa limosa) [A156]

Bar-tailed Godwit (Limosa lapponica) [A157]

Curlew (Numenius arquata) [A160]

Redshank (Tringa totanus) [A162]

Greenshank (Tringa nebularia) [A164]-

Black-headed Gull (Chroicocephalus ridibundus) [A179]

Table 5: Lower River Shannon SPA: Attributes and Targets associated with identified Habitats and Species potentially affected by water pollution.

Habitat / Species	Relevant Attribute	Relevant Target	Distribution
Cormorant Whooper Swan Light-bellied Brent Goose Shelduck Wigeon Teal Pintail Shoveler Scaup Ringed Plover Golden Plover Grey Plover Lapwing Knot Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Greenshank Black-headed Gull	Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by the listed species other than that occurring from natural patterns of variation.	Entire estuarine component of site.

In the absence of mitigation, the significance of an effect on the above listed Qualifying Interests of the SAC and Special Conservation Interests of the SPA by contaminants derived from activities associated with the Wind Farm Project entering the estuarine system would depend on the type of pollutant, as well as the magnitude and duration of a pollution event.

Aquatic invertebrate communities and aquatic macrophytes can be affected by sediment loading which reduces both the biotic diversity and the food resource for fish populations through direct toxicity to fish and invertebrates, and also indirectly affecting top predators such as otter and carnivorous bird species through a reduction in prey availability. Suspended solids often hold nutrients such as phosphorus that can result in eutrophication and reduced oxygen levels, which can affect aquatic communities.

3.3 Potential for Indirect Effects on Annexed Species

Otter is a widespread species along the River Maigue system and throughout the Shannon estuary.

The home range or territory of an otter pair depends to a large extent on food supply. Hayden & Harrington (2000) note that in good habitats along lakeshore there may be one otter per 4 km of shoreline, while on the coast there may be one otter per kilometre.

While otter was recorded along the Charleville Stream within the proposed Project Site during the baseline surveys (see **EIAR Chapter 6: section 6.3.4**), it is unlikely that these animals would commute to the Lower River Shannon SAC due to the channel distance of approximately 25 km.

An assessment of potential effects on otter has been undertaken in the EIAR (**Chapter 6: section 6.4.5.3**). It was noted that while two watercourse crossings are required for the Project (over the Maigue River and Charleville Stream) these will be clear span bridges and will not affect the passage of otter along these watercourses.

It was also noted that while the construction phase of the Project has potential to give rise to temporary disturbance of otter, this is not likely to interfere with their foraging activity along the watercourses, for the following reasons:

- A key mitigation measure during the construction phase is the avoidance of sensitive hydrological features, by application of suitable buffer zones, i.e. 50 m to main watercourses, and 10 m to main drains (see EIAR Chapter 10: section 10.6.2.1). The only infrastructure elements located within the 50 m watercourse buffers are the river crossings over the River Maigue and the Charleville Stream. With a buffer of 50 m in place for the duration of the works, semi-aquatic species such as otter are likely to commute along the river corridors other than when the above-mentioned bridge works are being undertaken.
- Otter are primarily nocturnal and are mainly active after dusk and just before dawn. However, animals may be more active by day during cold weather (Hayden & Harrington 2000). Given construction phase works will be undertaken largely in daytime hours (from 07:00 to 19:00 hrs on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 hrs on a Saturday, and no work on Sundays or Public Holidays – see Chapter 2: section 2.6.6), the construction works are unlikely to have a significant effect on the foraging activities of the local otter population and especially from spring to autumn when the species is mostly likely to breed.

However, the local otter population within the watercourses associated with the site, as well as downstream of the proposed Project, could be affected adversely if contaminants generated during the construction phase were to enter the watercourses and affect the prey items (fish etc.) of the otter. In the absence of mitigation, the effect on the local otter population could be Significant. Mitigation to maintain water quality in the associated watercourses, and ultimately the Shannon estuary, during the construction phase of the Project will minimise or eliminate the risk to the otter population.

3.4 Mitigation Measures for Maintenance of Water Quality

The objective of the mitigation measures is to avoid, minimise and control contaminated run-off entering drains and local watercourses and potentially the two identified European sites which are hydrologically linked to the Project Site.

