Chapter 6 – Hydrology and Hydrogeology

AWN Consulting Ltd, The Tecpro Building, IDA Business & Technology Park, Clonshaugh, Dublin 17, D17 XD90

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

6. HYDROLOGY AND HYDROGEOLOGY

6.1 Introduction

This chapter of the EIAR evaluates the likely significant effects, if any, which the Proposed Development will have on hydrology (surface water) and hydrogeology (groundwater). In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects. This chapter contains necessary information as defined in the Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022).

The Proposed Development comprises the construction, commissioning, and operation of the c. 23.65-kilometre (km) GNI 143 Ballykilleen Pipeline and all ancillary and associated temporary works. The proposed GNI 143 Ballykilleen Pipeline is designed to connect the existing BGE77 pipeline (also known as Pipeline to the West (PTTW)) to the Edenderry Renewable Energy Complex.

The chapter initially provides a description of the receiving environment of the site and the potential impacts of the development. When assessing the potential impacts, this assessment considers the significance of the environmental attributes, and the predicted scale, and duration of the likely effects.

The chapter also outlines the proposed mitigation measures that will reduce or eliminate the identified potential impacts and define the residual effects of the proposed overall development (the effect after the implementation of mitigation measures).

This chapter is supported by figures contained in Volume 4 of this EIAR. While selected figures may be reproduced within the chapter for ease of reference, the full size and quality of those figures are provided in Volume 4. Annotated mark ups, diagrams and photographic records are excluded, as these are provided for illustrative or contextual purposes only and are not replicated at full presentation quality.

The relevant Volume 4 figures to this chapter include:

Figure 6-1 Designated Areas
Figure 6-2 Hydrological Connectivity to Designated Areas
Figure 6-3 Hydrological Environment
Figure 6-4 Compound Hydrological Environment
Figure 6-5 WFD Surface Waterbody Quality Status 2019-2021
Figure 6-6 Compound WFD Surface Waterbody Quality Status 2019-2024
Figure 6-7 Aquifer Classification
Figure 6-8 Compound Aquifer Classification
Figure 6-9 Groundwater Bodies
Figure 6-10 Compound Groundwater Bodies
Figure 6-11 Aquifer Vulnerability
Figure 6-12 Compound Aquifer Vulnerability
Figure 6-13 Groundwater Wells
Figure 6-14 Compound Groundwater Wells
Figure 6-15 WFD Ground Waterbody Quality Status 2019-2021
Figure 6-16 Compound WFD Ground Waterbody Quality Status 2019-2024

6.2 Methodology

6.2.1 Relevant Legislation and Guidance

This impact assessment was undertaken having regard to the following legislation and guidance:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022).
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009, previously NRA). The TII criteria for rating the hydrogeological and hydrological related attributes are presented in Appendix 6.1 of this EIAR.
- Water Framework Directive 2000/60/EC.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation, regulations and guidelines. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003).
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014).
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended).
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 as amended).
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010).
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011).
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988.
- Local Government (Water Pollution) Acts 1977-1990.
- SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations 1998.
- Water Services Guidelines for Planning Authorities Draft (Department of Housing, Planning and Local Government, 2018).
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board);
- Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers;
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors;
- CIRIA C648 Control of Water Pollution from Constructional Sites;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2008); and
- Inland Fisheries Ireland (IFI) – A Guideline on Planning for Watercourses in the Urban Environment.

6.2.2 Assessment Methodology

This chapter presents the Environmental Impact Assessment (EIA) of the Proposed Development in relation to hydrology and hydrogeology, undertaken in accordance with the Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022). The methodology applied is consistent with the overarching EIA framework described in Chapter 1 of this EIAR.

The assessment addresses the construction and operational phases of the Proposed Development and, where relevant, considers the potential for direct, indirect and residual effects on the receiving environment.

The impact assessment methodology applied within this chapter comprises the following stages:

6.2.2.1 Characterisation of Receiving Environment

The receiving environment is described in Section 6.3 of this chapter based on desk-based review, site investigations and monitoring and relevant published datasets as described in Section 6.2.3.

The receiving environment has been established for hydrology and hydrogeology to identify sensitive environmental receptors within the study area.

6.2.2.1.1 Sources of Information

Desk-based hydrological and hydrogeological information in the vicinity of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Latest EPA Envision water quality monitoring data for watercourses in the area.
- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping.
- River Basin Management Plan for Ireland 2018-2021 (Department of Housing, Planning and Local Government, 2018).
- Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW, 2009).
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie).
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports.
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

Site specific data was derived from the following sources:

- Gas to Bord na Mona, Edenderry Construction Methodology. Fingleton White (2026).
- Site Investigation- Gas to Bord na Mona, Edenderry Phase 1 GI – Geotechnical Interpretative Report (IGSL Ltd, 2025);
- Construction Environmental Management Plan. Gas to Bord na Mona, Edenderry. AWN Consulting (2026);
- Flood Risk Assessment (FRA). Edenderry Gas Pipeline JBA, (2026).
- Hydrogeological Impact Assessment. Gas to Bord na Mona, GNI Edenderry/Kilwarden, Minerex Environmental Limited (2026).
- Site development plans and drawings submitted with the planning application pack.
- Consultation with project engineers and design Team.

The principal attributes (and effects) assessed include the following:

- Water Framework Directive (WFD) Status and potential for increased risk of deterioration of this status due to the activities of the site.
- River and aquifer water quality in the vicinity of the site (where available).
- Surface, transitional and coastal watercourses near the site and potential impact on surface water quality arising from Proposed Development related works including any discharge of surface water run-off.
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.
- High-yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the Proposed Development.
- Classification (regionally important, locally important etc) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the Proposed Development e.g. removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality.
- Natural hydrogeological/ karst features in the area and potential for increased risk presented by the activities at the site; and,

- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporarily.

6.2.2.2 Study Area

The study area for this assessment is a buffer distance of 250m from the centre line of the Proposed Scheme (i.e. overall width of 500m) (hereafter referred to as 'study area') as per relevant guidelines (Estimation of Importance of Hydrological and Hydrogeological Attributes, TII, 2009). This method involves evaluating the quality, significance, or value of hydrological attributes on a regional, national, or local scale. However, professional judgement has also been applied to this assessment during the evaluation of potential risks posed to the receiving hydrological and hydrogeological environment. Accordingly, where relevant, search criteria have been applied beyond the stated buffer distance.

6.2.2.3 Identification of Potential Impacts and Significance

The potential impacts arising from interactions between the Proposed Development are identified in Section 6.5 having regard to:

- the location, nature, scale and duration of the proposed works;
- the characteristics and sensitivity of identified receptors; and
- relevant guidance, standards and industry best practice (set out in Section 6.2.1).

The significance of each identified impact is evaluated using professional judgement, informed by the EPA Guidance (2022) descriptors defined in Table 1-5 of Chapter 1 of this EIAR.

6.2.2.4 Mitigation, Monitoring or Reinstatement Measures

Definition of Mitigation, where potentially significant adverse effects are identified, mitigation measures are provided in Section 6.6 of this chapter to avoid or reduce those effects.

Monitoring or reinstatement measures are identified where relevant in Section 6.7 of this chapter

6.2.2.5 Residual Effect

Residual Effects Conclusion, Residual effects (the effects after the implementation of the mitigation measures) on hydrology and hydrogeology, are defined in Section 6.8 of this chapter.

The significance of each identified impact is evaluated using professional judgement, informed by the EPA Guidance (2022) descriptors defined in Table 1-5 of Chapter 1 of this EIAR.

6.2.3 Forecasting Methods and Difficulties Encountered

There were no difficulties encountered in the preparation of this EIAR Chapter

6.3 Receiving Environment

6.3.1 Area of the Development and Land Use

The Proposed Development site and associated temporary working areas cover an area of approximately 243.4 hectares (ha) (the "Proposed Development Site") and encompasses all lands required for the construction and operation of the pipeline, including the Kilwarden Offtake Installation, the Ballykilleen AGI, temporary construction compounds, and all associated ancillary works.

The Proposed Development Site comprises the c. 23.65 km linear route of the underground GNI 143 Ballykilleen Pipeline and its temporary working areas.

For the purpose of this EIAR chapter, the pipeline length has been subdivided into 6 sections, (refer to Table 6-1) below for the chainage and corresponding distances along the pipeline length). Refer to Volume 4 (Site Location Sheet 1-6) for the site location mapping which includes the chainage and respective sections 1-6 which correspond to Sheets 1-6.

In addition to the linear pipeline, the Proposed Development includes temporary construction infrastructure within the red line boundary, comprising five Temporary Construction Compounds, temporary laydown areas (Type A and Type B), construction access points, and a temporary construction haul road or 'running track' along the pipeline route. Temporary Construction Compounds 03 (near Edenderry town) and 04 (in the townland of Esker More, Co. Offaly) are located off the linear route but within the red line boundary. All other temporary works, including access, haul roads, laydown areas, and temporary watercourse crossings, are located along the pipeline route.

Table 6-1 Structured Sections to describe the Proposed Development

Pipeline Section	Start Point (m)	End Point (m)	Length (m)
Pipeline Section 1: Kilwarden Offtake Installation to the L40181 Road (RDX05)	0	3,931	3,931
Pipeline Section 2: L40181 Road (RDX05) to the L4091 (RDX09)	3,931	7,441	3,510
Pipeline Section 3: L4091 Road (RDX09) to the Yellow River (RVX02)	7,441	11,669	4,228
Pipeline Section 4: Yellow River (RVX02) to the R441 (RDX12)	11,669	15,348	3,679
Pipeline Section 5: R441 (RDX12) to the L5003 (RDX15)	15,348	19,494	4,146
Pipeline Section 6: L5003 (RDX15) to the Ballykilleen AGI	19,494	23,650	4,156
GNI 143 Ballykilleen Pipeline	0	23,650	23,650

The wider area is characterised as predominantly rural and primarily associated with greenfield land with a predominant agricultural function.

The landscape within the Proposed Development Site is predominantly rural, comprising irregular agricultural fields used for grazing and cropping and bounded by traditional hedgerows characteristic of Counties Meath and Offaly. The lands are largely undeveloped, with no residential dwellings or permanent buildings located within site. Existing infrastructure intersected along the pipeline route includes regional and local roads, agricultural access tracks, drainage ditches, the M4 Motorway, and the Grand Canal. Residential dwellings occur in the wider area but primarily as dispersed one-off houses along local roads, with no urban centres directly adjoining the site.

At the southern end of the route, the receiving environment transitions from agricultural to industrial lands associated with the Edenderry Renewable Energy Complex, an established energy-generation facility. The proposed Ballykilleen AGI is located within this industrial area. The nearest external industrial operation is Kilsaran Clonard Quarry, approximately 2.8 km east.

6.3.2 Hydrology

6.3.2.1 Background

The Proposed Development site is located within the former Eastern River Basin District (ERBD) (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water

Framework Directive (WFD). The Proposed Development site is located in the Eastern River Basin District (ERBD).

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the first River Basin Management Plan (RBMP) 2009-2015 was published. The second cycle river basin management plan was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland (Dept. of Housing Local Government & Heritage, Sept 2024) has since been published.

During the development of this plan, a prioritisation exercise was undertaken by the local authorities, the EPA and other stakeholders to identify those water bodies that require immediate action within this plan cycle to 2027. During the catchment characterisation, the EPA has carried out an analysis of the likely water quality outcomes that may be achieved as a result of the measures outlined in the third-cycle River Basin Management Plan. The analysis forecasts the number of water bodies that are likely to achieve their 2027 status objectives, and those that are likely to show improvements, so that an assessment can be made of the gap to achieving Water Framework Directive (WFD) environmental objectives. The forecast analysis is a snapshot in time based on the best available information on the measures being implemented as of September 2023. It depends on assumptions being made about how the measures in the plan will be implemented, for example, where measures are voluntary. Improved information on the measures being implemented will allow the forecasts to be further refined over time. The 2021 characterisation assessment identified there were 2,610 water bodies, out of a total of 4,842 water bodies (54%), which had met their objectives. These water bodies require ongoing basic measures to protect water quality. Of the remainder, 1,649 (34% of the total) were categorised as being 'At Risk' of not achieving their objectives and had evidence available to determine the water quality issue(s) and the pressure(s) that needs to be addressed. These water bodies are prioritised in the Plan for measures to restore water quality. The other 583 water bodies are in 'Review', which means additional evidence is required to confirm the nature of any water quality issues and the impacts from any relevant pressures.

The third cycle river basin management plan (2022-2027) i.e. "Water Action Plan 2024 - A River Basin Management Plan for Ireland" has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the Proposed Development.

6.3.2.2 Regional Hydrological Environment

The two main hydrological features of region include the River Boyne and River Figile.

6.3.2.2.1 River Boyne

The River Boyne rises from Trinity Well at Newberry Hall to the east of Carbury (Carbury Bog), County Kildare and flows approximately 112 km (70 miles) northeast through counties Offaly, Kildare, and Meath, prior to its' outfall into the Irish Sea between Mornington, County Meath, and Baltray, County Louth at the Boyne Estuary Plume Zone (EU Code: IE_EA_010_0000) coastal waterbody, c. 61km (linear distance) northeast of the site.

In relation to the proposed pipeline, the upper stage course of the River Boyne flows north through adjacent lands located to the east of section 3 and 4 of the proposed pipeline route and at its nearest point is located c. 110m east of Section 3 at RVX02, the river crossing which represents the pipelines intersection with the Yellow [Castlejordan] River (refer to Section 6.3.2.3.3 below).

6.3.2.2.2 Figile River

The Figile River in Ireland rises at the confluence of the Crabtree and Cushaling rivers near the Kildare-Offaly border. It flows primarily south through County Offaly, passing near Clonbulloge, before merging with the Slate and Cushina rivers, entering County Kildare, and draining into the River Barrow at Passlands, north of Monasterevin. The River Barrow subsequently merges/joins with the River Suir at Cheekpoint and ultimately outfalls to the Eastern Celtic Sea (EU Code: IE_SE_050_0000) coastal waterbody off the southeast coast of Ireland, c. 131km (linear distance) southeast of the site (refer to Section 6.3.2.3.6 below).

In relation to the proposed pipeline, the Ballyleaken and Ballykilleen Streams are secondary/tertiary tributaries to the River Figile. Both of these streams traverse the southern portion of the site (Section 6) and generally flow in a southerly direction before ultimately discharging to the River Figile c. 1.9km and 200m southeast of Section 6, respectively at the point of closest proximity. From here the River Figile subsequently flows south and outfalls to the River Nore & River Barrow SAC at a confluence point located approximately 16.1km south of the site (linear distance at the point of closest proximity).

6.3.2.3 Local Hydrological Environment and Surface Water Quality

The site predominantly comprises portions of multiple fields with some internal and boundary hedgerows. Currently, there is no artificial drainage infrastructure within the site boundary currently. The site is characterised predominantly as greenfield grassland and hedgerow, therefore at present drainage is predominantly via overland flow to drainage ditches, streams and river watercourses which traverse / flow through / adjacent to the site boundary, coupled with drainage to ground whereby surface water and rainfall, is generally percolated to ground through the site via infiltration to grass and soil under the influence of gravity. Drainage along road crossings within the site typically involves overland flow to roadside ditches or gulleys.

AWN Consulting Ltd. undertook targeted site walkovers in October 2024 along the Proposed Development route, including focused inspections at key watercourse crossings. The hydrological environment within the vicinity of Mount Hevey Bog SAC was further inspected in November 2025. These walkovers were undertaken to establish local drainage, identify surface water flow pathways, confirm flow directions within agricultural lands, and understand the potential connectivity between field drainage features, watercourses, and downstream receptors.

Triturus Environmental Ltd. undertook biological water quality surveys that have been used to inform the baseline assessment of surface water quality for the EIAR. A total of 33 no. riverine survey sites were assessed using Q-sampling in July 2025, in accordance with Environmental Protection Agency (EPA) methodology. The full survey results are presented in *Aquatic Baseline Report for a Proposed Gas Networks Ireland Gas Pipeline, Edenderry, Co. Offaly*, included as an appendix to Chapter 7 (Biodiversity) of the EIAR.

The AWN site walkovers were supplemented by ecological field surveys undertaken by Triturus Environmental Ltd. and Altemar Ecological Consultants, which provided additional information on aquatic features, riparian habitats, and hydrological connectivity relevant to ecological receptors. This was further supported by project engineering inputs, including photographic surveys and site walkovers undertaken by Fingleton White.

Information obtained from site walkovers, ecological surveys, and engineering surveys was reviewed alongside desk-based datasets to inform the baseline understanding of surface water flow and hydrological connectivity across the Proposed Development site.

6.3.2.3.1 Pipeline Section 1: Kilwarden Offtake Installation to the L40181 Road (RDX05)

The current EPA watercourse mapping indicates that Section 1 is traversed by 2 no. waterbodies EPA named and mapped (refer to Volume 4 Hydrological Environment Sheet 1 of 6) and 1 no. unmapped waterbodies.. Temporary Construction Compound 01 and 02 are located adjacent and adjoining to this pipeline section.

According to the EPA maps, the Proposed Development pipeline route spans across three sub catchments; The northern (Section 1-2), central (Section 3-5) and southern portions (Section 6) of the site lie within the Boyne_SC_030 subcatchment, Boyne_SC_010 subcatchment and Figile_SC_010 subcatchment, respectively.

Table 6-2 Mapped & Named EPA Watercourse Traversing Pipeline Section 1

EPA Waterbody Name	Water Crossing Reference	Order Class	Flow Direction	Outfall	Distance to Outfall (Linear)
Kinnegad 07 / Kilwarden	RVX01	River	Easterly	River Boyne	c. 5.3 km
AGHNAGILLAGH	WCX02	Stream	South East	River Boyne	c. 3.5 km

Table 6-3 Unmapped & Unnamed Watercourses Traversing Pipeline Section 1

Water Crossing Reference	Chainage/ ITM Coordinates	Inferred Flow Direction	River Q Values, Status*	Final Receptor
WCX01	1900	North-easterly	Q2-3, Poor	River Boyne

Note-*Refer to the Appendix 7.5 for the Aquatic Fisheries Report Baseline (2025)

Table 6-4 WFD Surface Waterbody Quality Status (EPA, 2026)

EPA Waterbody Name	WFD Waterbody Name	European Code	WFD Status (2019-2024)	WFD Risk Score (3rd Cycle)
Kinnegad 07 / Kilwarden River	Boyne_040	IE_EA_07B040600	Poor	At Risk
AGHNAGILLAGH Stream	Boyne_040	IE_EA_07B040600	Poor	At Risk

The Kilwarden River (Kinnegad 07) and AGHNAGILLAGH Stream both belong to the Boyne_040 WFD surface waterbody. According to Catchments.ie (2025) the Boyne_040 most recent WFD surface water status (WFD Period: 2019-2024) is classified as '*Poor*" and its current WFD risk score (3rd risk cycle) is currently '*At Risk*'. This status is related and attributed to its 'Poor' ecological status or potential, in particular its 'Poor' biological and invertebrate status or potential.

The most recent Sub-Catchment Assessment (December, 2018) carried out by the EPA on the Boyne_SC_030 Sub-Catchment states the main pressure identified on the Boyne_040 WFD surface/river waterbody is from hydromorphology through channelization, coupled with extractive industry, specifically peat harvesting and quarries.

6.3.2.3.2 Pipeline Section 2: L40181 Road (RDX05) to the L4091 (RDX09)

At present, the EPA watercourse mapping indicates that Section 2 is traversed by 2 no. EPA named and mapped waterbodies (refer to Volume 4 Hydrological Environment Sheet 2 of 6) and 2 no. unmapped waterbodies.

This section of the proposed pipeline route traverses through Boyne_SC_010 and Boyne_SC_030 Sub-Catchments.

Table 6-5 Mapped & Named EPA Watercourse Traversing Pipeline Section 2

EPA Waterbody Name	Water Crossing Reference	Order Class	Flow Direction	Outfall	Distance to Outfall (Linear)
KNOCKERSALLY or COLEHILL Stream	WCX04	Stream	Southeast	River Boyne	c. 1.6 km
PARK 07 Stream	WCX05	Stream	Southeast	River Boyne	c. 1.2 km

Table 6-6 Unmapped & Unnamed Watercourses Traversing Pipeline Section 2

Water Crossing Reference	Chainage/ ITM Coordinates	Inferred Flow Direction	River Q Values, Status*	Final Receptor
WCX03	4900	southeast	Q2-3, Poor	River Boyne
WCX06	7500	south	N/A*	River Boyne

Note-*Refer to Appendix 7.5 of the EIAR for the Aquatic Fisheries Report Baseline (2025)

N/A*- Waterbody was not of fisheries or aquatic value given the dry nature of the channel, hence it was not possible to collected a biological water quality sample.

Table 6-7 WFD Surface Waterbody Quality Status (EPA, 2026)

EPA Waterbody Name	WFD Waterbody Name	European Code	WFD Status (2019-2024)	WFD Risk Score (3rd Cycle)
KNOCKERSALLY or COLEHILL Stream	Boyne_030	IE_EA_07B040400	Good	Not At Risk
PARK 07 Stream	Boyne_030	IE_EA_07B040400	Good	Not At Risk

The KNOCKERSALLY or COLEHILL Stream and PARK 07 Stream both belong to the Boyne_030 WFD river waterbody. According to Catchments.ie (2026) the Boyne_030 most recent WFD surface water status (WFD Period: 2019-2024) is classified as '*Good*' and its current WFD risk score (3rd risk cycle) is currently '*Not At Risk*'. This status is related and attributed to its 'Good' ecological status or potential, in particular it 'Good' biological and invertebrate status or potential.

The most recent Sub-Catchment Assessment (December, 2018) carried out by the EPA on the Boyne_SC_010 Sub-Catchment does not identify any main pressure on the Boyne_030 WFD surface/river waterbody.

6.3.2.3.3 Pipeline Section 3: L4091 Road (RDX09) to the Yellow River (RVX02)

At present, the EPA watercourse mapping indicates that Section 3 is traversed by 4 No. EPA named and mapped waterbodies (refer to Volume 4 Hydrological Environment Sheet 3 of 6) and 4 no. unmapped waterbodies.

Table 6-8 Mapped and Named EPA Watercourses Traversing Pipeline Section 3

EPA Waterbody Name	Water Crossing Reference	Order Class	Flow Direction	Outfall	Distance to Outfall (Linear)
BALLYNAKIL 07 Stream	WCX06	Stream	South	River Boyne	c. 1.0 km

CASTLEJORDAN 07 Stream	WCX11	Stream	East	River Boyne	c. 0.7 km
RAHIN Stream	WCX12	Stream	Northeast	River Boyne	c. 0.65 km
Yellow [Castlejordan] Stream	RVX02	River	East	River Boyne	c. 0.1 km

Table 6-9 Unmapped & Unnamed Watercourses Traversing Pipeline Section 3

Water Crossing Reference	Chainage/ ITM Coordinates	Inferred Flow Direction	River Q Values, Status*	Final Receptor
WCX07	7980	South Easterly	Q2, Bad	River Boyne
WCX08	8770	South	Q2-3, Poor	River Boyne
WCX09	9220	South	Q2, Bad	River Boyne
WCX10	9550	South Easterly	Q2-3, Poor	River Boyne

Note-*Refer to Appendix 7.5 of the EIAR for the Aquatic Fisheries Report Baseline (2025)

Table 6-10 WFD Surface Waterbody Quality Status (EPA, 2026)

EPA Waterbody Name	WFD Waterbody Name	European Code	WFD Status (2019-2024)	WFD Risk Score (3rd Cycle)
BALLYNAKIL 07 Stream	Boyne_030	IE_EA_07B040400	Good	Not At Risk
CASTLEJORDAN 07 Stream	Boyne_030	IE_EA_07B040400	Good	Not At Risk
RAHIN Stream	Boyne_030	IE_EA_07B040400	Good	Not At Risk
Yellow [Castlejordan] Stream	YELLOW (CASTLEJORDAN)_030	IE_EA_07Y020300	Good	Not At Risk

The BALLYNAKIL 07 Stream, the CASTLEJORDAN 07 Stream and the RAHIN Stream all belong to the Boyne_030 WFD river waterbody. According to Catchments.ie (2026) the Boyne_030 most recent WFD surface water status (WFD Period: 2019-2024) is classified as '*Good*' and its current WFD risk score (3rd risk cycle) is currently '*Not At Risk*'. This status is driven by and attributed to its 'Good' ecological status or potential, in particular it 'Good' biological and invertebrate status or potential.

The most recent Sub-Catchment Assessment (December, 2018) carried out by the EPA on the Boyne_SC_010 Sub-Catchment does not identify any main pressure on the Boyne_030 WFD surface/river waterbody.

The Yellow [Castlejordan] Stream belong to the YELLOW (CASTLEJORDAN)_030 WFD river waterbody. According to Catchments.ie (2026) the YELLOW (CASTLEJORDAN)_030 most recent WFD surface water status (WFD Period: 2019-2024) is classified as '*Good*' and its current WFD risk score (3rd risk cycle) is currently '*Not At Risk*'. This status is related and attributed to its 'Good' ecological status or potential, in particular its 'Good' biological and invertebrate status or potential.

The most recent Sub-Catchment Assessment (December, 2018) carried out by the EPA on the Yellow [Castlejordan]_SC_010 Sub-Catchment does not identify any main pressure category on the YELLOW (CASTLEJORDAN)_030 WFD surface/river waterbody.

