Appendix 9A

Water Framework Directive

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Water Framework Directive Assessment

PRESENTED TO

Ballinlee Green Energy Ltd.
Ballinlee Windfarm

DATE

September 2025

Environmental Consultancy Services

DOCUMENT CONTROL SHEET

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LIST OF ABBREVIATIONS

Abbreviation	Definition
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
DEHLG	Department of Environment, Heritage and Local Government
DWPA	Drinking Water Protected Areas
EGC	Enviroguide Consulting
GSI	Geological Survey Ireland
OPW	Office of Public Works
RBMP	River Basin Management Plan
TII	Transport Infrastructure Ireland
UE	Uisce Éireann
WAP	Water Action Plan
WFD	Water Framework Directive
WWTP	Wastewater Treatment Plant

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Appendix A Designated and Protected Sites

1 INTRODUCTION

Enviroguide Consulting (hereafter referred to as EGC) was appointed by Malachy Walsh and Partners (MWP) on behalf of Ballinlee Green Energy Ltd. (hereafter referred to as the Applicant) to complete a Water Framework Directive (WFD) Assessment for the proposed windfarm development at Ballinlee Co. Limerick (hereafter referred to as the 'Proposed Development' and 'site').

This report presents the findings of the WFD Assessment for the site and Proposed Development.

1.1 Project Objective

The overall objective of this WFD assessment is to determine if any specific components or activities associated with the Proposed Development will compromise WFD Article 4 objectives, cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status. This assessment identifies any waterbodies with the potential to be impacted, describes the proposed mitigation measures, defines any residual impacts, and determine if the Proposed Development is compliant with the WFD.

1.2 Project Scope of Work

The scope of this WFD assessment included the following tasks in line with WFD Common Implementation Strategy (CIS) Guidance:

- Screening for Potential Effects - Determine whether the Proposed Development could have any direct or indirect effect on the different quality elements relevant to the WFD.
- Scoping of Further Investigations - Outline the information required to determine the significance of any effect on the relevant quality elements.
- Data Collection and Assessment - Assess whether any effect could cause deterioration or compromise the status/potential status of a water body.

1.3 Professional Competency

This chapter of the EIAR has been prepared by Warren Vokes Ba, MSc, MCIWEM, C.WEM, a Senior Environmental Consultant of Enviroguide. Warren holds a MSc River Environments and their Management and is a Chartered Water and Environmental Manager with over 9 years' experience as an Environmental Consultant. Warren has carried out environmental assessments for a range of project types and hydrological and hydrogeological site settings. Project types include: wind farms, hydro pump storage, flood alleviation schemes, residential, commercial and capital infrastructure.

This chapter of the EIAR has been reviewed by Gareth Carroll BA, BAI, MIEnvSc, CEnv, a Principal Environmental Consultant of Enviroguide. Gareth is a Chartered Environmentalist with over 13 years' experience in preparing environmental assessments for a range of project types and hydrological and hydrogeological site settings. Project types include: wind farms, solar farms, residential, commercial and capital infrastructure.

2 METHODOLOGY

2.1 Legislative Context

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU, and 2014/101/EU ("WFD"), was established to ensure the protection of the water environment. The Directive was transposed in Ireland by the European Communities (EU) (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

The WFD requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. It applies to all surface waters (defined as inland waters, both standing and flowing and includes rivers, lakes, reservoirs, streams and canals), groundwater, transitional (estuarine) and coastal waters. This includes both natural and "artificial and heavily modified bodies of water" ('artificial' is defined in Article 2(8) as 'a body of surface water created by human activity' and 'heavily modified' is defined in Article 2(9) as 'a body of surface water which as a result of physical alternations by human activity is substantially changed in character').

Any new development must ensure that this fundamental requirement of the WFD is not compromised. The Article 4 objectives, which have been considered as part of the design process of the Proposed Development, include the following:

- Protect, enhance, and restore all bodies of surface water and groundwater with the aim of achieving good surface water status by 2027.
- Prevent deterioration and maintain a 'high' status where it already exists.
- Implement the necessary measures with the aim of progressively reducing pollution in surface waters and groundwater.
- Ensure waters in protected areas meet requirements.

2.1.1 National Policy

The WFD is implemented through the River Basin Management Plans (RBMP) and which operate on a renewing six-year cycle of planning, action, and review. RBMPs set targets to address water quality issues including the identification of river basin districts, water bodies, protected areas, and any pressures or risks, monitoring, and setting environmental objectives. In Ireland, the first RBMP covered the period from 2009 to 2015, with the second cycle plan covering the period from 2018 to 2021.

The Water Action Plan 2024 (RBMP 3rd Cycle – 2022-2027) Programme of Measures outlines comprehensive measures to protect and improve water quality across various sectors. The Programme of Measures (PoM) for the RBMP is a comprehensive set of actions designed to achieve the environmental objectives set out in the WFD. The PoM includes both basic and supplementary measures:

Key elements of the PoM include:

- Integrated Catchment Management: The PoM uses an integrated catchment management approach, focusing on identifying the right measures for specific locations to maximise effectiveness.
- Collaboration: Implementation involves collaboration between various government departments, local authorities, the EPA, and other stakeholders, with the Programme Delivery Office overseeing and coordinating efforts.

- Monitoring and Reporting: An enhanced monitoring and reporting programme tracks the implementation progress and assesses the effectiveness of the measures.
- Targeted Actions: The PoM identifies specific actions under each pressure/issue affecting water quality, assigning lead organisations, timelines, and key performance indicators.
- Multiple Benefits: The PoM aims to deliver multiple benefits for water, biodiversity, and climate change mitigation and adaptation.
- Environmental Assessment: All measures and projects arising during the third-cycle RBMP are subject to further environmental assessments, including Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA), as required.

The Water Action Plan 2024 provides numerous specific examples of measures within the PoM, categorised by the sector driving the impact:

- Agriculture: Implementation of a stronger and more targeted Nitrates Action Programme, including tighter controls on nutrient applications, a livestock excretion banding system, a national fertiliser sales database, and enhanced inspection and enforcement programmes.
- Hydromorphology: Developing a new Controlled Activities for the Protection of Waters regime to address pressures on the physical condition of waters.
- Forestry: Increasing the area of forests with appropriate water setbacks, seeking improvements to the licence applications process for key forestry activities, and rolling out schemes that promote water protection.
- Urban Wastewater: Continued investment in urban wastewater infrastructure and a review of water bodies where urban wastewater is a significant pressure.
- Peatlands: Updating the National Peatlands Strategy and continuing the national programme of peatland restoration.

These measures are designed to ensure that all new developments comply with the WFD's fundamental requirements and contribute to the overall goal of achieving good water status by 2027.

This assessment takes into account and meets all the requirements and objectives outlined above, ensuring compliance with the WFD.

2.1.2 Other Relevant Policy and Guidance

The methodology adopted for this assessment takes cognisance of other relevant standards and regulations pertinent to undertaking a WFD assessment in particular the following:

- Council Directive 2006/118/EEC, 2006. On the protection of groundwater against pollution and deterioration. European Parliament and the Council of European Communities.
- Commission Directive 2014/80/EU of 20 June 2014 amending Annex II to Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration.
- EU Water Framework Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy with amending Directives 2008/105/EC, 2013/39/EU and 2014/101/EU

- European Communities (Water Policy) Regulations 2003 (S.I. No. 722/2003).
- Environmental Protection Agency, December 2011. Guidance on the Authorisation of Discharges to Groundwater.
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (Groundwater Protection Schemes, 1999).
- Local Government, July 1990. No. 21 of 1990. Local Government (Water Pollution) (Amendment) Act, 1990.
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and as amended.
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and as amended.
- Environmental Protection Agency (EPA) (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR).
- Inland Fisheries Ireland (IFI) (2016), Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Water.
- Transport Infrastructure Ireland (TII 2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- DoEHLG (Nov 2009) The Planning System and Flood Risk Management – Guidelines for Planning Authorities.

2.2 Waterbody Characterisation

The following definition of a waterbody is presented in Article 2 of the WFD:

“Body of surface water' means a discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, a transitional water or a stretch of coastal water. This definition is transcribed in Part 1 of S.1. No. 272/2009 - European Communities Environmental Objectives (Surface Waters') Regulations 2009. Guidance on what constitutes a "discrete and significant element" is presented in the "Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance document No.2 identification of Water Bodies" (CIS No.2).

As noted in the CIS guidance document, "The Directive does not include a threshold for very small waterbodies". The WFD under Annex II sets out two systems for differentiating water bodies into typologies: System A and B System. The limited number of descriptors in System A was to aid cross comparison of waterbody typologies across the EU. However, in many regions of Europe the limited descriptors and parameters do not provide appropriate differentiation for Waterbodies. This was the case on the island of Ireland (ecoregion 17) where System B was adopted instead. System B has no predefined descriptor ranges but must allow for at least the same level of differentiation as System A and can consider additional descriptors to those required for System A.

As part of the implementation of the WFD in Ireland the EPA set out parameters for characterisation under System B. The EPA characterisation of waterbodies is described in the *Submission in accordance with Article 5 of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, and in accordance with EC-DG Environment D.2* document 'Reporting Sheets for 2005 Reporting" dated 19th November 2004. (EPA, 2005).

It should be noted that WFD covers all waterbodies, but not every watercourse is monitored or classified by the EPA individually. Local 'non-characterised' water features are considered tributaries of the 'characterised' water bodies they connect to and are assessed as such here.

2.3 Water Framework Directive Classification

The information used in the classification of the status of our water bodies is collected in the national WFD monitoring programme.

2.3.1 Surface Water Assessment

Under the WFD, surface water bodies are defined as stated in section 2.1 above and below:

- Rivers.
- Lakes.
- Transitional waters.
- Coastal waters.
- Artificial surface water bodies.
- Heavily modified surface water bodies.

The overall status of surface waters is classified using information on the ecological status and chemical status which are outlined below.

2.3.1.1 Ecological Status

The ecological status of a surface water body is assessed based on the following categories, with each category receiving a rating of, “High,” “Good,” “Moderate,” “Poor” and “Bad” (EPA, 2025). Refer to Figure 2-1 for a representation of the WFD classification of the waterbodies (Catchments.ie, 2025).

High status, which is considered to be the best status achievable or benchmark for a given water body, is the *‘reference condition’* defined as the biological, chemical, and morphological conditions associated with no or very low human pressure.

The ecological status of a surface water body is assessed according to:

- Biological quality (i.e., the condition of biological elements (aquatic flora and fauna));
- Physico-chemical quality (temperature, oxygenation, nutrient conditions) and,
- Hydromorphological quality (waterflow (i.e., flow and tidal conditions), sediment composition and movement, riverbank structure, etc).

The overall ecological status of a surface water body is based on the lowest of the three individual categories, which means that the condition of a single quality element (i.e., biological, physico-chemical and hydromorphological) can cause a water body to fail to reach its WFD classification objectives.

In the case of artificial and heavily modified waters, ecological potential status is assessed similarly to ecological status above but is rated as “Maximum,” “Good,” “Moderate,” “Poor” or “Bad” ecological potential instead. In general terms, ‘maximum ecological potential’ means that the water body is as close as possible to a comparable surface water body, with the only differences being those directly attributed to artificial or modified nature of the water body.

2.3.1.2 Chemical Status

Chemical status (level of harmful chemicals in the water) is recorded by one of two ratings, 'Good' or 'Fail.' It is assessed by compliance with Environmental Quality Standards (EQS) for chemicals that are listed in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 S.I. No. 272/2009 (as amended). This involves making sure that no changes take place that would worsen the current condition of any water body and that a Proposed Development does not prevent the achievement of the future status objectives of any waterbody.

The chemical status classification for the waterbody is determined by the lowest scoring chemical reported in the waterbody.

For an Artificial or Heavily Modified Water Body (A/HMWB), hydromorphologically altered for anthropogenic purposes (i.e., water supply, flood protection or navigation), a Good Ecological Potential (GEP) applies in those waterbodies, which means that the ecological status must be as close as possible to that of a similar natural water body, but without compromising its human use.

2.3.2 Groundwater Assessment

Groundwater is awarded either "Good" or "Poor" status. Groundwater is assessed based on its chemical and quantitative status.

2.3.2.1 Chemical Status

Good chemical status of a groundwater body requires the entry of hazardous substances and saline intrusion into the groundwater to be prevented, and the presence of other pollutants to be below the limits within S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended). Concentrations of pollutants must also not be of such a concentration as to effect the ecological or chemical status of associated surface waters or to damage linked terrestrial ecosystems.

2.3.2.2 Quantitative status

Quantitative status (i.e., the amount of water present) is assessed based on whether or not the available groundwater resource is being reduced by the long-term rate of annual abstraction.

A representation of the WFD classification of the waterbodies is presented Figure 2-1.

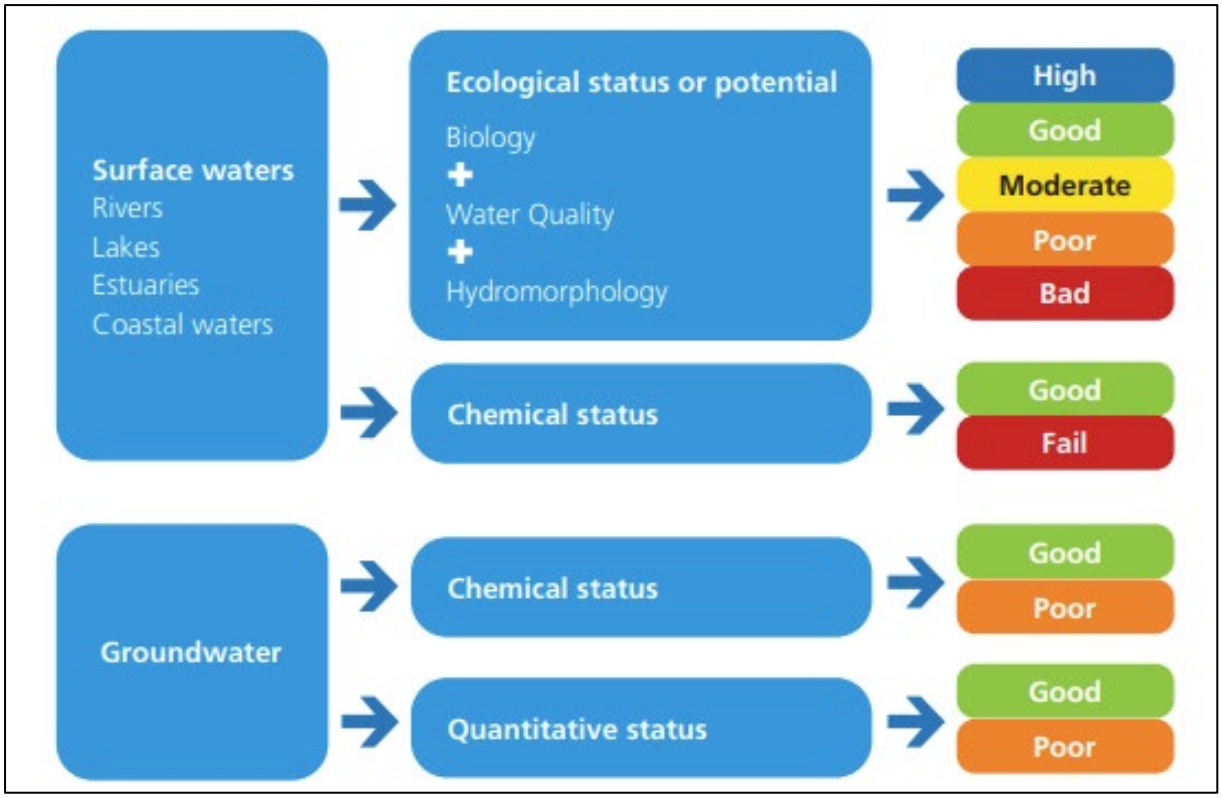

Figure 2-1. WFD Classification (source: EPA, 2025 – www.catchments.ie)

2.4 Approach to WFD Assessment

In order to assist in the implementation of the WFD, EU member states, alongside Norway and the European Commission, developed a Common Implementation Strategy (CIS) in May 2001. This CIS was designed to provide coherent and comprehensible guidelines aimed at achieving the aims of WFD.

CIS Guidance Document 36 provides an outline of an approach to WFD Assessments which breaks the assessment down into the following sequential steps.

- Screening for Potential Effects - Determine whether the Proposed Development could have any direct or indirect effect on the different quality elements relevant to the WFD.
- Scoping of Further Investigations - Outline the information required to determine the significance of any effect on the relevant quality elements.
- Data Collection and Assessment - Assess whether any effect could cause deterioration or compromise the status/potential status of a water body.

If the Proposed Development is determined to compromise or deteriorate the status/potential status of a waterbody then an “Article 4(7) Test” is required. The Proposed Development can only be authorised if the conditions as outlined under Article 4(7) a) to d) are fulfilled. The applicant must provide detailed evidence to meet these four stringent tests:

- (a): All practical steps are taken to mitigate the adverse impacts on the water body.
- (b): The reasons for modifications or alterations are documented in the RBMP.
- (c)(1): There is an overriding public interest in the Development or
- (c)(2): The benefits outweigh those of the WFD objectives, particularly regarding human health, safety, or sustainable development.

- (d): The project's benefits cannot be achieved by a significantly better environmental option that is technically feasible and not disproportionately costly.