An in-depth discussion of water quality and the required mitigation to prevent or minimise the entry of contaminants to local watercourses is provided in the accompanying EIAR, in **Chapter 7: Aquatic Ecology** and **Chapter 10: Hydrology & Hydrogeology**. Best practice mitigation measures will be implemented during the design, construction, operational and decommissioning phases of the Project. The mitigation measures are Site-specific and are proven techniques. When in force, the mitigation measures will be monitored to ensure their efficacy.

The potential for risk to local watercourses and ultimately the identified qualifying interests of the two European sites is largely during the construction phase of the Project. It is not envisaged that the operational phase or the decommissioning phase of the Project will result in significant impacts on the hydrological regime or water quality of the area.

3.4.1 Construction Phase Mitigation

A Construction and Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. This document will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect biodiversity and the environment, are implemented. The CEMP includes a Surface Water Management Plan, a Water Quality Management Plan and a Waste Management Plan. The accompanying CEMP has been prepared on the basis that it will be further developed and expanded following the appointment of the Contractors for the main construction works (as some items can only be finalised with appropriate input from the Contractor who will actually carry out the main construction works). The development of the mitigation measures and all method statements for watercourse crossings adhere to all relevant guidance and current best practice.

Prior to commencement of construction works, the Contractors will identify a core Environmental Management Group, comprising of specific project personnel and an Ecological Clerk of Works (ECoW). The group will draw on technical expertise from relevant specialists where required and will liaise with other relevant external bodies as required (such as Inland Fisheries Ireland).

The Ecological Clerk of Works will be responsible for coordination, compliance monitoring and continued development of the CEMP and any other surveys, reports or method statements required. The ECoW will also review the Contractors' method statements and environmental plans as required by the CEMP, carry out compliance auditing during the construction phase and coordinate the Environmental Management Group and required liaisons between Limerick County Council, the Contractors, and other statutory authorities. The ECoW will have appropriate experience of working on large scale renewable energy projects and with relevant qualifications, *e.g.* BSc in ecology or environmental management and accreditation such as CIEEM.

There follows an overview of the approach to mitigation.

Mitigation by Avoidance

The fundamental mitigation measure to be implemented during each stage of the Project will be avoidance of sensitive hydrological receptors wherever possible, this key principle is referred to as "mitigation by avoidance". This principle has been adopted during the design of the site layout and associated infrastructure across multiple design iterations. The final Development layout plan has been identified as the optimal layout design available for protecting the existing hydrological regime of the Site, while at the same time incorporating and overlaying engineering and other environmental constraints.

The greatest risk of adverse impacts on the aquatic environment will occur during the construction phase of the Project. Key to minimising this risk has been the siting of all turbine locations and other key infrastructure at a minimum set-back of 50 m from main watercourses, and a set-back of 10 m from main drains.

Where possible all of the key Development areas (turbines, hardstands, construction compound, substation etc.) have been located significantly away from the delineated 50 m natural watercourse buffer zones. Where works are proposed within the buffer zone, *i.e*. at watercourse crossings, additional mitigation measures will be implemented as set out below.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed in detail in EIAR **Chapter 10: section 10.6.2.1**) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and the associated release of sediment.
- Avoid excavations within close proximity to surface watercourses.
- Avoid the entry of suspended sediment from earthworks into watercourses.
- 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.

3.4.1.1 Mitigation by Design

The Project's design has been optimised to utilise the existing infrastructure (existing site access tracks) where practicable. This design prevents the unnecessary disturbance of spoil, significantly reducing the potential for elevated concentrations of suspended solids in runoff.

There is an existing drainage network at the Site which comprises agricultural drains. The following drainage control measures will be used during the construction phase in conjunction with the existing drainage network to ensure the protection of all rivers and downstream watercourses.

Source controls:

- Interceptor drains, diversion drains, erosion and velocity control measures such as the use of sand bags, oyster bags filled with gravel, filter fabrics and other similar/equivalent or appropriate systems.
- Small working areas, covering temporary stockpiles, weathering off temporary stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.

