Proposed Derrygreenagh Power Project, Co. Offaly Environmental Impact Assessment Report

Chapter 12: Water Environment

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12.0 WATER ENVIRONMENT

12.1 Introduction

12.1.0 This chapter of the Environmental Impact Assessment Report (EIAR) presents the baseline condition, flood risk status, and potential impacts of the Proposed Development and Overall Project, as described in Chapter 5: The Proposed Development and Overall Project, on the Water Environment.

12.1.1 The principal components of the Proposed Development and Overall Project are as follows:

- The **'Power Plant Area'** relating to the main thermal power plant area east of the R400 road, which includes Combined Cycle Gas Turbine (CCGT) and Open Cycle Gas Turbine (OCGT) plant; a gas Above Ground Installation (AGI) ('Derrygreenagh AGI'); water abstraction and water treatment infrastructure; respective surface and process water discharge connection routes; and a permanent peat and spoil deposition area for overburden material excavated from the Power Plant Area. The process water discharge pipe will extend west of the R400 road before ultimate discharge south into the Yellow River.
- **'Electricity Grid Connection'** relating to the 220kV substation west of the R400 road, pylon towers, overhead lines, line-cable interface compound, underground cabling, associated cabling and connections to a new loop-in 400kV substation site and compound.
- The **'Gas Connection Corridor'** will enable the Proposed Development to connect to the existing high pressure gas pipeline to the west, c. 9.6 north of the Power Plant Area via AGI at tie-in location and underground routing of the pipeline. The underground gas connection is not being applied for in the planning application for the Proposed Development (as it will be applied for by Gas Networks Ireland (GNI) under separate consenting processes). However, the Gas Connection Corridor, identified by GNI during the preliminary design stage, is assessed in this EIAR as part of the Overall Project for completeness, as it will be integral to the operation of the Proposed Development. The route of the Gas Connection Corridor is the preferred route, as indicated by GNI, at the time of writing but may be subject to change as part of the detailed design process to be carried out.

12.1.2 The principal components of the Proposed Development and Overall Project of relevance to the Water Environment, aside from construction and demolition activities, are as follows:

- The discharge of process and foul water from the Power Plant Area, by pipe, into the Yellow River to the south.
- The discharge of surface/ drainage water from the Power Plant Area, by pipe, into the Mongagh River to the north.
- The use of existing onsite groundwater abstraction borehole, PW1, to supply the water requirements of Proposed Development.
- The placement of impervious surfaces at the Power Plant Area and substation sites and compounds.

12.1.3 The assessment of impacts on the Water Environment considers changes in water quality, hydrology, hydrogeology, hydromorphology, flood risk and water resources, as well as how these changes could impact on water dependent ecosystems, such as

wetlands, and on the Water Framework Directive (WFD) status of the identified waterbodies.

12.1.4 The impact assessment has been undertaken in accordance with the following broad stages:

- Reviewing the planning and legislative context.
- Establishing the baseline.
- Appraisal of potential impacts and determining the classification and significance of effects.
- Identification of potential mitigation and enhancement measures.

12.1.5 Environmental effects have been assessed for the construction, operational and decommissioning phases of the Proposed Development and Overall Project. The residual effects reported at the end of this chapter take account of the mitigation measures as described in this chapter.

12.1.6 The chapter is supported by information in the following chapters, figures, and appendices:

- EIAR Volume I Chapter 4: Existing Site and Conditions.
- EIAR Volume I Chapter 5: The Proposed Development.
- EIAR Volume I Chapter 9: Biodiversity.
- EIAR Volume I Chapter 13: Soils and Geology.
- EIAR Volume I Chapter 17: Major Accidents and Disasters.
- Figure 12.1: Surface water features and their attributes.
- Figure 12.2: Groundwater monitoring boreholes.
- Figure 12.3: Aquifer designations and groundwater vulnerability.
- EIAR Appendix 12A: Flood Risk and Drainage Assessment.
- EIAR Appendix 12B: Surface Water and Groundwater Analytical Results (TBC).
- EIAR Appendix 12C: WFD Screening Assessment.
- EIAR Appendix 12D: Groundwater Yield Report.
- EIAR Appendix 12E: Foul Water Technical Note
- EIAR Appendix 12F: Emission Limit Value Calculation
- EIAR Appendix 13B: Site Investigation Report (GQRA).

12.1.7 The Technical Team Lead for this chapter was Darragh Reilly (Principal Hydrogeologist, MSc, BSc (Hons), Fellow of Geological Society (FGS)). Details of his professional experience are presented in EIAR Appendix 1B (refer to EIAR Volume II). The following experts at AECOM have also contributed to this chapter and supporting appendices:

- Jenny Rush, Associate Hydrogeologist, MSc, PDip, BA (Hons), CGeol. Jenny Rush is a Chartered Geologist and Associate Hydrogeologist with AECOM and She leads projects in the UK and Ireland, around hydrogeological assessment, impact assessment and water resources planning. Jenny has gained considerable experience in EIA across a range of sectors (rail, road, mining, and water

companies), in both the UK and Ireland, providing project management and technical support.

- Neil Mackenzie, Technical Director, MSc, BSc (Hons), CGeol, CSci, FCIWEM, CEnv. Neil Mackenzie is a Technical Director, with professional accreditations as a Chartered Geologist and Fellow of CIWEM. Neil has undertaken both hydrological and hydrogeological investigations for major infrastructure (rail and road projects), energy (PSH & windfarm) and mineral extraction projects. His experience within includes on roads, water resources and groundwater protection.
- Neil Williams, Technical Director, CGeog, CEnv, CSci, CWEM. Neil Williams is AECOM's lead fluvial geomorphologist, managing a team of eight river restoration specialists. He is a Chartered Geomorphologist, Environmentalist, Scientist, and Water and Environment Manager. He is a registered Practitioner with the River Restoration Centre, supporting UK river restoration with extensive experience in research and consultancy in a comprehensive range of river environments across the UK and Canada.
- Sarah Waite, Senior Water Scientist, MSc, BSc. Sarah has 15 years' experience in environmental water management, including water quality, water resources and flood flow estimation. She spent 5 years working in the UK water industry as a water quality scientist prior to joining AECOM. Sarah has conducted numerous studies of the impacts of discharges to the freshwater, coastal and transitional water environment and worked to develop industry standard guidance for this work on behalf of Uisce Éireann (formerly Irish Water).
- Aoife Harte, Senior Engineer, BSc, BSc, FdSc. Aoife joined AECOM in 2022 having previously worked for Waterways Ireland and the Environment Agency. She led on assessment management projects and flood risk and environmental project management work. Aoife has gained considerable experience in flood risk, environment and asset management, Flood Risk Assessments, Develop and approval of NEC4 Tender Documents, Pre-Construction Information and RAMS, Site supervision of contractors and subcontractors, Partnership working with other risk management authorities and Stakeholder and community engagement.

12.2 Methodology

Study Area

12.2.0 For the purposes of this assessment, a **Study Area** of 1km radius around each component of the Proposed Development and Overall Project (as defined in Chapter 1 and Chapter 5 of this EIAR) has been considered. This Study Area takes account of waterbodies (both surface and groundwater) within and adjacent to the Proposed Development and Overall Project, their immediate catchments, and any water dependent habitats which could be hydraulically connected to these waterbodies in which potentially significant impacts could arise.

Desk Study

12.2.1 A desk study has been undertaken as part of this assessment to identify the key waterbodies and potential Water Environment receptors within and adjacent to the Proposed Development and Overall Project, and to gather and critically evaluate relevant data and information on their condition and attributes. The following sources of information have been reviewed:

- Ordnance Survey Ireland (OSI) website for historical maps of 1:2,500 scale and 1:10,560 scale and aerial photographs [Accessed September 2023].
- OSI Discovery series of 1:50,000 scale [Accessed September 2023].
- Geological Survey of Ireland (GSI) online map viewer www.gsi.ie/mapping [Accessed September 2023].
- EPA online map viewer, https://gis.epa.ie/EPAMaps/ [Accessed September 2023].
- EPA Catchments online map viewer, www.catchments.ie [Accessed September 2023].
- EPA Hydronet online map viewer, https://epawebapp.epa.ie/hydronet/ [Accessed September 2023].
- National Parks and Wildlife Service (NPWS) designated sites and protected areas online map viewer, www.npws.ie/mapping [Accessed September 2023].
- Wetland Surveys Ireland wetland inventory online map viewer, www.wetlandsurveys.ie [Accessed September 2023].
- GeoHive historic maps online map viewer, https://webapps.geohive.ie/mapviewer/index.html [Accessed September 2023].
- Office of Public Works (OPW), Fluvial and Coastal Flood information mapping from the Catchment Flood Risk Assessment and Management Program (CFRAM), https://www.floodinfo.ie [Accessed September 2023].
- Glover Site Investigations Limited, 2008, Derrygreenagh CCGT, Report No. 08-0221.
- Mott McDonald, 2008. Derrygreenagh CCGT, Geo-environmental Interpretative Report, 240674/CAR/004.
- Bord na Móna, 2022. Annual Environmental Report (AER) for Integrated Pollution Control (IPC) Licence No. P0501-01.
- GSI, 2004. Athboy groundwater body description.
- IDL, 2023. Derrygreenagh Thermal Power Project, Site investigation contract factual report.

- Triturus, 2023. *Aquatic baseline report for Derrygreenagh.*
- GSI, 1996. *Toberdaly Public Supply Groundwater Source Protection Zones* report.

Site Surveys

12.2.2 A site walkover and reconnaissance visit was undertaken in March 2023 to inform this assessment and was undertaken under dry and fair-weather conditions. The walkover included inspections of existing groundwater monitoring boreholes, site condition and a brief inspection of surface waterbodies in the Study Area.

12.2.3 A programme of monthly groundwater and surface water quality monitoring has also been undertaken as part of this assessment, at nine (9 no.) surface water locations within the wider catchment and six (6 no.) groundwater monitoring boreholes located at the Power Plant Area and 200kV substation site (see Figure 12.2). The purpose of this programme of monthly monitoring was to provide an understanding of baseline water quality within the Study Area, to inform the assessment and to inform the calculation of Emission Limit Values (ELVs) which will achieve compliance with the aims of the WFD (Refer to Appendix 12F Emission Limit Value Calculation, EIAR Volume II). Further detail on this monitoring programme is provided in Section 12.4 below.

Impact Assessment Methodology

12.2.4 A qualitative assessment of the likely significant effects on the Water Environment has been undertaken, using the source-pathway-receptor approach (see Plate 12.1 below). For an impact on the Water Environment to exist, the following is required:

- An impact source (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a water body).
- A receptor that is sensitive to that impact (i.e., water bodies and the services they support).
- A pathway by which the two are linked.

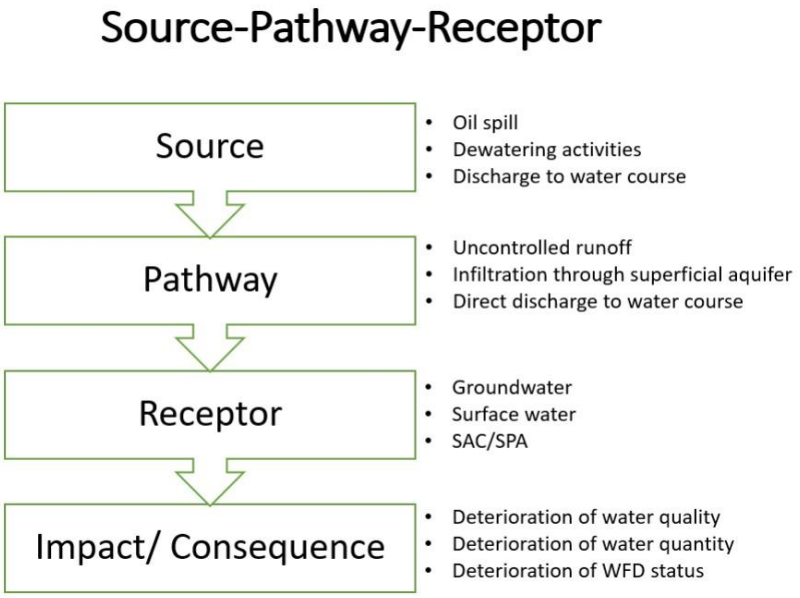

Plate 12.1: Source-Pathway-Receptor model

12.2.5 The first stage in applying the Source-Pathway-Receptor model is to identify the causes or 'sources' of potential impact from a development. The sources have been identified through a review of the details of the Proposed Development and Overall Project, including the size and nature of the development, proposed construction methodologies and timescales. The next step in the model is to undertake a review of the potential receptors that have the potential to be affected.

12.2.6 The last stage of the model is, therefore, to determine if there is a viable exposure pathway or a 'mechanism' linking the source to the receptor. This has been undertaken in the context of local conditions relative to the water receptors within the study area, such as topography, geology, climatic conditions, and the nature of the impact (e.g., the mobility of a liquid pollutant or the proximity to works that may physically impact a water body).

12.2.7 The assessment of the likely significant effects is qualitative, and considers both construction, operational and decommissioning phases, as well as cumulative effects with other developments. This assessment has considered the risk of pollution to surface water bodies and groundwater directly and indirectly from construction activities, particularly in relation to those water features which are within or close to the Proposed Development. The risk of pollution from runoff from the built environment has also been considered so that appropriate measures can be incorporated into the design of the Proposed Development.

Flood Risk Assessment

12.2.8 A Flood Risk Assessment is provided in Appendix 12A (refer to EIAR Volume II) which assesses flood risk for the Site. Refer to the Flood Risk Assessment for a full description of the flood risk assessment methodology.

Determination of Sensitive Receptors

12.2.9 The EPA 2022 Guidelines provide high-level guidance across multiple disciplines on the assessment of effects and recognises that *"when more specific definitions exist within a specialised factor or topic, e.g., biodiversity, these should be used in preference to these generalised definitions"*. In the absence of specific criteria for rating sensitivity in the EPA's 2022 EIAR guidance, the criteria from the NRA's *Guidelines on Procedures for Assessment Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (NRA, 2008) have been used and are presented in the table below. The sensitivity rating ranges from low to extremely high, and considers their likely adaptability, tolerance, and recoverability, as well as their designation.

Table 12-1: Receptor sensitivity/ importance (NRA, 2009)

SENSITIVITY/ IMPORTANCE	DESCRIPTION	EXAMPLE
Extremely High	Attribute has a high quality or value on international scale or protected by EU legislation	River, groundwater body, surface water dependent ecosystems (SWDE) or groundwater dependent terrestrial ecosystems (GWDTE) of Special Area of Conservation (SAC) or Special Protected Area (SPA) status
Very High	Attribute has a high quality or value on regional or national scale	River, groundwater body, SWDE or GWDTE of Natural Heritage Area (NHA) status, regionally important public water supply, active continuous hydrometric station, Quality Class A (Biotic Index Q4, Q5)

SENSITIVITY/ IMPORTANCE	DESCRIPTION	EXAMPLE
High	Attribute has a high quality or value on local scale	SWDE or GWDTE of county importance, locally important potable water supply, Quality Class B (Biotic Index Q3-4)
Medium	Attribute has a medium quality or value on local scale	SWDE or GWDTE of local importance, local potable water supply, Quality Class C (Biotic Index Q3, Q2-3)
Low	Attribute has a low quality or value on a local scale	Local water supply used for domestic/ agricultural purposes, Quality Class D (Biotic Index Q2, Q1)

Rating of Impact

12.2.10 The EPA 2022 Guidelines focus on *likely, significant effects*. In the absence of specific criteria for rating of potential impacts and determining their significance, the criteria listed in Annex III of the amended Directive [1] and in the NRA's *Guidelines on Procedures for Assessment Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (NRA, 2008) have been used. These focus primarily on the type and characteristics of potential impacts in terms of magnitude, direct/ indirect, probability, nature/ quality, and duration, as follows:

- **Magnitude**: The EPA 2022 Guidelines provide high-level guidance across multiple disciplines on the assessment of effects and recognises that *"when more specific definitions exist within a specialised factor or topic, e.g., biodiversity, these should be used in preference to these generalised definitions"*. In the absence of specific criteria for rating of impact magnitude, the criteria from the Box 5.2 and Box 5.3 of NRA's *Guidelines on Procedures for Assessment Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (NRA, 2008) has been used and are presented in Table 12-2 below.
- **Direct/ Indirect:** The NRA 2008 Guidelines provide an outline description of the direct/ indirect nature of impacts, using the terms *direct* – a change or alteration as a consequence of the site activity; *indirect* – a change or alternation as a consequence of activities related to the site activity; which have been used in this assessment.
- **Nature/ Quality:** The NRA 2008 Guidelines provide an outline description of the quality of impacts, using the terms *positive* – a change which improves the quality of the environment; *neutral* – no change or change that is imperceptible; and *negative/ adverse* – a change which reduces the quality of the environment, which have been used in this assessment.
- **Probability:** The NRA 2008 Guidelines provides an outline description of the degree of confidence or certainty using terms such as *certain* and *likely*, which have been used in this assessment. No consideration is given to impacts which may be rated as *possible* or *unlikely*.
- **Duration:** The NRA 2008 Guidelines provide an outline description of the duration of impacts, using the terms *temporary* – lasting less than a year; *short-term* - lasting one to seven years*; medium-term* – lasting seven to fifteen years; *long-term* – lasting

[1] Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

fifteen to sixty years; and *permanent* – lasting over sixty years, which have been used in this assessment.

12.2.11 It should be noted the control measures, as outlined in **Chapter 5: The Proposed Development and Overall Project**, have been considered embedded in the project design and their application has been assumed in determining the significance of the impact. Mitigation measures will be devised for each potential complete pollutant linkage (comprising a source, pathway, and receptor), no matter how significant the impact. Additional mitigation measures have then been considered prior to determination of residual impacts.

Table 12-2: Magnitude of impact (NRA, 2009)

IMPACT LEVEL	DESCRIPTION	TYPICAL EXAMPLE
Large adverse	Results in loss of attribute and/ or quality and integrity of attribute	Hydrogeology: – Removal of large proportion of aquifer – Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. – Potential high risk of pollution to groundwater from routine runoff – Calculated risk of serious pollution incident >2% annually Hydrology: – Loss or extensive change to a waterbody or water dependent habitat – Increase in predicted peak flood level >100mm. – Extensive loss of fishery – Calculated risk of serious pollution incident >2% annually – Extensive reduction in amenity value
Moderate adverse	Results in impact on integrity of attribute or loss of part of attribute	Hydrogeology: – Removal of moderate proportion of aquifer – Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. – Potential medium risk of pollution to groundwater from routine runoff – Calculated risk of serious pollution incident >1% annually Hydrology: – Increase in predicted peak flood level >50 mm. – Partial loss of fishery – Calculated risk of serious pollution incident >1% annually – Partial reduction in amenity value
Small adverse	Results in minor impact on integrity of attribute or loss	Hydrogeology: – Removal of small proportion of aquifer

IMPACT LEVEL	DESCRIPTION	TYPICAL EXAMPLE
	of small part of attribute	– Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. – Potential low risk of pollution to groundwater from routine runoff – Calculated risk of serious pollution incident >0.5% annually Hydrology: – Increase in predicted peak flood level >10 mm. – Minor loss of fishery – Calculated risk of serious pollution incident >0.5% annually – Slight reduction in amenity value
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Hydrogeology: – Calculated risk of serious pollution incident <0.5% annually Hydrology: – Negligible change in predicted peak flood level. – Calculated risk of serious pollution incident <0.5% annually

Significance of Effect

12.2.12 The methodology used for describing the potential impacts considers the "quality" of the impacts (i.e., whether it is adverse or beneficial), the "probability" of the event occurring and the "duration" of the impacts (i.e., whether it is short or long term), and a rating of impacts "magnitude" of negligible to large, as per the NRA 2008 Guidelines (NRA, 2008). The impact rating is then combined with the sensitivity rating of the impacted receptor to determine the significance of the potential effect (see table below).

Table 12-3: Effect significance ratings (NRA, 2008)

		MAGNITUDE OF IMPACT			
		Negligible	**Small**	**Moderate**	**Large**
SENSITIVITY/ IMPORTANCE OF ATTRIBUTE	**Extremely High**	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
	High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe (Very significant) / Significant
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Limitations and General Assumptions

12.2.13 The following assumptions and limitations have been used in the preparation of this assessment:

- The assessment is based on the available data and on the description of the Proposed Development and Overall Project detailed within **Chapter 5: The Proposed Development and Overall Project** of this EIAR.
- The assumptions and limitations relating to ground conditions are outlined in the EIAR Chapter 13: Soils & Geology, and in Appendix 13B Site Investigation Report (GQRA) (refer to EIAR Volume II). For the purposes of the assessment, it has been assumed that no site remediation is required to facilitate the Proposed Development.
- The WFD screening assessment is based on the latest publicly available information from the EPA on WFD water status. Where, there are gaps in the available information for certain WFD water bodies, an assumption has been made using the overall ecological status or potential, as to the water quality status.
- While Construction Method Statements will be prepared by the Engineering and Construction (E&C) Contractor when appointed, it has been assumed all works will take place using best practice, as set out in an Outline Construction Environmental Management Plan (oCEMP) (refer to Appendix 5A, EIAR Volume II).
- The assessment is based on the available water quality data and limited to a total of four (4 No.) months of analytical results of water sampling.
- The assessment is based on the available water level data and is limited to non-continuous measurement of groundwater levels at existing boreholes in the Power Plant Area.
- The description of the baseline environmental conditions for the Gas Connection Corridor is based on desktop information only. The Gas Connection Corridor is not being applied for as part of the planning application for the Proposed Development (as it will be subject to separate consenting processes to be carried out by GNI at a later date). However, the Gas Connection Corridor identified by GNI at preliminary design stage, has been assessed in this EIAR as part of the Overall Project, for completeness, as it will be integral to the operation of the Proposed Development. The route of the Gas Connection Corridor is the preferred route, as indicated by GNI, at the time of writing but may be subject to change as part of the detailed design process to be carried out.

12.3 Regulatory, Policy and Guidance Framework

Policy

12.3.1 The Offaly County Development Plan 2021-2027 and Westmeath County Development Plan 2021-2027, prepared in accordance with the provisions of the Planning and Development Act 2000 (as amended), set out a range of proposed policy objectives for development up to 2027 (Offaly County Council, 2021 and Westmeath County Council, 2021). The plans incorporate the mandatory objectives listed in the Planning and Development Act 2000, including conservation and protection of the environment and promotion of compliance with environmental standard.

