MWP

Chapter 8 Hydrology and Hydrogeology

Ballinla Wind Farm

Ballinla Wind Farm Limited

August 2025

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8. Water

8.1 Introduction

This chapter considers the potential effects on hydrology and hydrogeology arising from the Proposed Development. A full description of the Proposed Development lands and all associated project elements is provided in Chapter 2 of this EIAR.

The principal objectives of this chapter are to identify:

- Hydrological and hydrogeological characteristics of the receiving environment at the Site of the Proposed Development.
- Potential impacts 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.

This chapter of the EIAR should be read in conjunction with Chapter 5 Population and Human Health, Chapter 6 Biodiversity, Chapter 9 Land and Soils and Chapter 14 Material Assets of the EIAR and other information provided by the Applicant pertaining to the design proposals for the Proposed Development.

8.1.1 Competency of Assessor

This chapter of the EIAR has been prepared by Warren Vokes BA MSc MCIWEM C.WEM a Senior Consultant of Enviroguide. Warren holds a MSc River Environments and their Management and is a Chartered Water and Environmental Manager with over 8 years' experience as an Environmental Consultant. Warren has carried out environmental assessments for a range of project types and geological and hydrogeological site settings.

This chapter of the EIAR has been reviewed by Gareth Carroll BA, BAI, MIEnvSc, CEnv a Principal Consultant of Enviroguide. Gareth is a Chartered Environmentalist with over 12 years' experience in preparing environmental assessments for a range of project types and geological and hydrogeological site settings.

8.2 Methodology

The methodology adopted for the assessment has regard to the relevant guidelines and 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.

- Local Government, October 2007. No. 30.2007. Water Services Act 2007.
- Local Government, July 1990. No. 21.1990. Local Government (Water Pollution) (Amendment) Act, 1990.
- 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.
- 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).
- Offaly County Council, 2021. Offaly Development Plan 2021-2027.

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).
- EPA, 2014. Guidance on the Authorisation of Direct Discharges to Groundwater.
- EPA, 2013. Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites.
- EPA, 2013. Storage and Transfer of Materials for Scheduled Activities.
- EPA, May 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

8.2.1 Phased Approach

A phased approach was adopted for this EIAR in accordance 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 Proposed Development area. The study area, for the purposes of assessing the baseline conditions for this chapter of the EIAR, extends beyond the Proposed Development boundaries and includes a 2km radius Proposed Development and potential receptors outside of this radius that are potentially hydrologically connected with the Proposed Development, were also considered. The extent of the wider study area was based on the Institute of IGI Guidelines (IGI, 2013) that recommends a minimum distance of 2km radius from the Proposed Development. 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 Proposed Development area and the study area is crucial. The site of the Proposed Development is the focal point of the assessment, 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 study area including published information and details pertaining to the Proposed Development provided by the Applicant and design team.

A site walkover survey to establish the environmental site setting and baseline conditions at the Proposed Development, relevant to the hydrological and hydrogeological environment was undertaken by Enviroguide Consulting on the 11st of October 2024.

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

- EPA web mapping (EPA, 2025).
- GSI Datasets Public Viewer and Groundwater web mapping (GSI, 2025).
- NPWS web mapping (NPWS, 2025).
- Ordnance Survey Ireland (OSI) web mapping (OSI, 2025).
- WFD web mapping (WFD, 2025).
- Teagasc web mapping (Teagasc, 2025).
- Office of Public Works (OPW) database on historic flooding and the Catchment Flood Risk Assessment and Management (CFRAM) maps (OPW, 2025).
- Information provided by the Applicant pertaining to the design proposals for the proposed development.

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

- Ground Investigations Ireland, 2024. Peat Probing and Soakaway Results.
- Enviroguide 2025, Water Framework Directive Assessment Report.

- Malachy Walshe & Partners, 2025. Flood Risk Assessment Report.
- Malachy Walsh & Partners, 2023. Aquatic Ecology and Fish Report.

Element 2: Involves direct and indirect site investigation and a studies stage, 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 direct or indirect site investigations and a studies stage were not required as there was sufficient information including site investigation data regarding the Proposed Development and the hydrological and hydrogeological conditions in the vicinity, 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 Element 1 of the assessment. Mitigation measures to address all identified adverse impacts that were identified in Element 1 of the assessment were considered in relation to the Construction Phase and Operational Phase of the Proposed Development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Element 4: Completion of **Chapter 8** Hydrology and Hydrogeology of the EIAR which includes all the associated figures and documents.

8.2.2 Description of Importance of the Receiving Environment

The TII criteria for rating of the importance of hydrogeological features at the Proposed Development 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 8-1.

Table 8-1: Criteria for Rating Importance of Hydrogeological Features

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	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. Ecosystem 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. 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.

Importance	Criteria	Typical Example
		Quality Class C (Biotic Index Q3, Q2- 3). 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.

8.2.3 Description and Assessment of Potential Impacts

Impacts will vary in quality from negative, 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 8-2 in accordance with EPA, 2022 guidelines on the information to be contained in EIARs.

Table 8-2: Criteria for Assessment of Potential Impacts Terminology and Methodology

Quality of Effects/Impacts	Definition
Negative	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.
Extend and Context of Effects	**Definition**
Extend	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**

Quality of Effects/Impacts	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.

8.3 Baseline Environment

8.3.1 Site Location and Description

The site of the Proposed Development is located in a rural area of east Co. Offaly. The site is approximately 4km west of the Edenderry town boundary and 24km east of Tullamore. The Proposed Wind Farm is within the townlands of Ballinla, Ballybrittan and Leitrim in the municipal district of Edenderry, Co. Offaly.

The Proposed Development red line boundary includes a total land area of approximately 42ha. The existing land cover at the site is a mix of agricultural land and coniferous forests.

The Grand Canal is to the north of the Proposed Development, approximately 500m from the nearest Turbine. The majority of the main development site consists of pastures while the more elevated areas of the site are

composed of coniferous forest, which are owned and managed by forestry companies. The surrounding land includes some pastures and lands principally occupied by agriculture. The lands within the site of the Proposed Development are owned by a number of different private landowners and one semi state body. Primary access to the main development site will be provided from the local public road linkage (L5010) between the L-5006 in the east and the R400 to the west.

The Proposed TDR will include development in the townlands of Leitrim, Ballyfore Big, Ballyleakin, and Ballina (Geashill By) Co. Offaly.

The Proposed Grid Connection is approximately 8km and is located along road networks within the townlands of Lumville, Clarkville, Ballyfore Little, Griffinstown and Ballycullane.

The Proposed Development location is presented in Figure 8-1 and the existing site layout is presented in Figure 8-2.

Figure 8-1: Site Location

Figure 8-2: Current Site Use

8.3.2 Topography

The topography of the Proposed Wind Farm is generally flat with minor slopes. The ground level ranges from approximately 80m AOD to 92m AOD.

8.3.3 Soil, Subsoil and Geology

The soils and geology at the site of the proposed development are summarised as follows:

- The soils beneath the majority of the site are mapped by Teagasc (Teagasc, 2025) as predominately peat (Basin Peats, Blanket Peats (some)' (IFS Soil Code: Cut), 'Grey Brown Podzolics, Brown Earths (medium-high base status)' (IFS Soil Code: BminDW), 'Surface water Gleys, Ground water Gleys' Mineral Mainly Poorly Drained (IFS Soil Code: BminPD) and 'Peaty Gleys' (IFS Soil Code: BminPDPT) and localised areas of fine loamy drift.
- The subsoil or quaternary sediments beneath the Proposed Wind Farm are mapped by the GSI (GSI, 2024) as primarily cut over raised peat (GSI, 2025) and limestone derived till along the Proposed Grid Connection.
- The bedrock beneath the site is mapped by the GSI (GSI, 2025) as the Edenderry Oolite Member (New Code: CDEDEN) described as visean limestone and calcareous shale. The Proposed Grid Connection crosses through a geological contact with limestone of the Lucan formation where the L5006 come in close proximity to Ballykillen Hill.
- There are no karst features mapped by the GSI (GSI, 2024) at the site or within a 2km radius of the site.

8.3.4 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 8-3.

Table 8-3: Long-Term Mean Monthly Rainfall Data (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
82	67.3	62.2	62.3	58.8	70.9	77.1	82.2	70.6	92.3	91.3	88.2	905.2
Note: 1km x 1km Irish Grid Coordinated selected for the Site =X (Easting): 258000, Y (Northing): 232000												

The closest the synoptic meteorological station to the site is at Mullingar which is located approximately 24.4km north of the site. The average potential evapotranspiration (PE) from the Mullingar station for the period 2021 to 2024 (Met Éireann, 2025) is presented in Table 8-4.

Table 8-4: Average Potential Evapotranspiration (mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
10.3	17.4	31.0	51.4	71.9	80.5	79.1	65.0	44.0	22.9	10.3	7.5	491.3

8.3.5 Hydrogeology

8.3.5.1 Site Hydrogeology and Groundwater Levels

Ground investigations, in the form of peat probing and soakaway testing, were completed for portions of the Proposed Development area by Ground Investigations Ireland (GII) during August 2024 and September 2024 (GII, 2024), (refer to EIAR Volume III, Appendix 8-1).

The ground investigations in the northern section of the Proposed Wind Farm included the excavation of eight soakaway pits to a maximum depth of 2.1m below ground level (mbGL), logging of soils encountered, and preparation of a factual report. The ground conditions encountered are summarised as follows:

- Topsoil was encountered from ground level to depths typically ranging from 0.2mbGL to 0.35mbGL.
- Gravelly CLAY and SAND with low cobble content was encountered between 0.35mbGL and the final depth of excavation at 2.1mbGL.
- Groundwater was encountered as seepage at a depth of 2.0mbGL in trial pit SA06 only.
- Soakaway testing for the site concluded that four of the eight testing locations failed with the remaining returning an f value ranging between 1.188E-05 m/s and 7.475E-06 m/s. It was subsequently concluded that the site was unsuitable for discharge to ground.

In the southern section peat probes were carried out in the peat subsoils of the southern section. Refusal of the probe was at depths ranging from 0.27m to 4.04m.

8.3.5.2 Groundwater Body and Flow Regimes

The bedrock aquifer beneath the Proposed Wind Farm is within the Rhode Groundwater Body (GWB) (EU Code: IE_SE_G_116). The Rhode GWB covers approximately 437km² and spans areas across Co. Offaly (GSI, 2025). The majority of the area is low-lying bog with a very flat surface. The highest elevations are to the north at Rhode (150m AOD). The surface drainage direction is to the southeast to the Philipstown River and also the tributaries of the Cushina River.

A small area of the northeastern portion of the Proposed Grid Connection and TDR works is within the Trim GWB (EU Code: IE_EA_002). The Trim GWB covers approximately 669km^2 and spans areas across Co. Meath, Co. Louth, Co. Kildare and Co. Offaly (GSI, 2024). The area is mostly undulating lowlands with hillier areas at the GWB boundaries. The River Boyne is almost entirely enclosed within the Trim GWB with elevations falling to the river from southwest (Proposed Wind Farm location) to northeast.

The most southerly 1km of the Proposed Grid Connection and two nodes of the Proposed TDR is within the Cushina GWB (EU Code: IE_SE_G_048). The Cushina GWB covers approximately 170km^2 and spans areas across Eastern Offaly, Laois and Kildare (GSI, 2024). The topography in the area is extremely low lying to the north with some small hills in the south. In general, the land surface slopes to the centre and south of the body towards the River Figile.

The Ballinla (Geashill-By) TDR node is underlain by the Geashill GWB (EU Code: IE_SH_G_103). The Ballina GWB covers approximately 280 km^2. Land within this GWB is relatively flat with elevations ranging between 40m and 160m AOD and most ground is between 70m and 100m AOD.

The main recharge mechanisms within the underlying GWBs at the Proposed Development are summarised as follows:

- Recharge in the Rhode GWB is described as occurring in areas where subsoil thickness is lowest or where the permeability of the overlying subsoil is highest. This is most likely to occur in the vicinity of the Proposed Development, to the north of the GWB where higher elevations and more permeable soils are located. In the area of the Toberdaly springs, permeable bedrock is of a thickness of approximately 30m. Bedrock in most areas is covered by subsoil greater than 5m in thickness, with clay/till dominating the uppermost 3m to 5m and the remaining 5m to 12m comprising of sand/gravel and clayey till units.
- For the north-eastern section of the Proposed Grid Connection and Proposed TDR within the Trim GWB, the primary recharge mechanisms are likely to be through diffuse and point recharge, with point recharge occurring over areas of more fractured limestone.
- In the Cushina GWB diffuse recharge will occur via rainfall percolating through the subsoil. Due to the generally low permeability of the aquifers within this GWB, a high proportion of the recharge will then discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively reducing further the available groundwater resource in the aquifer.
- In the Ballina GWB Diffuse recharge will occur over the GWB via rainfall soaking through the subsoil only where subsoil is shallow or absent, or where subsoils are gravelly and high or moderate permeability. Thick, low permeability subsoils will cause rainfall to runoff, probably to another area within the GWB. In lowland areas where water tables are high, potential recharge may be rejected.

The main discharge mechanisms within the underlying GWBs at the site of the Proposed Development are summarised as follows:

- The main groundwater discharge mechanism within the Rhode GWB is described as occurring to the rivers and streams to the south and southeast, while the discharge mechanisms at the Toberdaly springs are a composite of deep and shallow groundwater flows. The GSI (Rhode GWB Report) identifies that

the majority of groundwater flow direction in the aquifer is from north and west to the south and east (GSI, 2024). Groundwater flow in the Rhode GWB generally occurs within enlarged fractures in the upper layers of bedrock. Regional groundwater system is unlikely across the width of the GWB due to it not being a regional karstic aquifer.

- Within the Trim GWB, discharge most likely occurs as baseflow along riverbeds and as point source at springs. The primary discharge being as baseflow to the River Boyne and its tributaries. Groundwater flow in the Trim GWB is determined by the degree of karstification and fracturing of the limestones. In highly karstified limestone areas (northeast of the GWB), groundwater flow will occur in conduits drawing water from very deep depths while in less karstified limestone areas groundwater flow will be at shallower depths.
- Within the Cushina GWB, discharge from this aquifer will be towards the overlying rivers where they are in hydraulic continuity with the aquifer. Drainage density in the south is quite low and this may indicate a higher permeability of the limestones here. Since there are an absence of streams in the area the aquifer discharges via springs, a number of karstic springs have been recorded in this southern area southeast of Emo.
- Within the Ballina GWB, groundwater discharges to gaining streams and rivers where subsoil thickness permits, and to the springs within the GWB, also where subsoil is sufficiently thin to let groundwater discharge to surface (such as Kelly (2001) proposes at Killeigh and Meelaghans springs).

8.3.5.3 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, 2025) has classified the bedrock aquifer beneath the Proposed Development as follows:

- The Edenderry Oolite Member bedrock aquifer beneath the wind farm site is mapped as a Locally Important Aquifer (Lm) which is generally moderately productive.
- The majority of the Proposed Grid Connection is primarily mapped as a Locally Important Aquifer (Lm) which is generally moderately productive. The southern 1.4km of the Proposed Grid Connection is mapped as a Locally Important Aquifer (LI) which is moderately productive only in local zones.
- The identified nodes along the Proposed TDR are underlain by a Locally Important Aquifer (LI) which is generally moderately productive.