In-Line controls:

- Interceptor drains/swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps, sediment traps, temporary pumping systems, settlement ponds, 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 that the existing network of drains present in some areas will be integrated and enhanced as required and used within the Project drainage system. The integration of the existing drainage network and the proposed wind farm network is relatively simple. The key elements are the upgrading and improvements to water treatment elements, such as in-line controls and treatment systems, including silt traps, settlement ponds and buffered outfalls.

Prior to the commencement of road upgrades (or new road/hardstand or turbine base installs) 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 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 forestry drains that have surface water flows and also along existing forestry roadside drains.
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50 m buffer zone.

The following silt control measures will be used as required throughout the construction phase of the Project:

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 the existing drainage network of sand and gravel-sized sediment, released from the excavation of mineral sub-soils of glacial and glacio-fluvial origin and entrained in surface water runoff. Inspection and maintenance of these structures during the construction phase are critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.

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, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through.

Settlement Ponds: The Project footprint will be divided into drainage catchments and stormwater runoff rates based on the 10-year return period rainfall event will be calculated for each catchment. These flows will then be used to design settlement ponds for each drainage catchment. The settlement ponds will either be designed for 4.1hr or 24hr retention times used to settle out medium silt (0.01mm) and fine silt (0.004mm) respectively (EPA, 2006).

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 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.

Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. This makes use of the natural vegetation of the Wind Farm Site to provide a polishing filter for the wind farm drainage prior to reaching the downstream watercourses.

Water Treatment Train: If the discharge water from construction areas fails to be of a high quality, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply to all of the construction phase.

Weather Warnings: The works programme for the construction stage of the proposed Project will also take account of weather forecasts and predicted rainfall in particular. Large excavations and movements of peat/subsoil or peat 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. (available forecasting systems are detailed in **Chapter 9: section 9.7.2.1**)

Management of Runoff from Spoil Storage Areas: It is proposed that excavated excess soil and subsoil will be stored in six no. temporary spoil deposition areas within the Site (see **EIAR: Chapter 2: section 2.5.16**). There is a 1no. permanent spoil storage area (berm) next to the Substation that can hold 8,100m^3 of spoil. During the initial placement of subsoil, silt fences, straw bales and biodegradable matting will be used to control surface water runoff from the deposition areas. Drainage from these areas will ultimately be routed to an oversized swale and a number of stilling ponds and a 'Siltbuster' with appropriate storage and settlement designed for a 1 in 10 year return period before being discharged to the onsite watercourses. Soil/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 soil/subsoil reinstatement areas will no longer be a potential source of silt laden runoff.

A detailed Spoil Management Plan (**Appendix 2.1, Management Plan 4**) will be prepared and will address the re-use, reinstatement, storage and restoration of all material excavated during the construction phase including detailed methodologies regarding the establishment and management of the spoil deposition area for the entire Project.

Additional Measures for Works within Buffer Zone: In addition to the above mitigation measures, where works are proposed within the delineated hydrological buffer zones the following additional mitigation measures will be implemented:

- Double row silt fences will be emplaced immediately down-gradient of the construction areas.

Mitigation for use of Cement-based Products

As already noted, the release to local drains and watercourses of run-off from cement-based products during the construction phase could have serious effects on aquatic life and ultimately on the interests of the European sites with connectivity to the Project Area. The following measures will be implemented throughout the construction phase**.**

- No batching of wet-cement products will occur onsite. Ready-mixed supply of wet concrete products and emplacement of pre-cast elements will take place.
- Where possible pre-cast elements for culverts and concrete works will be used.
- Vehicles will undergo a visual inspection prior to being permitted to the wind farm Site to ensure that there is no excess cementitious material which could be deposited on site.
- Where concrete is delivered onsite, only the chute will be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. A dedicated bunded area will be created to cater for concrete wash-out and this will be located in the Temporary Construction Compound.
- The contractor will use weather forecasting to plan dry days for pouring concrete.
- The contractor will ensure the pour site is free of standing water and plastic covers will be ready in case of a sudden rainfall event.
- No surplus concrete will be stored or deposited anywhere on Site.
- Raw or uncured waste concrete will be disposed of by removal from the Site and returned to the source location or disposed of appropriately at a suitably licensed facility.
- Where shuttering is required to be installed in order contain the concrete during pouring, it will be installed to a high standard with minimal potential for leaks. Additional measures will be taken to ensure minimal potential of leaking, these measures are the use of plastic sheeting and the use of sealing products at joints.

