MWP

Chapter 09 Water

Ballinlee Wind Farm

Ballinlee Green Energy Ltd.

September 2025

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9. Water

9.1. Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the hydrology and hydrogeology (surface water and groundwater, respectively) environment within and immediately surrounding the site of the Proposed Development, an assessment of the potential impacts of the Proposed Development on the receiving water environment (hydrology and hydrogeology) and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Hydrological and hydrogeological baseline characteristics of the receiving environment at the Site of the Proposed Development and wider study area.
- Potential impacts (direct, indirect and cumulative) that the Proposed Development may have on the receiving water environment.
- Potential constraints that the environmental attributes may place on the Proposed Development.
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development.
- Evaluate the significance of any residual impacts.
- Propose appropriate monitoring is integrated in the scheme.

This chapter of this EIAR should be read in conjunction with EIAR **Volume II**, **Chapter 02** Description of the Proposed Development, **Chapter 05** Population and Human Health, **Chapter 06** Biodiversity, **Chapter 08** Land and Soils and **Chapter 17** Material Assets-Built Services, **Volume III**, **Appendix 9B** Water Framework Directive Assessment Report and other information provided pertaining to the design proposals for the Proposed Development.

9.1.1. Quality Assurance and Competency of Experts

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.

9.1.2. Description of 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 development follows:

Core Wind Farm Components

- Wind Turbines: seventeen (17) wind turbines with a tip height of 160 meters (except for T6 with tip height 150m), including associated foundations and crane hardstand areas.
- Permanent Meteorological Mast: One (1) permanent meteorological mast 92 meters in height, with associated foundation, hardstand area, and ancillary main crane hardstand area.
- Electrical Substation: One (1) electrical substation (110kV) including Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing, and all associated works.
- Site Entrances: Nine (9) site entrances.
- Internal Site Service Tracks: Approximately 10.8 kilometres (kms) of new internal access tracks to be constructed.
- Clear Span Bridge: A new clear span bridge over the Morningstar River.
- Underground Electric Collector Cable Systems: Underground electric collector cable systems between turbines within the wind farm site.
- Underground Electric Cabling Systems: 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

- Temporary Access Track: New temporary access track via R-516 to facilitate the turbine delivery route located in the townland of Tullovin.
- Temporary Construction Site Compounds: Three (3) temporary construction site compounds, one approximately 95m x 50m and two approximately 55m x 25m.
- Borrow Pits: Two (2) borrow pits to be used as a source of stone material during construction and for storage of excess excavated materials.
- Deposition Areas: Nine (9) deposition areas and two (2) No. temporary deposition areas.
- Surface Water Management Systems: Associated surface water management systems.
- Tree Felling: Tree felling required for wind farm infrastructure.
- Whooper Swan Management Works
- Habitat Enhancement Works

A full description of the Proposed Development is outlined in this EIAR Volume II, Chapter 02 Description of the Proposed Development and Chapter 04 Civil Engineering.

The characteristics of particular relevance with respect to hydrology and hydrogeology are discussed in Section 9.3.

The entire lands subject to the proposed development are referred to in this chapter as the "the site". The works required within the site vary spatially depending on the element of the development proposed at any specific location. To aid in the assessment and description of potential effects the proposed development is also distinguished in this chapter with regard to the "main development site" (which refers to the lands immediately adjacent to the proposed turbines, borrow pits, deposition areas, met mast and substation) and the proposed "grid connection route" (which refers to the linear development linking the main development site to the existing 220/110kV 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".

9.1.3. Study Methodology

9.1.3.1. Relevant Legislation & Guidance

The methodology adopted for the assessment complies with relevant guidelines and has regard to the legislation including:

- Council Directive 2006/118/EEC, 2006. On the protection of groundwater against pollution and deterioration. European Parliament and the Council of European Communities.
- 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 amendments 2455/2001/EC, 2008/32/EC and 2008/105/EC (Water Framework Directive (WFD)).
- European Commission, 2022. WFD Reporting Guidance 2022. Final Draft V4.
- Local Government, October 2021. No. 1.1977. Local Government (Water Pollution (Amendment) Act as amended.
- Local Government, October 2007. No. 30.2007. Water Services Act 2007 as amended.
- Local Government, July 1990. No. 21.1990. Local Government (Water Pollution) (Amendment) Act, 1990. as amended.
- Local Government, March 1977. No. 01/1977. Local Government (Water Pollution) Act, 1977 with amendments.
- S.I. No. 722/2003 – European Communities (Water Policy) with amendment S.I. No. 413/2005.
- S.I. No. 489/2011 – European communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 as amended.
- S.I. No. 122/2010 – European Communities (Assessment and Management of flood Risks) Regulations 2010 including amendment S.I. No. 495/2015.
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019.
- S.I. No. 9 of 2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 including amendments S.I. No. 149 of 2012 and S.I. No. 366 of 201.

- Transport for Ireland (TII), 2009. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- WFD Working Group, 2005. Guidance on the Assessment of the Impact of Groundwater Abstractions (WFD, 2005).
- Limerick City and County Council, 2022. Limerick Development Plan 2022-2028.

Other guidance used in the assessment of potential impacts on the receiving water environment include:

- Construction Industry Research and Information Association, 2001. Control of Water Pollution from Construction Sites (CIRIA – C532).
- Construction Industry Research and Information Association, 2015. Environmental Good Practice on Site Guide (CIRIA – C741).
- Construction Industry Research and Information Association, 2016. Groundwater Control: Design and Practice (CIRIA – C750).
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (DEHLG/EPA/GSI, 1999).
- Department of the Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, 2009).
- Department of Housing, Planning and Local Government, August 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DHPLG, 2018).
- Environmental Protection Agency, 2014. Guidance on the Authorisation of Direct Discharges to Groundwater.
- Environmental Protection Agency, 2013. Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites.
- Environmental Protection Agency, 2013. Storage and Transfer of Materials for Scheduled Activities.
- Environmental Protection Agency, May 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- European Commission, 2017, Guidance on the preparation of the EIAR.

9.1.3.2. Consultation

As part of the assessment, consultation with statutory consultees and relevant stakeholders was undertaken. These included National Parks and Wildlife Service (NPWS), Office of Public Works (OPW) and Inland Fisheries Ireland (IFI). Refer to EIAR, Volume III, Appendix 1B Stakeholder Consultation and Responses for details.

9.1.3.3. Phased Approach

A phased approach was adopted for this EIAR in accordance with Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines and is described in the following sections.

Element 1: An initial assessment and impact determination stage was carried out by Enviroguide to establish the project location, type and scale of the Proposed Development, the baseline conditions, and the type of hydrological and hydrogeological environment, to establish the activities associated with the Proposed

Development and to undertake an initial assessment and impact determination. This element of the assessment also included developing the Conceptual Site Model (CSM) for the Site and receiving environment.

This stage of the assessment included a desktop study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for this chapter of the EIAR, extends beyond the site boundaries and includes a 2.0km radius of the site and Proposed Development and potential receptors outside of this radius that are hydro geologically / hydrologically connected with the Site were also considered. The extent of the wider study area was based on the Institute of Geologists of Ireland (IGI) Guidelines (IGI, 2013) that recommends a minimum distance of 2.0km radius from the Site. This broader 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 application 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 desk study involved collecting all the relevant data for the site and surrounding area including published information and details pertaining to the Proposed Development provided by the design team.

A site walkover survey to establish the environmental site setting and baseline conditions at the site of the Proposed Development relevant to the hydrological and hydrogeological environment was undertaken by Enviroguide on the 21st of November 2024.

The Element 1 stage of the assessment was completed by Enviroguide and included the review of the following sources of information:

- Environmental Protection Agency (EPA) webmapping (EPA, 2025).
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping (GSI, 2025).
- National Parks and Wildlife Services (NPWS) webmapping (NPWS, 2025).
- Ordnance Survey Ireland (OSI) webmapping (OSI, 2025).
- Water Framework Directive Ireland (WFD) webmapping (WFD, 2025).
- Teagasc webmapping (Teagasc, 2025).
- Office of Public Works (OPW) database on historic flooding and the Catchment Flood Risk Assessment and Management (CFRAM) maps (OPW, 2025).
- Limerick Groundwater Protection Scheme (Deakin et al, 2018).
- Maigue River Trust Resources (Maigue Rivers Trust, 2025).
- Information provided pertaining to the design proposals for the Proposed Development.

Other documents and reports reviewed as part of this assessment included the following:

- Northwest Geotech Ltd, 2024. Ground Investigation Report
- Enviroguide 2025, Water Framework Directive Assessment Report
- Malachy Walsh & Partners, 2025. Aquatic Ecology and Fish Report
- Malachy Walsh & Partners, 2025. Flood Risk Assessment Report
- Malachy Walsh & Partners, 2025. Surface Water Management Plan (SWMP)
- Malachy Walsh & Partners, 2025. Construction Environmental Management Plan (CEMP)

Element 2: Involves direct and indirect site investigation and studies where necessary to refine the CSM developed as part of Element 1 and evaluate the potential impacts associated with the Proposed Development. Based on a review of the information compiled and reviewed in Element 1, it was determined that a direct or indirect site investigations and studies stage was not required as there was sufficient information including site investigation data regarding the Proposed Development and the hydrological and hydrogeological conditions in the vicinity of the site to inform the impact assessment of the Proposed Development on the receiving hydrological and hydrogeological environment.

Element 3: Evaluation of Mitigation Measures, Residual Impacts and Final Impact Assessment were based on the outcome of the information gathered in Elements 1 and 2 of the assessment. Mitigation measures to address all identified adverse impacts that were identified in Elements 1 and 2 of the assessment were considered in relation to the Construction Phase, Operational Phase and Decommissioning Phase of the Proposed Development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Element 4: Completion of EIAR **Volume II**, **Chapter 09** Water which includes all the associated figures and documents.

9.1.3.4. Description of Importance of the Receiving Environment

The Transport Infrastructure Ireland (TII) criteria for rating of the importance of hydrogeological features at the site as documented in the National Roads Authority Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009), are summarised in **Table 9-1**.

Table 9-1: Criteria for Rating Site Importance of Hydrogeological Features

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988. Groundwater supports river, wetland or surface water body ecosystem protected by European Union (EU) legislation e.g., SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body. Waterbody protected by national legislation – e.g., NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers.

		Salmon fishery. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source. Quality Class C (Biotic Index Q3, Q2- 3). Coarse fishery. Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes. Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes. Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding.

9.1.3.5. Description and Assessment of Potential Impacts

Impacts will vary in quality from adverse, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this chapter is described in Table 9-2 in accordance with EPA, 2022 guidelines on the information to be contained in EIARs.

Table 9-2: Criteria for Assessment of Potential Impacts Terminology and Methodology

Quality of Effects/Impacts	Definition
Adverse	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**Definition**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.

Significant Effects	An effect which, by its character, magnitude, duration, or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration, or intensity significantly alters a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.
Extent and Context of Effects	**Definition**
Extent	Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
Context	Describe weather the extent, duration or frequency will conform or contrast with established (baseline) conditions
Probability of Effects	**Definition**
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration of Effects / Impacts	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Types of Effects	**Definition**
Indirect Effects	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
Cumulative Effects	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
“Do-nothing” Effects	The environment as it would be in the future should the subject project not be carried out
“Worst-case” Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

9.2. The Existing and Receiving Environment (Baseline Situation)

9.2.1. Site Location and Description

The proposed development includes seventeen wind turbines (i.e. the main development site), each with a blade tip height of 160m (except for T6 with blade height 150m), an on-site electrical substation, a grid connection route, and other ancillary infrastructure. Ancillary works include: internal access tracks, borrow pits, spoil deposition areas, site entrances and temporary work compounds. The development footprint for the access tracks, hardstands and other facilities within the application area is approximately 255 hectares (ha).

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 south of Limerick City and 3km west 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 9-1 and the existing site is presented in Figure 9-2.