It is noted that there are no gravel aquifers mapped within a 2km radius of the site and Proposed Development (GSI, 2025).

The bedrock aquifers beneath the site of the Proposed Development are presented in Figure 8-3.

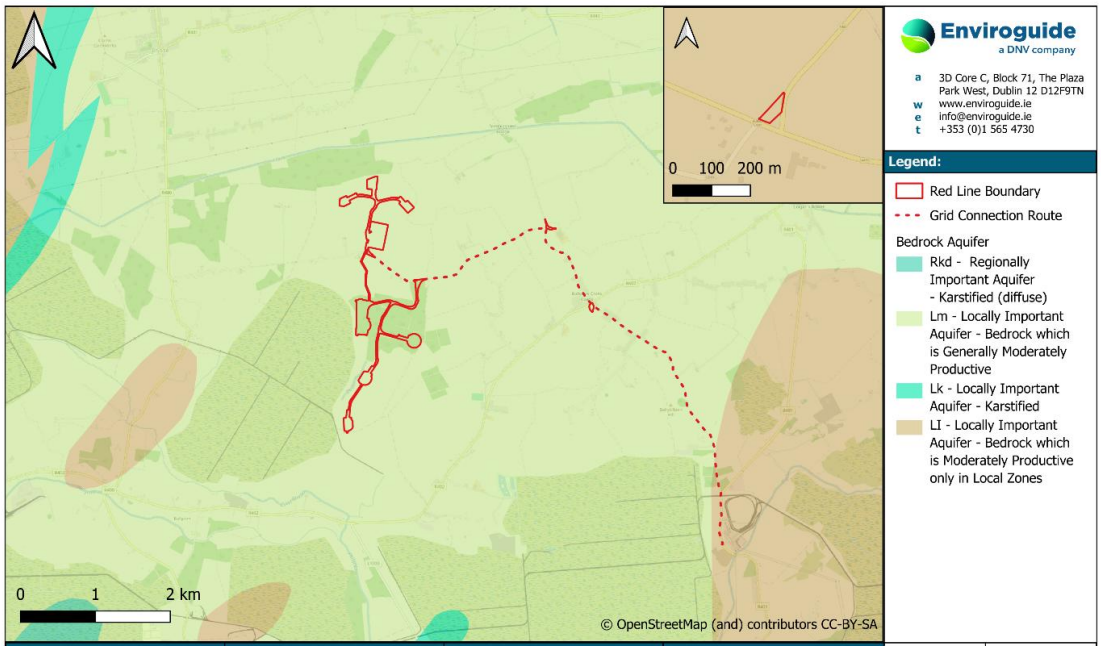

Figure 8-3: Bedrock Aquifers

8.3.5.4 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 8-5. 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 8-5: Vulnerability Mapping Criteria (DEHLG/EPA/GSO, 1999)

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 has assigned a groundwater vulnerability rating of 'Moderate' (M) for the majority of groundwater beneath the Proposed Development (GSI, 2025). The subsoil permeability classification beneath the Proposed

Wind Farm and Proposed TDR Nodes is also 'Moderate' (GSI, 2025). Based on the 'Moderate' permeability and 'Moderate' vulnerability rating, the depth to bedrock beneath the site is anticipated to be greater than 10mbGL.

The majority of the Proposed Grid Connection are also assigned a groundwater vulnerability rating of 'Moderate' (M) with the exception of the lands in the vicinity of Ballykilleen Hill which exhibits rock at or near the surface.

The groundwater vulnerability map is presented in Figure 8-4.

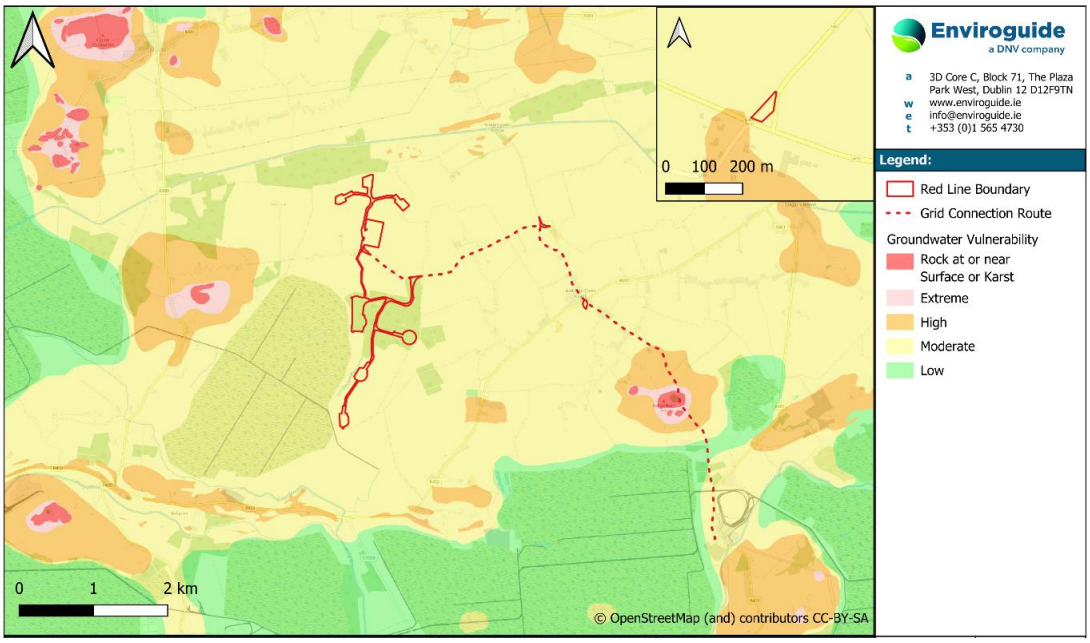

Figure 8-4: Groundwater Vulnerability

8.3.6 Hydrology

8.3.6.1 Catchment and Surface Water Features

The Proposed Wind Farm is mapped by the EPA (EPA, 2025) to be within the Barrow WFD Catchment (I.D.: 14) with a small section of the northern portion of the site within the Boyne WFD Catchment (I.D.: 07). The majority of the Proposed Grid Connection is also mapped with the Barrow WFD catchment with the exception of a small section of the northern portion of the site within the Boyne WFD Catchment (I.D.: 07).

The Proposed Wind Farm is primarily mapped to be within the Figile_SC_020 WFD Sub-Catchment (Sub-Catchment I.D.: 14_14), with the exception of a small section in the northern portion of the site within Figile_SC_010 (Sub-Catchment I.D.: 14_03). The Proposed Grid Connection is mapped within Figile_SC_020, Boyne_SC_010 and Figile_SC_010 Sub-Catchment. The Proposed TDR works are located within the Lower Shannon WFD Catchment (I.D:25A) and the Tullamore_SC_010 sub-catchment (Sub-Catchment I.D.: 25A_4).

The Barrow catchment includes the area drained by the River Barrow upstream of the River Nore confluence and all streams entering tidal water between the Barrow railway bridge at Great Island and Ringwood, Co. Kilkenny, draining a total area of 3,025km². The largest urban centre in the catchment is Carlow.

The Boyne Catchment includes the area drained by the River Boyne and by all streams entering tidal water between The Haven and Mornington Point, Co. Meath, draining a total area of 2,694km². The largest urban centre in the catchment is Drogheda. The other main urban centres are Navan, Trim, Kells, Virginia, Bailieborough, Athboy, Kinnegad, Edenderry and Enfield.

The Lower Shannon catchment (25A) covers an area of 1,248km² and is characterised by relatively flat topography with much of the low-lying areas in the catchment covered in thick deposits of peat. The majority of the catchment is underlain by impure limestones with some purer karstified limestone located from Tyrrellspass to Kilcormac.

The majority of the site is mapped by the EPA (EPA, 2025) to be withing the Esker Stream_020 WFD Sub-basin (EU Code: IE_SE_14E010200) with a small section of the Proposed Grid Connection within Figile_030 (EU Code: IE_SE_14F010200). The remaining northern portion of the site is mapped within the BOYNE_020 WFD River Sub-basin (EU Code: IE_EA_07B040300).

Both the Boyne_020 (River Waterbody Code: IE_EA_07B040300) which is located within the northern portion of the Proposed Wind Farm and the Esker Stream_020 (River Waterbody Code: IE_SE_14E010200) which is in the central and southern portions of the Proposed Wind Farm are indicated to drain the main development area as shown in EPA mapping. The Esker stream is also known as the Leitrim stream and may be referred as such within this Chapter. The Grand Canal Main Line (Boyne) (River Waterbody Code: IE_07_AWB_GCMLW) flows west - east to the north of the Proposed Development. The Boyne_020 river sub basin begins within the Proposed Development and drains in a northeasterly direction for approximately 9km before discharging into the Boyne_030 (River Waterbody Code: IE_EA_07B040400) with the Boyne eventually discharging to the Boyne Estuary (Transitional Waterbody Code: IE_EA_010_0100). A section of the Boyne_020 drains the northeast most section of the Proposed Grid Connection and is referred to by the EPA as the Kinnafad Stream. The Leitrim Stream begins within the site and flows in a southerly direction for 4.95km before discharging into the Figile_040 (River Waterbody Code: IE_SE_14F010300) further discharging into the Barrow_090 (River Waterbody Code: IE_SE_14B011000) approximately 26.2km downstream of the site with eventual discharge to the Barrow Suir Nore Estuary (Transitional Waterbody Code: IE_SE_100_0100).

The southern section of the Proposed Grid Connection is indicated to drain to the Figile_030 (River Waterbody Code: IE_SE_14F010200). The Figile_030 flows south and also confluences with the Figile_040.

The Ballinla (Geashill-by) TDR node is indicated to drain to the Tullamore_020 (River Waterbody Code: IE_SH_25T030100). The Tullamore_020 flows north and also confluences with the Tullamore_030 (River Waterbody Code: IE_SH_25T030300).

A number of open drainage ditches were identified during the site walkover undertaken by Enviroguide Consulting on the 10th of October 2024. These drainage ditches, which were observed to contain standing water at the time of inspection were connected to the Leitrim Stream. The channels in the northern portion of the site are deep, widened, straight and generally have no significant vegetation within the main channel. The lands drained by these ditches included areas within the Boyne Catchment as depicted in EPA mapping. As these ditches now discharge to the Leitrim Stream, the entirety of the Proposed Wind Farm is considered to drain to the Barrow Catchment. Only a small portion of the Proposed Grid Connection and the Proposed Ballyfore Big TDR works are likely to drain to the Kinnafad Stream and downstream Boyne catchment. The main channel of the Leitrim Stream in the southern portion of the Proposed Wind Farm is less modified though the channel is also deep, straight and no has significant vegetation within the main channel.

There is no identified direct hydrological connection between the Proposed Development and the Grand Canal. The Rogerstown_07 river crosses the Grand Canal approximately 1km east of Trimblestown Bridge via an under-canal culvert that has been identified with no connection to the canal itself.

The surface water features mapped by the EPA (EPA, 2024) within a 2km radius of the site are presented in Figure 8-5.

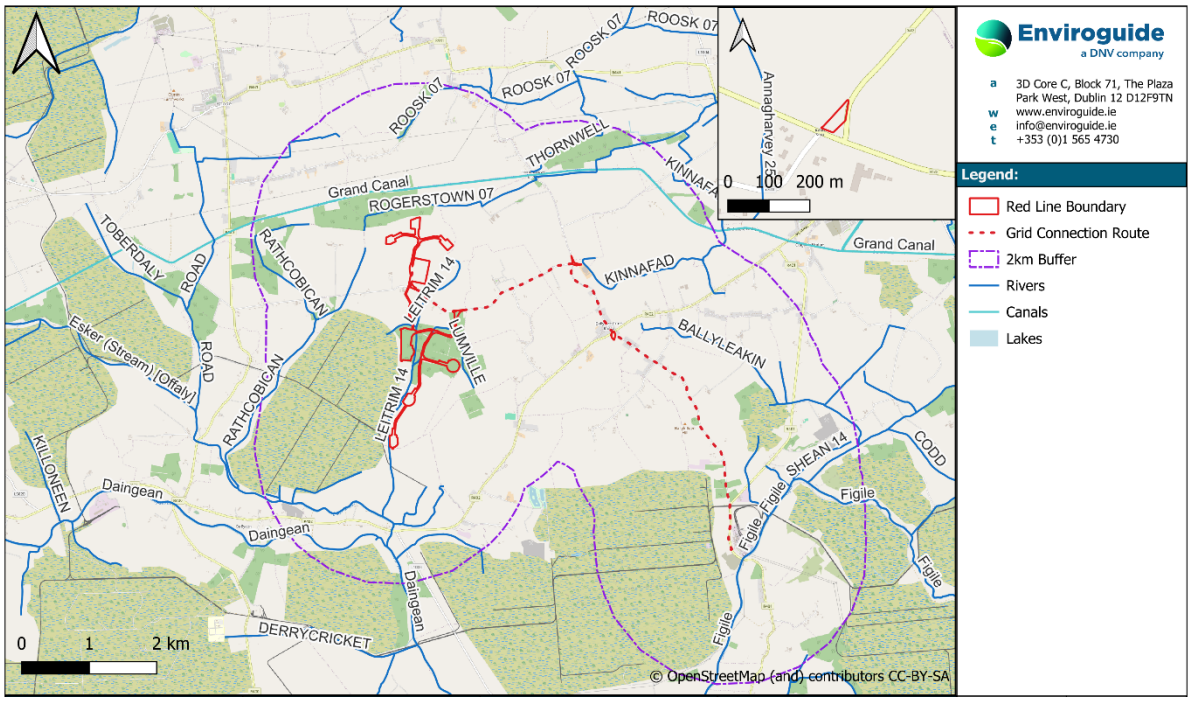

Figure 8-5: Local Surface Water Features

8.3.6.2 Existing Drainage Infrastructure

It is understood that there is no existing Uisce Éireann (UÉ) or local authority drainage infrastructure throughout the main development site. However, the route of the Proposed Grid Connection and Proposed TDR works will cross and be in close proximity to existing surface water drainage infrastructure within the public road network.

8.3.6.3 Existing Foul Drainage

It is understood that there is no existing UÉ or local authority foul drainage infrastructure throughout the Proposed Wind Farm. 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.

8.3.6.4 Aquatic Ecology and Fish Report

The Aquatic Ecology and Fish Report (refer to **EIAR Volume III, Appendix 6-1**), prepared by MWP for the Proposed Development (MWP, 2023), outlines the findings of the freshwater aquatic ecology and fish surveys. Aquatic field work was carried out on the 14th and 15th June (biological sampling) and 2nd and 3rd August (electric fishing) during 2023. A survey was also undertaken on 26th January 2024 when water levels were higher to determine if any waterbodies within the Proposed Wind Farm drained to the north. The report details the methodology, including desktop studies and field surveys, and presents results on aquatic habitats, macroinvertebrate diversity, water quality, and fish populations.