Mitigation for use of Hydrocarbons

The following measures will be implemented during the construction phase to ensure that hydrocarbon based products do not enter drains or watercourses:

- During construction, where possible, all refuelling on site will be within the temporary compound within the dedicated re-fuelling area.
- All plant will be inspected and certified to ensure they are leak free and in good working order prior to use onsite.
- Site vehicles will be refuelled offsite where possible.
- Only essential refuelling will be completed outside of the dedicated re-fuelling area but not within 50m of any watercourses. Onsite re-fuelling of plant and machinery will be carried out using a mobile double skinned fuel bowser:
- Onsite refuelling will be carried out by trained personnel only;
- A permit to fuel system will be put in place;
- Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system;
- All fuel storage areas will be bunded appropriately for the duration of the construction phase. Fuels will be stored in the Temporary Construction Compound and bunded to at least 110% of the storage capacity of fuels to be stored. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- The electrical control building (at the substation) will be bunded appropriately to 110% of the volume of oils that will be stored, and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be 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;
- An emergency plan for the construction phase to deal with accidental spillages is included within the Construction and Environmental Management. Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.

Mitigation for Watercourse Crossings

Mitigation measures for the proposed new watercourse crossings (no. 2) are detailed below:

- The new proposed watercourse crossings will be via a bottomless or clear span culverts and the existing banks will remain undisturbed as much as possible.
- No instream excavation works are proposed and therefore there will be no direct effect on the stream at the proposed crossing locations.
- Any guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland will be incorporated into the design of the proposed crossings.
- As a further precaution, construction work near streams 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", that is, May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates and the risk of entrainment of suspended sediment in runoff.

- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area.
- 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.

Mitigation for Turbine Delivery Route Works

While works along the TDR are required at a number of locations, it is considered that no significant effects will occur on surface waters, for the following reasons (see EIAR **Chapter 10: section 10.6.2.11**):

- All works are relatively minor and localised and cover very small areas.
- Excavation/earthworks will all be small scale.
- These works are distributed over a wide area.
- All works are temporary in nature.

Nevertheless, on a precautionary basis, key temporary drainage measures will be installed, as follows:

- All existing dry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using 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.
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50 m buffer zone.

3.4.2 Operational Phase Mitigation

As part of the wind farm drainage design, it is proposed that runoff from the infrastructure will be collected locally in new proposed silt traps, settlement ponds and vegetated buffer areas prior to release into the existing site drainage network. The new proposed drainage measures will then create significant additional attenuation to what is already present. The operational phase drainage system will be installed and constructed in conjunction with the existing site drainage network and will include the following:

1. Interceptor drains will be installed 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 can be re-distributed into downstream field drains.
2. Collector drains will be used to gather runoff from access roads and turbine hardstanding areas of the Site likely to have entrained suspended sediment, and channel it to new local settlement ponds for sediment settling.

- On sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains.

3. 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. Check dams will be monitored to ensure no blockages/bypass and ongoing effective operation.
4. Settlement ponds, emplaced downstream of access road 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 existing drains.

- Settlement ponds will be designed in consideration of the greenfield runoff rate.
- All surface water runoff from the development will have to pass through the proposed settlement ponds prior to release into the existing site drainage network.

The following specific measures will be implemented during the operational phase to ensure the ongoing protection of watercourses and water quality at the Site and in downstream reaches leading towards the identified European sites (Lower River Shannon SAC & River Shannon and River Fergus Estuaries SPA), which have hydrological connectivity with the proposed Project Site:

- The Site compound / office will house all potential pollutants within a secure bunded COSSH store for the operational phase of the Project.

- All on-site wastewater treatment facilities will function in full compliance with current water quality requirements (Building Regulations 2010 as amended S.R. 66:2015) to prevent nutrient loading entering aquatic environments. It is proposed to install a sealed underground holding tank for effluent from the Substation compound. The tank shall be routinely emptied by a licensed contractor.