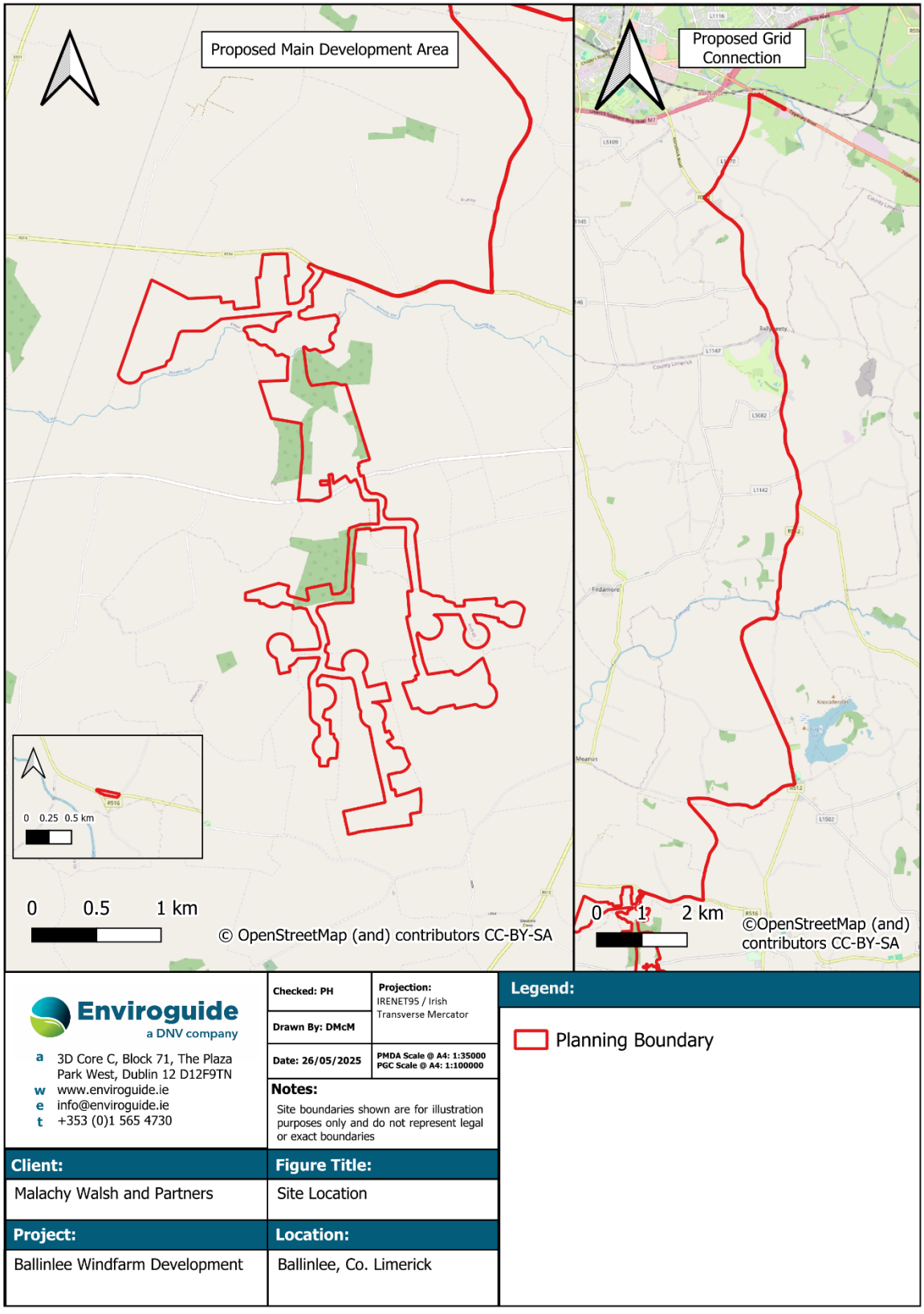

Figure 9-1: Site Location

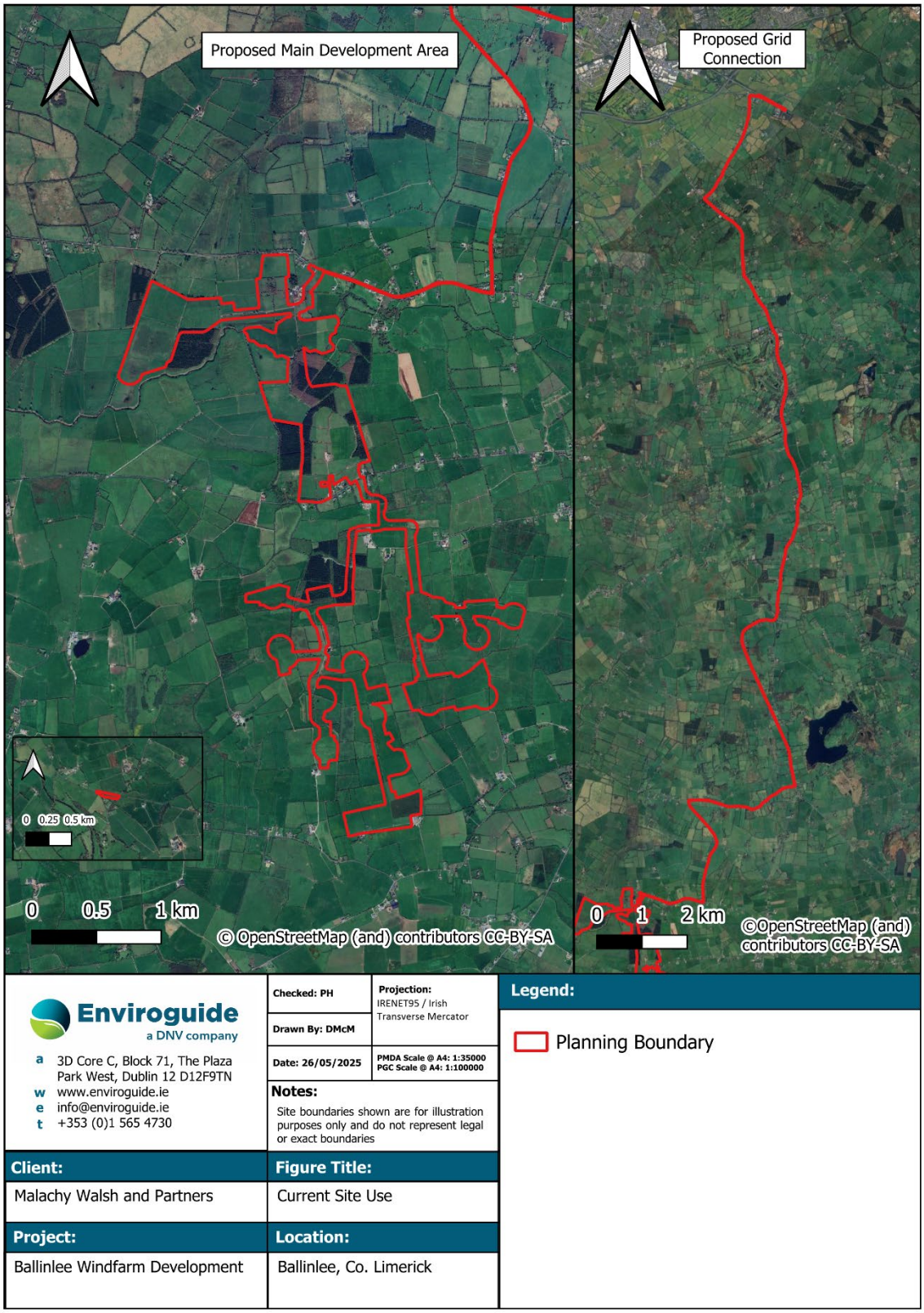

Figure 9-2: Existing Site

9.2.2. Topography

The topography of the site is generally flat at 53mmOD (meters above Ordnance Datum), there is a slight rise 1km to the west of 75m. The grid connection route elevation is generally between 50-65mOD.

9.2.3. Soil, Subsoil and Geology

The soils, subsoil and geology at the site of the Proposed Development are described in EIAR, Volume II Chapter 08, Land and Soils. Table 8-2 outlines the predominant soil type over the majority of the wind farm as per the published soils map (GSI).

9.2.4. Rainfall

Monthly rainfall data available for 1km x 1km grids (for the period 1991 to 2020) was sourced from Met Éireann (Met Éireann, 2025) and is presented in Table 9-3.

Table 9-3: Long Term Mean Monthly Rainfall Data (Depth in mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
96.5	80	70.4	62.8	63.6	71.7	73	82.7	74.7	99	103.2	103.5	981.1
Note: 1km x 1km Irish Grid Coordinated selected for the Site =X (Easting): 162000, Y (Northing): 135000												

The closest synoptic meteorological station to the site is at Shannon Airport which is located approximately 33.7km north of the main development site. The long term average potential evapotranspiration (PE) from the Shannon Airport station for the period ranging between 2022 and 2025 (Met Éireann, 2025) is presented in Table 9-4.

Table 9-4: Average Potential Evapotranspiration (Depth in mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
15.3	22.1	36.7	59.1	79.1	88.4	83.0	70.3	49.9	28.8	15.8	13.1	561.6

9.2.5. Hydrogeology

9.2.5.1. Site Hydrogeology and Groundwater Levels

Ground investigations at the main development site were undertaken by Northwest Geotech Ltd. between the 6th and the 9th of August 2024 (refer to EIAR, Volume III, Appendix 8A Northwest Geotech Ltd, 2024 Ground Investigation Report).

The ground investigations included the excavation of twenty-four (24No.) trial pits, logging of soils encountered, and preparation of a factual report. The trial pit locations were chosen to provide representative samples at key

locations throughout the site, i.e. at proposed turbine or borrow pit locations. The ground conditions encountered are summarised as follows:

- Topsoil was encountered from ground level to depths typically ranging from 0.2 meters below ground level (mbGL) to 0.4mbGL.
- Peat remnants described as spongy dark brown amorphous peat was encountered at depth between 0.5mbGL and 1.5mbGL at trial pit locations TP01, TP02 and TP04. The thickness of peat remnants ranged from 0.2m at TP02 to 0.8m at TP01.
- Sandy gravelly CLAY, frequently with low to medium cobble and boulder content, was encountered below the topsoil and / or peat remnants to a maximum depth and final depth of excavation of 2.7mbGL.

Groundwater was encountered as seepage at depths of 1.40mbGL and 2.20mbGL in trial pits TP04 and TP16 respectively.

Two (2) No. trial pits were excavated in proximity to the Northern Borrow Pit. The trial pits reached refusal at rockhead at depths of 0.6m and 0.7m. No groundwater was encountered at either location.

Two (2) No. trial pits were also excavated in proximity to the Southern Borrow Pit. The trial pits reached refusal at a rockhead at depths of 1.4m and 0.4m. Again, no groundwater was encountered at either location.

The site investigation locations are presented in Figure 9-3.

Further site investigation works were carried out by MWP during November 2024 and February 2025.Trial pit logs are included in Appendix 8B. All trial pits were terminated at 3mbGL (max reach of excavator). Bedrock was only encountered at TPBP19 at 1m. Boulders were encountered at TPBP10, TPBP11, TPBP15 and TPBP20 at depths ranging from 1.8mbGL to 2.8mbGL. Groundwater seepage was encountered at bedrock (1mbGL) in TPBP19 and at 2.3mbGL in TPBP18.

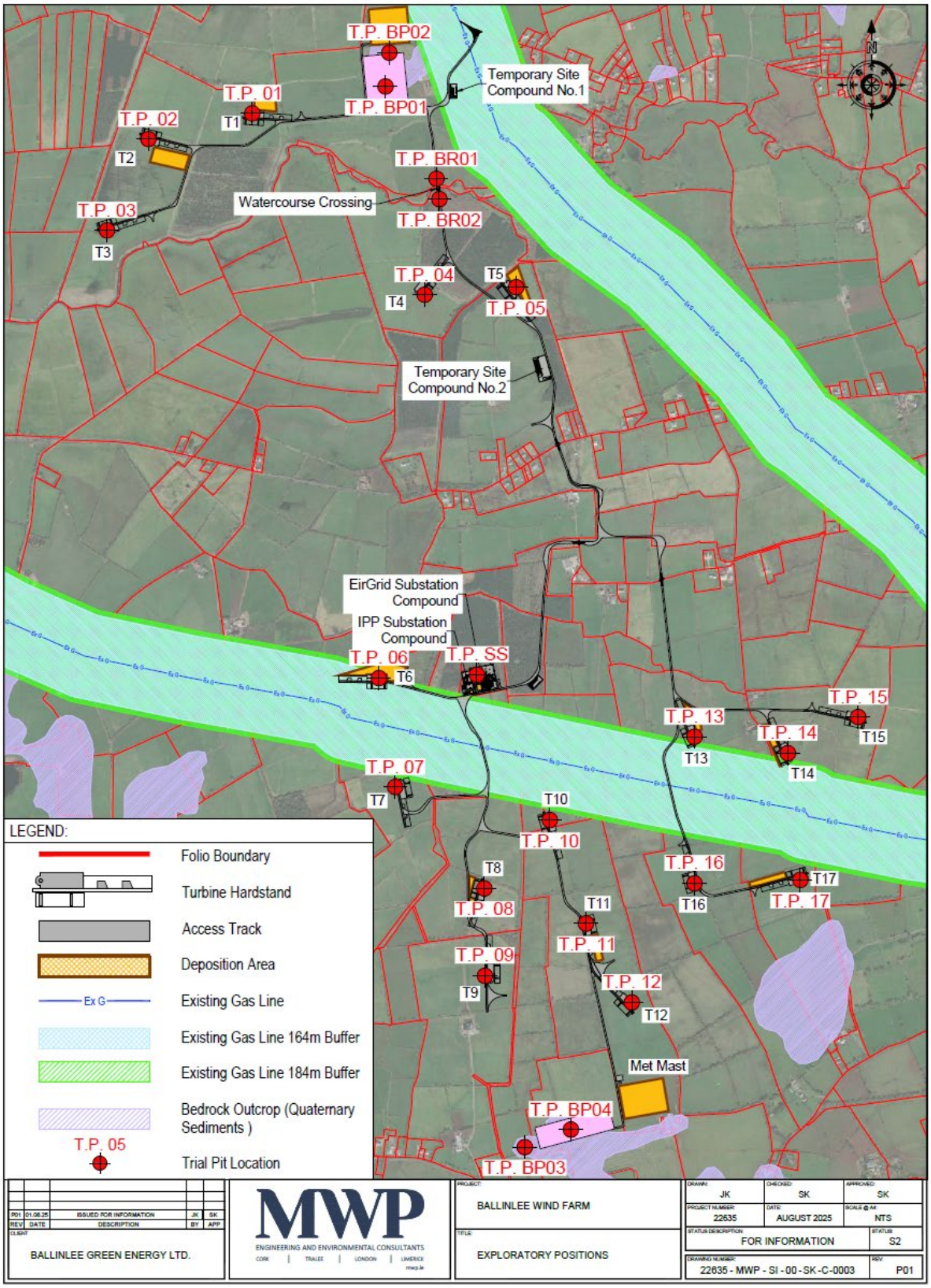

Figure 9-3: Site Investigation Locations (EIAR, Volume III: Appendix 8A Northwest Geotech Ltd 2024)

9.2.5.2. 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 260km^2 and occupies the lowlands of Co. Limerick (GSI, 2025). The highest point, at 165 (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.

- Recharge is mainly pluvial in nature, occurring diffusely over the entire groundwater body via rainfall soaking through the subsoil or directly into the aquifer where rock is at the surface. If subsoil is thick and impermeable (high clay content), potential recharge will runoff. Potential recharge may be rejected in some areas due to a high water table.
- The main discharges are to the streams and rivers crossing the aquifer and to springs. There may be a small volume of groundwater flow from this GWB to the karstic North Kilmallock and Fedamore GWBs to the south and north, respectively. Due to the aforementioned subsoil structure at the site, there is a potential for rejection of pluvial recharge, and surface water flow into adjacent small streams is possible.

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 210km^2 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.

- Recharge occurs mainly through diffuse infiltration of rainfall across the GWB. In karstified areas, recharge can be more focused, occurring through swallow holes and other karst features. The karstified aquifers within the Fedamore GWB play a significant role in both discharge and recharge processes.
- The Fedamore Groundwater Body (GWB) discharges groundwater primarily through springs and as baseflow to rivers that cross the groundwater body. Additionally, it supports several groundwater-dependent ecosystems, including large fen areas.

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.

- Diffuse recharge occurs over the entire groundwater body via rainfall soaking through the subsoil, particularly in the higher areas where subsoils are thinner. A proportion of rainfall will not recharge the aquifer but will runoff. Gravel lenses in the subsoils may contribute flow and storage to the bedrock aquifer.

- There are numerous springs occurring to the east and west of Bruree village; these drain into the River Maigue. The streams and rivers crossing the GWB are gaining. Most of the streams originating as springs within the GWB have their origins in the lower-lying ground (<100 mOD). Known springs occur in similarly low-lying ground (<70 mOD). Deakin (1995) considers that the small springs, rises, and isolated ponds within the GWB are perched.