Key findings of the Aquatic Ecology and Fish Report are that the watercourses at the Proposed Wind Farm are highly modified and degraded, consisting mainly of drainage ditches, small streams, and deepened rivers. These water features now drain into the Leitrim Stream in the River Barrow catchment. The aquatic macroinvertebrate

communities are common but show reduced diversity due to poor water quality, which is rated as moderate or poor. The main water quality issues stem from agriculture, forestry, and past peat harvesting. Fish species present include three-spined stickleback, brown trout, and others, but salmonids are largely absent due to unsuitable conditions. High sediment loads negatively impact water quality and aquatic life. Amphibians use the drainage ditches in the northern part of the site.

8.3.7 Flood Risk

A flood risk assessment (FRA),refer to EIAR Volume III, Appendix 8-2, developed by MWP (MWP, 2025), assessed the potential flood risk associated with fluvial, groundwater, coastal and pluvial flooding for the site and Proposed Development. A summary of the main findings of this FRA is as follows.

- The report was prepared in the context of *The Planning System and Flood Risk Management – Guidelines for Planning Authorities, November 2009 (PSFRM)*, published by the Office of Public Works and the Department of Environment, Heritage and Local Government.
- The Proposed Development includes for the construction of seven turbines, hardstands, foundations, access tracks, internal underground connector cable, substation, LiDAR station, felling areas and ancillary development.
- 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 Leitrim watercourse and the Lumville watercourse.
- In particular, the NIFM published flood extents which indicate that this site may be vulnerable to flooding.
- A Stage 3 Detailed FRA was carried out to assess flood risk issues in sufficient detail to provide a quantitative appraisal of potential flood risk to the site.
- There are no flow records available for the Leitrim watercourse and the Lumville watercourse. The IH124 flood estimation method was selected as the most appropriate flood estimation method to calculate the flood flows for catchments.
- 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.
- The model was used to create a flood zone map 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.
- Flood mapping indicates that the proposed substation is located within Flood Zone B. Turbine 1 is located in Flood Zone B which has a moderate probability of flooding (0.1% to 1% probability (between 1 in 100 and 1 in 1,000) for river flooding. The remaining six 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).
- To ensure that there is no unacceptable flood risk, the following mitigation measures are recommended:
    - The design flood level for the proposed substation is the 0.1%AEP Mid-Range Future Scenario (MRFS) flood level plus 500mm freeboard.
    - The design flood level for the proposed seven turbines is the 1%AEP MRFS flood level plus 500mm freeboard

- It was concluded that, once the proposed mitigation measures are implemented, the Proposed Development will not have an adverse impact on flooding elsewhere.
- Residual risks associated with the development were also assessed and are considered to be acceptable.

8.3.8 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 twenty-two (22) groundwater sources recorded at the Proposed Development or within a 2km radius of the Proposed Development (refer to Figure 8-6 and Table 8-6).

Table 8-6: GSI Springs and Wells within 2km of the Site

GSI Name	Type	Drill Date	Depth (mbGL)	Townland	Source Use	Yield Class
2321NEW007	Borehole	1940-01-01	26.4	ESKER MORE	Public supply (Co Co)	Poor
2321NEW010	Dug well	1959-01-01	3.4	RATHVILLA	Domestic use only	N/A
2321NEW014	Borehole	1940-01-01	18.3	BALLYLEAKIN	Domestic use only	Poor
2321NEW016	Dug well	1899-12-30	1.5	RATHLUMBER	Domestic use only	N/A
2321NEW017	Dug well	1899-1230	3.7	BALLINAKILL	Domestic use only	N/A
2321NWW064	Dug well	1962-08-17	7.6	CURRAGH	Domestic use only	Poor
2321NWW066	Borehole	1962-04-30	27.7	NEWTOWN	Domestic use only	Poor
2321NWW072	Borehole	1899-12-30	18.3	BALLYCOLLIN	N/A	N/A
2321NWW082	Borehole	1999-08-16	83	BALLYMOONEY	Agri use only	Poor
2323SEW007	Borehole	1966-12-02	24.7	BALLYBRITTAN	Domestic use only	Moderate
2323SEW032	Borehole	1967-12-15	12.8	LEITRIM	N/A	Poor
2323SEW033	Borehole	1968-07-26	21.9	BALLYCOLGAN	N/A	Poor
2323SEW034	Borehole	1968-08-13	38.1	BALLYBRITTAN	N/A	Poor
2323SEW035	Borehole	1968-09-03	24.9	BALLYBRITTAN	N/A	Poor
2323SEW036	Borehole	1964-07-13	15.5	BALLYBRITTAN	N/A	Good
2621NWW002	Dug well	1899-12-30	2.7	SHEAN	Domestic use only	Poor
2621NWW007	Dug well	1899-12-30	5.2	BALLYKILLEEN	Domestic use only	N/A
2621NWW008	Dug well	1899-12-30	9.1	BALLYKILLEEN	Domestic use only	N/A
2621NWW010	Borehole	1971-12-03	33.5	CLONCANT	N/A	Poor
2621NWW011	Borehole	1955-05-05	49.7	CLONCANT	N/A	N/A
2621NWW012	Borehole	1972-09-30	32.6	CLONCANT	N/A	Poor
2623SWW008	Dug well	1899-12-30	5.2	RATHMORE	Domestic use only	N/A

It is understood that there is no existing water supply at the Proposed Wind Farm and no connection to public or group water scheme is required as part of the Proposed Development.

There is one groundwater source protection area (SPA) identified (GSI, 2024) within a 2km radius of the Proposed Development. The Clonbulloge Public Water Supply (PWS) source protection zone is 1.5km southeast of the Proposed Grid Connection at the Edenderry power plant. An EPA audit (May 2024) of the Clonbulloge water treatment plant (WTP) describes the abstraction point as "directly adjacent the Figile River" and "Raw water is abstracted from the Figile River Well, a spring water source located at the WTP". The Figile_040 river waterbody is also identified (EPA, 2024) as source for the Clonbulloge (PWS). The Figile River is 0.25km southeast of the Proposed Grid Connection with the Clonbulloge WTP a further 3.4km downstream. It is noted that although the Proposed Wind Farm drains to the Figile_040, this is via the Leitrim Stream which confluences with the Figile River approximately 50m downstream of the Clonbulloge WTP.

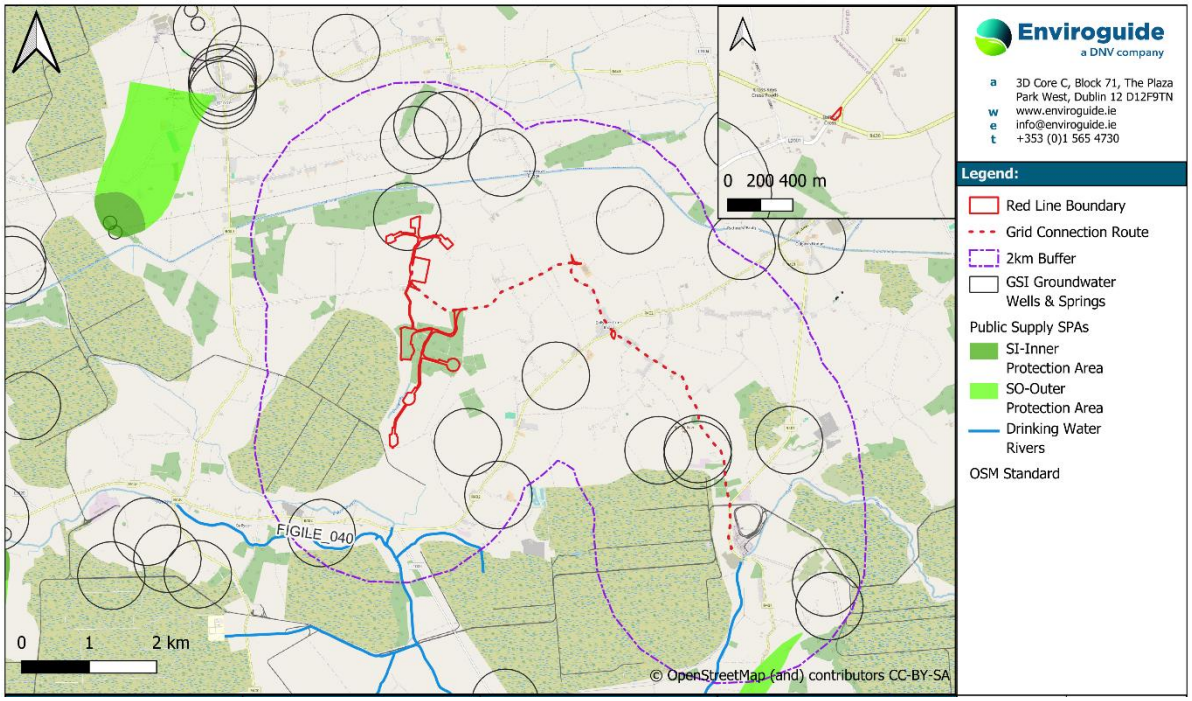

Figure 8-6: Groundwater Wells and Springs and Public Supply SPAs

8.3.9 Water Quality Data

8.3.9.1 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 hydrological connection to the Proposed Development is presented in Table 8-7.

Table 8-7: Surface Water Quality

WFD Waterbody Name	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2020)
Boyne_020	Ammonia-Total (as N)	Annual	Good	Downwards	0.064mg/l
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Upwards	2.893mg/l

WFD Waterbody Name	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2020)
	ortho-Phosphate (as P)-unspecified	Annual	Moderate	Upwards	0.054mg/l
Esker Stream_020	There is no monitoring data available for review.				
Grand Canal Main Line (Boyne)	There is no monitoring data available for review.				
Boyne_030	Ammonia-Total (as N)	Annual	Good	Downwards	0.044mg/l
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Upwards	2.893mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Upwards	0.020mg/l
Figile_040	Ammonia-Total (as N)	Annual	Good	Downwards	0.061mg/l
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Upwards	1.832mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Upwards	0.021mg/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 Wastewater Treatment Directive and Nitrates Directive. The scheme compares the compliance of individual parameters against a set of criteria indicative of trophic state (refer to Table 8-8). 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 8-8: Trophic Status Assessment Scheme

Waterbody	Trophic Status	Pollution Status	Condition
Upper Barrow Estuary	Intermediate	Unpolluted	Intermediate status water bodies are those which breach one or two of the criteria.
Barrow Nore Estuary Upper	Potentially Eutrophic	Slightly Polluted	Potentially Eutrophic water bodies are those in which criteria in two of the categories are breached and the third falls within 15 per cent of the relevant threshold value
New Ross Port	Intermediate	Unpolluted	Intermediate status water bodies are those which breach one or two of the criteria.
Lower Suir Estuary (Little Island – Cheekpoint)	Intermediate	Unpolluted	Intermediate status water bodies are those which breach one or two of the criteria.
Barrow Suir Nore Estuary	Intermediate	Unpolluted	Intermediate status water bodies are those which breach one or two of the criteria.
Boyne Estuary	Potentially Eutrophic	Slightly Polluted	Potentially Eutrophic water bodies are those in which criteria in two of the categories are breached and the third falls within 15 per cent of the relevant threshold value

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

8.3.9.2 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 Proposed Development or that are hydrologically connected to the Proposed Development.

8.3.10 Water Framework Directive

The WFD status for river, lake, groundwater, transitional and/or coastal water bodies that have a potential hydrological connection to the subject site as recorded by the EPA (EPA, 2024) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in Table 8-9 and Figure 8-7.

Table 8-9 WFD River Status

Waterbody Name	Waterbody EU Code	Location from Proposed Development	Distance Downstream of the Site (km)	WFD Status (2016-2021)	WFD Risk	Potential For Effect
Barrow Catchment						
Esker Stream_010	IE_SE_14E010100	West	3.5	Moderate	Review	No, hydrologically upstream of the site.
Esker Stream_020	IE_SE_14E010200	On site	0.0	Moderate	At Risk	Yes, hydrologically connected to site.
Figile_030	IE_SE_14F010200	East	0.5	Moderate	At Risk	No, hydrologically upstream of the site.
Figile_040	IE_SE_14F010300	South	1.79	Moderate	At Risk	Yes, downstream of the site.

Waterbody Name	Waterbody EU Code	Location from Proposed Development	Distance Downstream of the Site (km)	WFD Status (2016-2021)	WFD Risk	Potential For Effect
Figile_050	IE_SE_14F010400	Southeast	9.7	Poor	At Risk	Yes, downstream of the site.
Figile_060	IE_SE_14F010500	Southeast	12.73	Good	Not at Risk	Yes, downstream of the site.
Figile_070	IE_SE_14F010510	Southeast	18.78	Good	Review	Although upstream waterbody drains a section of the Proposed Development area, due to the distances involved and dilution within the waterbodies, it is unlikely for potential pollutants to migrate to the surface waterbody in concentrations sufficient to cause adverse effects on status. This also applies to all downstream waterbodies.
Boyne Catchment						
Grand Canal Main Line (Boyne)	IE_07_AWB_GCMLW	North	0.0	Good	Not at Risk	No direct hydrological connection
Boyne_020	IE_EA_07B040300	On site	0.0	Poor	At Risk	Yes, hydrologically connected to site.
Boyne_030	IE_EA_07B040400	Northeast	5.94	Good	Not at Risk	Yes, downstream of the site.
Boyne_040	IE_EA_07B040600	Northeast	13.10	Moderate	At Risk	Although upstream waterbody drains a section of the Proposed Development area, due to the distances involved and dilution within the waterbodies, it is unlikely for potential pollutants to migrate to the surface waterbody in concentrations sufficient to cause

Waterbody Name	Waterbody EU Code	Location from Proposed Development	Distance Downstream of the Site (km)	WFD Status (2016-2021)	WFD Risk	Potential For Effect
						adverse effects on status. This also applies to all downstream waterbodies.
Lower Shannon Catchment						
Tullamore_020	IE_SH_25T030100	West	0.1	Poor	At Risk	Yes, downstream of the site.
Tullamore_030	IE_SH_25T030300	Northwest	4.76	Poor	At Risk	Yes, downstream of the site.
Tullamore_040	IE_SH_25T030400	Northwest	10.92	Moderate	At Risk	Although upstream waterbody drains a section of the Proposed Development area, due to the distances involved and dilution within the waterbodies, it is unlikely for potential pollutants to migrate to the surface waterbody in concentrations sufficient to cause adverse effects on status. This also applies to all downstream waterbodies.
Groundwater Bodies						
Rhode GWB	IE_SE_G_116	Underlying	0.0	Good	Not at Risk	Yes, underlying the site
Trim GWB	IE_EA_G_002	Underlying	0.0	Good	At Risk	Yes, underlying the site
Cushina GWB	IE_SE_G_048	Underlying	0.0	Good	Not at Risk	Yes, underlying the site
Geashill GWB	IE_SH_G_103	Underlying	0.0	Good	Not at Risk	Yes, underlying the site