The Proposed Development must not permanently exclude or compromise the WFD objectives in other water bodies within the same RBD and must comply with other environmental legislation (Article 4(8)). Additionally, new provisions must guarantee at least the same level of protection as existing legislation (Article 4(9)). Additional guidance relating to Article 4(7) derogations is provided in the Common Implementation Strategy Document No.36 (EU Water Directors, 2017).

If it is determined that the Proposed Development will not cause deterioration in the status of a waterbody likely to be impacted by the development or prevent such a waterbody from achieving good status, then no Article 4(7) assessment is required and the proposed development may be authorised in accordance with the WFD.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

Ballinlee Green Energy Ltd (the Applicant) propose to develop a wind farm (named Ballinlee Wind Farm) comprising of seventeen (17) No. wind turbines located on privately-owned predominantly agricultural lands in east County Limerick.

A summary of the components of the proposed wind farm development is presented below:

Core Wind Farm Components

- Seventeen (17) No. wind turbines (turbine tip height of 160m, and 150m (T6)) with associated foundations and crane hardstand areas.
- One (1) No. Permanent Meteorological Mast (92m height) and associated foundation, hardstand area and ancillary main crane hardstand area.
- One (1) No. Electrical Substation (110kV) including Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing and all associated works.
- Nine (9) No. site entrances.
- New and upgraded internal site service tracks (approximately 10.8km of new internal access tracks to be constructed).
- New clear span bridge over the Morningstar River.
- Underground electric collector cable systems between turbines within the wind farm site.
- Underground electric cabling systems between the wind farm site and the connection point at the existing Killonan 220/110kV substation.

Associated Components of the Proposed Development

- New temporary access track via R-516 to facilitate turbine delivery route located in the townland of Tullovin.
- Three (3) No. temporary construction site compounds (one approximately 95m x 50m and two approximately 55m x 25m).
- Two (2) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated materials.
- Nine (9) No. deposition areas and two (2) No. temporary deposition areas.
- Associated surface water management systems.
- Tree felling required for wind farm infrastructure.

The entire lands subject to the proposed development are referred to in this report as the “the site”. To aid in the assessment and description of potential effects the proposed development is also distinguished in this report with regard to the “main development site” (which refers to the lands immediately adjacent to the proposed turbines and substation) and the proposed “grid connection route” (which refers to the linear development linking the main development site to the Killonan substation). Additionally, the temporary access track in the townland of Tullovin to facilitate the turbine delivery is referred to as the “Tullovin access track”.

3.1 Construction Phase

Construction works will be carried out in a phased manner in order to minimise disruption to the local community, minimise environmental impact and ensure the safest working conditions possible. A comprehensive description of activities is outlined in Chapter 4 of this EIAR. The construction of the proposed development will principally comprise of the following works:

- Felling of any areas of coniferous forestry plantation necessary to facilitate construction works.
- Construction of site entrances and any sections of internal access tracks necessary to facilitate access to the temporary construction compound and proposed on-site borrow pit location. Existing tracks will be upgraded, and new tracks will be constructed to access each of the turbines, substation compound and meteorological mast. These access tracks will be constructed using excavated and floating track techniques depending on the ground conditions.
- Construction of temporary construction compound including fencing (for security and ecology, water and archaeological exclusion zones), site offices, parking, material laydown and storage areas, etc.
- Establishment of the on-site borrow pits and temporary storage of stockpiled overburden and surplus excavated materials within the material storage areas.
- Earthworks and drainage infrastructure associated with construction of new and upgraded internal access tracks, crane hardstand, turbine foundations and substation compound.
- Construction of upgraded and new watercourse crossings for construction of internal access tracks and underground cables.
- Excavation of turbine bases and permanent met mast foundations, and associated turbine hardstand areas. The foundations are anticipated to be circular in shape and approximately 27m in diameter and 3.5m in depth The turbine foundations will be constructed using standard reinforced concrete construction techniques. The hardstand areas will be excavated and bear onto rock (or other suitable bearing stratum) with a foundation of 0.5-1.5m depending on the local bedrock profile. In the decommissioning phase, the hardstands will be left in situ and covered over by soil and revegetated.
- A network of underground cabling servicing each turbine with electrical power and signal transmission will be installed along internal access tracks within the proposed development
- Installation of sections of underground cabling to selected connection point option.
- Construction of the substation compound.
- Turbine delivery, installation, and commissioning.
- Meteorological mast delivery, installation, and commissioning.
- No in-stream works will be required in EPA mapped watercourses. Minor works will be required to existing land drains as part of the construction phase.

3.1.1 Surface Water Management

A site surface water management system will be constructed on the site to attenuate run-off, guard against soil erosion and safeguard downstream water quality. The drainage system will be implemented along all work areas including all internal site access tracks, storage areas, crane hardstand areas and temporary site construction compounds. Details of the proposed site drainage system are described in the Surface Water Management Plan (EIAR Volume III, Appendix 2E) and Chapter 4 of this EIAR.

Wind farm open surface water features are designed in accordance with *CIRIA - C753 The SuDS Manual 2015* and *Limerick City and County Council - Surface Water/SuDS Specification*

2022. The following gives an outline of drainage management arrangements along internal services tracks:

- The surface water run-off drainage system will be implemented along all internal access tracks, to separate and collect 'dirty water' run-off from the access track and to intercept clean over land surface water flows from crossing internal tracks.
- To achieve separation, clean water drains will be positioned on the upslope and dirty water drains positioned on the downslope of access tracks, with track surfaces sloped towards dirty drains.
- Clean water will be piped under both the access tracks and downslope collection drains to avoid contamination. Piping the clean water under the access track allows the clean water to follow the course it would have taken before construction thus mimicking the existing surface water over land flow pattern of the site and thus not altering the natural existing hydrological regime on site.
- The treatment process consists of primary; secondary and tertiary treatment as follows:
    - The primary treatment consists of a three-stage settlement pond with an overtopping weir at each stage. The sediment load of the surface water will be reduced as it passes through each stage. Generally, the first chamber removes the largest portion of the sediment load, while the remaining two chambers will remove remaining large particles from the sediment load. Several factors, including the flow rate, turbidity and particle sizes can influence the removal rate.
    - Before the water is released onto the existing ground surface, it passes through a secondary treatment system in the form of a graded gravel filter bed that removes the remaining fine particles from the sediment load.
    - The outflow from each interceptor is dispersed across a wide area of vegetation so that the velocity is minimised and the vegetation can filter out the residual sediment load from the surface water. This is the final or tertiary stage of the treatment process. Existing rills and collector drains within the tertiary treatment area are blocked off to prevent concentration of the flow.
- The treated surface water runoff from the IPP & EirGrid compound areas will outflow to an existing surface water drain, downstream of the outflow control hydrobrake's. The surface water from the IPP & EirGrid compound areas combine in a manhole before outflow to the existing surface water drain via a precast concrete headwall.

3.1.2 Watercourse Crossings

The internal access tracks at the main development site will require several watercourse crossings. A clear-span bridge will be constructed as part of the proposed development over the Morningstar River to provide access to northern and southern parts of the site. Culvert crossings will also be required to facilitate internal access across the minor tributaries of the Morningstar River in the southern portion of the main development site. Construction activities will include vegetation removal, topsoil stripping, crane pad preparation, excavation, dewatering, blinding bedding, aggregate placement & compaction, shuttering, placing reinforcement, pouring concrete, abutment walls, cill beam, bridge beams, bridge deck surface, backfilling, grading and revegetation.

The proposed grid route crosses multiple watercourses, where there are a mixture of Concrete Pipes and Masonry Box Culverts present. Due to the shallow cover levels, the presence of the

structures built on the natural stream bed and dry-stone construction methods used, Horizontal Directional Drilling (HDD) solutions may be required in some instances.

A major watercourse crossing is present on the R512, named Sixmile Bridge, which is a listed structure built in the 1800s and consists of a multi span Masonry Bridge crossing the Camoge River. Due to minimal cover levels and being a listed structure a bespoke HDD solution will be required at this location.

3.1.3 Temporary Construction Compounds and Welfare Facilities

Three (3) No. temporary construction compounds will be set up upon commencement of the construction phase (refer to planning application Drawing No. **22635-MWP-00-00-DR-C-5413** and **22635-MWP-00-00-DR-C-5414** for details).

The compounds will be used as a secure storage area for construction materials and will also contain temporary site cabins to provide welfare facilities for site personnel. Facilities will include office space, meeting rooms, canteen area and mobile sanitary facilities.

The proposed development will include an enclosed wastewater management system at the temporary compounds capable of handling the demand during the construction phase. The discharge from the toilets will go to a holding tank where the effluent will be temporarily stored and removed at regular intervals by an approved contractor and disposed of in a licenced facility.

Upon completion of the project the compounds will be decommissioned by backfilling the area with the material arising during excavation and landscaping with topsoil.

3.1.4 Water Supply

Water needs for construction activities will be limited to potable water, concrete truck chute washing, wheel wash and dust suppression. This water requirement will be imported to the site in bulk and stored at temporary compounds.

It is estimated that up to approximately 3,000 litres per day of potable water will be required during peak construction for construction employees. It is proposed that this water requirement will be imported in bulk water tanks.

3.2 Operational Phase

The Operational Phase of the Proposed Development will comprise a wind farm (named Ballinlee Wind Farm) comprising of seventeen (17) No. wind turbines and all associated infrastructure with an export capacity of in excess of 76MW. The proposed development is expected to have a lifespan of 35 years.

Surface water will be managed in accordance with the principles and objectives of SuDS to treat and attenuate water prior to discharging offsite. The site surface water management system constructed during the construction phase of the proposed development will be implemented and maintained for the operational phase of the proposed development.

During the operational phase, maintenance personnel will visit the substation building on a regular basis. The daily average wastewater production during the operational phase is estimated from the average number of workers on site, which is expected to be 2 workers, resulting in a typical wastewater production rate of 60 litres per day on days where substation

maintenance and monitoring is undertaken. This is likely to take place once per year over a short period. The regional manager will likely visit the customer control building two times per month. The wastewater generated during the operational phase will be managed by a holding tank which is of twin-hull design and fitted with an alarm to indicate levels and when it is due for empty. The holding tank will be emptied by a permitted contractor and treated at a licenced facility.

Potable water for the operational and maintenance phase is estimated to be approximately 20 litres per day. This water will be supplied as bottled water. During the operational phase surface water runoff from footpaths and roof areas will be collected in a rainwater harvesting tank and used as a greywater system.

The power generation aspect of the proposed development will not produce any waste emissions or pollutants. The general operation and maintenance of the proposed development is expected to produce a minimal amount of waste. Wastes arising during the operation phase of the proposed development include but are not limited to lubricating oils, cooling oils, and packaging from spare parts. The containment and disposal of such oils will be carried out by an approved contractor. Such operations will be carried out in accordance with the Waste Management (Hazardous Waste) Regulations, 1998. The remaining wastes will all be removed from site and reused, recycled, or disposed of in an authorised facility in accordance with best practice.

3.3 Decommissioning and Restoration

3.3.1 Wind Farm

The wind farm has been designed to have an operational life of 35 years and any further proposals for wind farm development at the site after this time will be subject to a new planning permission application. If planning permission is not sought after 35 years, the site will be decommissioned and reinstated with all wind turbines and towers removed. Removal of infrastructure will be undertaken in accordance with the Schedule of Environmental mitigation included in Chapter 19 Mitigation of this EIAR and commitments arising from any conditions attached to a grant of permission, in conjunction with other landowner, regulatory requirements and best practice applicable at the time. The information below outlines the proposed decommissioning tasks based on current requirements and best practice. When the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. The turbines and monitoring mast will also be removed from site. It is likely that where possible, turbine components will be reused as they have a life well in excess of the wind farm proposal i.e., greater than 35 years. Wind farm components may also be recycled.

It is anticipated that internal underground cables connecting the proposed turbines to the proposed on-site substation will be cut back and left underground in order to minimise disruption from construction and the potential for environment effects. The cables will not be removed if an environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them in situ. The assessment will be carried out closer to the time to take into account environmental changes over the project life.

Upon decommissioning, turbine foundations will be covered with soil and reseeded. The substation will remain in place as part of the permanent electrical infrastructure. Hardstand areas

will be remediated to match the existing landscape thus requiring reforestation or return to grassland by placing topsoil and grass seed. Access tracks will be left for use by the land-owner.

3.3.2 Grid Connection

The grid cable will remain a permanent part of the national grid and therefore decommissioning is not foreseen. In the event of decommissioning, it will involve removing the cable from the ducting but leaving the ducting and associated supporting structure in place. The ducting will not be removed if the environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them in situ. The assessment will be carried out closer to the time to consider environmental changes over the project life. The removal of the ducts would also cause some limited disruption to road users. Leaving the ducts in place would avoid disruption to road users without compromising the structure of the roadway.

The substation will remain in place and will previously have been taken in charge by the system operator, after the wind farm is connected to the national electricity grid.

4 SITE SETTING AND RECEIVING ENVIRONMENT

4.1 Site Location and Description

The proposed development includes seventeen wind turbines (i.e., the main development site), each with a blade tip height of 160 meters and one (T6) with a blade tip height of 150m, an on-site electrical substation, a grid connection route, and other ancillary infrastructure. The area within the proposed development boundary is approximately 255.12ha.

The main development site is located on privately-owned, predominantly agricultural lands within the townlands of Ballincurra, Ballinlee South, Ballingayrour, Ballinbea, Knockuregare, Ballinlee North, Carrigeen, and Camas South. It is located approximately 18.0km southeast of Limerick City and 3 kilometers southwest of Bruff, Co. Limerick. The surrounding land-use is predominantly rural characterised by agricultural holdings and one-off residential dwellings. Some patches of forestry plantation occur within the site and some on neighbouring properties. Additionally, the main development site falls within a 'Preferred Area' for wind energy development as defined in the current Limerick Development Plan 2022-2028.

The proposed grid connection route is approximately 27.6km and is located along road networks within the townlands of Milltown, Ballysimon Commons, Coolyhenan, Knockananty, Ballybrennan, Drombanny, Carrigmartin, Cahernarry (Cripps), Scart, Ballyogartha, Ballyneety, Knockbrien, Glen, Ballymacreese, Ballynagarde, Stonepark, Carriganattin, Rochestown, Friarstown, Rockstown, Skool, Friarstown South, Grange, Ballynagallagh, Rockbarton, Cahirguillamore, Ballynanty, Ballybane, Ballyreesode and Camas North.

The site location is presented in Figure 4-1 and the existing site layout is presented in Figure 4-2.