Legislation

12.3.2 The following European legislation and transposing Irish legislation are of relevance to this Water Environment assessment of the Proposed Development and Overall Project:

- European Union Water Framework Directive (WFD) (2000/60/EC).
- European Union Directive (2011/92/EU) on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU.
- The EU Floods Directive 2007/60/EC.
- Planning and Development Act, 2000 (as amended).
- European Communities (Quality of Salmonid Water) Regulations, 1988 (S.I. No. 84 of 1988).
- Planning and Development Regulations (as amended).
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

12.3.3 The following Irish legislation governs the shape of the WFD characterisation, monitoring and status assessment programmes in terms of monitoring different water categories, determining the quality elements and undertaking characterisation and classification assessments. The Board is respectfully asked to discharge its obligations under the Water Framework Directive and assess whether the Proposed Development and Overall Project will compromise the objectives of that Directive, in light of the pending CJEU reference by the High Court in Sweetman v An Bord Pleanála [2021] IEHC 16; [2021] IEHC 777.

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003) and amendments (S.I. No. 413 of 2005, S.I. No. 219 of 2008, S.I. No. 326 of 2010 and S.I. No. 93 of 2010).
- European Union (Water Policy) Regulations, 2014 (S.I. No. 350 of 2014) and amendments (S.I. No. 261 of 2018 and S.I. No. 166 of 2022).
- European Communities Environmental Objectives (Surface Water) Regulations, 2009 ('S.I. No. 272 of 2009 as amended'), and amendments (S.I. No. 327 of 2012, S.I. No. 386 of 2015 and S.I. No. 77 of 2019).
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 as amended), and amendments (S.I. No. 389 of 2011, S.I. No 149 of 2012, S.I. No. 366 of 2016, S.I. No. 287 of 2022).
- European Communities (Assessment and Management of Flood Risks) Regulations, 2010 (S.I. No. 122 of 2010).

Guidance

12.3.4 The following guidance documents have been used to inform the methodology, scope, and content of this assessment and to assist in the identification and mitigation of likely significant effects

- European Communities, Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (EC, 2017).
- Department of Housing, Local Government and Heritage (DHLGH), 2018. *River Basin Management Plan 2018-2021*.
- Environmental Protection Agency (EPA), 2022. *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.
- EPA, 2003. *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*.
- EPA, 2013. *Management of Contaminated Land and Groundwater at EPA Licensed Sites*.
- National Roads Authority (NRA), 2008. *Guidelines on Procedures for Assessment Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.
- Transport Infrastructure Ireland (TII), 2015, *Road Drainage and the Water Environment (DN-DNG-03065)*.
- Institute of Geologists of Ireland (IGI), 2013. *Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements*.
- Inland Fisheries Ireland, 2016. *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites*.
- CIRIA (Construction Industry Research and Information Association), 2006. *Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648).*
- Department of Environment, Housing and Local Government (DOEHLG), 2009. *The Planning System and Flood Risk Management – Guidelines for Planning Authorities*.
- Joint Assistance to Support Projects in European Regions (JASPERS), 2018. *Water Framework Directive Project assessment checklist tool*.
- Planning Inspectorate Note (PINS), 2017. *Advice Note 18: The Water Framework Directive*.

12.4 Baseline Environmental Conditions (Receiving Environment) and Constraints

12.4.1 The description of the baseline condition of the Water Environment and the identification of hydrological and hydrogeological receptors with the potential to be impacted by the Proposed Development and Overall Project, focuses on the following receptor types:

- Surface waterbodies, and associated water quality, flows and hydromorphology[2].
- WFD river sub basins.
- Surface water abstraction/ monitoring/ discharge points.
- Designated sites with surface water dependent habitats or species (or SWDEs).
- Surface water flood risk areas.
- Aquifers[3], and associated water quality, levels, and flows.
- WFD groundwater bodies.
- Groundwater abstraction/ monitoring points/ discharges.
- Karst[4] landforms and traced underground connections.
- Groundwater dependent terrestrial ecosystems (GWDTEs).
- Areas of groundwater flood risk.

Power Plant Area

Land Use, Topography and Rainfall

12.4.2 The Power Plant Area is located approximately 3.75 km south-east of Rochfortbridge along the R400 road, in Co. Offaly, and approximately 2.2 km south of Junction 3 on the M6 motorway for Rhode and Rochfortbridge (see Figure 12.2). It is located on a “mineral island” within the Drumman Bog cutaway peatlands to the east of the R400 road, except for the process water discharge through Derryarkin Bog west of the R400 road, respectively.

12.4.3 The topography of the Power Plant Area is generally flat, between 85m and 86m above Ordnance Datum (mAOD). To the south of the Power Plant Area beyond the current extent of onsite buildings, the ground level rises to approximately 90m AOD towards the cutting in which the narrow-gauge railway is located. Additionally, to the north of the site, there is a gentle slope to an elevation of approximately 82m AOD.

12.4.4 The Power Plant Area is approximately 49 hectares and will be located predominantly on the site of the existing Derrygreenagh Works east of the R400 road. The Power Plant Area is industrial in nature with historical operations consisting primarily of the repair and modification of machinery used for the harvesting and transport of peat from the nearby bogs and offices for administrative purposes. Currently, the primary use of the existing Derrygreenagh Works (refer to Chapter 4: Existing Site) is for repair of plant and machinery, for post peat harvesting activities and office space for Bórd na Mona (BnM).

[2] Hydromorphology considers the physical character and water content of water bodies (Hydromorphology: What is it? - Catchments.ie - Catchments.ie).

[3] Aquifer is defined by the EU Water Framework Directive (WFD, 2000/60/EC) as a: *"subsurface layer of … geological strata ..[which allows].. either a significant flow of groundwater or the abstraction of significant quantities of groundwater".* In Ireland, nearly all bedrock types are classified as aquifers since they are able to provide water in sufficient amounts for houses and farms (What is an aquifer? (gsi.ie))

[4] Karst is a landscape with distinctive hydrology and landforms that arise when the underlying rock is soluble (What is karst? (gsi.ie)).

12.4.5 The closest Met Éireann weather observing station to the Proposed Development and Overall Project, with available historical data, is located at Mullingar (Rathruddy West) (Station No. 2721), at approximately 18.5km north-west of the Power Plant Area. The 30 year or 'long term average' (LTA) monthly rainfall dataset (1979-2008) is shown in the plate below, as well as the available monthly rainfall data for 2020-2023 (until June). The LTA annual rainfall (1979-2008) is 941.3mm. According to Met Éireann, most of the eastern half of the country gets between 750 and 1000mm of rainfall in the year, while rainfall in the west generally averages between 1000mm and 1400mm. The LTA annual rainfall for Mullingar is therefore within the range for the east. The datasets show that monthly rainfall is generally lower in the spring months and wetter in the summer/ autumn months.

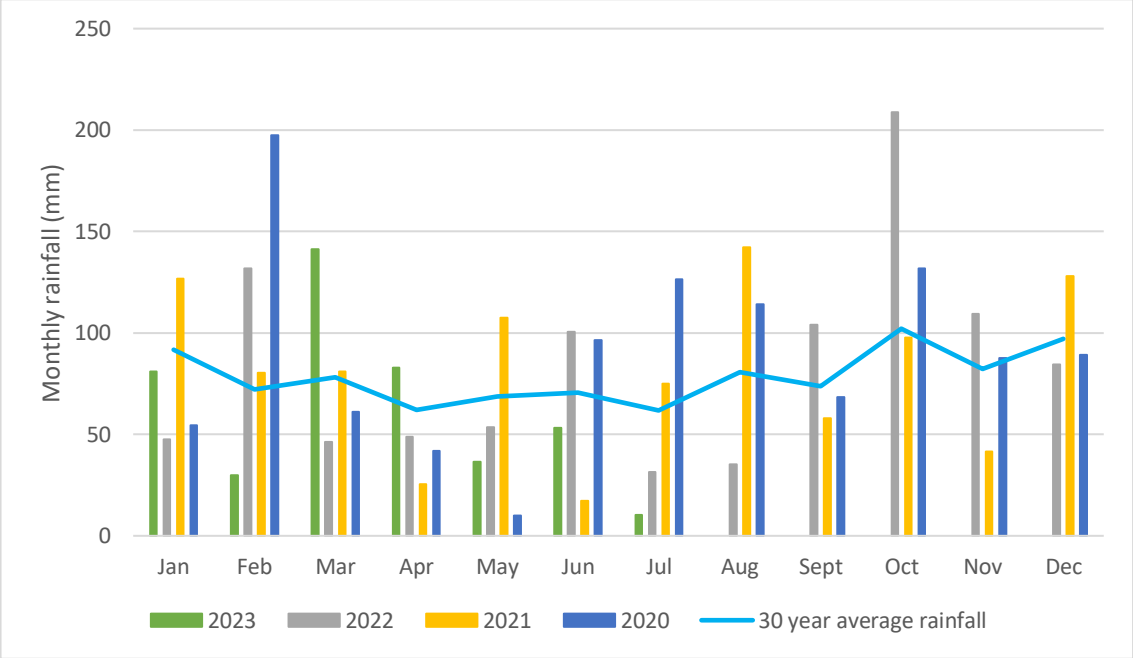

Plate 12.2: Mullingar monthly rainfall and days of rainfall >1mm (1979-2008)

Hydrology

Surface waterbodies

12.4.6 The nearest river to the Power Plant Area is the Castlejordan_020 (EPA Code 07C04) river waterbody (also referred to as the Mongagh River), located immediately adjacent to the northernmost boundary of the Power Plant Area. The Castlejordan_020 is a WFD designated river waterbody (IE_EA_07C040100). The most recent EPA mapping of WFD status and significant pressures (3rd Cycle, 2016-2021) for this river waterbody is provided in the Table 12-4 below.

12.4.7 The WFD hydromorphological status (heavily modified status) of this surface waterbody is listed as unknown (EPA Catchments, 2023). However, according to Triturus *Aquatic baseline report for Derrygreenagh* (2023), the Castlejordan_020 river waterbody (07C04) at the R400 road is a heavily modified lowland depositing watercourse (FW2) and has been historically deepened and straightened with resulting poor hydromorphology in a U-shaped channel.

12.4.8 The Castlejordan_020 river waterbody (also referred to as the Mongagh River) is a tributary of the Yellow (Castlejordan)_010 (EPA Code 07Y02) river waterbody (also referred to as the Yellow River). The Castlejordan_020 river waterbody flows into the Yellow River at approximately 15 km downstream of the Power Plant Area. The Yellow

River is a WFD designated river waterbody (IE_EA_07Y020300). The most recent EPA mapping of WFD status and significant pressures (3rd Cycle, 2016-2021) for this river waterbody is provided in the Table 12-4 below.

12.4.9 The WFD hydromorphological status (heavily modified status) of the Yellow River is listed as unknown (EPA Catchments, 2023). However, according to Triturus *Aquatic baseline report for Derrygreenagh* (2023), the Yellow River (07Y02) at the R400 road is a lowland depositing watercourse (FW2) and has been extensively deepened and straightened with a deep U-shaped profile but exhibited good recovery with semi-natural characteristics.

12.4.10 Both the Mongagh and Yellow rivers are tributaries of the Boyne_030 (Boyne River) WFD river body (EPA Code 07B04, IE_EA_07B040400).

12.4.11 There are no EPA mapped surface water features within the Power Plant Area boundary. However, there are a few small man-made ditches cut into the peat surrounding the site, which are understood to feed into the Mongagh River.

12.4.12 The surface waterbodies within the Study Area around the Power Plant Area are shown in Figure 12.1.

Table 12-4: Power Plant Area - WFD surface waterbodies

EPA WFD WATERBODY NAME	WATERCOURSE NAME	EPA CODE	WFD ID	WFD STATUS (2016-2021)	WFD AT RISK STATUS (3RD CYCLE)	APPROX. DISTANCE FROM POWER PLANT AREA
Castlejordan_020	Mongagh River	07C04	IE_EA_07C040100	Good	Review	10m north
Yellow (Castlejordan)_010	Yellow River	07Y02	IE_EA_07Y020070	Poor	At Risk (Extractive industry significant pressures)	1,560m south
Yellow (Castlejordan)_020			IE_EA_07Y020100	Good	Not At Risk	1,680m south
Boyne_030	Boyne River	07B04	IE_EA_07B040400	Good	Not At Risk	10km east

Surface water flows

12.4.13 According to EPA Catchments, there is an available river flow estimate generated by the EPA's Hydrotool[5] for the Mongagh River, downstream of the proposed surface water discharge point (Easting 649504, Northing 738976), and for the Yellow River, both upstream and downstream of the proposed process water discharge point (Easting 649758, Northing 736426). The following table summarises this data.

[5] The EPA's Hydrotool is a dataset of naturalised river flow duration percentiles for Irish rivers that will enable assessment of quantitative impacts relating to hydrological alterations. The flow estimates represent flows that could be expected in rivers under naturalised conditions and do not take account of artificial influences of any kind such as water supply abstractions or waste water discharges.

Table 12-5: Power Plant Area - EPA Hydrotool River Flow Estimates

WATERCOURSE NAME	RIVER SEGMENT ID	APPROX. DISTANCE FROM DISCHARGE POINT (m)	CONTRIBUTING CATCHMENT AREA (km^2)	NATURALISED FLOW ESTIMATES (m^3/s)		
				Q10	Q50	Q95
Mongagh River	07_564	400	17.19	0.826	0.212	0.056
	07_334	2,830	46.10	1.364	0.427	0.084
Yellow River	07_293	1,500 (upstream)	23.14	1.003	0.263	0.062
	07_331	940 (downstream)	42.16	1.905	0.484	0.122
	07_332	1,890 (downstream)	43.41	1.985	0.502	0.129

Surface water quality

12.4.14 According to EPA Catchments, there are two (2 No.) river monitoring stations located on the Yellow River, at which latest river Q values have been assigned. The Q values refer to a biological rating system for freshwaters where the presence and quantity of specific organisms, primarily invertebrates, are surveyed and the overall health of the watercourse rated. The following table summarises this data. The nearest river station on the Mongagh River is at over 6km from the Power Plant Area.

Table 12-6: Power Plant Area - EPA latest river Q values

EPA WFD WATERBODY NAME	WATERCOURSE NAME	RIVER STATION NAME	LATEST RIVER Q VALUE (STATUS)	YEAR	DISTANCE FROM SITE
Castlejordan_020	Mongagh River	Baltinoran Bridge	4 (Good)	2020	6km northeast
Yellow (Castlejordan)_010	Yellow River	Nr Derryarkin	3 (Poor)	2003	2km west
		Bridge downstream of Big River confluence	3 (Poor)	2020	1.5km west
Yellow (Castlejordan)_020		Garr Bridge	4 (Good)	2020	3.5km east
Boyne_030	Boyne River	Ballyboggan Bridge	4 (Good)	2020	15km northeast

12.4.15 As part of this assessment, surface water monitoring was undertaken at seven (7 no.) locations across the Study Area as outlined in Figure 12.1. The Power Plant Area lies within the CASTLEJORDAN_020 sub-basin which drains to the Mongagh River. The following table outlines the two monitoring locations on the Mongagh River, referred to as SW_M1 and SW_M3. Process water is to be discharged through Derryarkin Bog west to the Yellow River which is outlined in the Electricity Grid Connection section below.

Table 12-7: Power Plant Area – Surface water monitoring locations

WATERCOURSE NAME	LOCATION	EASTING	NORTHING	LOCATION DESCRIPTION
Mongagh River	SW_M1	248478	238921	Upstream of existing and future site discharges
Mongagh River	SW_M3	250270	239233	Downstream of existing and future site discharges and confluence

12.4.16 A summary of the laboratory results from four (4 no.) rounds of monitoring conducted between April and July 2023 and the laboratory datasheets are presented in Appendix 12B. Each round of monitoring was undertaken over the course of 3 days on the weeks beginning of the 17 April, 22 May, 03 July and 24 July.

12.4.17 Screening for total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene, xylene (BTEXs); polycyclic aromatic hydrocarbons (PAHs) and phenols was undertaken at SW_M3 (downstream location) during Round 1 monitoring in April 2023. Concentrations were below the laboratory detection limits and these determinants were not tested for in the remainder of the monitoring rounds and samples collected.

12.4.18 At SW_M3, the laboratory results show that the pH varied between 7.4 and 8.3 pH units; the electrical conductivity varied between 428 µS/cm and 683 µS/cm and the chloride concentration varied between 17 mg/l and 21.8mg/l. The ammonia (NH_3) concentration was between 0.035 mg/l and 0.203 mg/l. Nitrate varied between 1.44 mg/l N and 3.32 mg/l N. The volatile organic compound (VOC) analysis recorded all determinants below the laboratory detection limits in all samples.

12.4.19 There was only sample (SW_M3 - Round 2) the demonstrated elevated ammonia above the EPA Interim Guideline Value (IGV) value of 0.15 mg/l at 0.203 mg/l/. There was only one exceedance of the Orthophosphate IGV value of 0.03 mg/l which was SW_M1 – Round 2 at a concentration of 0.036 mg/l. There was no exceedance of the IGV limits for Nitrate of 50 mg/l N and Chloride of 250 mg/l.

WFD river sub basins

12.4.20 The WFD was transposed into Irish Legislation by the European Communities (Water Policy) Regulations 2003, (Statutory Instrument 722) on 22nd December 2003. The legislation established the River Basin Districts (RBDs) and provides support for the protection of the status of all waters. River sub basins are a management and reporting unit for the Water Framework Directive (WFD). The Power Plant Area falls within the Boyne WFD catchment and the Castlejordan_020 WFD river sub basin (see Figure 12.1).

Surface water abstraction/ monitoring/ discharge points

12.4.21 The Yellow and Mongagh rivers are not designated as drinking water rivers and therefore there are no surface water abstraction locations within the study area.

12.4.22 According to EPA Hydronet, there is one EPA surface water monitoring point located on the Mongagh River (Derrygreenagh, station ID 07028), which is currently inactive. Consistent and long-term level and flow gauging is important for many purposes including water quality, WFD and flood risk purposes, therefore all hydrometric stations with an ‘operational’ status would be identified as a constraint.

12.4.23 According to EPA Catchments, there are no Section 4 (of the Local Government (Water Pollution) Act 1977, as amended) discharges[6] recorded within the Power Plant Area, based on EPA mapping. The existing BnM site at Derrygreenagh currently discharges treated and surface water into a drainage ditch to the north of the Power Plant Area, which ultimately flows into the Mongagh River.

Designated sites with surface water dependent habitats or species

12.4.24 There are no recorded SACs or SPAs located within 1km of the Power Plant Area. However, the River Boyne and River Blackwater SAC and SPA are hydraulically connected >25km downstream of the Power Plant Area, via the Mongagh River (Castlejordan_020 WFD waterbody (IE_EA_07C040100)) (see table below). A summary of all designated sites is presented in Chapter 9 – Biodiversity (refer to EIAR Volume I); however, a number of sites are of interest to the biodiversity assessment for ornithological and atmospheric reasons rather than hydrological connectivity, and therefore not included here.

Table 12-8: Power Plant Area – Designated surface water dependent sites

DESIGNATED SITE NAME	REASON(S) FOR DESIGNATION[7]	APPROX. DISTANCE TO POWER PLANT AREA
River Boyne and River Blackwater SAC [002299]	Alkaline fens [7230] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	27km downstream (to northeast)

Surface flood risk and drainage

12.4.25 A Flood Risk and Drainage Assessment is provided for the Power Plant Area in Appendix 12A (refer to EIAR Volume II). The below is a summary of baseline flood risk, based on Appendix 12A.

12.4.26 The Power Plant Area, based on the National Indicative Flood Mapping (NIFM) extents, is situated within Flood Zone C (< 0.1% AEP) for present day and future scenarios, therefore the overall risk of fluvial flooding is considered to be low.

12.4.27 Based on the 2022 Annual Environmental Report (AER) (Licence No. P0501-01) for the existing Derrygreenagh Works, the existing drainage consists of stormwater managed via oil-interceptors which are inspected on a monthly basis and sampled for associated discharges each month. All peat production area runoff is treated via an associated silt pond designed, inspected and maintained in accordance with condition 6 of the Integrated Pollution Control (IPC) Licence.

[6] Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990, allows for the issuance of discharge licences in respect of the discharge of trade effluent and/ or sewage effluent to surface water or groundwater. These licences set conditions so that the discharge is treated and controlled in a manner that protects the receiving environment (Discharge Licences | Dublin City Council).

[7] EU Annex I Habitats identified as groundwater dependent terrestrial ecosystems in Working Group on Groundwater, 2005. *Guidance on the application of groundwater risk assessment sheets SWRA 1-6 and GWDTERA 1-9 to areas designated for the protection of habitats and species*. Guidance document no. GW11.

Hydrogeology

Geology, aquifers and groundwater conditions

12.4.28 The superficial deposits and bedrock geology at the Power Plant Area are detailed in Chapter 13: Soils and Geology (refer to EIAR Volume I). A summary of the mapped geology, aquifer classifications, groundwater vulnerability and subsoil permeability beneath the Proposed Development and Overall Project is provided below (GSI, 2023) (see Figure 13.1 in Chapter 13: Soils and Geology of this EIAR):

- The southern half of the Power Plant Area is mapped as being underlain by till (boulder clay) derived from limestones (TLs). These deposits are not mapped as being an aquifer but are considered likely to act as a pathway to the underlying bedrock aquifer, where permeable. The northern half is mapped as being underlain by cut over raised peat (Cut).
- The Power Plant Area is mapped as being underlain by the Lucan Formation, which comprises of dark grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. This formation is mapped as being a locally important aquifer (Ll), bedrock which is moderately productive only in local zones. The Lucan Formation contains intrusions of Volcaniclastic Agglomerate, the closest being mapped at approximately 500m to the south of the Power Plant Area.
- The subsoil permeability at the Power Plant area is low.
- The groundwater vulnerability is mapped as being low.
- There are no mapped faults beneath the Power Plant Area; however, regionally, the overall study area is highly faulted with a few north-east to south-west and south-east to north-west trending faults mapped.
- The groundwater flow direction within the bedrock aquifer around the Power Plant Area, is likely to be to the northeast, in line with the regional surface water flow direction. However, local variations in groundwater flow direction may occur where shallow groundwater is in hydraulic continuity with surface waterbodies.
- The groundwater flow direction within the superficial deposits is likely to vary depending on composition, local permeability differences, thickness of the deposits and the proximity to surface watercourses. It is expected that shallow groundwater discharge (baseflow) to surface watercourses will only occur where they are in hydraulic continuity. However, there is no data to determine the degree of hydraulic connectivity available to this study.