6.3.2.3.4 Pipeline Section 4: Yellow River (RVX02) to the R441 (RDX12)

At present, the EPA watercourse mapping indicates that Section 4 is traversed by 1No. EPA named and mapped waterbodies (refer to Volume 4 Hydrological Environment Sheet 4 of 6) and 3 no. unmapped waterbodies.

Table 6-11 Mapped & Named EPA Watercourse Traversing Pipeline Section 4

EPA Waterbody Name	Water Crossing Reference	Order Class	Flow Direction	Outfall	Distance to Outfall
ROOSK 07 Stream	WCX16	Stream	East-northeast	River Boyne	c. 1.3 km

Table 6-12 Unmapped & Unnamed EPA Watercourse Traversing Pipeline Section 4

Water Crossing Reference	Chainage/ ITM Coordinates	Inferred Flow Direction	River Q Values, Status*	Final Receptor
WCX13	12880	East	Q3, Poor	River Boyne
WCX14	13080	East	Q3, Poor	River Boyne
WCX15	13320	Northeast	Q2-3, Poor	River Boyne

Note-*Refer to Appendix 7.5 of the EIAR for the Aquatic Fisheries Report Baseline (2025)

Table 6-13. WFD Surface Waterbody Quality Status (EPA, 2026)

EPA Waterbody Name	WFD Waterbody Name	European Code	WFD Status (2019-2024)	WFD Risk Score (3rd Cycle)
ROOSK 07 Stream	Boyne_030	IE_EA_07B040400	Good	Not At Risk

The ROOSK 07 Stream belongs to the Boyne_030 WFD river waterbody. According to Catchments.ie (2026) the Boyne_030 most recent WFD surface water status (WFD Period: 2019-2024) is classified as '*Good*' and its current WFD risk score (3rd risk cycle) is currently '*Not At Risk*'. This status is driven by and attributed to its 'Good' ecological status or potential, in particular it 'Good' biological and invertebrate status or potential.

The most recent Sub-Catchment Assessment (December 2018) carried out by the EPA on the Boyne_SC_010 Sub-Catchment does not identify any main pressure on the Boyne_030 WFD surface/river waterbody.

6.3.2.3.5 Pipeline Section 5: R441 (RDX12) to the L5003 (RDX15)

Currently, the EPA watercourse mapping indicates that Section 4 is traversed by 2No. EPA named and mapped river waterbodies (refer to Volume 4 Hydrological Environment Sheet 5 of 6).

Table 6-14 Mapped & Named EPA Watercourse Traversing Pipeline Section 5

EPA Waterbody Name	Water Crossing Reference	Order Class	Flow Direction	Outfall	Distance to Outfall (Linear)
MOUNTWILSON STREAM	N/A*	Stream	East	River Boyne	c. 2.2 km
KINNAFAD Stream	WCX19	Stream	Northeast	River Boyne	c. 2.4 km

Table 6-15 Unmapped & Unnamed EPA Watercourse Traversing Pipeline Section 5

Water Crossing Reference	Chainage/ ITM Coordinates	Inferred Flow Direction	River Q Values, Status*	Final Receptor
WCX17	15480	Southwest then Northeast	Q3, Poor	River Boyne
WCX18	16000	Southwest then Northeast	N/A*	River Boyne
WCX20	16640	Northeast	Q3, Poor	River Boyne
WCX21	16820	Southwest	Q3, Poor	River Boyne
WCX22	17150	West	N/A*	River Boyne
WCX23 (Grand Canal)	18050	East		Liffey Lower Estuary Transitional Waterbody & Dublin Bay Coastal Waterbody

Note-*Refer to Appendix 7.5 of the EIAR for the Aquatic Fisheries Report Baseline (2025)

N/A*- Waterbody was not of fisheries or aquatic value given the dry nature of the channel, hence it was not possible to collected a biological water quality sample.

Table 6-16 WFD Surface Waterbody Quality Status (EPA, 2026)

EPA Waterbody Name	WFD Waterbody Name	European Code	WFD Status (2019-2024)	WFD Risk Score (3rd Cycle)
MOUNTWILSON STREAM	Boyne_020	IE_EA_07B040300	Moderate	At Risk
KINNAFAD Stream	Boyne_020	IE_EA_07B040300	Moderate	At Risk

The MOUNTWILSON Stream and KINNAFAD Stream both belong to the Boyne_020 WFD river waterbody. According to Catchments.ie (2026) the Boyne_020 most recent WFD river waterbody status (WFD Period: 2019-2024) is classified as '*Moderate*' and its current WFD risk score (3rd risk cycle) is currently '*At Risk*' of not achieving good status. This status is related and attributed to its 'Moderate' ecological status or potential, in particular it 'Moderate' biological and invertebrate status or potential and 'Moderate' supporting chemistry and nutrient conditions, in particular elevated Ammonium.

According to the Aquatic baseline report for a proposed Gas Networks Ireland prepared by Triturus Environmental Ltd. (2025), while the Mountwilson Stream is mapped on the EPA watercourse mapping database this stream at the mapped location has been identified as being dry and was not of fisheries or aquatic value given the dry nature of the channel. It was not possible to collect a biological water quality sample.

The most recent Sub-Catchment Assessment (December 2018) carried out by the EPA on the Boyne_SC_010 Sub-Catchment states the main pressure identified on the Boyne_020 WFD surface/river waterbody is from hydromorphology through land drainage, urban wastewater (Agglomeration PE of 2,001 to 10,000) and urban run-off (diffuse sources).

6.3.2.3.6 Pipeline Section 6: L5003 (RDX15) to the Ballykilleen AGI

At present, the EPA watercourse mapping indicates that Section 6 is traversed by 2No. EPA named and mapped waterbodies. The BALLYKILLEEN Stream traverses through the section 6 of the site at No.2 separate locations (refer to Volume 4 Hydrological Environment Sheet 6 of 6). Temporary Construction Compound 05 is located adjacent and adjoining to this pipeline section.

Table 6-17 Mapped & Named EPA Watercourse Traversing Pipeline Section 6

EPA Waterbody Name	Water Crossing Reference	Order Class	Flow Direction	Outfall	Distance to Outfall
BALLYLEAKEN	WCX24	Stream	Southeast	River Figile	c. 1.7 km
BALLYKILLEEN Stream	WCX29	Stream	South	River Figile	c. 0.6 km
BALLYKILLEEN Stream	WCX30	Stream	Southeast	River Figile	c. 0.2 km

Table 6-18 Unmapped & Unnamed EPA Watercourse Traversing Pipeline Section 6

Water Crossing Reference	Chainage/ ITM Coordinates	Inferred Flow Direction	River Q Values, Status*	Final Receptor
WCX25	20600	Southeast	Q3, Poor	River Figile
WCX26	20980	Southeast	Q3, Poor	River Figile
WCX27	22360	East	Q3, Poor	River Figile
WCX28	22530	East	Q2-3, Poor	River Figile

Note-*Refer to the Appendix 7.5 for the Aquatic Fisheries Report Baseline (2025).

Table 6-19 EPA/WFD River Waterbodies traversing chainage Section 6 of the pipeline route (EPA, 2025)

EPA Waterbody Name	WFD Waterbody Name	European Code	WFD Status (2019-2024)	WFD Risk Score (3rd Cycle)
BALLYLEAKEN Stream	FIGILE_030	IE_SE_14F010200	Moderate	At Risk
BALLYKILLEEN Stream	FIGILE_030	IE_SE_14F010200	Moderate	At Risk

The BALLYLEAKEN Stream and BALLYKILLEEN Stream both belong to the FIGILE_030 WFD river waterbody. According to Catchments.ie (2026) the FIGILE_030 most recent WFD river waterbody status (WFD Period: 2019-2024) is classified as '*Moderate*' and its current WFD risk score (3rd risk cycle) is currently '*At Risk*'. This status is related and attributed to its 'Moderate' ecological status or potential, in particular it 'Moderate' biological and invertebrate status or potential and 'Moderate' supporting chemistry and nutrient conditions, in particular elevated Ammonium.

The most recent Sub-Catchment Assessment (December, 2018) carried out by the EPA on the Figile_SC_010 Sub-Catchment states the main pressure identified on the FIGILE_030 WFD surface/river waterbody is from extractive industry, specifically related to peat extraction.

6.3.2.3.7 Temporary Construction Compound 03

The Temporary Construction Compound 03 is located within the Boyne_SC_010 WFD subcatchment. There are no river waterbodies traversing the compound boundary area. The waterbody / watercourse is closest proximity to this storage area is the Edenderry Stream (EPA Code: IE_EA_07B040300) which is a secondary tributary to the River Boyne and belongs to the Boyne_020 WFD river waterbody. This source of the stream is located in the eastern side of Edenderry Town centre and flows north where it is located c. 360m to the east of this Temporary Construction Compound 03 at the point of closest proximity. The Edenderry Stream merges/joins with the Monasteroris Stream at a confluence point located c. 410m northeast of this storage compound. From here the Monasteroris Stream continues to flow north for c. 740m before discharging to the River Boyne.

The Kinnafad Stream (Boyne_020), which is a primary tributary of the Boyne River and is located approximately 0.9km to the northwest of this storage area at the point of closest proximity. The Kinnafad Stream flows east/northeast across lands to the north of this storage area before it discharges/outfalls to the Boyne River (Boyne_020) at a confluence point located approximately 1.2km north of the emporary Construction Compound 03, at the point of closest proximity. From here, the Boyne River flows in a general northern direction.

The Edenderry Stream, Monasteroris Stream and Kinnefad Stream all belong both belong to the Boyne_020 WFD river waterbody. According to Catchments.ie (2026) the Boyne_20 most recent WFD river waterbody status (WFD Period: 2019-2024) is classified as '*Moderate*' and its current WFD risk score (3rd risk cycle) is currently '*At Risk'* of not achieving good status. This status is related and attributed to its 'Moderate' ecological status or potential, in particular it 'Moderate' biological and invertebrate status or potential and 'Moderate' supporting chemistry and nutrient conditions, in particular elevated Nitrate and Opthophosphate.

6.3.2.3.8 Temporary Construction Compound 04

Temporary Construction Compound 04 is located within the Figile_SC_020 WFD Subcatchment. According to the EPA River waterbody mapping database, there are no river waterbodies traversing the Temporary Construction Compound 04 boundary area. The nearest river waterbody is the Rathvilla_or_Rathclonbrackan Stream (EPA Code: IE_SE_14F010300), which rises in a bog c. 550m to the south of the storage compound, prior to flowing north towards the site where it is located c. 75m to the south of the storage compound 4 at the point of closest proximity. The In turn, the Rathvilla_or_Rathclonbrackan Stream (Figile_040) subsequently flows west for c. 1.1km prior to its confluence with the Philipstown River (EPA Name / Code: Daingean / IE_SE_14F010300). From here, the Philipstown River flows in an alternation south and east direction (respectively) prior to discharging to the Figile River (Figile_050) at a confluence point located c. 5.1 km south-east of Temporary Construction Compound 04. Therefore, the Rathvilla_or_Rathclonbrackan Streamn and Philipstown (Daingean) River are secondary and primary tributaries of the Figile River.

The Rathvilla_or_Rathclonbrackan Stream and Daingean Stream both belong to the FIGILE_040 WFD river waterbody. According to Catchments.ie (2026) the FIGILE_030 most recent WFD river waterbody status (WFD Period: 2019-2024) is classified as 'Poor'' and its current WFD risk score (3rd risk cycle) is currently 'At Risk' of not achieving good status. This status is related and attributed to its 'Moderate' ecological status or potential, in particular it 'Poor' biological and invertebrate status or potential.

6.3.2.4 Bathing Waters and Recreational Waterbodies

The local environment also includes areas of natural resources that relate to populations and human health that may be impacted by the Proposed Development, this includes economic resources, recreational and bathing waters, and drinking water resources.

A review of the Environmental Protection Agency's (EPA) online mapping that includes the Register of Protected Areas (RPA) under the Water Framework Directive (WFD) has shown that there are no Recreational Waters or Bathing Waterbodies located in the immediate vicinity of the site or downstream in any of the watercourses or rivers through which the pipeline route traverses / crosses.

6.3.2.5 Water Supplies

A review of the Environmental Protection Agency's (EPA) online mapping, which includes the Register of Protected Areas (RPA) established under the Water Framework Directive (WFD), indicates the river waterbodies that traverse the site which are listed above in section 6.3.2.1 are not located within a designated Surface Water Drinking RPA. This classification of drinking water river lines has been delineated in accordance with the European Communities (Drinking Water) (No. 2) Regulations 2007 (SI No.

278/2007). This regulatory framework aims to ensure the protection of water resources utilised for human consumption, thus safeguarding public health and the environment.

6.3.2.6 Flood Risk Assessment

JBA Consulting (2026) has undertaken a Flood Risk Assessment for the proposed gas pipeline in the environs of Edenderry. The Flood Risk Assessment was undertaken in accordance with The Planning System and Flood Risk Management Guidelines (OPW, 2009). This is included under separate cover with the application.

The site is located within Flood Zone A, B and C, signifying varying risk from fluvial flooding. Pluvial flood potential may arise from localised depressions in the ground at the site but is not considered a significant risk.

Flood Zone C is indicative of the lowest probability of flooding; less than 0.1% from both rivers and coastal/tidal. Flood Zone B indicates moderate probability of flooding; between 1% and 0.1% from rivers and between 0.5% and 0.1% from coastal/tidal, while Flood Zone A signifies where the probability of flooding is highest; greater than 1% (1 in 100) from river flooding or 0.5% (1 in 200) for coastal / tidal flooding.

The CFRAM predictive flood extent study indicates that majority of the Proposed Development is within Flood Zone C with the only section within Flood Zone A / B. This section will traverse the Yellow River and the Boyne tributary. A small area at risk of pluvial flooding has been identified to the south of the Yellow River.

The flood risk from the Kilwarden River, Kilgile River, River Boyne and a number of tributaries have been screened out based on review on CFRAM, NIFM and JBA models.

Regarding the Yellow River a 20m exclusion zone is provided during the construction phase. A trenchless crossing technique will be utilised to cross the river and no topsoil etc. will be stripped within this flood zone.

For both the Yellow River and the Boyne tributary, the flood risk during the construction will be managed by the mitigation measures outlined in Section 6.6.1.7.

All remaining Flood Zone A & B areas that intercepts the pipeline are retained within the stream banks. All development located in Flood Zone B will be installed underground, and all associated construction works are located in Flood Zone C.

There will be no impact or change to the existing above ground environment that could result in a change to fluvial or surface water flood extents upon installation of the gas pipeline.

The Justification Test has been applied and passed as part of the FRA process. The type of development is classed as a 'Highly Vulnerable Development'. This type of development is deemed appropriate for this flood zonation.

6.3.2.7 Rating of Importance of Hydrological Attributes

Based on the review of the receiving environment undertaken (Section 6.3.1 through Section 6.3.5) and based on the TII methodology (2009) (See Appendix 6.1), the importance of the hydrological features at this site can be rated as '*Medium-High*' importance with medium to high quality or value on a local scale. This rating is also attributed to the hydrological/hydraulic connectivity to The River Boyne & River Blackwater SPA and The River Nore & River Barrow SAC, albeit via a lengthy pathway distance and significant mixing and dilution downstream in the subject catchments (Boyne & Figile). The medium importance rating is attributed also to the lack of hydrological connectivity to the nearest (adjacent) sensitive receptor – The Hevey Bog SAC which is located hydrologically upgradient of the site.

6.3.3 Hydrogeology

6.3.3.1 Background

6.3.3.1.1 Aquifer Classification,

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater transmissivity (mm^3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

The GSI (2026) classifies the principal aquifer types in Ireland as:

Bedrock Aquifer

- Rkc – Regionally Important Aquifer – Karstified (conduit)
- Rkd – Regionally Important Aquifer – Karstified (diffuse)
- RK – Regionally Important Aquifer – Karstified
- Rf – Regionally Important Aquifer – Fissured bedrock
- Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive
- Lk – Locally Important Aquifer – Karstified
- LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones
- PI – Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones
- PU – Poor Aquifer – Bedrock which is Generally Unproductive

Gravel Aquifer

- Lg - Locally Important Aquifer - Sand & Gravel
- Rg - Regionally Important Aquifer - Sand & Gravel

6.3.3.1.2 Background to Aquifer Vulnerability

Groundwater vulnerability is a term used to represent the natural ground, intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures/ fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of/ or of mixtures of peat, sand, gravel, glacial till, clays or silts).

Groundwater vulnerability is an indication of how easily the aquifer can become contaminated by human activity. It is dependent on the thickness and permeability of the overlying soils and depth to the water table. For example, a bedrock aquifer with minimal thickness of overburden or with a thin layer of permeable overburden will be more vulnerable to contamination than a bedrock aquifer which has a thick layer of low permeability overburden. Extreme groundwater vulnerability is also associated with karst landforms as these are a direct pathway for water and contaminants to enter the aquifer from the surface.

Table 6-20 Vulnerability Mapping Guidelines

Vulnerability Rating	Hydrogeological Condition				
	Subsoil Permeability (type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate Permeability (e.g. sandy subsoil)	Low Permeability (e.g. clayey subsoil, clay, peat)	(Sand/ gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3 m	0 - 3 m	0 - 3 m	0 - 3 m	-
High (H)	> 3 m	3 - 10 m	3 - 5 m	> 3 m	n/a
Moderate (M)	n/a	> 10 m	5 - 10 m	n/a	n/a
Low (L)	n/a	n/a	> 10 m	n/a	n/a

Notes: (1) n/a: Not applicable
(2) Precise permeability values cannot be given at present
(2) Release point of contaminants is assumed to be 1-2 below ground surface

6.3.3.1.3 Water Framework Directive Status

The Water Framework Directive (WFD) 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater, transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the Directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy (commonly known as the Water Framework Directive [WFD]). The WFD required 'Good Water Status' for all European water by 2027, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'.

6.3.3.2 Groundwater Body Characteristics & Groundwater Quality

The Proposed Pipeline Route traverses through 5No. Groundwater Bodies. The description and characteristics of these groundwater bodies are outlined below.

6.3.3.2.1 Athboy (GWB) Groundwater Body (European Code: IE_EA_G_001).

Based on the most recent data (www.epa.ie), the Athboy GWB for which the site is located entirely within, has a WFD status of "*Good*" (WFD Period: 2019-2024) and a WFD risk score (3rd Cycle) of "*Not at Risk*" of not achieving good status. This status is driven by and attributed to the "Good" Quantitative Groundwater Body Status and "Good" Chemical Groundwater Body Status.

The flow paths and key characteristics within the Athboy GWB are described as follows (GSI, 2026):

- 'The specific yield data from various pumping tests in the area indicates that the aquifer is unconfined. Groundwater flow in the aquifer will generally take place in the upper 3 to 5 m of the bedrock where there has been weathering. In some local areas there may be the development of deeper flow through a network of connected fractures and fissures. In some instances these fractures become enlarged by solution to form karstic conduits, which can transport large quantities of water at high speeds. A

calculation of the drainage density for the entire area is 0.662 km/km2. This is considered to be indicative of a moderately good aquifer. The typical groundwater flow path length is estimated at 0.75 km'

- 'In karstic areas there is a direct link between the surface and groundwater systems. There is evidence that in some areas of this GWB the limestone is karstified. Springs, swallow holes and caves are three typical karstic features present where groundwater and surface water are directly linked. The area contains numerous surface water bodies, which are considered as protected areas and to differing extents are dependent on groundwater. One site at Lough Shesk, near Clonmellon on the Meath/Westmeath border is worth special consideration. The hummocky nature of the terrain in this area produces frequent springs and seepages, rich in lime. Consequently, a series of base-rich marshes have developed in the poorly drained hollows, generally linked with three larger lakes, i.e. Lough Shesk, Freehan Lough and Newtown Lough. This site has been rated as of national importance. There is no other place in the county where the full sequence of stages in the open water/peat bog transition is so well illustrated within a compact area. The main threat to the site lies in drainage of the wetland areas, either directly or by means of dredging of the adjacent river systems or lowering the water table by over abstraction.'
- 'This large GWB extends from Navan in the northeast to Tyrrellspass and Rochfortbridge in Westmeath. The area is low-lying; some isolated hills rarely rise above 150 m OD. The GWB boundary is defined to the south and west by the topographic boundary with other RBDs. To the north the boundary is at the contact with the Lower Paleozoic rocks and to the east the boundary coincides with the change in aquifer classification of the Calp from an Ll aquifer to an Lm aquifer. The GWB is composed primarily of moderate permeability rocks, although localized zones of enhanced permeability do occur. Groundwater flow will mainly occur laterally through the upper weathered zone of the aquifer. Below this, flow occurs along fractures, faults and karstic conduits. Recharge occurs diffusely through the subsoils and via outcrops and in some local areas direct recharge may be possible where via sinking streams. The aquifers are generally unconfined but may be locally confined where the subsoil is thicker and/or less permeable. Regional groundwater flow is from northwest to southeast, but locally, groundwater discharges to the streams and rivers crossing the aquifer. In general groundwater flow paths will be less than a kilometre from recharge to discharge point; longer groundwater flow paths may develop where there is a higher degree of karstification. Groundwater discharges to the numerous small streams crossing the aquifer, and to the springs and seeps. There may also be some discharge to the Trim GWB to the east of this body.'

The flow direction in the overburden generally follows no fixed pattern or trend. Flows of this nature are typical of low permeability clay strata with intermittent fill areas, where often the water level measures represent pore water seepages into the overburden monitoring well (opposed to bedrock wells) or perched groundwater conditions (not bedrock aquifer water). The clay is not considered to be a contamination pathway based on the discontinuous perched/pore water table meaning there is no continuous connectivity of shallow groundwater.

These aquifer types are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local to short distances. Therefore, given the local flow paths (<750m) and little connectivity, there is a potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located at the Mount Hevey Bog SAC, located c. 20 m north of the site at the point of closest proximity (linear distance).

6.3.3.2.2 Kilrathmurry Gravels (GWB) Groundwater Body (European Code: IE_EA_G_044).

Based on the most recent data (www.epa.ie), the Kilrathmurry Gravels GWB for which the site is located entirely within, has a WFD status of "*Good*" (WFD Period: 2019-2024) and a WFD risk score (3rd Cycle) of "*Not at Risk*" of not achieving good status. This status is driven by and attributed to the "Good" Quantitative Groundwater Body Status and "Good" Chemical Groundwater Body Status.

The flow paths and key characteristics within the Kilrathmurry Gravels GWB are described as follows (GSI, 2026):

- 'Although the aquifer is permeable, groundwater velocity is slow because storativity is high and water table elevations are generally subdued. This also means that discharge to rivers will not be flashy and will be sustained through drier periods of the year.'
- 'The interaction between surface water and groundwater throughout this aquifer is complex and will depend on the position of the water table. The nature of this interaction will not be uniform over the area of the body. During flooding, when the river stage is above the water table in the gravel aquifer, river water will seep into the gravel aquifer. The aquifer provides storage for this rainwater and it is not until the river stage has reduced and the hydraulic gradient is reversed that the water is released into the river. This phenomenon is known as bank storage and is indicative of a high interactive surface water groundwater system. It also accounts for the fact that such rivers bounded by gravel aquifers have a less 'flashy' flooding and higher baseflow and dry weather flow.'
- 'This GWB is located around 7 km northeast of Edenderry, north Co. Kildare. The gravel aquifer is contained between the low-lying valleys of the Boyne and Glash river. The extent of the body is defined by the presence of gravel deposits in excess of 10m thick. The GWB is composed of permeable sand and gravel deposits with a high storativity. Recharge occurs diffusely through the overlying topsoil. The aquifer is generally unconfined but may become locally confined where lower permeability deposits overlie the gravels. The water table within gravel aquifers is usually flat and therefore the depth to water will depend on the topography of the area. The flow paths within the aquifer are constrained by the extent of the deposit and therefore will not develop to a regional scale. Groundwater discharge will occur via springs and seeps along the lowest boundary of the body and also along river courses. There may also be discharge to rivers as baseflow where the water table lies above the river stage.'

6.3.3.2.3 Trim (GWB) Groundwater Body (European Code: IE_EA_G_002)

Based on the most recent data (www.epa.ie), the Trim GWB for which the site is located entirely within, has a WFD status of "*Good*" (WFD Period: 2019-2024) and a WFD risk score (3rd Cycle) of "*At Risk*" of not achieving good status. This current 'Good' status is driven by and attributed to the "Good" Quantitative Groundwater Body Status and "Good" Chemical Groundwater Body Status.