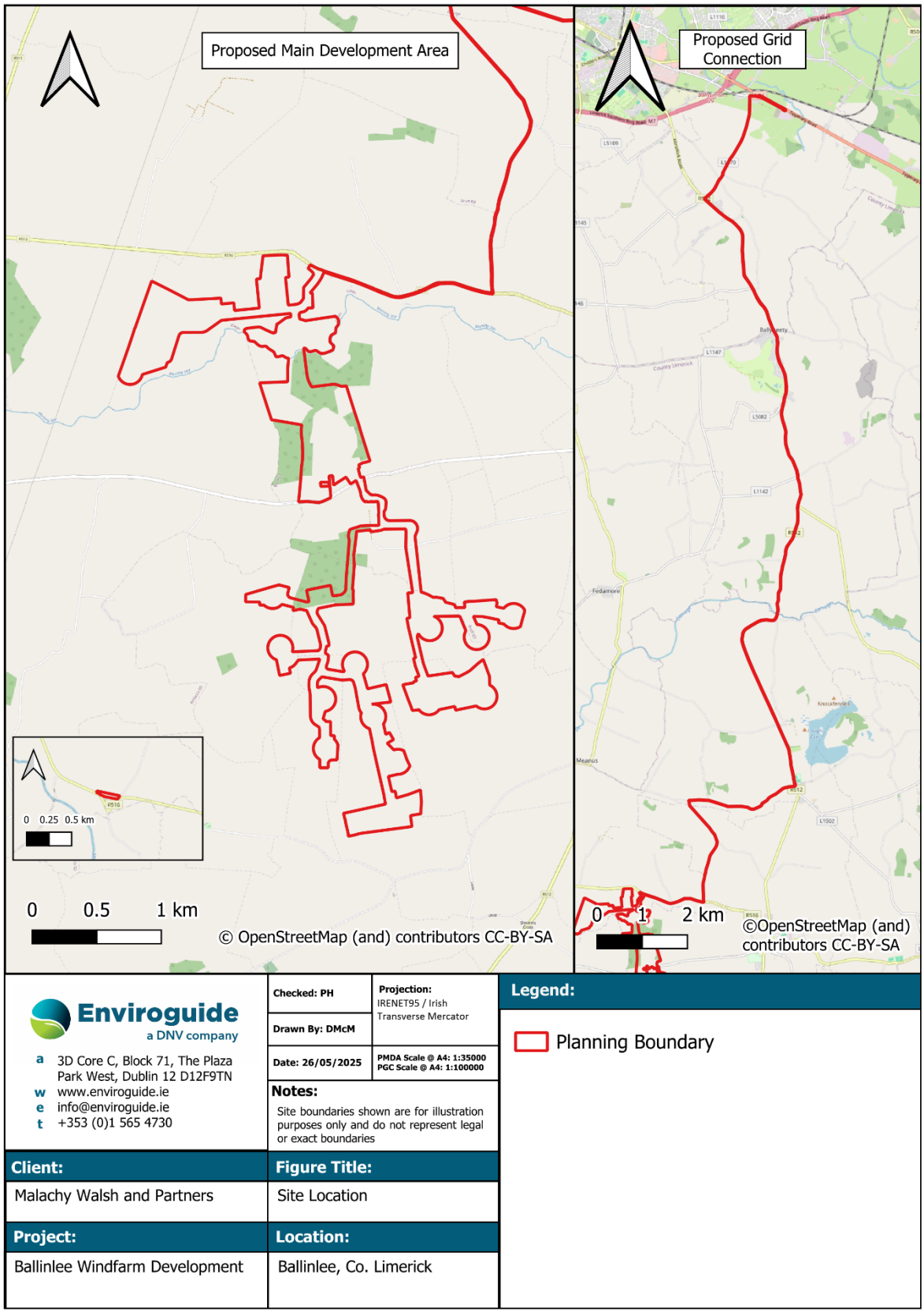

Figure 4-1. Site Location

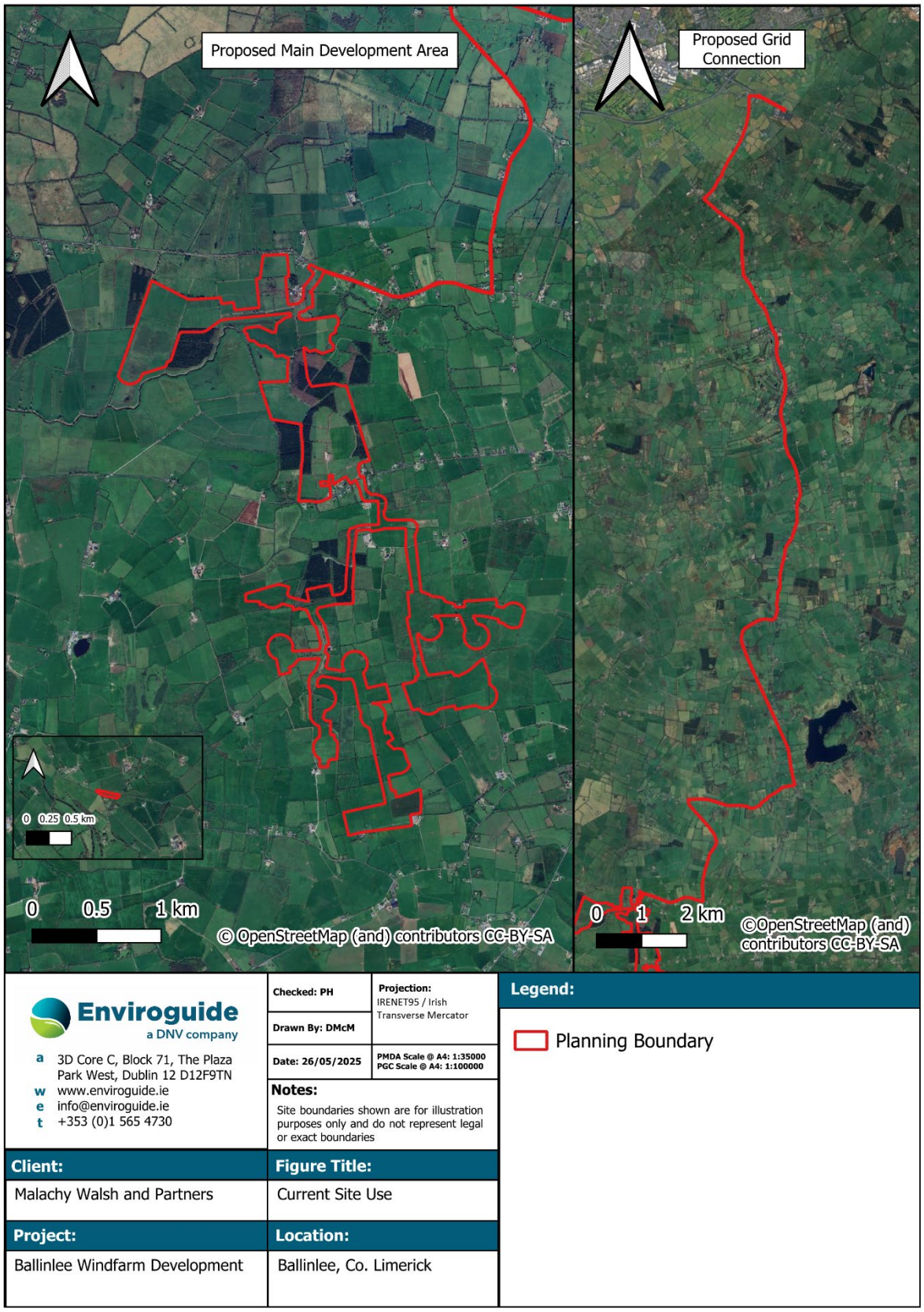

Figure 4-2. Site Layout

4.2 Catchment and Surface Water Features

The main development site is mapped by the EPA (EPA, 2025) to be within the Shannon Estuary South Water Framework Directive (WFD) Catchment (Catchment I.D.: 24) and the Maigue_SC_030 WFD Sub-Catchment (Sub-Catchment I.D.: 24_17). The Shannon Estuary South WFD Catchment includes the area drained by the River Deel and Maigue River, and all streams entering tidal water in the Shannon Estuary between Kilconly Point and Thomond Bridge, Limerick, draining a total area of 2,033km². The largest urban centre in the catchment is the southern part of Limerick City. The other main urban centres in this catchment are Newcastle West, Charleville, Kilmallock Rathkeale and Mungret. The Maigue River confluences with the Shannon Estuary approximately 25.5km northwest of the site at its closest point.

The main development site is mapped by the EPA (EPA, 2025) to be within the Morningstar_060 WFD Sub-basin (EU Code: IE_SH_24M020800). The Morningstar_060 (River Waterbody Code: IE_SH_24M020800) is comprised of the Morningstar River and several minor tributary streams. The minor streams generally flow perpendicular to the Morningstar River. Listed from east to west these are the Killorath Stream, the Rathcannon Stream, the Balinlee South Stream, the Ballinrea Stream, the Ballingayrour Stream, and the North Balinlee Stream. The Morningstar River ultimately confluences with the Maigue River approximately 5.8km west of the site at its closest point. The proposed development will require new crossings of all watercourses within the main development area with the only exceptions being the Killorath and South Ballinlee streams.

The route of the proposed grid connection is mapped by the EPA (EPA, 2025) to be within the Shannon Estuary South WFD Catchment (Catchment I.D: 24) but will also cross the Ballynaclogh_SC_010 and Shannon [Lower]_SC_090 WFD Sub-catchments. The route of the proposed grid connection is also mapped by the EPA as transecting the Ballycullane (Limerick)_010, the Camoge_020, the Ballynaclogh_010, the Whitehall_010, and the Groody_010 WFD River Sub Basins. The proposed grid connection route directly crosses the Camoge River and crosses minor headwater streams / drainage channels contributing to the Groody Rivers. The Camoge crossing will require horizontal directional drilling as the existing road bridge is a protected structure.

The surface water features mapped by the EPA (EPA, 2025) within a 2km radius of the site are presented in Figure 4-3.

4.2.1 Aquatic Ecology and Fish Report

The Aquatic Ecology and Fish Report, prepared by Malachy Walsh and Partners (MWP) for the proposed development (MWP, 2025), outlines the findings of the freshwater aquatic ecology and fish surveys. The aquatic fieldwork was conducted on the 15th and 18th of July and the 27th of September 2022, while the amphibian survey took place on the 2nd of February 2023, and water quality sampling was undertaken on the 16th and 17th of January 2025. The report details the methodology, including desktop studies and field surveys, and presents results on aquatic habitats, macroinvertebrate diversity, water quality, and fish populations.

The biological water quality of the Morningstar River and its tributaries shows varying levels of ecological health, with many sites indicating 'Poor' to 'Moderate' conditions based on Q-

ratings, BMWP scores, and the EPT index. Summary results are reproduced below in Table 4-1.

Table 4-1. Chemistry results for the Morningstar River[1] (monitoring station code S24M020800) between January 2022 and October 2024

Site	Watercourse	Q-rating	Quality Status	Corresponding WFD Status	BMWP Score	BMWP Category	BMWP Interpretation	EPT
2	Camas South	Q2-3	Moderately Polluted	Poor	15	Poor	Polluted or impacted	0
3	Morningstar (River)	Q3-4	Slightly Polluted	Moderate	100	Good	Clean but slightly impacted	13.3
4	Parkroe	Q3	Moderately Polluted	Poor	60	Moderate	Moderately impacted	10
5	Morningstar (River)	Q3-4	Slightly Polluted	Moderate	95	Good	Clean but slightly impacted	12
6	Ballinrea	Q3	Moderately Polluted	Poor	51	Moderate	Moderately impacted	5.7
7	Ballinlee South	Q3	Moderately Polluted	Poor	70	Good	Clean but slightly impacted	7.9
8	Rathcannon	Q3	Moderately Polluted	Poor	96	Good	Clean but slightly impacted	6
9*	South Ballinlee	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10	Rathcannon	Q3	Moderately Polluted	Poor	52	Moderate	Moderately impacted	3.5
11	Killorath	Q2-3	Moderately Polluted	Poor	40	Poor	Polluted or impacted	0

*Unsuitable for Q-rating scheme due to small size/poor habitat.

Laboratory analysis of water samples from various aquatic sites indicated that pH levels were generally alkaline and nitrate concentrations exceeded the 1.8 mg/l N threshold at most sites, with the highest value recorded at Site 7. Conductivity levels were elevated, consistent with soils rich in limestone, and water hardness was classified as 'very hard' across all sites, with values surpassing 300 mg/l CaCO3.

[1] Site 1, located on the Morningstar (River) was surveyed for Aquatic habitat and physico-chemical properties only.

Table 4-2. Summary of key water quality parameters from samples taken at aquatic sites (refer to Aquatic Ecology and Fish Report for Detailed Results).

Site	Watercourse	pH	Temperature (°C)	Conductivity (µS/cm)	Total hardness (mg/L CaCO3)	Nitrate (mg/l N)
1	Morningstar (River)	8.3	16.4	481	325	2.32
2	Camas South	8.2	16.5	514	346	1.99
3	Morningstar (River)	8.3	16.3	480	342	2.45
4	Parkroe	8.1	16.4	493	339	0.84
5	Morningstar (River)	8.4	16.5	480	336	2.37
6	Ballinrea	8.4	16.5	524	364	4.13
7	Ballinlee South	8.3	16.6	564	402	9.06
8	Rathcannon	8.3	16.4	514	359	1.07
9	South Ballinlee	8.2	16.5	523	333	1.73
10	Rathcannon	8.3	16.5	536	361	4.34
11	Killorath	8.0	16.6	643	447	5.3

Key findings of the Aquatic Ecology and Fish Report indicate that the Morningstar River provides suboptimal habitat for salmonids, supporting juvenile salmon and brown trout, while smaller streams within the main development site are mainly suitable for pollution-tolerant species like three-spined stickleback and minnow. The report highlights significant ecological pressures from agricultural practices, leading to siltation and nutrient enrichment, and recommends measures to mitigate habitat loss and improve water quality, such as hedgerow replacement, watercourse buffering, and protection of wet grassland habitats.

4.2.2 Baseline report on Grid Connection Route Aquatic Ecology Surveys

The baseline aquatic ecology assessment for the Ballinlee Wind Farm grid connection route was prepared by Woodrow (2025). The grid connection route was visited by Woodrow on 14 and 15 May 2025 where four watercourses were assessed: the River Camogue and three tributaries (Rockstown, Loughgur, and Ballycullane 24 streams). Water quality analysis showed generally acceptable chemical conditions, but dissolved oxygen saturation was below the Water Framework Directive (WFD) threshold at most sites, and nutrient enrichment was evident, particularly elevated nitrate at Ballycullane 24 and orthophosphate at Rockstown and Loughgur streams. Macroinvertebrate surveys indicated degraded ecological conditions, with Q-values of Q3 (poor status) at the Camogue and Ballycullane sites and Q2 (bad status) at Loughgur, suggesting moderate to serious pollution and a decline compared to previous EPA assessments.

Fish habitat surveys revealed that the River Camogue supports a diverse range of habitats suitable for salmonids and lamprey, with salmonid fry and a lamprey transformer recorded, although spawning habitat was suboptimal due to siltation and algal growth. In contrast, the tributaries offered limited habitat diversity and were considered unsuitable for salmonid or lamprey species, with only minnows observed at Ballycullane. White-clawed crayfish were not detected at any site despite suitable habitat in the Camogue, likely due to crayfish plague in the catchment; tributary habitats were assessed as poor for crayfish.

Overall, the River Camogue retains good water chemistry and fish habitat potential but exhibits biological signs of stress, while the tributaries show significant ecological degradation linked to nutrient enrichment, low dissolved oxygen and livestock poaching. These findings highlight the need for mitigation measures during construction and potential habitat restoration, particularly considering historical crayfish presence and the importance of maintaining fish passage and water quality.

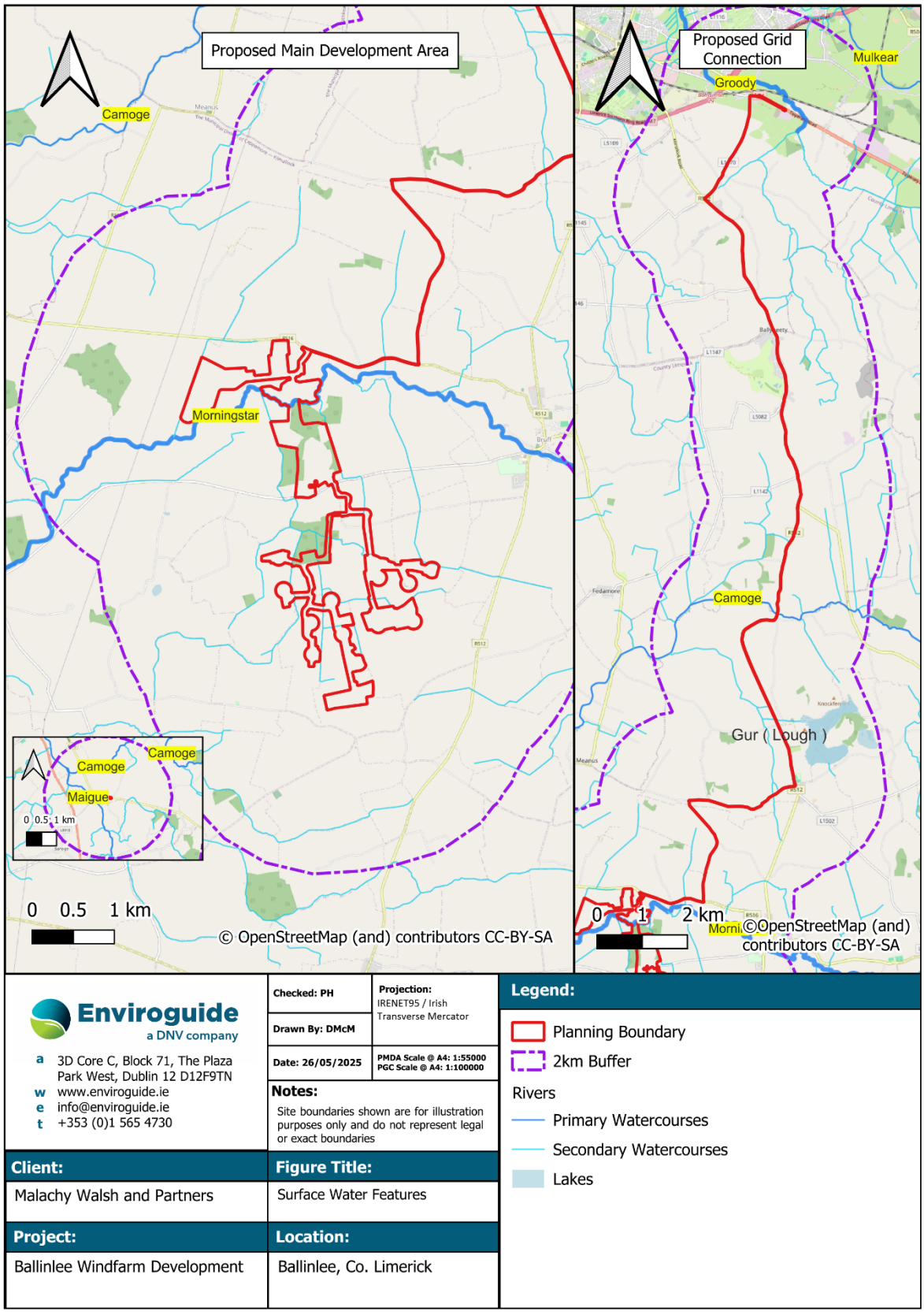

Figure 4-3. Local Surface Water Features

4.3 Groundwater Body and Flow Regimes

The EPA (EPA, 2025) maps the groundwater body (GWB) beneath the majority of the main development site as the Hospital GWB (EU Code: IE_SH_G_107). The Hospital GWB covers approximately 260km2 and occupies the lowlands of Co. Limerick (GSI, 2025). The highest point, at 165 meters above Ordnance Datum (mOD), is Cromwell Hill in the northeast of the GWB, which is underlain by volcanic rocks. The lowest parts are in the northwest, along the course of the River Maigue, with most of the area around 100 mOD. Elevation increases slightly to 120 mOD and 170 mOD along the western and eastern margins of the Hospital GWB, respectively, which are surface water catchment boundaries. Drainage density within the Hospital GWB is high, with many small tributaries draining to the major rivers crossing the Hospital GWB.