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). Recharge primarily occurs through diffuse infiltration of rainfall, and groundwater discharges mainly through springs and baseflow to rivers.
- 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). Recharge occurs through both diffuse infiltration and focused recharge via karst features. Groundwater discharges through springs and baseflow to rivers.
- 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). Recharge mainly occurs through diffuse infiltration of rainfall, and groundwater discharges through springs and baseflow to rivers.
- 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). Recharge occurs through both diffuse infiltration and focused recharge via karst features. Groundwater discharges through springs and baseflow to rivers.
- 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). Recharge mainly occurs through diffuse infiltration of rainfall, and groundwater discharges through springs and baseflow to rivers.

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.

9.2.5.3. Aquifer Classification

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 indicted 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, 2024) 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 (100-400m^3/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.

The bedrock aquifers beneath the site of the Proposed Development are presented in Figure 9-4.

It is noted that there are no gravel aquifers mapped at the site or within a 2.0km radius of the site (GSI, 2025).

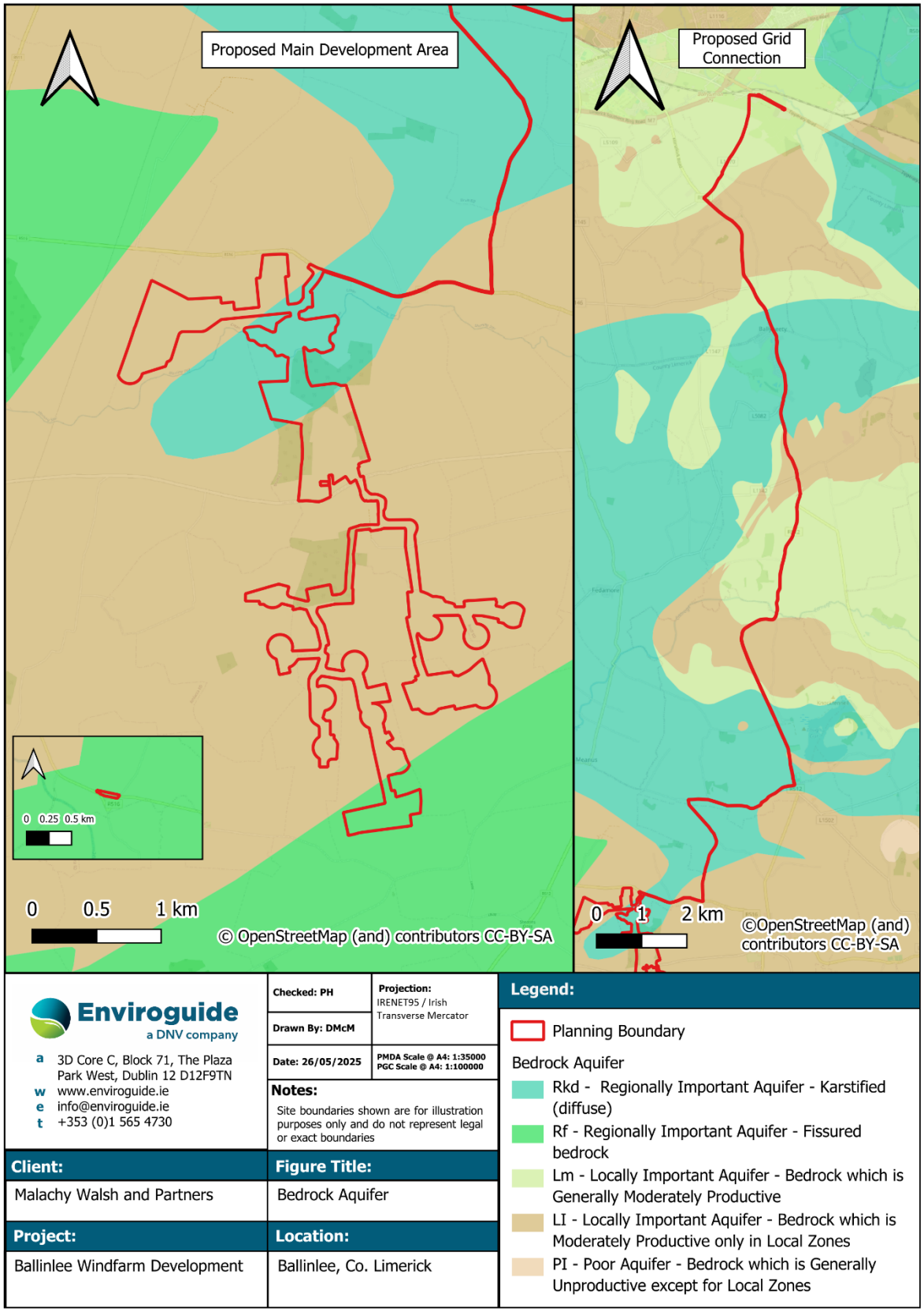

Figure 9-4: Bedrock Aquifers

9.2.5.4. Groundwater Vulnerability

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes publication (DEHLG/EPA/GSI, 1999) and summarised in Table 9-5. The publications state that as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area.

Table 9-5: Vulnerability Mapping Criteria

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability and Type			(Swallow Holes, Losing Streams)	(Sand and Gravel Aquifers Only)
	High Permeability (Sand and Gravel)	Moderate Permeability (Sandy Subsoil)	Low Permeability (Clayey Subsoil, Clay, Peat)		
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High

Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.

The GSI (GSI, 2025) has assigned a groundwater vulnerability rating of 'Moderate' (M) for the majority of groundwater beneath the main development site. Some of the northern portion, a small area in the central portion and in the southern area of the main development site have been assigned a groundwater vulnerability rating of 'High' (H). There are two small regions both in the north and south of the main development site which have been assigned a groundwater vulnerability rating of 'Extreme' (E) or with 'rock at or near surface or Karst' (X). 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 and the proposed substation 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).

The groundwater vulnerability map is presented in Figure 9-5.

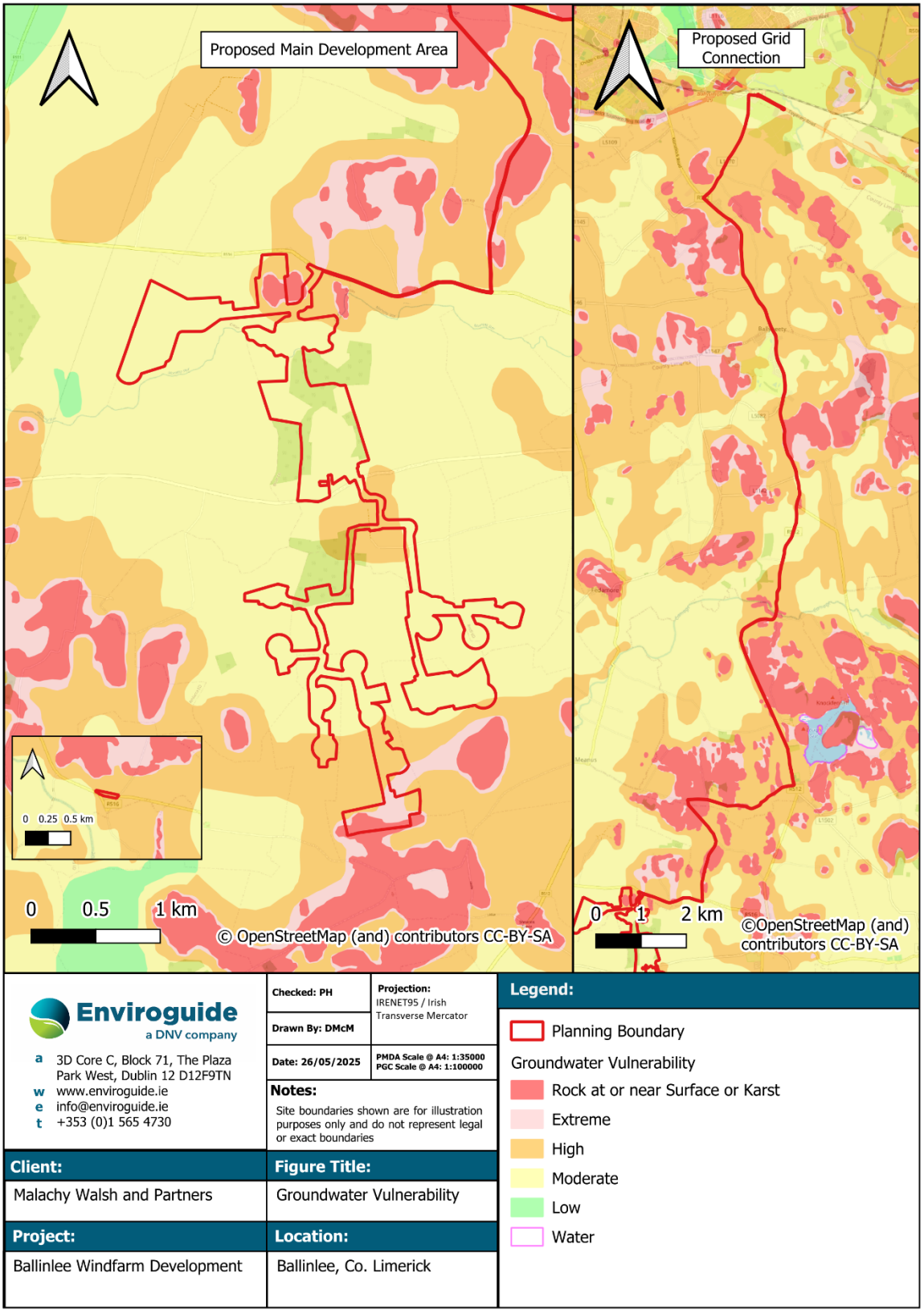

Figure 9-5: Groundwater Vulnerability

9.2.5.5. 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).

9.2.6. Hydrology

9.2.6.1. 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 main development 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 (AKA Raymondstown Stream), the Balinlee South Stream, the Ballinrea Stream, the Ballingayrour Stream, the North Balinlee Stream, Parkroe Stream and Camas South 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 site 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 River. 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 9-6**.

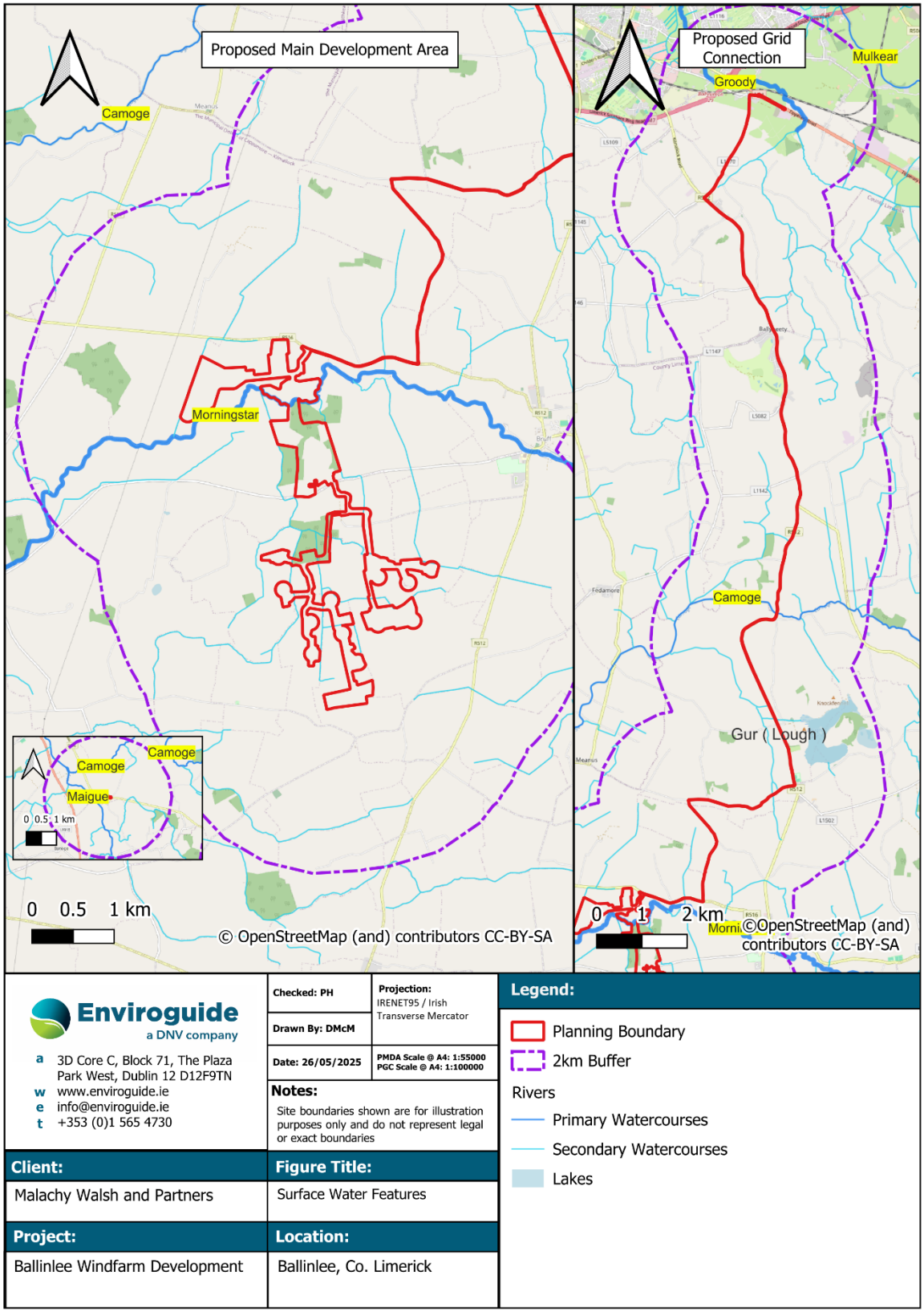

Figure 9-6: Local Surface Water Features

9.2.6.2. Existing Drainage Infrastructure

There are no existing Uisce Éireann (UÉ) or Limerick City and County Council (LCCC) drainage infrastructure throughout the main development site. However, the route of the proposed grid connection will cross and be in close proximity to existing infrastructure within the public road network.

9.2.6.3. Existing Foul Drainage

There are no existing UÉ or LCCC foul drainage infrastructure throughout the main development site. However, the route of the proposed grid connection will cross and be in close proximity to existing foul drainage infrastructure within the public road network.