The flow paths and key characteristics within the Trim GWB are described as follows (GSI, 2026):

- 'The nature of groundwater flow in this aquifer will be determined by the degree of karstification and fracturing and the purity of the limestones. In highly karstified limestone flow will be concentrated into conduits, which may draw water very deep underground. During the drilling of Production Well No.1 at Slane major inflow of groundwater was recorded in fissured limestone between 27 and 38 metres below ground level (-9.75 and -20.75 m O.D) with a cavernous fissure from 35 to 37 metres. The specific yield of 0.002 was calculated from the early data from the Trial Well No.2 and indicates that the aquifer is unconfined. Where the limestone is less karstified the flow systems will be shallower and more diffuse. Although groundwater will still flow mainly along fractures, there will not have been the large-scale dissolution of the rocks to convert these into large conduits that concentrate flow deep underground. An example of this can be seen at Dunshaughlin where a 300 metre deep well was drilled for the Council adjacent to the Tower in Dunshaughlin and encountered 296 metres of dark gray to black limestones, intermittently shaly. Calcite veining occurred through the sequence and the abundance of shale and veining increased with depth. The rock was competent indicating no significant fracturing in this area. There is evidence of confined groundwater flow in the eastern area of the GWB around Basketstown, Co. Meath. Hydrogeological investigation of the area indicates the limestone is overlain by a thick layer of clay which itself is overlain by a gravel deposit. Measurements of the water level in both aquifers showed the piezometric surface in the bedrock aquifer to be above the top of the rock and at a similar elevation to the water table in the gravel deposits above (Cullen 1993). Investigations carried out for Tara Mines Ltd (1.5 km east of Navan) involving exploratory drilling and permeability testing revealed that the limestone was karstified in some places at between 25 and 73

metres below ground but that the cavities were filled with a variety of unconsolidated material. (Minerex 1983). This material did not necessarily prevent groundwater movement and analyses of some infilling material revealed a proportion of medium sized gravel (up to 20 mm) and results from some falling head tests revealed high permeabilities (86.4 m/d) The fault system discharges groundwater at a rate of about 4200 m3 /d to the mine sump but this is at a depth of 250 m below ground level. Joint planes also transmit groundwater within the mine but to a lesser extent than the faults. It should be noted that there will be some drawdown towards the mines as dewatering pumping causes a cone of depression surrounding the site'

6.3.3.2.4 Rhode (GWB) Groundwater Body (European Code: IE_SE_G_116)

Based on the most recent data (www.epa.ie), the Rhode GWB for which the site is located entirely within, has a WFD status of "*Good*" (WFD Period: 2019-2024) and a WFD risk score (3rd Cycle) of "*Not at Risk*" of not achieving good status. This status is driven by and attributed to the "Good" Quantitative Groundwater Body Status and "Good" Chemical Groundwater Body Status.

The flow paths and key characteristics within the Rhode GWB are described as follows (GSI, 2026):

- 'Groundwater flows from north and west to the south and east. A regional groundwater system is unlikely across the width of the groundwater body because the aquifer is not a regional karstic aquifer. Although the aquifer is permeable to depths of 30m conduit systems my not be developed as in major karstic aquifer systems.'
- 'This groundwater body is defined to the north by the boundary of the SERBD and the ERBD. To the east and west the boundary of the AW & AWed formations and the Calp defines the boundary and to the south the contact with the Waulsortian Limestone. Where these rock units are overlain by permeable till with gravel the groundwater can be considered as unconfined. Where it is overlain by peat the groundwater is considered to be confined by the layer of impermeable marl that typically underlies bogs. For the main part of the aquifer it seems likely that groundwater recharges to the north in the areas of higher elevation and more permeable subsoils e.g. gravel. The flow of groundwater is to the south and southeast, probably within enlarged fractures in the upper layers of the bedrock. Groundwater will discharge to the surface water streams especially to the east at the contact with the Calp.'

6.3.3.2.5 Cushina (GWB) Groundwater Body (European Code: IE_SE_G_048)

Based on the most recent data (www.epa.ie), the Cushina GWB for which the site is located entirely within, has a WFD status of "*Good*" (WFD Period: 2019-2024) and a WFD risk score (3rd Cycle) of "*Not at Risk*" of not achieving good status. This status is driven by and attributed to the "Good" Quantitative Groundwater Body Status and "Good" Chemical Groundwater Body Status.

The flow paths and key characteristics within the Cushina GWB are described as follows (GSI, 2026):

- 'The majority of groundwater flow in this aquifer is considered to occur in the upper 3m of the bedrock where the rock is more broken and weathered. Beneath this groundwater flow in through a connected network of fractures, some of which may become enlarged due to solution of the limestone. Isolated deep groundwater flow may be found to depths of 50m below the top of the rock. Groundwater flow paths are typically medium length (hundreds of meters) in locally important aquifers although the low drainage density in the area may suggest longer groundwater flow paths (e.g. in the order of Kilometers) are possible.'
- 'There are a number of Karst springs and boreholes located in the southern area of the GWB'
- 'The aquifers within the GWB are generally unconfined but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the effective thickness of this aquifer is likely to be about 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep water strikes in more

isolated faults/ fractures can be encountered at 50-70 mbgl. Regional groundwater flow is from north to south, but on a local scale, groundwater discharges to the streams and rivers crossing the aquifer. Flow path lengths are variable and will depend on the degree of karstification of the limestone and hence its purity. Groundwater discharges to the numerous small streams crossing the aquifer, and to the springs and seeps.'

6.3.3.3 Hydrogeological Setting: Aquifer Classification and Vulnerability

6.3.3.3.1 Pipeline Section 1: Kilwarden Offtake Installation to the L40181 Road (RDX05)

The bedrock aquifer underlying Pipeline Section 1, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Aquifer Classification, Sheets 1 of 6), is classified as a "*LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*", and "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*". The GSI aquifer mapping database does not indicate/identify any gravel aquifers underlying this section the site.

Pipeline Section 1 is underlain by the Athboy GWB (European Code: IE_EA_G_001)

The GSI presently classifies the predominant aquifer vulnerability classification for this section is 'Moderate', while some areas of the central and northern portion of this section have been classified as 'High' and 'Extreme' vulnerability, respectively. Refer to Volume 4 (Aquifer Vulnerability Sheet 1 of 6) for the Aquifer Vulnerability mapping for this section. Based on the subsoil type and description, the expected depth to bedrock is expected to be greater than or within the range of 5-10m. However, the northwest portion of the site is depicted as having an aquifer vulnerability which ranges from 'High', 'Extreme', and 'Rock at or near surface (subcrop), thereby indicating a low permeability subsoil thickness of 3-5m, 0-3m and subcrop/outcrop, respectively.

A small section of the Kilwarden Off take if underlain by Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive while the rest of the pipeline within section 1 is underlain by LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones. The Athboy GWB aw described in Section 6.3.3.2.1 is described of having a network of connected fractures and fissures which dominates the deeper groundwater flow. The groundwater flow path length is estimated at 0.75 km. however, it should be noted that the groundwater flow direction is south to southeast along with little connectivity and overburden thickness of low permeability subsoils there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area Mount Hevey Bog SAC (Site Code: 002342), located c. 20m north (linear distance) of the Kilwarden Offtake Installation Pipeline Section 1.

6.3.3.3.2 Pipeline Section 2: L40181 Road (RDX05) to the L4091 (RDX09)

The bedrock aquifer underlying Pipeline Section 2, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Aquifer Classification, Sheets 2 of 6),, is classified predominantly as a "*LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*", and a minor portion in the southern end of this section is classified as "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*".

The Pipeline Section is primarily underlain by the Athboy GWB (European Code: IE_EA_G_001). A minor localised area of the southern portion of this section is underlain by Kilrathmurry Gravels GWB (European Code: IE_EA_G_044).

The predominant aquifer vulnerability classification for this section is 'Moderate', while some localised areas of the northern and southern portion of this section have been classified as 'High' vulnerability. Refer to Volume 4 (Aquifer Vulnerability Sheet 2 of 6) for the Aquifer Vulnerability mapping for this section. Based on the subsoil type and description, the expected depth to bedrock is expected to be greater than or within the range of 5-10m of low permeability Till derived from limestone which is dominant in this

section. However, the southern portion of the site associated with the gravels is depicted as 'High' vulnerability, thereby indicating a high permeability subsoil thickness of 3+m, respectively.

Despite the presence of a gravel aquifer, this particular area of the gravel aquifer is classified as *LI* and *Lm* aquifer types, which are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local to short distances. Therefore, given the local flow paths and little connectivity, there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located the Mount Hevey Bog SAC, located at circa 3.5km+ north of the site at the point of closest proximity (linear distance).

6.3.3.3.3 Pipeline Section 3: L4091 Road (RDX09) to the Yellow River (RVX02)

The bedrock aquifer underlying Pipeline Section 3 according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Aquifer Classification, Sheet 3 of 6), is classified as a predominantly "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*", with smaller localised zones classified as "*LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*".

The northern portion of this section is partially underlain by the Athboy groundwater body (GWB) and Kilrathmurry Gravels GWB. The southern and central portion of Section 3 is overlying the Trim GWB.

The predominant aquifer vulnerability classification for this section is 'Moderate', which are associated with areas underlain by Tills derived from limestone, whereby an overburden thickness of 5-10m of low permeability Clay/Till is expected. Some localised (less extensive) zones of the northern, central and southern portion of this section have been classified as 'High' vulnerability, which are generally associated with the 'Gravels derived from Limestones' with a thickness of 3m+ of high permeability subsoils. Refer to Volume 4 (Aquifer Vulnerability Sheet 3 of 6) for the aquifer/groundwater vulnerability mapping for this section of the site.

Despite the presence of a gravel aquifer and the Trim GWB having areas of karstification, this particular area of the gravel aquifer is classified as *LI* and *Lm* aquifer types, which are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. According to the GSI database, this area does not host karstification or karstic underground traced flowpaths and as such, flow paths are generally local to short distances. Therefore, given the local flow paths and little connectivity, there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located the Mount Hevey Bog SAC, located at circa 7km+ north of the site at the point of closest proximity (linear distance).

6.3.3.3.4 Pipeline Section 4: Yellow River (RVX02) to the R441 (RDX12)

The bedrock aquifer underlying the Pipeline Section 4 according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Aquifer Classification, Sheets 4 of 6),, is classified entirely as a predominantly "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*". This section is not underlain by any gravel aquifer.

There are no recorded groundwater resource protection zones in the immediate area of the proposed site, i.e., zones surrounding a groundwater abstraction area. In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity.

Pipeline Section 4 is overlying the Trim GWB (European Code: IE_EA_G_002).

The predominant aquifer vulnerability classification for this section is 'Moderate', while some localised (less extensive) zones of the northern portion of this section has been classified as 'High' vulnerability. Refer to Volume 4 (Aquifer Vulnerability Sheet 4 of 6) for the aquifer/groundwater vulnerability mapping for this section of the sitefor the Aquifer Vulnerability mapping for this section, whereby an overburden thickness of 5-10m of low permeability Clay/Till is expected. Some localised (less extensive) zones of this section have been classified as 'High' vulnerability, which are generally associated with the 'Gravels derived from Limestones' and 'Alluvium' deposits which are associated with the fluvial / river watercourses which traverse this section, which are expected to have a thickness of 3m+ of high permeability subsoils.

Despite the Trim GWB having areas of karstification, this particular area of the Trim GWB is classified as a locally important *(Lm) aquifer* types, which are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. According to the GSI database, this area does not host karstification or karstic underground traced flowpaths and as such, flow paths are generally local to short distances. Therefore, given the local flow paths and little connectivity, there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located the Mount Hevey Bog SAC, located at circa 11km+ north of the site at the point of closest proximity (linear distance).

6.3.3.3.5 Pipeline Section 5: R441 (RDX12) to the L5003 (RDX15)

The bedrock aquifer underlying Pipeline Section 5, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Aquifer Classification, Sheets 5 of 6),, is classified entirely as a predominantly "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*".

Pipeline Section 5 is overlying the Trim GWB (European Code: IE_EA_G_002).

The predominant aquifer vulnerability classification for this section is 'Moderate', while some localised (less extensive) zones of the northern portion of this section has been classified as 'High' vulnerability. Refer to Volume 4 (Aquifer Vulnerability Sheet 3 of 6) for the aquifer/groundwater vulnerability mapping for this section of the site.. An overburden thickness of 5-10m of low permeability 'Cut over raised Peat' and 'Clay/Till derived from limestone' is expected.

Despite the presence of a gravel aquifer and the Trim GWB having areas of karstification, this particular area of the Trim GWB is classified as a locally important *(Lm) aquifer* types, which are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. According to the GSI database, this area does not host karstification or karstic underground traced flow paths and as such, flow paths are generally local to short distances. Therefore, given the local flow paths, little connectivity and overburden thickness of low permeability subsoils there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located at the Long Derries, Edenderry SAC (Site Code: 000925), located c. 4.1 km east of Section 5 of the site at the point of closest proximity (linear distance).

6.3.3.3.6 Pipeline Section 6: L5003 (RDX15) to the Ballykilleen AGI

The bedrock aquifer underlying the Proposed Development site, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Aquifer Classification, Sheets 6 of 6),, is classified as a "*LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*", and "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*". The GSI aquifer mapping database does not indicate/identify any gravel aquifers underlying this section the site.

The approximate northern (partial) and central portion of this site is underlain by the Rhodes groundwater body (GWB) (European Code: IE_SE_G_116), which corresponds to a "*LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*".

The approximate northern (partial) and southern portion of this site is underlain by the Cushina groundwater body (GWB) (European Code: IE_SE_G_048), which corresponds to a "*Lm – Locally Important Aquifer – Bedrock which is Moderately Productive*".

The northern and southern parts of this section have been widely classified with 'Moderate' Vulnerability. The central portion of this section displays varied vulnerability, ranging / alternating between 'Low', 'Moderate', 'High' and 'Extreme' vulnerability. Refer to Volume 4 (Aquifer Vulnerability Sheet 6 of 6) for the aquifer/groundwater vulnerability mapping for this section of the site.. An overburden thickness of 5-10m of low permeability 'Cut over raised Peat' and 'Clay/Till derived from limestone' is expected throughout the vast majority of this section.

Given that the Rhode GWB is classified as a "LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones", this groundwater body characterised by discrete local fracturing with little connectivity and local flow paths rather than large, connected fractures which are more indicative of Regional Aquifers. Therefore, given the local flow paths, little connectivity and overburden thickness of low permeability subsoils there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located at the Long Derries, Edenderry SAC (Site Code: 000925), located c. 3.8 km east of Section 6 of the site at the point of closest proximity (linear distance).

While the Cushina GWB contains areas of karstification, such zones are confined / limited to the southern parts of this GWB and are not expected to feature in the northernmost portion of this GWB, in which this section of the site is situated. This particular area of the Cushina GWB is classified as a locally important (LI) aquifer types, which are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. According to the GSI database, this area does not host karstification or karstic underground traced flow paths and as such, flow paths are generally local to short distances. Therefore, given the local flow paths, little connectivity and overburden thickness of low permeability subsoils there is a low potential for a hydrogeological connection/linkage to the nearest protection area located at The Long Derries, Edenderry SAC (Site Code: 000925), located c. 3.8 km east of Section 6 of the site at the point of closest proximity (linear distance) from chainage Section 6 of the proposed pipeline route.

6.3.3.3.7 Temporary Construction Compound 03

The bedrock aquifer underlying Temporary Construction Compound 03, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Compound Aquifer Classification), is classified entirely as a predominantly "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*".

This entire section of the site is overlying the Trim GWB.

The aquifer vulnerability classification for this area is 'Moderate'. Refer to Volume 4 (Aquifer Classification Temporary Construction Compound 03), for the Aquifer Vulnerability mapping for this area / section of the site. An overburden thickness of 5-10m of low permeability 'Cut over raised Peat' and 'Clay/Till derived from limestone' is expected.

Despite the presence of a gravel aquifer and the Trim GWB having areas of karstification, this particular area of the Trim GWB is classified as a locally important *(Lm) aquifer* types, which are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. According to the GSI database, this area does not host karstification or karstic underground traced flow paths and as such, flow paths are generally local to short distances. Therefore, given the local flow paths, little connectivity and overburden thickness of low permeability

subsoils there is a low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection area located the Mount Hevey Bog SAC, located at circa 15.5km+ north of the site at the point of closest proximity (linear distance).

6.3.3.3.8 Temporary Construction Compound 04

The bedrock aquifer underlying the Temporary Construction Compound 04, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Volume 4 (Compound Aquifer Classification), is classified as a "*Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive*". The GSI aquifer mapping database does not indicate/identify any gravel aquifers underlying this section the site.

The approximate northern (partial) and central portion of this site is underlain by the Rhodes groundwater body (GWB) (European Code: IE_SE_G_116), which corresponds to a "*LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*".

The approximate northern (partial) and southern portion of this site is underlain by the Cushina groundwater body (GWB) (European Code: IE_SE_G_048), which corresponds to a "*Lm – Locally Important Aquifer – Bedrock which is Moderately Productive*".

The aquifer vulnerability classification for this area is 'High'. Refer to Volume 4 (Compound Aquifer Classification), for the Aquifer Vulnerability mapping for this area / section of the site. An overburden thickness of 3-5m of low permeability 'Cut over raised Peat' and 'Clay/Till derived from limestone' is expected.

6.3.3.4 Regional Groundwater Wells and Groundwater Resources

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland. The current well index shows multiple boreholes are located within a 1km radius of the site as presented in Table 6-21. Volume 4 (Groundwater Wells Sheet 1 to 6, corresponding to Sections 1 to 6) presents the GSI well search for the area surrounding the Proposed Development site.

Table 6-21. GSI Well Index (GSI, 2026)

GSI Name	Source Type	Accuracy	Townland	Use	Yield Class
2623SWW256	Borehole	to within 20m	Grange west	Domestic use only	Poor
2623SWW276	Dug well	to within 50m	Grange west	Domestic use only	
2623SWW280	Dug well	to within 50m	Rahin	Domestic use only	
2623SWW340	Dug well	to within 50m	Kinnafad	Domestic use only	
2623SWW340	Dug well	to within 50m	Kinnafad	Domestic use only	
2623SWW216	Borehole	to within 1km	Kinnafad	Unknown	Poor
2623SWW432	Dug well	to within 50m	Grange west	Domestic use only	
2623NWW077	Dug well	to within 100m	Kilwarden	Public supply (County Council)	

GSI Name	Source Type	Accuracy	Townland	Use	Yield Class
2623NWW080	Dug well	to within 100m	Ardnamullan	Public supply (County Council)	
2623NWW081	Borehole	to within 100m	Ticroghan	Public supply (County Council)	
2623NWW049	Dug well	to within 1km	Ardnamullan	Domestic use only	
2623NWW051	Dug well	to within 1km	Park	Public supply (County Council)	
2623NWW052	Dug well	to within 1km	Ballyboggan	Unknown	
2623NWW053	Dug well	to within 1km	Hardwood	Unknown	Poor
2623NWW054	Dug well	to within 1km	Kilwarden	Domestic use only	Poor
2623NWW055	Dug well	to within 1km	Kilwarden	Domestic use only	
2623NWW056	Dug well	to within 100m	Kilwarden	Unknown	
2623NWW066	Borehole	to within 1km	Hardwood	Domestic use only	Poor
2623NWW082	Dug well	to within 100m	Ticroghan	Public supply (County Council)	
2623NWW083	Dug well	to within 100m	Ticroghan	Public supply (County Council)	
2623NWW085	Dug well	to within 100m	Towlaght	Public supply (County Council)	
2623NWW087	Dug well	to within 100m	Ticrochan	Public supply (County Council)	
2623NWW088	Dug well	to within 100m	Ardnamullan	Public supply ((County Council)	
2623NWW098	Borehole	to within 50m	Kilwarden	Other	Poor
2623NWW027	Dug well	to within 50m	Ballyboggan	Unknown	
2623NWW028	Dug well	to within 50m	Ballyboggan	Unknown	
2623NWW029	Dug well	to within 50m	Ballyboggan	Unknown	
2623SWW006	Dug well	to within 1km	Colgans bridge	Domestic use only	
2623SWW007	Dug well	to within 1km	Edenderry	Domestic use only	
2623SWW008	Dug well	to within 1km	Rathmore	Domestic use only	
2623SWW009	Dug well	to within 1km	Edenderry	Domestic use only	
2623SWW010	Borehole	to within 1km	Monasteroris	Domestic use only	Moderate
2621NWW002	Dug well	to within 1km	Shean	Domestic use only	Poor

GSI Name	Source Type	Accuracy	Townland	Use	Yield Class
2621NWW007	Dug well	to within 1km	Ballykilleen	Domestic use only	
2621NWW008	Dug well	to within 1km	Ballykilleen	Domestic use only	
2623SWW012	Borehole	to within 20m	Drumcooly	Group Scheme	Moderate
2623SWW013	Borehole	to within 20m	Drumcooly	Group Scheme	Moderate
2321NEW017	Dug well	to within 1km	Ballinakill	Domestic use only	
2621NWW012	Borehole	to within 1km	Cloncant	Unknown	Poor
2323SEW033	Borehole	to within 1km	Ballycolgan	Unknown	Poor
2321NEW010	Dug well	to within 1km	Rathvilla	Domestic use only	
2321NEW016	Dug well	to within 1km	Rathlumber	Domestic use only	
2623NWW086	Dug well	to within 100m	Kilwarden	Public supply (County Council)	

There are no recorded groundwater resource protection zones in the immediate area of the proposed site, i.e., zones surrounding a groundwater abstraction area. In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity. Additionally, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas in the vicinity of the Proposed Development site. There are no recorded source protection areas / Zones (SPZs, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution) or recorded groundwater resource protection zones.

The nearest Group Water Scheme (Preliminary Source Protection Area Zone of Contribution) to the site is Ballykilleen (Zone of Contribution Unique ID IE_GSI_ZOC_37), which is located c. 600m to the east of the subject development site at the point of closest proximity. The subject development site is outside the zone of contribution for this supply.

In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity. The Public Water Supply / Public Supply Source Protection Area / Zone (SPZ) / drinking water protection area in closest proximity to the Proposed Development site is the EDENDERRY PWS (Source Protection Area Unique ID: IE_GSI_SPA_269), which is located c. 2.7 km east of the pipeline route beneath the townland of Edenderry (linear distance at the point of closest proximity). The subject development site is outside the zone of contribution for this supply.

Neither of these areas share a hydrological or hydrogeological connection to the site and are located hydrologically upgradient / upstream of the development site.

6.3.3.5 Hydrogeological Site Investigation of the north section of the pipeline alignment and proximal Mount Hevey Bog SAC.

Minerex Environmental Limited (December, 2025) has prepared this Hydrogeological Impact Assessment for the new proposed gas pipeline from Kilwarden offtake, Co. Meath to the Edenderry Power Station, Co. Offaly for Murphy International Limited. This report includes a hydrogeological review of the site and an

assessment of lateral connectivity and potential impacts during the construction phase and focuses in particular on the northern section of the pipeline alignment, which lies in proximity to the Mount Hevey Bog Special Area of Conservation (SAC). The assessment was carried out since the SAC is located c. 20m from the Proposed Development site boundary and c.200m the Kilwarden offtake location where the proposed excavation depth is c.3.4mBGL. Please refer to the report presented in Volume 3 Appendix 6.2.

6.3.3.5.1 Topography and Regional Hydrogeology

In line with the observations recorded by AWN Consulting (refer to section 6.3.4.1 below) during the site investigation conducted by AWN Consulting on 11th November 2025 at the Mount Hevey Bog, Kilwarden Offtake Installation location and adjacent agricultural fields, the site slopes towards the Kilwarden River, which is the main surface water feature and drainage receptor. The topography of the focus area is characterised by gradually sloping lowland topography, with ground levels decreasing from approximately 74 m AOD in the northwest to 70 m AOD in the southeast, based on available online mapping. The Mount Hevey Bog SAC, located immediately to the north of the site, occupies a topographically elevated position as a raised bog. Ground levels within the SAC are higher than those of within the works area. Both surface water and groundwater flow from the site are directed away from the SAC, towards lower lying areas, further limiting the potential for hydrogeological connectivity towards the SAC from the proposed works.

Based on information provided by the GSI summary of initial characterisation, the Athboy GWB underlaying the focus area demonstrates a general decrease in elevation from a northwestern to southeastern pathway and the typical groundwater flow path length within the Athboy GWB (refer to Section 6.3.3.2.1 above) estimated to be 0.75km. This is consistent with the regional discharge pathway.

6.3.3.5.2 Site (local) Hydrogeology

The findings from ground investigation and groundwater monitoring can be summarised as follows:

Groundwater Strikes were recorded during the drilling of the boreholes. These strikes were encountered at depths ranging from approximately 3.3 m to 5.8 m below ground level (mBGL), with observed rates of groundwater ingress varying from moderate to rapid. Majority of proposed excavations are anticipated to be within clay deposits; therefore, a reduced rate of groundwater ingress is expected during construction works.