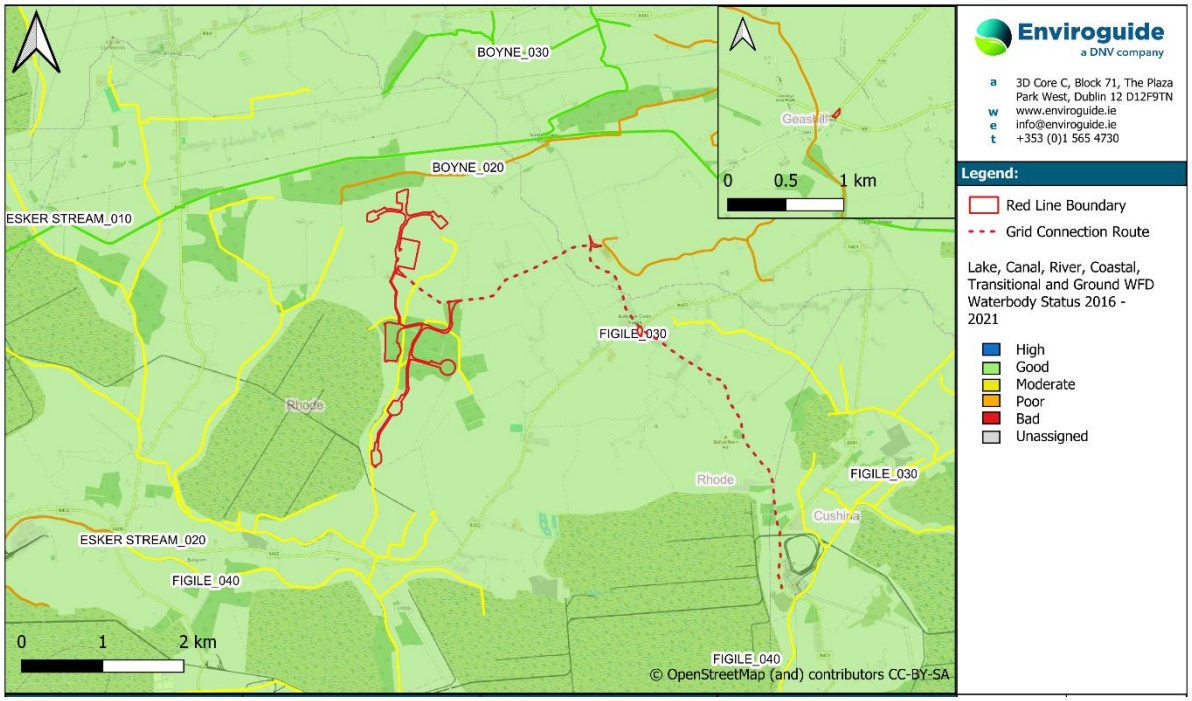

Figure 8-7: Water Framework Directive Status

8.3.10.1 Nature Conservation

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

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.

While hydrological connectivity can extend over considerable distances, the likelihood of any measurable impact is considered negligible due to the substantial separation distance, combined with the natural dilution, attenuation, and dispersion processes that occur within intervening watercourses. As a result, sites beyond 30km are not considered to fall within the ZoI of the Proposed Development.

There are nine further Natura 2000 sites that are identified within the potential hydrological ZoI of the Proposed Development. There are also five NHAs and seven further pNHAs identified with a potential hydrological connection to the Proposed Development. The Natura 2000 sites and other protected and designated sites or areas with a potential hydrological connection to the site are summarised in Table 8-10 and presented in Figure 8-8.

Table 8-10: Designated and Protected Sites

Designated Site	Site Code	Distance (km)[1]	Direction	Potential Hydrological Connection to the Proposed Development
Special Area of Conservation (SAC)				
The Long Derries, Edenderry SAC	000925	8.34	East	No, hydrologically upstream of the Proposed Development
Raheenmore Bog SAC	000582	9.94	West	
River Boyne and River Blackwater SAC	0002299	17.22	Northeast	Yes, downstream of the Proposed Development within potential ZoI.
River Barrow and River Nore SAC	002162	16.18	Southeast	
Charleville Wood SAC	000571	9.52	West	
River Shannon Callows SAC	000216	47.33	Southwest	Yes, though connection is extremely tenuous due to distance, watercourse dilution and nature of the proposed works. Not considered to be within ZoI.
Special Protection Area (SPA)				
River Boyne and River Blackwater SPA	004232	17.22	Northeast	Yes, downstream of the Proposed Development within potential ZoI.
Lough Ernell SPA	004044	19.18	Northwest	No, hydrologically upstream of the Proposed Development
Slieve Bloom Mountains SPA	004160	25.40	Southwest	No, hydrologically upstream of the Proposed Development
Proposed Natural Heritage Area (pNHA)				
Grand Canal	002104	0.4	North	No direct hydrological connection
Royal Canal	002103	17.24	Northeast	No direct hydrological connection. However, the Boyne has a pumped feeder contribution to the Roal Canal. Connection is extremely tenuous due to distance, watercourse dilution and nature of the Proposed Development. Not considered to be within ZoI.
Ballina Bog	001012	5.3	West	There is no hydrological link connecting the Study Area to the pNHA
Rahugh Ridge (Kiltober Esker)	000918	14.1	West	
Raheen Lough	000917	13.4	West	
The Long Derries, Edenderry	000925	8.34	East	No, hydrologically upstream of the Proposed Development
Raheenmore Bog	000582	9.94	West	
Natural Heritage Areas (NHA)				
Carbury Bog NHA	01388	11.20	Northeast	No, hydrologically upstream of the Proposed Development
Black Castle Bog NHA	000570	2.13	North	
Daingean Bog NHA	002033	9.76	Southwest	
Milltownpass Bog NHA	002323	13	North	
Cloncrow Bog (New Forest) NHA	000677	14.9	North	

'*' = Distance is measured as closest point to the Proposed Development

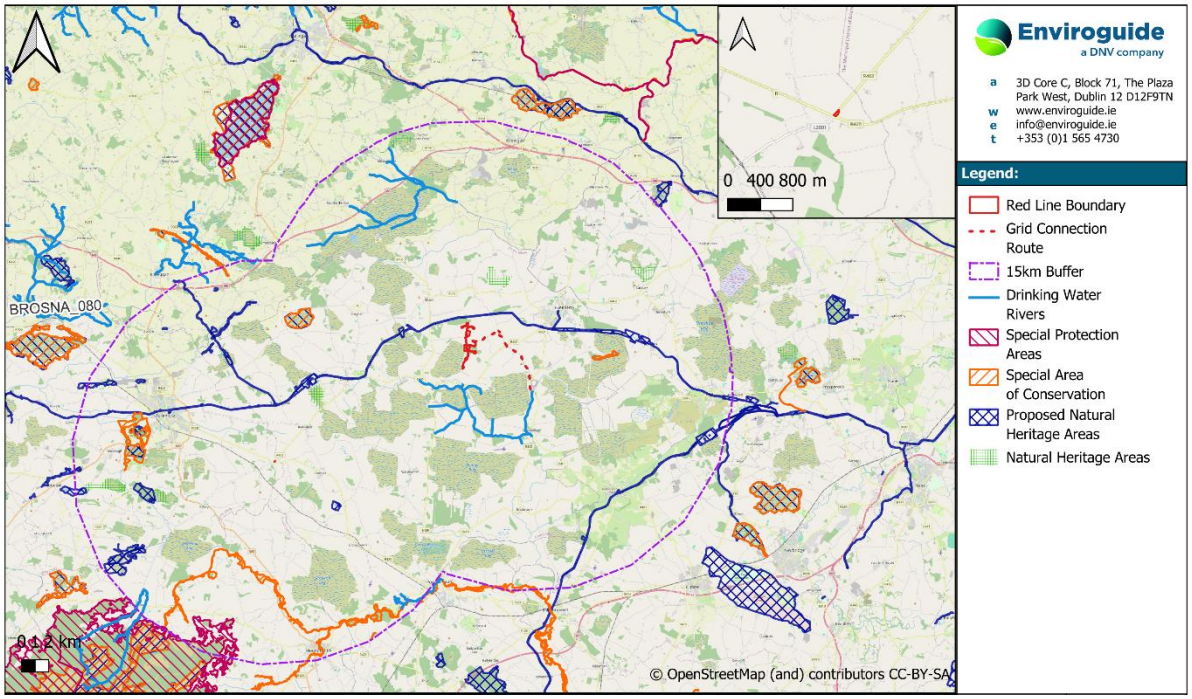

Figure 8-8: Designated and Protected Sites

8.3.10.2 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.

The Figile_040 waterbody is identified (EPA, 2024) as a drinking water river supplying the Clonbulloge PWS, under Article 7 of the WFD. The Figile_040 is located approximately 1.4km downstream of the Proposed Wind Farm and 0.25km from the Proposed Grid Connection. It is noted that the watercourse draining the Proposed Wind Farm (Leitrim Stream) confluences with the Figile River approximately 50m downstream of the Clonbulloge WTP.

8.3.10.3 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 at Balbriggan/Skerries approximately 72km east of the Site within the Irish Sea.

8.3.10.4 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".

Sections of the Boyne River, the Barrow River, the Boyne Estuary and the Barrow Estuary are all designated as nutrient sensitive. The closest designated Nutrient Sensitive fish Area location is the Barrow_90 waterbody approximately 25km downstream of the site.

8.3.10.5 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 Laytown/Bettystown located approximately 72km east of the site.

8.4 Importance of Receiving Environment

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

The Edenderry Oolite Member bedrock aquifer beneath the Proposed Wind Farm is mapped as a Locally Important Aquifer (Lm) which is generally moderately productive. The majority of the Proposed Grid Connection is primarily also mapped as a Locally Important Aquifer (Lm) which is generally moderately productive. The southern 1.4km of the Proposed Grid Connection is mapped as a Locally Important Aquifer (LI) which is moderately productive only in local zones. The Proposed Ballinla (Geashill-by) TDR works area is underlain by a Locally Important Aquifer (LI) which is generally moderately productive.

Overall, taking account of the receiving hydrological environment, in accordance with the criteria set out in Table 8-1, the site of the Proposed Development is considered to be of 'High' importance.

8.5 Characteristics of the Proposed Development

8.5.1 Construction Phase

The construction works for the Proposed Development will be carried out in a phased manner to minimise disruption to the local community, minimise environmental impact and ensure the safest working conditions possible. A comprehensive description of activities is outlined in Chapter 3 Civil Engineering of this EIAR. The construction of the Proposed Development will principally comprise of the following works:

- Felling of any areas of coniferous forestry plantation necessary to facilitate construction works.
- Construction of site entrances and any sections of internal access tracks necessary to facilitate access to the temporary construction compound.
- Construction of the temporary construction compound including storage area for construction materials, temporary site cabins to provide welfare facilities for site personnel, office space, meeting rooms, canteen area, mobile sanitary facilities and parking.

- Establishment of the temporary storage of stockpiled overburden and surplus excavated materials topsoil and subsoil within the temporary material storage areas. Establishment of the spoil deposition area at T4.
- 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 associated turbine hardstand areas.
- Installation of sections of underground cabling between turbines.
- Installation of sections of underground cabling to selected connection point option.
- Construction of the substation compound.
- Turbine delivery works, installation and commissioning.
- Landscaping and biodiversity enhancement.

8.5.1.1 Water Course Crossings

As part of the civil engineering works associated with the Proposed Development, four water crossings are required over EPA registered watercourses.

Watercourses Within the Wind Farm Boundary

Four watercourse crossings will be required on EPA registered streams as part of the Proposed Development. The water crossings will consist of one clear span bridge and three culverts.

Land Drains within the Wind Farm Boundary

In the northern section of the Proposed Wind Farm, there are small field drains within the hedge lines of the agricultural fields. There will be approximately nine field drains to be crossed in this section of the wind farm. All watercourse and drain crossings in the northern section of the Proposed Wind Farm will be made using bottomless culverts. No instream works will take place on the northern section of the Proposed Wind Farm.

In the southern section of the Proposed Wind Fam, there are numerous minor forestry drains all draining east to west within the forestry and the peatlands. Four land drains have been noted in site walkovers. They will be crossed using box culverts.

Watercourses within the Proposed Grid Connection

The Proposed Grid Connection is 8km long on local roads and crosses one EPA registered watercourse, the Leitrim Stream. Eighteen land drains have been identified along the route. Refer to **Chapter 3 Civil Engineering** of this EIAR for the details on watercourse crossings.

8.5.1.2 Conifer Tree Felling

Felling of commercial conifer forestry will be required to accommodate the construction of some wind farm infrastructure, namely four turbine foundations, and associated hardstands, access tracks, turbine assembly, and deposition areas. It is proposed to fell around turbines both to facilitate construction and as a mitigation measure for bats as per best practice guidance and local specific biodiversity requirements.

8.5.1.3 Temporary Construction Compounds and Welfare Facilities

One temporary construction compound will be established upon commencement of the construction phase (refer to planning application **Drawing No. 23882-MWP-00-00-DR-C-5417** for details).

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. There will be areas designated for parking as well as construction waste within this compound. The Proposed Development will include an enclosed wastewater management system at the temporary compound capable of handling the wastewater demand during the construction phase. A holding tank is proposed at the compound for wastewater management. The holding tank will be emptied by a licensed permitted contractor only. Upon completion of the project the compound will be decommissioned by backfilling the area with the material arising during excavation and landscaping with topsoil.

8.5.1.4 Water Supply

Water needs for construction activities will be limited to concrete truck chute washing, wheel wash, dust suppression and sanitary facilities. This water requirement will be sourced from on-site rainwater collection systems and settlement ponds.

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

8.5.1.5 Proposed Grid Connection

The Proposed Grid Connection is approximately 8km in length, the majority of which is located within local roads. One EPA-registered watercourse crossing is required along the Proposed Grid Connection: the Leitrim Stream. A total of 18 land drains and one EPA-registered watercourse have been identified along the route. Land drains will be crossed using bottomless culverts. The single watercourse crossing, located on the L-5010 between the northern and southern site entrances of the Proposed Wind Farm, will be constructed using Horizontal Directional Drilling (HDD). In addition, a second HDD crossing is proposed under the existing Bord na Móna rail track, located along the R401 near Edenderry Power Station, to avoid surface disruption and maintain the integrity of the rail infrastructure. Refer to **Chapter 3: Civil Engineering** of the EIAR for further details on all watercourse and infrastructure crossings.

8.5.1.6 Proposed TDR

There will be no works proposed along the vast majority of the TDR, with only relatively minor temporary works proposed at three specific locations. Therefore, there will be no potential for hydrogeological impacts along the vast majority of this route. Temporary works at these locations will involve some topsoil stripping and placement of hardcore to allow passage of the wind turbine components.

8.5.1.7 Embedded Controls

A CEMP has been prepared by MWP (MWP, 2025) and will be updated throughout the pre-construction and construction phase and will be implemented on site. The CEMP will be a key construction contract document, which will ensure that all mitigation measures, which are considered necessary to protect the environment, prior to construction, during construction and during operation of the Proposed Development, are implemented. The CEMP will collate and manage the proposed and agreed mitigation measures, monitoring and follow-up arrangements and management of environmental impacts. The environmental commitments of the Proposed

Development will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later development stages. The CEMP will mainly address the construction phase however, where monitoring is to continue into the operational phase these commitments will be communicated and transcribed into operational process documentation.

A site surface water management system will be constructed on the site to attenuate runoff guard against soil erosion and safeguard downstream water quality. The drainage system will be implemented along all work areas including all internal site access tracks, storage areas, crane hardstand areas and temporary site construction compound. Details of the proposed site drainage system are described in Chapter 3: Civil Engineering of this EIAR.