The EPA (EPA, 2025) maps the GWB beneath some of the northern portion of the main development site as the Fedamore GWB. The Fedamore GWB (EU Code: IE_SH_G_084) covers approximately 210km2 in an elongated east - west irregular outline as it wraps around the Knockroe Northwest and Knockroe Southwest GWBs in the east and is partially dissected by rocks of the Hospital GWB in the west. Over most of the GWB ground elevation ranges between 20mOD and 60mOD, although higher ground is found east of Fedamore, where average elevations are between 60mOD and 80mOD. The lowest ground of less than 10mOD is found in the northwest of the GWB, near the confluence of the Maigue and Clonshire Rivers. The highest elevations occur along parts of the eastern boundary, including near Lough Gur and Cromwell Hill. High elevations along the eastern boundary are generally associated with the more resistant volcanic rocks or cherty bedded limestones.

The EPA (EPA, 2025) maps the GWB beneath the southern portion of the main development site as the Bruree GWB (EU Code: IE_SH_G_046). The Bruree GWB is elongated in an east / northeast – west / southwest direction along a slightly elevated ridge. The highest elevations are 125mOD west of Bruree and 103mOD east of Bruree. The River Maigue flows roughly north to south across the GWB at Bruree, where the elevation is approximately 50mOD. The area is well drained and streams generally flow off the lower parts of the GWB where they ultimately drain into the River Maigue.

The route of the proposed grid connection will also pass through the Fedamore GWB, the Knockroe Northwest and Knockroe Southwest GWBs, the Herbertstown GWB, the Ballyneety GWB and the Limerick City East GWB.

- The Knockroe Northwest Groundwater Body (GWB) covers an area of approximately 6 km². The elevation ranges from 70mOD in the west to over 200mOD at Derk Hill on the northern boundary. The aquifers in this GWB are mainly locally important (Ll) with some regionally important karstified aquifers (Rkd).
- The Knockroe Southwest Groundwater Body (GWB) spans approximately 20 km². Elevations range from 60mOD in the west to over 230mOD at Derk Hill on the eastern boundary. This GWB consists of locally important aquifers (Ll) and some pure bedded limestones (Lm).
- The Herbertstown Groundwater Body (GWB) covers an area of approximately 38 km². Elevations within this GWB range from just under 70mOD to over 130mOD. The aquifers are locally important (Lm).
- The Ballyneety Groundwater Body (GWB) spans approximately 68 km². Elevations range from 30mOD to 50mOD in the northwest and northeast to over 160mOD in the

west and southwest. This GWB includes regionally important karstified aquifers (Rkd) and locally important aquifers (Lm).

- The Limerick City East Groundwater Body (GWB) covers an area of approximately 46 km². It is generally low-lying, with elevations ranging from less than 10mOD to about 40 mOD, and higher ground up to 90mOD in the south. The aquifers are locally important (Lm) with some regionally important karstified aquifers (Rkd).

The proposed temporary access track in the townland of Tullovin is located within the Ballingarry GWB. The Ballingarry GWB spans approximately 94 km². The River Maigue flows roughly North to South across the eastern part of the GWB, where the elevation is approximately 40 mAOD. Streams generally flow off the lower elevations of the GWB where they ultimately drain into the River Maigue, Morningstar or Deel. The higher areas are generally well drained; drainage ditches are present in the flatter parts of the area. Diffuse recharge will occur over the entire groundwater body via rainfall soaking through the subsoil and directly into outcropping rock. It will occur most readily where rock is close to surface. The majority of the GWB comprises Rf: Regionally important fissured bedrock aquifer. The Groundwater Bodies beneath the site of the Proposed Development are presented in Figure 5-1.

4.3.1 Aquifer Classification and Vulnerability

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor) and vulnerability (extreme, high, moderate or low). Resource value refers to the scale and production potential of the aquifer whilst vulnerability refers to the ease with which groundwater may be contaminated by human activities (vulnerability classification primarily based on the permeability and thickness of subsoils).

The GSI (GSI, 2024) has classified the bedrock aquifers beneath the main development site as follows:

- The bedrock aquifer beneath the majority of the main development site is mapped by the GSI (GSI, 2024) as a Locally Important Aquifer (Aquifer Category: LI) which is generally moderately productive, only in local zones. The proposed substation and all proposed turbines except for turbine No.4 are underlain by the LI aquifer.
- Some of the northern portion of the main development site is mapped as a Regionally Important Aquifer - Karstified (diffuse) (Aquifer Category: Rkd). Turbine No.4 is indicated to be underlain by an Rkd aquifer.
- The southern portion of the main development site is mapped as Regionally Important Aquifer - Fissured bedrock (Aquifer Category: Rf).

It is noted that the GSI (GSI, 2025) has classified the bedrock aquifers beneath the route of the proposed grid connection as Locally Important (Aquifer Category: LI and Lm) and Regionally Important - Karstified (diffuse) (Aquifer Category: Rkd).

Locally important aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or ‘good’ yields (100-400m3/d). Groundwater flow occurs predominantly through fractures, fissures and joints. Regionally important aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or ‘excellent’ yields (>400 m3/d). ‘Karstification’ is the process whereby limestone is slowly dissolved away by percolating waters. Karstification frequently results in the uneven distribution of permeability through the rock, and the development of distinctive karst

landforms at the surface (e.g. swallow holes, caves, dry valleys), some of which provide direct access for recharge/surface water to enter the aquifer.

It is noted that there are no gravel aquifers mapped at the site or within a 2.0km radius of the site (GSI, 2025). The bedrock aquifers beneath the site of the Proposed Development are presented in Figure 4-4.

Two proposed turbines (No.9 and No.12) are located within areas indicted by the GSI to have a groundwater vulnerability rating of 'High' (H). All other proposed turbine locations, the proposed substation, and the location of the temporary track for the turbine delivery route, are assigned a groundwater vulnerability rating of 'Moderate' (M). Similar to the main development site, the majority of the route of the proposed grid connection has been assigned a groundwater vulnerability rating of 'Moderate' (M) to 'High' (H). However, there are some areas along the route which have been assigned a groundwater vulnerability of 'Extreme' (E) or with 'rock at or near surface or Karst' (X).

4.3.2 Karst Features

No karst features are indicated to be within 2km of the main development site (GSI, 2025). The closest features are approximately 50m west of the grid connection route in Grange (2km north of the Holycross crossroads). These consist of a pair of springs that feed headwater streams in the Camoge catchment. It is indicated that these springs are linked to the sinkholes that drain Lough Gur approximately 1.8km to the east, notably the Pollavaddra sinkhole/enclosed depression at the north-eastern end of the lake (O' Connel et al. 2022).

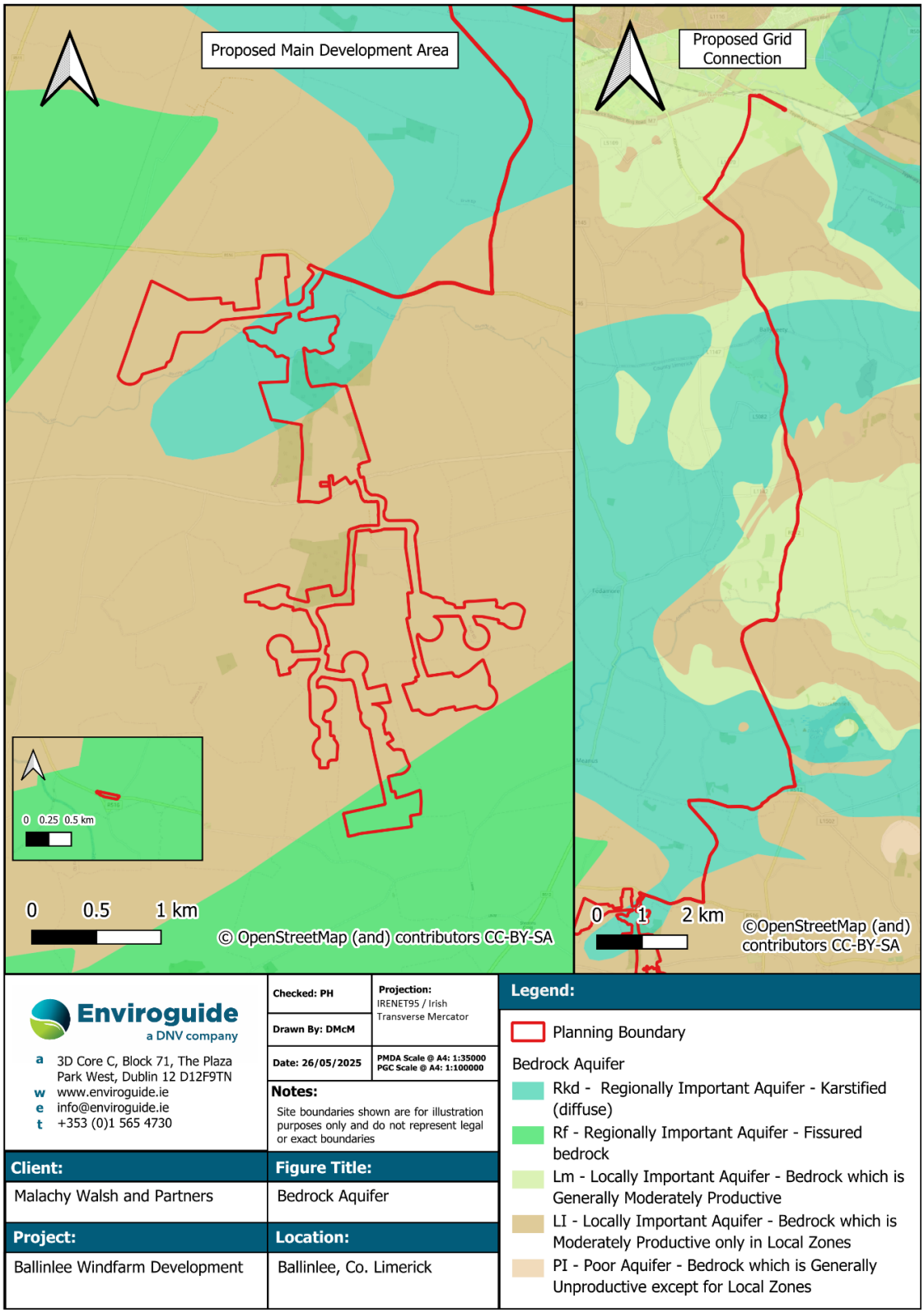

Figure 4-4. Bedrock Aquifers

4.4 Flood Risk

A site-specific flood risk assessment (SSFRA), developed by MWP (MWP, 2025), assessed the potential flood risk associated with fluvial, groundwater, coastal and pluvial flooding for the site and Proposed Development. The SSFRA (MWP, 2025) concludes the following:

- The report has been prepared in the context of The Planning System and Flood Risk Management – Guidelines for Planning Authorities, November 2009 (PSFRM), published by the Office of Public Works and the Department of Environment, Heritage and Local Government.
- The Stage 1 and 2 flood risk assessments indicated that there is potential for flooding at this site. The potential source of flooding was identified as fluvial flooding from the Morningstar River and its tributaries, particularly in the northern part of the project area. A Stage 3 Detailed Flood Risk Assessment (FRA) was carried out to assess flood risk issues in sufficient detail to provide a quantitative appraisal of potential flood risk to the site.
- In order to predict the flood extents and flood levels at the site, a combined 1D-2D hydraulic model was created using HEC-RAS river modelling software. A series of 1D hydraulic models were created to model the southern area of the site. The model was used to create a flood zone map and predict baseline flood levels of the existing site which indicates the extent of Flood Zones A and B. Areas of the site outside of these Flood Zones are in Flood Zone C.
- The flood zone map indicates that the proposed substation is located within Flood Zone C. The majority of the 17 no. turbines are located in Flood Zone C which has a low probability of flooding (less than 0.1% annual exceedance probability or 1 in 1000).
- Some of the 17no. turbines are located within Flood Zone A / Flood Zone B, therefore having a high to medium probability of flooding during the 1% and 0.1% AEP events respectively.
- To ensure that there is no unacceptable flood risk, the following mitigation measures are recommended:
    - The design flood level for the proposed substation is the 0.1% AEP MRFS flood level plus 500mm freeboard.
    - The design flood level for the proposed 17 no. turbines is the 1%AEP MRFS flood level plus 300mm freeboard. This freeboard is only required at turbines located within the flood zones A & B.
- It was concluded that, with the implementation of the proposed mitigation measures, the proposed development will not have an adverse impact on flooding elsewhere.
- Residual risks associated with the development were also assessed and are considered to be acceptable.

4.5 Nature Conservation

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (2009/147/EC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). SACs and SPAs are collectively known as Natura 2000 or European sites (referred to hereafter as Natura 2000 site).

National Heritage Areas (NHAs) are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland

overlap with SAC and/or SPA Sites. Although many NHA designations are not yet fully in force under this legislation (referred to as ‘proposed NHAs’ or pNHAs), they are offered protection in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

There are three (3No.) Natura 2000 sites that are identified with a potential hydrological connection to the site and Proposed Development. There are also thirteen (13No.) pNHA identified with a potential hydrological connection to the site and Proposed Development. The Natura 2000 sites and other protected and designated sites or areas with a potential hydrological connection to the site are summarised in Appendix A and presented in Figure 4-5.

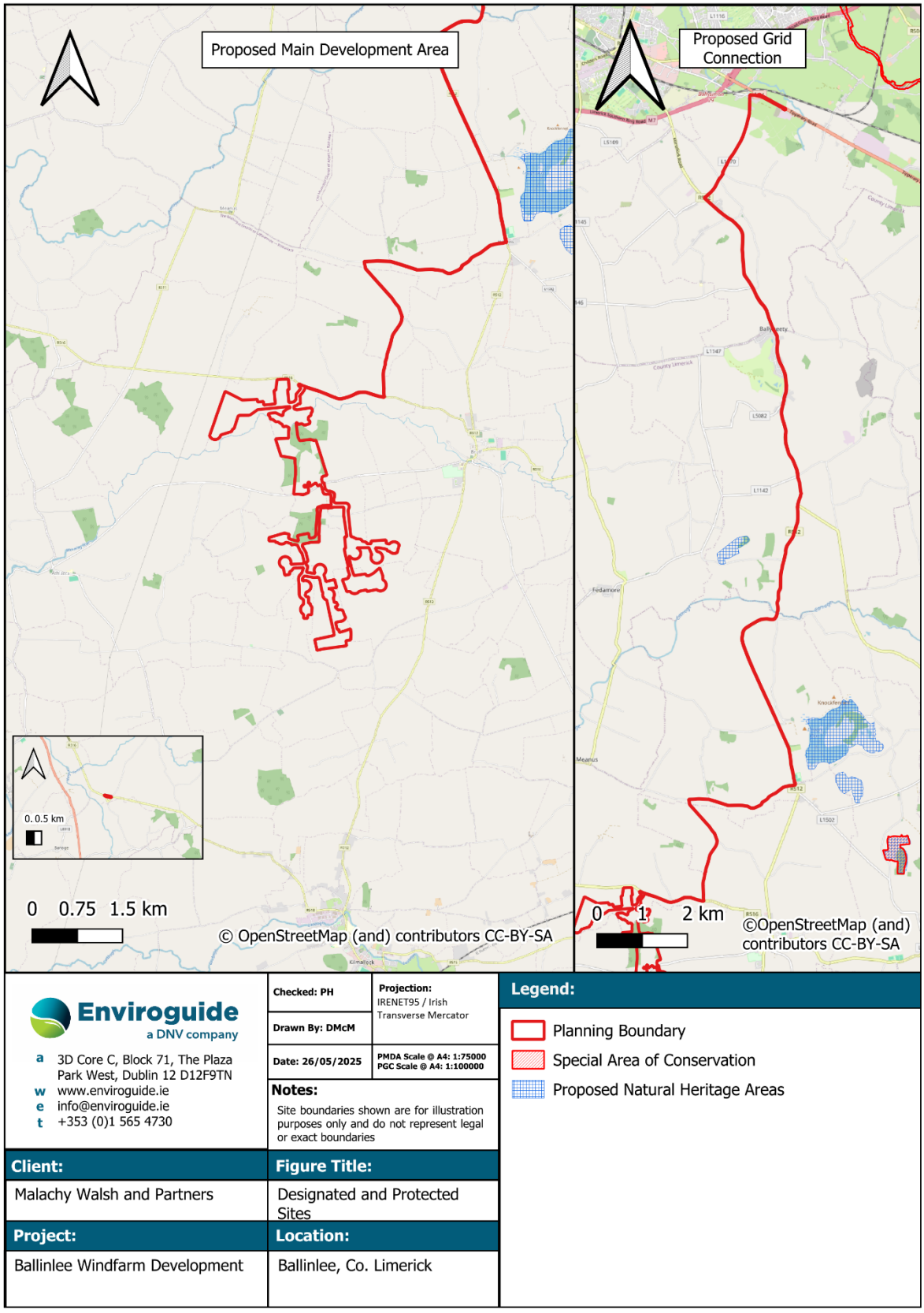

Figure 4-5. Designated and Protected Sites

4.6 Drinking Water

The river drinking water protected areas (DWPA) are represented by the full extent of the WFD river waterbodies from which there is a known qualifying abstraction of water for human consumption as defined under Article 7 of the WFD.

There are no surface water drinking water sources, under Article 7 of the Water Framework Directive, identified by the EPA (EPA, 2025) at the site or within a 2km radius of the main development site and / or route of the proposed grid connection. However, the Maigue_080 waterbody, which is ~10.3km downstream of the Site, is designated as a DWPA.