Mitigation measures for the use of hydrocarbons on site will be the same as those outlined for the construction phase.

3.4.3 Decommissioning Phase Mitigation

Decommissioning of the proposed wind farm Project will be scheduled to take place after the proposed 35-year operational life of the Project. Potential effects on European sites from the Decommissioning phase of the proposed Project are likely to be broadly similar to construction phase effects but of a reduced magnitude due to the reduced scale of the proposed works in comparison to the construction phase works. The implementation of all mitigation measures relevant to the protection of ground and surface waters within the wind farm Site as detailed for the construction phase will be adopted in full (as relevant) during the decommissioning phase to ensure all such effects are avoided.

When the final Decommissioning Plan is prepared prior to decommissioning and presented as a standalone document, all drainage management measures, which will include maintenance of the operational drainage measures, will be included in that document, as required. However, it should be noted that by the time

decommissioning is undertaken after the planned 35-year lifespan of the Project, the areas within the Site will have re-vegetated resulting in a resumption of the natural drainage management that will have existed prior to any construction. It is not anticipated that the Decommissioning phase will interrupt this restored drainage regime in any way with the works proposed.

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

3.5 Analysis of "In-combination" Effects

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

Other Wind Farm Projects

Chapter 2, Section 2.3.2 of the EIAR identified a total of 10 no. operational, consented and proposed wind farms within a 20 km radius of the site of the Proposed Wind Farm Project (see **Table 6** & **Figure 7**). The nearest is the Rathnacally Wind Farm (2 no. turbines) at a distance of c. 5.9 km to the south. The largest developments is the proposed Ballinlee Wind Farm (17 no. turbines) at a distance of c.7.7 km to the northeast and the operational Castlepook Wind Farm (14 no. turbines) in the Ballyhoura Mountains (c.14 km from Garrane site).

Apart from the operational Slievaragh Wind Farm, all the other wind farms are located in separate hydrological catchments and have no potential for in-combination effects on the Maigue River system when considered with the Proposed Project (see details in EIAR Chapter 10: section 10.7.4.4, Table 10.21). The Slievaragh Wind Farm drains to the Loobagh River and is located at the eastern boundary of the hydrological cumulative study area. There is limited potential for cumulative effects as the Slievaragh Wind Farm is already operational. Nevertheless, the mitigation measures which will be implemented will ensure that the Project does not have the potential to result in significant effects on the hydrological/hydrogeological environment.

It is concluded that the proposed Garrane Project will not contribute to a significant effect on designated sites associated with the Shannon system when considered in-combination with other wind energy projects.

Table 6: Wind Farms within 20 km of the Proposed Project Site.

Wind Farm	Status	No. of Turbines	Distance to the Site Boundary	Direction from the Wind Farm	Potential for In-combination Effects
Rathnacally Wind Farm	Operational	2	c. 5.9km	South	None – in a different

Wind Farm	Status	No. of Turbines	Distance to the Site Boundary	Direction from the Wind Farm	Potential for In-combination Effects
					hydrological catchment
Boolard Wind Farm	Operational	2	c. 9.0km	Southwest	None – in a different hydrological catchment
Kilmeedy Wind Farm	Operational	2	c. 16km	Northwest	None – in a different hydrological catchment
Slieveragh Wind Farm	Operational	2	c. 19.3km	East	While in same catchment as Garrane site, the mitigation proposed for Garrane Project will ensure that there is no potential for significant hydrological effects when considered alone or in-combination with the Slieveragh project.
Knocknatallig Wind Farm (formerly Buttevant Wind Farm)	Operational	6	c. 11.3km	South	None – in a different hydrological catchment
Castlepook Wind Farm	Operational	14	c. 14km	Southeast	None – in a different hydrological catchment
Kilberehert Wind Farm	Operational	3	c. 18.8km	Southwest	None – in a different hydrological catchment
Annagh Wind Farm	Proposed	6	c. 8.6km	South	None – in a different hydrological catchment
Tullacondra Wind Farm	Consented	9	c. 20.7km	Southwest	None – in a different hydrological catchment
Ballinlee Wind Farm	Proposed	17	c. 7.7km	Northeast	None – in a different hydrological catchment