12.4.29 There have been two (2 No.) historic ground investigation (GI) works undertaken in the Power Plant Area. A preliminary ground investigation was undertaken in April/ May 2008 by Glover Site Investigations Limited to establish ground conditions at the existing BnM facility at Derrygreenagh (Derrygreenagh Works). A second ground investigation was undertaken in April-July 2023 by Irish Drilling Limited (IDL) at the existing facility, and at the proposed substation sites. The following table summarises the groundwater strikes recorded during these ground investigation works. Most of the boreholes drilled in this area during the most recent investigation, undertaken in April 2023, were recorded to be dry. The locations are shown on Figure 12.2.

Table 12-9: Power Plant Area - Summary of groundwater strikes

BOREHOLE NAME	GROUNDWATER STRIKE (MBGL)	GEOLOGICAL UNITS	GROUND INVESTIGATION
BH02	2.6, 10.0	Gravel	Glover, 2008
BH03	8.9, 9.4, 12.0	Gravel, Cobbles, Boulders	
BH05	2.9, 8.2, 23	Clay, Gravel, Clay	
BH06A	8.1	Gravel	
BH07	8.0	Gravel	
BH08	7.8	Weathered limestone	
BH09	12.5	Gravel	
OB1/BH4	4.2, 10.6	Gravel	
BH101	6.0	Gravel	IDL, 2023
BH105	10.2	Weathered limestone	

12.4.30 A total of four (4 No.) months of groundwater level monitoring undertaken with the Power Plant Area is available to this assessment. The locations are shown on Figure 12.2. The following table summarises the monitoring boreholes and the range of groundwater levels recorded during this period (April – July 2023).

Table 12-10: Power Plant Area - Summary of Monitoring Boreholes and Monitored Groundwater Levels

BOREHOLE NAME	DEPTH	GEOLOGICAL UNITS	SCREENED OPPOSITE	MONITORED WATER LEVELS (MBGL)
OB2	60.0	Superficial deposits (0-25) Weathered limestone (25-28) Limestone bedrock (28-60)	Limestone bedrock	7.13 – 8.04
BH118	9.2	Made ground (0-0.8) Superficial deposits (0.8-9.2)	Silt	7.48 – 7.93
BH117	55.4	Superficial deposits (0-55.4)	Silt, gravel and cobbles	7.90 – 8.22
BH104	50.9	Superficial deposits (0-37.7) Limestone bedrock (37.7-47) Cavity (47-47.6) Limestone bedrock (47.6-50.9)	Gravel, Limestone bedrock	7.76 – 8.48
BH111A	20.7	Superficial deposits (0-7) Limestone bedrock (7-20.7)	Limestone bedrock	11.62 – 11.98
BH116	7.6	Superficial deposits (0-22.1)	Sand, gravel	6.26

12.4.31 Variable head permeability tests were carried out at a number of the groundwater monitoring boreholes, installed during the most recent investigation, undertaken in April 2023, the results of which are provided below (IDL, 2023). The locations are shown on Figure 12.2.

Table 12-11: Power Plant Area - Summary of permeability test results

BOREHOLE NAME	DEPTH	GEOLOGICAL UNITS	PERMEABILITY (m/sec)
BH101	8.6	Made ground, silt, gravel	$1.73E^{-06}$
BH102	5.1	Made ground, peat, silt, gravel	$5.85E^{-05}$
BH103	3.5	Made ground, gravel, silt	$3.58E^{-06}$
BH112	5.1	Made ground, sand	$2.02E^{-05}$

12.4.32 Two (2 No.) pumping tests were carried out at the Power Plant Area at the PW1 well. A pumping test undertaken by Glover in 2008 identified that PW1 had sufficient capacity to supply up to 630m^3/day on an ongoing basis. It was noted that whilst the pumping well had not quite established equilibrium, equilibrium state was being approached as well as in the four monitoring wells. A second pumping test undertaken by HES in 2023 identified that PW1 has sufficient capacity to supply at least 1,008m^3/ day on an ongoing basis (Refer to Appendix 12D Groundwater Yield Report, EIAR Volume II). No further information on these tests, including aquifer property values, is available to this assessment.

Table 12-12: Power Plant Area - Summary of pumping test results

WELL ID	TEST DURATION	PUMPING RATE (m^3/ day)	DRAWDOWN (m)	TRANSMISSIVITY (m^2/ day)	SPECIFIC CAPACITY (m^3/ day/ m)	RADIUS OF CONE OF DEPRESSION (m)
PW1	Unknown	605	5.24	235.5	57.7	30
PW1	7-day constant rate	1,008	8.78	-	-	-

Groundwater quality

12.4.33 There were eight (no. 8) boreholes installed within the Power Plant Area from both the 2008 and 2023 G.I investigations utilised for the purposes of groundwater quality monitoring. Additionally, the existing sites supply borehole, referred to the as the 'Hostel Well', was also included during the groundwater quality monitoring.

12.4.34 A summary of the boreholes used for monitoring are presented in the table below.

Table 12-13: Power Plant Area - WFD surface waterbodies

BOREHOLE ID	TARGET STRATA	INSTALLED
BHSS04	Superficial deposits	2023 G.I works
BH117	Superficial deposits	2023 G.I works
BH118	Superficial deposits	2023 G.I works
BH104	Bedrock	2023 G.I works
BH111a	Bedrock	2023 G.I works
BHSS(M)07	Bedrock	2023 G.I works
OBH2	Bedrock	2008 G.I works
Hostel Well	Bedrock (unconfirmed)	Unknown

12.4.35 Monthly water quality monitoring undertaken by AECOM, on behalf of BnM, commenced in May 2023. The results of the first four (no. 4) rounds of groundwater monitoring and a summary of laboratory results are presented in Appendix 12B.

12.4.36 In summary, TPH and BTEX were detected below laboratory Limits of Detection (LOD) in all of samples during the four (4 no.) monitoring rounds. Phenols were detected just above the laboratory LOD of 0.2 µg/l in one sample at BH117 at a concentration of 0.22 µg/l. The remainder of samples were below the LOD. However, concentrations returned to below their respective LOD's during Round 4. Elevated p-Cresols at 3.5 µg/l in bedrock monitoring borehole BH117 during Round 3. However, concentrations returned to below the LOD of 0.2 µg/l during Round 4.

12.4.37 PAHs were detected the LOD's in number of samples across the four monitoring rounds. Fluoranthene was detected above the laboratory LOD of 0.02 µg/l at a concentration of 0.04 µg/l during round 3 at BH111a. 2,3/3,5-Dimethylphenol + 4-Ethylphenol and o-Ethylphenol were detected above their LOD's of 0.02 µg/l and 0.03 µg/l at concentrations of 0.028 and 0.25 respectively in BMSS(M)07 during Round 3.

12.4.38 The data shows that the pH varied between 6.5 and 7.9 pH units. However, a single reading of 2.8 pH units was recorded during Round 3 at BMSS(M)07 but this is considered to be erroneous. The electrical conductivity between 582 µS/cm and 3,280 µS/cm. However, an outlier reading was recorded during Round 3 at BH111A, but this is also considered to be erroneous. The chloride concentrations varied between 11.4 mg/l and 32.3 mg/l. The ammonia (NH_3) concentration varied between below laboratory LOD of 0.05 mg/l and 6.07 mg/l. Nitrate concentrations varied between below laboratory LOD of 1 mg/l N, and 3.178 mg/l N.

12.4.39 There were no exceedances of the Drinking Water Regulations [8] recorded during the monitoring period. There was exceedance of the EPA Interim Guideline Value (IGV) [9] value of 0.15 mg/l in BHSS04 during Round 4 at 6.07 mg/l and in BHSS(M)07 for Round 3 and 4 at 1.83 mg/l and 3.7 mg/l respectively. There was exceedances of the orthophosphate IGV value of 0.03 mg/l which was BHOB2 – Round 2, BHSS(M)07 - Round 4 and BH117 – Round 3 at a concentration of 0.073 mg/l, 5.2 mg/l and 0.312 mg/l respectively.

WFD groundwater bodies

12.4.40 The Power Plant Area, as well as the overall study area, is mapped by being within the Athboy groundwater body (GWB) (IE_EA_G_001) (EPA, 2023). This groundwater body has a flow regime characterised as 'poorly productive'. Groundwater flow will mainly occur laterally through the upper weathered zone of the aquifer, and below this, flow occurs along fractures, faults, and karstic conduits (GSI, 2004a).

12.4.41 The EPA mapping of 3rd cycle (2016-2021) WFD status and significant pressures indicates that the Athboy groundwater body has been classified as having overall 'Good' status, with no listed significant pressures and classified as being 'Not At Risk' WFD status i.e., not at risk of not achieving WFD status objectives by 2027.

Groundwater abstractions/ monitoring points/ discharges

12.4.42 There is one well located in the Power Plant Area - 'PW1' – and one well located approximately 80m outside of the Proposed Development - the 'Hostel Well'. These wells are not recorded in the GSI's National Well Database (GSI, 2023). The PW1 well was

[8] European Union (Drinking Water) Regulations 2023, S.I. No. 99/2023. Available at: https://www.irishstatutebook.ie/eli/2023/si/99/made/en/print

[9] EPA, 2003. Groundwater Interim Report. Available at: https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/groundwater-interim-report.php

drilled to 65mbGL into and screened opposite the Lucan Formation (Glover, 2008). This well was pump tested and was considered capable of supplying at least 1,008 m^3/ day on an ongoing basis. It is understood that this well is not currently in use. There are no details on the well depth, construction, drilled geology or pump testing results available to this study for the Hostel Well; however, this well supplies all the current water requirements for the existing BnM site.

12.4.43 According to the GSI's Athboy GWB description, there is one recorded groundwater abstraction referred to as 'BnM at Derrygreenagh', with a recorded yield of 27 m^3/d. It is not known is this is referring to the 'Hostel Well', which is the water supply to the site.

Karst landforms

12.4.44 There are no karst features mapped within the Power Plant Area, and the closest feature is a karst spring mapped at approximately 6.4km to the south (GSI, 2023).

Groundwater Dependent Terrestrial Ecosystems

12.4.45 The Power Plant Area is bound on to the east and north by the Knockdrin Garr Cutover Complex (including the Drumman Bog), and to the west and south by the Derrygreenagh Bog Group (including the Derryarkin Bog) respectively (Wetland Surveys Ireland, 2023). These sites are outlined in Figure 12.2. Both sites are undesignated but contain habitats which typically rely on groundwater contributions, in particular fen (Working Group on Groundwater, 2004). Fens and flushes are associated with bogs and form in hollows when peat-forming systems are fed by groundwater which has a richer mineral content. Calcareous fens are an EU Annex I protected habitat. However, a review of these habitats, provided in EIAR Chapter 9: Biodiversity, suggests that these habitats were identified during surveys as Poor Fen and Flush and not of Annex I status (Woodrow, 2022).

12.4.46 The River Boyne and River Blackwater SAC and SPA are located approximately 25m downstream on the Mongagh River from the Power Plant Area, and while at distance, are hydraulically connected via surface watercourses. The qualifying interests or reasons for designation for the River Boyne and River Blackwater SAC and SPA include EU Annex I habitats which are groundwater dependent terrestrial ecosystems (Working Group on Groundwater, 2004). However, given the distance from the Power Plant Area, it is unlikely that these habitats are hydraulically connected via groundwater.

Groundwater flood risk

12.4.47 There are no mapped areas of historic groundwater flooding or of probability of groundwater flooding within the Power Plant Area Study Area (GSI, 2023).

12.4.48 According to GSI recharge mapping, groundwater recharge at the Power Plant Area is mapped as 110 mm/ year and is characterised as 'Made Ground'.

Electricity Grid Connection

Land Use, Topography and Rainfall

12.4.49 The 220kV substation site is adjacent to the Power Plant Area, located on the western side of the R400 roadway, also on a "mineral island" but at a slightly lower ground level than the Power Plant Area, with a topographical low of 79m AOD increasing to a level of 84m AOD.

12.4.50 The double circuit 220kV hybrid transmission facilitated by a line-cable interface compound on Ballybeg Bog consists of an Overhead Line (OHL) (c. 5km) and Underground Cable (UGC) (c. 3.4km) to tie in with the 400kV loop-in substation location at the Oldstreet-Woodland 400kV line.

12.4.51 The Electricity Grid Connection transmission route runs southward from the 220kV substation Site and the OHL traverses relatively level cutover peatland at elevations between 70 and 80+ metres OD (Ordnance Datum Malin Head) to the substation where the cables begin to run underground.

12.4.52 EPA Corine 2018 landcover mapping describes the landcover in the vicinity of the Electricity Grid Connection route as almost entirely 'inland wetlands' described as 'peat bog', with an area of 'agricultural areas' described as 'pastures' from 250m to 1,100m at the 400kV substation site. Peat has been intensively harvested from the areas traversed by the Electricity Grid Connection within Derryarkin Bog and Ballybeg Bog.

12.4.53 The closest Met Éireann weather observing station to the Electricity Grid Connection, with available historical data, is located at Mullingar (Rathruddy West) (Station No. 2721), at approximately 19km north-west of the Electricity Connection Corridor. The 30 year or 'long term average' (LTA) monthly rainfall dataset (1979-2008) is shown in Plate 12.2 (Section 12.4, Power Plant Area), as well as the available monthly rainfall data for 2020-2023 (until June). The LTA annual rainfall (1979-2008) is 941.3mm. According to Met Éireann, most of the eastern half of the country gets between 750 and 1000mm of rainfall in the year, while rainfall in the west generally averages between 1000mm and 1400mm. The LTA annual rainfall for Mullingar is therefore within the range for the east. The datasets show that monthly rainfall is generally lower in the spring months and wetter in the summer/ autumn months.

Hydrology

Surface waterbodies

12.4.54 The Electricity Grid Connection Area crosses two (no. 2) WFD designated river waterbodies – the Yellow (Castlejordan)_010 and 020 (EPA Code 07Y02) (IE_EA_07Y020070 and IE_EA_07Y020100 respectively) and the Castletown Tara Stream_010 (EPA Code 07C08) (IE_EA_07C080190), also known as the Coolcor Stream. The most recent EPA mapping of WFD status and significant pressures (3rd Cycle, 2016-2021) for these river waterbodies is provided in the Table 12-14 below.

12.4.55 The WFD hydromorphological status (heavily modified status) of these surface waterbodies is listed as unknown (EPA Catchments, 2023). However, according to Triturus *Aquatic baseline report for Derrygreenagh* (2023), the Yellow River (07Y02) at the R400 road is a lowland depositing watercourse (FW2) and has been extensively deepened and straightened with a deep U-shaped profile but exhibited good recovery with semi-natural characteristics. The Castletown Tara Stream_010 (07C08) (Coolcor Stream) is a lowland depositing stream (FW2) and has been extensively straightened and over-deepened historically, with resulting very steep trapezoidal banks (5m bankfull heights) and poor hydromorphology.

12.4.56 There are two (no. 2) surface water bodies near the 400kV substation site both designated as Esker Stream_010 (EPA Code 14E01) and WFD river waterbody (IE_SE_14E010100) located approximately 950m and 1.3 km to the east and west respectively. These Esker Streams are tributaries of the Figile_040 (EPA Code 14F01) and WFD river waterbody (IE_SE_14F010300) at approximately 5km to the south of the Electricity Grid Connection, which in turn is a tributary of the Barrow_110 (EPA Code 14B01).

12.4.57 The WFD hydromorphological status (heavily modified status) of the Yellow River is listed as unknown (EPA Catchments, 2023). However, according to Triturus *Aquatic baseline report for Derrygreenagh* (2023), the Esker Stream_010 (14E01) is a semi-natural lowland depositing watercourse (FW2) and has been historically widened but retains a semi-natural supporting habitat.

12.4.58 The Grand Canal waterbody (IE_14_AWB_GCMLW), a designated WFD canal waterbody, is located within 450m to the south of the 400kV substation.

12.4.59 The surface waterbodies within the Study Area around the Electricity Grid Connection are shown in Figure 12.1.

Table 12-14: Electricity Grid Connection Area - WFD surface waterbodies

EPA WFD WATERBODY NAME	WATERCOURSE NAME	EPA CODE	WFD ID	WFD STATUS (2016-2021)	WFD AT RISK STATUS (3RD CYCLE)	APPROX. DISTANCE FROM ELECTRICITY GRID CONNECTION
Yellow (Castlejordan)_010	Yellow River	07Y02	IE_EA_07Y020070	Poor	At Risk (Extractive industry significant pressures)	Traversed by
Yellow (Castlejordan)_020			IE_EA_07Y020100	Good	Not At Risk	Traversed by
Castletown Tara Stream_010	Coolcor Stream	07C08	IE_EA_07C080190	Moderate	At Risk (Extractive industry significant pressures)	Traversed by
Esker Stream_010	Esker Stream	14E01	IE_SE_14E010100	Moderate	Review	430m (to east)
Grand Canal Main Line West (Barrow)	Grand Canal		IE_14_AWB_GCMLW	Good	Review	450m (to south)

Surface water flows

12.4.60 According to EPA Catchments, there is an available river flow estimate generated by the EPA's Hydrotool[10] for the Yellow River, both upstream and downstream of the proposed process water discharge point (Easting 649758, Northing 736426), as outlined in Table 12-5. The following table summarises the data for the Esker Stream_010.

Table 12-15: Electricity Grid Connection - EPA Hydrotool river flow estimates

WATERCOURSE NAME	RIVER SEGMENT ID	CONTRIBUTING CATCHMENT AREA (km^2)	NATURALISED FLOW ESTIMATES (m^3/s)		
			Q10	Q50	Q95
Esker Stream	14_1792	5.81	0.24	0.062	0.015
	14_1829	12.62	0.366	0.111	0.029

[10] The EPA's Hydrotool is a dataset of naturalised river flow duration percentiles for Irish rivers that will enable assessment of quantitative impacts relating to hydrological alterations. The flow estimates represent flows that could be expected in rivers under naturalised conditions and do not take account of artificial influences of any kind such as water supply abstractions or wastewater discharges.

Surface water quality

12.4.61 According to EPA Catchments, there are two (2 No.) river monitoring stations located on both the Yellow River (Castlejordan) and the Castletown (Tara Stream) at which latest river Q values have been assigned. The following table summarises this data.

Table 12-16: Electricity Grid Connection - Latest river Q values

WATERCOURSE NAME	WFD WATERBODY NAME	RIVER STATION NAME	LATEST RIVER Q VALUE (STATUS)	YEAR
Yellow River	Yellow (Castlejordan)_010	Nr Derryarkin	3 (Poor)	2003
		Bridge downstream of Big River confluence	3 (Poor)	2020
Castletown (Tara Stream)	Castletown (Tara Stream) _010	Rhode WWTW upstream	3-4 (Moderate)	2020
	Castletown (Tara Stream) _010	Rhode WWTW downstream	3-4 (Moderate)	2020
Yellow River	Yellow (Castlejordan)_020	Garr Bridge	4 (Good)	2020

12.4.62 As part of this assessment, surface water monitoring was undertaken at seven (7 no.) locations across the Study Area as outlined in Figure 12.1. With the exception SW_M1 and SW_M3, all of the surface water monitoring locations are on surface water bodies that receive runoff catchment from the along Electricity Grid Connection Area, as outlined in Figure 12.1.

Table 12-17: Electricity Grid Connection – Surface water monitoring locations

WATERCOURSE NAME	LOCATION	EASTING	NORTHING	LOCATION DESCRIPTION
Yellow river	SW_Y1	249675	236497	Upstream of potential future site discharges, immediately upstream of EPA monitoring site
Yellow river	SW_Y2	251746	235958	Downstream of potential future site discharge and transmission line
Coolcor Stream	SW_C1	251891	234594	Downstream of potential transmission station, aligns with AER site
Coolcor Stream	SW_C2	249988	233103	Upstream of potential transmission station.
Unnamed stream	SW_U1	250935	230953	Downstream of potential transmission station, located on an unnamed and unmarked drain within the bog (no upstream watercourse)
Road	SW_R1	253227	231546	Downstream of potential substation and transmission line.

WATERCOURSE NAME	LOCATION	EASTING	NORTHING	LOCATION DESCRIPTION
Esker Stream	SW_E1	249966	230369	Downstream of potential substation and transmission line

12.4.63 A summary of the laboratory results from four (4 no.) rounds of monitoring conducted between April and July 2023 and laboratory datasheets are presented in Appendix 12B. Each monitoring was undertaken over 3 days on the weeks of the 17th April, 22nd May, 3rd July and 24th July.

12.4.64 Screening for TPH, PAH's, BTEX, phenols and cresols was undertaken at SW_M3 (downstream location) during Round 1 monitoring in April 2023. Concentrations were below the laboratory detection limits and these determinands were not tested for in the remainder of the monitoring rounds.

12.4.65 The monitoring results at the above listed locations show that the pH varied between 7 and 8.2 pH units; the electrical conductivity between 340 µS/cm and 1507 µS/cm and the chloride concentration between 12 mg/l and 20.3 mg/l. The ammonia (NH3) concentration was between 0.035 mg/l and 0.203 mg/l. Nitrate varied between 1.314 mg/l N and 3.99 mg/l N with the exception of the SW_Y2 sample recorded at 206.59 mg/l during Round 4. It is not known the reason for this elevated concentration. The volatile organic compound (VOC) analysis recorded all determinands below the laboratory detection limits in all samples.

12.4.66 There were multiple samples with elevated ammonia above the EPA IGV value of 0.15 mg/l as follows: SW_E1 - Round 3 (1.33 mg/l), SW_U1 - Round 2 (0.23 mg/l), SW_R1 - Round 2 (0.15 mg/l), SW_C1 - Round 1,2 and 4 (0.0.23 – 0.55) and SW_C2 - Round 2 – 4 (0.15 – 0.42).

12.4.67 There were only three exceedances of the orthophosphate EPA IGV value of 0.03 mg/l which were SW_U1 – Round 4, SW_C1 – Round 2 and SW_C2 – Round 4 at concentrations of 0.061 mg/l, 0.043 mg/l and 0.086 mg/l respectively. There was one exceedance of the EPA IGV limit for Nitrate of 50 mg/l N at SW_Y2 during Round 4 at a concentration of 206 mg/l. However, subsequent monitoring round showed concentrations well below the IGV standard.

WFD river sub basins

12.4.68 The Electricity Grid Connection falls within the Boyne WFD catchment and, to the south of the L1010 road, within the Barrow WFD catchment. The 200kV substation falls within the Castlejordan_020 WFD river sub basin and the OHL and UGC routes and 400kV substation site falling within the Yellow (Castlejordan)_020, Castletown Tara Stream_010 and Esker Stream_010 WFD river sub basins.