4.7 Shellfish Areas

Although the Shellfish Waters Directive (SWD) has been repealed, areas used for the production of shellfish that were designated under the SWD, are protected under the WFD as 'areas designated for the protection of economically significant aquatic species'.

The requirement from a WFD perspective is to ensure that water quality does not impact on the quality of shellfish produced for human consumption. In Ireland, 64 areas have been designated as shellfish waters (S.I. No. 268 of 2006, S.I. No. 55 of 2009, S.I. 464 of 2009).

The closest designated Shellfish Area location is the West Shannon Ballylongford approximately 73.0km downstream of the site in the Lower Shannon Estuary.

4.8 Nutrient Sensitive Areas

EU member states are required under the Urban Wastewater Treatment Directive (91/271/EEC) to identify nutrient-sensitive areas. These have been defined as "natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken".

No waterbodies within the Maigue WFD Catchment are designated as nutrient sensitive. The closest downstream designated nutrient sensitive area is the Cashen / Feale Estuary, which is located approximately 100.0km downstream of the site.

4.9 Bathing Waters

Bathing waters are designated under Regulation 5 of Directive 2006/7/EC. Designated Bathing Waters exist under S.I. No. 79/2008 and S.I. No. 351/2011 Bathing Water Quality (Amendment) Regulations 2011. EC Bathing Water Profiles - Best Practice and Guidance 2009.

The closest designated bathing water location is Cappagh Pier, Kilrush located approximately 76km downstream of the site.

5 SCREENING FOR POTENTIAL EFFECTS

This stage aims to determine if the Proposed Development impacts WFD waterbodies. It involves gathering relevant design information of the Proposed Development and the baseline environment of potentially impacted waterbodies. Where no potential impact pathways are identified, Stage 2 and 3 of the assessment are not undertaken.

The screening stage includes the following:

- Initial screening to identify relevant water bodies using criteria such as direct impact, connectivity, and underlying groundwater bodies.
- Reviewing the RBMP to decide which water bodies to include.
- Collecting baseline data and relevant design information of the Proposed Development.

The screening assesses the potential risk to WFD objectives based on design, implementation, and baseline data. Activities associated with the Proposed Development are divided into construction and operational phases, as detailed in Section 3. The assessment uses expert knowledge for a qualitative evaluation of potential risks to WFD objectives.

5.1 Surface Waterbodies

The methodology for screening surface waterbodies is based on proximity to the Proposed Development and scale and nature of the works and activities likely to affect the waterbody in question. The initial study area extends beyond the site boundaries and includes a 2.0km radius of the Proposed Development and potential receptors outside of this radius that are potentially hydrologically connected with the site which is based on the Institute of Geologists of Ireland (IGI) Guidelines (IGI, 2013). This broader study area is necessary to identify and evaluate all potential receptors that could be affected by the Proposed Development, either directly or indirectly. The distinction between the site and the study area is crucial. The site of the Proposed Development is the focal point of the Proposed Development, while the study area includes any potential hydrogeological / hydrological connections to sensitive receptors including habitats that might experience secondary effects.

The WFD status for river, lake, transitional and/or coastal water bodies that have a potential hydrological connection to the site as recorded by the EPA (EPA, 2025) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in Table 5-1 and Figure 5-1. Table 5-1 also presents the screening exercise undertaken for identified surface waterbodies within the study area.

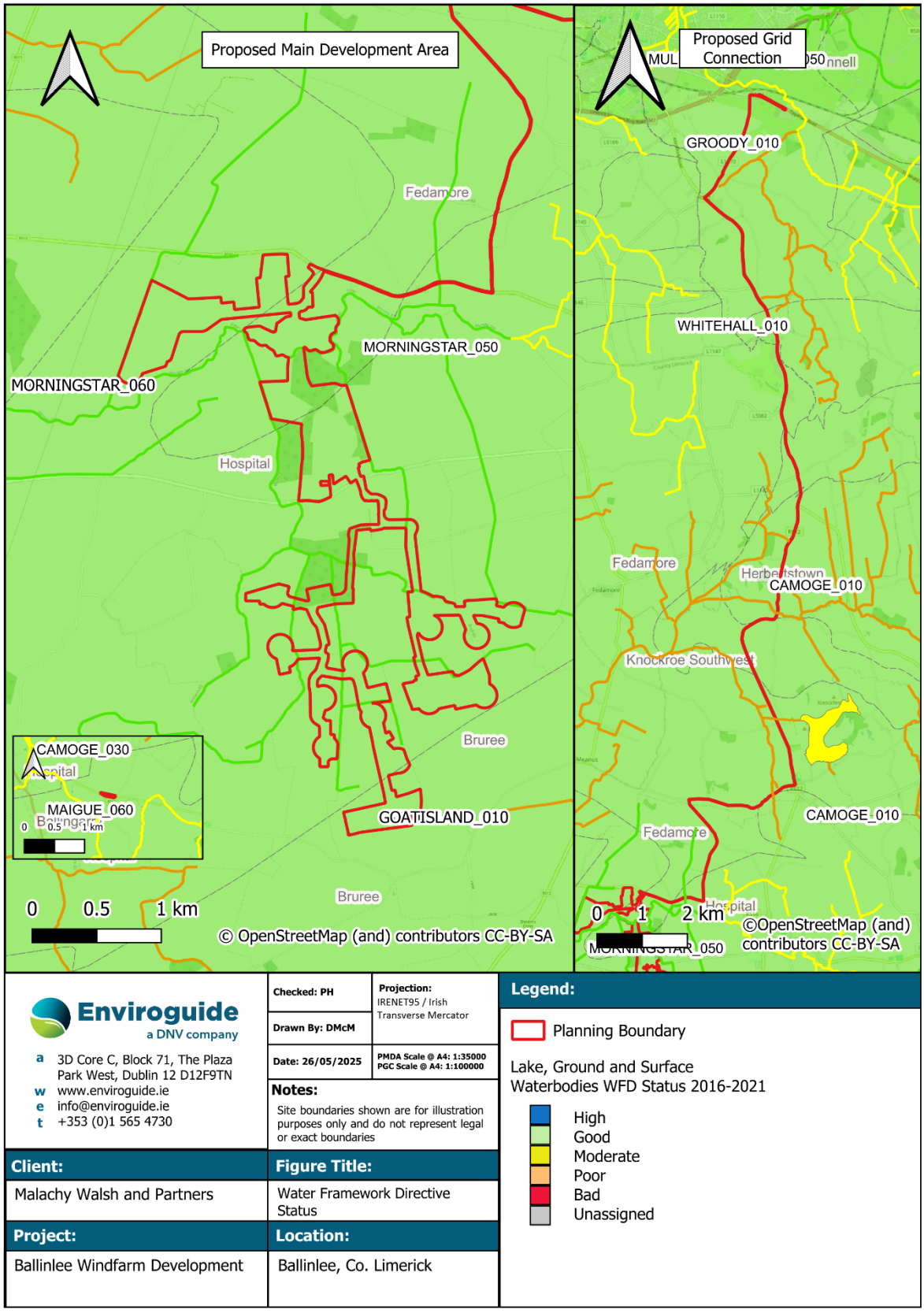

Figure 5-1. Water Framework Directive Status

Table 5-1. Surface Waterbodies Screening Assessment

Waterbody Name	Waterbody EU Code	WFD Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
Goatisland_010	IE_SH_24G200860	Review	Poor	Screened Out	Upstream tributary of the Morningstar River that is spatially near to the southern portion of the proposed development though is in a separate watershed to the proposed works. No works are to be undertaken within catchment of waterbody.
Ballyania Stream_010	IE_SH_24B010890	Review	Poor	Screened Out	Upstream tributary of the Maigue River that is spatially near to the southern portion of the proposed development though is in a separate watershed to the proposed works. No works are to be undertaken within catchment of waterbody.
Morningstar_050	IE_SH_24M020600	At Risk	Moderate	Screened Out	Upstream waterbody on the Morningstar River. No works are to be undertaken within catchment of waterbody. The scale and nature of the works mean that migration of impacts upstream are unlikely.
Morningstar_060	IE_SH_24M020800	Review	Good	Screened In	Waterbody drains the main development area of the site and includes tributary streams of the Morningstar that will be the receiving watercourses for runoff from the site. Several new watercourse crossings are to be constructed over watercourses within this waterbody. Works within the catchment have the potential to adversely affect water quality status.
BALLYCULLANE (Limerick)_010	IE_SH_24B900440	At Risk	Poor	Screened In	Waterbody drains a section of the proposed grid connection route and works to facilitate grid connection have the potential to adversely affect water quality status during construction as a result of contaminated runoff.
CAMOGE_020	IE_SH_24C010400	At Risk	Poor	Screened In	Waterbody drains a section of the proposed grid connection route and works to facilitate grid connection have the potential to adversely affect water quality status during construction as a result of contaminated

Waterbody Name	Waterbody EU Code	WFD Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
					runoff. A new directionally drilled crossing of this waterbody will be required.
CAMOGE_030	IE_SH_24C010600	At Risk	Poor	Screened In	Upstream waterbody drains a section of the proposed grid connection route and works to facilitate grid connection have the potential to adversely affect water quality status during construction as a result of contaminated runoff.
BALLYNACLOGH_010	IE_SH_24B040800	Review	Moderate	Screened Out	Waterbody drains a small section of the proposed grid connection route. However; the open channel network is limited and a direct pathway for potential pollutants to migrate to the surface waterbody could not be identified. Additionally, the nature of the works at this location are unlikely to generate significant volumes of pollutants.
WHITEHALL_010	IE_SH_25W210770	At Risk	Poor	Screened In	Waterbody drains a section of the proposed grid connection route and works to facilitate grid connection have the potential to adversely affect water quality status during construction as a result of contaminated runoff.
GROODY_010	IE_SH_25G050200	At Risk	Moderate	Screened In	Upstream waterbody drains a section of the proposed grid connection route and works to facilitate grid connection have the potential to adversely affect water quality status during construction as a result of contaminated runoff.
Maigue_050	IE_SH_24M010500	Not At Risk	Good	Screened In	Waterbody is located at the confluence of Morningstar and Maigue Rivers. Potential cumulative impacts resulting from coinciding pollution events have been considered, specifically the proposed Garrane windfarm development located on the banks of the Maigue River upstream of the confluence has the potential to contribute to potential adverse cumulative affects.
Maigue_060	IE_SH_24M010600	At Risk	Moderate	Screened In	A temporary access track with the townland of Tullovin is required to facilitate the turbine delivery. This is within the catchment of

Waterbody Name	Waterbody EU Code	WFD Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
					Maigue_060 / Maigue_070 (on the border of both). Works to the access track have the potential to adversely affect water quality status during construction as a result of contaminated runoff. The River Maigue is ~300m southwest of the proposed works within the proposed works within the Ballingarry GWB. The Maigue is considered a gaining watercourse at this location.
Maigue_070	IE_SH_24M010700	At Risk	Moderate	Screened In	A temporary access track within the townland of Tullovin is required to facilitate the turbine delivery. This is within the catchment of Maigue_060 / Maigue_070 (on the border of both). Works to the access track have the potential to adversely affect water quality status during construction as a result of contaminated runoff. The River Maigue is ~300m southwest of the proposed works within the proposed works within the Ballingarry GWB. The Maigue is considered a gaining watercourse at this location.
Mulkear (Limerick)_050	IE_SH_25M040590	Not At Risk	Good	Screened Out	Upstream tributary of the Shannon River that is spatially near to the northern most portion of the proposed grid connection though is in a separate watershed to the proposed works. No works are to be undertaken within catchment of waterbody.
SHANNON (LOWER)_060	IE_SH_25S012600	Review	Moderate	Screened Out	Although upstream waterbody drains a section of the proposed development area, due to the distances involved and dilution within the waterbodies, it is unlikely for potential pollutants to migrate to the surface waterbody in concentrations sufficient to cause adverse effects on status.
Maigue_080	IE_SH_24M010900	At Risk	Poor	Screened Out	
Maigue_090	IE_SH_24M010980	Review	Poor	Screened Out	
Maigue Estuary	IE_SH_060_0700	At Risk	Moderate	Screened Out	
Upper Shannon Estuary	IE_SH_060_0800	At Risk	Poor	Screened Out	

Waterbody Name	Waterbody EU Code	WFD Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
Lower Shannon Estuary	IE_SH_060_0300	Not At Risk	Good	Screened Out	
Fergus Estuary	IE_SH_060_1100	At Risk	Moderate	Screened Out	
Deel Estuary	IE_SH_060_0600	At Risk	Moderate	Screened Out	
Clonderalaw Bay	IE_SH_060_1200	Review	Moderate	Screened Out	
Mouth of the Shannon	IE_SH_060_0000	Not At Risk	Good	Screened Out	
Lough Gur	IE_SH_24_99	At Risk	Moderate	Screened Out	Lough Gur is hydrologically upstream of the proposed grid connection route. No works are to be undertaken within contributing catchment of waterbody.

5.2 Groundwater

Similar to surface waterbodies (refer to Section 5.1), the methodology for screening ground waterbodies is based on proximity to the site of the Proposed Development and the scale and nature of the works likely to effect the waterbody in question.

The WFD status for groundwater bodies that have a potential hydrological connection to the site as recorded by the EPA (EPA, 2025) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in Table 5-2 and Figure 5-2. Table 5-2 also presents the screening exercise undertaken for identified groundwater bodies within the study area.

Table 5-2. Groundwater Bodies Screening Assessment

Waterbody Name	Waterbody EU Code	Aquifer Classification	GWB Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
Hospital GWB	IE_SH_G_107	Locally Important Aquifer (LI)	Not at Risk	Good	Screened In	Works required to facilitate the turbine foundations and borrow pits have the potential to adversely affect the status of the underlying GWB if unmitigated. Construction will temporarily increase groundwater vulnerability. Encountering groundwater during excavations may require dewatering.
Fedamore GWB	IE_SH_G_084	Regionally Important Aquifer (Rkd).	Not at Risk	Good	Screened In	Works required to facilitate the turbine foundations and borrow pits have the potential to adversely affect the status of the underlying GWB if unmitigated. Construction will temporarily increase groundwater vulnerability. Encountering groundwater during excavations may require dewatering.
Bruree GWB	IE_SH_G_046	Regionally Important Aquifer (Rf)	At Risk	Good	Screened In	Works required to facilitate the turbine foundations and borrow pits have the potential to adversely affect the status of the underlying GWB if unmitigated. Construction will temporarily increase groundwater vulnerability. Encountering groundwater during excavations may require dewatering.
Knockroe Northwest GWB	IE_SH_G_130	Locally Important Aquifer (LI)	Not at Risk	Good	Screened Out	Waterbody will only be subject to minor works required to facilitate proposed grid connection. It is unlikely for potential pollutants to migrate to ground in concentrations sufficient to cause adverse effects on status.
Knockroe Southwest GWB	IE_SH_G_131	Locally Important Aquifer (LI)	Not at Risk	Good	Screened Out	
Herbertstown GWB	IE_SH_G_106	Locally Important Aquifer (Lm)	At Risk	Good	Screened In	Works required to facilitate the proposed grid connection crossing of the Camoge River via horizontal directional drilling have the potential to adversely affect

Waterbody Name	Waterbody EU Code	Aquifer Classification	GWB Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
						the status of the underlying GWB if unmitigated. Encountering groundwater during excavations may require dewatering.
Ballingarry	IS_SH_G_022	Regionally Important Aquifer (Rf).	At Risk	Good	Screen In	Works required to facilitate the proposed temporary access track have the potential to adversely affect the status of the underlying GWB if unmitigated. The River Maigue is ~300m southwest of the proposed works within the Ballingarry GWB. The Maigue is considered a gaining watercourse at this location.
Ballyneety GWB	IE_SH_G_036	Regionally Important Aquifer (Rkd).	Not at Risk	Good	Screened Out	Waterbody will only be subject to minor works required to facilitate proposed grid connection. No potential for pollutants to migrate to ground in concentrations sufficient to cause adverse effects on status.
Limerick City East GWB	IE_SH_G_138	Locally Important Aquifer (Lm and Ll)	At Risk	Good	Screened Out	
Patrickswell	IE_SH_G_197	Locally Important Aquifer (Lm and Ll)	Not at Risk	Good	Screened Out	Waterbody is spatially remote from location of works likely to adversely affect the waterbody. No potential for pollutants to migrate to ground in concentrations sufficient to cause adverse effects on status.
Castleconnell	IE_SH_G_052	Locally Important Aquifer (Lm and Ll)	Not at Risk	Good	Screened Out	
Industrial Facility (P0650-02)	IE_SH_G_260	Locally Important Aquifer (Lm)	Not at Risk	Good	Screened Out	
Slieve Phelim	IE_SH_G_213	Locally Important Aquifer (Lm and Ll)	Not at Risk	Good	Screened Out	

Waterbody Name	Waterbody EU Code	Aquifer Classification	GWB Risk Status	WFD Status (2016-2021)	Screening Assessment	Justification
Ballyneety	IE_SH_G_036	Regionally Important Aquifer (Rkd).	Not at Risk	Good	Screened Out	

5.3 Register of Protected Areas

The WFD Register of Protected Areas is a comprehensive list of areas designated under the Water Framework Directive (WFD) that require special protection due to their environmental significance. These areas include:

- Drinking Water Protected Areas: Areas designated for the abstraction of water intended for human consumption.
- Areas for the Protection of Economically Significant Aquatic Species: Such as shellfish waters.
- Recreational Waters: Including bathing waters.
- Nutrient-Sensitive Areas: Such as nitrate vulnerable zones.
- Areas for the Protection of Habitats and Species: Including those designated under the Habitats Directive and Birds Directive.