The site drainage system for the wind farm is designed to maintain the existing flow regime and water quality. Clean water from upstream is diverted around work areas to prevent contamination, while dirty water is collected and treated separately. Flood attenuation measures include temporary storage within drainage channels using stone dams. Stream crossings will use bottomless culverts or pre-cast concrete culverts to avoid altering watercourse profiles and ensure fish passage. Environmental control measures will be implemented to minimise sedimentation and pollution during construction. There will be no direct outfalls to watercourses instead each clean water drain will be terminated in a discharge channel running parallel to the ground contours that will function as a weir to disperse the flow over a wider area of vegetation.

8.5.2 Operational Phase

The operational phase of the Proposed Development will consist of up to seven wind turbines and associated infrastructure. The wind farm is designed for a 35-year operational lifespan.

Surface water will be managed in line with SuDS principles, ensuring water is treated and attenuated before being discharged offsite. The surface water management system installed during construction will remain in place and be maintained throughout the operational phase. Further details are provided in Chapter 3: Civil Engineering.

There will be no direct discharges to watercourses. Instead, clean water drains will discharge into channels aligned with natural ground contours. These channels will act as weirs, dispersing flow across vegetated areas to promote infiltration and reduce runoff velocity.

During operation, maintenance personnel will infrequently visit the substation. On days when maintenance occurs, an average of two workers is expected on site, generating approximately 100l of wastewater per day. This wastewater will be collected in a twin-hull holding tank equipped with a level alarm. The tank will be emptied by a licensed contractor and the contents treated at an authorised facility.

Potable water use is estimated at 50l/d and will be supplied via bottled water. Rainwater harvesting will support wastewater facilities at the substation compound.

The power generation process will not produce emissions or pollutants. Operational waste is expected to be minimal and may include lubricating oils, cooling fluids, and packaging from spare parts. Hazardous materials will be handled and disposed of by approved contractors in accordance with the Waste Management (Hazardous Waste) Regulations, 1998. All other waste will be removed from site and either reused, recycled, or disposed of at authorised facilities following best practice.

8.6 Assessment of Effects

The potential impacts described below regarding the construction phase, operational phase, decommissioning phase and cumulative impacts have been conservatively assessed in the absence of standard avoidance, remedial and mitigation measures as described in Section 8.7.

8.6.1 Construction Phase

In the absence of 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 including:
    - Proposed Wind Farm: the Rhode GWB.
    - Proposed Grid Connection: Rhode GWB, Trim GWB & Cushina GWB.
    - Proposed TDR Works: Trim GWB, Rhode GWB and Geashill GWB.
- Downstream receiving waterbodies including the Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies.
- Regionally groundwater flow is in a general southerly direction in line with the Barrow Catchment but a small portion of the Proposed Grid Connection likely has ground water flow that extend to the northeast with the Boyne catchment. Local groundwater flows will be to the receiving surface waterbodies in the immediate sub-catchment.
- The GSI (GSI, 2025) have identified 22 groundwater sources within a 2km radius of the site including the route of the Proposed Grid Connection.
- Clonbulloge Public Water Supply scheme downstream of the Proposed Grid Connection via the Figile River.
- Natura 2000 Sites and pNHAs with an identified hydrological connection. The Natura 2000 sites are assessed and described in further detail in **Chapter 6: Biodiversity** of this EIAR.

8.6.1.1 Hydrogeological Flow Regime

During the construction phase of the proposed development there will be no direct discharges to or abstractions from groundwater at the proposed development with the exception of rainfall which will infiltrate to ground over a limited portion of the site. 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.

Excavation activities, particularly for turbine foundations, may require dewatering, which has the potential to temporarily lower local groundwater levels and affect nearby wells. Based on the findings of the Ground Investigation (GII, 2025), there may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels at 2mbgl), where encountered during ground works. Where required, shallow recharge wells will be utilised to ensure the existing hydrogeological regime is maintained by allowing water to infiltrate back into the ground, ensuring that 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. The Proposed TDR works are not expected to result in any significant alteration to the local hydrogeological regime. The construction activities will be confined to shallow excavations and surface-level works, avoiding deep ground disturbance that could impact groundwater flow paths or recharge zones. Consequently, no significant changes to groundwater levels, flow directions, or recharge dynamics are anticipated. In the absence of mitigation, the following pre-mitigation effects on the hydrogeological flow regime are predicted to be **likely, negative, negligible** 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.

In addition to excavation-related impacts, the Proposed Grid Connection includes the use of HDD to cross sensitive watercourses and other environmentally constrained areas. While HDD is a trenchless technique

designed to minimise surface disturbance, it can still pose risks to the hydrogeological environment. These include the potential for inadvertent returns (frac-outs) of drilling fluids, which could migrate into shallow groundwater systems, particularly in areas of high permeability or fractured bedrock. However, all HDD crossings are designed to occur at a minimum depth of 1.5m below the base of the watercourse, significantly reducing the likelihood of interaction with shallow aquifers or groundwater-dependent ecosystems. In the absence of mitigation, the following pre-mitigation effects on the hydrogeological flow regime associated with the Proposed Grid Connection are predicted to be **unlikely, negative, low** and **temporary** within a very localised zone of the aquifer only and there will be no impact on the flow regime of receiving groundwater bodies.

The Proposed TDR works are not anticipated to result in any significant changes to local hydrogeological flow regimes. These works will primarily occur along existing roadways and disturbed areas, minimising the need for new ground disturbance or alteration of natural drainage patterns. As a result, there will be no long-term alteration to land use, drainage patterns, or surface water flow regimes along the Proposed TDR. Overall, impacts to the hydrogeological flow regime will likely be **likely, neutral, negligible and temporary**.

Table 8-11: Construction Effects (Pre-Mitigation) on Hydrogeological Flow Regime Alteration

Hydrogeological Flow Regime Alteration of Sensitive Receptors							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Wind Farm	Negative	Negligible	Local	Temporary	Direct	Likely	Imperceptible
Proposed Grid Connection	Negative	Low	Local	Temporary	Direct	Unlikely	Slight
Proposed TDR	Neutral	Negligible	Local	Temporary	Direct	Likely	Imperceptible

8.6.1.2 Hydrological Flow Regime

While no direct discharges to or abstractions from surface water are proposed during the construction phase, the construction of the Proposed Wind Farm has the potential to alter the local hydrological flow regime through activities such as land re-profiling and altering existing drainage pathways. These activities may result in changes to surface water flow paths, drainage patterns and aquatic habitats. The following pre-mitigation effects on the hydrological flow regime are predicted to be **likely, negative, negligible** to **low**, **temporary** effects on local surface water flow paths.

Several minor crossings of the Leitrim Stream and its tributary drainage channels will be required. In the northern section of the Proposed Wind Farm, all crossings will be constructed using bottomless culverts, with no in-stream works proposed. In the southern section of the Proposed Wind Farm, a clear-span bridge will be used to cross the Leitrim Stream, and in-stream works may be required for culvert installation. These works will be carried out in accordance with Inland Fisheries Ireland (IFI) guidance. Construction methodologies are detailed in **Chapter 3: Civil Engineering**.

While the majority of the Proposed Grid Connection will be installed via shallow trenches within public road or verges, two sections will be installed via HDD which can alter subsurface hydrology, affecting flow patterns or connectivity between water bodies. However, all HDD crossings are designed to occur at a minimum depth of 1.5m below the base of the watercourse to minimise the risk of direct interaction with aquatic habitats or hydrological connectivity. In addition, several land drains will be intersected during the construction of the Proposed Grid Connection, which may temporarily influence the hydrological regime of local surface waters and result in localised changes to runoff patterns, temporary ponding or altered timing and volume of water entering adjacent watercourses. Culverts will be installed at each crossing point to maintain existing flow paths and ensure continuity of drainage. These culverts will be appropriately sized and positioned to replicate the natural flow

conditions, thereby minimising any disruption to the surface water hydrology during and after construction. The following pre-mitigation effects on the hydrological flow regime are predicted to be **likely, negative, negligible**, **temporary** effects on local surface water flow paths due to water crossings and HDD.

The Proposed TDR works are not anticipated to result in any significant changes to local hydrological flow regimes. These works will primarily occur along existing roadways and disturbed areas, minimising the need for new ground disturbance or alteration of natural drainage patterns. As a result, there will be no long-term alteration to land use, drainage patterns, or surface water flow regimes along the Proposed TDR. Overall, impacts to the hydrological flow regime will likely be **likely, neutral, negligible and temporary**.

Table 8-12: Construction Effects (Pre-Mitigation) on Hydrological Regime of Sensitive Receptors

Hydrological Flow Regime Alteration of Sensitive Receptors							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Wind Farm	Negative	Negligible to Low	Local	Temporary	Direct	Likely	Imperceptible to slight
Water Crossings	Negative	Negligible	Local	Temporary	Direct	Likely	Imperceptible
Proposed TDR	Neutral	Negligible	Local	Temporary	Direct	Likely	Imperceptible

These effects are expected to be confined to the immediate vicinity of the works and will not impact the flow regime of downstream receiving water bodies.

8.6.1.3 Sedimentation - Water Quality

In-stream works will be required to construct the proposed culvert crossings in the southern portion of the Proposed Development. All in-stream works will be undertaken during the summer when the flow within the receiving waterbodies is at its minimum. There is the potential for some disturbance of the stream bed and increased suspended solids content of the water downstream of the works area during the construction works. Elevated suspended solids can reduce water clarity, smother aquatic habitats, and impair the ecological status of the receiving waterbodies. In the absence of mitigation, this may result in a **likely, negative**, **medium**, **short-term** impact on the receiving Leitrim stream, its tributaries and downstream waterbodies depending on the nature of the incident.

There is the potential for localised disturbance of the stream banks and bed and increased suspended solids content of the water downstream of the works area during the construction of a clear span bridge crossing of the Leitrim stream and its tributaries. In the absence of mitigation, this may result in an **unlikely, negative**, **medium**, **short-term** impact on the receiving Leitrim stream, its tributaries and downstream waterbodies depending on the nature of the incident.

There is a risk of runoff with entrained sediment or other contaminants from internal access routes within the site or other contaminants from groundworks areas and stockpiled soils entering the receiving Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies via overland flow. The appointed contractor will ensure that any run-off from the site will be managed for the duration of the construction phase to ensure that surface water runoff is contained, attenuated and treated onsite prior to discharge offsite. However, in the absence of standard mitigation measures, there is a potential **likely, negative**, **medium** and **short-term** impact on the receiving water quality and WFD status of the Leitrim stream, its tributaries and downstream receiving waterbodies.

During the construction works along the route of the Proposed Grid Connection, there is a potential risk of runoff with contaminants migrating offsite via existing surface water drainage along public roads. In the absence of mitigation, it is considered that this could result in **unlikely, negative**, **medium** and **short-term** impact to water quality of the Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies.

Table 8-13: Construction Effects (Pre-Mitigation) Sedimentation of Surface

Contamination of Surface Water from Suspended Sediments							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
In-Stream Culvert	Negative	Medium	Local	Short-Term	Direct	Likely	Moderate
Clear Span Bridge	Negative	Medium	Local	Short-Term	Direct	Unlikely	Moderate
Proposed Wind Farm Earthworks	Negative	Medium	Local	Short-Term	Direct	Likely	Moderate
Proposed Grid Connection Earthworks	Negative	Medium	Local	Short-Term	Direct	Unlikely	Moderate

8.6.1.4 Accidental Spills and Leaks – Water Quality

During construction, there is the potential , 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 productive fissured bedrock areas like the Rhode, GWB, there is a high degree of interconnection between groundwater and surface water. In a worst-case scenario, and in the absence of mitigation, the release of contaminants used onsite could enter the underlying aquifer and rapidly migrate towards receiving watercourses including the Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies.

Similarly, the use of HDD for the Proposed Grid Connection introduces additional, albeit localised, risks to the hydrogeological environment. Although HDD is a trenchless technique designed to minimise surface disturbance, it involves the use of drilling fluids (typically bentonite-based) under pressure, which can pose a contamination risk if an inadvertent return (frac-out) occurs. This is particularly relevant in areas of shallow, fractured bedrock or high permeability subsoils, where there is a potential for drilling fluids to migrate into the groundwater system.

In the event of such scenarios and in the absence of mitigation, it is considered that this could result in an **unlikely, negative, medium** to **high** and **short-term** reversible impact on the underlying aquifer environment and the receiving waterbodies depending on the nature of the incident.

Table 8-14: Construction Effects (Pre-Mitigation) Accidental Spills and Leaks

Contamination of GWBs and Surface Waters from Accidental Spills and Leaks							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Development	Negative	Medium to High	Local	Short-Term	Direct	Unlikely	Significant

8.6.1.5 Use of Cementitious Materials – Water Quality

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, in the absence of mitigation, the use of cementitious material at the site may result in a **unlikely, negative**, **medium** to **high** and **short-term** reversible impact on the receiving water environment due to the potential release of alkaline substances from concrete works, particularly during foundation construction and structural installations, however it is noted that any concrete discharged would be accidental, localised to the immediate vicinity of the construction works and of limited volume .

Table 8-15: Construction Effects (Pre-Mitigation) Use of Cementitious Material

Contamination of GWBs and Surface Waters from Cementitious Material							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Development	Negative	Medium to High	Local	Short-Term	Direct	Unlikely	Significant

8.6.1.6 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 theoretical risk of flooding in parts of the Proposed Development, the risk of flood-related impacts during construction is considered unlikely as even in Flood Zone B, the probability of a flood event occurring in any given year is less than 1%. Given the temporary nature of the construction phase is temporary this also reduces the window of exposure to potential flood events.

Overall, in the absence of appropriate mitigation, flood events during the construction phase have the potential to have **unlikely, negative**, **short-term**, **medium** to **high** reversible effects on hydrological receptors.

Table 8-16: Construction Effects (Pre-Mitigation) Contamination of Surface Waters from Flooding

Contamination of Surface Waters from Flooding							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Development	Negative	Medium to high	Local	Short-Term	Indirect	Unlikely	Moderate to Significant

8.6.1.7 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. Given these embedded controls, it is considered that any impact on the relating to wastewater during the construction phase will be **likely, neutral**, **negligible** and **temporary**.

Table 8-17: Construction Effects (Pre-Mitigation) Wastewater Contamination

Contamination of GWBs and Surface Waters from Wastewater							
	Quality of Effect	Significance of Effect	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Development	Neutral	Negligible	Local	Temporary	Direct	Likely	Imperceptible

8.6.1.8 Water Supply

During the construction phase of the Proposed Development, affects on water quality (as set out above) have the potential to negatively effect surface water and groundwater derived sources of potable water. However, due to the Proposed Developments layout, tenuous connectivity to sensitive sources (abstraction locations) and scale and nature of the proposed works the likely effects are limited. Groundwater sources (GSI, 2025) within the immediate vicinity of the Proposed Development are generally recorded as having a "poor" yield indicating limited connectivity with the wider aquifer. Considering this in conjunction with the separation distances between the Proposed Development and the groundwater sources, it is anticipated that, in the absence of mitigation measures, any impact on these sources during the construction phase will be **unlikely, negative**, **negligible to low** and **temporary**.