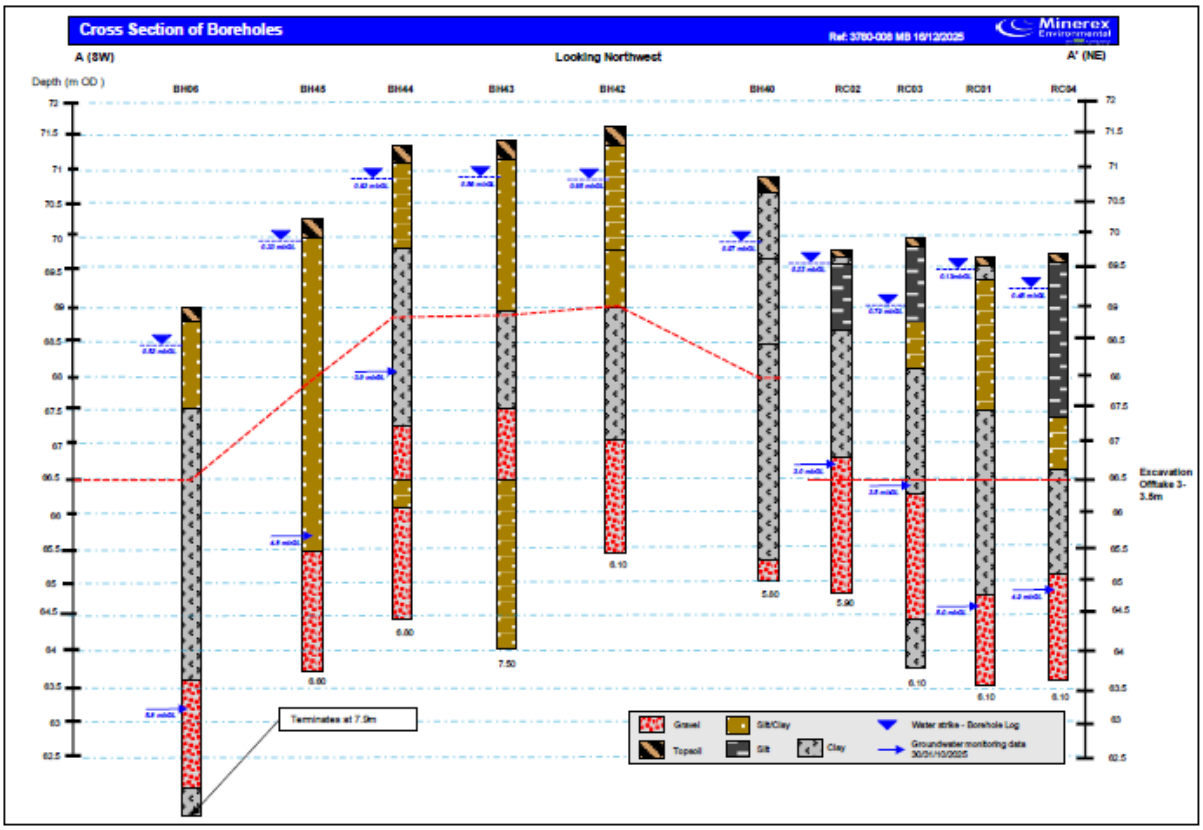
Groundwater level monitoring was undertaken by IGSL, with data available from 25/10/2025 to 09/12/2025 for RC01, RC04, BH06, BH40, and BH43. Monitoring data for BH45 are available for the period from 28/10/2025 to 19/11/2025. No significant fluctuations in groundwater levels were observed during the monitoring period, with groundwater levels remaining relatively stable and ranging from approximately 0.0 to 1.0 mbGL across all monitored boreholes. Groundwater levels recorded in RC01, RC04, BH06, BH43, and BH45 were generally within the range of 0.0 to 0.5 mbGL.

Electric dipper readings obtained by IGSL on 30/10/2025 using data loggers indicate groundwater levels ranging from approximately 0.1 to 0.97 mbGL. A visual representation of the groundwater strikes, and electric dipper readings is provided in Insert 6-1 below. A summary of electric dipper readings recorded by MEL during the site visit on 10 December 2025 is presented in Table 6-22 below.

Table 6-22 Groundwater Levels

Borehole	Water Level (mBGL)	Water Level (mOD)
RC01	0	69.55
RC02	0	69.76
RC03	0.39	69.56
RC04	0.2	69.51
BH40	0.88	69.98
BH42	0.32	71.21
BH43	0.33	71.12

Insert 6-1 Cross Section of Boreholes displaying geological cross section and water strike and water level data (Source: Minerex Environmental Limited, 2025)



Minerex Environmental Limited (2025) have noted that based on information provided by the GSI summary of initial characterisation, the Athboy GWB underlaying the focus area and the groundwater monitoring undertaken for the scheme demonstrates a general decrease in elevation from a northwestern to southeastern pathway. This is consistent with the regional discharge pathway and groundwater flow directions. Groundwater recharge is primarily diffuse, allowing the infiltration of rainfall to the aquifer. A significant portion the groundwater discharges directly to surface waters, mainly through the upper part of the aquifer. The typical groundwater flow path length within the Athboy GWB is estimated to be 0.75km, as reported in GSI groundwater body description. In this case, the Kilwarden River represents the nearest principle point of discharge based on pathway and distance area.

6.3.3.5.3 Site Hydrochemistry and Groundwater Quality

IGSL has been monitoring water levels since October 2025 and water quality in all boreholes with the monitoring wells installed. The Environmental / chemical testing results from these groundwater samples from the 30th and 31st of October 2025 are included in Appendix G of the Minerex Environmental Limited Report (2025) included in Volume 3 Appendix 6.2 in this EIAR application. These water samples were analysed for:

- pH
- Sulphate
- Cyanide
- Total petroleum hydrocarbons (TPH)
- Polyaromatic hydrocarbons (PAH)
- Phenols
- Various metals (arsenic, boron, cadmium, copper, mercury, nickel, lead, zinc,
- chromium)

The summary of the results is listed below:

- Total petroleum hydrocarbons (TPH) are below the limit of detection
- Polyaromatic hydrocarbons (PAH) are below the limit of detection
- Sulphate above limits in BH34
- Nickel above limits in BH34, RC03, RC01

Additional sampling and testing were completed by MEL during site visit in December 2025. Boreholes BH40 and BH43 were sampled and laboratory analysis for additional parameters was completed.

The certificate of analysis is attached in Appendix H of the Minerex Environmental Limited Report (2025) included in Volume 3, Appendix 6.2 this EIAR application. The comparison of the baseline hydrochemistry and typical licence limits and groundwater/surface water regulations have identified a few parameters which may be of concern. It is important to note that the samples taken would represent untreated water from the site.

The main parameter of concern would be the ammoniacal nitrogen. This is likely high due to the agricultural activities in the area and exceeds the Environmental Quality Standards (EQS) for Inland Surface Water. The metals concentration that exceeds the limits from the groundwater regulations are unlikely to be issues of concern for any discharge to surface waters since the concentrations are below the EQS for inland surface waters established under Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019).

6.3.3.6 Rating of Site Importance of the Hydrogeological Features

The review of the receiving environment undertaken (Section 9.3) and based on the TII methodology (2009) (Appendix 6.1) the importance of the hydrogeological features at this site can be rated as '*Medium*' importance with Medium importance or value on a local scale, due to the aquifer beneath the site being predominantly classified as a "*Locally Important Aquifer (LI/Lm)*", in which the aquifer is characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local.

6.3.4 Designated Sites of Conservation

The NPWS (2026) on-line database have been reviewed to determine the location of areas of conservation within proximity to the Proposed Development site, and there are no Special Protected Areas (SPA) established under the EU Birds Directive (79/409/EEC), or Special Areas of Conservation (SAC) established under the Habitats Directive within the boundary of the site. Furthermore, with the exception of the fully lined Grand Canal pNHA, there are no Natural Heritage Areas (NHA), or proposed Natural Heritage Areas (pNHA) established under the Wildlife Acts, 1976 and 2000 (as amended) located within the site boundary or vicinity. The lands in which the development is located have no formal designations.

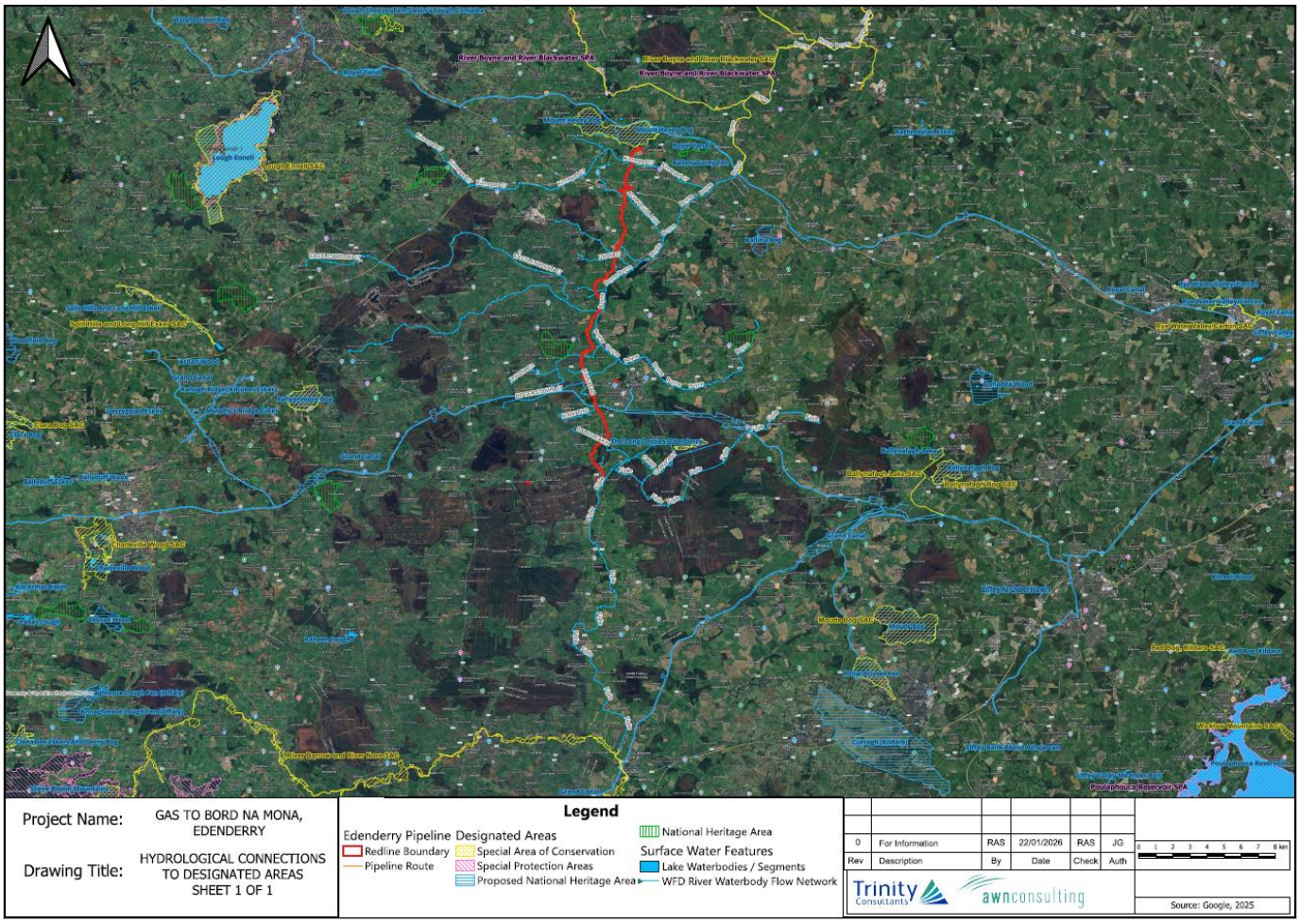
The Areas of Conservation or European Designated Natura 2000 sites in closest proximity of the site are as follows:

- The Mount Hevey Bog SAC (Site Code: 002342), located c. 20m north (linear distance) of the Kilwarden Offtake Installation Pipeline Section 1.
- The River Boyne & River Blackwater SAC (Site Code: 002299), located c. 6.2km east (linear distance) of Pipeline Section 1 at the point of closest proximity.
- The River Boyne & River Blackwater SPA (Site Code: 004232), located c. 6.2km east (linear distance) of Pipeline Section 1 at the point of closest proximity.
- The River Nore & River Barrow SAC (Site Code: 002162), located c. 16.1km south (linear distance) at of Pipeline Section 6 the point of closest proximity.
- The Long Derries, Edenderry SAC (Site Code: 000925), located c. 3.8 km east of Pipeline Section 6 of the site at the point of closest proximity.

The Proposed National Heritage Areas Natural Parks and Wildlife Service (NPWS, 2026) in the context of the site are as follows:

- The Mount Hevey Bog pNHA (Site Code: 001584), located c. 20m north (linear distance) of the Kilwarden Offtake Installation Pipeline Section 1.
- The Grand Canal pNHA (Site Code: 002104), traverses / intersects the site at Pipeline Section 5.

Figure 6-1 Designated Areas (SAC, SPA, pNHA) & Hydrological Pathway Connections/Linkages (NPWS/EPA, 2026)



6.3.4.1 Hydrological Connectivity

The hydrological Source-Pathway-Receptor (S-P-R) Linkages to sensitive receptors are outlined below:

River Boyne & River Blackwater SAC/SPA

The site currently has a direct hydrological connection/pathway linkage to River Boyne & River Blackwater SPA via the following river waterbodies:

- Boyne_040 (Kinnegad 07 Stream & AGHNAGILLAGH Stream).
- Boyne_030 (KNOCKERSALLY or COLEHILL Stream / PARK 07 Stream / BALLYNAKIL 07 Stream / CASTLEJORDAN 07 Stream / RAHIN Stream / ROOSK 07 Stream).
- YELLOW (CASTLEJORDAN)_030 (Yellow [Castlejordan] Stream).
- Boyne_020 (MOUNTWILSON Stream & Kinnafad Stream).

These waterbodies are primary/secondary tributaries to the River Boyne. They traverse the northern and central portions of the site (Section 1-5) and flow in an alternating east to northeast direction before ultimately merging/joining with the River Boyne, which subsequently discharges to the River Boyne & River Blackwater SPA at a confluence point located approximately 6.2km northeast of the site (linear distance at the point of closest proximity). Such a pathway involves significant mixing and dilution through contribution from the named tributaries feeding the Boyne at confluence points downstream in the catchment.

The site currently has a ***hydrological*** linkage / connection to the **downstream / downgradient** River Boyne & River Blackwater SPA (minimum 6.2 km east/northeast of the site) via overland flow, direct runoff and baseflow contributions to the numerous river waterbodies / streams / drainage ditches which traverse the site (mentioned / listed above in Section 6.3.2.1) and convey flow to the Boyne River waterbody which in turn, ultimately discharges / outfalls The River Boyne & River Blackwater SPA. Albeit this source pathway linkage exists, it involves a significant pathway distance allowing for significant attenuation and a large dilution factor downstream in the catchment (multiple tributaries traversing the site and feeding into the Boyne River).

The River Nore & River Barrow SAC

At present, the site has a direct hydrological connection/pathway linkage to The River Nore & River Barrow SAC via the following river waterbodies:

- BALLYLEAKEN Stream (FIGILE_030).
- BALLYKILLEEN Stream (FIGILE_030).

These two streams are secondary/tertiary tributaries to the River Figile. They traverse the southern portion of the site (Section 6) and generally flow in a southerly direction before ultimately discharging to the River Figile, which subsequently flows south and outfalls to the River Nore & River Barrow SAC at a confluence point located approximately 16.1km south of the site (linear distance at the point of closest proximity). Such a pathway involves significant mixing and dilution with multiple tributaries downstream in the catchment.

- The site also currently has direct ***hydrological*** pathway linkage to the ***downstream / downgradient*** River Nore & River Barrow SAC (16.1km south) via the BallyKilleen Stream which traversed the pipeline route and joins / merges with the Figile river which subsequently flows south for 16.1km prior to discharge to the SAC.
- The AGI located at the southern end of the site – the AGI. The stormwater drainage will connect to an attenuation pond located within the BnM facility. This pond subsequently discharges at a controlled rate into the Figile River post treatment and attenuation at a controlled rate. This represents an indirect ***hydrological*** Source-Pathway-Receptor linkage to River Nore & River Barrow SAC, albeit via a lengthy pathway distance allowing for significant attenuation and significant level of dilution within the attenuation (drainage design) and downstream in the catchment of the Figile River.

Mount Hevey Bog SAC

A site Walkover was conducted by AWN Consulting on 11th November 2025 at the Mount Hevey Bog, Kilwarden Offtake Installation location and adjacent agricultural fields, bounding the offtake field to the south and west.

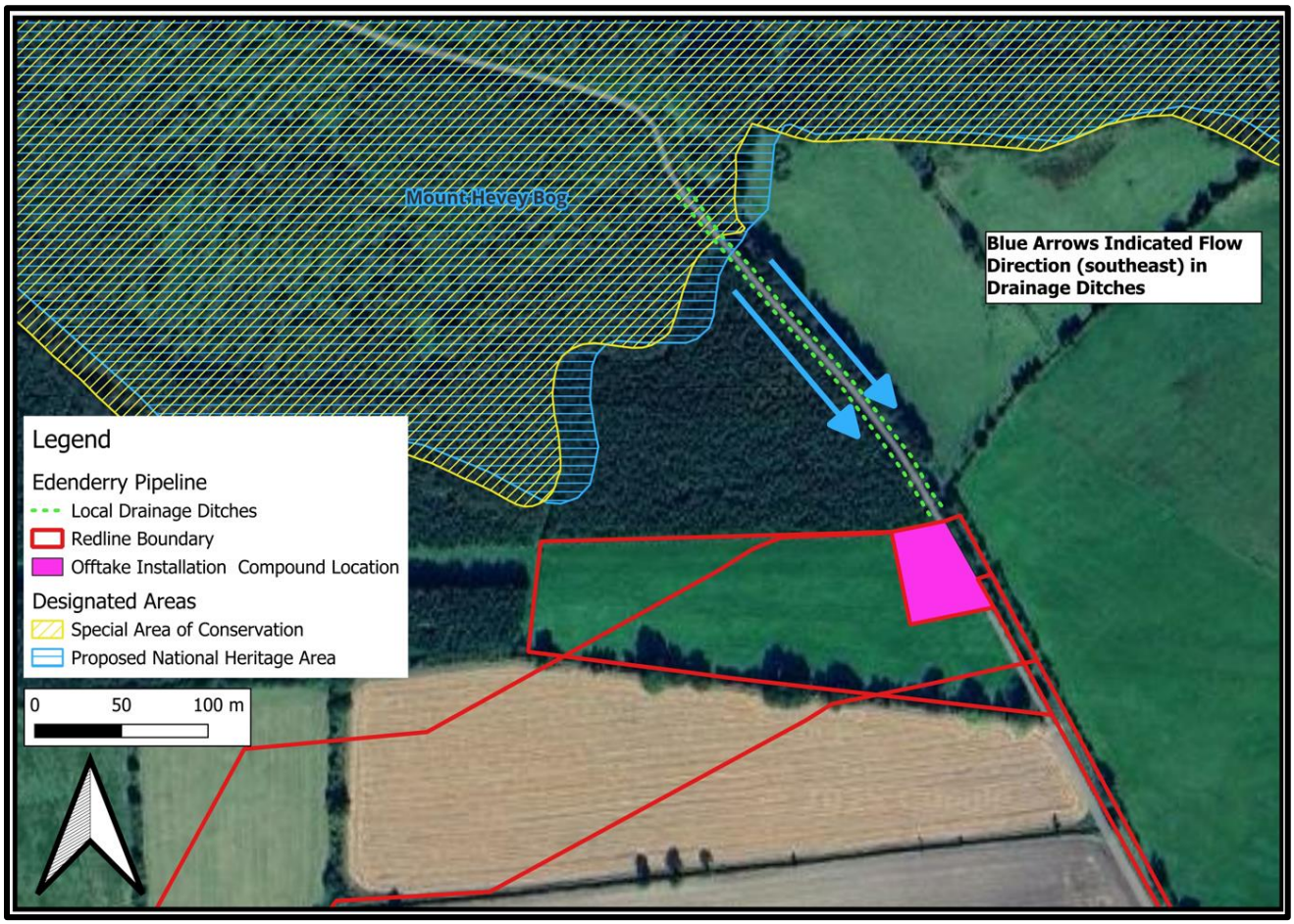
The walkover commenced along the southern fringe of the Mount Hevey Bog SAC, located c. 20 meters north of the Kilwarden offtake installation location.

The topography of this area is characterised by a gentle slope/gradient from North to South with localised minor undulations. The field of the offtake installation and the adjacent fields to the south and southwest are categorised as greenfield land (some with land drains) with a historic agricultural function / land use.

The land of the Mount Hevey Bog SAC (c. 20m north of the Offtake) consists of dense forestry and woodland which grew progressively and extensively thicker/denser moving north (upgradient). This southern fridge/margin of the SAC was thoroughly examined for drainage pathways/patterns until access was limited due to dense overgrowth/trees. No drainage ditches, streams or flowing watercourses were identified in this portion of the SAC.

The walkover subsequently progressed along the local access road which bounds the offtake field to the east. Moving north towards higher elevation, 2 No. drainage ditches aligning the local road were identified. These ditches both showed flow in a south-southeast direction downgradient, in line with the local topography (refer to Insert 6-2 below).

Insert 6-2 Land Use and Local Hydrology at the Kilwarden Offtake Installation location



- The current EPA watercourse mapping indicates that this northern portion of the pipeline which is in close proximity to the Mount Hevey Bog is traversed by 1No. river waterbody. The Kilwarden River (EPA Name: Kinnegad 07) represents the main hydrological feature of this area. The Aghamore 07 Stream flows southwards from its source located in the central portion of the Mount Hevey Bog before it joins / merges with and discharges to the Kilwarden River at a confluence point located c. 1.1km east of the site at the point of closest proximity. From here, the Kilwarden River flows in an easterly direction, traversing the southern portion of this subject section of the pipeline route, to the south of R161. In turn, the Kilwarden River flows in an alternating eastern-southeastern direction prior to discharging to the River Boyne, at a confluence point located c. 4.9km southeast of the site.
- The site has no ***hydrological*** pathway linkage / connection to the Mount Hevey Bog SAC, as this natura 2000 conservation site is located ***hydrologically upgradient / upstream*** of the Proposed Development site.

The Long Derries, Edenderry SAC

- The Long Derries, Edenderry SAC is located c. 3.8 km east of Section 6 of the site at the point of closest proximity. However, the site shares no hydrological pathway linkage / connection to this SAC, as this Natura 2000 conservation site is located hydrologically upgradient / upstream of the subject development site and thus no potential to be impacted by the Proposed Development.

The Grand Canal pNHA (proposed National Heritage Area)

- The Grand Canal pNHA, traverses / intersects the site at chainage Section 5, however the canal is a fully lined feature, therefore negating any ***hydrological*** connectivity or pathway to this waterbody.

6.3.4.2 Hydrogeological Connectivity

The hydrogeological Source-Pathway-Receptor (S-P-R) Linkages to sensitive receptors are outlined below:

River Boyne & River Blackwater SAC/SPA

- Currently, the site has a no potential for a ***hydrogeological*** (groundwater) connection to ***downstream / downgradient*** River Boyne & River Blackwater SPA listed above in section 6.3.6, due to the distance of separation (minimum 6.2km east) being greater/larger than the distance of local underground flow paths within the multiple aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the majority of overburden, which is characteristic of cohesive glacial clays, thereby further reducing/decreasing the potential for a hydrogeological linkage pathway to the sensitive receptors. While some higher permeability granular deposits (e.g. Gravels and alluvium) exist, these are discontinuous and confined by the surrounding cohesive Til deposits which, combined with the predominant moderate vulnerability (5-10m+ overburden thickness) negates the potential of offsite vertical and lateral migration.

The River Nore & River Barrow SAC

- At present, the site has a no potential for a ***hydrogeological*** (groundwater) connection to the ***downstream / downgradient*** River Nore & River Barrow SAC listed above in section 6.3.6, due to the distance of separation (minimum 16.1km south) being greater/larger than the distance of local underground flow paths within the multiple aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the majority of overburden, which is characteristic of cohesive glacial clays, thereby further negating the potential for a hydrogeological linkage pathway to the sensitive receptors. While some higher permeability granular deposits (e.g. Gravels and alluvium) exist, these are discontinuous and confined by the surrounding cohesive Til deposits which, combined with the predominant moderate vulnerability (5-10m+ overburden thickness) negates the potential of offsite vertical and lateral migration.

Mount Hevey Bog SAC

- The Mount Hevey Bog SAC occupies a topographically elevated position relative to the works area, and both groundwater and surface water flow direction are likely away from the SAC. A Source-Pathway Receptor (SPR) risk assessment was undertaken for the construction phase. Risks to the Mount Hevey Bog SAC was assessed as negligible to low risk, due to limited aquifer productivity, cohesive overburden, short groundwater flow paths and likely absence of hydraulic connectivity with the SAC (Minerex Environmental Limited (MEL), 2026)
- The Proposed Development site has a low potential for a hydrogeological connection / linkage with the nearby upstream / upgradient Mount Hevey Bog SAC (20m north) designated sites, due to underground flow path distances in the locally important aquifer, which is characterised by low fracture connectivity, discrete local fracturing with little connectivity rather than large, well-connected fractures which are more indicative of Regional Aquifers. Such a hydrogeological linkage / connection does involve a significant dilution factor downgradient in the aquifer (Athboy GWB, Section 1 Chainage of the site pipeline route). Additionally, vertical migration to the underlying bedrock is minimised where

overburden soil cover in Section 1 has low permeability, typical of the Tils derived from Limestone and Cut over raised Bog which is present in this area of the site, resulting in good natural aquifer protection from any localised diesel/ fuel oil spills during either construction or operational phases thereby further negating the potential for a hydrogeological linkage pathway to this sensitive receptors. There are no groundwater dependent wetlands within the downstream zone of influence of the Proposed Development.

The Long Derries, Edenderry SAC

- The Long Derries, Edenderry SAC is located c. 3.8 km east of Section 6 of the site at the point of closest proximity. At present, the site has a no potential for a ***hydrogeological*** (groundwater) connection to the ***downstream / downgradient*** Long Derries, Edenderry SAC, due to the distance of separation (minimum 3.8 km east) being greater/larger than the distance of local underground flow paths typical of the aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the majority of overburden, which is characteristic of cohesive glacial clays, thereby further negating the potential for a hydrogeological linkage pathway to the sensitive receptors.