9.2.6.4. Aquatic Ecology and Fish Report

The Aquatic Ecology and Fish Report, prepared by Malachy Walsh and Partners (MWP) (Appendix 6F) 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 9-6.

Table 9-6: Biological water quality results and interpretations at study sites on watercourses potentially affected by the proposed wind farm

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

Site	Watercourse	Q-rating	Quality Status	Corresponding WFD Status	BMWP Score	BMWP Category	BMWP Interpretation	EPT
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.

Table 9-7: Chemistry results for the Morningstar River (monitoring station code RS24M020800) between January 2022 and October 2024

Parameter	Unit	Limit of Detection	Morningstar River		
			N	Mean	Max
Ammonia-Total (as N)	mg/l	0.02	13	0.020	0.039
BOD - 5 days (Total)	mg/l	1	13	0.77	1.9
Dissolved Oxygen	% Saturation	1	13	95.7	115
Dissolved Oxygen	mg/l	0.1	13	10.38	12.6
Nitrate (as N)	mg/l	0.2	5	1.19	2.1
Nitrite (as N)	µg/l	4	5	6.59	10.3
ortho-Phosphate (as P) - unspecified	mg/l	0.01	13	0.084	0.16
Total Hardness (as CaCO3)	mg/l	10	13	266.2	307

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 (including livestock fencing), and protection of wet grassland habitats. Note,

as set out in Chapter 6 Biodiversity, approximately 3.4ha of GS4 Wet Grassland was recorded within the Planning Application Boundary. The GS4 was located adjacent the tributary streams of the Morning Star River in the southern portion of the Main Development area. There is no indication that these areas have a groundwater dependence and are likely due to poor drainage due to proximity to the minor streams.

9.2.6.5. Baseline report on Grid Connection Route Aquatic Ecology Surveys

The baseline aquatic ecology assessment for the Ballinlee Wind Farm grid connection route prepared by Woodrow (2025). The Site 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.

9.2.7. Flood Risk

A site-specific flood risk assessment (SSFRA), developed by MWP (MWP, 2025) (Appendix 9B), 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:

I. This 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.

II. The main components of the proposed project and associated planning application include seventeen (17) wind turbines, associated tracks and infrastructure, permanent deposition areas, an on-site 110kV electrical substation and a Grid Connection Route (GCR) which consists of an underground electrical grid connection from the Wind Farm Site to the existing Killonan 110/220kV substation.

III. 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 area of the project area.

IV. 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.

V. There are flow records available for the Morningstar River. The Flood Studies Update 2 (FSU2) was selected as the most appropriate flood estimation method to calculate the flood flows for the main Morningstar River. The Poots & Cochrane flood estimation method was adopted for catchments that have an area <5km².

VI. 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.

VII. 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.

VIII. 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).

IX. 4 of the 17 no. 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.

X. To ensure that there is no unacceptable flood risk, the following mitigation measures will be implemented:

a. The design flood level for the proposed substation is the 0.1% AEP MRFS flood level plus 500mm freeboard.

b. The design flood level for the proposed 17 no. turbines is a minimum of 1%AEP MRFS flood level plus 300mm freeboard

c. Conveyance measures to be provided at various locations along the proposed access tracks and the minimum conveyance capacity requirements are outlined in Section 4.4.7.

d. The proposed access tracks will only be raised to the maximum heights above existing ground levels outlined in Section 4.4.7 to allow floodplain flow to pass over the access track for more extreme exceedance flood events.

e. It was concluded that, once the mitigation measures are implemented, the proposed development will not have an adverse impact on flooding elsewhere.

f. Residual risks associated with the development were also assessed and are considered to be acceptable.

9.2.8. Water Supply and Drinking Source Protection

A search of the GSI groundwater well database (GSI, 2025) was conducted to identify registered wells and groundwater sources in the surrounding area. There are one hundred and thirty seven (137 No.) groundwater sources recorded at the site or within a 2km radius of the site including the route of the proposed grid connection (refer to Table 9-8 and Figure 9-6).

Table 9-8: GSI Springs and Wells within 2km of Site

GSI Name	Type	Drill Date	Depth (mbGL)	Townland	Source Use	Yield Class
1413NEW030	Borehole	1899-12-30	33.1	LOUGHANSTOWN	Agricultural & domestic use	N/A
1413SWW122	Borehole	04/04/2003	41.1	ANHID EAST	Agricultural & domestic use	Poor
1413SWW130	Borehole	19/02/2001	43.3	BALLYCULLEEN	Agricultural & domestic use	Good
1413SWW131	Borehole	23/06/2001	43.9	TULLOVIN	Agricultural & domestic use	Moderate
1413SEW104	Borehole	23/12/1977	0	BALLINREA	Agricultural use only	N/A
1413SEW103	Borehole	10/02/1969	47.5	CAMAS NORTH	Agricultural use only	Poor
1413SEW100	Borehole	04/08/1977	68.3	BALLINCURRA	Agricultural use only	Poor
1413SEW098	Borehole	24/09/1968	73.2	BALLINCURRA	Agricultural use only	Poor
1413SEW099	Borehole	28/05/1968	35.4	BALLINCURRA	Agricultural use only	Moderate
1413SEW096	Borehole	14/05/1969	17.1	BALLINCURRA	Agricultural use only	Poor
1413SEW097	Borehole	08/05/1968	34.7	BALLINCURRA	Agricultural use only	Poor

1413NEW178	Borehole	1899-12-30	54.9	BALLYNEETY	Domestic use only	Good
1413SEW114	Borehole	30/07/1999	49.4	DROMBEG	Domestic use only	Good
1413SEW115	Borehole	26/05/1998	86	DROMBEG	Domestic use only	Moderate
1413SEW113	Borehole	10/07/1999	99.1	RATHCANNON	Domestic use only	Good
1413SWW128	Borehole	30/07/1999	73.8	ROSSTEMPLE	Domestic use only	Good
1413SWW125	Borehole	01/06/2000	49.4	BALLYMACRORY	Domestic use only	Good
1413SWW129	Borehole	21/11/1998	68.3	TULLOVIN	Domestic use only	Poor
1413SEW111	Borehole	24/08/1999	54.9	RATHCANNON	Domestic use only	Poor
1413SEW110	Borehole	01/08/2000	67.7	BALLINREA	Domestic use only	Good
1415SEW050	Borehole	1899-12-30	58.5	LICKADOON	Group Scheme	Excellent
1413SEW090	Borehole	01/08/1993	122	NEWTOWN	Group Scheme	Excellent
1413SEW089	Borehole	01/08/1993	0	BRUFF	Group Scheme	Good
1413NEW146	Borehole	01/02/1994	61	LOUGH GUR	Group Scheme	Excellent
1415SEW053	Unknown	1899-12-30	0	CAHERNARRY (KEANE)	Group Scheme	Good
1413NEW081	Borehole	26/09/1975	65.8	INCH ST LAWRENCE NORTH	Industrial use	N/A
1413NEW082	Borehole	31/05/1974	30.9	LUDDENBEG	Industrial use	N/A
1413SEW094	Borehole	1899-12-30	7.3	MAIDSTOWN	Other	Moderate

1415SEW052	Unknown	1899-12-30	0	DROMBANNY	Other	N/A
1415SEW059	Borehole	1899-12-30	0	DROMBANNY	Other	N/A
1413NEW143	Borehole	01/05/1964	40.6	BALLYBRICKEN	Public supply	N/A
1413NEW114	Dug well	1899-12-30	4.4	FRIARSTOWN	Unknown	N/A
1413NEW115	Dug well	1899-12-30	3.6	FRIARSTOWN	Unknown	N/A
1413NEW083	Borehole	25/06/1974	69.2	LUDDENBEG	Unknown	Poor
1413NEW113	Dug well	1899-12-30	2.6	FRIARSTOWN	Unknown	N/A
1413SEW050	Borehole	15/03/1969	26.8	BALLINCULLOO	Unknown	Moderate
1413NEW057	Borehole	17/07/1976	103.3	BALLYNAGARDE	Unknown	Poor
1413SEW049	Borehole	15/10/1969	27.4	KNOCKUREGARE	Unknown	Moderate
1413SEW047	Borehole	15/10/1965	32.3	BALLINSTONA SOUTH	Unknown	Poor
1413SEW012	Dug well	15/09/1972	2.1	BALLYCULLEEN	Unknown	Moderate
1413SEW045	Borehole	15/10/1966	33.5	DROMBEG	Unknown	Poor
1415SEW045	Borehole	15/04/1970	39	KILLONAN	Unknown	Poor
1413SEW010	Borehole	15/10/1968	14.3	GARBALLY	Unknown	Moderate
1413NEW059	Borehole	15/07/1967	45.7	KILLORATH	Unknown	Moderate
1413NEW077	Borehole	02/10/1959	46.3	GRANGE	Unknown	Poor

1413SEW039	Dug well	1899-12-30	4.6	BRACKVOAN	Unknown	Moderate
1413SEW035	Borehole	02/05/1973	32.9	DROMIN NORTH	Unknown	Poor
1413NEW112	Dug well	1899-12-30	1.2	RAWLEYSTOWN	Unknown	N/A
1415SEW032	Dug well	15/10/1968	1.8	DROMBANNY	Unknown	Good
1415SEW025	Borehole	15/09/1966	27.4	MILLTOWN	Unknown	Poor
1413NEW133	Borehole	16/11/1959	50.3	CARRIGANATTIN	Unknown	Poor
1413NEW134	Dug well	02/09/1959	6.1	LUDDENMORE	Unknown	Poor
1413NEW007	Borehole	01/03/1962	20.1	TOBERYQUIN	Unknown	N/A
1413NEW004	Dug well	1899-12-30	7	BALLYNAGARDE	Unknown	N/A
1415SEW036	Borehole	15/10/1969	26.2	LICKADOON	Unknown	Moderate
1413SEW092	Borehole	26/03/1966	30.1	ROCKBARTON	Unknown	N/A
1413SEW018	Borehole	15/08/1968	71.9	CAHIRGUILLAMORE	Unknown	Good
1413SEW019	Dug well	1899-12-30	12.2	DROMBEG	Unknown	N/A
1413NEW054	Borehole	15/09/1972	18	POULTALLOON	Unknown	Poor
1413SWW033	Borehole	01/01/1963	19.2	ROSSTEMPLE	Unknown	Moderate
1413NEW055	Dug well	30/07/1959	3.1	SKOOLHILL	Unknown	Poor
1413SEW014	Borehole	09/06/1960	27.4	ROCKBARTON	Unknown	Poor
1413SEW015	Borehole	15/06/1970	65.2	CREAN	Unknown	Poor

1413SEW013	Borehole	15/05/1965	37.5	ROCKBARTON	Unknown	Good
1413SWW024	Borehole	01/01/1965	48.8	DOHORA	Unknown	N/A
1413NEW002	Dug well	15/09/1967	5.2	BALLYNAGARDE	Unknown	Poor
1413NEW003	Spring	1899-12-30	0	BALLYNAGARDE	Unknown	Low Spring
1413NEW041	Borehole	15/08/1969	22.9	BALLYCULLANE	Unknown	Moderate
1413SEW079	Dug well	13/12/1972	2.7	GOATISLAND	Unknown	Moderate
1413NEW135	Borehole	15/07/1972	61	BALLYMACREESE	Unknown	Poor
1413NEW039	Borehole	15/06/1972	34.1	LOUGHANSTOWN	Unknown	Moderate
1415SEW010	Borehole	15/06/1967	22.5	KILLONAN	Unknown	Moderate
1413NEW130	Borehole	15/05/1971	25.6	GORTBOY	Unknown	Poor
1413NEW099	Dug well	1899-12-30	9.1	CARRIGANATTIN	Unknown	N/A
1413NEW132	Dug well	15/05/1968	6.1	GLEN	Unknown	Moderate
1413NEW100	Dug well	1899-12-30	6.1	FRIARSTOWN	Unknown	N/A
1413NEW097	Dug well	1899-12-30	4.9	LUDDENMORE	Unknown	N/A
1413NEW129	Dug well	01/03/1962	1.5	CAHERELLY EAST	Unknown	Moderate
1413NEW098	Dug well	1899-12-30	19.5	BALLYBRICKEN SOUTH	Unknown	N/A
1413NEW092	Dug well	1899-12-30	1.2	STONEPARK	Unknown	N/A
1413NEW118	Borehole	04/04/1970	29.3	BALLYVORNEEN	Unknown	Poor

1413NEW116	Borehole	1899-12-30	24.1	BALLINGOOLA	Unknown	N/A
1413NEW117	Borehole	1899-12-30	56.2	FRIARSTOWN SOUTH	Unknown	N/A
1413SEW069	Borehole	15/10/1969	56.7	GARBALLY	Unknown	Poor
1413NEW131	Borehole	06/10/1960	21.9	BRUFEA	Unknown	Poor
1413NEW070	Dug well	15/10/1965	3.4	UPPER GRANGE	Unknown	Poor
1413NEW029	Borehole	1899-12-30	11.6	BALLYNAGARDE	Unknown	N/A
1415SEW048	Borehole	14/06/1976	77.1	KILCULLEEN	Unknown	N/A
1413NEW001	Borehole	15/10/1962	50.9	GLEN	Unknown	Poor
1413NEW043	Borehole	15/02/1972	26.2	BALLYNAGARDE	Unknown	Poor
1413NEW175	Dug well	1899-12-30	0	POULTALLOON	Unknown	N/A
1413NEW066	Borehole	15/08/1970	20.1	COOLFUNE	Unknown	Moderate
1413SEW040	Borehole	15/11/1969	13.1	BRACKVOAN	Unknown	Moderate
1413NEW127	Borehole	15/07/1966	56.1	GRANGE	Unknown	Poor
1413NWW200	Borehole	15/05/1971	57.3	MONASTER SOUTH	Unknown	Moderate
1413NWW198	Dug well	12/09/1957	3.7	BALLYMACSRADEEN	Unknown	Poor
1413NEW126	Borehole	15/08/1969	33.5	GRANGE	Unknown	Moderate
1413NEW062	Borehole	10/03/1971	22.9	BALLYCULLANE	Unknown	Moderate