The Clonbulogue PWS is approximately 3.4km downstream of the Proposed Grid Connection via the Figile River. Any potential effect associated with the construction of the Proposed Grid Connection is limited due to the scale and nature of the works at this location (terminal connection within the existing Edenderry Power Plant facilities). Overall it is anticipated that, in the absence of mitigation measures, any impact on the Clonbulogue PWS during the construction phase will be **unlikely, neutral**, **negligible** and **temporary**.

Table 8-18: Construction Effects (Pre-Mitigation) Water Supply

Contamination of Potable Water Supplies							
	Quality of Effect	Significance of Effect	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Groundwater Sources	Neutral	Negligible to low	Local	Temporary	Direct	Unlikely	Imperceptible to Slight
Surface Water Sources	Neutral	Negligible	Local	Temporary	Direct	Unlikely	Imperceptible

8.6.2 Operational Phase

8.6.2.1 Hydrogeological Flow Regime

There will be no direct outfalls to watercourses. Surface water runoff from the Proposed Wind Farm, which will be managed in accordance with the principles and objectives of SuDS, will be treated and attenuated prior to discharge from the site to the Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies via overland flow. The Proposed Wind Farm will also result in the removal of one shallow forestry land drain, which currently serves a limited catchment. Post-development flow paths will be maintained, and greenfield runoff rates will be returned to pre-drainage conditions during the operational period of the Proposed Wind Farm. Overall, impacts to the hydrological flow regime will likely be **likely, neutral, negligible and long-term**.

During the operational phase, the Proposed Grid Connection, located within existing road surfaces or road verges, will continue to interact with the surrounding hydrogeological environment. The presence of subsurface infrastructure may still influence local hydrogeological conditions. HDD-installed ducts, if not fully sealed or if intersecting permeable strata, could act as preferential pathways for shallow groundwater movement, potentially altering natural flow directions. Similarly, culverts and associated backfill materials may modify infiltration rates and subsurface drainage patterns, particularly in areas with high groundwater tables or sensitive soils. it is considered that the likely effect on the hydrogeological regime of the underlying aquifers as a result of the Proposed Grid Connection will be **likely, neutral, negligible** and **permanent**.

During the operational phase, no significant effects are predicted in relation to the works carried out along the Proposed TDR as these works are temporary in nature and will be fully reinstated upon completion of the construction phase. Reinstatement will include the restoration of any disturbed ground, drainage features, and road surfaces to their original condition or better, in accordance with best practice and local authority requirements. As a result, there will be no long-term alteration to land use, drainage patterns, or groundwater flow regimes along the Proposed TDR, and the operational phase of the development is not expected to give rise to any effects. Overall, impacts to the hydrological flow regime will likely be **likely, neutral, negligible and temporary**.

Table 8-19: Operational Effects (Pre-Mitigation) Hydrogeological Flow Regime Alteration

Hydrogeological Flow Regime Alteration of Sensitive Receptors							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Wind Farm	Neutral	Negligible	Local	Long-Term	Direct	Likely	Imperceptible
Proposed Grid Connection	Neutral	Negligible	Local	Permanent	Direct	Likely	Imperceptible
Proposed TDR	Neutral	Negligible	Local	Temporary	Direct	Likely	Imperceptible

8.6.2.2 Hydrological Flow Regime

There will be no direct outfalls to watercourses during the operational phase. Surface water runoff from the Proposed Wind Farm will be managed in accordance with SuDS principles, ensuring treatment and attenuation prior to discharge to surface waters and downstream waterbodies via overland flow for the operational period of the Proposed Wind Farm. The Proposed Wind Farm will also result in the removal of one shallow forestry land drain, which currently serves a limited catchment. Post-development flow paths will be maintained, and

greenfield runoff rates will be returned to pre-drainage conditions. The following effect is predicted as **likely**, **neutral**, **negligible**, **long-term** effect on the hydrological flow regime.

The Proposed Grid Connection will be routed through existing hardstanding areas and road verges, minimising direct disturbance to natural land and water features. Watercourse crossings will be achieved using HDD avoiding direct excavation of the watercourse bed, and culverts will be used to cross drainage channels. These interventions have the potential to cause minor, localised alterations to hydrological flow patterns. Specifically, culvert crossings may affect flow velocity or sediment transport if not properly designed, while HDD installations carry a low risk of subsurface flow disruption. These effects are considered to be **likely, neutral, negligible** and **permanent**.

During the operational phase, no significant effects are predicted in relation to the works carried out along the Proposed TDR as these works are temporary in nature and will be fully reinstated upon completion of the construction phase. Reinstatement will include the restoration of any disturbed ground, drainage features, and road surfaces to their original condition or better, in accordance with best practice and local authority requirements. However, temporary road widening works may give rise to indirect effects on the water environment that could persist into the operational phase including subtle alterations to surface water flow paths, changes in infiltration rates due to subsoil compaction, or minor disruptions to existing drainage connectivity. Overall, impacts to the hydrological flow regime will likely be **likely, neutral, negligible and temporary**.

Table 8-20: Operational Effects (Pre-Mitigation) Hydrological Flow Regime Alteration

Sedimentation of Surface Waters							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Wind Farm	Neutral	Negligible	Local	Long-Term	Direct	Likely	Imperceptible
Proposed Grid Connection	Neutral	Negligible	Local	Permanent	Direct	Likely	Imperceptible
Proposed TDR	Neutral	Negligible	Local	Temporary	Direct	Likely	Imperceptible

8.6.2.3 Sedimentation – Water Quality

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. There will be no direct outfalls to watercourses. 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 discharging to the Leitrim stream and its tributaries via overland flow. Given the limited potential for sediment-laden runoff during operation and the design of the drainage system, the resulting effect on the water quality form surface water runoff will be **likely, negative, negligible** and **long-term**.

Table 8-21: Operational Effects (Pre-Mitigation) Sedimentation of Surface Waters

Sedimentation of Surface Waters							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Wind Farm	Negative	Negligible	Local	Long-Term	Direct	Likely	Imperceptible

8.6.2.4 Accidental Spills and Leaks – Water Quality

Lubricating and cooling oils required for the operation and maintenance of the Proposed Development will be stored and handled in accordance with the site's operating plan. Underground cables are not expected to require maintenance during the operational phase. However, in the unlikely event of a hazardous material release, such as a failure of secondary containment or a materials handling accident, deleterious substances could infiltrate the underlying groundwater or migrate offsite via surface water drainage. Based on the embedded controls described in Chapter 03 which include the installation of Class 1 full retention oil separators in the substation compound and bunded containment areas for hazardous materials. Oil-filled transformers located within the substation compound are equipped with bunded containment systems to prevent the release of hydrocarbons into the surrounding environment in the event of a leak or spill. These bunds are designed to capture and retain any leaked fluids. The Proposed Development also includes a comprehensive drainage and attenuation network, including check dams, sediment ponds, vegetated buffer zones, and separation of clean and dirty water flows. These systems are designed to intercept, treat, and disperse runoff, ensuring that any contaminants are filtered and diluted before reaching sensitive watercourses. The modular design of the settlement ponds and the use of multi-tiered treatment stages further enhance the system's capacity to manage unexpected discharges. The resulting **pre-mitigation effect** is **unlikely, negative**, **low**, **short-term** effect on a local area of the aquifer and receiving watercourses (Leitrim Stream, Kinnafad Stream, Figile River). Effects on downstream waterbodies (e.g., Barrow River, Boyne River) are unlikely to be perceptible due to dilution.

Table 8-22: Operational Effects (Pre-Mitigation) Accidental Spills and Leaks

Contamination of GWBs and Surface Waters from Accidental Spills and Leaks							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Wind Farm	Negative	Low	Local	Short-Term	Indirect	Unlikely	Slight

8.6.2.5 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, however in the unlikely event of failure of the holding tank or alarm system fails, there is a potential risk of wastewater escaping and contaminating the surrounding water environment. However, the volume of wastewater from the operational phase of the Proposed Development is very low (typically <2,000 litres/month) and all wastewater will be contained, removed offsite, and treated at a licensed facility with sufficient capacity. It is considered that the effect on the water quality from wastewater generated onsite will be **likely, neutral, negligible** and **long-term** given that it will be managed and removed offsite in accordance with all necessary statutory contents and waste management legislation.

Table 8-23: Operational Effects (Pre-Mitigation) Wastewater Contamination

Wastewater Contamination							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Proposed Development	Neutral	Negligible	Local	Long-Term	Indirect	Likely	Imperceptible

8.6.2.6 Flood Risk

The Proposed Development is partially situated within Flood Zone B, which is associated with a medium probability of fluvial flooding. As detailed in the Site-Specific Flood Risk Assessment (SSFRA) (MWP, 2025), all critical infrastructure—including turbines and the substation—will be constructed to appropriate design flood levels, incorporating allowances for future climate change scenarios.

Embedded controls including elevating structures above the 1% and 0.1% AEP MRFS flood levels with a 500mm freeboard, have been integrated into the design to ensure resilience against potential flood events. While the Proposed Development may result in a slight increase in surface water runoff due to the introduction of impermeable surfaces, this is not expected to significantly alter local flood dynamics. The primary receptor in this instance is the local hydrological environment, including nearby watercourses and floodplains, which could be affected by changes in runoff or flood storage. Likely impacts to flood risk as a result of the proposed development **pre-mitigation effect** is **likely, negative, negligible** to **low** and **permanent**.

During the operational phase of the Proposed Development, there is a potential for deterioration in surface water quality during a flood event due to the mobilisation of contaminants from site infrastructure. However, this risk is considered low given the limited presence of hazardous materials, the sealed nature of key infrastructure, and the implementation of standard pollution prevention measures. The risk of contamination of surface waters during a flood event is considered low. The resulting **pre-mitigation effect** is **likely**, **negative**, **negligible**, **long-term** effect on water quality and hydrological receptors due to flood risk during the operational phase.

Table 8-24: Operational Effects (Pre-Mitigation) Flood Risk and Indirect Effects on Water Quality

Flood Risk and Indirect Effects on Water Quality							
	Quality of Effect	Magnitude	Spatial Extent	Duration	Other Relevant Criteria	Likelihood	Significance of Effect
Flood Risk	Negative	Negligible to Low	Local	Permanent	Direct	Likely	Imperceptible to Slight
Effects on Water Quality	Negative	Negligible	Local	Long-Term	Indirect	Likely	Imperceptible

8.6.3 Decommissioning Phase

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

Proposed Development will be decommissioned with all seven 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.

8.6.4 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 offsite projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor. As part of this assessment, other offsite developments and proposed offsite developments as detailed in Chapter 2: Project Description of this EIAR were reviewed and considered for possible cumulative effects with the Proposed Development.

Each component of the Proposed Development has been designed to avoid significant hydrological or hydrogeological impacts through the implementation of best practice construction methods, drainage controls, and reinstatement measures.

Due to the localised nature of the construction works along the Proposed Grid Connection, impacts on the water environment will not extend beyond the immediate vicinity of the underground cable excavations. Therefore, no cumulative effects on the water environment, between the Proposed Grid Connection and any other planned developments will occur.

The TDR works are temporary in nature and will be fully reinstated following construction, ensuring no long-term alteration to surface or subsurface water flow regimes as such, effects on the water environment, between the Proposed Grid Connection and any other planned developments will occur.

The potential for cumulative effects on the water environment has been considered in the context of other existing, permitted, and under-construction developments in the surrounding area. The construction phase of the Proposed Development represents the period of highest potential for cumulative impacts, due to the increased risk of sediment runoff, accidental spills, and disturbance to hydrological pathways.

The material for the cumulative assessment was gathered through a search of relevant County Councils' Online Planning Registers, the ABPs website and the EIA Portal. A review of applications for the preceding 5 years was carried out during the EIA process. The search focused on the townlands common to the development area. All other wind farm developments were considered within 15km of the site for cumulative impact on Hydrology and hydrogeology. Finally, recent planning applications that are pending a decision from the planning authority, which were accompanied by an EIAR, were also considered. The projects in the surrounding areas mostly relate to small scale development including agricultural sheds and shed extensions, dwelling houses, and extensions to dwelling houses, attic conversions, domestic wastewater treatment systems, installation of photovoltaic for domestic purposes, garages, demolitions, and retention permission applications etc.

Such minor domestic and agricultural development will not introduce cumulative effects. These minor projects are either under the threshold for EIA or excluded from the list of projects requiring EIA and due to the nature and scale of these applications would not introduce complex or significant issues. Therefore, they are not considered in the cumulative assessment. The most relevant applications relate to the expansion of Ballinla Farm within the subject site. The remaining developments are ancillary applications for the nearby wind farms or Edenderry Power Station.

Nearby renewable energy projects within a 15 km radius that were reviewed for potential cumulative interactions include:

- Cloncreen Wind Farm – constructed and operational (approx. 2 km south).
- Mountlucas Wind Farm – constructed and operational.
- Cushaling Wind Farm – permitted.
- Yellow River Wind Farm – operational.
- Kilcush Solar Farm – permitted, approx. 7 km south.
- Oldcourt Solar Farm – permitted, approx. 10 km east.
- Highfield Solar Farm – constructed and operational.
- Ballykilleen Battery Energy Storage System – permitted.

Of these, Cloncreen, Mountlucas, Yellow River Wind Farm, and Highfield are already operational and therefore pose minimal cumulative construction-phase risk.

8.6.4.1 Construction Phase

8.6.4.1.1 Water Quality Impacts

During the construction phase of the Proposed Development, there is potential for cumulative impacts on water quality arising from sedimentation, accidental spills or leaks of fuels and oils, and the use of cementitious materials such as concrete. These risks are particularly relevant when considered in combination with other nearby developments that may be under construction within the same timeframe. Sediment-laden runoff from exposed soils, if not properly managed, can increase turbidity and degrade aquatic habitats in nearby watercourses. Similarly, accidental releases of hydrocarbons or concrete washout water can introduce harmful pollutants into the water environment, with the latter posing a high pH risk to aquatic life. However, all developments, including

the Proposed Development, are subject to standard environmental protection measures such as Construction Environmental Management Plans (CEMPs), surface water management protocols, and pollution prevention strategies. These measures are specifically designed to prevent sedimentation, contain and manage spills, and ensure proper handling and disposal of cementitious materials. With these controls in place, the potential for significant cumulative effects on water quality is considered to be low, and the overall cumulative impact is assessed as **likely, negative, temporary, indirect**, **negligible magnitude** and **not significant**.

8.6.4.1.2 Water Supply

Water supply requirements to the proposed development will be minimal. Where required, water supply during the construction phase will be provided via rainwater harvesting and bulk water tanks in accordance with all necessary statutory consents. There will be no potable water connection made to either a group water scheme or public supply. 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. Cumulative impacts to Water Resources as a result of the proposed development are **likely, negative, negligible magnitude**, **imperceptible** and **long-term**.

8.6.4.1.3 Wastewater

Foul water from the Proposed Development will be collected and tankered offsite as and when required to a licenced facility for disposal. The capacity of the wastewater holding tank will be monitored regularly. The Proposed Development could place cumulative pressure on existing wastewater infrastructure and lead to water quality impacts if not properly managed or if treatment capacity is insufficient. 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. Cumulative impacts to wastewater treatment as a result of the proposed development are **likely, negative, negligible magnitude, imperceptible** and **long-term**.