The Grand Canal pNHA (proposed National Heritage Area)

- The Grand Canal pNHA, traverses / intersects the site at chainage Section 5, however the canal is a fully lined feature, therefore negating any ***hydrogeological*** connectivity or pathway to this waterbody.

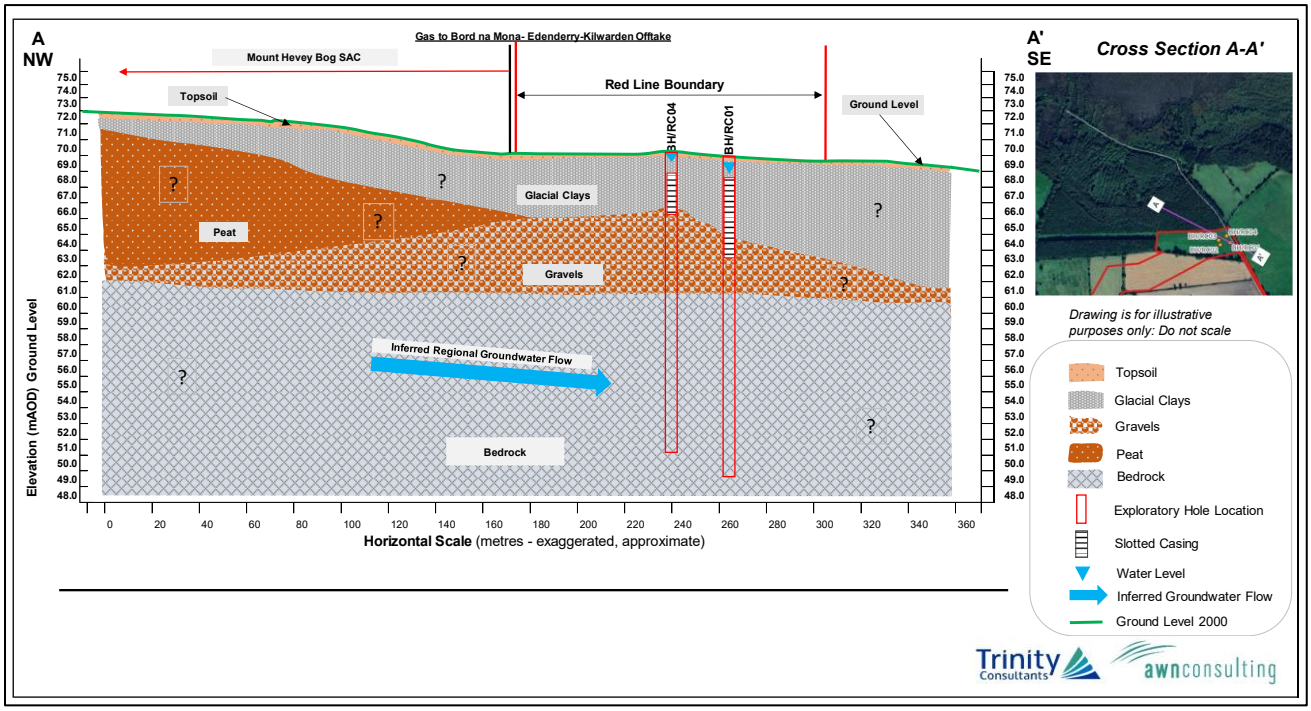
6.3.5 Conceptual Site Model

AWN have developed a conceptual site model (CSM) in order to identify any likely Source-Pathway-Receptor linkages relating to the site and the Proposed Development. Two cross sections have been produced to outline the hydrogeological connectivity. Cross section A-A' outlines the connectivity at kilwarden offtake with regards to the Mount Hevey SAC and cross section B-B' outlines the connectivity to the River Boyne & River Blackwater SPA as presented in Insert 6-3 and 6-4 respectively.

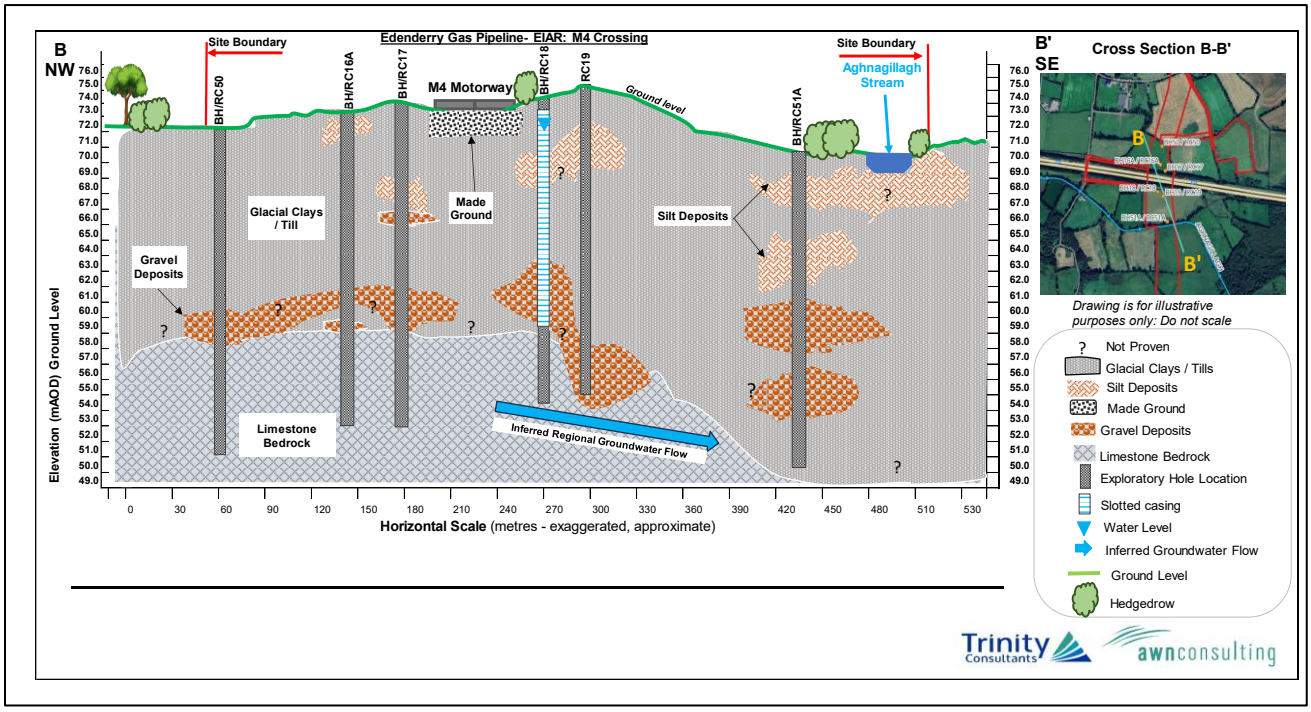
- The bedrock aquifer underlying the Proposed Development site, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map presented in Appendix 6.3, Pages 1-2, is classified predominantly as a "LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones", and "Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive", whereby the aquifer is characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local. The GSI database indicates/identifies that a minor localised area of the southern portion of Section 2 is underlain by Kilrathmurry Gravels GWB (European Code: IE_EA_G_044). The GSI aquifer mapping database does not indicate/identify any gravel aquifers underlying any other section the proposed pipeline route.
- The GSI presently classifies the aquifer underlying the Proposed Development site with several vulnerability classifications. The groundwater vulnerability of the majority of the site as 'Moderate'. Based on the subsoil type and description (low permeability till), the expected depth to bedrock is expected to be greater than or within the range of 5-10m. Some localised less extensive zones of the site are depicted as having an aquifer vulnerability which ranges from 'Low', 'High', to 'Extreme', , thereby indicating a low permeability (Till/Clay/Peat) subsoil thickness of 10m+, 3-5m, 0-3m and high permeability (Gravel) subsoil thickness of 3m+, respectively.
- A review of the available soil quality data is provided in Chapter 5 section 5.3.7.1 As noted, there is no known evidence of extensive soil contamination as a result of previous use. However, any residual soil contamination encountered during construction will be removed of to a licenced site minimising any potential for mobilisation in the water environment.
- The Proposed Development is outside the zone of contribution for any source protection zones (SPZs), public or group groundwater supplies.

- The site has no ***hydrological*** pathway linkage / connection to the Mount Hevey Bog SAC, as this natura 2000 conservation site is located ***hydrologically upgradient / upstream*** of the Proposed Development site.
- The site currently has a direct ***hydrological*** linkage / connection to the downstream / downgradient River Boyne & River Blackwater SPA and River Nore & River Barrow SAC, albeit the pathway to these receptors involves a significant pathway distance allowing for significant attenuation and a large dilution factor downstream in the catchment.
- Currently, the site has a no potential for a ***hydrogeological (groundwater)*** connection to River Boyne & River Blackwater SPA or the River Nore & River Barrow SPA/SAC located downstream from the Proposed Development.
- The potential for impact on the Mount Hevey Bog SAC located upstream of the Proposed Development is considered low, via hydrogeological connectivity.
- There is no potential for impact on the Mount Hevey Bog SAC via hydrological connection, since the Bog is located upstream of all hydrological pathways/connections.

Insert 6-3. Cross Section A-A' at Kilwarden Offtake



Insert 6-4. Cross Section B-B' at M4 Crossing



6.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase and operational phase of the Proposed Development. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. Therefore, it should be read in conjunction with the full development package.

For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 'Description of the Proposed Development' of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the Proposed Development.

6.4.1 Construction Phase

The activities required for the construction phase of the Proposed Development represents the greatest risk of potential impact on the hydrological and hydrogeological environment. These activities primarily pertain to site enabling works, preparation, excavation and infilling activities required to facilitate construction of the Proposed Development.

Construction laydown areas will be established during the earthworks and site preparation phase which will be used by the main follow-on contractors to accommodate temporary construction facilities such as site offices, parking, storage of construction materials and temporary sheds/workshops.

6.4.1.1 Watercourse Crossings – Overview

a. The Proposed Development intersects a total of 32 watercourses (river/stream/ditch/canal), the majority of which will be crossed using open cut trenches. Table 6-23 and The Kilwarden River (RVX01) and Yellow River (RVX02) crossing has been confirmed to be installed using trenchless construction methods. See Chapter 2 for further details.

Table 6-24 details the location and crossing method of each water course crossing (WCX). These crossings are associated with tertiary ditches that ultimately discharge into the watercourses described above.

Table 6-23 GNI143 Ballykilleen Pipeline River Crossing Methodology

RVX No.	River	Pipeline Chainage (m)	Approximate Crossing Span/Length (m)	Anticipated Crossing Construction Technique [1]
RVX01	Kilwarden River	1230	272	Trenchless(a)
RVX02	Yellow River	11414	509	Trenchless(a)

b. The Kilwarden River (RVX01) and Yellow River (RVX02) crossing has been confirmed to be installed using trenchless construction methods. See Chapter 2 for further details.

Table 6-24 GNI143 Ballykilleen Pipeline Watercourse Crossing Methodology

Water Crossing	Stream	Chainage/ ITM Coordinates	Crossing Span (m)	Anticipated Crossing Technique
WCX01	Unmapped channel	1900	3	Open Cut
WCX02	Aghnagillagh Stream	3187	6	Trenchless(b)
WCX03	Unmapped channel	4893	3	Open Cut
WCX04	Knockerasally or Colehill River	6666	7	Open Cut
WCX05	Park River	7303	6	Open Cut
WCX06	Ballynakill Stream	7496	20	Open Cut
WCX07	Unmapped channel	8030	5	Open Cut
WCX08	Unmapped channel	8815	5	Open Cut
WCX09	Unmapped channel	9278	6	Open Cut
WCX10	Unmapped channel	9603	7	Open Cut
WCX11	Castlejordan River	10036	6	Open Cut
WCX12	Rahin Stream	10125	6	Open Cut
WCX13	Unmapped channel	12916	6	Open Cut
WCX14	Unmapped stream	13124	8	Open Cut
WCX15	Unmapped channel	13376	5	Open Cut

WCX16	Roosk River	14871	10	Open Cut
WCX17	Unmapped channel	15543	6	Open Cut
WCX18	Unmapped channel	16054	3	Open Cut
WCX19	Kinnafad River	16366	7	Open Cut
WCX20	Unmapped stream	16706	9	Open Cut
WCX21	Unmapped channel	16882	5	Open Cut
WCX22	Unmapped channel	17204	6	Open Cut
WCX23	Grand Canal	18090	192	Trenchless[c]
WCX24	Ballyleakin River	20522	4	Open Cut
WCX25	Unmapped channel	20679	6	Open Cut
WCX26	Unmapped channel	21034	5	Open Cut
WCX27	Unmapped channel	22459	5	Open Cut
WCX28	Unmapped channel	22617	5	Open Cut
WCX29	Ballykilleen Stream	22753	4	Trenchless[b]
WCX30	Ballykilleen Stream	23151	5	Open Cut

c. Pipeline Chainage (m) indicates the approximate location of the crossing along the pipeline.
d. The crossing is currently anticipated to be undertaken using trenchless construction techniques. See Chapter 2 for further details.
e. The Grand Canal (WCX23) crossing has been confirmed to be installed using trenchless construction methods. See Chapter 2 for further details.

6.4.1.1.1 Open Cut - Watercourse Crossings

Open-cut watercourse crossings represent a key interaction pathway between construction activities and surface waters. The contractor may opt for a trenchless crossing method if they deem it more suitable for ease of construction. At these locations, construction activities may involve:

- Temporary diversion of flow using flume pipes;
- Short-term isolation of the working area from flowing water;
- Excavation of the channel bed to the required depth; and
- Reinstatement of the watercourse bed and banks following pipe installation.

Open cut water crossings are carried out as quickly as possible (typically 3-4 days) to minimise their potential environmental impact. The methodology for open-cut watercourse crossings, including the use of temporary flumes, sediment control measures, and reinstatement requirements, is described in Chapter 2, Section 2.4.2.5.

6.4.1.1.2 Trenchless - River / Watercourse / Road Crossings

Trenchless construction techniques will be employed at key sensitive crossings along the route to minimise disturbance to soils, geology and surface features.

Confirmed trenchless crossings include:

- Kilwarden River (RVX01)
  - The indicative planning design provides for an HDD crossing length of approximately 271.13 m (c. 272 m), gas transmission pipeline installed entirely underground. The HDD reaches a maximum depth of approximately 50 mOD below ground, corresponding to a depth of approximately 14.46 m beneath the bed of the Kilwarden River (RVX01) at its deepest point. See application drawing GNI143-GNI-PL-CRI-0001

- Yellow River (RVX02)
  - The indicative planning design provides for an HDD crossing length of approximately 508.7 m (c. 508 m), gas transmission pipeline installed entirely underground. The HDD reaches a maximum depth of approximately 40 m mOD below ground, corresponding to a depth of approximately

21.73 m beneath the Yellow River (RDX02) at its deepest point. See application drawing GNI143-GNI-PL-CRI-0002.

- M4 Motorway (RDX04) and Aghnagillagh Stream (WCX02)
  - The indicative planning design provides for an HDD crossing length of approximately 349.65 m (c. 350 m), gas transmission pipeline installed entirely underground. The HDD reaches a maximum depth of approximately 50 m mOD below ground, corresponding to a depth of approximately 20 m beneath the existing M4 Motorway (RVX01) at its deepest point, and 6.85m below the Aghnagillagh Stream (WCX02). See application drawing GNI143-GNI-PL-CRD-0003.

- Grand Canal (WCX23)
  - The indicative planning design provides for an HDD crossing length of approximately 191.59 m (c. 192 m), gas transmission pipeline installed entirely underground. The HDD reaches a maximum depth of approximately 66 m mOD below ground, corresponding to a depth of approximately 9.2m beneath the Grand Canal (WCX23) at its deepest point. See application drawing GNI143-GNI-PL-CWC-0001.

Where trenchless crossings are undertaken below the bed of a river, watercourse or canal they will be constructed to ensure a minimum vertical clearance of 1.6 metres between the true riverbed and the trenchless crossing and will not involve in-channel excavation, bed or bank disturbance, or the installation of temporary or permanent structures within the watercourse. These works do not constitute the construction or alteration of a bridge or culvert over a watercourse. Accordingly, OPW approval under Section 50 of the Arterial Drainage Act 1945 is not required for these trenchless crossings.

It is also anticipated that up to four additional regional road crossings may be constructed using trenchless techniques; however, the final construction methodology at these locations will be confirmed by the appointed contractor during the construction phase, who may elect to use open-cut methods subject to site-specific conditions. Hence, where there is any uncertainty in trenching methodology, the impact assessment is carried out considering a worst case scenario of Open cut trenching.

The appointed Contractor will prepare detailed, site-specific method statements in advance of trenchless crossing works. These method statements will fully detail the proposed drilling methodology, contingency procedures, and emergency response actions. These measures will be incorporated into the construction-stage CEMP and implemented in full during the works.

6.4.1.2 Temporary Construction Infrastructure

A full description of the location, layout and construction of temporary infrastructure is provided in Chapter 2 (Description of the Proposed Development) Section 2.4.4.

6.4.1.2.1 Construction Compounds and Haul Roads

Temporary construction compounds, and material laydown aeras will be established (refer to Chapter 2, Section 2.4.4). Temporary haul roads (also referred to as running tracks) will be established within the pipeline working width to facilitate the movement of construction vehicles, plant and materials along the route (see Chapter 2, Section 2.4.4). These works in general include:

- Temporary stripping and stockpiling of topsoil and subsoil;
- Creation of temporary areas of compacted ground or stone surfacing;
- Formation of compacted stone or temporary surfacing over geotextile membrane where required;
- Localised compaction of soils, with potential short-term effects on infiltration rates;
- Interaction with existing agricultural field drainage systems and minor drainage ditches;
- Use of bog mats or similar measures in soft ground or flood-prone areas to limit ground disturbance;
- Storage of fuels, oils and chemicals within designated, bunded areas; and
- Generation and management of surface water runoff from disturbed or compacted surfaces.

Construction compounds will be reinstated following completion of construction works, with topsoil replaced and land restored to preconstruction condition, thereby ensuring no permanent alteration to drainage or infiltration characteristics. Haul roads are fully temporary and will be removed following pipeline installation, with ground regraded and reinstated using stored topsoil.

6.4.1.2.2 Temporary Watercourse Structures

Temporary watercourse structures will be installed along the pipeline route to facilitate construction access. These will be temporary bridge installations and temporary culverts at watercourse crossings. A detailed description of their design and installation is provided in Chapter 2 (Description of the Proposed Development) Sections 2.4.4.

A temporary bridge structure will be installed over the Kilwarden River (RVX01) to facilitate construction access across the watercourse without in-channel working. Temporary bridges may also be used at other watercourse crossings where required.

At watercourse crossings, temporary culverts will be installed to allow for an uninterrupted construction running track during pipeline installation. These culverts will temporarily convey flows through the watercourse beneath the running track.

Temporary bridge installations and temporary culverts required to facilitate construction works will be subject to approval by the Office of Public Works (OPW) under Section 50 of the Arterial Drainage Acts as per the OPW guidance set out in publication Construction, Replacement or Alteration of Bridges and Culverts: A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945. Rev. 201905-3. Section 50 requires that the consent is obtained prior to the construction, alteration, or use of any bridge or similar structure over a watercourse, in order to ensure that such works do not obstruct channel conveyance or give rise to increased flood risk upstream or downstream. Temporary bridge structures and temporary culverts will be designed and installed in accordance with OPW requirements and will be fully removed following completion of construction works, with the watercourse and adjacent lands reinstated to their pre-construction condition.

Emergency preparedness and environmental incident response measures relevant to works at watercourse crossings are addressed in Section 6 (Emergency Preparedness / Environmental Incident Plan) of the Outline Construction Environmental Management Plan (Appendix 2.2 of Chapter 2). The appointed Contractor will prepare a detailed, construction-stage CEMP that fully develops these provisions, including site-specific emergency response procedures, notification protocols, and corrective actions for temporary watercourse structures.

6.4.1.3 Earthworks, Excavation and Material Management

Open cut trenches are excavated to the required minimum 1.65 m depth (to base of trench), ensuring depth of cover to the top of the pipe is not less than 1.2 m. All concrete surface areas (AGI, Hot Tap & Pigging Compound) will be excavated to 0.45m below ground plus additional for hot tap area & topsoil stripping. During the construction process, there will be a need for localised stockpiling of this soil, soil, tarmac and hardcore in certain areas.

The stockpiling of the soil component allows for the efficient reuse of excavated material on site, rather than importing fill material from off-site. This approach reduces the environmental impact of the construction project by minimizing the amount of waste that needs to be disposed of and reducing the need for transportation of materials. It is anticipated that the majority (95%) of the excavated soil will be reinstated as backfill.

6.4.1.4 Construction Water Use and Hydrostatic Testing

Following installation, the pipeline will undergo hydrostatic pressure testing using approximately 6,667,655 litres of clean potable water. There are no chemical additives to this water. The required water will be sourced from an existing supply either from nearby municipal supply point (mains water supply, local authority fire hydrants) or alternatively, abstraction from another water supply in private ownership from groundwater / surface water that is permitted and registered with the EPA under the European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018).

Following hydrostatic testing (6,667,655 litres) this water will be discharged to nearby surface water or to ground, alternatively, it may be removed via tankering. There shall not be discharge of untreated, silty, or contaminated water from the works to any watercourse. The discharge of hydrostatic testing water from the site will be managed and controlled for the duration of the works. All water discharges associated with hydrostatic testing and commissioning will be controlled in terms of timing and flow rate to ensure they do not cause localised flooding, erosion, or mobilisation of sediments. Appropriate mitigation measures will be implemented as required, including attenuation or phased discharge where necessary.

6.4.1.5 Dewatering

Dewatering may be required within the pipe trench to create a dry working environment. Dewatering from the excavations will be managed as required to assist with creating a dry working environment and prevent water flooding the construction site. Construction water will also come from localised pumping of surface water run-off, rainfall, and groundwater ingress in the pipeline trench and launch/receiver shafts during and after heavy rainfall events.

6.4.1.6 Interaction with Flood Zones

Sections of the pipeline route intersect areas identified as being within Flood Zones A and B, most notably at the Yellow River (RVX02) crossing. Construction characteristics relevant to flood risk management include:

- Avoidance of topsoil stripping within designated flood zones where practicable;
- Use of trenchless construction beneath river channels in flood-sensitive areas;
- Use of bog mats and temporary haul roads where required to maintain ground stability; and
- Programming of works to minimise flood risk exposure.
- Berm works min height of 2m within Flood Zone A.

The implications of these characteristics for flood risk, surface water flow and sediment transport are assessed in the following sections of this chapter.

6.4.2 Operational Phase

The Proposed Development characteristics which relate to the hydrological and hydrogeological environment during operation are summarised below:

- Currently, there is no artificial drainage infrastructure within the length of the pipeline route. The site is characterized predominantly as greenfield grassland and hedgerow, therefore at present drainage is predominantly via overland flow to drainage ditches, streams and river watercourses which flow adjacent to or traverse to the site boundary, coupled with drainage to ground whereby surface water and rainfall, is generally percolated to ground through the site via infiltration to grass and soil under the influence of gravity. Drainage along road crossings within the site typically involves overland flow to roadside ditches or gulleys. Given that all trenches established throughout the pipeline to facilitate the proposed pipeline will be fully backfilled and reinstated, drainage along the bulk of the route during the operational phase will persist as it currently/presently does.

- The proposed underground gas transmission pipeline does not require an operational surface water drainage design, water supply, or wastewater demand.
- There are no new connections potable water or foul water proposed.
- The GNI 143 Ballykilleen Pipeline will not alter the existing hardstanding areas, as all trenches established through roads to facilitate the proposed pipeline will be fully backfilled and reinstated).
- There will be additional hardstanding at the Ballykilleen AGI compound located at the southern end of the pipeline and the Kilwarden Offtake Installation at the northern end of the pipeline. This addition of hardstanding will result in minor localised increased in surface water generation and runoff rate which will drain to the adjacent land and to ground.
- There incorporation of additional hardstand areas at the Ballykilleen AGI and Kilwarden Offtake Installation will lead to a resultant minor localised decrease in recharge to the aquifer due to the Proposed Development.
- The Kilwarden Offtake Installation drainage system will allow for removal of surface water from areas of hardstand. A 7.2 m × 3.25 m × 1.6 m soakaway pit will be constructed in the southeastern corner of the compound to facilitate infiltration and manage surface water runoff, this soakaway overflows to an existing drainage ditch along the laneway used to access the site.
- The proposed Ballykilleen AGI will include a concrete standing area, internal access routes, and a site drainage system connected to the existing Edenderry Renewable Energy Complex stormwater drainage network, in line with agreement between GNI and Bord na Móna. This system will drain stormwater through the existing stormwater drainage network and discharge to the Figile River.
- There is no required bulk diesel store on site.
- There is no requirement for abstraction of groundwater during operational phase.
- Given the nature of the pipeline itself and its purpose for gas transmission, it does not involve foul effluent.
- There is no abstraction of surface water and no new connections potable water proposed, therefore no potential impacts on surface water resources.

6.5 Potential Impacts of the Proposed Development

This section details the potential impacts to hydrology (surface water) and hydrogeology (groundwater) associated with the Proposed Development. As outlined below the activities required for the construction phase of the Proposed Development represents the greatest risk of potential impact on the hydrological and hydrogeological environment. These activities primarily pertain to the site preparation, enabling works, excavation and infilling activities required to facilitate construction of the Proposed Development.