1413SEW052	Borehole	15/09/1971	16.8	RAYMONDSTOWN	Unknown	Moderate
1413SWW028	Borehole	01/05/1968	26.8	DOHORA	Unknown	Poor
1413NEW147	Borehole	01/11/1993	106	BALLYNEETY	Unknown	Excellent
1413SEW025	Borehole	01/05/1969	55.5	CAHIRGUILLAMORE	Unknown	Poor
1413SEW023	Borehole	10/10/1960	18.3	CLORANE	Unknown	Poor
1413NEW108	Spring	1899-12-30	0	ROCKFARM	Unknown	N/A
1413SEW024	Borehole	01/01/1971	34.7	BALLYNANTY	Unknown	Moderate
1413SEW087	Dug well	1899-12-30	6.7	BRUFF	Unknown	N/A
1413SEW022	Borehole	15/06/1971	20.7	GARBALLY	Unknown	Poor
1415SEW035	Borehole	15/04/1971	44.8	LICKADOON	Unknown	Poor
1413SWW095	Borehole	01/01/1964	45.1	BALLYNABANOGE	Unknown	N/A
1415SEW044	Borehole	1899-12-30	15.2	COOLYHENAN	Unknown	Poor
1413NEW186	Borehole	08/08/1974	45.3	BALLYBRICKEN	Unknown	N/A
1413SEW057	Borehole	15/09/1965	24.4	ATHLACCA	Unknown	Poor
1413SEW058	Borehole	15/08/1973	33.5	RATHCANNON	Unknown	Moderate
1413SEW056	Dug well	15/05/1972	4	MAIDSTOWN	Unknown	Moderate
1413NEW025	Spring	1899-12-30	2.2	SKOOL	Unknown	N/A
1413SEW034	Borehole	15/08/1971	19.2	DROMIN NORTH	Unknown	Moderate

1413SEW009	Borehole	15/09/1969	32	CARRIGEEN	Unknown	Moderate
1413SEW007	Borehole	1899-12-30	33.5	CREAN	Unknown	Moderate
1413SEW020	Dug well	15/06/1968	4.3	CAMAS SOUTH	Unknown	Poor
1413SEW008	Borehole	15/08/1970	45.7	CREAN	Unknown	Moderate
1413SEW033	Borehole	15/04/1973	27.7	DROMIN NORTH	Unknown	Poor
1413SWW019	Borehole	15/08/1971	24.4	BALLYMACRORY	Unknown	Poor
1413SWW017	Borehole	15/07/1971	16.8	ANHID WEST	Unknown	Moderate
1413SWW018	Borehole	15/06/1965	14	ANHID WEST	Unknown	Moderate
1413NEW052	Borehole	15/04/1971	15.5	SKOOLHILL	Unknown	Moderate
1413SEW042	Borehole	15/10/1972	22.3	RATHCANNON	Unknown	Moderate
1413SEW078	Dug well	10/09/1973	1.5	GOATISLAND	Unknown	Moderate
1413SEW041	Dug well	15/08/1972	4.6	RATHCANNON	Unknown	Moderate
1413SEW028	Dug well	15/02/1968	2.4	BALLYANIA	Unknown	Poor
1413SEW011	Borehole	15/09/1967	45.9	BALLYCULLEEN	Unknown	Moderate
1413NEW075	Borehole	20/12/1960	22.9	LOUGHGUR	Unknown	Poor
1413NEW076	Borehole	22/08/1959	51.5	LOUGHGUR	Unknown	Moderate
1413SEW005	Borehole	15/10/1968	36.6	BRUFF	Unknown	Poor
1413SEW003	Borehole	1899-12-30	36.6	DROMBEG	Unknown	Poor
1413SEW004	Borehole	1899-12-30	24.4	CREAN	Unknown	Poor

1413SEW001	Borehole	15/09/1967	30.5	BALLYCULLEEN	Unknown	Moderate
1413SEW002	Borehole	15/11/1967	27.1	CAMAS NORTH	Unknown	Poor

Even in the absence of GSI recorded wells it has been assumed that Rural dwellings in the vicinity of the main development site are supplied by unrecorded wells and potential impacts on these have been assessed as to ensure a comprehensive assessment.

There is no existing water supply at the main development site and no connection to a public or group water scheme is required as part of the proposed development.

There is no groundwater source protection area (SPA) identified by the GSI (GSI, 2025) at the site, however the Bruff Public Supply Groundwater SPA is located approximately 1.98km east of the main development site at its closest point (underlain by Locally Important Aquifer (Lm).

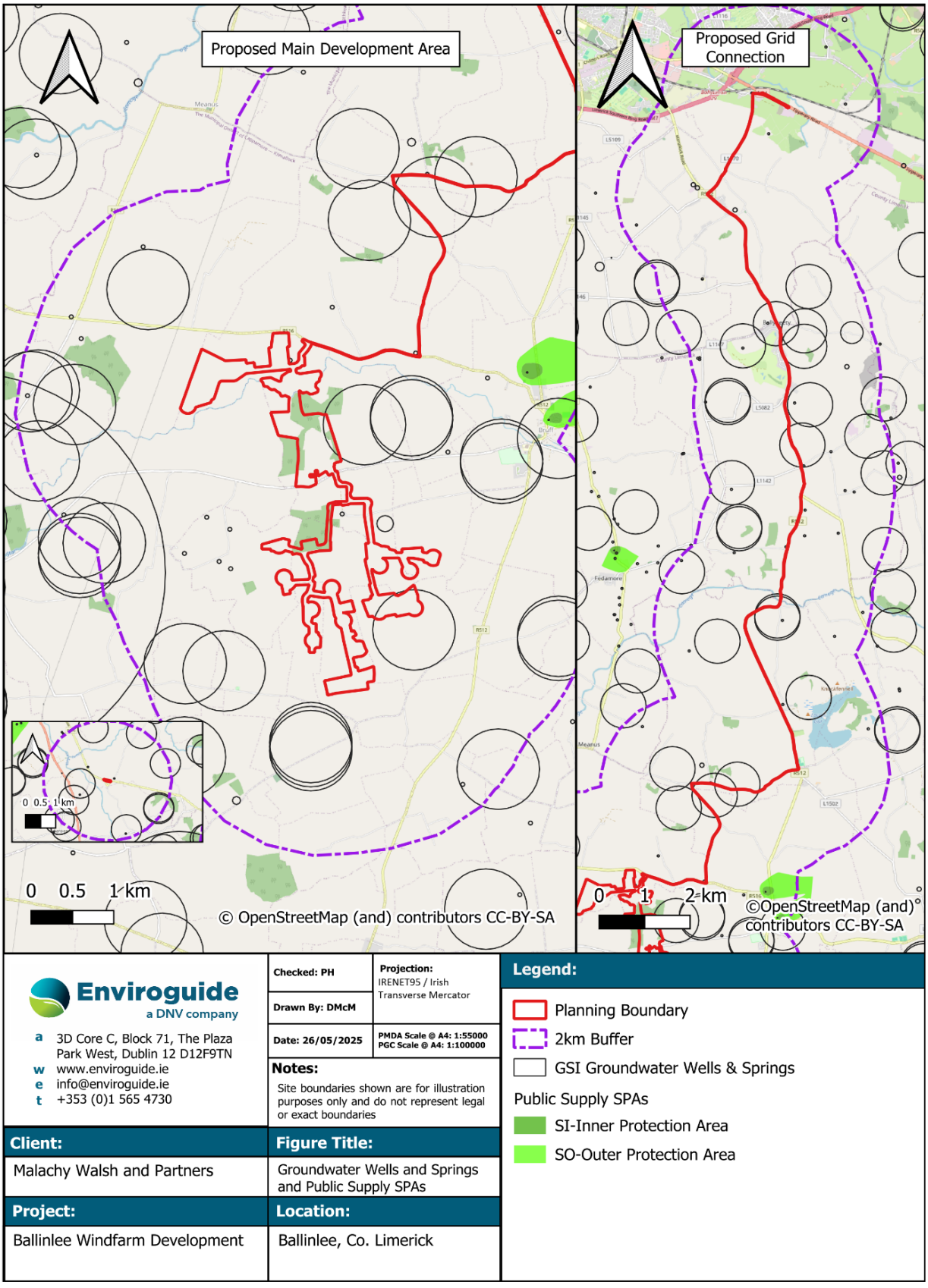

Figure 9-7: Groundwater Wells, Springs, and Public Supply SPA's

9.2.9. Water Quality Data

9.2.9.1. Published Regional Surface Water Quality

The EPA surface water quality monitoring database (EPA, 2025) was consulted. A summary of the most recent published EPA water quality monitoring data (EPA, 2025) for waterbodies which have a potential hydraulic connection to the site is presented in Table 9-9.

Table 9-9: Surface Water Quality

WFD Waterbody Name	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2020)
Morningstar_060	Ammonia-Total (as N)	Annual	High	Upwards	0.016mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Upwards	1.344mg/l
	ortho-Phosphate (as P)- unspecified	Annual	Poor	Downwards	0.065mg/l
Maigue_050	There is no monitoring data available for review.				
Maigue_060	Ammonia-Total (as N)	Annual	High	Upwards	0.026mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Upwards	1.715mg/l
	ortho-Phosphate (as P)- unspecified	Annual	Poor	Downwards	1.715mg/l
Maigue_070	Ammonia-Total (as N)	Annual	High	Downwards	0.027mg/l
	ortho-Phosphate (as P)- unspecified	Annual	Poor	Downwards	0.069mg/l
Maigue_080	Ammonia-Total (as N)	Annual	High	Downwards	0.029mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Upwards	1.693mg/l
	ortho-Phosphate (as P)- unspecified	Annual	Poor	Downwards	0.068mg/l
Maigue_090	Ammonia-Total (as N)	Annual	High	Upwards	0.032mg/l
	ortho-Phosphate (as P)- unspecified	Annual	Poor	Downwards	0.0614mg/l

The status of individual estuarine and coastal water bodies is assessed using the EPA's Trophic Status Assessment Scheme (TSAS). This assessment is required for the Urban Waste Water Treatment Directive and Nitrates Directive. The scheme compares the compliance of individual parameters against a set of criteria indicative of trophic state (Table 9-10). These criteria fall into three different categories which broadly capture the cause-effect relationship of the eutrophication process, namely nutrient enrichment, accelerated plant growth, and disturbance to the level of dissolved oxygen normally present.

Table 9-10: Trophic Status Assessment Scheme

Waterbody	Trophic Status	Condition
Maigue Estuary	Intermediate	Intermediate status water bodies are those which breach one or two of the criteria.
Upper Shannon Estuary	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category.
Lower Shannon Estuary	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category.
Fergus Estuary	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category.
Clonderalaw bay	Intermediate	Intermediate status water bodies are those which breach one or two of the criteria.
Foynes Harbour	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category.
Mouth of the Shannon	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category.

9.2.9.2. Published Regional Groundwater Quality

The EPA (EPA, 2025) groundwater monitoring data was reviewed and there are no groundwater quality monitoring stations within a 2km radius of the site or that are hydrologically connected to the site.

9.2.10. Water Framework Directive

The WFD status for river, lake, groundwater, transitional and/or coastal water bodies that have a potential hydraulic connection to the subject site as recorded by the EPA (EPA, 2025) in accordance with European

Communities (Water Policy) Regulations 2003 as amended (SI no. 722/2003) are provided in **Table 9-11** and **Figure 9-7**.

Table 9-11: Water Framework Directive Status

Waterbody Name	Waterbody EU Code	Location from Site	Distance Downstream of the Site (km)	WFD Status (2016-2021)	WFD Risk	Hydrological Connection to the Site
River Waterbodies						
Morningstar Catchment						
Morningstar_060	IE_SH_24M02 0800	Onsite	Onsite	Good	Review	Yes, hydrologically connected to site.
Camoge Catchment						
BALLYCULLANE (Limerick)_010	IE_SH_24B90 0440	Northeast	Onsite (Crossing)	Poor	At Risk	Yes, hydrologically connected to site
CAMOGE_020	IE_SH_24C01 0400	Northeast	Onsite (Crossing)	Poor	At Risk	Yes, hydrologically connected to site
CAMOGE_030	IE_SH_24C01 0600	Northeast	6.7km	Poor	At Risk	Yes, hydrologically connected to site
Ballynaclogh Catchment						
BALLYNACLOGH_010	IE_SH_24B04 0800	North	2.08km	Moderate	Review	Yes, hydrologically connected to site
Groody Catchment						
WHITEHALL_010	IE_SH_25W21 0770	Northeast	0.5km	Poor	At Risk	Yes, hydrologically connected to site
GROODY_010	IE_SH_25G05 0200	Northeast	Onsite (Crossing)	Moderate	At Risk	Yes, hydrologically connected to site
SHANNON (LOWER)_060	IE_SH_25S01 2600	Northeast	2.35km	Moderate	Review	Yes, hydrologically connected to site
Maigue Catchment						
Maigue_050	IE_SH_24M01 0500	Southwest	6.16km	Good	Not at Risk	Yes, downstream of the site.
Maigue_060	IE_SH_24M01 0600	West	6.22km	Moderate	At Risk	Yes, downstream of the site.
Maigue_070	IE_SH_24M01 0700	Northwest	8.78km	Moderate	At Risk	Yes, downstream of the site.

Maigue_080	IE_SH_24M01 0900	Northwest	10.36km	Poor	At Risk	Yes, downstream of the site.
Maigue_090	IE_SH_24M01 0980	Northwest	13.62km	Poor	Review	Yes, downstream of the site.
Transitional Waterbodies						
Maigue Estuary	IE_SH_060_0 700	Northwest	15.43km	Moderate	At Risk	Yes, downstream of the site.
Upper Shannon Estuary	IE_SH_060_0 800	Northwest	24.14km	Poor	At Risk	Yes, downstream of the site.
Lower Shannon Estuary	IE_SH_060_0 300	Northwest	31.71km	Good	Not at Risk	Yes, downstream of the site.
Fergus Estuary	IE_SH_060_1 100	Northwest	32.27km	Moderate	At Risk	Yes, downstream of the site.
Deel Estuary	IE_SH_060_0 600	West	32.19km	Moderate	At Risk	Yes, downstream of the site.
Clonderalaw Bay	IE_SH_060_1 200	Northwest	49.05km	Moderate	Review	Yes, downstream of the site.
Coastal Waterbodies						
Mouth of the Shannon	IE_SH_060_0 000	West	61.03km	Good	Not at Risk	Yes, downstream of the site.
Groundwater Bodies						
Hospital GWB	IE_SH_G_107	Underlying	0km	Good	Not at Risk	Underlying
Fedamore GWB	IE_SH_G_084	Underlying	0km	Good	Not at Risk	Underlying
Bruree GWB	IE_SH_G_046	Underlying	0km	Good	At Risk	Underlying
Knockroe Northwest GWB	IE_SH_G_130	Underlying	0km	Good	Not at Risk	Underlying
Knockroe Southwest GWB	IE_SH_G_131	Underlying	0km	Good	Not at Risk	Underlying
Herbertstown GWB	IE_SH_G_106	Underlying	0km	Good	At Risk	Underlying
Ballingarry	IS_SH_G_022	Underlying	0km	Good	At Risk	Underlying

Ballyneety GWB	IE_SH_G_036	Underlying	0km	Good	Not at Risk	Underlying
Limerick City East GWB	IE_SH_G_138	Underlying	0km	Good	At Risk	Underlying
Patrickswell	IE_SH_G_197	Underlying	0km	Good	Not at Risk	Underlying
Castleconnell	IE_SH_G_052	East	1.5km	Good	Not at Risk	Potential hydrogeological connection
Industrial Facility (P0650-02)	IE_SH_G_260	Underlying	0km	Good	Not at Risk	Potential hydrogeological connection
Slieve Phelim	IE_SH_G_213	East	1.4km	Good	Not at Risk	Potential hydrogeological connection
Ballyneety	IE_SH_G_036	East	1km	Good	Not at Risk	Potential hydrogeological connection
Note: the main development site (wind farm) is only underlain by the Hospital, Fedamore and Bruree GWB's.						