8.6.4.1.4 Agriculture

Land management practices in the surrounding area, particularly agriculture and forestry, have been considered in evaluating potential cumulative impacts on the water environment. The specific cumulative impact being assessed is the combined effect of the Proposed Development and ongoing agricultural activities on surface water quality, particularly through the potential for increased sediment and nutrient runoff into nearby waterbodies during the construction phase. Agricultural activity within the planning boundary will be suspended during the construction and commissioning phases, while farming in the wider area will continue, separated from construction areas by stock-proof fencing. Agriculture has been identified as a pressure on water quality in the Figile sub-catchment, with potential for sediment and nutrient runoff into nearby waterbodies. The Proposed Development, along with other land uses, could contribute to cumulative water quality pressures during construction. However, the implementation of robust water protection measures—including sediment control, pollution prevention protocols, and best-practice site management—will minimise the risk of impact. In the absence of mitigation, the Proposed Development is assessed as having **likely, negative, medium magnitude, moderate** and **short-term** cumulative effect on water quality in combination with the surrounding agriculture in the environs.

8.6.4.1.5 Forestry

There is the potential for cumulative impacts to arise between the Proposed Development and existing or planned forestry activities in the surrounding area, particularly during the construction phase which may give rise to increased sedimentation and pollution runoff into surface waters.

Poorly managed forest operations can harm water quality and aquatic habitats. Common issues include sediment and nutrient release, acidification, and altered stream flow regimes. For replacement forestry lands, significant cumulative effects are not expected. The Applicant commits to locating replanting efforts away from the Proposed Development to avoid potential cumulative effects or hydrological connectivity pathways. Additionally, the Proposed Development will not start until felling and afforestation licenses are secured, ensuring appropriate identification, assessment, and licensing of afforested lands by the relevant authorities. Forestry operations within the planning boundary will cease for the Proposed Wind Farm and resume post-commissioning.

The potential for cumulative effects on water quality arises primarily during the construction phase, particularly where forestry felling to facilitate the Proposed Wind Farm is carried out in parallel with forestry operations in the wider area. Without appropriate mitigation, there is a risk of increased sedimentation and pollutant runoff entering local watercourses. In this context, the combined activities could result in a likely, negative, low-magnitude, slight, and short-term cumulative effect on water quality and aquatic receptors. However, with the implementation of standard water protection measures (sediment control, buffer zones, and pollution prevention protocols) significant cumulative effects are not expected to occur.

8.6.4.2 Operational Phase

8.6.4.2.1 Water Resources

Water supply requirements to the Proposed Development will be minimal. Where required, water supply during the construction phase will be provided via rainwater harvesting and bulk water tanks in accordance with all necessary statutory consents. There will be no potable water connection made to either a group water scheme or public supply. 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. Cumulative impacts to Water Resources as a result of the proposed development are likely, negative, negligible magnitude, imperceptible and long-term.

8.6.4.2.2 Water Quality

During the operational phase of the Proposed Development all excavation and construction related work will have ceased and therefore there is no potential for water quality impacts from these sources. Also, the Proposed Development drainage measures will ensure there is no runoff from the Proposed Development and rainfall percolates back to ground, as is the natural hydrological regime of the area. Cumulative impacts to water quality during the operational phase of the proposed development are likely, neutral, negligible magnitude, imperceptible and long-term.

8.6.5 Potential Effects on Surface and Groundwater WFD Status

An assessment of the likely impacts to WFD waterbodies and Article 4 objectives has been completed by Enviroguide (2025) (included in Volume 3 as Appendix 8-3). In the absence of any 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 Leitrim Stream, the Kinnafad Stream, the Figile River,

immediate downstream waterbodies and underlying Groundwater bodies. There is no identified potential impact to the transitional waterbodies 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.

8.7 Mitigation and Monitoring Measures

The standard 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). These measures are considered to be industry standard and an intrinsic part of contemporary construction methodologies. The effective implementation of these measures will ensure that the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations (S.I. 272 of 2009 and as amended) and the European Communities Environmental Objectives (Groundwater) Regulations (S.I. No. 9 of 2010 and as amended) individually or in combination.

8.7.1 Construction Phase

8.7.1.1 Good Practice Measures

Implementation of good practice measures as a matter of course during the construction of the Proposed Development are not considered to be mitigation measures but form an integral part of the design/construction process.

During the Construction Phase, all works will be undertaken in accordance with the CEMP (MWP, 2025). Following appointment, the contractor will be required to further develop the CEMP 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 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 wash-out area.
- Controlling surface water entering Site.
- Preventing existing drainage features becoming pathways for construction runoff.
- Reducing soil exposure and reinstating as rapidly as possible.

- Contingency measures.

Emergency procedures will be developed by the main contractor in advance of works commencing and spillage kits will be available onsite including in vehicles operating onsite. 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 offsite. 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 onsite will be fully trained on the use of equipment.

8.7.1.2 In-Stream Works

Where instream works are required for the construction of watercourse crossings and culverts, the following mitigation measures will be implemented to protect water quality and maintain the integrity of the receiving waterbodies:

- All instream and near-stream works will be carried out in accordance with:
    - Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (2016).
    - Transport Infrastructure Ireland (TII) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (2008).
    - CIRIA C648 – Control of Water Pollution from Linear Construction Projects (2006).
- No instream works will be carried out outside the permitted IFI window of July 1st to September 30th, to protect aquatic habitats and fish spawning periods.
- A qualified Environmental Clerk of Works (ECoW) will be present onsite during all instream works (e.g., bridge and culvert installations) to oversee environmental protection measures and ensure compliance with best practice.
- The ECoW will conduct regular water quality monitoring upstream and downstream of the works area to detect any changes and initiate corrective actions if necessary.
- Silt fences and sediment control measures will be installed as required to prevent sediment from entering watercourses.

- Prior to construction, defined works areas will be fenced off at each crossing location. Silt fences will be attached to these fences to create a barrier between the works and adjacent watercourses (e.g., the Leitrim stream and its tributaries).
- Silt fences will be constructed using geotextile membranes that allow water to pass through while retaining sediment.
- Heras fencing will be installed in front of the silt fences to prevent "site creep" — the gradual encroachment of construction activities toward sensitive areas.
- Precast concrete culverts will be used to minimise in-stream construction time and reduce the risk of pollution.
- Existing vegetation will be preserved where possible, and disturbed areas will be promptly replanted to stabilise soils and reduce erosion.
- All river protection measures (e.g., silt fences, settlement ponds) will be maintained in effective condition throughout the works and inspected regularly.
- Daily monitoring of silt fences and settlement ponds will be carried out by the contractor or ECoW, particularly during sensitive phases such as site clearance, concrete pours, and after heavy rainfall events.
- Maintenance of sediment control infrastructure will be undertaken as needed to ensure continued effectiveness.
- Monitoring frequency will be adjusted based on the stage of works and environmental conditions, with increased checks during high-risk activities or adverse weather.

8.7.1.3 Hydrological and Hydrogeological Flow Regime

Excavation, dewatering, and construction activities may disrupt natural surface and subsurface water flow paths, potentially altering the hydrological and hydrogeological regime. Mitigation and monitoring measures to limit potential impacts are as follows:

- Implement a site-specific surface water management system based on SuDS principles incorporating features such as:
    - Swales, filter drains, and attenuation basins to manage runoff volumes and rates.
    - Check dams and level spreaders to reduce flow velocity and promote infiltration.
    - Settlement ponds or silt traps to capture suspended solids before discharge.
- All watercourse crossings (e.g. for access tracks or cable routes) will be designed in accordance with OPW Section 50 requirements, ensuring that culverts or bridges are appropriately sized to accommodate the 1-in-100-year flood event plus climate change allowance.
- Crossings will be constructed using methods that maintain flow continuity and minimise in-stream works.
- Drainage infrastructure will be designed to replicate pre-development greenfield runoff rates and avoid increasing flood risk downstream.
- Maintain existing drainage patterns where possible; reinstate any disturbed field drains or watercourses post-construction.
- Use shallow recharge wells where dewatering is required to maintain local groundwater levels.

- All dewatering 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.
- Seal and backfill cable trenches to prevent preferential flow paths.
- Monitor groundwater levels during construction and adjust dewatering practices accordingly.

8.7.1.4 Sedimentation

The following mitigation measures would be implemented to reduce the potential for sedimentation during the construction phase:

- No work will take place within the 20m buffer zones of EPA mapped watercourses, except for drainage/stream crossings, associated track construction and minor works.
- Site traffic will only be permitted within this buffer to access watercourse crossings or to facilitate instream and near-stream works (near-stream works on EPA watercourses will include some forestry felling carried out to forestry felling 10m buffer standards).
- There will be no storage of material/equipment or overnight parking of machinery inside the 15m buffer zone to the watercourse.
- Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the buffer zone boundary.
- Where works are necessary inside the 20m buffer double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase.
- Drainage channels and streams will be clearly identified onsite and shown on method statements and site plans.
- During the construction activities there will be a requirement for diverting rainwater away from the construction areas, into nearby drainage channels and streams.
- Visual inspections of roads and wheel washing at site entry/exit points will be undertaken to prevent the accumulation of dirt.
- Excavations will only remain open for limited time periods to reduce groundwater and surface water ingress and water containing silt will be passed through a settlement pond prior to discharge.
- Dewatering, where required, will incorporate the use of filter media. There will be no direct discharges into the watercourses.
- Spoil and temporary stockpiles including stone stockpile areas will be positioned in locations which are distant from drainage systems and retained drainage channels, away from areas subject to flooding.
- To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff.
- Where required, silt fences will be erected at the toe of stockpiles to prevent runoff. The silt fences will be monitored daily by the appointed contractor and silt will be removed as required.
- Runoff from spoil heaps will be prevented from entering watercourses by diverting it through onsite settlement ponds and removing material as soon as possible to designated storage areas.

- Silt traps will be placed across the works boundary in any areas adjacent to watercourses to avoid siltation of watercourses. These will be maintained and cleaned regularly throughout the construction phase.
- Use biodegradable erosion control matting on exposed slopes.
- Phase vegetation clearance and re-seed disturbed areas promptly.
- Monitor and maintain sediment control measures daily, especially after rainfall events.

8.7.1.5 Accidental Spills and Leaks

The following mitigation measures would be implemented to reduce the potential for accidental spills and leaks during the construction phase:

- 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 prepare method statements for weather and flood forecasting and continuous monitoring of water levels in the Leitrim stream 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.
- No work will take place within the 20m buffer zones of EPA mapped watercourses, except for drainage/stream crossings, associated track construction and minor works.
- Site traffic will only be permitted within this buffer to access watercourse crossings or to facilitate instream and near-stream works (near-stream works on EPA watercourses will include some forestry felling carried out to forestry felling 10m buffer standards).
- Wastewater from the construction welfare facilities will be managed by means of a sealed storage tank. All wastewaters will be removed from site by permitted waste collector to wastewater treatment plants.
- There will be no tracking of machinery within watercourses.
- There will be no storage of material/equipment or overnight parking of machinery inside the 15m buffer zone to the watercourse.
- Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary.
- Designate a bunded storage area at the contractor's compound(s) and away from surface water gullies or drains for oils, solvents and paints used during construction. The fuel storage tanks shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area or 25% of the total capacity of all the tanks within the bund, whichever is the greater.
- Chemicals will be stored within a storage container with an accompanying Control of Substances Hazardous to Health ("COSHH") Datasheet in accordance with health and safety regulations. All chemicals will be stored in designated bunded areas at least 15m away from watercourses.
- Drainage from the bunded area shall be diverted for collection and safe disposal. All containers within the storage area will be clearly labelled, so that appropriate remedial action can be taken in the event of a spillage. When moving drums from the bunded storage area to locations within the site plot, a suitably sized spill pallet will be used for containing any spillages during transit.

- All plant and equipment utilised onsite will be maintained is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Proposed Development. Only emergency breakdown maintenance will be carried out onsite.
- Drip trays and spill kits will be available onsite to ensure that any spills from vehicles are contained and removed offsite.
- Drip trays will be located under all static plant.
- Hoses and valves will be checked regularly for signs of wear and will be turned off and securely locked when not in use.
- Diesel pumps and similar equipment will be checked regularly, and any accumulated oil removed for appropriate disposal.
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in designated impermeable refuelling areas isolated from surface water drains.
- There will be no refuelling allowed within 15m of the watercourses.
- Where mobile fuel bowsers are used on the site, in the event of a machine requiring refuelling outside of the designated impermeable area, fuel will be transported in a mobile double skinned tank.
- Adequate stocks of hydrocarbon absorbent materials (e.g., spill-kits and/or booms) shall be held onsite to facilitate response to accidental spills. Spill response materials shall also be stored on all construction vehicles.
- In the event of an accidental spillage, or water pollution incident, the site manager or designate shall notify the Local Authority as soon as possible.

8.7.1.6 Use of Cementitious Materials

Mitigation and monitoring measures to limit potential impacts associated with the use of natural resources throughout the course of the Proposed Development are as follows:

- No work will take place within the 20m buffer zones of EPA mapped watercourses, except for drainage/stream crossings, associated track construction and minor works.
- Site traffic will only be permitted within this buffer to access watercourse crossings or to facilitate instream and near-stream works (near-stream works on EPA watercourses will include some forestry felling carried out to forestry felling 10m buffer standards).
- Ready-mixed concrete will be brought to the site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated water (for example storm water) to the underlying subsoil and groundwater.
- The pouring of concrete will take place within a designated area protected (for example by a geosynthetic material) to prevent concrete runoff into the soil/groundwater media.
- Any use of concrete in proximity to watercourses will be carefully controlled to avoid spillage. No onsite batching should occur. Washout from mixing will be carried out only in a designated contained impermeable area.
- Wash down and washout of concrete transporting vehicles will take place at an appropriate designated area and direct discharge of wash water to ground or surface waters will be strictly prohibited. Alternatively,

where washout takes place onsite, it will be carried out in a designated, carefully managed onsite washout area.

- Wastewater from washing of concrete lorry chutes will be directed into a concrete washout container, lined with an impermeable membrane. The container should be of good condition, should not overflow or leak and should be easily accessible to vehicles. The containers must be checked and emptied at a frequency equivalent to the volume of concrete being used and no runoff should leave the washout location. The area much be clearly marked and must be located away from storm drain inlets, open drainage facilities, water courses and ditches.

8.7.1.7 Flood Risk

Construction activities undertaken in or near flood-prone areas can significantly increase the risk of flooding and associated impacts on the water environment. Improper site drainage, obstruction of natural flow paths, or the alteration of existing hydrological regimes may exacerbate flood risk both on-site and downstream. These effects can lead to the mobilisation of sediments, pollutants, or construction materials into nearby watercourses, potentially degrading water quality and affecting the Water Framework Directive (WFD) status of receiving waterbodies. To mitigate these risks and ensure the protection of the water environment during flood events, the following mitigation measures are required:

- Develop and implement a Flood Risk Management Plan tailored to the site.
- Avoid storing materials, fuels, or machinery in flood-prone areas.
- Install temporary bunds, berms, or barriers to divert floodwaters from sensitive zones.
- Store hazardous substances above predicted flood levels and in secure, weather-resistant containers.
- Use permeable surfaces to reduce surface water flow.
- Regularly inspect and maintain site drainage systems.
- Monitor water levels during high risk periods.
- Conduct pre and post flood inspections and adapt mitigation measures based on weather forecasts and site conditions.