An analysis of the potential impacts of the Proposed Development on the hydrological and hydrogeological environment during the construction and operation phases is outlined below. Due to the inter-relationship between land, soils and geology with hydrogeology and hydrology the following impacts discussed will be considered applicable to both Chapter 5 and Chapter 6 of the EIA Report. Remediation and mitigation measures included in the design of this project to address these potential impacts are presented in Section 6.6 of this EIA.

6.5.1 Construction Phase

6.5.1.1 Potential Impacts on Surface Water and Groundwater Quality

6.5.1.1.1 General construction activities and pollution risk (earthworks, trenching, compounds, refuelling, welfare)

There is potential for run-off water or groundwater to become contaminated with pollutants released associated with or during construction activity. If a spill occurs and is not mitigated, contaminated water and collected surface water run-off which arises from construction sites can pose a short-term / temporary risk nearby watercourses and the underlying aquifers.

During construction of the development, the potential of contamination is associated with the following sources:

- Suspended solids (muddy water with increased turbidity (measure of the degree to which the water loses its transparency due to the presence of suspended particulates)) – arising from excavations, top and sub soil stripping, and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons and other construction chemicals (ecotoxic) – accidental spillages from construction plant or onsite storage, stored fuels, oils, and materials;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms. Construction phase sewerage will be contained in a tank and taken by tanker off site for disposal at a licensed waste management facility.

Land clearing, earthworks and excavations will necessitate the removal of vegetation cover and the excavation of soil and subsoils. As a result, there is potential for run-off water to become contaminated with pollutants/silt released during construction activity. In the absence of mitigation, rainfall runoff, dewatering water, and hydrostatic testing water generated during the construction and commissioning phases may contain elevated levels of suspended solids or become contaminated by pollutants associated with construction activities. Increased suspended sediment loads in runoff can lead to higher turbidity in receiving waters, which may reduce light penetration, impair aquatic habitats, and affect downstream water quality. Elevated turbidity can also clog infiltration pathways, reducing local soil permeability and potentially altering recharge dynamics to the underlying aquifer.

There is also the potential risk of unintentional discharge from construction traffic or stored materials like fuels and oils which could have negative impacts on both surface waters on-site and downstream from the site and the underlying groundwater. Moreover, construction activities often involve the use of chemicals, such as paints, adhesives, solvents, and pesticides, which can also pose a risk of contamination if not handled and disposed of properly. These chemicals can seep into the soil or be carried by rainwater or other runoff, ultimately contaminating surface water.

Construction activities may also involve chemicals such as paints, adhesives, solvents, and curing agents, which can leach into soils or be mobilised by rainfall runoff. If these substances enter surface water or groundwater, they can degrade water quality and pose ecological risks. Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora.

Accidental discharges can also occur from welfare facilities during construction. Wastewater from these facilities may contain bacteria, chemicals, and organic matter, which could contaminate nearby water sources if improperly managed. However, the use of sealed containment systems for welfare facilities ensures that there are no significant risks, and therefore no additional mitigation is required.

There is low potential for groundwater to become contaminated with pollutants. There is minimal risk of aquifer contamination due to the predominant cohesive (low permeability) nature and thickness of soil cover present across the site providing a natural level of protection to accidental discharges or spillages during the construction phase. Additionally, all excavated material for the pipeline route trenches is backfilled and fully reinstated, thereby ground conditions will remain largely unchanged from its original state.

The relatively shallow depth of excavation required for the majority of the development reduces potential for groundwater to become contaminated with construction related pollutants by accidental spillages or leaks. Excavations are predominantly anticipated to extend to approximately 1.5-2.5m below ground level (mbGL) for the pipeline installation. For the larger crossings, a horizontal directional drilling (HDD) method will be used to a maximum depth of 22m.

However, the majority of the pipeline will be installed by an open cut method. There will be an area of approximately 20-30m that will be stripped prior to the excavation for the pipeline. For the Kilwarden offtake, the excavation is expected to be approximately 10m by 10m and at a depth of 3 to 3.5mbGL.

Due to the historical greenfield use at the site and lack of extensive contamination encountered by site (IGSL) investigations (only some minor exceedances, refer to Chapter 5 Section 5.3.7 for further information on exceedances), the risk of extensive contaminated groundwater being present throughout the site is largely considered low.

In the absence of mitigation measures the potential impacts during the construction phase on surface water quality and groundwater quality are ***negative***, ***slight and short term***.

6.5.1.1.2 Open-cut watercourse crossings (in-channel works)

During the proposed open-cut watercourse crossings, construction activities will involve direct disturbance of the watercourse bed and banks. These in-channel works have the potential to mobilise fine sediments and disturbed materials into water, resulting in an increase in suspended solids and turbidity within the watercourse.

Disturbance of the bed and banks during excavation, fluming, temporary damming and reinstatement works can accelerate localised erosion and lead to the downstream transport of sediments. Elevated turbidity can reduce light penetration within the watercourse, adversely affecting aquatic vegetation, and may also cause clogging of fish gills and smothering of habitats.

In addition to sediment release, there is a potential risk of contaminants entering the watercourse during opencut crossings. Fuels, oils, lubricants, concrete residues, and other construction related substances may be inadvertently released during instream works or from plant operating in close proximity to the channel. Such releases could result in localised degradation of water quality and have short term adverse effects on aquatic fauna and flora.

Any deterioration in water quality arising at open-cut crossings has the potential to be conveyed downstream via surface water flow, potentially affecting downstream watercourses and receiving river systems. However, the spatial extent of such effects would be limited by dilution, dispersion and the short duration of the in-channel works.

Open-cut watercourse crossings are typically completed over a short period (generally a number of days), limiting the duration of disturbance. Nevertheless, due to the direct interaction with the watercourse bed and banks, these works represent a higher-risk activity in terms of potential impacts on surface water quality when compared to trenchless crossing methods.

In the absence of mitigation measures, there is the potential for ***negative, significant, brief effects*** (effects lasting less than a day) on surface water quality associated with open-cut watercourse crossings during the construction phase.

6.5.1.1.3 Temporary Structures at Watercourse Crossings

At locations where open-cut watercourse crossings are undertaken for pipeline installation, temporary culvert or flume crossings will also be required to facilitate construction vehicle access and movement of plant and materials. These temporary structures therefore occur at the same watercourse crossing locations and form part of the overall construction activity at each crossing point.

In addition, a temporary bridge structure will be installed over the Kilwarden River (RVX01). There will be no temporary structures or vehicle crossings at the Yellow River (RVX02) or Grand Canal (WCX23). Inland Fisheries Ireland, through statutory consultation, has requested that no fording of watercourses will be undertaken as part of the Proposed Development, due to the risk of uncontrolled sedimentation and adverse effects on fisheries habitat.

Temporary culvert or flume crossings installation and removal can involve disturbance of watercourse bed and banks which may give rise to mobilisation of sediments that can contribute to short-term increases in suspended solids and turbidity within the watercourse.

The temporary bridge (RVX01) avoids direct disturbance to the watercourse bed. A minimum 10m clearance from the riverbank except for approach roads/ramps. If the installation is not executed correctly, there is a potential risk of compromising the integrity and stability of the drain/stream banks during the bridge installation process. This could lead to erosion or destabilisation of the surrounding areas and potentially impact the aquatic habitat. The temporary bridge will remain operational for the duration of the construction works.

The temporary bridge does not involve the use of concrete. Instead, the bridge structure (precast concrete) will be supported by timber bogmats or similar. This approach eliminates the risk of concrete spillage into the watercourse, ensuring that the watercourse will remain unaffected by the typical risks associated with concreting operations.

There is also a risk of accidental release of fuels, oils or other construction related substances during the installation, operation or dismantling of temporary structures.

The installation and removal of temporary structures involve the highest potential interaction with the watercourse. Once installed, direct disturbance of the watercourse bed is eliminated. However, the structures themselves may create a risk to surface water quality through localised bank disturbance, and the potential for accidental release of contaminants from plant operating nearby.

In the absence of mitigation measures, there is the potential for ***negative, significant, brief effects*** (effects lasting less than a day) on surface water quality during the installation and removal of temporary structures, and ***negative, slight to moderate, short-term effects*** on surface water quality during the period in which temporary structures remain in place during construction.

6.5.1.1.4 Trenchless River / Watercourse Crossings

The GNI 143 Ballykilleen Pipeline will pass beneath the Kilwarden River (RVX01), Yellow River (RVX02), the M4 Motorway (RDX04) including the Aghnagillagh Stream (WCX02), and the Grand Canal (WCX23) using trenchless construction method. It is currently anticipated that trenchless construction techniques may also be used at other crossings and the contractor may opt for trenchless construction techniques if deemed more suitable. However, due to uncertainty of the methodology used at certain crossings, the assessment has been carried out as worst case scenario and crossings have been assessed as openc cut trenching as highlighted in Section 6.5.1.1.2. A minimum clearance of 1.6 m will be maintained between the pipeline and the true bed level of each watercourse or canal.

As the pipeline will be installed beneath the channel, no excavation or in-stream works are required, and there will be no direct disturbance of the river or canal bed, banks or sediments. There is therefore no direct physical pathway for construction activities to interact with surface waters at these locations.

There is a potential risk of groundwater becoming contaminated from drilling fluids, albeit this will be localised and contaminated water making its way to the surface with drilling spoils. If not contained and treated prior to discharge this contaminated can pose a risk to the hydrological environment.

Due to the absence of in-channel works, trenchless crossings avoid hydromorphological disturbance and eliminate direct contact with surface water during construction. Any potential effects on surface water quality or groundwater quality would be limited to indirect pathways associated with construction activities at the surface (e.g. runoff from works areas or accidental releases), and would not arise from interaction with the watercourse itself.

Given the physical separation between construction activities and the watercourses, any indirect effects on surface water or groundwater quality would be localised in extent and short-term in duration.

In the absence of mitigation measures, the potential impacts during the construction phase on surface water quality and groundwater quality associated with trenchless crossings are considered to be ***negative, slight, short-term***.

6.5.1.2 Potential Impacts on Surface Water and Groundwater Flow and Quantity

6.5.1.2.1 General construction activities (earthworks, trenching, compounds, dewatering, commissioning water)

Construction activities have the potential to temporarily influence surface water flow pathways and local drainage patterns through vegetation removal, ground compaction, excavation, and the establishment of temporary working areas. Localised changes in ground permeability and the introduction of compacted surfaces within temporary compounds and laydown areas may increase the rate and volume of overland flow during rainfall events, with potential short-term effects on local ditches and small drains that convey flow to downstream watercourses.

Land clearing, earthworks and excavations will be required for construction phase operations to facilitate site clearance, construction of the above ground compound, foundations and installation of services. This will include site levelling, construction, and building foundation excavation, this will necessitate the removal of vegetation cover and the excavation of soil and subsoils.

The gradual introduction of impermeable surfaces and the compaction of soils across the at the Kilwarden Offtake Installation and Ballykilleen AGI as a result of the land clearing and earthworks will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a slight increase in surface water run-off along with sediment loading, which could potentially impact local drainage in these localised areas if not adequately mitigated.

Where excavations encounter perched water or shallow groundwater, limited dewatering may be required to maintain a dry working environment. Dewatering (where required) can cause short-term localised drawdown in shallow groundwater in the immediate vicinity of an excavation, with discharge volumes potentially increasing local surface flows if released to ground or drainage features without control. Dewatering will be carefully controlled to prevent sediment entering watercourses in accordance with the contractor's Construction Environmental Management Plan (CEMP).

During commissioning, hydrostatic testing will require approximately 6,667,655 litres of water. The required water will be sourced from an existing supply either from nearby municipal supply point (mains water supply, local authority fire hydrants) or alternatively, abstraction from another water supply in private ownership from groundwater / surface water that is permitted and registered with the EPA under the European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018). In flow/quantity terms, the principal risk relates to the rate and location of any discharge (if discharged on-site), which could cause short-term localised overland flow or erosion if uncontrolled.

The increase in the rate and volume of direct surface run-off (rainfall, dewatering or the disposal of hydrostatic testing water) can result in increased sediment loading, scouring impacts local drainage and watercourse, and downstream impacts.

There are no significant surface water or groundwater abstractions proposed during construction, therefore no potential impacts on the existing surface water and groundwater regime.

There are no proposed permanent diversions of any drainage ditches or waterbodies as part of the Proposed Development.

Based on the lengthy hydrological distance, dilution factor, and low potential for vertical migration through predominantly moderate vulnerability, there is no likelihood of a significant impact on the surface water or groundwater flow in the river and groundwater waterbodies discussed in section 6.3.2.1.

In the absence of mitigation measures, the potential impacts on surface water and groundwater flow/quantity from general construction activities are ***negative, short-term*** and ***slight to moderate***.

6.5.1.2.2 Open-cut watercourse crossings (in-channel works)

Open-cut watercourse crossings require temporary isolation of the works area (typically via damming and fluming) to facilitate trench excavation and pipeline installation. These measures temporarily alter the local flow regime within the immediate crossing area and can create short-term changes in upstream/downstream water levels and velocities.

Clearing vegetation to facilitate these work may lead to the destabilisation of watercourse banks and/or the bed, rendering them more susceptible to erosion.

Temporary damming/fluming can also increase the potential for localised scour, bank erosion or sediment deposition if flows are constricted or redirected, particularly during higher flow conditions.

Open-cut crossings are typically undertaken over a short period (construction methodology indicates approximately 3–4 days per crossing), limiting the duration of flow disruption. Following completion, the channel is reinstated to its original profile and the flume/dams removed to restore normal flow conditions.

In the absence of mitigation measures, open-cut watercourse crossings have the potential to result in ***negative, significant, short-term effects*** on surface water flow.

6.5.1.2.3 Temporary Structures at Watercourse Crossings

At locations where open-cut crossings are undertaken, temporary culvert or flume crossings will also be required to facilitate construction vehicle access. These temporary structures remain in place for the duration of works at each crossing and can locally influence flow conveyance and channel hydraulics.

Temporary culverts/flumes, if undersized or improperly installed, can constrain flows potentially leading to localised ponding upstream, increased scour downstream, or bank erosion around the structure. The temporary damming can alter water flow and potentially lead to sediment buildup and erosion.

A temporary bridge structure is identified in the construction methodology for use at the Kilwarden River (RVX01) to facilitate construction access. The bridge structures avoid direct interaction with the river, but works associated with approaches/abutments can still affect bank stability.

Clearing vegetation may lead to the destabilisation of watercourse banks and/or the bed, rendering them more susceptible to erosion. The act of removing vegetation can also bring about changes in the flow patterns of the water, triggering or expediting erosion along the banks or bed.

In the absence of mitigation measures, there is potential for ***negative, significant, brief effects*** on flow conditions during the installation and removal of temporary structures, and ***negative, slight to moderate, short-term effects*** on local flow conveyance during construction.

6.5.1.2.4 Trenchless River / Watercourse Crossings

Trenchless crossings (e.g. HDD/auger boring) will be used at key crossings including the Kilwarden River (RVX01), Yellow River (RVX02), Grand Canal (WCX23) and Aghnagillagh Stream (WCX02) (associated with the M4 Crossing (RDX04)), with the pipeline installed beneath the channel at depth. No in-channel excavation is required, trenchless crossings avoid temporary damming/fluming and do not directly disturb the bed or banks.

The trenchless crossings do not directly alter surface water flow within the watercourse and do not create a hydraulic constriction within the channel. Any potential influence on flow/quantity would be limited to indirect, temporary surface activities (e.g. short-term runoff management), rather than changes to the channel itself.

During deep drilling using HDD, groundwater will be encountered which will be brought back to the surface with arising, however, it will be a miniscule volume of water which will not alter the flow or quantity of the underlying aquifer systems given the size of the groundwater bodies along the Proposed Development.

In the absence of mitigation measures, the potential impacts on surface water flow and quantity associated with trenchless crossings are considered ***negative, slight,*** and ***short-term.***

6.5.1.2.5 Potential Risks Associated with Flooding and Flood Risk

During the construction phase of the Proposed Development, temporary works, excavation activities have the potential to influence surface water flow paths and flood conveyance in proximity to watercourses and mapped floodplains.

Construction activities at the Ballykilleen AGI site will involve earthworks. If undertaken without appropriate design controls, these activities could increase susceptibility to flooding during rainfall events or result in surface water accumulation on site. A site specific flood risk assessment has been undertaken by JBA consulting and is included with the application documentation.

There is a potential for impact of flooding in the vicinity of Yellow River and Boyne Tributary which falls under Flood zone A and B during construction activities. Mitigation measures have been proposed in Section 6.6.1.7 to manage the flood risk to the areas of the site located in Flood Zone A & B.

In the absence of mitigation measures, construction-phase activities have the potential to result in ***negative, slight to moderate, short-term impacts*** on surface water flow and local flood conditions during periods of high rainfall or elevated river levels.

6.5.1.1 Potential Impacts on Designated Areas

6.5.1.1.1 River Boyne and River Blackwater SAC/SPA

The site currently has a hydrological linkage / connection to the downstream / downgradient River Boyne & River Blackwater SPA (minimum 6.2 km east/northeast of the site) via overland flow, direct runoff and baseflow contributions to the numerous river waterbodies / streams / drainage ditches which traverse the site (mentioned / listed above in Section 6.3.2.1) and convey flow to the Boyne River waterbody which in turn, ultimately discharges / outfalls. The River Boyne & River Blackwater SPA. Albeit this source pathway linkage exists, it involves a significant pathway distance allowing for significant attenuation and a large dilution factor downstream in the catchment (multiple tributaries traversing the site and feeding into the Boyne River).

Currently, the site has a no potential for a hydrogeological (groundwater) connection to downstream / downgradient River Boyne & River Blackwater SPA listed above in section 6.3.6, due to the distance of separation (minimum 6.2km east) being greater/larger than the distance of local underground flow paths within the multiple aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the majority of overburden, which is characteristic of cohesive glacial clays, thereby further reducing/decreasing the potential for a hydrogeological linkage pathway to the sensitive receptors. While some higher permeability granular deposits (e.g. Gravels and alluvium) exist, these are discontinuous and confined by the surrounding cohesive Till deposits which, combined with the predominant moderate vulnerability (5-10m+ overburden thickness) negates the potential of offsite vertical and lateral migration.

No likely exceedance of surface water or groundwater threshold concentrations at the River Boyne & River Blackwater SPA is likely based on the loading, pathway (over burden thickness, cohesive/low permeability type, local flow paths and low fracture connectivity within the aquifer) together with attenuation and dilution (contribution of other tributaries downstream within the pathway prior to discharge to the SPA.

Without the consideration of mitigation measures, the construction phase of the Proposed Development will likely have a , moderate to significant and short-term impact on the S-P-R linkage with the River Boyne & River Blackwater SPA.

Therefore, in the absence of mitigation measures the potential impacts during the construction phase on River Boyne and River Blackwater SAC/SPA are ***negative***, ***moderate to significant*** and ***short term***.

6.5.1.1.2 River Nore and River Barrow SAC

The site also currently has direct hydrological pathway linkage to the downstream / downgradient River Nore & River Barrow SAC (16.1km south) via the Ballykilleen Stream which traversed the pipeline route and joins / merges with the Figile river which subsequently flows south for 16.1 km prior to discharge to the SAC. This represents an indirect hydrological Source-Pathway-Receptor linkage to River Nore & River Barrow SAC, albeit via a lengthy pathway distance allowing for significant attenuation and significant level of dilution within the attenuation (drainage design) and downstream in the catchment of the Figile River.

At present, the site has a no potential for a hydrogeological (groundwater) connection to the downstream / downgradient River Nore & River Barrow SAC listed above in section 6.3.6, due to the distance of separation (minimum 16.1km south) being greater/larger than the distance of local underground flow paths within the multiple aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the majority of overburden, which is characteristic of cohesive glacial clays, thereby further negating the potential for a hydrogeological linkage pathway to the sensitive receptors. While some higher permeability granular deposits (e.g. Gravels and alluvium) exist, these are discontinuous and confined by the surrounding cohesive Till deposits which, combined with the predominant moderate vulnerability (5-10m+ overburden thickness) negates the potential of offsite vertical and lateral migration.

No likely exceedance of surface water or groundwater threshold concentrations at the River Nore & River Barrow SAC is likely based on the loading, pathway (over burden thickness, cohesive/low permeability type, local flow paths and low fracture connectivity within the aquifer) together with attenuation and dilution within the pathway prior to discharge to the SAC

Without the consideration of mitigation measures, the construction phase of the Proposed Development will likely have a neutral, imperceptible and short-term impact on the S-P-R linkage with the River Nore & River Barrow SAC. Therefore, in the absence of mitigation measures the potential impacts during the construction phase on River Nore and River Barrow SAC are ***negative***, ***slight*** and ***short term***.

6.5.1.1.3 Mount Hevey Bog SAC

The main hydrogeological risk to the Mount Hevey Bog (located c. 20m north of the offtake installation location at Section 1) arises from uncontrolled surface water runoff during construction phase, which could transport sediments or contaminants into nearby drainage features and surface waters if not appropriately managed. The risk of significant impacts to the underlying bedrock aquifer is considered low, given its poor productivity and the protection afforded by cohesive deposits overlying the limestone. However, the shallow groundwater table increases potential interaction with construction works, particularly at the offtake excavation area (Minerex Environmental Limited (MEL), 2026). Please refer to the Hydrological Impact Assessment Report in Appendix 6.2 of Volume 3.

The site has no hydrological pathway linkage / connection to the Mount Hevey Bog SAC, as this natura 2000 conservation site is located hydrologically upgradient / upstream of the Proposed Development site.

6.5.1.1.4 Other sites

The Grand Canal traverses / intersects the site at chainage Section 5, however the Grand Canal is a fully lined and contained feature, therefore negating any hydrological or hydrogeological connectivity or pathway to this waterbody.

The Long Derries, Edenderry SAC is located *hydrologically* upgradient / upstream of the subject development site and thus no potential to be impacted by the Proposed Development. At present, the site has a no potential for a *hydrogeological* (groundwater) connection to the *downstream / downgradient* Long Derries, Edenderry SAC, due to the distance of separation (minimum 3.8 km east) being greater/larger than the distance of local underground flow paths typical of the aquifers beneath the site.

Therefore, in the absence of mitigation measures the potential impacts during the construction phase on Grand Canal pNHA and Long Derries, Edenderry SAC are ***negligible***, ***imperceptible*** and ***short term***.

6.5.1.2 Potential Impacts on Human Health and Populations

A reduction in surface water or groundwater quality via unmitigated pollutants entering the adjacent drainage ditch, stream or downstream surface waterbody or entering the soil and migrating to the underlying aquifer / GWB has the potential to lead to negative impacts on human health and populations if a pathway existed.

Hydrocarbons and petroleum products for example have the greatest risk for human health when they are in drinking water. Furthermore, humans can also be exposed to petroleum hydrocarbons or other contaminants by inhaling the fumes / dust from contaminated groundwater / surface water (or soil). Depending on the type of contaminant and the level of exposure, soil contamination can have serious health implications.

The site is not located near any public groundwater supplies or group schemes. As previously mentioned, there are no groundwater source protection zones, Groundwater Drinking Water Protection Areas (Public Supply Source Protection Areas or Group Scheme Preliminary Source Protection Areas) in the immediate vicinity of the site. Given the separation distance between the Proposed Development site and the nearest groundwater source protection zones there are no potential impacts on groundwater source protection zones (proposed site is outside of the zone of contribution of this supply). Additionally, as there are no recorded recreational waters or bathing waterbodies, or surface water drinking RPA located downstream of the development, hence there is no potential for impacts on human health and populations.

However, it is noted that there are no recorded Recreational Waters, Bathing Waterbodies, or Surface Water Drinking RPA, located downstream in the environments.

There is no source pathway linkage to the underlying aquifer or any Public Drinking Water Supply scheme or Source Protection Zone (SPZ). The nature and thickness of soil cover present at the site provides a natural level of protection. No bulk oil storage is required during site operation.

While a portion of the Proposed Route Corridor runs within close proximity of the wider Edenderry town area, which is serviced by Local Authority potable water mains, the route is predominantly located in a rural setting and therefore there is a high probability that there are wells in the vicinity of the Proposed Route Corridor that are used for potable supply. However, these wells are potentially used for domestic purposes and the Proposed Development will not likely impact the groundwater regime due to the opted construction methodology and in turn no impact on these wells is foreseen.

No likely impact on the groundwater quality is foreseen due to low potential loading, and natural attenuation within overburden, reducing potential for off site migration.

Given this greenfield land has historically been utilized for agricultural purposes, the potential risk of extensive contamination is considered low.

Any contaminated / hazardous water encountered onsite will be removed from site and sent to a licenced treatment / disposal facility that accepts the corresponding soil classification / category, while clean soils maybe be reused onsite for backfill, reinstatement / landscaping. Therefore, on this basis in the absence of mitigation measures the potential impacts during the construction phase on human health and populations due to changes to the potential for contamination of soil and groundwater are ***negative***, ***slight*** and ***short term.***

There are minimal potential impacts during the construction phase on human health and populations due to changes to the hydrological environment

6.5.1.3 Potential Impacts on Water Framework Directive Status

There is a potential of accidental discharges during the construction phase (as set out in Section 6.5.1.1). However, these are temporary short-lived events that will not impact on the status of the underlying GWB aquifers, or listed river waterbodies in the long-term and will not impact on trends in water quality and over all WFD status assessment. As such the Proposed Development will not cause any significant deterioration or change in water quality status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

Therefore, there is no potential for impacts on water framework directive status based on the current understanding of the Proposed Development during construction.