Surface water abstraction/ monitoring/ discharge points

12.4.69 The Yellow River, Coolcor and Esker streams are not designated as drinking water rivers and there are no surface water abstraction locations within the study area.

12.4.70 According to EPA Hydronet, there is one EPA surface water monitoring point located on the Coolcor Stream at 700m to the east of the Electricity Grid Connection Area (Rhode WWTP, station ID SF07_009), which is currently inactive. Consistent and long-term level and flow gauging is important for many purposes including water quality, WFD and flood risk purposes, therefore all hydrometric stations with an 'operational' status would be identified as a constraint.

12.4.71 According to EPA Catchments, there are three urban wastewater (UWW) emission points located on the Coolcor Stream. These are listed as a stormwater overflow

(TPEFF2500D0227SW002) located approximately 700m, a primary effluent emission point (TPEFF2500D0227SW001) located approximately 900m, and a primary effluent emission point (TPEFF3900D0227SW003) located approximately 1.6km (all east of the Electricity Grid Connection). These discharges appear to relate to the listed UWW plant location operated by Uisce Eireann at Rhode (Reg No. D0227-01), plant within approximately 800m, east of the Electricity Grid Connection. This plant is listed as a licensed tertiary phosphate removal plant, with a population equivalent (pe) of between 1,000 and 2,000.

Designated sites with surface water dependent habitats or species

12.4.72 There are no recorded SACs or SPAs within 1km of the Electricity Grid Connection. There is one proposed Natural Heritage Area (pNHA), the Grand Canal pNHA (ID 002103) located within 100m to the south of the Electricity Grid Connection (UGC route). This site is proposed for designation for its ecological value and diversity of species and its water supply fed from Lough Owel.

12.4.73 However, the River Boyne and River Blackwater SAC and SPA are hydraulically connected >22km downstream of the Electricity Grid Connection Area, via the Yellow River (Castlejordan) WFD waterbody (see table below). A summary of all designated sites is presented in Chapter 9 – Biodiversity (refer to EIAR Volume I); however, these sites are of interest to the biodiversity assessment for atmospheric reasons and therefore not included here.

Table 12-18: Electricity Grid Connection Area – Designated surface water dependent sites

DESIGNATED SITE NAME	REASON(S) FOR DESIGNATION[11]	APPROX. DISTANCE TO ELECTRICITY GRID CONNECTION AREA
River Boyne and River Blackwater SAC [002299]	Alkaline fens [7230] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	22.5km downstream (to northeast)

Surface flood risk and drainage

12.4.74 The below is a summary of baseline flood risk, based on Appendix 12A (refer to EIAR Volume II).

12.4.75 The Electricity Grid Connection route, based on the NIFM extents, has elements (water compatible) which are situated within Flood Zone A (>1% AEP) for present day and future scenarios, however all highly vulnerable elements of the development including the substation have been located outside of the present day and future scenarios (<0.1% AEP), therefore the overall risk of fluvial flooding is considered to be low.

12.4.76 There is existing surface water pumping at the Electricity Grid Connection site, at Ballybeg Bog. There are several silt ponds around the Proposed Development site and Ballybeg Bog contains outfalls on the eastern side (SW11, 12, 13 and 13A) which discharge water into the Yellow River north of the site (under Condition 6.2 of IPC licence P0501-01). Upstream of outfall SW13 is a pump site located in the centre of the bog which houses two submersible 22kW pumps that operate on a duty and assist basis (Bord na Móna, 2023).

[11] EU Annex I Habitats identified as groundwater dependent terrestrial ecosystems in Working Group on Groundwater, 2005. *Guidance on the application of groundwater risk assessment sheets SWRA 1-6 and GWDTERA 1-9 to areas designated for the protection of habitats and species*. Guidance document no. GW11.

Hydrogeology

Geology, aquifers and groundwater conditions

12.4.77 The superficial deposits and bedrock geology are detailed in Chapter 13: Soils and Geology. A summary of the mapped geology, aquifer classifications, groundwater vulnerability and subsoil permeability beneath the Electricity Grid Connection is provided below (GSI, 2023) (see Figure 13.1 in Chapter 13 of this EIAR):

- The 220kV substation Site and the OHL and UGC routes, are mapped as being underlain by cutover raised peat (cut).
- The 400kV substation Site and associated sections of the OHL and UGC routes are mapped as being underlain by cutover raised peat (cut) and till derived from limestones (TLs). These deposits are not mapped as being an aquifer but are considered likely to act as a pathway to the underlying bedrock aquifer, where permeable.
- The 220kV substation, 400kV substation and majority of the UGC are mapped as being underlain by the Lucan Formation (Ll aquifer). An area approximately 400m south of the Power Plant Area which lies within the OHL Route is mapped as being underlain by Agglomerate comprising volcaniclastic agglomerate and basalts (Lm aquifer).
- The subsoil permeability at the Electricity Grid Connection is classified as moderate, where underlain by till at the 400kV substation Site, and low where underlain by peat.
- The groundwater vulnerability is mapped as being low, where underlain by peat, to moderate, where underlain by till.
- There are no mapped faults beneath the 220kV substation sites. However, there is a mapped fault underlying the UGC, which has a south-east to north-west trend.
- The groundwater flow direction within the 220KV Substation Site and OHL Route is likely to be the same as the Power Plant Area, while in the area of the UGC and 400kV Substation, the groundwater flow direction within the bedrock aquifer is likely to be to the southeast, due to a groundwater / topographical divide around the townland of Kilbrennan (see Figure 12.3).

12.4.78 A total of four (4 No.) months of groundwater level monitoring undertaken with the Electricity Grid Connection Area, around the 220kV substation site, is available to this assessment. The locations are shown on Figure 12.2. The following table summarises the monitoring boreholes and the range of groundwater levels recorded during this period (April – July 2023). No monitoring of groundwater levels has been undertaken in boreholes located at the 400Kv substation site.

Table 12-19: Electricity Grid Connection Area - Summary of monitoring boreholes and monitored groundwater levels

BOREHOLE NAME	DEPTH	GEOLOGICAL UNITS	SCREENED OPPOSITE	MONITORED WATER LEVELS (MBGL)
BHSS04	8.3	Superficial deposits (0-8.3)	Silt	5.11 – 5.12
BHSS(M)07	49.07	Superficial deposits (0-49.07)	Sand and gravel	5.77 – 5.99

Groundwater quality

12.4.79 The 2023 Ground Investigation undertaken by IDL concerned the Power Plant Area and the Electricity Grid Connection and is described in Chapter 13: Soils and Geology. However, no water quality monitoring was undertaken within the Electricity Grid Connection Area, as part of this investigation.

WFD groundwater bodies

12.4.80 The Electricity Grid Connection, as well as the overall Study Area, is mapped by being within the Athboy groundwater body (GWB) (IE_EA_G_001) (EPA Catchments, 2023). This groundwater body has a flow regime characterised as 'poorly productive'. Groundwater flow will mainly occur laterally through the upper weathered zone of the aquifer, and below this, flow occurs along fractures, faults and karstic conduits (GSI, 2004a).

12.4.81 The EPA mapping of 3rd cycle (2016-2021) WFD status and significant pressures indicates that the Athboy groundwater body has been classified as having overall 'Good' status, with no listed significant pressures and classified as being 'Not At Risk' WFD status i.e., not at risk of not achieving WFD status objectives by 2027.

12.4.82 The 400kV substation Site and associated sections of the OHL and UGC routes are mapped as being within the Daingean groundwater body (GWB) (IE_SE_G_049) (EPA Catchments, 2023). This groundwater body has a flow regime characterised by short groundwater flow paths, with most of the groundwater flow being within the upper weathered zone, and recharging and discharging in local zones (GSI, 2004b).

Groundwater abstractions/ monitoring points/ discharges

12.4.83 According to the GSI's National Well Database, the nearest mapped groundwater abstractions to the Site are as follows:

- The 'Abstraction Well' (ID 2323SEW023) is mapped at approximately 200m to the west of the OHL. It was reportedly drilled in 1964 to a depth of 19.8m with a 33m^3/d yield. From aerial photography, the borehole appears to be located on a quarry. However, it is not known if this well still exists and is in use.
- A borehole owned by Edenderry RDC and part of a Public Water Supply (PWS) (ID 2323SEW013) is located in close proximity to the west of the 400kV substation Site. This was drilled in 1924 to 46.5m in depth, with a poor yield of 21.8m^3/ day. It is not known if this well still exists and is in use.
- A dug well (ID 2323SEW014) is located in close proximity to the west of the 400kV substation Site. This was dug in 1963 to 9.1m in depth, with a poor yield of 8.7m^3/ day and used for domestic supply purposes. It is not known if this well still exists and is in use.
- A borehole (ID 2323SEW037) is located at approximately 700m to the west of the 400kV substation Site. This was drilled in 1999 to 70.1m in depth, with a moderate yield of 43.6m^3/ day and used for agricultural and domestic supply purposes. It is not known if this well still exists and is in use.
- The spring associated with the Toberdaly PWS (ID 2323SEK001) is mapped at approximately 900m to the east of the 400kV substation Site and the UGC. This spring is related to three spring sources that supply the Toberdaly Public Supply and is protected by a delineated Source Protection Area, which at its closest is at approximately 500m from the UGC Route.
- Two boreholes, referred to as Heaveys BH (ID 2323SEW038) and Pool BH (ID 2323SEW039) and which appear to have been drilled as investigation boreholes by

Offaly County Council, are located approximately 1km to the east of the 400kV substation. These were drilled in 1999 to depths of 68.6m and 60.9m respectively with an excellent yield of 1,000m^3/d. These boreholes are not listed as wells in the GSI's *Toberdaly Public Supply Groundwater Source Protection Zones* report (1996); and therefore, it has been assumed that they are not related to the Toberdaly Public Supply.

12.4.84 The nearest public water supply and delineated Source Protection Area (SPA) to the Electricity Grid Connection is Toberdaly PWS, located at approximately 500m to the east. This spring is related to three spring sources that supply the Toberdaly Public Supply and is protected by a delineated Source Protection Area.

12.4.85 The Toberdaly PWS is also used as an EPA groundwater monitoring point (station ID GWIE_SE_G_04925000012) (EPA, 2023). This station appears to be used for WFD water quality surveillance and to be in operation. Consistent and long-term level and flow gauging is important for many purposes including water quality, WFD and flood risk purposes, therefore all hydrometric stations with an 'operational' status are identified as a receptor to protect these records.

Karst landforms

12.4.86 There are no karst features mapped within the Electricity Grid Connection (GSI, 2023). The nearest karst feature is a mapped spring (GSI reference 2323SEK001) located approximately 900m to the east of the 400kV substation Site. This spring supplies the Toberdaly Public Supply.

Groundwater Dependent Terrestrial Ecosystems

12.4.87 There is one pNHA, i.e., the Grand Canal pNHA (ID 002103), located within 100m of the Electricity Grid Connection Area. This site comprises the canal channel and its banks and is proposed for designation for its ecological value and diversity of species. As it is most likely lined, it is unlikely to be in hydraulic connection with groundwater, and therefore unlikely to be a groundwater dependent terrestrial ecosystem.

12.4.88 The 220kV Substation Site lies within the Derryarkin Bog. The transmission route OHL traverses Derryarkin Bog and Ballybeg Cutover Complex, the UGC traverses the Ballybeg Bog, while sections of the UGC south of the L1010 road connecting into the 400kV Substation Site are adjacent to a remnant area of raised bog. This area qualifies as the EU Priority Annex I habitat 'Active Raised Bogs' [7110] (Woodrow, 2022), which is listed as a groundwater dependent terrestrial ecosystem, with low to extreme sensitivity to changes in groundwater quality and quantity (Working Group on Groundwater, 2004).

Groundwater flood risk

12.4.89 There are no mapped areas of historic groundwater flooding or of probability of groundwater flooding within the study area (GSI, 2023).

12.4.90 The surrounding area underlying the OHL, line-cable interface compound and UGC is characterised as 'Cut Peat' and has a mapped recharge of between 21 mm/ year and 41 mm/ year. The western half of the 400kV substation Site has a mapped recharge of between 151 mm/ year and 200 mm/ year and is characterised by 'Till derived chiefly from limestone', while the eastern half has a mapped recharge of between 1 mm/ year and 50 mm/ year and is characterised by 'Cut Peat'.

Gas Connection Corridor

Land Use, Topography and Rainfall

12.4.91 The Gas Connection Corridor runs northwest from the Power Plant Area to the Dublin-Galway high pressure gas line (BGE/77) and is characterised by a generally low relief and relatively level agricultural terrain, generally at between 80 and 110 metres OD (Ordnance Datum Malin Head), reaching its maximum elevation of over 110m metres OD in agricultural land close to Kilbrennan.

12.4.92 EPA Corine 2018 landcover mapping records the landcover in the vicinity of the Gas Connection Corridor largely as 'Agricultural Areas' described as 'Pastures' other than the peatland areas at the south eastern end of the route, which are recorded as 'inland wetlands' described as 'peat bog', two areas of artificial surfaces associated with the M6 motorway corridor ('Road and rail network') and with the town of Rochfortbridge ('Discontinuous urban fabric') and an area of 'Agricultural Areas' described as 'Land principally occupied by agriculture with significant areas of natural vegetation'.

12.4.93 The closest Met Éireann weather observing station to the Gas Connection Corridor, with available historical data, is located at Mullingar (Rathruddy West) (Station No. 2721), at approximately 13km north-west of the Gas Connection Corridor. The 30 year or 'long term average' (LTA) monthly rainfall dataset (1979-2008) is shown in Plate 12-1, as well as the available monthly rainfall data for 2020-2023 (until June). The LTA annual rainfall (1979-2008) is 941.3mm. According to Met Éireann, most of the eastern half of the country gets between 750 and 1000mm of rainfall in the year, while rainfall in the west generally averages between 1000mm and 1400mm. The LTA annual rainfall for Mullingar is therefore within the range for the east. The datasets show that monthly rainfall is generally lower in the spring months and wetter in the summer/ autumn months.

Hydrology

Surface waterbodies

12.4.94 The Gas Connection Corridor area incorporates stretches of four (4 No.) WFD designated river waterbodies – the Mongagh River, the Yellow River, the Rochfortbridge Stream and the River Brosna. The most recent EPA mapping of WFD status and significant pressures (3rd Cycle, 2016-2021) for these river waterbodies is provided in the Table 12-20 below.

Table 12-20: Gas Connection Corridor - WFD surface waterbodies

EPA WFD WATERBODY NAME	WATERCOURSE NAME	EPA CODE	WFD ID	WFD STATUS (2016-2021)	WFD AT RISK STATUS (3RD CYCLE)	APPROX. DISTANCE FROM GAS CONNECTION CORRIDOR AREA
Castlejordan_020	Mongagh River	07C04	IE_EA_07Y020300	Good	Review	Traversed by
Yellow (Castlejordan)_010	Yellow River	07C02	IE_EA_07C040050	Poor	At Risk	Traversed by
Yellow (Castlejordan)_020			IE_EA_07Y020100	Good	Review	Traversed by
Rochfortbridge Stream_010	Rochfortbridge Stream	07R04	IE_EA_07 R040300	Moderate	At Risk	Traversed by
Brosna_040	River Brosna	25B09	IE_SH_25B090200	Moderate	At Risk	Traversed by

EPA WFD WATERBODY NAME	WATERCOURSE NAME	EPA CODE	WFD ID	WFD STATUS (2016-2021)	WFD AT RISK STATUS (3RD CYCLE)	APPROX. DISTANCE FROM GAS CONNECTION CORRIDOR AREA
Brosna_050			IE_SH_25B090250	Moderate	At Risk	Traversed by

Surface water flows

12.4.95 According to EPA Catchments, there is an available river flow estimate generated by the EPA's Hydrotool[12] for the Yellow River (Castlejordan)_010, as summarised in Table 12-21 below.

Table 12-21: Gas Connection Corridor - EPA Hydrotool river flow estimates

EPA WFD WATERBODY NAME	RIVER SEGMENT ID	CONTRIBUTING CATCHMENT AREA (km^2)	NATURALISED FLOW ESTIMATES (m^3/s)		
			Q10	Q50	Q95
Yellow (Castlejordan)_010	07_431	20.76	0.752	0.23	0.053

Surface water quality

12.4.96 According to EPA Catchments, there are five (5 No.) river monitoring stations located on the WFD river waterbodies crossed by the Gas Connection Corridor, at which latest river Q values have been assigned. The Q values refer to a biological rating system for freshwaters where the presence and quantity of specific organisms, primarily invertebrates, are surveyed and the overall health of the watercourse rated. The following table summarises this data.

Table 12-22: Gas Connection Corridor - EPA latest river Q values

WATERCOURSE NAME	EPA WFD WATERBODY NAME	RIVER STATION NAME	LATEST RIVER Q VALUE (STATUS)	YEAR
Yellow River	Yellow (Castlejordan)_010	Mongagh Bridge (RS07C040010)	3 (Poor)	1990
		Bridge southeast of Rochfortbridge (RS07C040040)	3 (Poor)	2020
	Yellow (Castlejordan)_010	Southeast of Rahinine downstream of Rochfortbridge Stream (RS07C040050)	3 (Poor)	2009

[12] The EPA's Hydrotool is a dataset of naturalised river flow duration percentiles for Irish rivers that will enable assessment of quantitative impacts relating to hydrological alterations. The flow estimates represent flows that could be expected in rivers under naturalised conditions and do not take account of artificial influences of any kind such as water supply abstractions or wastewater discharges.

WATERCOURSE NAME	EPA WFD WATERBODY NAME	RIVER STATION NAME	LATEST RIVER Q VALUE (STATUS)	YEAR
	Yellow (Castlejordan)_020	Southeast of Rahinine (RS07C040060)	3 (Poor)	2000
Rochfortbridge Stream	Rochfortbridge Stream_010	Bridge southeast of Derry (RS07R040300)	3-4 (Moderate)	2020

12.4.97 No surface water monitoring has been undertaken in this area as part of this study.

WFD river sub basins

12.4.98 The WFD was transposed into Irish Legislation by the European Communities (Water Policy) Regulations 2003, (Statutory Instrument 722) on 22nd December 2003. The legislation established the River Basin Districts (RBDs) and provides support for the protection of the status of all waters. River sub basins are a management and reporting unit for the Water Framework Directive (WFD). The Gas Connection Corridor lies predominantly within the Boyne WFD catchment, while with the northern reaches of the Gas Connection Corridor lie within the Lower Shannon WFD catchment (see Figure 12.1).

Surface water abstraction/ monitoring/ discharge points

12.4.99 The Yellow River, Rochfortbridge Stream and River Brosna are not designated as drinking water rivers and therefore there are no surface water abstraction locations within the study area.

12.4.100 According to EPA Hydronet, there are two (2 No.) EPA surface water monitoring point located within the Gas Connection Corridor – one on the Mongagh River (Derrygreenagh, station ID 07028), and one on the Rochfortbridge Stream (Rochfortbridge, station ID 07111), both of which are currently inactive. Consistent and long-term level and flow gauging is important for many purposes including water quality, WFD and flood risk purposes, therefore all hydrometric stations with an 'operational' status would be identified as a constraint.

12.4.101 According to EPA Catchments, there is one (1 No.) urban wastewater (UWW) emission points located on the Yellow (Castlejordan)_010. This is listed a stormwater overflow (TPEFF3200D0101SW002) within the Gas Connection Corridor and approximately 300m downstream of Rochfortbridge. This discharge appears to relate to the listed UWW plant location operated by Uisce Eireann at Rochfortbridge (Reg No. D0101) within the Gas Connection Corridor. This plant is listed as a licensed tertiary phosphate removal plant, with a population equivalent (pe) of between 2,001 and 10,000.

Designated sites with surface water dependent habitats or species

12.4.102 There are no recorded SACs or SPAs within 1km of the Gas Connection Corridor. However, the River Boyne and River Blackwater SAC and SPA are located >20km downstream of the Gas Connection Corridor, where the Mongagh River enters the River Boyne. The Lough Ennell SAC and SPA are located >1.8km downstream of the Gas Connection Corridor, where the River Brosna enters this lake waterbody (see table below). A summary of all designated sites is presented in Chapter 9 – Biodiversity (refer to EIAR Volume I); however, these sites are of interest to the biodiversity assessment for atmospheric reasons and therefore not included here.

Table 12-23: Gas Connection Corridor Area – Designated surface water dependent sites

DESIGNATED SITE NAME	REASON(S) FOR DESIGNATION[13]	APPROX. DISTANCE TO GAS CONNECTION CORRIDOR AREA
River Boyne and River Blackwater SAC [002299]	Alkaline fens [7230] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	21.5km downstream (to northeast)
Lough Ennell SAC	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] Alkaline fens [7230]	1.8km downstream (to north)

Surface flood risk and drainage

12.4.103 The below is a summary of baseline flood risk, based on Appendix 12A (refer to EIAR Volume II).

12.4.104 The Gas Connection Corridor, based on the NIFM extents, is buried and deemed water compatible, which is situated within Flood Zone C (<0.1% AEP) for present day and future scenarios therefore the overall risk of fluvial flooding is considered to be low.

Hydrogeology

Geology, aquifers and groundwater conditions

12.4.105 The superficial deposits and bedrock geology are detailed in Chapter 13: Soils and Geology. A summary of the mapped geology, aquifer classifications, groundwater vulnerability and subsoil permeability beneath the Gas Connection Corridor is provided below (GSI, 2023) (see Figure 13.1 in Chapter 13 of this EIAR):

- The Gas Connection Corridor is mapped as being underlain by cutover raised peat (cut) at its southernmost and northernmost reaches, with the remainder being underlain by till derived from limestones (TLs) and channels of alluvium (A) along the watercourses. These deposits are not mapped as being an aquifer but are considered likely to act as a pathway to the underlying bedrock aquifer, where permeable.
- The Gas Connection Corridor is mapped as being underlain by the Lucan Formation (Ll aquifer), with a narrow band of Agglomerate comprising volcaniclastic agglomerate and basalts (Lm aquifer) to the south of the M6 road, and a wider band of Waulsortian Limestone Formation (Ll aquifer) around Rochfortbridge.
- The subsoil permeability at the Gas Connection Corridor is classified as moderate, where underlain by till and alluvium, and low where underlain by peat.
- The groundwater vulnerability is mapped as high to moderate where underlain by till and alluvium, and low where underlain by peat.
- There are three (3 No.) mapped faults within the Gas Connection Corridor, two of which are parallel and trend southwest to northeast, and one which trends south southwest to north northeast. The older Waulsortian Limestone Formation is faulted against the younger Lucan Formation here.