The register helps ensure that these areas are managed and their integrity protected to meet the Article No.4 objectives set out in the WFD.

The WFD and its associated directives provide a robust framework for the protection of water bodies, including protected areas. Guidance documents, such as the CIS guidance (European Commission, 2021. Common Implementation Strategy) on the delineation of water bodies and groundwater monitoring, clarify the requirements for protected areas and their integration into the overall water management strategy.

Given this integrated approach, a separate screening / risk evaluation for protected areas is not required. The existing assessment process already encompasses the necessary considerations and measures to protect these areas. The assessment ensures compliance with the WFD objectives including protected areas.

Potential impacts of the proposed development on protected areas are discussed further in Chapter 6 Biodiversity and Chapter 9 Hydrology and Hydrogeology of the Environmental Impact Assessment (EIAR) submitted with the planning application for the Proposed Development.

5.4 Water Action Plan (WAP) 2024 Programme of Measures

The Water Action Plan (WAP) provides information on the status and planned actions for surface waterbodies in Ireland. These entries offer insights into the specific measures being considered or implemented to improve the ecological status of the surface waterbodies.

The WAP identifies several key pressures impacting water quality in surface waterbodies across the country:

- Nutrient Pollution: Excessive levels of phosphorus and nitrogen from agricultural runoff are a significant concern. These nutrients can lead to eutrophication, which depletes oxygen in the water and harms aquatic life.
- Urban Pollution: Inadequately treated wastewater and stormwater runoff from urban areas contribute to the degradation of water quality. This includes pollutants such as heavy metals, oils, and other contaminants.
- Physical Modifications: Changes to the river's natural flow and structure, such as barriers and drainage works, disrupt the ecosystem and affect water quality.

- Climate Change: Altered weather patterns and increased frequency of extreme weather events exacerbate existing pressures on water quality.

The WAP identifies several suggested actions to protect and restore water quality in surface waterbodies ensuring a sustainable and healthy aquatic environment. The actions include:

- Nutrient Management: Implementing stricter controls on agricultural practices to reduce nutrient runoff. This includes promoting the use of buffer strips, cover crops, and precision farming techniques.
- Improving Wastewater Treatment: Upgrading wastewater treatment facilities to ensure that effluents meet higher standards before being discharged into waterbodies.
- Restoring Natural Ecosystems: Removing or modifying barriers to restore natural river flow and habitat connectivity. This also involves re-naturalizing riverbanks and floodplains.
- Integrated Catchment Management: Developing and implementing catchment-specific management plans that address local pressures and involve stakeholders in decision-making processes.
- Climate Adaptation Measures: Enhancing resilience to climate change by incorporating adaptive management strategies and investing in green infrastructure.

6 SCOPING OF FURTHER INVESTIGATIONS

The publicly available data reviewed in this assessment has been deemed adequate for appraising the potential risks associated with the proposed development in relation to WFD article 4 objectives. The use of desk-based information is appropriate for this assessment due to the comprehensive nature of existing baseline data recorded as part of the EPA's ongoing WFD monitoring programme with supplemental data provided by organisations such as the GSI, NPWS and OPW. This provides sufficient insight into hydrological and hydrogeological conditions without necessitating further investigations. Nonetheless, publicly available data has been broadly supported in a site specific context by data recorded as part of the Aquatic Ecology and Fish Report (MWP, 2025) and Baseline report on Grid Connection Route (GCR) Aquatic Ecology Surveys (Woodrow, 2025).

7 WFD IMPACT ASSESSMENT

Potential effects of the Proposed Development on the WFD waterbody status (i.e., river waterbodies, ground waterbodies, etc.) during construction, operation and decommissioning phases have been considered. Refer to Sections 7.3 and 7.4 below for further detailed assessment.

7.1 Construction Phase

7.1.1 Hydrological and Hydrogeological Flow Regime

During the construction phase of the proposed development there will be no direct discharges to or abstractions from surface water or groundwater at the proposed development with the exception of rainfall which will infiltrate to ground. Water needs for construction activities will be limited to potable water, concrete truck chute washing, wheel wash, dust suppression and sanitary facilities. This water requirement will be imported to the site in bulk and stored at temporary compounds.

Several minor crossings of the Morningstar Rivers tributaries will be required in addition to a crossing of the Morningstar River itself. No in-stream works will be required in EPA mapped watercourses.

Surface water drains in some instances are required to be removed or infilled due to the location of access tracks, turning heads or wind turbine hardstand areas. Any altered drainage channel will be replaced with an appropriately sized conveyance swale. Additionally based on the findings of the Ground Investigation (Northwest Geotech, 2024), there may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels ranging between 1.40mbgl and 2.20mbgl), where encountered during groundworks. Based on the findings of the Ground Investigation (Northwest Geotech, 2025), groundwater was not encountered at the trial pits at the proposed borrow pit sites. Nonetheless, there remains potential for shallow groundwater to be encountered during groundworks which would require dewatering. Any required groundwater dewatering will be localised and temporary and associated effects will be within the immediate vicinity of the works.

Where dewatering is required, this will be treated as part of the surface water drainage network and allowed to infiltrate to ground ensuring that the existing hydrogeological regime is maintained and groundwater levels remain stable. There will be no unauthorised discharge of water (groundwater or surface water runoff) to ground, drains or water courses during the construction phase.

7.1.2 Water Quality

In-stream/near-stream Works – No in-stream works will be required in EPA mapped watercourses. Minor works will be required to existing land drains as part of the construction phase. Where possible, near-stream works will be undertaken during the summer when the flow within the receiving waterbodies is at its minimum. There is the potential for some disturbance of the stream bed and increased suspended solids content of the water downstream of the works area. Effects on downstream waterbodies such as the Shannon are unlikely due toto the distances involved, dilution and the nature of the proposed works.

Watercourse Crossings - There is the potential for some increased suspended solids content of the water downstream of the works area during the construction of a clear span bridge across the Morningstar River and clear span culvert crossings of minor streams / drainage channels. Effects on downstream waterbodies such the Shannon are unlikely due to the distances involved, dilution and the nature of the proposed works.

Directional Drilling - During the construction phase of the proposed development, activities will include HDD (horizontal directional drilling) at some watercourse crossings along the route of the proposed grid connection. This process will necessitate earthworks involving the removal of vegetation cover and excavation of minor entry and exit pits. All crossings are currently facilitated by existing bridges and culverts along the public road, with no in-stream works required at these locations. However, due to the proximity of construction activities to the streams, there is a potential risk of impacting surface water quality during trench excavation. The primary risk to surface and groundwater quality associated with directional drilling is contamination from fracturing lubricants and oils.

Piling Impacts (if required) - Piling in karstified aquifers presents unique challenges and risks due to the characteristics of karst landscapes. Karst terrain is characterised by soluble bedrock such as limestone, which can form conduits, caves, and sinkholes through dissolution by groundwater over time. During the Construction Phase of the Proposed Development, piling may potentially create pathways for contaminants to enter underlying groundwater systems more rapidly and directly than in non-karst areas. The risk of piling in karstified aquifers lies in the potential for contaminants used during construction, such as grout or other materials, to infiltrate quickly into the groundwater through existing conduits, fractures, or dissolution features created by the piling process. These contaminants can then spread rapidly through the interconnected network of underground pathways characteristic of karst landscapes to receiving watercourses including the Morningstar River. Appropriate controls will be in place to prevent this unlikely scenario, refer to section 8 below.

Discharge of Entrained Sediment or Other Contaminants in Surface Runoff (Overland Flow) - There is a risk of runoff with entrained sediment or other contaminants (agricultural derived nutrients, organic matter, heavy metals from machine wear) from internal access tracks within the site or other contaminants from groundworks areas and stockpiled soils entering the receiving Morningstar River, its tributaries and Maigue River via overland flow. The appointed contractor will ensure that any run-off from the site will be managed for the duration of the construction phase to ensure that surface water runoff is contained, attenuated and treated onsite prior to outflow. Effects on downstream waterbodies such the Shannon are unlikely due to the distances involved, dilution and the nature of the proposed works.

Discharge of Entrained Sediment or Other Contaminants in Surface Runoff (Existing Drainage) - During the construction works along the route of the proposed grid connection, there is a potential risk of runoff with contaminants migrating offsite via existing surface water drainage along public roads. Appropriate controls will be in place to prevent this unlikely scenario, refer to Section 8 below.

Handling of Deleterious Materials - During excavation, the groundwater vulnerability will temporarily be increased and there will be an increased risk to the underlying bedrock aquifer due to any accidental release of deleterious materials (e.g., fuels or other hazardous materials being used onsite), through the failure of secondary containment or a materials handling

accident at the Site, to exposed granular subsoils or bedrock creating a direct pathway to the underlying bedrock aquifer. Furthermore, in karstified limestone areas like the Fedamore and Bruree GWB's, there is a high degree of interconnection between groundwater and surface water. Furthermore, groundwater storage in karstified bedrock is low, limiting the potential for contaminant attenuation in such aquifers. In a worst-case scenario, and in the absence of mitigation, the release of contaminants used onsite could enter the underlying aquifer and migrate towards receiving watercourses including the Morningstar River, the Maigue River and the Shannon Estuary.

Use of Cementitious Materials - There is a potential risk associated with the cementitious materials used during construction works including construction of foundations and other structures impacting on the underlying groundwater at the site.

Flood Risk - During a flood event there is the potential for pollutants derived from construction materials to be mobilised by flood waters.

Wastewater - Foul water discharge from the temporary welfare units at the site during the construction phase will be tankered offsite in accordance with CEMP.

7.2 Operational Phase

7.2.1.1 Hydrogeological Flow Regime

During the operational phase there will be no discharges to groundwater at the proposed development.

There will be a minor increase in hardstanding in the immediate vicinity of the proposed wind turbines. This will result in a highly localised reduction of groundwater infiltration and recharge. Therefore, it is considered that there will be little to no change to the overall recharge potential to the aquifer at the main development site. Taking account of the baseline hydrogeological setting and nature of the Proposed Development there will be an 'imperceptible' effect on the hydrogeological flow regime within a very localised zone of the aquifer.

The proposed grid connection route is located in existing areas of hardstanding or in the verge of the existing road network, the shallow depths required will likely have a negligible effect on the groundwater flow regime. Certain watercourse crossings (e.g., River Camogue) will require (HDD) horizontal directional drilling under the riverbed. The directionally drilled conduit will have a negligible displacement of groundwater, will be deep enough as to not effect flow in the hyporheic zone and will not limit groundwater flows in general.

7.2.1.2 Hydrological Flow Regime

Surface water runoff from the Proposed Development, which will be managed in accordance with the principles and objectives of SuDS, will be treated and attenuated prior to outflow either overland (and allowed to infiltrate to ground) or to an existing drainage ditch in the case of the IPP & SS compounds. Impacts to the hydrological flow regime will likely be imperceptible.

Any existing drainage channel that is modified or removed will be replaced with an appropriately located and sized conveyance swale that ensure flow paths and rates are preserved.

As stated above, the proposed grid connection is to be located in existing areas of hardstanding or in the verge of the existing road network. Watercourse crossings will be within bridge decks or directionally drilled under the riverbed.

7.2.1.3 Water Quality

During the operational phase of the proposed development there will be no direct discharges to groundwater.

Surface Water Runoff - During the operational phase of the proposed development, there is limited potential for discharge of any contaminated runoff to the receiving water courses associated with surface water runoff from the site. Surface water runoff from the Proposed Development, will be managed in accordance with the principles and objectives of SuDS, will be treated and attenuated prior to outflow either overland (and allowed to infiltrate to ground) or to an existing drainage ditch in the case of the IPP & SS compounds. Based on the design of the proposed development there is limited potential sources of contamination during the operational phase and there will be limited potential for discharge of contaminants associated with surface water runoff.

Handling of Deleterious Materials - Lubricating oils and cooling oils required for the operation and maintenance of the wind turbines and substation will be managed in accordance with the developments operating plan. It is unlikely that the underground cables will require maintenance during its operation. In the event of an unlikely scenario, if the accidental release of hazardous material (i.e., oils being used onsite), through the failure of secondary containment or a materials handling accident, were to occur over open ground then these materials could infiltrate to the underlying groundwater or migrate offsite via surface water drainage.

Wastewater - The wastewater generated during the operational phase will be managed by a holding tank which is of twin-hull design and fitted with an alarm to indicate levels and when it is due for empty. The holding tank will be emptied by a permitted contractor and treated at a licenced facility.

Flood Risk – Portions of the site are located within Flood Zone A where the probability of flooding is high. As documented in the SSFRA (MWP, 2025) when in operation in a future climate scenario, all proposed structures will be defended from flooding to an appropriate standard. As such, the risk of contamination of surface waters exacerbated during a future climate scenario flood event is considered low.

7.2.1.4 SuDS and Flood Risk

The SSFRA (MWP, 2025) demonstrates that the flood risks to the proposed development can be adequately managed through the implementation of appropriate mitigation measures and adherence to the guidelines set out in the Limerick Development Plan and ‘The Planning System and Flood Risk Management. Guidelines for Planning Authorities’ (Department of Environment, Heritage and Local Government, 2009). The proposed development will have a negligible impact flood risk in the surrounding areas, and the inclusion of flood risk management measures and sustainable drainage systems will ensure that the flood risk to the proposed development and adjacent properties is minimised.

7.3 Decommissioning Phase

At the end of the estimated 35-year lifespan of the wind farm element of the Proposed Development, it will be decommissioned and reinstated with all wind turbines and towers removed. Hardstand and turbine foundation areas will be left in situ and covered with soil to match the existing landscape. Access tracks will be left for use by the landowners. At present it is anticipated that underground cables connecting the turbines to the substation will be cut back and left underground. The cables will not be removed if an environmental assessment of the decommissioning operation demonstrates that this would do more harm than leaving them in situ. The substation and Proposed Grid Connection will remain a permanent part of the national grid and therefore decommissioning is not foreseen. In the event of decommissioning, it will involve removing above ground structures and equipment while leaving underground infrastructure in place.

Proposed Development will be decommissioned with all wind turbines and towers removed. Removal of infrastructure will be undertaken in line with landowner and regulatory requirements and best practice applicable at the time. The information below outlines the likely decommissioning tasks based on current requirements and best practice.

Prior to wind turbine removal, due consideration would be given to any potential impacts arising from these operations. Some of the aspects to be considered and agreed with the Local Authority prior to decommissioning may include:

- Potential disturbance by the presence of cranes, heavy goods vehicles and personnel onsite.
- Onsite temporary compound would need to be located appropriately.
- Time of year and timescale (to be outside sensitive periods).
- Prior to the decommissioning work, a comprehensive plan will be drawn up to ensure the safety of the public and workforce and the use of best available techniques at the time.
- Prior to the decommissioning work, a comprehensive reinstatement proposal, including the implementation of a programme that details the removal of structures and landscaping, will be submitted to the Planning Authority.

Any disturbance associated with the removal and disposal of the material may likely be more deleterious than leaving them in place. In the event of decommissioning being progressed, full engagement with the Local Authority and relevant departments including planning, environment and roads would take place to agree and ensure that any potential effects are minimised and controlled. A decommissioning plan will be agreed, and this would guide the process and control any potential effects.

During the decommissioning phase, temporary works such as the removal of turbine foundations, access tracks, and associated infrastructure may result in short-term alterations to local surface water flow paths. These activities could include minor excavation, backfilling, and regrading of land, which may temporarily disrupt existing drainage patterns. Decommissioning phase effects are likely to be very similar to construction phase impacts but the overall likelihood for adverse effects will be much lower due to reduced groundworks and excavations taking place.