Therefore, on this basis in the absence of mitigation measures the potential impacts during the construction phase on Water Framework Directive Status due to changes to the potential for contamination of soil and groundwater are ***neutral, imperceptible*** and ***short term.***

6.5.2 Operational Phase

6.5.2.1 Potential Impacts on Surface Water and Groundwater Quality

The Proposed Development will not involve abstraction of surface water or groundwater, generation of foul wastewater, permanent diversions of watercourses or drainage ditches, or the routine handling or bulk storage of fuels, oils or chemicals. Following reinstatement, the underground pipeline corridor will not give rise to any operational discharges or drainage modifications.

The only potential impact on surface water or groundwater quality arises from infrequent routine maintenance activities, and stormwater and surface water management.

6.5.2.1.1 Accidental Spills During Maintenance Activities

During maintenance activities, there is a likelihood of localised and minor accidental spillages associated with maintenance vehicles or equipment. There is limited potential for leaks or spills of petroleum hydrocarbons from during site maintenance activities during operation of the development; if unmitigated, such spillages could result localised contamination of surface water runoff or underlying soils.. These pollutants such as hydrocarbons that are a known carcinogen (cause cancer) in many animals and suspected to be carcinogenic to humans and changes in water pH in runoff water may result in adverse changes in water chemistry (dissolved oxygen content, biological oxygen demand etc).

In the absence of mitigation, the potential impacts on surface water and groundwater quality during the operational phase are assessed as ***neutral, imperceptible,*** and ***long-term.***

6.5.2.1.2 Stormwater and Surface Water Management

Surface water runoff arising from hardstanding areas associated with the Kilwarden Offtake Installation and Ballykilleen AGI will be managed through dedicated on-site drainage systems.

These designed systems measures to prevent uncontrolled discharge to ground or surface waters to ensure that runoff does not mobilise sediments or contaminants that could adversely affect surface water or groundwater quality.

These discharges will consist solely of uncontaminated stormwater arising from rainfall and under normal operating conditions.

Surface water runoff from access roads, car parking areas associated with above ground compounds can potentially contain slightly elevated levels of contaminants such as hydrocarbons which will be collected within on-site drainage and treated with no resultant impact on the local hydrological surface water network.

In the absence of mitigation, the potential impacts on surface water and groundwater quality during the operational phase are assessed as ***neutral, imperceptible,*** and ***long-term.***

6.5.2.2 Potential Impacts on Surface Water and Groundwater Flow and Quantity

During the operational phase, the Proposed Development will not involve abstraction of surface water or groundwater, permanent diversions of watercourses, or routine discharges that could alter existing hydrological or hydrogeological regimes.

During operation, the Proposed Development will not involve abstraction of surface water or groundwater and will not result in permanent alterations to watercourses, drainage networks or catchment flow regimes. Following reinstatement, the underground pipeline will not alter surface water runoff patterns or groundwater flow along the pipeline corridor.

6.5.2.2.1 Stormwater and Surface Water Management

Minor localised hardstanding associated with the Kilwarden Offtake Installation and Ballykilleen AGI will result in a localised reduction in groundwater recharge at those locations. While this reduction provides additional protection to the underlying aquifer, it also marginally reduces recharge in the immediate area. However, given the limited extent of hardstanding relative to the overall aquifer area, this reduction will not result in any significant change to the natural hydrological or hydrogeological regime.

Surface water runoff from hardstanding areas will be conveyed via soakaway and attenuation infrastructure, ensuring controlled discharge and preventing localised flooding or changes to downstream flow regimes.

The drainage at the Kilwarden Offtake Installation connects to a soakaway pit, and the at the Ballykilleen AGI stormwater drainage will connect to an attenuation pond located within the Edenderry Renewable Energy Complex. Therse systems ensure ensuring controlled discharge and preventing localised flooding or changes to downstream flow regimes.

In the absence of mitigation, the potential impacts on surface water and groundwater flow and quantity during the operational phase are assessed as ***neutral, imperceptible,*** and ***long-term****.*

The drainage at the Kilwarden Offtake site (northernmost point of the pipeline) connects to a soakaway pit.

During the operational phase, the gas transmission pipeline is underground. All temporary construction works will be fully removed on completion of construction and commissioning. The pipeline working

corridor will be fully reinstated to its original ground levels, restoring pre-construction permeability. As a result, there will be no permanent alteration to surface water flow paths, or floodplain storage along the pipeline route. No new hardstanding or impermeable surfaces will be introduced along the pipeline corridor that could increase surface water runoff rates or volumes.

The CFRAM study indicates that majority of the Proposed Development is within Flood Zone C with the only section within Flood Zone A/B is the section that will traverse the Boyne tributary. All remain Flood Zone A & B areas that intercepts the pipeline are retained within the stream banks. All development located in Flood Zone B will be installed underground, and all associated construction works are located in Flood Zone C. At the Kilwarden AGI, finished ground levels will be raised above the relevant design flood levels, with appropriate freeboard.

The section of the pipeline located under the Boyne Tributary and within its general floodplain is located within Flood Zone C based on the JBA flood maps. i.e. there is a low risk of inundation.

The risk from fluvial flooding on the site is negligible. Following construction ground levels and conditions will be returned to their condition prior to construction. This will result in no change to flood extents and therefore flood risk will remain negligible.

According to JBA (2026) there will be no impact or change to the existing above ground environment that could result in a change to fluvial or surface water flood extents upon installation of the gas pipeline. The pipeline will be installed 1600mm below the riverbed level. This depth is based on the industry standard safe installation depth of 1.5x the sleeve diameter below the riverbed. It is currently an indicative depth pending further ground investigation and more detailed analysis of groundwater flow and the water table. A final depth will be confirmed at the detailed design stage.

The pipeline will have an internal diameter of 200mm and under the river crossing this will be installed with a 600mm concrete sleeve which is an impermeable layer. Elsewhere the pipeline will be laid in a trench. Best practise should be ensured so that the sleeve joints are sealed and that any gaps between the sleeve and surrounding ground material are plugged with appropriate impermeable material. Similarly, any trench would need to be sealed at appropriate intervals. Adopting these best practise measures will prevent groundwater or permeating surface water from transmitting along the length of the pipeline and instead flow paths will travel around the structure and continue as before. This will result in no change to the groundwater flow regime. The sleeve is also a protective feature that will prevent impacts from hydrostatic pressure from flood water (JBA Consulting, 2026).

There will be no impact or change to the existing above ground environment that could result in a change to fluvial or surface water flood extents upon installation of the gas pipeline. As the pipeline will be installed underground there will be no new hardstanding areas or change to the existing ground levels. Excavated areas will be reinstated with subsoils and topsoil that will result in no change to the existing permeability. Existing environmental conditions will be maintained following construction such that there will be no impact on the pluvial flow paths. There will be no impact to groundwater due to the best practise installation methods employed on both the trench and drilled sections to ensure no transmissivity of groundwater along a preferential pathway. As the pipeline will be installed underground (with appropriate groundwater mitigation) it will not interfere with the predicted flood extents/ levels and therefore will not increase flood risk elsewhere in the catchment.

Climate change scenarios included in the CFRAM study indicate that there are some increases in flood extent due to climate change. As the pipeline is located underground, it specifically will not be impacted during a flood event once construction is complete.

There will be no impact or change to the existing above ground environment that could result in a change to fluvial or surface water flood extents upon installation of the gas pipeline. The type of development is classed as a 'Highly Vulnerable Development'. This type of development is deemed appropriate for this flood zonation.

Accordingly, the operational-phase effects on flood risk, surface water flow and groundwater flow and quantity are assessed as ***neutral, imperceptible,*** and ***long-term***.

6.5.2.3 Potential Impacts on Designated Sites

Once operational and reinstatement has occurred, the underground gas transmission pipeline will not alter the existing hardstanding areas that it will run beneath and will not result in any significant additional hardstanding or surface water generation or foul effluent.

In the absence of mitigation measures the potential impacts during the operational phase on the designated areas previously listed above in Section 6.3.4 are ***neutral, imperceptible,*** and ***long-term***.

6.5.2.4 Potential Impacts on Human Health and Populations

There is no potential for unmitigated off-site flooding as a result of the minor / slight localised increased hardstanding areas (associated above ground compound / pigging station location, offtake installation location / hot tap connection) and due to the flood risk at the site the Proposed Development has no potential to impact on human health, populations, and material assets, located downstream of the site.

There are no recorded recreational waters, bathing waterbodies, or surface water abstraction points located downstream of the Proposed Development site.

There are no recorded groundwater resource protection zones in the immediate area of the proposed site, i.e., zones surrounding a groundwater abstraction area. In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity. Additionally, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas in the vicinity of the Proposed Development site. There are no recorded source protection areas / Zones (SPZs, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution) or recorded groundwater resource protection zones. The nearest Group Water Scheme (Preliminary Source Protection Area Zone of Contribution) to the site is Ballykilleen (Zone of Contribution Unique ID IE_GSI_ZOC_37), which is located c. 600m to the east of the subject development site at the point of closest proximity. The subject development site is outside the zone of contribution for this supply.

In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity. The Public Water Supply / Public Supply Source Protection Area / Zone (SPZ) / drinking water protection area in closest proximity to the Proposed Development site is the EDENDERRY PWS (Source Protection Area Unique ID: IE_GSI_SPA_269), which is located c. 2.7 km east of the pipeline route beneath the townland of Edenderry (linear distance at the point of closest proximity). The subject development site is outside the zone of contribution for this supply.

Therefore, in the absence of mitigation measures the potential impacts during the operational phase on human health and population due to changes in the hydrological and hydrogeological environment are ***neutral, imperceptible,*** and ***long-term***.

6.5.2.5 Potential Impacts on Water Framework Directive Status

There are no long-term discharges planned which could have an impact on the status of the surface water body or underlying groundwater body. In the scenario of an accidental release (unmitigated leaks mentioned above in Section 6.5.2.1) there is potential for a temporary impact only which would not be of a sufficient magnitude to effect a change in the current water body status.

In the scenario of an unmitigated leak of fuel from car park areas and access roads during occasional maintenance (mentioned above in Section 6.5.2), these are temporary short-lived events that will not impact on the status of the local watercourses or the underlying groundwater body (GWB) in the long-term. As such the Proposed Development will not cause any significant deterioration or change in water quality status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

The Proposed Development has no foul loading / effluent generation, therefore the Proposed Development will have no impact on the overall water quality as a result of foul drainage within the local surface water network or the underlying aquifer as defined within the Water Framework Directive.

Therefore, in the absence of mitigation measures the potential impacts during the operational phase on water framework directive are ***neutral, imperceptible,*** and ***long-term***.

6.6 Mitigation Measures

The design has taken account of the potential impacts of the development on the hydrological environment local to the area where construction is taking place and containment of sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding water bodies.

These specific measures will provide protection to the receiving water (and soil) environments during the construction phase. These are work practices that are industry best practice measures that will be applied during the construction phase, and they are in no way included to avoid or reduce potential harmful effects to European sites.

6.6.1 Construction Phase

AWN Consulting and the project team have prepared an Outline Construction Environmental Management Plan (CEMP) (2026) that as Appendix 2.2 to this EIAR. This outlines and explains the construction techniques and methodologies which will be implemented during construction of the Proposed Development.

The main purpose of a CEMP is to provide a mechanism for implementation of the various mitigation and monitoring measures which are described in the EIAR. The CEMP demonstrates the applicant's commitment to implementing the Proposed Development in such a way as to avoid or minimise the potential environmental effects arising from construction activities.

Construction works and the proposed mitigation measures are informed by best practice guidance on the prevention of pollution during development projects including but not limited to:

- BS 5837/2012. Trees in relation to design, demolition and construction;
- BS 3998; 2010. Tree Work. Recommendations;
- CIRIA (2001). C532. Control of water pollution from construction sites. Guidance for consultants and contractors;
- CIRIA (2006). C648. Control of water pollution from linear construction projects. Technical Guidance;
- CIRIA (2008). C679. Invasive species management for infrastructure managers and the construction industry.;
- CIRIA (2015). C741. Environmental Good Practice on Site;
- CIRIA (2015). C753. The SuDS Manual;
- Environmental Protection Agency (2021). 'Best Practice Guidelines for the preparation of resources & waste management plans for construction & demolition projects';
- Invasive Species Ireland (2016). Best Practice Management Guidelines. Japanese knotweed;
- NRA (2005a). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes;

- NRA (2005b). Guidelines for the Treatment of Badger Prior to the Construction of National Road Schemes;
- NRA (2008). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes;
- NRA (2006). Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes; and,
- NRA (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant
- Species on National Roads (Revision 1).
- Sustainability & Environmental Appraisal (March 2020) LA 120 Environmental management.

The CEMP will be implemented and adhered to by the construction Contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures.

The CEMP sets out the proposed procedures and operations to be utilised on the proposed construction site. All mitigation measures outlined here, and within the CEMP will be implemented during the construction phase, as well as any additional measures required pursuant to consent conditions which may be imposed.

During the project planning phase, a further detailed emergency response plan will be developed by the construction contractor as part of the CEMP. This plan will outline a well-defined procedure for effectively managing emergencies as they arise. Furthermore, it's imperative to disseminate this emergency protocol to all site personnel during the site induction process. This plan will include for events such as:

- Pollution incidents: These may involve spillages, the malfunction of temporary structures, embankment collapse, acts of vandalism, fires, and other related events.
- Extreme weather occurrences: Events such as heavy rainfall, flooding, are important factors to consider due to their potential impact on the construction process.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained and informed in the implementation of the procedures.

All mitigation measures outlined here, and within the CEMP will be implemented during the construction phase, as well as any additional measures required pursuant to planning conditions which may be imposed.

6.6.1.1 Mitigation of General Construction Activities

The mitigation measures set out below address the potential impacts on surface water and groundwater quality identified in Section 6.5.1.1.1, as well as the potential impacts on surface water and ground water flow and quantity identified in Section 6.5.1.2.1.

Sediment Control Plan (SCP)

The appointed contractor(s) will develop a works specific Sediment Control Plan (SCP), which will form part of the CEMP (the principles of which are detailed here), in advance of any construction activities commencing. The reduction and prevention of suspended solid pollution will be required during all elements of construction.

The following mitigation measures will be implemented as part of the SCP during the construction phase in order to manage the potential impact associated with excavation, stockpiled materials, and reducing sediment runoff at source.

- Prior to commencement of construction the appointed contractor(s) will prepare and adhere to a method statement identifying the extent of the areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.
- The appointed contractor(s) will identify pathways of preferential flow within the project area and implement suitable mitigation measures to ensure contaminated water from the sites is treated before being released into any watercourse. Pathways of preferential flow are influenced by the site's topography and are subject to change as works are undertaken. Consequently, the appointed contractor(s) will need to determine these pathways on site and agreed with the Ecological Clerk of Works (EcoW).
- Clean water will be kept separate from contaminated water to reduce the volume to be treated. Any surface water run-off collecting in excavations will likely contain a high sediment load. This will not be allowed to directly discharge to any stormwater sewer, drainage ditch or watercourse.
- Where works are required within designated flood zones, topsoil stripping will be avoided where practicable, and trenchless construction methods will be employed where feasible to minimise sediment disturbance and migration.
- To further support environmental protection measures, the contractor shall deploy bog mats along the construction running track in designated flood zone areas. These mats will be placed directly on top of the existing topsoil to minimise ground disturbance and prevent sediment from entering adjacent watercourses.
- To prevent rainwater from inundating the construction area through the open pipeline trenches, running track, cut-off drains / interceptor ditches will be installed to intercept uncontaminated surface water and prevent it from entering the work zone.
- Run-off velocities and erosive energy will be reduced by extending the lengths of flow paths for rainwater run-off, building interceptor ditches and channels, and lining steep, unavoidable interceptors or conveyance channels with low-gradient designs to minimise secondary erosion. Additionally, ditches will be lined with filter fabric, rock, or polyethylene to prevent channel erosion.
- Designated areas for stockpiling excavated material will be identified >50 m distance from the Yellow River and Kilwarden River and >20 m distance from any other surface water body. Silt fences will be installed around stockpiles to limit movement of entrained sediment in surface water runoff. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- During earthworks and excavation works care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.
- Hard surface site roads and public roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential site traffic only.
- A stabilised entranceway consisting of an aggregate on a geotech mesh/fabric base that will be located at any entry or exit point of the construction site. Aggregate will be established at the site entrance points from the construction site boundary extending for at least 10 m.
- Depending on the soil conditions, haul roads will be stabilised utilising materials such as crushed rock, gravel and a layer of geotextiles to improve load-bearing capacity and prevent deformation under heavy traffic. Sediment produced, as a result of the construction processes, will be contained from entering nearby watercourses using a combination of settlement ponds and silt fences. Regular maintenance, including grading, resurfacing, and drainage management, is required to keep hauls road in good condition during the works.
- Dust suppression measures (e.g. damping down during dry periods), power washing facility or wheel cleaning facility, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.
- Silt fencing will be installed along the working area adjacent to any rivers and watercourses, during the construction phase, to ensure no silt entry to the adjacent surface waters. Silt fences will be a permeable woven geotextile fabric (Hy-Tex Terrastop Premium silt fence, or similar) and not a mesh. The silt fences will be positioned to allow an appropriate working area. The silt fencing will be installed as per manufacturer's guidelines.

- Monitoring of the effectiveness of the silt fences will be undertaken and maintenance of the fence will be undertaken if it comes into disrepair or significant amounts of silt begin to build up. Once the construction phase is complete, all fencing will be removed and disposed of to a licensed waste facility.
- Excavation works will not be carried out during or following heavy rainfall (extreme weather events).
- No unnecessary tracking or excavating in grassland/vegetated areas will occur (to prevent sediment laden run-off).
- Excavations will remain open for as little time as possible before placement of fill and be revegetated and remediation as soon as practicable.
- Reinstatement and revegetation will be carried out as soon as practicable after pipeline installation and commissioning is completed.
- The proposed construction berm constructed within the Flood Zone A will provide protection against the predicted 1% AEP flood event. Once constructed, the berm will be covered with a suitable geotextile layer across the berm surface, to reduce the mobilisation of suspended solids during flood or rainfall events.
- Additional remediation works and recontouring activities may be necessary following the completion of the primary works, especially after periods of heavy rainfall. These post-completion measures aim to ensure the stability and success of revegetation. Remediation may involve addressing any erosion or sediment displacement that has occurred due to the rainfall.
- Regular inspection of surface water run-off and sediment control measures will be carried out during the construction phase. A log the regular inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

Management of Construction Surface Water

The discharges of groundwater, surface water, hydrostatic testing water, water arising from trenchless construction works, or precipitation ('construction water') from the construction site will be managed and controlled for the duration of the construction works. Construction water that contains a high sediment load and potential for other pollutants will require removal. All discharges to surface waters will be suitably treated prior to discharge. There will be no direct discharge of untreated, silty, or contaminated water from any element of the works without appropriate treatment, attenuation, settlement and silt trapping.

The control and treatment measures for construction water to be implemented include minimisation and mitigation measures set out below:

- Construction working areas, compounds, laydown areas and access routes will be restricted to the minimum extent required to reduce soil compaction and disturbance of natural drainage.
- Temporary drainage features, including interceptor drains and cut-off ditches, will be installed upslope of excavation and working areas to intercept clean surface water and prevent increased inflows to construction areas.
- Temporary hardstandings and compacted areas within compounds will be designed with controlled drainage to prevent uncontrolled surface runoff.
- No permanent diversion, infilling or obstruction of existing drainage ditches or watercourses will occur as part of the Proposed Development.
- Existing drainage pathways will be maintained throughout construction, with temporary crossings installed where required to maintain flow continuity.
- During construction, surface waters drainage, including any excavation dewatering, will be treated to allow settlement prior to discharge.
- All surface water runoff will be intercepted and directed to the appropriate on-site treatment system for the removal of pollutants prior to discharge. Clean water from compound roofs etc will be kept separate from contaminated water to reduce the volume to be treated.
- A staged treatment system (treatment-train) will be in place during construction works that will ensure the quality of the discharge water is maintained and will comprise hydrocarbon interception for removal of petrol/diesel, settlement tanks for silt removal, and pH balancing (as required). Final treatment will

be via appropriately sized silt bags or silt socks, allowing water to settle out or filter before discharge. Used silt bags will be disposed of in an environmentally appropriate manner.

- The level of suspended solids in any direct discharges to fisheries waters as a consequence of construction works shall not exceed 25 mg/l of suspended solids, nor result in the deposition of silts on gravels or any element of aquatic flora and fauna (as per IFI (2016) Guidelines).
- Regular inspection of the staged treatment system and discharge quality will be carried out during the construction phase. A log of the regular inspections will be maintained, and any exceedance of 25 mg/l of suspended solids will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.
- Whenever possible, water pumped out from excavations will be discharged onto permeable vegetated areas after undergoing sediment removal through filtration.
- When discharging clean water into watercourses, measures like baffles, geotextiles, sediment mat, or riprap will be set up at the discharge point to avoid disturbing the watercourse. The design of the outfalls and the construction method statements for their installation shall be agreed with IFI prior to construction.
- Discharge to surface water (or storm sewer), or discharge to groundwater under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990.
- Should any discharge of contaminated construction water be required during the construction phase the discharge will be removed from site via road tanker or similar to a licenced / permitted facility.

Management of Hydrostatic Testing Water

- Water required for hydrostatic testing will be sourced from an existing supply either from nearby municipal supply point (mains water supply, local authority fire hydrants) or alternatively, abstraction from another water supply in private ownership from groundwater / surface water that is permitted and registered with the EPA under the European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018).
- The discharge of hydrostatic testing water will be carefully controlled with respect to rate, location and method, to avoid localised erosion, flooding or scouring.
- Where discharged on site, hydrostatic testing water will be released at controlled rates to vegetated areas or managed drainage systems following verification of water quality.
- Where necessary, hydrostatic testing water will be removed from site by tanker for appropriate disposal or re-use.

Control of Fuels, Oils, and Chemicals

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground of fuels and other construction chemicals and prevent any resulting to surface water and groundwater systems:

- All plant and machinery will be regularly maintained and serviced to minimise the risk of release of hydrocarbons. This will only be undertaken by qualified personnel
- Designation of bunded maintenance and refuelling areas on the Site;
- Provision of spill kit facilities across the Site strategically located in high risk areas;
- Where mobile fuel bowsers are used, the following measures will be taken:

    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump or valve will be fitted with a lock and will be secured when not in use;
    - All bowsers to carry a spill kit and operatives must have spill response training;
    - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be stored within temporary bunded areas, doubled skinned tanks or bunded containers to a volume of 110% of the capacity of the largest tank/container. Drainage from the bunded area(s) shall be temporarily diverted for collection and safe disposal.
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

These measures are consistent with CIRIA guidance on the control of water pollution from construction sites.

In addition to the measures above, all excavated materials will be visually assessed by suitably qualified persons for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Refuelling and maintenance of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area or within the construction compound (or where possible off the site) which will be away from surface water drains, a minimum 50m buffer zone will be adhered to. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

Control of Concrete

Where feasible all ready-mixed concrete will be brought to 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 storm water to the underlying subsoil.

Wash water from cleaning ready-mix concrete wagons and mixers will be contaminated. Wagons and mixers must be washed off-site or in a bunded, impermeable designated washout area. Washout to be removed off site and disposed of appropriately at a licenced facility or reused for concrete creation. Washout area is to be located as far away from the watercourse as is practicably possible.

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within any riparian or ecological buffer zone. Wash-outs will only be allowed to take place in designated areas with an impervious surface where all wash water is contained and removed from site by road tanker or discharged to foul sewer subject to agreement with Uisce Éireann.

Welfare Facilities and Materials Storage

Site welfare facilities will be established to provide sanitary facilities for construction workers on site. The appointed contractor(s) will ensure that sufficient facilities are available at all times to accommodate the number of employees on site. Welfare facilities will be situated >50 m distance from the Yellow River Kilwarden River, and Grand Canal, and >20 m distance from any other surface water body. Foul water from the offices and welfare facilities on the site will be contained within the portable toilets and collected by a licensed waste sewerage contractor.

Construction materials, including aggregates etc. will be stored >50 m distance from the Yellow River Kilwarden River, and Grand Canal and >20 m distance from any other surface water body, to prevent any blockage to flood water flow paths from occurring during high rainfall events.

All materials will be stored in compounds and will be stored in a manner that is safe and in line with best industry practice. Fuels and chemicals will be stored in an appropriately bunded area/with double skinned tanks.

Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent cross-contamination.

6.6.1.2 Mitigation of Impacts from Open-cut Watercourse Crossings

In combination with the general surface water and groundwater mitigation measures outlined above, the specific measures below will be implemented. The mitigation measures set out below address the potential impacts on surface water and groundwater quality identified in Section 6.5.1.1.2, as well as the potential impacts on surface water and ground water flow and quantity identified in Section 6.5.1.2.2.