[13] EU Annex I Habitats identified as groundwater dependent terrestrial ecosystems in Working Group on Groundwater, 2005. *Guidance on the application of groundwater risk assessment sheets SWRA 1-6 and GWDTERA 1-9 to areas designated for the protection of habitats and species*. Guidance document no. GW11.

- The regional groundwater flow direction within the Gas Connection Corridor is likely to be to the southeast within the Yellow River catchment, and to the northwest within the River Brosna catchment, due to a groundwater / topographical divide around the townland of Kilbrennan, northwest of Rochfortbridge (see Figure 12.3).

12.4.106 No groundwater monitoring has been undertaken in this area as part of this study.

Groundwater quality

12.4.107 The 2023 Ground Investigation undertaken by IDL concerned the Power Plant Area and the Electricity Grid Connection and is described in Chapter 13: Soils and Geology. However, no ground investigation works were undertaken within the Gas Connection Corridor. Therefore, no water quality monitoring was undertaken along the Gas Connection Corridor. The Gas Connection Corridor is not being applied for as part of the planning application for the Proposed Development (as it will be subject to separate consenting processes to be carried out by GNI at a later date).

WFD groundwater bodies

12.4.108 The majority of the Gas Connection Corridor, as well as the overall Study Area, is mapped by being within the Athboy groundwater body (GWB) (IE_EA_G_001) (EPA Catchments, 2023). This groundwater body has a flow regime characterised as 'poorly productive'. Groundwater flow will mainly occur laterally through the upper weathered zone of the aquifer, and below this, flow occurs along fractures, faults and karstic conduits (GSI, 2004a).

12.4.109 The EPA mapping of 3rd cycle (2016-2021) WFD status and significant pressures indicates that the Athboy groundwater body has been classified as having overall 'Good' status, with no listed significant pressures and classified as being 'Not At Risk' WFD status i.e., not at risk of not achieving WFD status objectives by 2027.

12.4.110 The northern section of the Gas Connection Corridor is mapped as being within the Clara groundwater body (GWB) (IE_SH_G_240) (EPA Catchments, 2023). This groundwater body has a flow regime characterised by short groundwater flow paths, with most of the groundwater flow being within the upper weathered zone, and recharging and discharging in local zones (GSI, 2003).

Groundwater abstractions/ monitoring points/ discharges

12.4.111 According to the GSI's National Well Database, the nearest mapped groundwater abstractions to the Gas Connection Corridor are as follows:

- The 'Hostel Well' is located approximately 80m to the south of the Power Plant Area. There are no details on the well depth, construction, drilled geology or pump testing results available to this study for the Hostel Well; however, this well supplies all the current water requirements for the existing BnM site.
- A series of dug wells (ID 2323NWW008, 2323NWW009, 2323NWW010, 2323NWW011 and 2323NWW015) are located in the Castlelost West townland. These were dug between 1996 and 1999 to depths of approximately 1.6m. There is no yield or usage information recorded within the database for these wells.
- A series of dug wells (ID 2323SEW200, 2323SEW201, 2323SWW101) are located in the Kiltotan townland. These were dug between 1996 and 1999 to depths of approximately 1.6m. There is no yield or usage information recorded within the database for these wells.

Karst landforms

12.4.112 There are no karst features mapped within the Gas Connection Corridor (GSI Online Viewer, 2023).

Groundwater Dependent Terrestrial Ecosystems

12.4.113 There are no GWDTEs located within the Gas Connection Corridor.

12.4.114 The River Boyne and River Blackwater SAC and SPA are located approximately 25m downstream on the Mongagh River from the Power Plant Area, and while at distance, are hydraulically connected via surface watercourses. The qualifying interests or reasons for designation for the River Boyne and River Blackwater SAC and SPA include EU Annex I habitats which are groundwater dependent terrestrial ecosystems (Working Group on Groundwater, 2004). However, given the distance from the Power Plant Area, it is unlikely that these habitats are hydraulically connected via groundwater.

12.4.115 The Lough Ennell SAC and SPA is located approximately 1.8km downstream on the River Brosna from the Gas Connection Corridor and is hydraulically connected via surface watercourses. The qualifying interests or reasons for designation for the Lough Ennell SAC and SPA include EU Annex I habitats which are groundwater dependent terrestrial ecosystems (Working Group on Groundwater, 2004). These habitats are likely to be hydraulically connected to the Clara WFD groundwater body underlying the Gas Connection Corridor.

Groundwater flood risk

12.4.116 There are two small, mapped areas of historic groundwater flooding within the Gas Connection Corridor Study Area (GSI Online Viewer, 2023). These areas are mapped as being groundwater and surface related and are located at approximately 1km south of Rochfortbridge.

12.4.117 The majority of the Gas Connection Corridor is characterised as 'Till derived chiefly from limestone' and has a mapped recharge of between 151-200 mm/ year. The remainder of the Gas Connection Corridor is characterised as 'Cut Peat' and has a mapped recharge of between 1 mm/ year and 50 mm/ year.

Summary of Water Environment Receptors

12.4.118 A summary of Water Environment receptors with the potential to be impacted by the Proposed Development and Overall Project is presented in Table 12-24.

Table 12-24: Summary of Water Environment receptors

CONSTRAINT TYPE	NAME	IMPORTANCE	REASON	UNIQUE CODE
Hydrology				
WFD river body	Mongagh River (Castlejordan_020 WFD waterbody, IE_EA_07C040100)	High	Good WFD status (biotic index Q4)	WE_RIVER_001
	Yellow River (Yellow (Castlejordan)_010, IE_EA_07Y020070)	Low	Poor WFD status (Q2-3, Q3)	WE_RIVER_002
	Yellow River (Yellow (Castlejordan)_020, IE_EA_07Y020100)	High	Good WFD status (biotic index Q4)	WE_RIVER_003

CONSTRAINT TYPE	NAME	IMPORTANCE	REASON	UNIQUE CODE
	Yellow River (Yellow (Castlejordan)_030, IE_EA_07Y020300)	High	Good WFD status (biotic index Q4)	WE_RIVER_004
	Coolcor Stream (Castletown Tara Stream_010, IE_EA_07C080190)	Medium	Moderate WFD status (biotic index Q3-4)	WE_RIVER_005
	Esker Stream (Esker Stream_010, IE_SW_14E010100)	Medium	Moderate WFD status (biotic index Q3-4)	WE_RIVER_006
	Boyne River (Boyne_030, IE_EA_07B040400)	High	Good WFD status (biotic index Q4)	WE_RIVER_007
	Rochfortbridge Stream_010 (IE_EA_07 R040300)	Medium	Moderate WFD status (biotic index Q3-4)	WE_RIVER_008
	River Brosna_040 and _050 (IE_SH_25B090200)	Medium	Moderate WFD status (biotic index Q3-4)	WE_RIVER_009
WFD canal water body	Grand Canal Main Line West (Barrow) (IE_14_AWB_GCMLW)	High	Good WFD status (biotic index Q4)	WE_CANAL_001
Hydrometric station	Mongagh River (Derrygreenagh Station ID 070280)	Low	Inactive	WE_SWMON_001
	Rhode WWTP (Station ID SF07_009)	Low	Inactive	WE_SWMON_002
	Rochfortbridge Stream (Rochfortbridge Station ID 07111)	Low	Inactive	WE_SWMON_003
Surface water abstractions	N/A	N/A	N/A	N/A
SWDE	Grand Canal pNHA	High	Proposed for designation on national scale	WE_SWDE_001
	River Boyne and River Blackwater SAC and SPA	Extremely high	Designated for water dependent habitats	WE_SWDE_002
	Lough Ennell SAC and SPA	Extremely high	Designated for water dependent habitats	WE_SWDE_003
Hydrogeology				
WFD groundwater body	Athboy	High	Supports SAC (Raheenmore Bog SAC)	WE_GWB_001
	Clara	High	Supports SAC (Lough Ennell SAC)	WE_GWB_002

CONSTRAINT TYPE	NAME	IMPORTANCE	REASON	UNIQUE CODE
	Daingean	High	Supports locally important source (Daingean PWS)	WE_GWB_003
Hydrometric station	Toberdaly PWS	High	Active groundwater monitoring station (EPA WFD surveillance)	WE_GWMON_001
Karst landform	Toberdaly PWS spring	High	Regionally important public water supply	WE_KARST_001
Groundwater abstractions	'Hostel Well'	Medium	Local potable water supply	WE_GWABS_001
	Onsite 'PW1'	Medium	Excellent yield with potential to supply existing site	WE_GWABS_002
	'Abstraction Well' (ID 2323SEW023)	Low	Local source – unclear if in use	WE_GWABS_003
	Edenderry RDC (ID 2323SEW013)	Low	Local source – unclear if in use	WE_GWABS_004
	Dug well (ID 2323SEW014)	Low	Local source – unclear if in use	WE_GWABS_005
	Borehole (ID 2323SEW037)	Low	Local source – unclear if in use	WE_GWABS_006
	Toberdaly PWS spring (ID 2323SEK001)	High	Regionally important public water supply	WE_GWABS_007
	Heaveys Borehole (ID 2323SEW038)	Medium	Excellent well yield/ unclear if in use	WE_GWABS_008
	Pool Borehole ((ID 2323SEW039)	Medium	Excellent well yield/ unclear if in use	WE_GWABS_009
	Dug well (ID 2323NWW008)	Low	Local source – unclear if in use	WE_GWABS_010
	Dug well (ID 2323NWW009)	Low	Local source – unclear if in use	WE_GWABS_011
	Dug well (ID 2323NWW010)	Low	Local source – unclear if in use	WE_GWABS_012
	Dug well (ID 2323NWW011)	Low	Local source – unclear if in use	WE_GWABS_013
	Dug well (ID 2323NWW015)	Low	Local source – unclear if in use	WE_GWABS_014
	Dug well (ID 2323SEW200)	Low	Local source – unclear if in use	WE_GWABS_015

CONSTRAINT TYPE	NAME	IMPORTANCE	REASON	UNIQUE CODE
	Dug well (ID 2323SEW201)	Low	Local source – unclear if in use	WE_GWABS_016
	Dug well (ID 2323SWW101)	Low	Local source – unclear if in use	WE_GWABS_017
GWDTEs	Knockdrin Garr Cutover Complex (including Drumman Bog)	Medium	Unknown value – survey required	WE_GWDTE_001
	Derrygreenagh Bog Group (including Derryakin Bog)	Medium	Unknown value – survey required	WE_GWDTE_002
	Ballybeg Cutover Complex	Medium	Unknown value – survey required	WE_GWDTE_003
	River Boyne and River Blackwater SAC and SPA	Extremely high	Designated for water dependent habitats	WE_GWDTE_004
	Lough Ennell SAC and SPA	Extremely high	Designated for water dependent habitats	WE_GWDTE_005

12.5 Predicted Impacts

Do Nothing Scenario

12.5.0 In the absence of the Proposed Development and Overall Project, no significant changes to hydrological and hydrogeological receptors are likely to occur under the current regime. The nature or value of the Study Area, in terms of WFD status, water resources and designated water dependent sites, would continue unchanged.

12.5.1 If the Proposed Development were not to proceed, environmental monitoring and site management of the Bogs (Drumman, Derryarkin and Ballybeg Bogs) would continue, as required under the conditions of the IPC Licence (P0501-01).

Impact Assessment for Power Plant Area

Construction Phase

12.5.2 During the construction phase, the following impacts on the Water Environment have the potential to occur.

- Impacts on surface and groundwater water quality due to the migration of sediments, or other construction chemicals/ wastewater, through uncontrolled site runoff.
- Impacts on surface and groundwater water quality due to accidental spillage of oils, fuels, or other construction chemicals/ wastewater.
- Impacts on surface and groundwater water flows, levels, and resource availability (to onsite and offsite groundwater abstractions and GWDTEs), due to dewatering of excavations, altered drainage regimes and discharging of abstracted water.
- Impacts on the geomorphology of watercourses, due to construction activities.
- Impacts to flood risk status by uncontrolled site runoff or by construction within areas at risk of flooding.

Impacts on water quality due to uncontrolled site runoff

12.5.3 Construction activities such as earthworks, site preparation, levelling, and grading operations typically result in the disturbance and excavation of soils. Exposed soil and peat are more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora, and fauna. This sediment could contain contaminants, particularly in the vicinity of the existing Derrygreenagh Works (refer to Chapter 5: Proposed Development and Figures 5-1 to 5-3 for a detailed description of Derrygreenagh Works). Refer to EIAR Volume I, Chapter 13: Soils and Geology for impacts relating to existing contamination.

12.5.4 Sediment in runoff can affect the Water Environment through smothering of riverbeds and plants, temporarily changing water quality (e.g., increased turbidity and reduced photosynthesis) and causing physical and physiological adverse impacts on aquatic organisms (such as abrasion and irritation). Given the location of the Power Plant Area, there is the potential for elevated metal concentrations in runoff, both in dissolved form or as suspended sediments. The potential impacts of sediment and other pollutants on aquatic organisms are addressed in Chapter 9: Biodiversity.

12.5.5 The Mongagh River is located adjacent to the northern boundary of the Power Plant Area and is the emission point for the proposed surface water discharge pipe leaving the area. The impact of a high sediment load entering this WFD river waterbody by way of the man-made ditches cut into the peat during construction could impact on both water quality, the hydromorphology and the habitat (see Chapter 9: Biodiversity). The Yellow

River is at >1km from this area and therefore the potential for impacts to this river water body is considered low. The Athboy WFD groundwater body, incorporating the locally important bedrock aquifer, is overlain by low permeability peat and superficial deposits, which will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards, and therefore the potential for impacts to groundwater as a result of uncontrolled site runoff is considered low. The importance of the Mongagh River is considered to be high; the impact rating is considered to be small adverse, direct, and temporary; which combined would result in a **moderate/ slight** effect on this receptor.

12.5.6 The Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog) are located immediately adjacent to the Power Plant Area. The impact of a high sediment load entering these GWDTEs during construction could impact on both water quality, the hydromorphology and the habitat (see Chapter 9: Biodiversity). The importance of these GWDTEs is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** effect on these receptors.

12.5.7 The onsite well, PW1, and the Hostel Well are understood to have suitably protected wellheads. The presence of low permeability peat and superficial deposits, and suitably protected wellheads at onsite boreholes, will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards. The importance of these groundwater abstractions is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** effect on these receptors.

Impacts on water quality due to accidental spillages

12.5.8 Any construction activities carried out close to surface waters involve a risk of pollution due to accidental spillage and leaks. While liquids such as oils, lubricants, paints, bituminous coatings, preservatives and weed killers present the greatest risk, fuel spillages from machinery operating close to watercourses also present a risk. The refuelling of general construction plant also poses a significant risk of pollution, depending on how and where it is carried out. In addition, lime and concrete (specifically, the cement component) is highly alkaline, and any spillage could affect the pH of the receiving waterbody.

12.5.9 Accidental spillages can result in a direct or indirect impact to surface water should contaminants enter surface waters directly, in this case, the Mongagh River. The Yellow River is at >1km from this area and therefore the potential for impacts to this river waterbody is considered low. This potential for direct adverse impacts on surface water quality is also valid for groundwater quality in the bedrock aquifer and the Athboy WFD GWB. The importance of the Mongagh River and the Athboy WFD GWB is considered to be high; the impact rating is considered to be small adverse, direct, and temporary; which combined would result in a **moderate/ slight** effect on these receptors.

12.5.10 The Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog) are located immediately adjacent to the Power Plant Area. The impact of an accidental spillage entering these GWDTEs during construction could impact on both water quality, the hydromorphology and the habitat (see Chapter 9: Biodiversity). The importance of these GWDTEs is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** effect on these receptors.

12.5.11 The onsite well PW1 and the Hostel Well are understood to have suitably protected wellheads. The presence of low permeability peat and superficial deposits, and suitably protected wellheads at onsite boreholes, will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards. The importance of these

groundwater abstractions is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** effect on these receptors.

Impacts on water levels and flows due to dewatering activities

12.5.12 Construction activities such as earthworks, site preparation, levelling, and grading operations can result in the need for dewatering activities, to remove encountered shallow groundwater. Temporary dewatering or altered drainage regimes has the potential to divert water away from groundwater abstractions, such as onsite PW1, and GWDTEs, or create flow barriers, leading to groundwater level and flow alteration.

12.5.13 Various components of the Power Plant Area will require excavation, including electrical cabling, the gas and heat export pipework, and cable joints for transmission cable routes (see EIAR Volume I, Chapter 5: The Proposed Development and Overall Project). The proposed depths of excavations (these depths are subject to change) are as follows:

- Where there is a structure, the maximum excavation depth will be approximately 2m.
- Where there is hardstanding, such as a road or car parking space, the excavation depth will be approximately 1m.
- Where there is a temporary construction compound, the excavation depth will be approximately 2m.

12.5.14 The results of the ground investigations suggest that the water table is at depths of greater than 2.6m bGL and is therefore unlikely to be intercepted during excavation works. Should shallow groundwater be encountered during construction, temporary dewatering and the discharge of abstracted water, could be required. Monitored groundwater levels are similar in the superficial deposits and underlying limestone bedrock, suggesting that these units are in hydraulic continuity. However, a 7-day pumping test undertaken at onsite groundwater abstraction PW1 in July and August 2023 showed there to be a limited response (0.46m) to pumping within the superficial deposits within the Power Plant Area (HES, 2023) (Refer to Appendix 12D Groundwater Yield Report, EIAR Volume II). Therefore, temporary dewatering of shallow groundwater in the superficial deposits is considered unlikely to significantly impact on water levels and resource availability in the underlying bedrock Athboy WFD groundwater body and GWDTEs. The importance of the Athboy WFD groundwater body is considered to be high and the importance of the Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog) is considered medium; the impact rating is considered to be negligible, direct and temporary for the Athboy WFD groundwater body, and small adverse, direct and temporary for the GWDTEs; which combined would result in an **imperceptible** effect and **slight** effect on these receptors respectively.

Impacts on watercourse morphology due to construction

12.5.15 During the construction of the new discharge pipelines to the Mongagh and Yellow rivers, there is the potential for the ingress of sediments to these river waterbodies and for the localised loss of natural bank habitat to the outfall. The importance of the Mongagh and Yellow rivers is considered to be high; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **moderate/ slight** effect.

Changes to flood risk and site drainage

12.5.16 Vegetation removal, site stripping, stockpiling, vehicle movements and bulk earthworks as part of the construction could leave topsoil and superficial deposits exposed to erosion by wind or rain. This could potentially lead to an increase in site runoff leaving site during

construction and to an increase in flood risk from pluvial sources. The importance of the Mongagh River is considered to be high; the impact rating is considered to be negligible, direct and temporary; which combined would result in an **imperceptible** effect.

Operational Phase

12.5.17 During the operational phase, the following Water Environment impacts have the potential to occur.

- Impacts on surface water quality in receiving waterbodies as a result of proposed discharges.
- Impacts on groundwater flows, levels and resource availability (to onsite and offsite groundwater abstractions and GWDTEs) due to increased groundwater abstraction from onsite borehole.
- Impacts on surface and groundwater water quality due to accidental spillage of oils, fuels, or other operational chemicals/ wastewater.
- Impacts on the geomorphology of watercourses due to any new drainage outfalls or other structures that may be installed or removed.
- Impacts to flood risk status by increased volume and rate of surface water runoff from new impervious areas.

Impacts on surface water quality as result of proposed discharges

12.5.18 The planned process wastewater discharge pipe is to extend west of the R400 road and discharge to the Yellow River at approximately 3km southwest of the Power Plant Area (Easting 649758, Northing 736426). This discharge comprises primarily of treated effluent from the water treatment plant which treats effluent from the water treatment plant and boiler blow-down. The quantity of process wastewater to be discharged from the Power Plant Area is estimated to be typically 14m^3/ hour with a peak flow rate of 50m^3/ hour for less than 8 hours per day, and therefore a peak flow rate of approximately 400m^3/ day (Fichtner, 2023). Refer EIAR Volume I, Chapter 5: Proposed Development, for more detail.

12.5.19 An assimilative capacity assessment was undertaken as part of the 2010 EIAR to determine if the Yellow River had sufficient assimilative capacity for the proposed process wastewater discharge at the time of 360m^3/ day (Mott MacDonald, 2010). Based on the anticipated limits likely to be set by the EPA under the Industrial Emissions (IE) Licence, and the planned water treatment systems at the time, the impact of discharge of process wastewater was expected to be insignificant. An Emission Limit Value (ELV) calculation has been undertaken as part of this assessment. The calculation sets out ELVs, based on the known discharge flow rate, upstream water quality and the receiving river flow rate, and discharge flow rates for the Proposed Development, which will achieve compliance with the aims of the WFD (2000/60/EC) and relevant Irish enacting regulations. The ELVs are considered achievable using Best Available Technology (BAT) for the treatment of process water effluent from thermal power plants. Refer to Appendix 12E Emission Limit Value Calculation, EIAR Volume II for more detail.

12.5.20 The planned rain/ surface water discharge, consisting of stormwater runoff from the site surfaces, is be treated in a stormwater system incorporating oil interceptors to enable the legislative limits to be achieved, prior to controlled discharge to the Mongagh River at approximately 700m north of the Power Plant Area (Easting 649504 Northing 738976). The quantity of rain/ surface water to be discharged from the Power Plant Area is estimated to be a maximum rate of 14.1l/s. Refer EIAR Volume I, Chapter 5: Proposed Development, for more detail.

12.5.21 The planned foul wastewater discharge, consisting of sewage and domestic type wastewater, is to be treated in a packaged treatment plant, discharged to the process wastewater plant and then to the consented discharge point on the Yellow river. Refer EIAR Volume I, Chapter 5: Proposed Development, for more detail.

12.5.22 The proposed discharges will be operated and controlled under a new IE Licence and will have requirement to comply with the relevant conditions of that licence. In addition, the ELVs have been calculated to achieve compliance with the aims of the WFD (2000/60/EC) and relevant Irish enacting regulations. Therefore, potential for impacts on surface water quality in receiving waterbodies as a result of proposed discharges is considered low. The importance of the Mongagh and Yellow rivers is considered to be high; the impact rating is considered to be negligible, direct and temporary; which combined would result in an **imperceptible** effect on this receptor.

Impacts on surface and groundwater quality due to accidental spillages

12.5.23 Any activities carried out close to surface waters involve a risk of pollution due to accidental spillage and leaks. While liquids such as oils, lubricants, paints, bituminous coatings, preservatives and weed killers present the greatest risk, fuel spillages from machinery operating close to waterbodies also present a risk.