8.7.1.8 Wastewater Management

Improper handling or unauthorised discharge of foul water or construction-related wastewater (e.g., from equipment washing or dewatering) could lead to contamination of surface water or groundwater, potentially affecting the WFD status of receiving waterbodies. The following mitigation measures are required:

- All foul water from temporary welfare facilities will be collected in sealed holding tanks and regularly removed offsite by a licensed contractor to a permitted wastewater treatment facility.
- No unauthorised discharge of water to ground or surface water will occur during the construction phase. All discharges will be subject to the appropriate consents under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from OCC under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water.
- Where water must be pumped from excavations, it will be treated (e.g., via settlement or hydrocarbon interceptors) before discharge and only in accordance with the relevant discharge licence.

- All existing drainage channels and public sewers will be clearly identified, protected, and shown on site plans and method statements to prevent accidental discharge of untreated water.
- Under no circumstances will untreated wastewater from equipment washing, road sweeping, or other construction activities be released offsite.

8.7.2 Operational Phase

During the operational phase of the Proposed Development, it is anticipated that routine maintenance of infrastructure and tracks will be required across the Site. This may include work such as maintaining access tracks and drainage and carrying out wind turbine maintenance.

Should any maintenance be required onsite which would involve construction type activities; mitigation measures will be adhered to along with the measures in the CEMP to avoid potential effects.

8.7.3 Decommissioning Phase

Effects will be avoided by leaving elements of the Proposed Development in place where appropriate as described in Chapter 2: Project Description. The onsite substation will likely be retained. The turbine bases will be rehabilitated by covering with local topsoil/peat in order to regenerate vegetation which will reduce runoff and sedimentation effects. Internal roads will remain as forest roads. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by onsite plant will be implemented as per the construction phase mitigation measures.

The potential impacts on the water environment during the decommissioning stage will be similar to those during the construction phase, and as such the proposed mitigation for the Decommissioning Phase are the same as those outlined in Section 8.6.1. Moreover, due to the relative long life of the wind farm infrastructure, it is likely that a revised/updated environmental assessment will be required at the time of decommissioning to account for any changes in baseline conditions at the Proposed Development site, and potential changes in assessment guidelines and legislation

8.7.4 Residual Impacts

Residual Impacts are defined as ‘effects that are predicted to remain after all assessments and 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 8.6 in terms of quality, significance, extent, likelihood, and duration. The relevant mitigation measures are detailed in Section 8.7, and the residual impacts are assessed (detailed in Table 8-11) 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. This includes the hydrological and hydrogeological elements supporting protected sites. The detailed assessment of potential impacts to Biodiversity and protected sites is presented in Chapter 6: Biodiversity of this EIAR.

There will be no impact to the existing WFD Status of water bodies associated with the Proposed Development including the Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies and underlying

groundwater bodies as a result of the Proposed Development taking account of design avoidance and mitigation measures where required.

8.7.5 Water Framework Directive

The 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), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

The WFD assessment for the Proposed Development (Enviroguide,2025), refer to **EIAR Volume III, Appendix 8-3,** 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 Leitrim Stream, the Kinnafad Stream, the Figile River and downstream waterbodies and underlying Groundwater bodies as a result of the proposed development taking account of design avoidance and mitigation measures (Enviroguide, 2025).

Table 8-25: Summary of Residual Effects

Stage	Potential Effect	Receptor	Pre-Mitigation Impact	Pre-Mitigation Significance of Effect	Mitigation	Post-Mitigation Impact	Residual Significance of Effect
Construction	Alteration of local hydrological flow regime due to watercourse crossings, land re-profiling, and drainage modifications for the Proposed Wind Farm	Local surface water flow paths, drainage patterns	Likely, negative, negligible to low, local, direct and temporary	Imperceptible to slight	Section 8.7.1.3	Likely, negative, negligible, local, direct and temporary	Imperceptible
Construction	Alteration of local hydrological flow regime due to watercourse crossings, land re-profiling, and drainage modifications for the Proposed Grid Connection	Local surface water flow paths, drainage patterns	Likely, negative, negligible, local, direct and temporary	Imperceptible	Section 8.7.1.3	Likely, negative, negligible, local, direct and temporary	Imperceptible
Construction	Alteration of local hydrological flow regime due to watercourse crossings, land re-profiling, and drainage modifications for the Proposed TDR	Local surface water flow paths, drainage patterns	Likely, neutral, negligible, local, direct and temporary	Imperceptible	Section 8.7.1.3	Likely, neutral, negligible, local, direct and temporary	Imperceptible
Construction	Alteration of local hydrogeological flow regime due to watercourse crossings, land re-profiling, and drainage modifications for the Proposed Wind Farm	Underlying groundwater environment	Likely, negative, negligible, local, direct and temporary	Imperceptible	Section 8.7.1.3	Likely, negative, negligible local, direct and temporary	Imperceptible
Construction	Alteration of local hydrogeological flow regime due to watercourse crossings, land re-profiling, and drainage modifications for the Proposed Grid Connection	Underlying groundwater environment	Unlikely, negative, low, local, direct and temporary	Slight	Section 8.7.1.3	Unlikely, negative, negligible, local, direct and temporary	Imperceptible
Construction	Alteration of local hydrogeological flow regime due to watercourse crossings, land re-profiling, and drainage modifications for the Proposed TDR	Underlying groundwater environment	Likely, neutral, negligible, local, direct and temporary	Imperceptible	Section 8.7.1.3	Likely, neutral, negligible, local, direct and temporary	Imperceptible

Stage	Potential Effect	Receptor	Pre-Mitigation Impact	Pre-Mitigation Significance of Effect	Mitigation	Post-Mitigation Impact	Residual Significance of Effect
Construction	Increased suspended solids and disturbance of stream bed during in-stream works	Leitrim Stream, its tributaries, and downstream waterbodies	Likely, negative, moderate, local, direct and short-term	Moderate	Section 8.7.1.2 & 8.7.1.4	Likely, negative, low, local, direct and short-term	Slight
Construction	Disturbance of stream banks and beds during clear-span bridge construction	Leitrim Stream, its tributaries, and downstream waterbodies	Unlikely, negative, moderate, local, direct and short-term	Moderate	Section 8.7.1.4	Unlikely, negative, low, local, direct and short-term	Slight
Construction	Discharge of sediment-laden or contaminated surface runoff from Proposed Wind Farm	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, negative, moderate, local, direct and short-term	Moderate	Section 8.7.1.2	Likely, negative, low, local, direct and short-term	Slight
Construction	Discharge of sediment-laden or contaminated surface runoff from Proposed Grid Connection	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Unlikely, negative, moderate, local, direct and short-term	Moderate	Section 8.7.1.2	Unlikely, negative, low, local, direct and short-term	Slight
Construction	Accidental spills and leaks	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Unlikely, negative, significant, local, direct and short-term	Significant	Section 8.7.1.5	Unlikely, negative, low, local, direct and short-term	Slight
Construction	Contamination of GWBs and Surface Waters from Cementitious Material	Underlying groundwater environment	Unlikely, negative, significant, local, direct and short-term	Significant	Section 8.7.1.6	Unlikely, negative, low, local, direct and short-term	Slight
Construction	Contamination of GWBs and Surface Waters from Wastewater	Hydrological receptors	Likely, neutral, negligible, local, direct and temporary.	Imperceptible	Section 8.7.1.7	Likely, neutral, negligible, local, direct and temporary.	Imperceptible
Construction	Contamination of Surface Waters from Flooding	Hydrological receptors	Unlikely, negative, moderate to significant, local, indirect and short-term	Moderate to Significant	Section 8.7.1.1 and 8.7.1.7	Unlikely, negative, low, local, indirect and short-term	Slight

Stage	Potential Effect	Receptor	Pre-Mitigation Impact	Pre-Mitigation Significance of Effect	Mitigation	Post-Mitigation Impact	Residual Significance of Effect
Construction	Contamination of Potable Water Sources -	Groundwater Sources of Potable Water	Unlikely, negative, negligible to low, local, direct and temporary	Imperceptible to Slight	Section 8.7.1.2, Section 8.7.1.5 and Section 8.7.1.6	Unlikely, neutral, negligible, local, direct and temporary	Imperceptible
Construction	Contamination of Potable Water Sources	Surface Water Sources of Potable Water	Unlikely, negative, negligible, local, direct and temporary	Imperceptible	Section 8.7.1.2, Section 8.7.1.5 and Section 8.7.1.6	Unlikely, neutral, negligible, local, direct and temporary	Imperceptible
Construction	Cumulative Effects on Water Quality (Coinciding Development)	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, negative, temporary, indirect, negligible magnitude	Not Significant	Section 8.7.1.2	Likely, negative, temporary, indirect, negligible magnitude	Imperceptible
Construction	Cumulative Effects on Water Supply During Construction	Water Supply Infrastructure	Likely, negative, negligible magnitude and long-term	Imperceptible	N/A	Likely, negative, negligible magnitude and long-term	Imperceptible
Construction	Cumulative Effects on Water Quality (Wastewater)	Hydrological receptors	Likely, negative, negligible magnitude and long-term	Imperceptible	Section 8.7.1.7	Likely, negative, negligible magnitude and long-term	Imperceptible
Construction	Cumulative Effects on Water Quality (Agriculture)	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, negative, medium magnitude, and short-term	Moderate	Section 8.7.1.2	Likely, negative, low magnitude, and short-term	Slight
Construction	Cumulative Effects on Water Quality (Forestry)	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, negative, low magnitude and short-term	Slight	Section 8.7.1.2	Likely, negative, negligible, and short-term	Imperceptible
Operation	Hydrological Flow Regime Alteration of Sensitive Receptors from the Proposed Wind Farm	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, neutral, negligible, local, direct and Long-term	Imperceptible	N/A	Likely, neutral, negligible, local, direct and Long-term	Imperceptible

Stage	Potential Effect	Receptor	Pre-Mitigation Impact	Pre-Mitigation Significance of Effect	Mitigation	Post-Mitigation Impact	Residual Significance of Effect
Operation	Hydrological Flow Regime Alteration of Sensitive Receptors from the Proposed Grid Connection	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, neutral, negligible, local, direct and permanent	Imperceptible	N/A	Likely, neutral, negligible, local, direct and permanent	Imperceptible
Operation	Hydrological Flow Regime Alteration of Sensitive Receptors from the Proposed TDR	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Likely, neutral, negligible, local, direct and temporary	Imperceptible	N/A	Likely, neutral, negligible, local, direct and temporary	Imperceptible
Operation	Hydrogeological Flow Regime Alteration of Sensitive Receptors from the Proposed Wind Farm	Underlying groundwater environment	Likely, neutral, negligible, local, direct and Long-term	Imperceptible	N/A	Unlikely, neutral, negligible, local, direct and Long-term	Imperceptible
Operation	Hydrogeological Flow Regime Alteration of Sensitive Receptors from the Proposed Grid Connection	Underlying groundwater environment	Likely, neutral, negligible, local, direct and permanent	Imperceptible	N/A	Likely, neutral, negligible, local, direct and permanent	Imperceptible
Operation	Hydrogeological Flow Regime Alteration of Sensitive Receptors from the Proposed TDR	Underlying groundwater environment	Likely, neutral, negligible, local, direct and temporary	Imperceptible	N/A	Unlikely, neutral, negligible, local, direct and temporary	Imperceptible
Operation	Discharge of sediment-laden or contaminated surface runoff from Proposed Wind Farm	Leitrim Stream, its tributaries, and downstream waterbodies	Likely, negative, negligible, local, direct and long-term	Imperceptible	N/A	Unlikely, negative, negligible, local, direct and long-term	Imperceptible
Operation	Accidental spills and leaks	Leitrim Stream, Kinnafad Stream, Figile River, and downstream waterbodies	Unlikely, negative, low local, indirect and long-term	Slight	N/A	Unlikely, negative, low, local, indirect and long-term	Slight
Operation	Contamination of GWBs and Surface Waters from Wastewater	Hydrological receptors	Likely, neutral, negligible, local, indirect and long-term	Imperceptible	N/A	Unlikely, neutral, negligible, local, indirect and long-term	Imperceptible

Stage	Potential Effect	Receptor	Pre-Mitigation Impact	Pre-Mitigation Significance of Effect	Mitigation	Post-Mitigation Impact	Residual Significance of Effect
Operation	Flood Risk	Hydrological receptors	Likely, negative, negligible to low, local, direct and permanent	Imperceptible to Slight	N/A	Likely, negative, negligible, local, direct and permanent	Imperceptible to Slight
Operation	Flood Risk – Indirect Effect on Water Quality	Hydrological receptors	Likely, negative, negligible, local, direct and Long-term	Imperceptible	N/A	Unlikely, negative, negligible, local, direct and Long-term	Imperceptible
Operation	Cumulative Effects on Water Resources	Hydrological receptors	Likely, negative, negligible magnitude and long-term.	Imperceptible	N/A	Likely, negative, negligible magnitude and long-term.	Imperceptible
Operation	Cumulative Effects on Water Quality	Hydrological receptors	Likely, neutral, negligible magnitude and long-term.	Imperceptible	N/A	Likely, neutral, negligible magnitude and long-term.	Imperceptible

8.7.6 Monitoring

8.7.6.1 Construction Phase

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

- 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 (MWP, 2025) are fully implemented and effective.
- A suitably qualified ECoW will be appointed for the duration of the works. The ECoW will be present onsite during instream works (i.e., bridge crossings and culverts) to ensure there is no potential for surface water runoff to the receiving waterbodies. The ECoW will undertake regular monitoring of water quality upstream and downstream of the works area to detect any changes and take corrective actions if necessary.
- The silt fences and settlement ponds will be monitored to ensure that they remain functional throughout construction of the Proposed Development. Where necessary, maintenance will be carried out on the fences and settlement ponds to ensure that they continue to be effective.
- The main contractor in consultation with the ECoW, will provide and implement a monitoring schedule for water quality monitoring throughout the construction phase of the Proposed Development. The frequency of monitoring and the monitoring parameters will be in line with best practice and guidance and will be agreed with OCC prior to commencement of the works.
    - Surface water monitoring to included Turbidity, pH/EC and colour will be undertaken upstream and downstream of the works areas, during water course crossings and construction of culverts.
    - Surface water samples will also be analysed for the following parameters to ensure 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):
        - ammoniacal nitrogen, total suspended solids (TSS), total petroleum hydrocarbons (TPH) and heavy metals.
    - Where required, daily monitoring will also be undertaken upstream and downstream 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.
- Inspection records and summary reports from site supervision by the ECoW will be made available to OCC upon request. Should any deviation from the proposed mitigation be noted, this will be reported to OCC and corrective measures will be agreed.
- Discharges to surface water/foul sewers will be monitored where required 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.

8.7.6.2 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.

8.8 Difficulties Encountered When Compiling

There were no difficulties encountered when compiling the Hydrology and Hydrogeology Chapter of this EIAR.