- The working areas at each watercourse will be kept to the minimum area required to carry out the proposed works and the area should be marked out and cordoned off in advance of work commencement.
- No watercourse crossings by vehicles or plant (i.e. fording) will occur at any location along the pipeline route.
- Where access is required, temporary culverts and/or bridges will be installed to allow vehicles to cross watercourses, thereby mitigating disruption to both flow and water quality.
- No unnecessary tracking or excavating in grassland/vegetated areas will be avoided to prevent sediment laden run-off.
- Silt fencing will be installed along the working area adjacent to the watercourse, during the construction phase, to ensure no silt entry to the adjacent surface waters.
- Silt fencing will be embedded to ensure silt retention and deposition and be positioned a minimum of 5m from the watercourse.
- Clearance of surrounding grasses and riparian vegetation to facilitate installation of silt fencing will be avoided.
- Monitoring of the effectiveness of silt fencing will be undertaken, and maintenance will be undertaken if it comes into disrepair or significant amounts of silt begin to build up. Once the construction phase is complete, all fencing will be removed and disposed of to a licensed waste facility.
- Works to stream banks and instream works to be conducted during times of settled weather and low water flows. Working during times of heavy rainfall is to be avoided.
- Following the dewatering process but prior to initiating the construction activities, systematically extract the exposed bed material from sections that will undergo disruption, especially in areas where machinery will be operating.
- Excavated stream bed material will be stockpiled separately from all other material, in a designated area at least 15m from any watercourse. Once crossing works are complete, this material will be used to reinstate the stream bed to its original level.
- De-watering may be required within the trench for pipeline works. Should this be required, water will be discharged into a vegetated area at least 20m from any watercourse. Water will be discharged via a silt bag and/or settlement tank. Silt fencing will surround the discharge area.
- Prior to the commencement of works a photographic record of the existing condition of the watercourses before any construction activities commence will be undertaken. This documentation will serve as a reference point for reinstalment activities after the completion of works.
- The works area for the flume crossings will be isolated from surface water using sandbags or suitable containment methods to create a seal that span the full width of the watercourse. Heavy gauge plastic may be required in order to ensure a watertight seal is obtained. This keeps a stretch of the river dry and the water is transferred downstream of the works area through gravity fed flumes.

- Sufficiently large flume pipes will be sized to ensure they are capable of accommodation flood flow water volumes are inserted into the watercourses, respectively, ensuring they extend past the area of the proposed trench and running track.
- Following the dewatering process but prior to initiating the construction activities, the exposed bed material will be systematically extracted from sections that will undergo disruption, especially in areas where machinery will be operating.
- De-watering from the isolated stream bed and from within the trench during pipeline works may be required. Water within the contained area contaminated with suspended solids or other potential pollutants shall not be released directly to surface water. It will be pumped to a suitable treatment system before discharge into the downstream watercourse.
- No vehicles or machinery will cross the streambed.
- Once crossing works are complete, the previously excavated stream bed material will be used to reinstate the stream bed to its original level.
- Should riverbed material excavated be deemed unfit for reinstatement of the riverbed, stone of the same size and geology shall be sourced for reinstatement purposes.
- Prior to reinstatement and removal of the flume the work area will be re-watered to avoid sudden ingress of water causing erosion of the replaced bed or bank material.
- Works to stream banks and instream works to be conducted during times of settled weather and low water flows. Working during times of heavy rainfall will be avoided.
- Watercourse banks will be reformed to their original profile. Geocoir will be laid and secured to the newly profiled bank to avoid any risk of erosion or run-off during high intensity rainfall events. A fast growing, deep rooting grass seed mix will be spread along these banks, as well as native plants and fencing, as appropriate, and agreed with the landowner.
- Once the dams and flume are removed, the watercourse will be allowed to flow normally for the remainder of construction.
- Prior to reinstatement and removal of the flume the work area will be re-watered to avoid sudden ingress of water causing erosion of the replaced bed or bank material.

Regular review of the works area will be undertaken to ensuring effective mitigation of impacts associated with the temporary damming/fluming works by an Environmental Officer or the ECoW. Best practice guidance will be followed for the proposed works including Inland Fisheries Ireland 'Guidelines on protection of fisheries during construction works in and adjacent to waters' (IFI, 2016) and Transport Infrastructure Ireland's 'Guidelines for the crossing of watercourses during the construction of national road schemes' (TII, 2008).

6.6.1.3 Mitigation of Impacts from Temporary Structures at Watercourse Crossings

In combination with the general surface water and groundwater mitigation measures outlined above, the specific measures below will be implemented. The mitigation measures set out below address the potential impacts on surface water and groundwater quality identified in Section 6.5.1.1.3 as well as the potential impacts on surface water and ground water flow and quantity identified in Section 6.5.1.2.3

- Temporary structures at watercourse crossings will require consent from the Office of Public Works (OPW) under Section 50 of the Arterial Drainage Acts as per the OPW guidance set out in publication Construction, Replacement or Alteration of Bridges and Culverts: A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945. Rev. 201905-3.
- All temporary culvert, flume or bridge crossings of watercourses will be subject to written agreement with Inland Fisheries Ireland with respect to sizing, location, duration and timing.
- All temporary culverts and flumes will be sized to pass anticipated flows without causing upstream impoundment or downstream scour.
- Structures will be inspected regularly and maintained to ensure hydraulic capacity is maintained throughout their operational period.
- The temporary bridge at the Kilwarden River (RVX01) will span the channel and avoid direct bed disturbance, with abutments set back from the bank to preserve flow conveyance.

- Temporary structures will be removed following completion of works, and the channel reinstated to original flow conditions.

As part of the Section 50 consent process, OPW will assess the hydraulic capacity, alignment, installation methodology and flood conveyance of all proposed temporary structures to ensure that there is no impediment to the free flow of water, no increased flood risk, and no unacceptable risk of erosion or instability upstream or downstream of the crossing locations.

6.6.1.4 Protection of Watercourses and Fisheries Habitat

In accordance with guidance and recommendations issued by Inland Fisheries Ireland, no fording of watercourses by vehicles or plant will occur at any stage of the Proposed Development.

All temporary watercourse crossing structures will be subject to written agreement with Inland Fisheries Ireland in respect of their design, sizing, timing, duration and method of installation. Clear-span bridge-type structures will be prioritised where practicable. Where culverts or flumes are required, these will be designed to pass the full range of anticipated flows, including flood flows, without ponding, scour or alteration of stream hydraulics.

No instream works shall be undertaken without prior agreement with Inland Fisheries Ireland, and works within watercourses will be programmed to avoid sensitive fisheries periods, with instream works normally restricted to the July–September window unless otherwise agreed.

A precautionary approach to sediment control will be applied at all watercourse crossings, ensuring that there is no discharge of silt-laden water, concrete residues, hydrocarbons or other deleterious substances to surface waters. Measures will include fluming, isolation of works areas, staged settlement, silt fencing and reinstatement of channel beds and banks using natural materials.

Biosecurity measures will be implemented to prevent the introduction or spread of invasive aquatic or riparian species, including the cleaning of machinery and equipment prior to entering and leaving watercourse working areas.

6.6.1.5 Mitigation of Impacts from Trenchless River and Watercourse Crossings

In combination with the general surface water and groundwater mitigation measures outlined above, the specific measures below will be implemented. The mitigation measures set out below address the potential impacts on surface water and groundwater quality identified in Section 6.5.1.1.4, in addition to the migration set out in Section 6.6.1.1.

- A minimum vertical clearance of 1.6 m will be maintained between the pipeline and the true bed level of all watercourses and canals.
- Launch and/or reception points for trenchless drilling/excavations will be located a minimum of 10 m from the top of the watercourse bank, and outside riparian buffer zones and flood zones (A and B), except where not practicable due to site-specific engineering constraints.
- Welfare facilities will be situated a minimum of 50 m from the Yellow River, Kilwarden River and the Grand Canal, and a minimum of 20 m from any other surface water body.
- All construction plant, refuelling, maintenance activities, and material storage associated with trenchless crossings, will be stored a minimum of 50 m from the Yellow River, Kilwarden River and the Grand Canal, and a minimum of 20 m from any other surface water body.
- All drilling fluids (where used) will be contained within closed systems, with returns managed and removed off-site for disposal at a licenced / permitted facility.

6.6.1.6 Mitigation for Designated Sites

6.6.1.6.1 River Boyne and River Blackwater SAC/SPA

The Proposed Development has an identified hydrological pathway linkage to the River Boyne and River Blackwater SAC and SPA, via overland flow, direct runoff and baseflow contributions to multiple watercourses and drainage features which traverse the site and ultimately discharge to the River Boyne, and thereafter to the designated site. While this linkage involves a minimum pathway distance of approximately 6.2 km, with significant attenuation, dispersion and dilution occurring (from mixing in the channel and from contribution of other watercourse downstream) within the intervening catchment, the scale and linear extent of the construction works necessitate a precautionary approach.

To ensure the protection of the River Boyne and River Blackwater SAC and SPA, all mitigation measures set out in Sections 6.6.1.1 to 6.6.1.5 will be implemented for the duration of the construction phase.

In particular, these measures include, but are not limited to:

- Implementation of the Construction Environmental Management Plan (CEMP);
- Sediment and erosion control measures, including staged treatment of construction water;
- Strict control of fuels, oils, chemicals and concrete works;
- Controlled management of construction runoff, dewatering and hydrostatic testing water;
- Watercourse-specific mitigation measures at all crossings and temporary watercourse structures; and
- Emergency response procedures for pollution incidents and extreme weather events.

The implementation of these measures will ensure that no significant increase in sediment loading, nutrient enrichment or contaminant release occurs that could adversely affect water quality in the River Boyne and River Blackwater SAC or SPA.

6.6.1.6.2 Mt Hevey Bog SAC

The Mount Hevey Bog SAC is located in close proximity to the Proposed Development at the Kilwarden Offtake Installation; however, the SAC is situated hydrologically upgradient of the site. There is no significant hydrogeological pathway linking the Proposed Development to the Mount Hevey Bog SAC. Given the absence of a hydrological Source–Pathway–Receptor linkage, the Proposed Development has no potential to give rise to hydrological impacts on the Mount Hevey Bog SAC.

The main hydrogeological risk to the Mount Hevey Bog (located c. 20m north of the offtake installation location at Section 1) arises from uncontrolled surface water runoff during construction phase, which could transport sediments or contaminants into nearby drainage features and surface waters if not appropriately managed (Minerex Environmental Limited (MEL), 2026).

The risk of significant impacts to the underlying bedrock aquifer is considered low, given its poor productivity and the protection afforded by cohesive deposits overlying the limestone. However, the shallow groundwater table increases potential interaction with construction works, particularly at the offtake excavation area.

Mitigation measures, including controlled water management and treatment, attenuation of surface water runoff, bunded fuel storage, and silt control measures, will significantly reduce risks. With these measures in place, the proposed pipeline can proceed without significant adverse impact on groundwater, surface water, or designated ecological receptors. With the implementation on standard construction phase mitigation measures, including water management measures the proposed pipeline development is not expected to result in significant adverse impacts on groundwater, surface water and the Mount Hevey Bog SAC.

Notwithstanding the absence of connectivity, and on a precautionary basis, all mitigation measures set out in Sections 6.6.1.1 to 6.6.1.5 inclusive will be implemented in full during the construction phase. These measures will ensure the control of surface water runoff, prevention of sediment mobilisation, and protection of groundwater quality in the wider area.

6.6.1.6.3 Other sites

The pipeline route crosses the Grand Canal, which is a fully lined and engineered waterbody. As a result, there is no hydrological or hydrogeological connectivity between construction activities associated with the Proposed Development and the qualifying interests of the Grand Canal pNHA. No additional mitigation measures are required for the protection of the Grand Canal pNHA beyond the standard construction mitigation measures outlined in Sections 6.6.1 to 6.6.1.5.

The Long Derries, Edenderry SAC is located a hydrologically upgradient of the site. There is no hydrological or hydrogeological pathway linking the Proposed Development to this designated site. Accordingly, no mitigation measures are required in relation to the Long Derries, Edenderry SAC.

The Proposed Development has an indirect hydrological linkage to the River Nore and River Barrow SAC via the Figile River catchment. However, this pathway involves a significant downstream separation distance (approximately 16.1 km) and substantial attenuation and dilution within the catchment. No site-specific mitigation measures are required for the protection of this European site.

6.6.1.7 Measures for the Mitigation of Flood Risk

Several mitigation strategies have been incorporated into the design of the pipeline or the installation method in order to mitigate any flood risk (JBA Consulting, 2026):

- The pipeline itself is considered to be narrow and installation 1600mm below the riverbed level will ensure there is no disruption in the hyporheic zone. This depth is based on the industry standard safe installation depth of 1.5x the sleeve diameter below the riverbed. Groundwater will have space for lateral and vertical movement. The pipeline does not present a barrier. The 600mm concrete sleeve used under the river crossing will protect the infrastructure from hydrostatic pressure of flood waters and mitigate the risk of interrupting or changing groundwater flow.
- The route has been designed to avoid Flood Zones A and B insofar as possible.
- The trench will be subject to impermeable treatment at intervals to ensure a similar standard of protection.
- The surrounding ground surface will be fully restored to its original state and there will be no change to permeability.
- For the tunnelling/boring under the river this is a 'trenchless' installation method that requires minimal excavation and reduces ground disturbance.
- There will be limited hardstanding within the Ballykillen AGI and Kilwarden Offtake Installations. As part of their design a stormwater system has been included therefore, there will be no increase in surface water runoff due to the development.
- Mitigation measures to reduce soil compaction from heavy machinery which could increase the risk of surface water runoff have been outlined in the CEMP.
- The AGI ground level has been raised above the nearest 0.1% AEP flood level with appropriate freeboard.
- For the construction near the Yellow River and the tributary of the River Boyne. a 20m exclusion zone is provided during the construction phase. A trenchless crossing technique will be utilised to cross the river and no topsoil etc. will be stripped within this flood zone.
- In areas of the site confirmed to be located within Flood Zone A, the flood risk will be managed via the monitoring of river levels and weather forecasts. It is recommended that works in proximity to the river bodies are restricted during red warning rainfall flood events.
- It is proposed to construct an approximate 2m berm using the site topsoil along the eastern side of the pipeline where it intersects the Flood Zone A outlines. This will protect this area of the pipeline

from the predicted 1% AEP flood event. The berm does not have an impact on flood levels downstream of the development.

6.6.1.8 Human Health and Populations

It has been established (refer to Section 6.3 above) that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream from the site. In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas or Source Protection Zones (SPZ) defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the Proposed Development site.

While a portion of the Proposed Route Corridor runs within close proximity of the wider Edenderry town area, which is serviced by Local Authority potable water mains, the route is predominantly located in a rural setting and therefore there is a high probability that there are wells in the vicinity of the Proposed Route Corridor that are used for potable supply. However, these wells are potentially used for domestic purposes and the Proposed Development will not likely impact the groundwater regime due to the opted construction methodology and in turn no impact on these wells is foreseen.

As there is no source pathway linkage to the Group Water Scheme and Public Supply Source Protection Area, no mitigation is required. However, on a precautionary basis, the mitigation measures set out above in Section 6.6 will be implemented during the construction works for the protection of human health and populations.

6.6.1.9 Water Framework Directive Status

It has been established (refer to Section 6.5 above) that there is a potential of accidental discharges during the construction phase. However, these are temporary short-lived events that will not impact on trends in water quality and overall WFD status assessment of the local hydrological environment (river waterbodies and streams listed in Section 6.3.2.1) or the underlying groundwater bodies (GWB) aquifers (mentioned above in Section 6.3.8.1) in the long-term. As such the Proposed Development will not cause any significant deterioration or change in water quality status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

On a precautionary basis, the mitigation measures set out in Section 6.6 will be implemented during the construction works for the protection of surface water and groundwater quality status and achievement of the programme of measures.

6.6.2 Operational Phase

6.6.2.1 Measures for Surface Water and Groundwater Quality

Any maintenance activities that may introduce contaminants will be carried out in accordance with Gas Networks Ireland (GNI) ISO 14001 operational environmental management system.

6.6.2.2 Measures for Surface Water and Groundwater Flow and Quantity

During the operational phase, the Proposed Development does not require specific mitigation measures in respect of surface water or groundwater flow and quantity as there are no significant impacts identified.

Notwithstanding this, to ensure the continued protection of surface water and groundwater flow regimes during operation, routine inspection and preventative maintenance of on-site stormwater drainage infrastructure at Kilwarden Offtake Installation and the Ballykilleen AGI will be undertaken as part of standard operational procedures.

6.6.2.3 Measures for the Mitigation of Flood Risk

The main measure applied to minimise flood risk elsewhere is retaining the existing ground level post installation. This will ensure that there will be no increase flood risk under present conditions and climate change scenarios elsewhere in the catchment, thereby minimising flood risk to people, property, the economy and the environment as far as reasonably possible.

The associated Ballykilleen AGI is located in Flood Zone C and has a greater than 1m freeboard over the predicted 0.1% AEP flood event.

6.6.2.4 Mitigation for Designated Sites

During the operational phase of the Proposed Development there will be no ground disturbance, excavation, runoff or discharges which eliminates any interaction with the SAC. Hence, there is no requirement for mitigation measures for the protection of designated sites.

There is no requirement for any additional mitigation measures.

6.6.2.5 Human Health and Populations

It has been established (refer to Section 6.3 above) that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream in the local hydrological environment (river waterbodies / streams / drainage ditches mentioned above in Section 6.3.2.1). In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the Proposed Development site. As there is no source pathway linkage, therefore no mitigation is required.

6.6.2.6 Water Framework Directive Status

The Proposed Development will not lead to any significant deterioration or changes in water quality status, nor will it hinder the achievement of the Water Framework Directive (WFD) objectives or the goals outlined in the third cycle river basin management plan (2022-2027), specifically the Water Action Plan 2024 for Ireland.

No further mitigation is required.

6.7 Monitoring or Reinstatement Measures

6.7.1 Construction Phase

During construction phase the following monitoring measures will be implemented and carried out as part of the CEMP:

- During construction, various activities can result in the displacement of soil and sediment, which can lead to erosion and potential pollution of water bodies. To prevent this, regular inspections of surface water run-off and sediment controls (e.g. silt traps, silt fences), and discharges will be conducted. This involves monitoring the flow of water across construction sites and ensuring that proper measures are in place to capture sediment and prevent sediment from entering nearby waterways. Inspection and maintenance of the silt control measures during construction phase is crucial to ensuring that they work as intended.
- Soil sampling to confirm disposal options for excavated soils to ensure correct disposal. Excavated soil during construction may contain contaminants or pollutants that could pose a risk to the environment if not managed properly. Soil sampling involves collecting representative samples of the

excavated soil and analysing them to determine their composition and potential contaminants to confirm disposal options.
- Regular inspection of construction / mitigation measures (e.g., concrete pouring, refuelling, etc) to minimise potential for discharge to ground. Construction sites involve numerous activities that can impact the environment, from pouring concrete to refuelling vehicles and equipment. Regular inspections of these activities ensure that mitigation measures are implemented to environmental effects.
- During operations, regular maintenance and monitoring will be undertaken under the guidance of an Environmental Clerk of Works (ECoW) to ensure the crossing functions effectively and that any potential issues are promptly addressed.

6.7.2 Operational Phase

No future surface water or groundwater monitoring is proposed for the Proposed Development.

Maintenance of the surface water drainage system at Ballykilleen AGI (attenuation and drainage network) and at the Kilwarden Offtake Installation (soakaway pits) in accordance with the manufacturer's instructions as per normal light industrial developments is required to ensure system functionality.

6.8 Residual Effects of the Proposed Development

6.8.1 Construction Phase

6.8.1.1 Surface Water and Groundwater Quality

The implementation of the mitigation and monitoring measures detailed in Section 6.6.1 and 6.7.1, will ensure that the potential impacts on surface water and groundwater quality during the construction phase are adequately mitigated. There will be no change to overall flow and quality within the hydrological and hydrogeological regime as a result of construction.

The residual effect on surface water and groundwater quality during the construction phase is considered to be ***neutral, imperceptible*** and ***short-term***.

6.8.1.2 Surface Water and Groundwater Flow and Quantity

The implementation of the mitigation and monitoring measures detailed in Section 6.6.1 and 6.7.1, will ensure that the potential impacts on surface water and groundwater flow and quantity during the construction phase are adequately mitigated. There will be no change to overall flow and quality within the hydrological and hydrogeological regime as a result of construction.

The Residual flood risk is principally limited to failure of the groundwater mitigation methods or changes to ground level at the surface when reinstating levels. Groundwater flood risk is managed by thorough construction method statements and any nominal changes to ground levels is unlikely to present any significant change in flood risk elsewhere but would be managed in the same manner.

Due to the location of the pipeline and the mitigation methods employed, the potential impacts from flooding to the pipeline are considered negligible. There will be no impact to groundwater flow as a result of the mitigation methods related to the pipe drilling and trench construction methods.

The residual effect on surface water and groundwater flow and quantity during the construction phase is considered to be ***neutral, imperceptible*** and ***short-term***.

6.8.1.3 Human Health and Populations

It has been established (refer to Section 6.3 above) that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream in the local hydrological

environment (river waterbodies / streams / drainage ditches mentioned above in Section 6.3.2.1). In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the Proposed Development site.

As there is no source pathway linkage, no residual impacts are anticipated on human health and populations. The residual effect on surface water and groundwater flow and quantity during the construction phase is considered to be ***neutral, imperceptible*** and ***short-term***.

6.8.1.4 Water Framework Directive Status

Even in the absence of the mitigation and monitoring measures detailed in Section 6.6.1 and 6.7.1, there is no predicted degradation on the status of the local river waterbodies which traverse the site (listed in Section 6.3.2.1) or the groundwater bodies underling the site (mentioned above in Section 6.3.8.1) in the long-term (chemically, ecological and quantity) or any impact on its potential to meet the requirements and/or objectives in third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

The residual effect on Water Framework Directive status during the construction phase is considered to be ***neutral, imperceptible*** and ***short-term***.

6.8.2 Operational Phase

6.8.2.1 Surface Water and Groundwater Quality

The implementation of the drainage design measures detailed in Section 6.6.2 and 6.7.2, will ensure that the potential impacts on surface water and groundwater quality once the Proposed Development is constructed and operational are adequately mitigated.

There will be no impact to the quality of downstream designated sites due to the lack of direct hydraulic connectivity once the Proposed Development is operational.

The residual effect on surface water and groundwater quality during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.2.2 Surface Water and Groundwater Flow and Quantity

The implementation of the drainage design measures detailed in Section 6.6.2 and 6.7.2, will ensure that the potential impacts on surface water and groundwater flow and quantity once the Proposed Development is constructed and operational are adequately mitigated.

There will be no impact to the quality of downstream designated sites due to the lack of direct hydraulic connectivity once the Proposed Development is operational.

The residual effect on surface water and groundwater flow and quantity during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.2.3 Human Health and Populations

It has been established (refer to Section 6.3 above) that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream in the local hydrological environment (river waterbodies / streams / drainage ditches mentioned above in Section 6.3.2.1). In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the Proposed Development site.

As there is no source pathway linkage, no residual impacts are anticipated on human health and populations.

The residual effect on human health and population during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.2.4 Water Framework Directive Status

Even in the absence of the mitigation and monitoring measures detailed in Section 6.6.2 and 6.7.2, there is no predicted degradation on the status of the local river waterbodies (streams, drainage ditches) or the underlying groundwater body (GWB) aquifers in the long-term (chemically, ecological and quantity) or any impact on its potential to meet the requirements and/or objectives in third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

There are appropriately designed mitigation measures which will be implemented during the operational phase to protect the hydrological and hydrogeological environment (receptors). There is a potential of accidental discharges at the hardstand areas (AGI & Offtake Installation location, in the southern and northern ends of the site, respectively) during the operational phase, however these are temporary short-lived events that will be intercepted by the surface water (stormwater) attenuation and drainage design / strategy and will not impact on the water status of waterbodies long-term and as such will not impact on trends in water quality and over all status assessment.

There is a potential of accidental discharges during the operational phase, however these are temporary short-lived events that will not impact on the water status of waterbodies long-term and as such will not impact on trends in water quality and over all status assessment.

There are no untreated discharges of wastewater during the operational phase to any open waterbody / watercourse.

Therefore, no residual impacts are anticipated on the Water Framework Directive status. The residual effect on Water Framework Directive status during the construction phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.9 References

- CIRIA (2001). Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors.
- CIRIA (2005). Environmental Good Practice on Site (C650).
- CIRIA (2007). CIRIA 697: The SUDS Manual.
- Eastern Regional Fisheries Board (2006). Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction
- Enterprise Ireland (n.d.). Best Practice Guide BPGCS005: Oil Storage Guidelines.
- EPA (2023). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2025). EPA Maps.
- GSI (2025). GSI Map Viewer.
- Institute of Geologists of Ireland (2013). Guidelines for the Preparation of Soils, Geology and Hydrogeology and Hydrology Chapters of Environmental Impact Statements.
- Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).
- NPWS (2025). Designations Viewer.
- OPW (2025). Flood Maps.
- OPW (2009). The Planning System and Flood Risk Management: Guidelines for Planning Authorities.
- Teagasc (2025). Teagasc Map Viewer.
- National Roads Authority (NRA) (2009). Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Flood Risk Assessment (FRA). Edenderry Gas Pipeline JBA, (2026).
- Hydrogeological Impact Assessment. Gas to Bord na Mona, GNI Edenderry/Kilwarden, Minerex Environmental Limited (2026).