Industrial Emissions Licence

An IE licence including emissions to water exists to the south of the Site. This licence (P0386-04) associated with the Rathgoggan North WwTP is held by Kerry Ingredients (Ireland) Ltd and includes discharge of treated effluent to the River Maigue (discharge was formerly to the Charleville Stream but the treated effluent is now piped across the Site and is discharged to the River Maigue just downstream of its confluence with the Loobagh River). However, the licence sets out strict ELVs for several hydrochemical parameters including BOD (20mg/l), COD (75mg/l), suspended solids (35mg/l), Total Nitrogen (15mg/l), Ammonia as N (3mg/l) and Orthophosphate as P (0.5mg/l). Discharge volume limits are also detailed in the IE licence (maximum of 5,000m3/day). A review of the 2024 AER shows that this facility is operating in accordance with its IE licence.

Taking into account the rigorous mitigation measures which will be implemented for all phases of the Garrane project to ensure the protection of downstream surface water quality and quantity, it is considered that there will not be a significant in-combination effect on the Maigue River system associated with the existing IE discharge to the River Maigue.

Other Developments

An inventory of other major developments or proposed developments (bigger than a one-off house) within a 10 km distance of the proposed Project Site has been compiled (see **Chapter 2, Table 2.2)**. There projects are relevant to the time period between 2019 and 2025. The projects include telecommunication masts (planning refs. 21986 & 2360822), solar farm (3.8 km to north, planning ref. 19455), residential development (3.9 km to south, planning ref. 224578), amenity facility (planning ref. 23403), and an industrial production unit (2.5 km to south-west, planning ref. 224226).

All of these projects have been subject to rigorous evaluation of effects on the environment and especially potential for effects on designated sites. Taking into account the distances of these projects from the proposed Garrane Green Energy Project, and the predicted effects (with mitigation in place) from the Proposed Project, it is considered that the Proposed Project will not contribute to any in-combination effect when considered with other developments within the study area.

Agriculture

Agriculture is the largest landuse activity within the study area. Agricultural operations have the potential for the release of sediment and nutrients to the aquatic environment, which can ultimately have negative effect on the interests of local surface watercourses, and ultimately the Shannon Estuary, which receives the inflowing waters.

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, which could ultimately have negative effects on the designated sites associated with the Shannon Estuary.

However, the strict mitigation measures which will be implemented during the construction, operational and decommissioning phases of the Proposed Project (as described in the EIAR and the present report) will ensure the protection of downstream surface water quality.

It is concluded that there will not be a significant in-combination effect on European sites when the Proposed Project is considered in combination with agricultural activities within the catchment.

In-combination Effects Conclusion

The main likelihood of in-combination effects is assessed to be hydrological (surface water quality) rather than hydrogeological (groundwater).

The primary potential for in-combination effects will occur during the construction phase as this is when earthworks and excavations will be undertaken at the Site. The potential for in-combination effects during the operational phase will be significantly reduced as there will be no exposed excavations, there will be no sources of sediment to reach watercourses, there will be no use of cementitious materials and fuels/oil will be kept to a minimum at the site. During the decommissioning phase, the potential in-combination effects are similar to the construction phase, but to a much lesser degree with less ground disturbance.

The assessment carried out in this report confirms, with no reasonable scientific doubt, that the proposed Project will not adversely affect the integrity of any of the relevant European sites, namely the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, either individually or in-combination with other plans and projects.