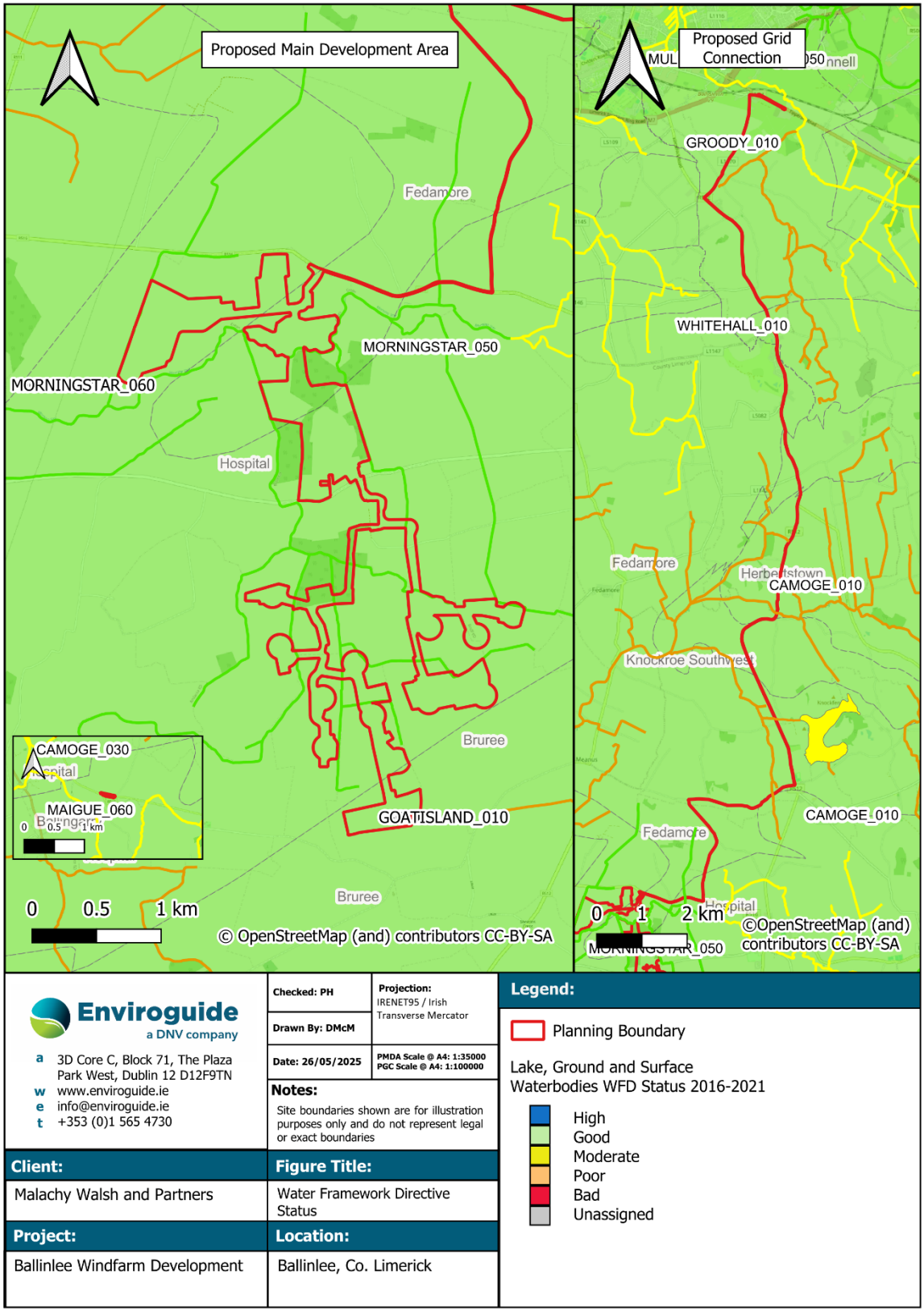

Figure 9-8: Water Framework Directive Status

9.2.10.1. 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.

Protected areas have been considered in line with EU Nature Restoration Regulation EU2024/1991 which sets legally-binding restoration targets that will increasingly shape Irish plan-making. These provisions sit alongside, not instead of, the Habitats/Birds Directives and the WFD, but now with additional restoration outcomes to consider.

There are three (3 No.) Natura 2000 sites that are identified with a potential hydraulic connection to the site and Proposed Development. There are also thirteen (13 No.) pNHA identified with a potential hydraulic connection to the site and Proposed Development. The Natura 2000 sites and other protected and designated sites or areas with a potential hydraulic connection to the site are summarised in Table 9-12 and Figure 9-8. Note that although a designated site may be hydrologically connected to the Proposed Development, that does not necessarily mean that the designated site has potential to be affected. Due to the distances involved and dilution within the waterbodies, it is unlikely for potential pollutants to migrate to the majority of designated sites in concentrations sufficient to cause adverse effects. Refer to Chapter 6 Biodiversity, the Natura Impact Statement and Appendix 9A Water Framework Directive Assessment for further details.

Table 9-12: 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, hydrologically upstream of the Site
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				

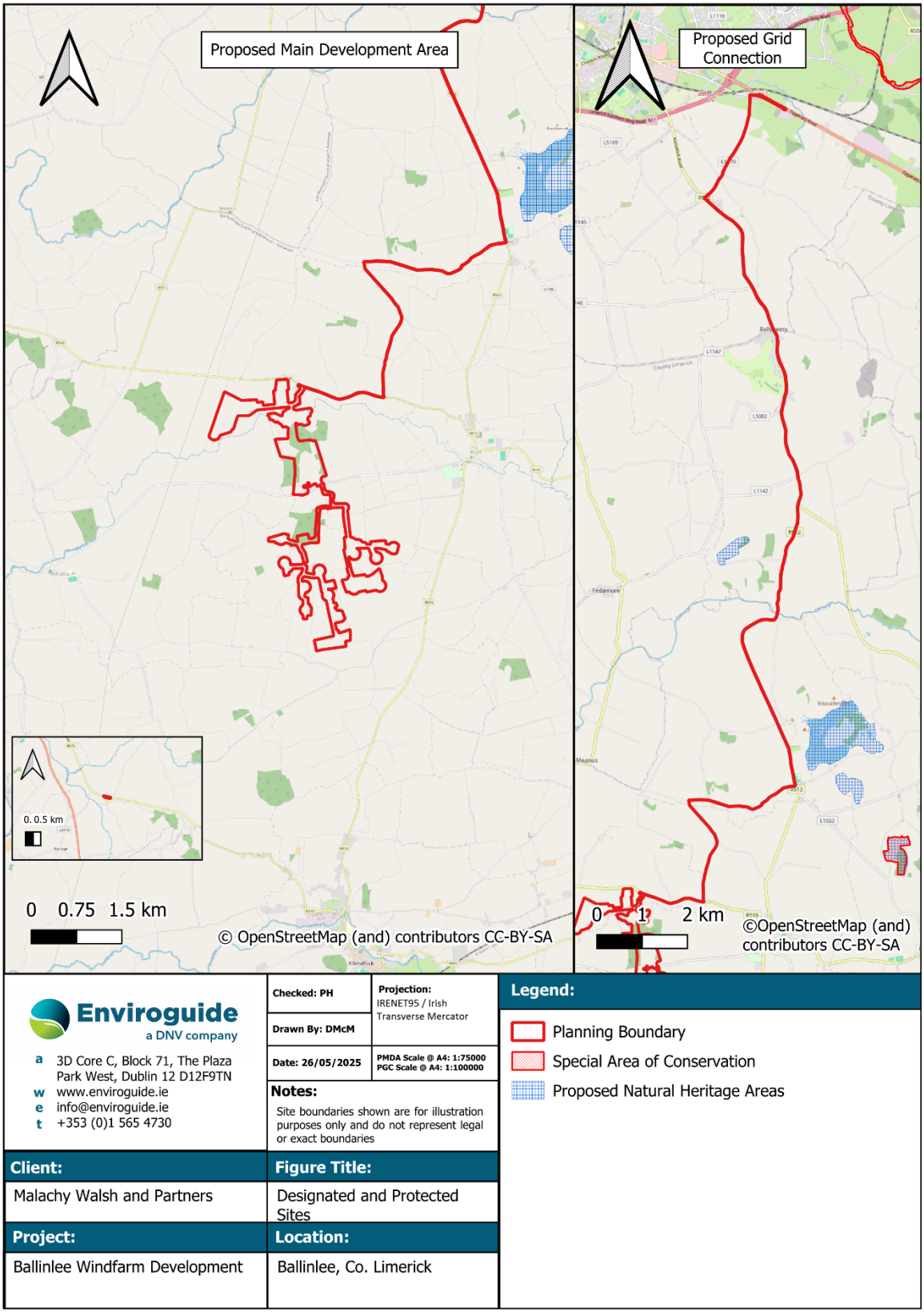

Figure 9-9: Designated and Protected Sites

9.2.10.2. 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.

9.2.10.3. 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.

9.2.10.4. 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 100km downstream of the site.

9.2.10.5. 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.

9.2.10.6. Water Framework Directive Assessment Summary

The Water Framework Directive Assessment Report (Enviroguide Consulting, 2025) (Appendix 9A), considered if any specific components or activities associated with the Proposed Development would 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 also identifies any waterbodies with the potential to be impacted, describe the proposed mitigation measures, and define any residual potential impacts.

The WFD assessment 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.

Consequently, as per the Water Framework Directive Assessment Report provided in Appendix 9A, 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.

9.2.11. Importance of Receiving Environment

The receiving water bodies have been assigned a WFD Status of 'good' for groundwater, and 'good' for the closest surface water bodies hydrologically connected to site of the Proposed Development (EPA, 2025).

The bedrock aquifer beneath the majority of the main development site is mapped by the GSI (GSI, 2025) as a Locally Important Aquifer (Aquifer Category: LI) which is generally moderately productive, only in local zones. Some of the northern portion of the main development site is mapped as a Regionally Important Aquifer - Karstified (diffuse) (Aquifer Category: Rkd). The southern portion of the main development site is mapped as Regionally Important Aquifer - Fissured bedrock (Aquifer Category: Rf). Furthermore, the GSI (GSI, 2024) 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).

Overall, taking account of the receiving hydrological environment, in accordance with the criteria set out in Table 9-1, the site of the proposed development is considered to be of 'High' importance.

9.3. Characteristics of the Proposed Development

9.3.1. 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 presented in EIAR, Volume II, Chapter 04, Civil Engineering. The construction of the proposed development will principally comprise of the following works:

- Forestry removal (between conifer plantation, immature woodland and mixed broadleaved/conifer woodland) of 14.4hectares, 924m of treeline and 1,578m of hedgerow is to be removed.
- 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 locations. 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 compounds 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 e.g. cohesive clays) with a foundation of 0.5-1.5m depending on the local bedrock profile. If poor ground conditions are encountered during excavation and a significant depth to sub-formation is required, a piled foundation may be considered. 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 in EPA mapped watercourses. Minor works will be required to existing surface water drains as part of the construction works.

9.3.1.1. Borrow Pits

There are two (2) No. proposed on-site borrow pit locations which have been identified to provide fill material for internal tracks, passing bays, hardstands, foundations, and the temporary compounds. It is estimated that these will provide 99,852 m^3 (61%) of aggregate material required for the development.

The extraction of rock from the borrow pits is proposed to be undertaken by a combination of rock breaking and ripping.

During the construction period, and post-excavation, the borrow pit areas and the other deposition areas will act as material storage areas for the management of excess material generated on the site during construction. Post-construction, the borrow pits will be filled with excess material generated on the site during construction and thereafter topped with topsoil recovered from construction areas and stored for later use in landscaping. The borrow pit sites will then be revegetated and restored to its current use as pasture.

Based on the findings of the Ground Investigation (Northwest Geotech, 2024), 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.

9.3.1.2. Surface Water Management

A site surface water management system as per the SWMP (EIAR Volume III, 2E) will be constructed on the site to attenuate run-off, guard against soil erosion, safeguard downstream water quality and ensure existing hydrological / hydrogeological flows regimes are maintained. 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 EIAR, Volume II, Chapter 04, Civil Engineering.

The Wind farms 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 access 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 tracks 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 the 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 over-topping 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 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.

9.3.1.3. Watercourse Crossings

The internal access tracks at the main development site will require several crossings of the watercourses described in Section 9.2.6.1. 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. Clear span pre-cast concrete culverts are the preferred option for crossing minor tributaries of the Morningstar River. However, consultation with the Office of Public Works and Inland Fishers Ireland will be carried out and the options of a closed conduit,

either pipe or box culvert, will be decided on. Culvert crossings will also be required to facilitate internal access across the minor tributaries of the Morningstar River throughout 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 under some of these structures may be required.

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 HDD solution will be required at this location.

9.3.1.4. Temporary Construction Compounds and Welfare Facilities

Three (3) No. temporary construction compounds will be set up upon commencement of the construction phase.

The compound 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 compound capable of handling the demand during the construction phase. The discharge from the toilet within each building 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 compound will be decommissioned by backfilling the area with the material arising during excavation and landscaping with topsoil.