7.4 Surface Waterbodies

7.4.1 Biological Quality

Table 7-1. Surface Waterbodies Biological Quality

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required?
Morningstar_060	Yes	Yes	Excavations required for turbine foundations and minor works/removal of existing land drains have potential to mobilise sediment and adversely affect biological quality of receiving waterbody. Several new crossings of the Morningstar_60 are required for internal site access including a crossing of the main channel of the Morningstar itself. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
BALLYCULLANE (Limerick)_010	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect biological quality of receiving waterbodies. Proposed grid connection route will cross Ballycullane (Limerick)_010 in existing bridge deck. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
CAMOGE_020	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect biological quality of receiving waterbodies. Proposed grid connection route will cross Camoge_020 via new directionally drilled crossing. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
CAMOGE_030	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect biological quality of receiving waterbodies. Camoge_030 downstream of works location though risk remains due to proximity and limited dilution potential upstream. The use of deleterious materials such as	Yes

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required?
			fuels, oils and cementitious materials will be required to be used on site through the construction phase.	
WHITEHALL_010	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect biological quality of receiving waterbodies. Proposed grid connection route will cross Whitehall_010 in existing bridge deck. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
GROODY_010	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect biological quality of receiving waterbodies. Proposed grid connection route will cross Groody_010 in existing bridge deck. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
Maigue_060	Yes	No	Works required for temporary access track have potential to mobilise sediment and adversely affect biological quality of receiving waterbody. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
Maigue_050	Yes	No	There is potential for coinciding pollution events during the construction phase to have an adverse cumulative effect on biological quality of the Maigue_50. This primarily derives use of deleterious materials such as fuels, oils and cementitious materials.	Yes

7.4.2 Hydromorphology Quality

Table 7-2. Surface Waterbodies Hydromorphological Quality

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required ?
Morningstar_060	Yes	Yes	Excavations required for turbine foundations and minor works/removal of existing land drains have potential to mobilise sediment and adversely affect biological quality of receiving waterbodies. Several new crossings of the Morningstar_60 are required for internal site access including a crossing of the main channel of the Morningstar itself. Construction within the floodplain may adversely affect the existing flood regime.	Yes
BALLYCULLANE (Limerick)_010	No	No	Excavations required as part of proposed grid connection have potential to mobilise sediment. However, depths and volumes of excavations required for the grid connection are limited and unlikely to adversely affect hydromorphological status of receiving watercourses. Proposed grid connection route will cross Ballycullane (Limerick)_010 in existing bridge deck.	No
CAMOGE_020	No	No	Excavations required as part of proposed grid connection have potential to mobilise sediment. However, depths and volumes of excavations required for the grid connection are limited and unlikely to adversely affect hydromorphological status of receiving watercourses. Proposed grid connection route will cross Camoge_020 via new directionally drilled crossing. The directionally drilled crossing will be sufficiently below the Camoge river bed as to not perceptibly effect flow in the hyporheic zone.	No
CAMOGE_030	No	No	Excavations required as part of proposed grid connection have potential to mobilise sediment. However, depths and volumes of excavations required for the grid connection are limited and unlikely to adversely affect hydromorphological status of the Camoge_030.	No
WHITEHALL_010	No	No	Excavations required as part of proposed grid connection have potential to mobilise sediment. However, depths and volumes of excavations required for the grid connection are limited and	No

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required ?
			unlikely to adversely affect hydromorphological status of receiving watercourses. Proposed grid connection route will cross Whitehall_010 in existing bridge deck.	
GROODY_010	No	No	Excavations required as part of proposed grid connection have potential to mobilise sediment. However, depths and volumes of excavations required for the grid connection are limited and unlikely to adversely affect hydromorphological status of receiving watercourses. Proposed grid connection route will cross Groody_010 in existing bridge deck.	No
Maigue_060	No	No	Works required for temporary access track have potential to mobilise sediment. However, volumes of mobilise sediment are limited and unlikely to adversely affect hydromorphological status of receiving watercourses.	
Maigue_050	No	No	Earth works required as part of the proposed development in combination with coinciding developments have the potential to mobilise sediments. However, potential volumes of sediments mobilised are seen as limited and unlikely to adversely affect hydromorphological status of receiving watercourses separately or cumulatively.	Yes

7.4.3 Chemical Quality

Table 7-3. Surface Waterbodies Chemical Quality

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required?
Morningstar_060	Yes	Yes	Excavations required for turbine foundations and minor works/removal of existing land drains have potential to mobilise sediment and adversely affect chemical quality of receiving waterbodies. Several new crossings of the Morningstar_60 are required for internal site access including a crossing of the main channel of the Morningstar itself. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction and operational phase.	Yes
BALLYCULLANE (Limerick)_010	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect chemical quality of receiving waterbodies. Proposed grid connection route will cross Ballycullane (Limerick)_010 in existing bridge deck. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
CAMOGE_020	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect chemical quality of receiving waterbodies. Proposed grid connection route will cross Camoge_020 via new directionally drilled crossing. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
CAMOGE_030	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect chemical quality of receiving waterbodies. Camoge_030 downstream of works location though risk remains due to proximity and limited dilution potential upstream. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required?
WHITEHALL_010	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect chemical quality of receiving waterbodies. Proposed grid connection route will cross Whitehall_010 in existing bridge deck. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
GROODY_010	Yes	No	Excavations required as part of proposed grid connection have potential to mobilise sediment and adversely affect chemical quality of receiving waterbodies. Proposed grid connection route will cross Groody_010 in existing bridge deck. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
Maigue_060	Yes	No	Works required for temporary access track have potential to mobilise sediment and adversely affect chemical quality of receiving waterbody. The use of deleterious materials such as fuels, oils and cementitious materials will be required to be used on site through the construction phase.	Yes
Maigue_050	Yes	No	There is potential for coinciding pollution events during the construction phase to have an adverse cumulative effect on chemical quality of the Maigue_50. This primarily derives use of deleterious materials such as fuels, oils and cementitious materials.	Yes

7.5 Groundwater Bodies

7.5.1 Chemical Quality

Table7-4. Groundwater Bodies Chemical Quality

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required?
Hospital GWB	Yes	No	During excavation, the groundwater vulnerability will temporarily be increased and there will be an increased risk to the underlying bedrock aquifer due to any accidental release of deleterious materials (e.g., fuels or other hazardous materials being used onsite), through the failure of secondary containment or a materials handling accident at the Site, to exposed granular subsoils or bedrock creating a direct pathway to the underlying bedrock aquifer. Furthermore, in karstified limestone areas like the Fedamore and Bruree GWB's, there may be high degree of interconnection between groundwater and surface water. Also, groundwater storage in karstified bedrock is low, limiting the potential for contaminant attenuation in such aquifers. Nonetheless, connectivity is likely low as no karstic features (springs or swallow holes) were identified within 2km of the main windfarm area. The closest karstic features are approximately 50m west of the grid connection route in Grange (2km north of the Holycross crossroads). Use of Cementitious Materials - There is a potential risk associated with the cementitious materials used during construction works including construction of foundations and other structures impacting on the underlying groundwater at the site.	Yes
Fedamore GWB	Yes	No		Yes
Bruree GWB	Yes	No		Yes
Herbertstown GWB	Yes	No		Yes
Ballingarry GWB	Yes	No		Yes

7.5.2 Quantitative Quality

Table 7-5. Groundwater Bodies Quantitative Quality

Receptor	Potential Impact (Construction / Decommissioning)	Potential Impact (Operation)	Potential Impact of Proposed Development	Mitigation Required?
Hospital GWB	Yes	No	Based on the findings of the Ground Investigation (Northwest Geotech, 2024), there may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels ranging between 1.40mbgl and 2.20mbgl), where encountered during groundworks. Where dewatering is required, this will be treated as part of the surface water drainage network and allowed to infiltrate to ground ensuring that the existing hydrogeological regime is maintained and groundwater levels remain stable. There will be no unauthorised discharge of water (groundwater or surface water runoff) to ground, drains or water courses during the construction phase. During the operational phase there will be no discharges to groundwater at the proposed development. There will be a minor increase in hardstanding in the immediate vicinity of the proposed wind turbines. This will result in a highly localised reduction of groundwater infiltration and recharge. Therefore, it is considered that there will be little to no change to the overall recharge potential to the aquifer at the main development site. The proposed grid connection route is located in existing areas of hardstanding or in the verge of the existing road network. Certain watercourse crossings (e.g., River Camogue) will require (HDD) horizontal directional drilling under the riverbed. The directionally drilled conduit will have a negligible displacement of groundwater, will be deep enough as to not effect flow in the hyporheic zone and will not limit groundwater flows in general.	Yes
Fedamore GWB	Yes	No		Yes
Bruree GWB	Yes	No		Yes
Herbertstown GWB	Yes	No		Yes
Ballingarry GWB	Yes	No		Yes

7.6 Potential Cumulative Impacts

Cumulative Impacts can be defined as “impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project”. Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor. Such effects are not caused or controlled by the project developer.

As part of this assessment, other offsite developments and proposed offsite developments as detailed in Chapter 1 of this EIAR were reviewed and considered for possible cumulative effects with the Proposed Development.

Three proposed or permitted wind farm developments are located within the same hydrological catchment as the proposed development. However, only one involves the construction of a new Wind Farm at Garrane. A “temporary transition compound” for turbine components is also required at Kildimo, County Limerick, to facilitate the Knockshanvo (Co. Clare) wind farm development. These projects are hydrologically connected to the Morningstar, Maigue, and Shannon river/estuary catchments. If construction coincides with that of the Ballinlee Wind Farm Development and standard practice control and mitigation measures are not applied, these projects have the potential for cumulative effects on water quality within the estuary.

Several other development projects along the River Maigue network and within 30 km of the Lower River Shannon SAC boundary have been evaluated for potential cumulative effects with a proposed Wind Farm. These projects, which include housing, a solar farm, and farm structures, are at least 3.3 km from the Wind Farm site. Cumulative effects from the Ballysimon Bridge construction over the River Groody are considered imperceptible to slight, as most work will be within existing infrastructure.

7.6.1 Water Resources

Water supply requirements to the proposed development will be minimal. Where required, water supply during the construction or operational phase will be provided via bulk water tanks in accordance with all necessary statutory consents. There will be no potable water connection made to either a group water scheme or public supply. During operation, surface water runoff from footpaths and roof areas will be collected in a rainwater harvesting tank and used as a greywater system. Therefore, the potential cumulative effects associated with the delivery of water to the site will have been adequately assessed as part of the statutory consent process which would have required the necessary environmental and human health impacts to be assessed and mitigated as appropriate at the source site.

7.6.2 Water Quality

Foul water from the Proposed Development will be collected and tankered offsite as and when required to a licenced facility for disposal. Volumes are likely negligible as there are no permanent staff onsite. The capacity of the waste water holding tank will be monitored regularly. Therefore, as the receiving facilities will be operated in accordance with relevant statutory approvals issued by the relevant statutory authority, the potential cumulative effects associated with the removal of wastewater offsite will have been adequately assessed at the destination facility ensuring there is no impact on the receiving water quality at the destination facility.

Developments described above have been identified as a potential source of cumulative impacts with regard to water quality during the construction phase of the proposed development. If coinciding pollution events were to occur during the construction phase there is potential for adverse effect on the WFD status of the receiving waterbodies. Cumulative affects during the operational phase are seen as unlikely considering the inherent surface water management elements in the design.

8 DESIGN AVOIDANCE AND MITIGATION

The measures outlined in this section of the report will ensure that there will be no significant impact on the receiving waterbodies. The effective implementation of these measures will ensure that the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations (S.I. 272 of 2009 and as amended) and the European Communities Environmental Objectives (Groundwater) Regulations (S.I. No. 9 of 2010 and as amended) individually or in combination.

8.1 Construction Phase

During the Construction Phase, all works will be undertaken in accordance with the Outline Construction Environmental Management Plan (CEMP) (MWP, 2025) and the Outline Resource and Waste Management Plan (RWMP) (MWP, 2025) and the Surface Water Management Plan (SWMP) (MWP, 2025). Following appointment, the contractor will be required to further develop the CEMP and RWMP to provide detailed construction phasing and methods to manage and prevent any potential emissions to ground and surface water with regard to the relevant industry standards (e.g., Guidance for Consultants and Contractors, CIRIA-C532', CIRIA, 2001). The CEMP and RWMP will be implemented for the duration of the Construction Phase, covering construction and waste management activities that will take place during the Construction Phase of the Proposed Development. These measures will address the main activities of potential impact which include:

- Control and Management of surface water runoff.
- Control and management of shallow groundwater during excavation and dewatering.
- Management and control of soil and materials.
- Appropriate fuel and chemical handling, transport and storage.
- Management of accidental release of contaminants at the site.
- Control and handling of cementitious materials.

The appointed contractor will produce a Pollution Prevention Plan (or similar document). This will include procedures and diagrams for:

- Dewatering of excavations (flow management etc.).
- Temporary soil storage (locations and general best practice).
- Fuel storage/refuelling.
- Concrete wash-out area (designated area at construction compound).
- Controlling surface water entering Site.
- Preventing existing drainage features becoming pathways for construction run-off.
- Reducing soil exposure and reinstating as rapidly as possible.
- Contingency measures.

Surface water runoff management will be required to prevent runoff entering excavations during construction. Surface water will require diversion around the open excavations using standard temporary drainage methods to ensure that surface water is effectively conveyed around works areas.

All open water bodies adjacent to areas of proposed works, including settlement ponds, will be protected by fencing. A 10m buffer will be retained for construction works excluding works

required to construct watercourse crossings (including utilities) and drainage infrastructure. Site traffic will only be permitted within this buffer to facilitate near-stream works.

Minor works to existing land drains or works carried out adjacent to watercourses will adhere to the Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (IFI, 2016), the Transport Infrastructure Ireland (TII) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2008) and CIRIA C648 Control of Water Pollution from Linear Construction Projects (CIRIA, 2006).

Entry to the Morningstar River and its tributaries by vehicles will be avoided, while vehicle usage along the banks will be restricted as much as practicable. Any machines working in close proximity of the watercourse must be protected against leakage or spillage of fuels, oils, greases. No in-stream works will be required in EPA mapped watercourses. Minor works will be required to existing land drains and will take account of Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.

To prevent elevated levels of erosion and sedimentation at the site during the construction phase, surface water at the site will be managed and controlled via the newly constructed site surface water management system to attenuate run-off, guard against soil erosion and safeguard downstream water quality. Silt traps, silt fences and settlement ponds will need to be provided by the contractor where necessary to prevent silts and soils being washed away by heavy rains during the course of the construction phase. As a minimum, silt fencing will be provided at all water crossings, and the settlement ponds will be designed to ensure they are not overwhelmed by one-off adverse precipitation events. The silt fencing and settlement ponds will be monitored daily by the appointed contractor and silt will be removed as required.

Where practical, cut-off V drains will be utilised to divert water entering Site and reduce the amount of water to be managed on-Site. Attention will be given to the maintenance and protection of all drains and temporary channels to minimise scour and the mobilisation of suspended solids (e.g. lining with hessian or clean stone, check dams, silt fencing etc.).

A suitably qualified Environmental Clerk of Works (ECoW) will be appointed for the duration of the works.

Surface water monitoring to include Turbidity, pH/EC and colour will be undertaken daily upstream and downstream of the works areas and where required, at the outlets from settlement ponds. Where water from the settlement ponds fails to meet the required standards, the water will be recirculated to the inlet of the sediment pond as required to provide further time for settlement. A penstock or similar valve will be provided on the outlet from the sediment pond to control the outflow. Works will be ceased until the cause of the difference is identified and (if it is associated with the works) rectified.

Works during the construction of closed conduit culverts and permanent surface water drainage features will include the following measures:

- An ECoW will be present onsite to oversee the near-stream works to ensure there is no potential for surface water run-off to the receiving waterbodies. The ECoW will undertake regular monitoring of water quality upstream and downstream of the works area to detect any changes and take corrective actions if necessary.

- Prior to the commencement of the construction works, small defined works areas will be fenced off at the location of the culverts / surface water drainage system outfalls (between the main construction site and the water courses). Silt fences will be attached to these fences. The silt fence will provide a solid barrier between the proposed works and the existing surface water drains and tributaries of the Morningstar River. The necessary works (culvert/pipe/headwall) will be undertaken within this defined area.
- Heras fencing will be installed in front of the silt fencing at the Site to prevent "Site creep", the progressive movement of site activities towards this silt fence.
- Precast headwalls and precast concrete culverts/HDPE pipes are proposed through-out the development.
- Existing vegetation will be preserved where possible and replant disturbed areas promptly to stabilize soil and reduce erosion.
- Once excavations for the culvert/pipe/headwall are complete, the base and sides of the excavations will be seeded with a native wetland wild flora seed mix which will be allowed to establish for a 6-8 week period prior to the culvert/pipe/headwall becoming operational and receiving surface waters from the site. This is a grass mix with some wildflower elements which will aid the overall biodiversity approach/green infrastructure and provide "green" erosion prevention of the outfall channel and prevent siltation of the receiving waterbodies.
- Following the installation of the pipework and reinstatement of the ground, the small section of the silt fence that protects the existing surface water drains and tributaries of the Morningstar River will be removed to facilitate the construction of the outfalls.

It will be ensured that all river protection measures will be maintained in good and effective condition for the duration of the proposed works and checked regularly to ensure that the silt fencing and other standard mitigation measures are operating effectively.

The silt fences and settlement ponds will be monitored to ensure that they remain functional throughout construction of the Proposed Development. Where necessary, maintenance will be carried out on the fences and settlement ponds to ensure that they continue to be effective. This will be particularly important after heavy rainfall events. The checks will be undertaken by the appointed contractor or ECoW. The frequency of monitoring will depend on the stage of works, and local environmental conditions. Daily checks may be appropriate during the initial site clearance, during works in the vicinity of watercourses and during and after storm events. It is noted that the frequency of monitoring will depend on the stage of works, and local environmental conditions. The frequency of checks will be increased during critical works including the initial decommissioning works, during concrete pours and after storm events.

Where required, stockpiles will be kept to a minimum and will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing waterbodies. To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff. Where required, silt fences will be erected at the toe of stockpiles to prevent run-off. The silt fences will be monitored daily by the appointed contractor/ECOW and silt will be removed as required.

Where dewatering of shallow groundwater is required or where surface water runoff must be pumped from the excavations, water will be managed in accordance with best practice standards (i.e., CIRIA C750). The dewatering methodology to be implemented by the appointed contractor will ensure that any dewatering is confined to the localised zone and

does not extend towards the site boundaries. Where dewatering is required, this will be treated as part of the surface water drainage network and allowed to infiltrate to ground ensuring that the existing hydrogeological regime is maintained and groundwater levels remain stable

There will be no unauthorised discharge of water to ground during the Construction Phase. Where water must be pumped from the excavations, water will outflow, following appropriate treatment (e.g., settlement or hydrocarbon interceptor). In the unlikely event that contaminated water needs to be removed from site for disposal, this will be carried out in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from LCC under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water. Under no circumstances will any untreated wastewater generated onsite (from equipment washing, access track sweeping etc.) be released offsite. No untreated wastewater generated onsite will enter the public sewers. It will be removed from site by a licensed contractor for appropriate treatment. Where required, public sewers (if present, along the grid connection), will be protected during construction to ensure they are not damaged by construction activity. Drainage channels will be clearly identified on site and shown on method statements and site plans.