12.5.24 Similar to during the construction phase, accidental spillages could result in a direct or indirect impact to surface water should contaminants enter waterbodies directly, in this case, the Mongagh and Yellow rivers. This potential for direct adverse impacts on surface water quality is also valid for groundwater quality in the bedrock aquifer and the Athboy WFD groundwater body. The importance of the Mongagh and Yellow rivers and the Athboy WFD GWB is considered to be high; the impact rating is considered to be small adverse, indirect and temporary; which combined would result in a **moderate/ slight** effect on these receptors.

Impacts on watercourse morphology due to proposed discharges

12.5.25 During operation, the proposed discharges to the Mongagh and Yellow rivers have the potential for bed and bank erosion, altering morphology, bed and bank habitats and resulting in increased sediment being transported downstream (refer to Appendix 12C WFD Screening Assessment, EIAR Volume II). In addition, outfalls and headwalls have the potential to cause loss and discontinuity of bank habitats, and outfall structures and pipe discharges have the potential to cause flow deflections and scour. The importance of these rivers is considered to be high; the impact rating is considered to be small adverse, direct and long-term; which combined would result in a **moderate/ slight** effect on the Mongagh and Yellow rivers.

Impacts on groundwater levels and resource availability due to increased groundwater abstraction

12.5.26 The existing BnM site uses the offsite 'Hostel Well' as the source of drinking, grey water and wash water. There is no operational or water level data for the Hostel Well available to this study. The Power Plant Area will use the recently tested onsite 'PW1' to provide the water requirements for the Proposed Development and Overall Project of 720m^3/ day. The pumping test undertaken at PW1 in July and August 2023 sustained an output of 1,010m^3/ day over a 7-day period with 8.78m of drawdown in groundwater levels, suggesting that the onsite groundwater abstraction is sufficient to meet these requirements (HES, 2023) (Refer to Appendix 12D Groundwater Yield Report, EIAR Volume II). In the absence of current operational and water level data, it is not possible to ascertain if abstraction of groundwater is in fact to increase as a result of the Power Plant Area. However, a 7-day pumping test undertaken at onsite groundwater abstraction PW1 in July and August 2023 showed there to be a limited response (0.46m) to pumping within the superficial deposits within the Power Plant Area (HES, 2023). Therefore, temporary dewatering of shallow groundwater in the superficial deposits is considered

unlikely to significantly impact on water levels and resource availability in the underlying bedrock Athboy WFD groundwater body and GWDTEs. The importance of the Athboy WFD groundwater body is considered to be high and the importance of the Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog) is considered medium; the impact rating is considered to be negligible, direct and temporary for the Athboy WFD groundwater body, and small adverse, direct and temporary for the GWDTEs; which combined would result in an **imperceptible** effect and **slight** effect on these receptors respectively.

Impacts to flood risk status by increased surface water runoff from new impervious areas

12.5.27 During the operational phase, the placement of increased impervious surfaces at the Power Plant Area could lead to an increase in the volume and rate of surface water runoff from the site and overall drainage discharge to the Mongagh River. The potential for changes to flood risk and site drainage is considered low (see EIAR Appendix 12A: Flood Risk and Drainage Assessment). The importance of the Mongagh River is considered to be high; the impact rating is considered to be negligible; which combined would result in an **imperceptible** effect on this receptor.

Decommissioning Phase

12.5.28 The Power Plant Area will have a design life of at least 25 years. At the end of its design life, it is expected that the Power Plant would either be decommissioned, or the lifetime could potentially be extended if appropriate.

12.5.29 Effects arising from the process of decommissioning of the Power Plant Area are considered to be of a similar nature and duration to those arising from the construction process on a precautionary basis (i.e., worst case scenario).

12.5.30 A Decommissioning Plan (including a Decommissioning Environmental Management Plan and potentially a Closure, Restoration and Aftercare Management Plan (CRAMP) will be prepared and agreed with the relevant authority prior to decommissioning. The Decommissioning Environmental Management Plan will consider in detail all likely environmental risks on the Site and contain guidance on how risks can be avoided or mitigated. Decommissioning activities for the Power Plant Area will be conducted in accordance with the appropriate guidance and legislation.

12.5.31 The operational requirements of the Power Plant Area may change during its design life, and it will be subject to regular reviews to identify potential modifications and amendments that would allow the asset to have a future sustainable use beyond 25 years.

Summary of predicted impacts

12.5.32 The following table summarises the predicted impacts for the Power Plant Area.

Table 12-25: Power Plant Area - summary of predicted impacts

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
Construction				
Impacts on water quality due to uncontrolled site runoff	Mongagh River	High	Small adverse, direct, and temporary	Moderate/ slight
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog	Medium	Small adverse, direct, and temporary	Slight

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
	Group (including Derryarkin Bog)			
	Onsite well, PW1, and offsite, Hostel Well	Medium	Small adverse, direct, and temporary	Slight
Impacts on water quality due to accidental spillages	Mongagh River	High	Small adverse, direct, and temporary	Moderate/ slight
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Medium	Small adverse, direct, and temporary	Slight
	Onsite well, PW1, and offsite, Hostel Well	Medium	Small adverse, direct, and temporary	Slight
	Athboy groundwater body	High	Small adverse, direct, and temporary	Moderate/ slight
Impacts on water levels and flows due to dewatering activities	Athboy groundwater body	High	Negligible, direct, and temporary	Imperceptible
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Medium	Small adverse, direct, and temporary	Slight
Impacts on watercourse morphology due to construction	Mongagh and Yellow rivers	High	Small adverse, direct, and temporary	Moderate/ slight
Changes to flood risk and site drainage	Mongagh River	High	Negligible, direct, and temporary	Imperceptible
Operation				
Impacts on surface water quality as result of proposed discharges	Mongagh and Yellow rivers	High	Negligible, direct, and long-term	Imperceptible
Impacts on surface and groundwater quality due to accidental spillages	Mongagh and Yellow rivers	High	Small adverse, direct, and long-term	Moderate/ slight
	Athboy WFD groundwater body	High	Small adverse, direct, and long-term	Moderate/ slight
Impacts on watercourse morphology due to proposed discharges	Mongagh and Yellow rivers	High	Small adverse, direct, and temporary	Moderate/ slight

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
Impacts on groundwater levels and resource availability due to increased groundwater abstraction	Athboy WFD groundwater body	High	Negligible, direct, and long-term	Imperceptible
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Medium	Small adverse, direct, and long-term	Slight
Impacts to flood risk status by increased surface water runoff from new impervious areas	Mongagh River	High	Negligible, direct, and long-term	Imperceptible

Impact Assessment for Electricity Grid Connection

Construction Phase

12.5.33 During the construction phase, the following potential impacts on the Water Environment may occur. These potential impacts have been assessed with consideration of the control measures and embedded mitigation, as outlined in Chapter 5: The Proposed Development and Overall Project.

- Impacts on surface and groundwater water quality due to the migration of sediments, or other construction chemicals/ wastewater, through uncontrolled site runoff.
- Impacts on surface and groundwater water quality due to accidental spillage of oils, fuels, or other construction chemicals/ wastewater.
- Impacts on surface and groundwater water flows, levels, and resource availability (to onsite and offsite groundwater abstractions and GWDTEs), due to dewatering of excavations, altered drainage regimes, and discharging of abstracted water.
- Impacts on watercourse morphology, due to construction activities.
- Impacts to flood risk status by uncontrolled site runoff or by construction within areas at risk of flooding.

Impacts on water quality due to uncontrolled site runoff

12.5.34 Construction activities such as earthworks, site preparation, levelling, and grading operations typically result in the disturbance and excavation of soils. Exposed soil and peat are more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora, and fauna.

12.5.35 Sediment in runoff can affect the Water Environment through smothering of riverbeds and plants, temporarily changing water quality (e.g., increased turbidity and reduced photosynthesis) and causing physical and physiological adverse impacts on aquatic organisms (such as abrasion and irritation). The potential impacts of sediment and other pollutants on aquatic organisms are addressed in Chapter 9: Biodiversity.

12.5.36 The Yellow River and the Coolcor Stream are crossed by the Electricity Grid Connection, and the Grand Canal WFD canal waterbody lies within 100m of this area. The impact of

a high sediment load entering these WFD waterbodies during construction could impact on both water quality, the hydromorphology and the habitat (see Chapter 9: Biodiversity). The Athboy and Daingean WFD groundwater bodies, incorporating the locally important bedrock aquifer, are overlain by low permeability peat and superficial deposits, which will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards, and therefore the potential for impacts to groundwater as a result of uncontrolled site runoff is considered low. The importance of the Yellow River and Grand Canal is considered to be high, and the Coolcor Stream is considered to be medium; the impact rating is considered to be small adverse, indirect and temporary; which combined would result in a **moderate/ slight** effect on the Yellow River and Grand Canal, and a **slight** effect on the Coolcor Stream.

12.5.37 The Electricity Grid Connection lies within the Derrygreenagh Bog Group (including Derryarkin Bog), the UGC Route traverses along a disused railway line and machine pass in Ballybeg Bog, to the east of UGC and 400kV Substation Site adjoins a remnant bog within Ballybeg Bog. The impact of a high sediment load entering these GWDTEs during construction could impact on both water quality, the hydromorphology and the habitat (see EIAR Volume I, Chapter 9: Biodiversity). The importance of these GWDTEs is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** effect on these receptors.

12.5.38 There are three (3 No.) groundwater abstractions located within close proximity to the Electricity Grid Connection – the 'Abstraction Well', a borehole owned by Edenderry RDC and a dug well; however, it is not known if these wells still exist or are in use. The Toberdaly PWS is located at approximately 500m distance. The presence of low permeability peat and superficial deposits, and suitably protected wellheads at onsite boreholes, will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards. The importance of these groundwater abstractions is considered to be medium, and of the Toberdaly PWS to be high; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** and **moderate/ slight** effect on these receptors respectively.

Impacts on water quality due to accidental spillages

12.5.39 Any construction activities carried out close to surface waters involve a risk of pollution due to accidental spillage and leaks. While liquids such as oils, lubricants, paints, bituminous coatings, preservatives and weed killers present the greatest risk, fuel spillages from machinery operating close to watercourses also present a risk. The refuelling of general construction plant also poses a significant risk of pollution, depending on how and where it is carried out. In addition, lime and concrete (specifically, the cement component) is highly alkaline, and any spillage could affect the pH of the receiving waterbody.

12.5.40 Accidental spillages can potentially result in a direct or indirect impact to surface water should contaminants enter surface waters directly, in this case, the Yellow River, the Coolcor Stream and the Grand Canal WFD canal waterbody. This potential for direct adverse impacts on surface water quality is also valid for groundwater quality in the bedrock aquifer and the Athboy WFD GWB. The importance of the Yellow River and Grand Canal is considered to be high, and the Coolcor Stream is considered to be medium; the impact rating is considered to be small adverse, direct, and temporary; which combined would result in a **moderate/ slight** effect on the Yellow River and Grand Canal, and a **slight** effect on the Coolcor Stream.

12.5.41 The Electricity Grid Connection lies within the Derrygreenagh Bog Group (including Derryarkin Bog), the UGC Route traverses the Ballybeg Bog along disused railway line and machine pass and to the east of the UGC and 400kV Substation Site skirt the edge

of a remnant bog within Ballybeg Bog. The impact of an accidental spillage entering these GWDTEs during construction could impact on both water quality, the hydromorphology and the habitat (see Chapter 9: Biodiversity). The importance of these GWDTEs is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** effect on these receptors.

12.5.42 There are three (3 No.) groundwater abstractions located within close proximity to the Electricity Grid Connection – the 'Abstraction Well', a borehole owned by Edenderry RDC and a dug well; however, it is not known if these wells still exist or are in use. The Toberdaly PWS is located at approximately 500m distance. The presence of low permeability peat and superficial deposits, and suitably protected wellheads at onsite boreholes, will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards. The importance of these groundwater abstractions is considered to be medium, and of the Toberdaly PWS to be high; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **slight** and **moderate/ slight** effect on these receptors respectively.

Impacts on water levels and flows due to dewatering activities

12.5.43 Construction activities such as earthworks, site preparation, levelling, and grading operations can result in the need for dewatering activities, to remove encountered shallow groundwater. Temporary dewatering or altered drainage regimes may divert water away from GWDTEs, such as the SAC, or create flow barriers, leading to groundwater level and flow alteration.

12.5.44 The results of the ground investigation work indicate that the shallow groundwater ingress was observed within trial pits and water strikes within ground investigation boreholes across the Electricity Grid Connection route between 0.4 to 2.0m. However, there is no information on the nature of the groundwater table across this area. However, a 7-day pumping test undertaken at onsite groundwater abstraction PW1 in July and August 2023 showed there to be a limited response (0.46m) to pumping within the superficial deposits within the Power Plant Area (HES, 2023) (Refer to Appendix 12D Groundwater Yield Report, EIAR Volume II). Therefore, temporary dewatering of shallow groundwater in the superficial deposits is considered unlikely to significantly impact on water levels and resource availability in the underlying bedrock Athboy WFD groundwater body and GWDTEs. The Grand Canal WFD canal waterbody is understood to be lined, and therefore not in hydraulic connection with groundwater, and therefore the potential for impacts to this canal waterbody as a result of dewatering is considered low. The importance Athboy and Daingean WFD groundwater bodies is considered to be high and of the GWDTEs to be medium; the impact rating is considered to be negligible, direct and temporary for the Athboy and Daingean WFD groundwater bodies, and small adverse, direct and temporary for the GWDTEs; which combined would result in an **imperceptible** effect and **slight** effect on these receptors respectively.

Impacts on watercourse morphology due to construction

12.5.45 There are no construction activities within or close to (within the 50m hydrological buffer outlined in Chapter 5: Proposed Development, EIAR Volume I) the identified river waterbodies, with which watercourse morphology could be impacted.

Changes to flood risk and site drainage

12.5.46 Vegetation removal, site stripping, stockpiling, vehicle movements and bulk earthworks as part of the construction could leave topsoil and superficial deposits exposed to erosion by wind or rain. This could potentially lead to an increase in site runoff leaving site during construction and to an increase in flood risk from pluvial sources. The importance of the Yellow River and the Coolcor Stream is considered to be high and medium respectively;

the impact rating is considered to be negligible, direct and temporary; which combined would result in **imperceptible** effects.

Operational Phase

12.5.47 During the operational phase of the Electricity Grid Connection impacts to the groundwater or surface water are not envisaged, unless via infrequent routine or emergency maintenance of elements of the power transmission infrastructure. Potential impacts during such works may be similar to those envisaged during construction.

Decommissioning Phase

12.5.48 The Electricity Grid Connection will be managed by the transmission asset operators (TAO) and transmission system operators (TSO) (ESBNI and EirGrid for electricity) as part of the national electricity grid. Upon decommissioning of the Power Plant Area, the 220kV substation and 400kV substation and associated transmission infrastructure will remain in situ and form part of the national grid infrastructure. Decommissioning of the Electricity Grid Connection therefore is not envisaged.

Summary of predicted impacts

12.5.49 The following table summarises the predicted impacts for the Electricity Grid Connection Area.

Table 12-26: Electricity Grid Connection Area - summary of predicted impacts

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
Construction				
Impacts on water quality due to uncontrolled site runoff	Yellow River	High	Small adverse, direct, and temporary	Moderate/ slight
	Coolcor Stream	Medium	Small adverse, direct, and temporary	Slight
	Grand Canal WFD waterbody	High	Small adverse, direct, and temporary	Moderate/ slight
	Derrygreenagh Bog Group (including Derryarkin Bog)	Medium	Small adverse, direct, and temporary	Slight
	Ballybeg Cutover complex	Medium	Small adverse, direct, and temporary	Slight
	Offsite 'Abstraction Well', Edenderry RDC borehole and dug well	Medium	Small adverse, direct, and temporary	Slight
	Toberdaly PWS	High	Small adverse, direct, and temporary	Moderate/ slight
Impacts on water quality due to accidental spillages	Yellow River	High	Small adverse, direct, and temporary	Moderate/ slight
	Coolcor Stream	Medium	Small adverse, direct, and temporary	Slight

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
	Grand Canal WFD waterbody	High	Small adverse, direct, and temporary	Moderate/ slight
	Derrygreenagh Bog Group (including Derryarkin Bog)	Medium	Small adverse, direct, and temporary	Slight
	Ballybeg Cutover complex	Medium	Small adverse, direct, and temporary	Slight
	Offsite 'Abstraction Well', Edenderry RDC borehole and dug well	Medium	Small adverse, direct, and temporary	Slight
	Toberdaly PWS	High	Small adverse, direct, and temporary	Moderate/ slight
Impacts on water levels and flows due to dewatering activities	Athboy groundwater body	High	Negligible, direct, and temporary	Imperceptible
	Daingean groundwater body	High	Negligible, direct, and temporary	Imperceptible
	Derrygreenagh Bog Group (including Derryarkin Bog)	Medium	Small adverse, direct, and temporary	Slight
	Ballybeg Cutover complex	Medium	Small adverse, direct, and temporary	Slight
Changes to flood risk and site drainage	Mongagh River	High	Negligible, direct, and temporary	Imperceptible
	Coolcor Stream	Medium	Negligible, direct, and temporary	Imperceptible

Impact Assessment for Gas Connection Corridor

12.5.50 During the construction phase, the following impacts on the Water Environment have the potential to occur.

- Impacts on surface and groundwater water quality due to the migration of sediments, or other construction chemicals/ wastewater, through uncontrolled site runoff.
- Impacts on surface and groundwater water quality due to accidental spillage of oils, fuels, or other construction chemicals/ wastewater.
- Impacts on surface and groundwater water flows, levels, and resource availability (to onsite and offsite groundwater abstractions and GWDTEs), due to dewatering of excavations, altered drainage regimes, and discharging of abstracted water.
- Impacts on watercourse morphology, due to construction activities.
- Impacts to flood risk status by uncontrolled site runoff or by construction within areas at risk of flooding.

Impacts on water quality due to uncontrolled site runoff

12.5.51 Construction activities such as earthworks, site preparation, levelling, and grading operations typically result in the disturbance and excavation of soils. Exposed soil and peat are more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora, and fauna. This sediment could contain contaminants, particularly in the vicinity of the Power Plant Area. Refer to EIAR Volume I, Chapter 13: Soils and Geology for impacts relating to existing contamination.

12.5.52 Sediment in runoff can affect the Water Environment through smothering of riverbeds and plants, temporarily changing water quality (e.g., increased turbidity and reduced photosynthesis) and causing physical and physiological adverse impacts on aquatic organisms (such as abrasion and irritation). The potential impacts of sediment and other pollutants on aquatic organisms are addressed in Chapter 9: Biodiversity.

12.5.53 The Yellow River, the Rochfortbridge Stream and the River Brosna are located within the Gas Connection Corridor. The impact of a high sediment load entering these WFD river waterbodies during construction could impact on water quality, the hydromorphology and the habitat (see Chapter 9: Biodiversity). The Athboy and Clara WFD groundwater bodies, incorporating the locally important bedrock aquifer, are overlain by low permeability peat and superficial deposits, which will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards, and therefore the potential for impacts to groundwater as a result of uncontrolled site runoff is considered low. The importance of the Yellow River is considered to be high, and the importance of the Rochfortbridge Stream and River Brosna is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **moderate/ slight** effect on the Yellow River and a **slight** effect on the Rochfortbridge Stream and River Brosna. **imperceptible** effect on these receptors.

12.5.54 The Gas Connection Corridor is within 1.8km of the Lough Ennell SAC and SPA, the qualifying interests of which include groundwater dependent habitats. The impact of a high sediment load entering this GWDTE during construction could impact on both water quality, the hydromorphology and the habitat (see EIAR Volume I, Chapter 9: Biodiversity). The importance of this GWDTE is considered to be extremely important; the impact rating is considered to be small adverse, direct and temporary; which combined would result in a **significant** effect on this receptor.

12.5.55 The Hostel Well, located in close proximity to the Gas Connection Corridor (approximately 700m to the south), is understood to have suitably protected wellheads; however, there is no yield, construction of usage information recorded within the GSI's National Well Database on the series of dug wells within the Gas Connection Corridor at townlands Castlelost West and Kiltotan. The presence of low permeability peat and superficial deposits, and suitably protected wellheads at onsite boreholes, will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards. The importance of the Hostel Well, and of the dug wells is considered to be medium and low respectively; the impact rating is considered to be small, direct and temporary; which combined would result in a **slight** and **imperceptible** effect respectively.

Impacts on water quality due to accidental spillages

12.5.56 Any construction activities carried out close to surface waters involve a risk of pollution due to accidental spillage and leaks. While liquids such as oils, lubricants, paints,

bituminous coatings, preservatives and weed killers present the greatest risk, fuel spillages from machinery operating close to watercourses also present a risk. The refuelling of general construction plant also poses a significant risk of pollution, depending on how and where it is carried out. In addition, lime and concrete (specifically, the cement component) is highly alkaline, and any spillage could affect the pH of the receiving waterbody.

12.5.57 Accidental spillages can potentially result in a direct or indirect impact to surface water should contaminants enter surface waters directly, in this case, the Yellow River, the Rochfortbridge Stream and the River Brosna. This potential for direct adverse impacts on surface water quality is also valid for groundwater quality in the bedrock aquifer and the Athboy and Clara WFD groundwater bodies. The importance of the Yellow River and the Athboy and Clara WFD groundwater bodies is considered to be high, and the importance of the Rochfortbridge Stream and River Brosna is considered to be medium; the impact rating is considered to be small adverse, indirect and temporary; which combined would result in a **moderate/ slight** effect on the Yellow River and a **slight** effect on the Rochfortbridge Stream and River Brosna. **imperceptible** effect on these receptors.

12.5.58 The onsite well, PW1, and the Hostel Well are understood to have suitably protected wellheads. The presence of low permeability peat and superficial deposits, and suitably protected wellheads at onsite boreholes, will provide some protection from uncontrolled site runoff entering the subsurface and migrating downwards. The importance of the onsite well PW1 and the Hostel Well is considered to be medium; the impact rating is considered to be small adverse, direct and temporary; which combined would result in **slight** effect.

Impacts on water levels and flows due to dewatering activities

12.5.59 Construction activities such as earthworks, site preparation, levelling, and grading operations can result in the need for dewatering activities, to remove encountered shallow groundwater. Temporary dewatering or altered drainage regimes may divert water away from groundwater abstractions, such as onsite PW1, and GWDTEs, or create flow barriers, leading to groundwater level and flow alteration.

12.5.60 Various components of the Gas Connection Corridor will require excavation, including main pipeline trenching (see EIAR Volume I, Chapter 5: The Proposed Development and Overall Project). The proposed depths of excavations (these depths are subject to change) are not expected to be below 2m.