9.3.1.5. 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. There will also be a very small water requirement for welfare facilities (i.e., toilet flushing and hand washing). It is estimated that up to approximately 3,000 litres per day of potable water will be required during peak construction for 80no. construction employees. It is proposed that this water requirement will be imported in bulk water tanks.

9.3.2. 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 outflow via either overland (and allowed to infiltrate to ground) or to an existing drainage ditch in the case of the IPP & SS compounds. The site surface water management system constructed during the construction phase of the proposed development (refer to Section 9.3.1.2) will be implemented and maintained

for the operational phase of the proposed development. Details of the proposed site drainage system are described in EIAR, Volume II, Chapter 04, Civil Engineering.

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. 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. Water for the waste water facilities at the substation compound will be serviced by a greywater rainwater harvesting 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 as amended. The remaining wastes will all be removed from site and reused, recycled, or disposed of in an authorised facility in accordance with best practice.

9.3.3. Decommissioning and Restoration

9.3.3.1. 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 landowner.

9.3.3.2. 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.

9.4. Potential Impact of the Proposed Development

9.4.1. Construction Phase

In the absence of appropriate mitigation measures during the construction phase of the proposed development there could be an effect on the receiving water environment including the following receptors:

- Underlying receiving GWBs:
    - Main Development Site: the Hospital GWB, the Bruree GWB and the Fedamore GWB.
    - Proposed Grid Connection Route: the Fedamore GWB, the Knockroe Northwest and Knockroe Southwest GWBs, the Herbertstown GWB, the Ballyneety GWB and the Limerick City East GWB.
    - Tullovin Access track: Ballingarry GWB
- Downstream receiving waterbodies: the Morningstar River, the Camoge River, the Groody River, the Maigue River, associated minor tributaries and the Shannon Estuary.
- Regionally groundwater flow is in a general north westerly direction towards the Shannon Estuary. Local groundwater flows will be to the receiving surface waterbodies in the immediate sub-catchment.
- The GSI (GSI, 2025) have identified 70No. groundwater sources within a 2km radius of the site including the route of the proposed grid connection.
- There are 3No. Natura 2000 Sites and 13No. pNHAs with an identified hydrological connection to the site and proposed development. Due to the distances involved and dilution within the waterbodies, it is unlikely for potential pollutants to migrate to the majority of designated sites in concentrations sufficient to cause adverse effects. The Natura 2000 sites are assessed and described in further detail in Chapter 06 of this EIAR.

9.4.1.1. 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. Therefore, there is no pressure on surface or groundwater sources for water supply on site.

Several minor crossings of the Morningstar Rivers tributaries will be required in addition to a crossing of the Morningstar River itself. The construction of watercourse crossings has the potential to adversely constrain flow if not appropriately sized with effects on channel velocities, scour and erosion. The proposed crossing of the Morningstar river is an appropriately sized clear span structure which negates the potential for adverse effects. Appropriately sized clear span pre-cast concrete culverts are the preferred installation for the minor culvert crossings as this also avoids instream works and potential sediment mobilisation.

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 (as described in Section 9.2.5.1) there may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels ranging between 1.mbgl and 2.30mbgl), where encountered during groundworks. Based on the findings of the Ground Investigation (EIAR, Volume III, Appendix 8A Northwest Geotech Ltd, 2024 Ground Investigation Report), 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. Excessive and prolonged dewatering / water abstraction can depress ground water levels in the vicinity of the abstraction point. However, 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 construction stage surface water drainage network and allowed to infiltrate to ground (at appropriate buffer from watercourses i.e. >=20) 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 ensuring only clean/uncontaminated water will be released.

Overall, it is considered that any impact on the hydrological and hydrogeological flow regime during the Construction Phase will be '**adverse**', '**imperceptible**' to '**slight**' and '**temporary**' within a very localised zone of the aquifer only and there will be no impact on the flow regime of receiving water bodies.

9.4.1.2. Water Quality

Near-stream Works – No in-stream works will be required in EPA mapped watercourses. Minor works will be required to existing surface/land drains as part of the construction phase. The treated surface water drainage will outfall to an existing surface water drain for the IPP & SS compounds and culvert crossings. 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 introduction of contaminants to the watercourse, some disturbance of the stream bed and increased suspended solids content of the water downstream of the works area during the construction works. Increased suspended solids in a watercourse raise turbidity, reducing light penetration and limiting photosynthesis, which disrupts the aquatic food web. Settling solids can smother spawning grounds and benthic habitats, while fine particles clog fish gills, causing stress or mortality. They often carry organic matter, increasing oxygen demand and lowering dissolved oxygen levels, and can transport pollutants like excess nutrients and heavy metals, leading to further contamination. The size and associated assimilative capacity of a watercourse is a key factor in defining the magnitude of potential impact, with smaller watercourses having less capacity to accept runoff without adverse effects This may result in an '**adverse**', '**moderate**', '**short-term**' impact on the receiving Morningstar River, its tributaries and Maigue River depending on the nature of the incident. Effects on

downstream waterbodies such the Shannon are unlikely due to the distances involved, dilution and the nature of the proposed works.

Watercourse Crossings - There is the potential for some disturbance of the stream banks and bed and increased suspended solids content of the water downstream of the works area during the construction of clear span bridges across the Morningstar River and culvert crossings of minor streams / drainage channels. Potential effects are the same as described under "Near-Stream Work" above. There are 9 No. proposed crossings of EPA registered watercourses including the Morningstar river crossing. This may result in an '**adverse**', '**moderate**', '**medium-term**' impact on the receiving Morningstar River, its tributaries and Maigue River depending on the nature of the incident. 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 may include HDD (horizontal directional drilling) at 4 no. crossings, existing service or watercourse, 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 an accidental release of fracturing lubricants and oils with subsequent contamination of the receiving waterbody. In the event of a worst-case scenario, it is considered that the impact of directional drilling has the potential to have '**adverse**', '**temporary**', '**moderate to significant**' impact on the receiving and downstream watercourses.

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. In the event of such scenarios, it is considered that this could result in '**adverse**', '**moderate to significant**' and '**temporary**' impact on a local area of the underlying aquifer environment and the receiving Morningstar River and downstream waterbodies depending on the nature of the incident. Appropriate controls will be in place to prevent this unlikely scenario, refer to **Section 9.5.1** below.

Rock Blasting (if required) - Mechanical excavation will be primarily employed at the turbine locations, hardstands and borrow pits. In the unlikely event that rock unsuitable for ripping is discovered, blasting may be necessary. No blasting works will take place at the borrow pits. If blasting is required at turbine foundations, it will result in some level of ground vibration and air overpressure. The primary effect of rock blasting with regard to hydrology and hydrology is the generation and expansion of fractures and joints within the rock leading to increased connectivity both vertically and laterally. This may potentially create pathways for contaminants and increased risk to water quality of the underlying aquifer. However, the blasting will take place at lessor depths and effects of blasting on connectivity will be highly localised to the blasting site, even when karst is considered. Although the highly localised effect on the rock will be permanent, the potential sources of pollution will be solely derived from construction activities and as such are temporary. As such it is considered that this could result in an '**adverse**', '**slight to moderate**' and '**temporary**' impact on a local area of the underlying aquifer environment.

Discharge of Entrained Sediment or Other Contaminants in Surface Runoff (Overland Flow) - There is a risk of runoff with entrained sediment or other contaminants from internal access tracks within the site or other contaminants (agricultural derived nutrients, organic matter, heavy metals from machine wear) from groundworks areas and stockpiled soils entering the receiving Morningstar River, its tributaries and Maigue River via overland flow. Excess runoff entering watercourses can carry sediment that smothers existing bed forms (and associated habitats) and alters the chemical composition of the watercourse. The size and associated assimilative capacity of a watercourse is a key factor in defining the magnitude of potential impact, with smaller watercourses having less capacity to accept runoff without adverse effects. 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 via either overland (and allowed to infiltrate to ground) or to an existing drainage ditch in the case of the IPP & SS compounds. The measures required to manage runoff are detailed in **Section 9.5.1**. However, in the absence of standard mitigation measures, there is a potential '**adverse**', '**moderate**' and '**medium-term**' impact on the receiving water quality and WFD status of the Morningstar River, its tributaries and downstream receiving waterbodies. 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 (excess sedimentation, oils, lubricants etc.) migrating offsite via existing surface water drainage along public roads. Mobilised contaminants may then be conveyed to receiving watercourses with subsequent adverse effects. It is considered that this could result in '**adverse**', '**moderate**' and '**medium-term**' impact to water quality of the Morningstar River, the Camogue River, the Groody River, the Maigue River and downstream waterbodies. Appropriate standard controls will be in place to prevent this unlikely scenario, refer to **Section 9.5**. Effects on downstream waterbodies such the Shannon are unlikely due to the distances involved, dilution and the nature of the proposed works.

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, Ballingarry 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 standard mitigation, the release of contaminants used onsite could enter the underlying aquifer and rapidly migrate towards receiving watercourses including the Morningstar River, the Maigue River and the Shannon Estuary. In the event of such scenarios, it is considered that this could result in an '**adverse**' '**significant**' and '**medium term**' impact on the underlying aquifer environment and the receiving waterbodies depending on the nature of the incident. Appropriate standard controls will be in place to prevent this unlikely scenario, refer to **Section 9.5**. Effects on downstream waterbodies such the Shannon are unlikely due to the distances involved, dilution and the nature of the proposed works.

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. Concrete and other cement-based products are highly alkaline and corrosive and can have significant adverse impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of ≥6 to ≤ 9 is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement-based products into watercourses directly or indirectly represents a risk to the aquatic environment. Freshwater ecosystems are dependent on stable near neutral pH hydrochemistry. They are extremely sensitive

to the introduction of high pH alkaline waters into the system. Overall, the use of cementitious material at the site may result in an '**adverse**', '**significant**' and '**medium-term**' impact on the receiving water environment at the site. However, it is noted that any concrete discharged would be accidental, localised to the immediate vicinity of the construction works and of limited volume. Effects on downstream waterbodies such the Shannon are unlikely due to the distances involved, dilution and the nature of the proposed works.

Flood Risk - During the construction phase, there is a potential risk that flood events, particularly those associated with intense or prolonged rainfall, could mobilise pollutants present onsite. These pollutants may include suspended sediments, hydrocarbons, cementitious materials, and other deleterious substances associated with construction activities.

Floodwaters can act as a transport mechanism, carrying these contaminants offsite and into nearby surface waterbodies resulting in a temporary deterioration in water quality due to contaminant mobilisation and increased sedimentation.

While there is a risk of flooding in parts of the Proposed Development, the risk of flood-related impacts during construction is considered unlikely as the majority of the development is in Flood Zone C. Only 4 turbines are located in Flood Zone A & B where the probability of flooding is greater than 1%. Given the nature of the construction phase is temporary this also reduces the window of exposure to potential flood events. Overall, flood events during the construction phase have the potential to have '**adverse**', '**temporary**', '**moderate**' to '**significant**' effects on hydrological receptors.

Wastewater - During the construction phase of the Proposed Development, there is a potential risk of contamination to surface water and groundwater from accidental leaks associated with welfare facilities. In particular, if a foul water holding tank were to leak, it could introduce pollutants such as nutrients, pathogens, or hydrocarbons into the underlying groundwater body, posing a risk to water quality. If not properly managed, such incidents could pose a threat to nearby surface water and groundwater receptors through contamination with nutrients or pathogens. However, foul water generated from temporary welfare facilities (e.g., toilets, washrooms, and canteens) during the construction phase of the Proposed Development will be managed in accordance with relevant waste management legislation and best practice guidelines. These facilities will be self-contained, and all wastewater will be collected in sealed storage tanks. The contents of these tanks will be regularly removed by a licensed waste contractor and transported offsite to an authorised wastewater treatment facility. It is considered that any impact relating to wastewater during the construction phase will be '**neutral**', '**imperceptible**' and '**temporary**'.

Invasive Species - Invasive species (either terrestrial or aquatic), their potential introduction / mobilisation during the construction stage and mitigation required has been considered as part of **Chapter 6** Biodiversity.

9.4.2. Operational Phase

9.4.2.1. 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 '**adverse**', '**imperceptible**' and '**permanent**' 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 excavation depths required will likely have negligible effect on the groundwater flow regime. Certain watercourse crossings (e.g., River Camogue) may 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. It is considered that the likely impact on the hydrogeological regime of the underlying aquifers as a result of the proposed grid connection will be '**neutral**', '**imperceptible**' and '**permanent**'.

9.4.2.2. Hydrological Flow Regime

Surface water runoff from the Proposed Development, which will be managed in accordance with the principles and objectives of SuDS and will be treated and attenuated prior to outflow via either overland (and allowed to infiltrate to ground) or to an existing drainage ditch in the case of the IPP & SS compounds.. 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. The proposed measures will ensure that existing flow rates and paths are maintained during the operational phase. Impacts to the hydrological flow regime will likely be **'neutral', 'imperceptible'** and **'permanent'**.

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. As all elements of the proposed grid connection are to be below ground or with existing bridge structures there will have no potential to effect surface hydrology (pathways or flow rates) during the operation phase. It is considered that the likely impact on the hydrogeological regime of the underlying aquifers as a result of the proposed grid connection will be **'neutral', 'imperceptible'** and **'permanent'**.

9.4.2.3. 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. It is considered that the likely impact on the water quality form surface water runoff will be **'adverse', 'imperceptible' to 'slight'** and **'permanent'**.

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 development's 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 and there would be a '**adverse**', '**moderate**' to '**significant**' and '**medium-term**' to '**long-term**' impact on a local area of the underlying aquifer environment and the receiving Morningstar Stream and its tributaries. Effects further downstream (Maigue, Shannon etc.) are unlikely to be perceptible due the volume of the receiving waterbodies and subsequent dilution.

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. It is considered that the likely impact on the water quality from wastewater generated onsite will be **'neutral'**, **'imperceptible'** and **'long-term'** given that it will be managed and removed offsite in accordance with all necessary statutory contents and waste management legislation.

Flood Risk – Part of the site is 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. Overall, flood events during the operational phase have the potential to have **'adverse'**, **'imperceptible', 'permanent'**, effects on water quality and hydrological receptors.

9.4.2.4. 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 standard 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. Likely impacts to flood risk as a result of the proposed development are **'adverse', 'imperceptible'** to **'slight'** and **'permanent'**.

9.4.2.5. 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.

The 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.

9.4.3. 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. Existing pressures have been taken into account in the baseline status assessment. Additional potential loading from in-combination events/developments are considered in this section.