Where required, standard design and construction measures (i.e., groundwater drainage around impermeable subsurface structures) will ensure that groundwater flow across the site is maintained and that there will be no impact on groundwater levels.

The horizontal directional drilling method will include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff or other drilling fluids from entering the entry and exit pits and surrounding formation. For directional drilling, the area around the bentonite batching, pumping, and recycling plant will be bunded using terram to accumulate sediment against its surface, along with sandbags to contain any spillages. Drilling fluid returns will be contained within a sealed tank or sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized skip before being taken off-site. The drilling fluid/bentonite will be non-toxic and naturally biodegradable, such as Clear Bore Drilling Fluid or a similar product. The drilling process and pressure will be constantly monitored to avoid leaks or breakouts into the surrounding geology or local watercourse. This will be gauged by observation and monitoring of pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped. Any fluids, lubricants and waste materials that result from the drilling will be contained and removed off-site.

The proposed piling methodology (if piling is required), will give cognisance to the Environment Agency's (EA) guidance on 'Piling into Contaminated Sites' (EA, 2002) and 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention' (EA, 2001), (or similar best practice) in order to minimise the potential for the introduction of any temporary conduit between any potential sources of contamination at the ground surface and underlying groundwater. The piling method will also include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff or other piling/drilling fluids from entering the pile bores and surrounding formation. Where there is a requirement to use lubricants, drilling fluids or additives the contractor will use water-based, biodegradable, and non-hazardous compounds under controlled conditions.

During the construction phase, fuelling and lubrication of equipment will be carried out in accordance with the procedures outlined in the CEMP in a designated area of the site away from any watercourses and drains (where not possible to carry out such activities offsite). Any diesel, fuel or hydrologic oils stored onsite will be stored in designated areas. These areas will be bunded and located away from surface water drainage and features. Bunds will have regard to Environmental Protection Agency guidelines 'Amendment to IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities' (EPA, 2013).

During the construction phase, cementitious grout will be used to prevent contamination of the hydrogeological environment. All grouting work will be carried out in the dry and effectively isolated from onsite drainage channels and waterbodies and will be monitored to prevent accidental discharge. The appointed contractor will follow appropriate design and methods, adhering to the CEMP and industry standards to protect groundwater and surface water quality. Ready-mixed concrete will be delivered by truck, with batching done offsite. Concrete truck wash down and wash out will occur at source, only chute wash will occur onsite in a controlled bunded area, with waste removed offsite in compliance with waste management legislation. The containers will be checked and emptied at a frequency equivalent to the volume of concrete being used to prevent runoff leaving the washout location. A risk assessment for wet concreting will be completed before works begin, and monitoring will ensure no accidental discharge.

The main contractor will maintain an emergency response action plan and emergency procedures will be developed by the main contractor in advance of any works commencing.

The main contractor will ensure that strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Proposed Development site. Only emergency breakdown maintenance will be carried out on-site. Drip trays and spill kits will be available on-site to ensure that any spills from vehicles are contained and removed off-site.

There may also be the requirement for use of portable generators or similar fuel containing equipment during the Construction Phase of the Proposed Development, which will be placed on suitable drip trays. Regular monitoring of drip tray content will be undertaken to ensure sufficient capacity is maintained at all times.

Emergency procedures will be developed by the main contractor in advance of works commencing and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures in the event of accidental fuel spillages. Remedial action will be immediately implemented to address any potential impacts in accordance with best practice standards and legislative requirements including but not limited to the Environmental Protection Agency Act, 1992 (as amended), Waste Management Act, 1996 (as amended) and the Safety, Health and Welfare at Work Act, 2005 (as amended).

- Any required emergency vehicle or equipment maintenance work will take place in a designated impermeable area within the site.
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants.
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydrologic oils will be immediately contained.

- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Proposed Development site and compliantly disposed of off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and standards.
- All construction works staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- All construction works staff on-site will be fully trained on the use of equipment.

All below ground drainage infrastructure will be constructed in accordance with current UÉ requirements to ensure that there are no potential impacts to groundwater quality.

The main contractor will prepare method statements for weather and flood forecasting and continuous monitoring of water levels in the Morningstar River and its Tributaries. These will be made available to the local authority where requested. The main contractor will also provide method statements for the removal of site materials, fuels, tools, vehicles, and persons from flood zones in order to minimise the risk to persons working on the site as well as potential input of sediment or construction materials into the waterbodies during flood events.

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. Foul drainage from temporary welfare facilities during the Construction Phase of the Proposed Development will be discharged to temporary holding tank(s), the contents of which will periodically be tankered off site to a licensed facility. Therefore, there will be no potential impact on water quality and the WFD status of receiving waterbodies and any Natura 2000 sites associated with discharges from the site.

8.2 Operational Phase

It is anticipated that fuel, lubricating oil, hydraulic fluid may be required as part of standard maintenance activities during the operational phase. For the vehicles and equipment that will be brought to the proposed development during operation, refuelling will be carried out using 110% capacity double bunded mobile bowsers.

Chemicals may be brought to the proposed development for maintenance works during the operational phase, some of which could be considered hazardous. Care will be taken with the usage and disposal of any fuel, oils and chemicals at the proposed development. Any hazardous waste generated at the proposed development will be disposed of to the licenced waste facility.

Disruption to the existing natural surface water network (drains, non EPA minor watercourses) will be mitigated by the construction of swales. The swales will be constructed first prior to the removal of the existing surface water drain. Surface water runoff that would have utilised the existing surface water drain being removed will be collected by the swale. The swales will convey surface water to, or in close proximity to, the same outfallpoint as the existing surface water drain that's being removed. The surface water swales will provide the same function as the surface water drains being replaced ensuring continuity of flow rates and volumes.

Surface water will be managed in accordance with the principles and objectives of SuDS to treat and attenuate water prior to outflow from proposed drainage network. Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be

incorporated into the overall management strategy for the Proposed Development. This will ensure that there are no impacts on water quality and quantity (flow regime) during the operational phase of the proposed development.

The wastewater generated during the operational phase will be managed by a holding tank which is of twin-hull design and fitted with an alarm to indicate levels and when it is due for empty. The holding tank will be emptied by a permitted contractor and treated at a licenced facility. All Foul water from the site will only be discharged to the UE network via a waste water treatment plant under the appropriate consents from UE, and therefore, the proposed development will not cause a potential impact on water quality and the WFD status of receiving waterbodies and any Natura 2000 sites associated with discharges from the site.

8.3 Decommissioning Phase

Effects will be avoided by leaving elements of the Proposed Development in place where appropriate. The onsite substation will likely be retained. The turbine bases will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Internal tracks will remain as forest or agricultural tracks. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by onsite plant will be implemented as per the construction phase mitigation measures.

The potential impacts on the water environment during the decommissioning stage will be similar to those during the construction phase, and as such the proposed mitigation for the Decommissioning Phase are the same as those outlined in Section 8.1. Moreover, due to the relative long life of the wind farm infrastructure, it is likely that a revised/updated environmental assessment will be required at the time of decommissioning to account for any changes in baseline conditions at the Proposed Development site, and potential changes in assessment guidelines and legislation.

8.4 Residual Risk to Waterbody Status

The effect of the design avoidance and mitigation measures have been assessed and summarised in Table 8-1 below, which provides a summary of the predicted/potential status changes associated with the Proposed Development, with and without mitigation. In all cases, the proposed measures are sufficient to meet WFD objectives. Similarly, the objectives of the WFD Register of Protected Areas will not be compromised and their long-term integrity will be preserved.

Table 8-1. Summary of WFD Status for Unmitigated and Mitigated Scenarios

WFD Waterbody I.D. & EPA Code	Current WFD Status (2016-2021)	Current WFD Risk	Unmitigated Status Change	Mitigated Status Change
Construction Phase				
Morningstar_060	Good	Review	Poor	Good
BALLYCULLANE (Limerick)_010	Poor	At Risk	Poor	Poor
CAMOGE_020	Poor	At Risk	Poor	Poor
CAMOGE_030	Poor	At Risk	Poor	Poor
WHITEHALL_010	Poor	At Risk	Poor	Poor

WFD Waterbody I.D. & EPA Code	Current WFD Status (2016-2021)	Current WFD Risk	Unmitigated Status Change	Mitigated Status Change
GROODY_010	Moderate	At Risk	Moderate	Moderate
MAIGUE_060	Moderate	At Risk	Moderate	Moderate
MAIGUE_050	Good	Not At Risk	Good	Good
MAIGUE_070	Moderate	At Risk	Moderate	Moderate
Operational Phase				
Morningstar_060	Good	Review	Moderate	Good

8.5 Residual Cumulative Impacts

It is reasonable to assume that any approved, pending, or further information stage cumulative development has demonstrated (or will demonstrate prior to approval) no adverse environmental effects and the incorporation of good practice measures (e.g., construction phase and permanent SuDS, pollution prevention measures) into their designs. Such measures would manage surface water runoff rate, quantity, and quality, resulting in no adverse effect on waterbody status or WFD objectives in general. As such, there are no likely significant cumulative effects predicted with the proposed Development and in conjunction with any other screened-in projects in any geographical area.

8.6 Potential Impact on Water Action Plan (WAP) Programme of Measures

Based on the findings of this assessment, it is considered that in applying the precautionary principle and assessing a worst-case scenario the Proposed Development will have no adverse impacts on the implementation of the WAP Programme of Measures. Adverse impacts associated with increased hardstanding will be negated through the implementation of SuDS and appropriate treatment of surface water runoff from the site.

9 MONITORING

9.1. Construction Phase

During the Construction Phase of the Proposed Development the following monitoring measures will be implemented:

- Inspections will be undertaken by the main contractor or appointed delegate during excavations and other groundworks to ensure that measures that are protective of water quality outlined in the EIAR and the CEMP (MWP, 2025) and SWMP (MWP, 2025) are fully implemented and effective.
- A suitably qualified ECoW will be appointed for the duration of the works. The ECoW will be present on-Site during near-stream works (i.e. construction of bridge / culvert crossings and drain removal) to ensure there is no potential for surface water run-off to the receiving waterbodies. The ECoW will undertake regular monitoring of water quality upstream and downstream of the works area to detect any changes and take corrective actions if necessary.
- The silt fences and settlement ponds will be monitored to ensure that they remain functional throughout construction of the Proposed Development. Where necessary, maintenance will be carried out on the fences and settlement ponds to ensure that they continue to be effective.
- The main contractor in consultation with the ECoW, will provide and implement a monitoring schedule for water quality monitoring throughout the construction phase of the proposed development. The frequency of monitoring and the monitoring parameters will be in line with best practice and guidance and will be agreed with LCCC prior to commencement of the works. Inspection records and summary reports from site supervision by the ECoW will be made available to LCCC upon request. Should any deviation from the proposed mitigation or exceedance of the agreed quality “trigger” limits be noted, this will be reported to LCCC and corrective measures will be agreed. Water quality monitoring to include:
    - Baseline sampling will occur at least twice, coinciding with both low flow and high flow stream conditions. The high flow sampling event will take place following sustained rainfall, while the low flow event will take place after a dry period.
    - Regular (monthly) sample analysis will examine relevant parameters and regulatory limits, including Environmental Quality Standards (EQSs). Samples will be taken from each watercourse / land drain draining from the construction site. Daily monitoring of surface water to include Turbidity, pH/EC and colour upstream and downstream of the works areas and where required, at the outlets from settlement ponds. Where water from the settlement ponds fails to meet the required standards, the water will be recirculated to the inlet of the sediment pond to provide further time for settlement. A penstock or similar valve will be provided on the outlet from the sediment pond to control outflow from the pond. Works will be ceased until the cause of the difference is identified and (if it is associated with the works) rectified.
- Outflows to surface water will be monitored as required.

- Routine monitoring and inspections will be undertaken by the main contractor or appointed delegate during refuelling, concrete works to ensure no impacts and compliance with avoidance, remedial and mitigation measures.

9.2. Operational Phase

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be undertaken throughout the lifetime of the Operational Phase of the Proposed Development.

10 CONCLUSIONS

The findings of the risk-based assessment identified that in the absence of any mitigation and avoidance measures there could be a potential impact on the waterbody status within receiving water bodies associated with the Proposed Development.

The mitigation measures as outlined above will prevent any impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009), as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

The Proposed Development will not cause a deterioration in the status of waterbodies hydrologically connected with the Proposed Development, taking account of design avoidance and mitigation measures that will be implemented. The Proposed Development will not jeopardise the objective to achieve 'good' surface water status or good ecological potential.

There will be no impact to the existing WFD status of waterbodies associated with the Proposed Development as a result of the Proposed Development taking account of embedded design avoidance and mitigation measures. Similarly, the objectives of the WFD Register of Protected Areas will not be compromised and their long-term integrity will be preserved.

10.1 WFD Article 4 Objectives Compliance Statement

The assessment contained within this report has comprehensively demonstrated that the proposed development adheres to the Article 4 objectives of the Water Framework Directive (WFD). Applying the precautionary principle and evaluating a worst-case scenario, it is evident that there are no adverse impacts to the Status of waterbodies, thus aligning with the objective to protect, enhance, and restore all bodies of surface water and groundwater, with the aim of achieving good surface water status by 2027.

Furthermore, the proposed development incorporates measures, such as Sustainable Drainage Systems (SuDS) and the appropriate management of construction stage runoff, which will prevent any deterioration in waterbody status and maintain high status where it already exists. Moreover, the necessary measures are being implemented with the aim of progressively reducing pollution in surface waters and groundwater, thereby fulfilling the objective of reducing pollution incrementally.

Regarding a derogation requirement, since none of the Article 4(7) criteria have been triggered, no Article 4(7) assessment is required. Therefore, authorisation for the Proposed Development may be permitted according to the Water Framework Directive (WFD).

Consequently, the proposed development is in full compliance with the overarching goal of achieving good surface water status by 2027 and maintaining the integrity of the water environment.

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Appendix A - Designated and Protected Sites

Designated Site	Site Code	Distance from Site (km)	Direction	Potential Risk
Special Area of Conservation (SAC)				
Lower River Shannon SAC	002165	15.8km	Northwest	Yes, downstream of the Site.
Kerry Head Shoal SAC	002263	92.9km	West	
Tory Hill SAC	000439	8.71km	Northwest	No, hydrologically upstream of the Site
Curraghchase Woods SAC	000174	21.08km	West Northwest	
Special Protection Area (SPA)				
River Shannon and River Fergus Estuaries SPA	004077	15.8km	Northwest	Yes, downstream of the Site
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	004161	26.23km	Northeast	No, hydrologically upstream of the Site
Slievefelim to Silvermines Mountains SPA	004165	25.12km	Northeast	No, hydrologically upstream of the Site
Proposed Natural Heritage Area (pNHA)				
Adare Woodlands	000429	12.43km	Northwest	Yes, downstream of the Site.
Herbertstown Fen	000436	5.10	East	No hydrological connection
Clonderalaw Bay	000027	47.75	Northwest	Yes, downstream of the Site.
Derrygeeha Lough	000050	47.34	Northwest	No hydrological connection
Poulnasherry Bay	000065	65.58	Northwest	Yes, downstream of the Site.

Inner Shannon Estuary - South Shore	000435	6.95	Northwest	Yes, downstream of the Site.
Cahiracon Wood	001000	38.56	West	Yes, downstream of the Site.
Cloonsnaghta Lough	001004	40.8	Northwest	No hydrological connection
Gortglass Lough	001015	39.67	Northwest	No hydrological connection
St.Senan's Lough	001025	55.86	Northwest	No hydrological connection
Ballylongford Bay	001332	58.7	Northwest	Yes, downstream of the Site.
Beal Point	001335	68.51	West	Yes, downstream of the Site.
Tarbert Bay	001386	53.53	West	Yes, downstream of the Site.
Sturamus Island	001436	35.27	West	Yes, downstream of the Site.
Scattery Island	001911	62.92	Northwest	Yes, downstream of the Site.
Fergus Estuary And Inner Shannon, North Shore	002048	5.5	Northwest	Yes, downstream of the Site.
Herbertstown Fen	000436	5.1	East	No hydrological connection
Lough Gur	000437	0.33	East	No hydrological connection
Tory Hill	000439	7.56	East	Yes, downstream of the Site.
Glen Bog	001430	2.35	East	No hydrological connection

Skoolhill	001996	0.83	West	No hydrological connection
Ballyhoura Mountains	002036	13.57	South	No, hydrologically upstream of the Site
Mountrussell Wood	002088	11.94	South	No hydrological connection
Castleoliver Woods	002090	13.24	South	No, hydrologically upstream of the Site
Ballyroe Hill & Mortlestown Hill	002089	11.78	South	No, hydrologically upstream of the Site
Natural Heritage Areas (NHA)				
Carbury Bog NHA	01388	11.20	Northeast	Yes, hydrologically downstream of the site.
Black Castle Bog NHA	000570	2.13	North	No, hydrologically upstream of the Site
Daingean Bog NHA	002033	9.76	Southwest	
Note: '*' = Distance is measured as closest point to the Site				

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