12.5.61 No ground investigations have been undertaken in the Gas Connection Corridor area as part of this study. However, the geological and hydrogeological setting remains similar to the Power Plant Area, and therefore the water table is likely to be at depths of greater than 2.6m bGL and is unlikely to be intercepted during excavation works. Should shallow groundwater be encountered during construction, temporary dewatering and the discharge of abstracted water, could be required. Monitored groundwater levels are similar in the superficial deposits and underlying limestone bedrock, suggesting that these units are in hydraulic continuity. A 7-day pumping test undertaken at onsite groundwater abstraction PW1 in July and August 2023 showed there to be a limited response (0.46m) to pumping within the superficial deposits within the Power Plant Area (HES, 2023) (Refer to Appendix 12D Groundwater Yield Report, EIAR Volume II). Therefore, temporary dewatering of shallow groundwater in the superficial deposits is considered unlikely to significantly impact on water levels and resource availability in the underlying bedrock Athboy and Clara WFD groundwater bodies and GWDTEs. The importance Athboy and Clara WFD groundwater bodies is considered to be high and of the Lough Ennell SAC and SPA to be extremely high; the impact rating is considered to

be negligible, direct and temporary; which combined would result in an **imperceptible** effect on these receptors.

Impacts on watercourse morphology, due to construction activities

12.5.62 The Gas Connection Corridor crosses two WFD river waterbodies – the Mongagh River and the Rochfortbridge Stream. The construction methodology for watercourse crossings is outlined in Chapter 5: Proposed Development, EIAR Volume I. There is the potential for morphological changes or alterations to these WFD river waterbodies at these crossings. The importance of the Mongagh River is considered to be high and of the Rochfortbridge Stream to be medium; the impact rating is considered to be small adverse, direct and temporary; which when combined would result in a **moderate/ slight** and **slight** effects respectively.

Changes to flood risk and site drainage

12.5.63 Vegetation removal, site stripping, stockpiling, vehicle movements and bulk earthworks as part of the construction could leave topsoil and superficial deposits exposed to erosion by wind or rain. This could potentially lead to an increase in site runoff leaving site during construction and to an increase in flood risk from pluvial sources. The importance of the Yellow River is considered to be high, and the Rochfortbridge Stream and River Brosna to be medium; the impact rating is considered to be negligible, indirect and temporary; which combined would result in an **imperceptible** effect.

Operational Phase

12.5.64 During the operational phase of the Gas Connection Corridor impacts to the groundwater or surface water are not envisaged, unless via infrequent routine or emergency maintenance of elements of the power transmission infrastructure. Potential impacts during such works may be similar to those envisaged during construction.

Decommissioning Phase

12.5.65 The Gas Connection Corridor will be managed by the transmission asset operators (TAO) and transmission service operators (TSO) (GNI for gas) as part of the national gas networks. At the end of its design life, it is expected that the gas connection pipeline may have residual life remaining, and the operational life may be extended if appropriate and/or the asset refurbished and retained as part of the national transmission network. Decommissioning of the Gas Connection Corridor therefore is not envisaged.

Summary of predicted impacts

12.5.66 The following table summarises the predicted impacts for the Gas Connection Corridor Area.

Table 12-27: Gas Connection Corridor Area - summary of predicted impacts

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
Construction				
Impacts on water quality due to uncontrolled site runoff	Yellow River	High	Small adverse, direct, and temporary	Moderate/ slight
	Rochfortbridge Stream and River Brosna	Medium	Small adverse, direct, and temporary	Slight
	Lough Ennell SAC and SPA	Extremely high	Small adverse, direct, and temporary	Significant

PREDICTED IMPACT	RECEPTOR NAME	RECEPTOR IMPORTANCE	RATING OF IMPACT	SIGNIFICANCE OF EFFECT
	Hostel Well	Medium	Small adverse, direct, and temporary	Slight
	Dug wells	Low	Small adverse, direct, and temporary	Imperceptible
Impacts on water quality due to accidental spillages	Yellow River	High	Small adverse, direct, and temporary	Moderate/ slight
	Lough Ennell SAC and SPA	Extremely high	Small adverse, direct, and temporary	Significant
	Rochfortbridge Stream and River Brosna	Medium	Small adverse, direct, and temporary	Slight
	Athboy and Clara WFD groundwater bodies	High	Small adverse, direct, and temporary	Moderate/ slight
	Onsite well, PW1, and offsite, Hostel Well	Medium	Small adverse, direct, and temporary	Slight
Impacts on water levels and flows due to dewatering activities	Athboy and Clara WFD groundwater bodies	High	Negligible, direct, and temporary	Imperceptible
	Lough Ennell SAC and SPA	Extremely high	Negligible, direct, and temporary	Imperceptible
Impacts on watercourse morphology due to construction	Yellow River	High	Small adverse, direct, and temporary	Moderate/ slight
	Rochfortbridge Stream	Medium	Small adverse, direct, and temporary	Slight
Changes to flood risk and site drainage	Yellow River	High	Negligible, direct, and temporary	Imperceptible
	Rochfortbridge Stream and River Brosna	Medium	Negligible, direct, and temporary	Imperceptible

12.6 Mitigation and Enhancement Measures

12.6.0 The following mitigation measures have either been incorporated into the design (i.e. embedded mitigation) or are standard construction or operational practices which will be included in the proposals. These measures have not been considered during the impact assessment.

Power Plant Area

Construction Phase

12.6.1 A Construction and Environmental Management Plan (CEMP) has been prepared to accompany this planning application (refer to Appendix 5A; EIAR Volume II). The CEMP sets out the key environmental considerations to be taken into account by the contractor during construction of the Proposed Development. The CEMP also details the mitigation and monitoring measures to be implemented in order to comply with the environmental commitments outlined in the EIAR. The contractor will be contractually obliged to comply with all such measures. It is intended that the CEMP would be updated prior to the commencement of the development, to include any additional mitigation measures, conditions and or alterations to the EIAR and application documents that may emerge during the course of the planning process and would be submitted to the Planning Authority for written approval in advance of commencement of any construction works on site.

12.6.2 To minimise the potential for adverse impacts to groundwater, surface water quality and geomorphology during construction, the following is an outline of the mitigation measures that will be in place (see EIAR Appendix 5A for more detail, refer to EIAR Volume II).

General Surface Water Management

12.6.3 General surface water management measures are detailed within the CEMP and summarised below:

- The existing surface water management system, such as drains, settlement ponds, outfalls and interceptors / separators, will be inspected and confirmed to be in suitable working order prior to any Power Plant Area works commencing on the Site.
- Additional new drainage installations will be installed in early stages of construction, alongside the remaining existing drainage facilities, which can be used to treat runoff for silt and hydrocarbons early on in the programme. Daily weather forecasting will also be used to inform the works schedule, ensuring excavation works do not coincide with high intensity or extreme rainfall events.
- The proposed surface water management system, including existing and proposed infrastructure, will be inspected and confirmed to be of sufficient capacity to treat any additional water generated by the Power Plant Area, including runoff from dust suppression, prior to discharge.
- Washout from power cleaning of drainage lines, oil interceptors or any other pipework which may contain pollutants will be collected and treated. No contaminated washout will be allowed enter any water body or be discharged to ground.
- There will be regular monitoring and prompt maintenance of the overall surface water management system throughout the Power Plant Area. This will ensure that the drainage system continues to function as designed.
- There will be no direct discharge to any water body at any time during the construction phases. All surface water run-off within the Site will be directed to this drainage system.

Sedimentation of Surface Waters

12.6.4 The proposed works will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below:

- All materials will be stored within temporary compounds, see CEMP temporary construction compound details, and transported to the works zone immediately prior to construction.
- Weather conditions will be taken into consideration when planning construction activities to minimise risk of run off from site.
- Provision of 50m exclusion zones and barriers (silt fences) between any excavated material and any surface water features to prevent sediment washing into the receiving water environment.
- If dewatering is required as part of the proposed works e.g. in wet areas, water will be pumped via settlement tanks or collection basins where any solids can settle out and suitable best practice de-watering methods will be used.
- The contractor shall ensure that silt fences are regularly inspected and maintained during the construction phase.
- If very wet ground must be accessed during the construction process bog mats/aluminium panel tracks will be used to enable access to these areas by machinery. However, works will be scheduled to minimise access requirements during winter months.
- The contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the Contractor is required to prepare a contingency plan for before and after such events.
- The contractor will carry out regular visual examinations of local watercourses that may be impacted by the proposed works during the construction phase to ensure that sediment is not above baseline conditions. In the unlikely event of water quality concerns, the Environmental Manager and ECoW will be consulted.
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows.
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be available and construction staff will be familiar with emergency procedures.
- Appropriate containment facilities will be provided to ensure that any spills from vehicles are contained and removed off site. Adequate stocks of absorbent materials, such as sand or commercially available spill kits shall be available.
- Entry by plant equipment, machinery, vehicles and construction personnel into watercourses or wet drainage ditches shall not be permitted. All routes used for construction traffic shall be protected against migration of soil or wastewater into watercourses; and
- Cabins, containers, workshops, plant, materials storage and storage tanks shall not be located near any surface water channels and will be located beyond the 50m hydrological buffer at all times.
- Unnecessary clearing and grading will be avoided.

- Clearing of adjacent drainage channels will be minimised.
- Silt control measures will be installed along the perimeter of the excavation areas adjacent to drainage channels and at locations along the proposed discharge pipeline routes, where there is a potential impact on drains or the Yellow River (process water discharge) and Castlejordan River (surface water discharge).
- Construction activities phased to minimise soil exposure, with large areas of grading avoided to minimise erosion potential.
- Soils are to be stabilised as soon as is practicable.
- To prevent chemical pollution, all liquid fuels and chemicals will be stored in suitable containers within bunds in designated areas away from the main construction site activities. The designated areas will be located an appropriate distance away from drainage channels and onsite boreholes.
- On-site refuelling is to be carried out in designated bunded areas only.
- Spill kits are to be maintained near working areas. All spills / leaks are to be cleaned up immediately. An emergency response plan will be put in place detailing the measures to be undertaken should pollution be identified, as detailed in the CEMP.
- Equipment will be regularly maintained, and leaks repaired as soon as is practicable. If the equipment cannot be repaired, it will be removed from the site. Accidental spillages will be contained and cleaned up immediately.
- Contained chemical portaloo toilets will be used on site during the construction phase. All sewage will be removed from the site to an authorised treatment plant.
- Construction of the discharge pipe placement will be carried out in accordance with the Inland Fisheries Ireland *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites* (2016). The guidelines will also be consulted regarding discharge pipes (process water and surface water) placement to avoid disruption to the river during the most sensitive stages of salmonid or lamprey development.

Fuel and Chemical Handling

12.6.5 Fuel and chemical handling will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below:

- Oils and lubricants will be required to be stored at least 50m away from a watercourse where practical and stored in vessels designed to hold 110% of the capacity of the largest tank / container within the bunded area. All plant and equipment shall be checked for leaks of fuel and lubricants before being allowed onto the site. The Principal Contractor will allow for regular checks and maintenance as required.
- Drainage from the bunded area will be diverted for collection and safe disposal. All containers within the storage area will be clearly labelled so that appropriate remedial action can be taken in the event of a spillage. When moving drums from the bunded storage area to locations within the Site, a suitably sized spill pallet will be used for containing any spillages during transit.
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in designated impermeable refuelling areas isolated from surface water drains. Spill kit facilities will be provided at the fuelling area in order to provide for any accidental releases or spillages in and around the area. Any used spill kit materials should be disposed of via a hazardous waste contractor.

- All equipment and machinery will be checked for leaks and other potential sources of contaminants before arriving on-site and on a daily basis. Any equipment or machinery likely to introduce to contaminants will not be brought on-site or will be removed from the Site immediately if any leak is discovered. Spill kits will be available to machine operators, and they will be trained in their use.
- The storage of hazardous substances will be necessary during construction and a number of considerations will need to be made to reduce the potential for pollution from these sources. Fuel will be required to be stored at least 50m from a water body and refuelling will only take place in designated areas, on hardstanding by appropriately trained personnel.
- Adequate stocks of hydrocarbon absorbent materials (e.g., spill-kits and / or booms) will be held on-site in order to facilitate response to accidental spills. Spill response materials will also be stored on all construction vehicles.

Control of Concrete and Lime

12.6.6 The control of concrete and lime will be carried out by employing accepted good work practices during construction, and environmental management measures such as those discussed below:

- No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the Site within 20m of an existing surface water drainage point. Washouts will only be allowed to take place in designated areas with an impervious surface.
- Concrete will be used to construct the Power Plant Area and will therefore need to be managed to reduce the potential for pollution. The Principal Contractor will be required to manage and mitigate concrete works ensuring that no concrete is laid during wet weather if achievable, so to reduce the risk of concrete being washed off the site and into the surface water drains or water bodies.
- Concrete mixing will be undertaken in designated impermeable areas, at least 10 m away from a water body or surface water drain to reduce the risk of runoff entering a water body, or the sub-surface, or groundwater environment.

Accidental Spillage, Flooding or Other Emergencies

12.6.7 Accidental spillages, flooding, or other emergencies will be avoided by employing accepted good work practices during construction, and environmental management measures such as those discussed below:

- Leaking or empty oil drums will be removed from site immediately and disposed of via an appropriately licensed waste disposal contractor.
- Spill kits and oil absorbent material will be carried by mobile plant and located at vulnerable locations (e.g., near oil filled equipment). Booms will be held on-site for works near water body/ drains. Spill kits will contain a breakable tie to show use and indicates whether it needs to be replenished. The Site Manager and Environmental Site Representative (ESR) will be responsible for replenishing spill kits.
- An Emergency Response Plan will be prepared by the appointed Contractor and included in the CEMP and construction workers trained to respond to spillages.
- A copy of the Emergency Response Plan will be kept in the Site Emergency Information File (along with other safety emergency preparedness plans) together with the results of any test of the plan.

- Oil interceptors will be required for refuelling areas; runoff from washing areas that contains detergents which may prevent oil interceptors from working correctly will be prevented from entering oil separators by providing separate designated areas for washing and refuelling.
- Discharge with oils and chemicals from vehicle washing areas will be considered as trade effluent and therefore will be disposed off-site.
- The installation of protective bunds along all water body boundaries and drains during construction will filter contaminants and prevent adverse runoff.
- Any plant, machinery or vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use.
- Any site welfare facilities will be appropriately managed, and all foul waste disposed of by a licenced contractor to a suitably permitted facility.
- During the construction phase, the Contractor will monitor weather forecasts on a monthly, weekly, and daily basis, and plan works accordingly. The Contractor will describe in the Emergency Response Plan the actions it will take in the event of a possible flood event. These actions will be hierarchal meaning that as the risk increases the Contractor will implement more stringent protection measures. This is important to ensure all workers, the construction site and third-party land, property and people are adequately protected from flooding during the construction phase.

Operational Phase

12.6.8 To minimise the potential for adverse impacts to water quality, the following is an outline of the general mitigation measures that will be in place (see Appendix 5A for more detail):

- The Power Plant Area will comply with the requirements of its IE Licence. This is set out to limit and minimise the impacts to air, soil, surface and groundwater, and the effects on environment and human health.
- The Power Plant Area will be operated in line with appropriate standards and the operator will implement and maintain an Environmental Management System (EMS) to the criteria of International Standards Organisation (ISO) 14001. The EMS will implement an approach of Plan-Do-Check-Act and will contain procedures and require appropriate training required to ensure that the Power Plant Area is operating in compliance with all regulatory requirements and in a manner that ensures continuous improvement.
- Sampling and analysis of discharges to the Water Environment will be carried out in accordance with the requirements of the IE Licence. This includes monitoring emissions limit values (continuous on the process water line for key parameters and composite or grab for other parameters) in accordance with the IE Licence.
- To prevent the risk of spillages, flooding, fire, and other potentially major incidents several measures will be in place. These include compliance with all relevant health, safety and environmental legislation; design, build and operation in accordance with industry practice; regular maintenance and inspections in accordance with manufacturer specification to reduce the risk of equipment failures; bunded or double skinned storage areas breaches; good and regular housekeeping; and spill kits stored on Site.
- Water quality monitoring will be undertaken post-construction, details of which will be included in the IE Licence. This is anticipated to be based on a combination of visual

observations, in situ testing using handheld water quality probes, and routine water quality monitoring.

Drainage Strategy

12.6.9 The Site drainage system will provide interception, conveyance, treatment, and attenuation of surface water runoff from the areas of hard standing associated with the Power Plant Area.

12.6.10 The maintenance required for drainage networks will be based on standard guidance and practice, such as the manufacturer's guidance for maximum efficiency of the oil interceptors.

12.6.11 As outlined in Appendix 12C (WFD Screening Assessment), proof of effective drainage design and treatment systems for water quality mitigation will be required in accordance with the technical requirements of EPA water quality standards and IPC licences.

12.6.12 A water quality monitoring program will be required for process wastewater and surface water runoff. Monitoring of the receiving water body upstream and downstream of the wastewater discharge point will be undertaken on a periodic basis to determine the impact of the discharge on the receiving water. The parameters, thresholds and frequency of the monitoring programmes required will be detailed in the IE licence for the Power Plant Area.

12.6.13 The Sustainable Drainage System (SuDS) design and maintenance regime will need to demonstrate that:

- Runoff quantity and quality controls are in accordance with the technical requirements of EPA water quality standards and IPC licences.
- All process wastewater treatment systems and surface water arrangements including interceptors and shutoff valves will need to be maintained to manufacturer specifications.
- All bunds and chemical containers comply with the appropriate standards and will be leak tested prior to commencement of operations and at a frequency thereafter to comply with the relevant conditions of the IPC licence.
- The discharge water pipeline will be inspected periodically, to comply with IE Licence conditions.
- Firewater Retention designs for the Power Plant Area will need to include control of pollutant runoff to water bodies in accordance with the technical requirements of EPA water quality standards and IPC licences.

12.6.14 Environmentally sympathetic discharge outfall structure designs are required for proof of meeting WFD objectives.

- Ideally for WFD objectives, discharge outfalls would be set back from watercourses and connected with ditches so there are no hard structures in watercourses including channel banks.
- If hard structures in watercourses are the only pragmatically feasible options available, geomorphology and hydromorphology assessments will be needed to inform WFD Impact Assessment at such time that confirmed design details become available.

Pollution Prevention and Control

12.6.15 The Power Plant Area will comply with the Industrial Emissions Directive (IED) under its IE Licence so that any impacts of emissions to air, soil, surface and groundwater, and

effects on the environment and human health will be minimised and avoided, where possible.

12.6.16 The Site will be operated in line with appropriate standards and the operator will implement and maintain an Environment Management System (EMS) which will be in accordance with criteria of International Standards Organisation (ISO) 14001. The EMS will implement an approach of Plan-Do-Check-Act and will contain procedures and require appropriate training required to ensure that the Power Plant Area is operating in compliance with all regulatory requirements and in a manner that ensures continuous improvement.

Hazard Prevention and Emergency Planning

12.6.17 Measures to prevent the risks of fire, flooding, spillages or other potentially major incidents will be embedded in the design. Measures to prevent potentially major incidents include:

- Compliance with all relevant health, safety and environmental legislation.
- Design, build and operation in accordance with good industry practice.
- Regular maintenance and inspections to reduce the risk of equipment failures.
- Bunded or double-skinned storage areas for liquid chemicals.
- Regular maintenance and site housekeeping to reduce the likelihood of leakages and improve leakage detection.
- Spill kits stored on site.

12.6.18 A site-specific Health and Safety Plan covering the works, commissioning and operation will be prepared to ensure compliance with relevant health and safety legislation.

12.6.19 A Site Emergency Plan will be developed in accordance with the IE Licence, which will include a fire strategy and appropriate training procedures.

12.6.20 A Flood Emergency Response Plan will be prepared in consultation with the EPA. This will define access and egress routes from the Site.

12.6.21 Procedures will be in place to clearly outline the responsibilities, actions and communication channels for operational staff and personnel on how to deal with emergencies should they occur. Staff will also receive the level of training required for their role and position. This will include dealing with events such as fires, spillages, flooding etc. Such measures will be included in the site operating and management system and regulated by EPA through the IE Licence.

Flood Risk Mitigation

12.6.22 Suitable drainage systems will be in place to manage any surface water to reduce fluvial flood risk. The comprehensive and detailed design of the surface water system, ground levels, finished slab levels, and SuDs measures will mitigate pluvial flood risk to the Proposed Development and ensure that the Power Plant Area does not increase the pluvial flood risk to neighbouring properties (refer to Planning Drawings).

Groundwater Abstraction Management

12.6.23 Prior to the commencement of operational pumping at PW1, the CEMP will be updated to include current operational and water level data, if available, and to outline locations within the Power Plant Area Study Area, at which groundwater levels will be monitored during periods of abstraction. These locations could include the existing ground investigation boreholes and locations within or at the edge of the adjacent Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including

Derryarkin Bog). The CEMP will also be updated to outline how best to ascertain if groundwater levels in the underlying aquifer and the adjacent GWDTEs are being impacted by operational abstraction.

Decommissioning Phase

12.6.24 Effects arising from the process of decommissioning of the Power Plant Area are considered to be of a similar nature and duration to those arising from the construction phase and therefore have not been considered separately.

12.6.25 A Decommissioning Plan will be produced and agreed with the EPA as part of the IE Licence application and licence surrender process. The plan will include all potential environmental risks on the Site and contain guidance on how risks can be removed or mitigated. In addition, the IE Licence Baseline Assessment Report will be referred to in the IE Licence application and updated to determine if any contamination has occurred and what, if any, remediation is required prior to IE Licence surrender. Additionally, decommissioning activities will be conducted in accordance with the appropriate guidance and legislation at the time of closure.

Electricity Grid Connection

Construction Phase

12.6.26 A Construction and Environmental Management Plan (CEMP) has been prepared to accompany this planning application (refer to Appendix 5A; EIAR Volume II). The CEMP sets out the key environmental considerations to be taken into account by the contractor during construction of the Proposed Development. The CEMP also details the mitigation and monitoring measures to be implemented in order to comply with the environmental commitments outlined in the EIAR. The contractor will be contractually obliged to comply with all such measures. It is intended that the CEMP would be updated prior to the commencement of the development, to include any additional mitigation measures, conditions and or alterations to the EIAR and application documents that may emerge during the course of the planning process and would be submitted to the Planning Authority for written approval in advance of commencement of any construction works on site.