As part of this assessment, other offsite developments and proposed offsite developments as detailed in Chapter 01 of this EIAR were reviewed and considered for possible cumulative effects with the Proposed Development.

The Garrane windfarm is the only proposed or permitted wind farm development located within the same hydrological catchment as the proposed development. A “temporary transition compound” for turbine components may also be 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, solar farms, and farm structures, are at least 3.3 km from the Wind Farm site. These projects have the potential to have adverse effects on water quality due to potential pollution events (excess sedimentation or introduction of contaminants) during construction. Cumulative effects from the Ballysimon Bridge construction over the River Groody are considered imperceptible to slight, as most work will be within existing infrastructure.

9.4.3.1. Water Resources

Water supply requirements to the proposed development will be minimal. Where required, water supply during the construction phase will be provided via import of bulk water tanks in accordance with all necessary statutory consents. There will be no potable water connection to be made to either a group water scheme or public supply. 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.

9.4.3.2. Water Quality

Foul water from the Proposed Development will be collected and tankered offsite (during construction and operation) as and when required to a licenced facility for disposal. During operation, 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 through the mobilisation of sediment or introduction of contaminants to hydrologically or hydrogeologically connected waterbodies. Distance and dilution is considered a mitigating factor for potential cumulative adverse effect on water quality. If coinciding pollution events were to occur during the construction phase there is potential for **'adverse', 'slight' to 'moderate'** and **'long term'** cumulative impacts on the Maigue, Groody, Shannon River /estuary in the immediate vicinity of the confluence. Cumulative affects during the operational phase are considered to have a considerably lessor potential for adverse effects due to the limited sources. Cumulative affects during the operational phase are seen as **'adverse', 'imperceptible'** and **'permanent'.**

However, 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 negligible effects on hydrology and hydrogeology (water environment). 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.

9.4.4. "Worst Case" Scenario

During the construction, operational and decommissioning phases of the proposed development, in a worst-case scenario, such as extreme weather during construction combined with a fuel spill / accidental unmitigated release of other hazardous compounds occurring leading to excess sedimentation and contamination of surface and groundwater, in the absence of any standard mitigation measures it is considered that there would be a potential **'adverse'**, **'significant'**, **'medium term'** impact on the quality of the underlying aquifers. Taking account of the limited attenuation within the aquifers, it is considered that there is also an indirect risk to the downstream receiving waterbodies (i.e., Morningstar River and Maigue River and Natura 2000 sites). However, this worst-case scenario is deemed to be an unlikely scenario taking account of the embedded design avoidance measures and mitigation measures and also due to the volume of the receiving waterbodies and subsequent dilution.

9.5. Avoidance, Remedial & Mitigation Measures

The measures outlined in this section of the report will ensure that there will be no significant impact on the receiving groundwater and surface water environment and associated receptors (e.g., Natura 2000 sites). 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.

9.5.1. Construction Phase

During the Construction Phase, all works will be undertaken in accordance with the Construction Environmental Management Plan (CEMP) (EIAR Volume III, 2A), Surface Water Management Plan (EIAR Volume III, 2E) and the Resource and Waste Management Plan (RWMP) (EIAR Volume III, 2B). 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, SWMP 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.
- Temporary soil storage.
- Fuel storage/refuelling.
- Concrete chute wash-out area.
- 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.

Management of surface water runoff 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 20m buffer will be retained for construction works. Site traffic will only be permitted within this buffer to facilitate near-stream works.

All 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 and hydraulic fuels. Where possible, near-stream works will take place outside the period July 1st to September 31st in line with 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 (as set out in Chapter 04 Civil Engineering and CEMP), guard against soil erosion and safeguard downstream water quality. Silt traps, silt fences and settlement ponds will 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 the 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 construction 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, additional modules will be added to the settlement pond until the required standards are met. Works will be ceased until the cause of the difference is identified and (if it is associated with the works) rectified.

Works for the construction of closed conduit culverts and permanent surface water drainage features to the existing surface water drains and tributaries of the Morningstar River will include the following measures:

- An ECoW will be present onsite to oversee the 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 headwall and precast concrete culverts/HDPE pipes are proposed throughout the development, where this is not possible in-situ concrete will be used.
- Existing vegetation will be preserved where possible and disturbed areas replanted 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 will 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 minor watercourses on site will be removed to facilitate the construction of the outfall for the IPP & SS compounds. Only workers and machinery essential to the construction of surface water drainage network, crossing and headwalls will be allowed within the 20m watercourse buffer area.

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.

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.

Blasting if required at turbine foundations will be carried out by a suitably qualified specialist under licence with a suite of standard best practice mitigation measures in place. Surface water management measures will be place as described above to ensure that surface water runoff cannot enter the area subject to blasting.

Where required, stockpiles will be kept to a minimum and will be protected within designated areas 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. 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 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 the 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 LCCC 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, road 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 Geotextiles 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.

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 hydraulic oils stored onsite will be stored in designated areas such as the temporary compounds. 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 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 (EIAR Volume III, Appendix 2A) and industry standards to protect groundwater and surface water quality. Ready-mixed concrete will be delivered by truck, with batching done offsite. Concrete truck chute wash down will occur 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 hydraulic 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.

9.5.2. 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.

Surface water will be managed in accordance with the principles and objectives of SuDS to treat and attenuate water prior to outflow via either overland (and allowed to infiltrate to ground) or to an existing drainage ditch in the case of the IPP & SS compounds. 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 collected in the holding tank and tankered to a licenced waste water treatment for treatment. 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.

9.5.3. Decommissioning Phase

Effects will be avoided by leaving elements of the Proposed Development in place where appropriate as described in Chapter 02 Project Description. 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 track may remain for agricultural use. 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 9.5.1. 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

9.6. Water Framework Directive

An assessment of the likely impacts to WFD waterbodies and Article 4 objectives has been completed by Enviroguide (2025) and presented in the Water framework Directive Assessment Report (Volume III, Appendix 9A). In the absence of any standard mitigation and avoidance measures there could be a potential impact on the water quality within receiving water bodies associated with the Proposed Development, specifically within the Morningstar River, The River Maigue, The Camoge, The Groody River, downstream waterbodies and underlying Groundwater bodies. There is no identified potential impact to the transitional waterbodies of the Shannon

Estuary and downstream coastal waterbodies attributed to the separation distances and anticipated assimilation capacity of the receiving water bodies taking account of the existing baseline conditions and WFD Status.

The standard mitigation measures including the implementation of a robust CEMP during the Construction Phase and the incorporation of SuDS in the design of the Proposed Development, 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), 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) and the EU Nature Restoration Regulation EU2024/1991.

The WFD assessment for the proposed development (Enviroguide, 2025) concludes that 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 water bodies associated with the Proposed Development including the Morningstar River, The River Maigue, The Camoge, The Groody River, downstream waterbodies and underlying Groundwater bodies as a result of the Proposed Development taking account of design avoidance and mitigation measures (Enviroguide, 2025).

9.7. Residual Impacts

Residual Impacts are defined as 'effects that are predicted to remain after all assessments and standard mitigation measures'. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts.

The predicted impacts of the Construction and Operational Phases are described in Section 9.4 in terms of quality, significance, extent, likelihood, and duration. The relevant standard mitigation measures are detailed, and the residual impacts are determined which take account of the avoidance, remedial and mitigation measures.

There will be no significant adverse residual impacts on the receiving hydrological and hydrogeological environment associated with the Proposed Development.

There will be no impact to the existing WFD Status of water bodies associated with the Proposed Development including the Morningstar River, The River Maigue, The Camogue, The Groody River, downstream waterbodies and underlying Groundwater bodies as a result of the Proposed Development taking account of design avoidance and mitigation measures where required. See Table 9-13 for details in the Residual Risk Assessment.

Table 9-13: Residual Risk Assessment

Activity	Attribute	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Works required for Drainage Outfall for the IPP & SS compounds	Water quality / WFD Status	Potential for impact on underlying groundwater bodies exacerbated by potential karstic flow pathways within aquifer, affecting the receiving Morningstar River (and associated tributaries) and downstream waterbodies.	Adverse	Moderate	Short Term	Direct / Cumulative/ Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase.	Imperceptible
Watercourse Crossings	Water quality / WFD Status	Potential for impact on underlying groundwater bodies exacerbated by potential karstic flow pathways within aquifer, affecting the receiving Morningstar River (and associated tributaries) and downstream waterbodies.	Adverse	Moderate	Short Term	Direct / Cumulative/ Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase.	Imperceptible
Handling of Deleterious Materials	Water quality / WFD Status	Potential for impact on underlying groundwater bodies exacerbated by potential karstic flow pathways within aquifer, affecting the receiving Morningstar River (and associated tributaries), the Camoge River, the Groody River and downstream waterbodies.	Adverse	Significant	Medium Term	Direct / Cumulative/ Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase.	Imperceptible

Introduction of contaminants to karstic flow paths	Water quality / WFD Status	Potential for impact on underlying groundwater bodies exacerbated by potential karstic flow pathways within aquifer, affecting the receiving Morningstar River (and associated tributaries) and downstream waterbodies.	Adverse	Significant	Medium Term	Direct / Worst Case	Surface water runoff management will be implemented to prevent runoff entering excavations during construction.	Imperceptible
Introduction of contaminants during directional drilling	Water quality / WFD Status	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 drilling process affecting the underlying groundwater bodies, Morningstar River, the Camoge River and downstream waterbodies	Adverse	Moderate to significant	Temporary	Direct / Worst Case	The directional drilling method and risk assessment 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 exist pits and surrounding formation.	Imperceptible
Introduction of contaminants during piling (if required)	Water quality / WFD Status	Potential for contaminants used during construction, such as lubricants or other materials, to infiltrate quickly into the groundwater through existing conduits, fractures, or dissolution features created by the piling process affecting the underlying groundwater bodies, Morningstar River and downstream waterbodies	Adverse	Significant	Temporary	Direct / Worst Case	The piling method and risk assessment will include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff or other piling fluids from entering the piling area and surrounding formation.	Imperceptible

Introduction of contaminants during rock blasting (if required)	Water quality / WFD Status	Potential for contaminants used during construction, such as lubricants or other materials, to infiltrate quickly into the groundwater through existing conduits, fractures, or dissolution features created by the roc blasting process affecting the underlying groundwater bodies	Adverse	Slight to Moderate	Temporary	Direct / Worst Case	The rock blasting method will include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff from entering blasting area and surrounding formation.	Imperceptible
Discharge of Entrained Sediment or Other Contaminants in Surface Runoff (Overland Flow)	Water quality / WFD Status	During the Construction Phase of the Proposed Development, there is a potential risk of runoff with contaminants migrating offsite via existing surface water drainage within the site and impacting water quality of the underlying groundwater bodies, Morningstar River and downstream waterbodies	Adverse	Moderate	Medium Term	Direct / Cumulative	Appropriate mitigation measures to manage surface water runoff will be undertaken during the Construction Phase.	Imperceptible
Discharge of Entrained Sediment or Other Contaminants in Surface Runoff (Existing Drainage)	Water quality / WFD Status	During the Construction Phase of the Proposed Development, there is a potential risk of runoff with contaminants migrating offsite via existing surface water drainage within the site and impacting water quality of the underlying groundwater bodies, Morningstar River and downstream waterbodies	Adverse	Moderate	Medium Term	Direct / Cumulative	Appropriate mitigation measures to manage surface water runoff will be undertaken during the Construction Phase.	Imperceptible

Flooding of Site During Construction	Water quality / WFD Status	Potential for impact on underlying groundwater bodies within a localised zone of the aquifer and on the Morningstar River (and associated tributaries), the Camoge River, the Groody River and downstream waterbodies.	Adverse	Moderate to significant	Temporary	Direct / Cumulative/ Worst Case	The main contractor will continuously monitor water levels in the Morningstar River and its tributaries. They will also provide method statements for the removal of site materials, fuels, tools, vehicles, and persons from flood zones	Imperceptible
Operational Phase								
Handling of Deleterious Materials	Water quality / WFD Status	Potential for impact on underlying groundwater bodies exacerbated by potential karstic flow pathways within aquifer, affecting the receiving Morningstar River (and associated tributaries), the Camoge River, the Groody River and downstream waterbodies.	Adverse	Significant	Medium Term	Direct / Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Operational Phase.	Imperceptible

9.8. Monitoring

9.8.1. 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 this EIAR and the CEMP (EIAR Volume III, 2A) 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 works (i.e., bridge crossings and culverts) to ensure there is no potential for surface water run-off to the receiving waterbodies. The ECoW will undertake regular (daily during significant works) 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 included 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 discharge from the site. 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 above.
- Removal of wastewater from the site will be undertaken by licenced contractors and treated in accordance with statutory consents (i.e., discharge licence).
- 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.

9.8.2. 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.

9.9. Interactions

9.9.1. Population and Human Health

An assessment of the potential impact of the Proposed Development on human health is included in Chapter 05 of this EIAR. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase of the Proposed Development that will be protective of site workers.

The Proposed Development will increase the amount of people in close proximity to flood-prone areas. This increased population density could heighten the potential for flood-related health impacts, particularly during construction. Residual risk will be mitigated by monitoring weather forecasts to optimize construction planning.

9.9.2. Land, Soil, Geology and Hydrogeology

An assessment of the potential impact of the Proposed Development on the Land and Soils is included in Chapter 08 of this EIAR. During the construction earthworks, heavy rainfall events have the potential to mobilise contaminated run-off and impact on the usability of materials stored onsite. This could therefore require the importation of additional material from external sources. Mitigation measures to reduce the risk of damage of construction materials from heavy rainfall and flood events is outlined in Chapter 04.

9.9.3. Biodiversity

An assessment of the potential impacts of the Proposed Development on the Biodiversity of the site, with emphasis on habitats, flora and fauna which may be impacted as a result of the excavation and importation of materials to the site are included in Chapter 06 of this EIAR. It also provides an assessment of the impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation or considered to be of particular conservation importance and proposes measures for the mitigation of these impacts.

9.9.4. Material Assets

An assessment of the potential impact on the Proposed Development on the material assets – utilities including built services and infrastructure has been set out in Chapter 17 of this EIAR.

There is a risk of excess silts from construction runoff accumulating in the existing drainage network, potentially compromising its capacity. To mitigate this, standard pollution control measures will be employed to manage contaminated runoff and preserve the integrity of drainage channels during construction.

9.10. Difficulties Encountered When Compiling

There were no difficulties encountered when compiling the Water Chapter of this EIAR.

9.11. References

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