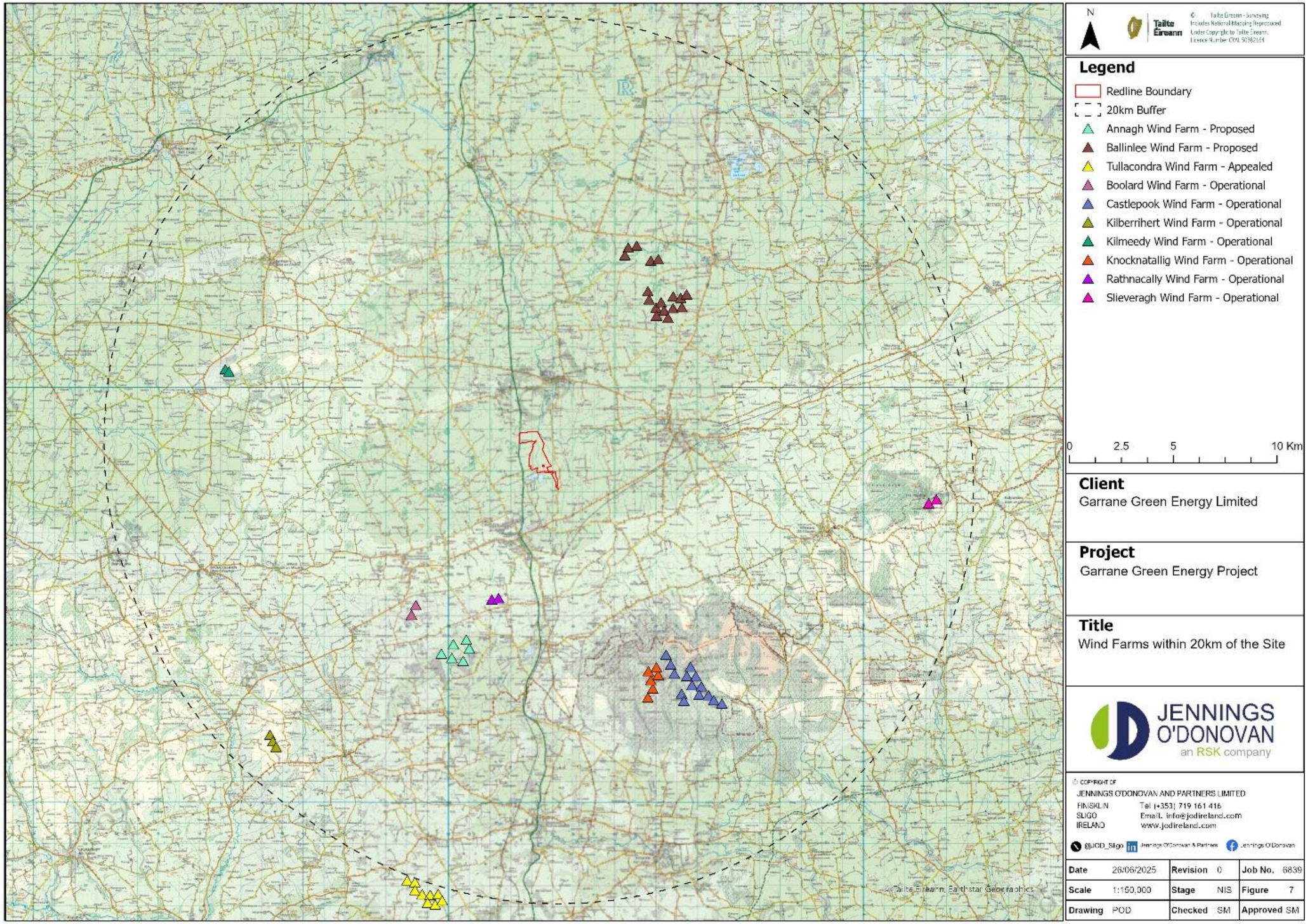


Figure 7: Locations of wind farm projects within a 20 km radius of the Site for the proposed Development.

4 CONCLUSION

This Natura Impact Statement has assessed the potential effects of a proposed Wind Farm Project at a site at Garrane, Co. Limerick on the integrity of identified relevant European sites.

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

The NIS contains information that the Commission, as competent authority, may consider in making its own complete, precise and definitive findings and conclusions as to the effects of the proposed Project. It is respectfully submitted that the information contained in this NIS is such that the competent authority will be capable of determining that all reasonable scientific doubt has been removed as to any adverse effects of the proposed Project on the integrity of the relevant European sites.

In conclusion, on the basis of the assessment set out in this NIS, it is respectfully submitted that the competent authority is able to determine that no reasonable scientific doubt remains that the proposed Project will not adversely affect the integrity of any European site, in view of the conservation objectives of that site.

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