12.6.27 The same general mitigation measures that will be in place during construction of the Power Plant Area to minimise the potential for adverse impacts to groundwater, surface water quality and geomorphology, and off-site receptors and construction workers, will be in place during the construction phase of the Electricity Grid Connection (see EIAR Appendix 5A for more detail, refer to EIAR Volume II).

Operational Phase

12.6.28 It has been assumed that same general mitigation measures that will be in place during operation of the Electricity Grid Connection as that of the operation of the Power Plant Area to minimise the potential for adverse impacts to groundwater, surface water quality and geomorphology, and off-site receptors.

Decommissioning Phase

12.6.29 Decommissioning of the Electricity Grid Connection is not envisaged as it will be managed by EirGrid once it is operational and will become an important part of the Republic of Ireland's national grid infrastructure. Therefore, no mitigation measures are required.

Gas Connection Corridor

Construction Phase

12.6.30 Prior to construction starting onsite, a Final CEMP will be prepared by the Contractor to be approved by the planning authority. The Final CEMP will detail the measures necessary to avoid, prevent and reduce adverse effects where possible upon receptors.

12.6.31 It is assumed that same general mitigation measures that will be in place during construction of the Power Plant Area and Electricity Grid Connection to minimise the potential for adverse impacts to groundwater, surface water quality and geomorphology, and off-site receptors and construction workers, are anticipated for the construction phase of the Gas Connection Corridor.

12.6.32 To minimise the potential for adverse impacts to groundwater surface water quality and morphology during construction, the following is an outline of the additional general mitigation measures that could be implemented.

- Maintenance and restoration of pre-construction land drainage patterns and drainage management features (ditches, culverts), and watercourse crossings will be agreed with the landowner/tenant and any third-party consultants employed on their behalf.
- It is expected that crossings of ditches, minor water courses and roads will be by open cut methods and appropriate diversion techniques. Major water courses and road crossing may require the use of techniques such as horizontal directional drilling, auger or thrust boring. Minor crossing activities will take place at the same time as the pipe is laid. Major crossing activities involving HDD, auger or thrust boring require specialist teams and will be carried out before the pipe reaches the crossing area.
- Watercourse crossings for the gas pipeline will be constructed such that the top of the gas pipeline shall be located not less than 1.7m from the bottom of the watercourse and will maintain a depth of cover of not less than 1.2 m in the adjoining fields. All watercourses, trenches, ditches, or culverts shall be maintained in effective working condition over their full working width for the duration of the Project and shall be restored to a condition at least as good as before the commencement of the Works.
- If necessary, suitable measures will be put in place to prevent sediment being washed off site, and soil stockpiles will be monitored/ measured for wash away to determine whether maintenance and/or remedial action is required.

Operational Phase

12.6.33 The same general mitigation measures will be in place during operation of the Gas Connection Corridor as that of the operation of the Electricity Grid Connection to minimise the potential for adverse impacts to groundwater, surface water quality and geomorphology, and off-site receptors.

Decommissioning Phase

12.6.34 Decommissioning of the Gas Connection Corridor is not envisaged as it will be managed by Gas Networks Ireland (GNI) and will become an important part of the Republic of Ireland's gas network infrastructure. Therefore, no mitigation measures are required.

12.7 Residual Effects

Power Plant Area

Construction and Operation Phases

12.7.0 With the implementation of mitigation measures outlined above, including implementation of the CEMP, residual impacts for the Power Plant Area are considered to be **imperceptible** and therefore not be significant.

Decommissioning Phase

12.7.1 Decommissioning of the Power Plant Area is not envisaged and has not been assessed under this EIAR as it will be managed by EirGrid once it is operational and will become an important part of the Republic of Ireland's national grid infrastructure.

Electricity Grid Connection

Construction and Operation Phases

12.7.2 With the implementation of mitigation measures outlined above, including implementation of the CEMP, residual impacts for the Electricity Grid Connection are considered to be **imperceptible** and therefore not be significant.

Decommissioning Phase

12.7.3 Decommissioning of the Electricity Grid Connection is not envisaged and has not been assessed under this EIAR as it will be managed by EirGrid once it is operational and will become an important part of the Republic of Ireland's national grid infrastructure.

Gas Connection Corridor

Construction and Operation Phases

12.7.4 With the implementation of mitigation measures outlined above, including implementation of the CEMP, residual impacts for the Gas Connection Corridor are considered to be **imperceptible** and therefore not be significant.

Decommissioning Phase

12.7.5 Decommissioning of the Gas Connection Corridor is not envisaged and has not been assessed under this EIAR as it will be managed by Gas Networks Ireland (GNI) and will become an important part of the Republic of Ireland's gas network infrastructure.

Summary of Residual Effects

12.7.6 The residual effects resulting from the Proposed Development are summarised in Table 12-28 below.

Table 12-28: Assessment of Residual Effects

DESCRIPTION OF EFFECT	RECEPTOR	SIGNIFICANCE OF EFFECT (BEFORE MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (FOLLOWING MITIGATION)
Power Plant Area – Construction Phase				
Impacts on water quality due to uncontrolled site runoff	Mongagh River	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General surface water management, fuel and chemical handling and control of concrete and lime	Imperceptible
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Slight		
	Onsite well, PW1, and offsite, Hostel Well			
Impacts on water quality due to accidental spillages	Mongagh River	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General surface water management, fuel and chemical handling and control of concrete and lime, and accidental spillages	Imperceptible
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Slight		
	Onsite well, PW1, and offsite, Hostel Well			
Impacts on water levels and flows due to dewatering activities	Athboy groundwater body	Imperceptible	None required	Imperceptible
	Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Slight	Section 12.6: Mitigation and Enhancement Measures – General Surface Water Management, Sedimentation of surface waters	Imperceptible
Impacts on watercourse morphology due to construction	Mongagh and Yellow Rivers	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General Surface Water Management, Sedimentation of surface waters	Imperceptible

DESCRIPTION OF EFFECT	RECEPTOR	SIGNIFICANCE OF EFFECT (BEFORE MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (FOLLOWING MITIGATION)
Changes to flood risk and site drainage	Mongagh River	Imperceptible	None required	Imperceptible
Power Plant Area – Operational Phase				
Impacts on surface water quality as result of proposed discharges	Mongagh and Yellow Rivers	Imperceptible	None required	Imperceptible
Impacts on surface and groundwater quality due to accidental spillages	Mongagh and Yellow rivers Athboy WFD groundwater body	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – Pollution prevention and control, hazard prevention and emergency planning	Imperceptible
Impacts on watercourse morphology due to proposed discharges	Mongagh and Yellow rivers	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General Surface Water Management, Sedimentation of surface waters	Imperceptible
Impacts on groundwater levels and resource availability due to increased groundwater abstraction	Athboy WFD groundwater body Knockdrin Garr Cutover (including Drumman Bog) and Derrygreenagh Bog Group (including Derryarkin Bog)	Imperceptible Slight	Section 12.6: Mitigation and Enhancement Measures – Groundwater Abstraction Management	Imperceptible
Impacts to flood risk status by increased surface water runoff from new impervious areas	Mongagh River	Imperceptible	None required	Imperceptible
Electricity Grid Connection – Construction Phase				

DESCRIPTION OF EFFECT	RECEPTOR	SIGNIFICANCE OF EFFECT (BEFORE MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (FOLLOWING MITIGATION)
Impacts on water quality due to uncontrolled site runoff	Yellow River	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General surface water management, fuel and chemical handling and control of concrete and lime	Imperceptible
	Grand Canal WFD waterbody			
	Toberdaly PWS			
	Coolcor Stream	Slight		
	Derrygreenagh Bog Group (including Derryarkin Bog), Ballybeg Cutover complex			
	Offsite 'Abstraction Well', Edenderry RDC borehole and dug well			
Impacts on water quality due to accidental spillages	Yellow River	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General surface water management, fuel and chemical handling and control of concrete and lime, and accidental spillages	Imperceptible
	Grand Canal WFD waterbody			
	Toberdaly PWS			
	Coolcor Stream	Slight		
	Derrygreenagh Bog Group (including Derryarkin Bog), Ballybeg Cutover complex			
	Offsite 'Abstraction Well', Edenderry RDC borehole and dug well			
Impacts on water levels and flows due to dewatering activities	Athboy and Daingean WFD groundwater bodies	Imperceptible	None required	Imperceptible
	Derrygreenagh Bog Group (including Derryarkin Bog), Ballybeg Cutover complex	Slight	Section 12.6: Mitigation and Enhancement Measures – General Surface Water Management, Sedimentation of surface waters	

DESCRIPTION OF EFFECT	RECEPTOR	SIGNIFICANCE OF EFFECT (BEFORE MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (FOLLOWING MITIGATION)
Changes to flood risk and site drainage	Mongagh River, Coolcor Stream	Imperceptible	None required	Imperceptible
Gas Connection Corridor – Construction Phase				
Impacts on water quality due to uncontrolled site runoff	Yellow River	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General surface water management, fuel and chemical handling and control of concrete and lime	Imperceptible
	Rochfortbridge Stream and River Brosna	Slight		
	Hostel Well			
	Lough Ennell SAC and SPA	Significant		
	Dug wells	Imperceptible	None required	Imperceptible
Impacts on water quality due to accidental spillages	Yellow River, Athboy and Clara WFD groundwater bodies	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General surface water management, fuel and chemical handling and control of concrete and lime, and accidental spillages	Imperceptible
	Lough Ennell SAC and SPA	Significant		
	Rochfortbridge Stream and River Brosna	Slight		
	Onsite well, PW1, and offsite, Hostel Well			
Impacts on water levels and flows due to dewatering activities	Athboy and Clara WFD groundwater bodies	Imperceptible	None required	Imperceptible
	Lough Ennell SAC and SPA			
Impacts on watercourse morphology due to construction	Yellow River	Moderate/ slight	Section 12.6: Mitigation and Enhancement Measures – General Surface Water Management, Sedimentation of surface waters	Imperceptible
	Rochfortbridge Stream	Slight		Imperceptible

DESCRIPTION OF EFFECT	RECEPTOR	SIGNIFICANCE OF EFFECT (BEFORE MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (FOLLOWING MITIGATION)
Changes to flood risk and site drainage	Yellow River, Rochfortbridge Stream	Imperceptible	None required	Imperceptible

12.8 Cumulative Effects

Interaction of Effects between the Various Elements of the Proposed Development and Overall Project

12.8.1 The potential cumulative impacts from interactions between various elements of the Proposed Development and Overall Project, as described in Chapter 5, have been considered in terms of impacts on the water environment. Due to the proximity, scale, and timelines associated with each element, there is potential for cumulative effects with the Proposed Development and Overall Project.

12.8.2 This impact assessment has considered all elements of the Proposed Development and Overall Project, including elements which are not subject to this planning permission, during the construction, operation, and decommissioning phases. A cumulative impact assessment has therefore been carried out throughout this chapter to examine the impacts that the various elements of the Overall Project will have on the water environment.

Power Plant Area

12.8.3 The Electricity Grid Connection is part of this application while a separate consent application for the Gas Connection Corridor will be made by Gas Networks Ireland (GNI) under Section 39A of the Gas Act. These elements of the Overall Project are integral to the operation of the Power Plant Area. Therefore, there is potential for overlapping construction phases of each element of the Overall Project (i.e., Grid Connection, Gas Connection Corridor and Power Plant) creating cumulative water environment impacts.

12.8.4 With the implementation of the mitigation, residual effects for the Power Plant Area during construction, operation and decommissioning are considered to be imperceptible or not significant.

12.8.5 No cumulative effects during the operation of the Power Plant Area are anticipated from the operation of the Electricity Grid Connection or the Gas Connection Corridor given the nature of these elements.

Electricity Grid Connection

12.8.6 The Electricity Grid Connection is part of this application with the Power Plant Area application, while a separate consent application for the Gas Connection Corridor will be made by GNI under Section 39A of the Gas Act. These are all part of the Overall Project and are all integral for the overall operation. Therefore, there is potential for overlapping construction phases of each element of the Overall Project (i.e., Grid Connection, Gas Connection Corridor and Power Plant) creating cumulative water environment impacts.

12.8.7 With the implementation of the mitigation, residual effects for the Electricity Grid Connection during construction, operation and decommissioning are considered to be imperceptible or not significant.

12.8.8 No cumulative effects during the operation of the Electricity Grid Connection are anticipated from the operation of the Power Plant Area or the Gas Connection Corridor given the nature of these elements.

Gas Connection Corridor

12.8.9 The Gas Connection Corridor will be subject to separate consenting applications which will be made by GNI. However, the Gas Connection Corridor has been considered part of the Overall Project as it is integral to the operation of the Proposed Development. Therefore, there is potential for overlapping construction phases of each element of the Overall Project (i.e., Grid Connection, Gas Connection Corridor and Power Plant) creating cumulative water environment impacts.

12.8.10 With the implementation of the mitigation, residual effects for the Gas Connection Corridor during construction, operation and decommissioning are considered to be imperceptible or not significant.

12.8.11 No cumulative effects during the operation of the Gas Connection Corridor are anticipated from the operation of the Power Plant Area or the Electricity Grid Connection given the nature of these elements.

Cumulative In-Combination Effects

12.8.12 A full list of planning applications obtained from the search is presented in Appendix 19A (refer to EIAR Volume II). Applications in relation to smaller planning applications predominantly for extensions or alterations to existing dwellings are not considered to be relevant to the cumulative assessment within this EIAR, given their small scale. Therefore, only projects of sufficient size and scale that may potentially act in-combination with the Proposed Development and Overall Project and are assessed herein.

12.8.13 Most of the projects listed in Appendix 19A are sufficiently distant and of a nature and scale that there are no pathways for these to act in-combination with the Proposed Development. Of the developments which are relatively close to the Proposed Development, i.e., within c. 1km of the Site, there is no likelihood of in-combination effects with the water environment receptors addressed in this Chapter following mitigation measures outlined in respective projects.

12.8.14 The scale and location of each of the projects listed in Appendix 19A of this EIAR have been considered cumulatively with each other and the construction and operation of the Proposed Development. Any impacts arising would not cause significant effects to any water environment receptors over those already identified and considered in each assessment.

12.9 References

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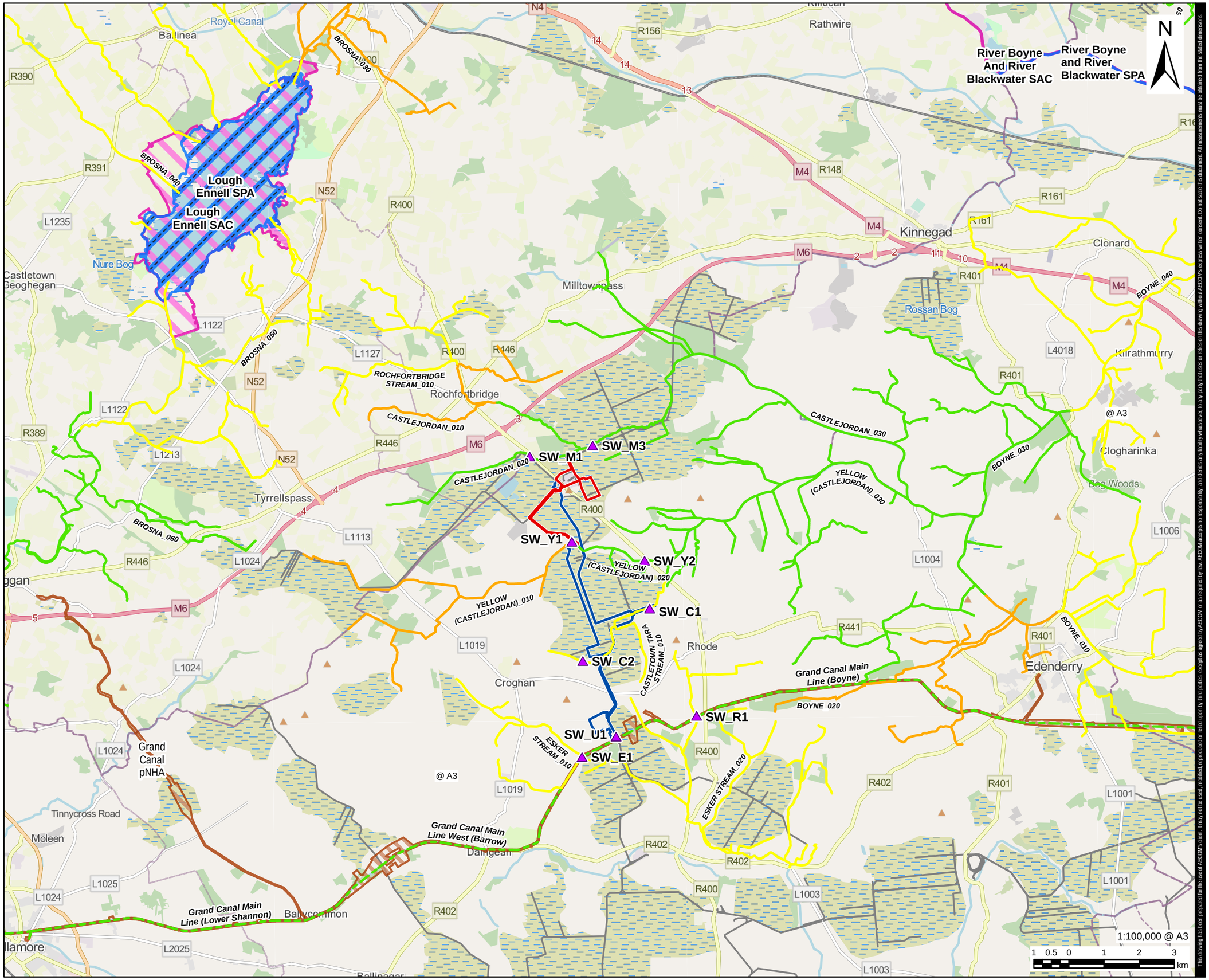

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PROJECT

Proposed Derrygreenagh Power Project

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LEGEND

- Power Plant Area Boundary
- Electricity Grid Connection Boundary
- Surface Water Monitoring Location

River Waterbody (WFD Status)

- Good
- Moderate
- Poor

Canal Waterbody (WFD Status)

- Good

Designated Sites

- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Proposed Natural Heritage Area (pNHA)

NOTES

ISSUE PURPOSE

FOR ISSUE

PROJECT NUMBER

60699676

FIGURE TITLE

Surface Water Features, Monitoring Locations and SWDEs

FIGURE NUMBER

Figure 12.1

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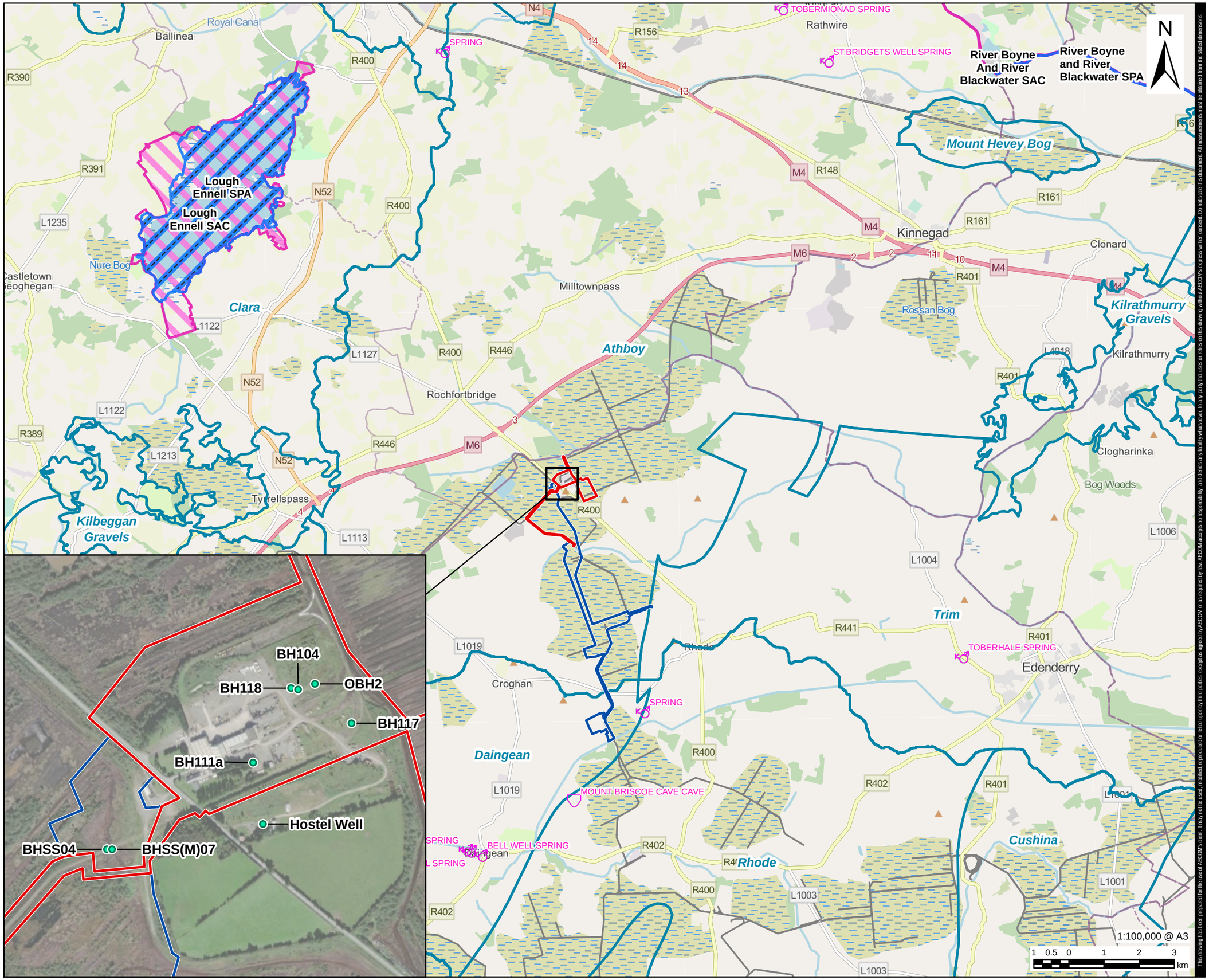

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LEGEND

- Power Plant Area Boundary
- Electricity Grid Connection Boundary
- Ground Waterbody
- Groundwater Monitoring Location

Karst Landform

- Borehole
- Cave
- Enclosed Depression
- Spring
- Swallow Hole

Designated Sites

- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

NOTES

ISSUE PURPOSE

FOR ISSUE

PROJECT NUMBER

60699676

FIGURE TITLE

Aquifer Designations, Groundwater Abstractions, Monitoring Locations and GWDTEs

FIGURE NUMBER

Figure 12.2

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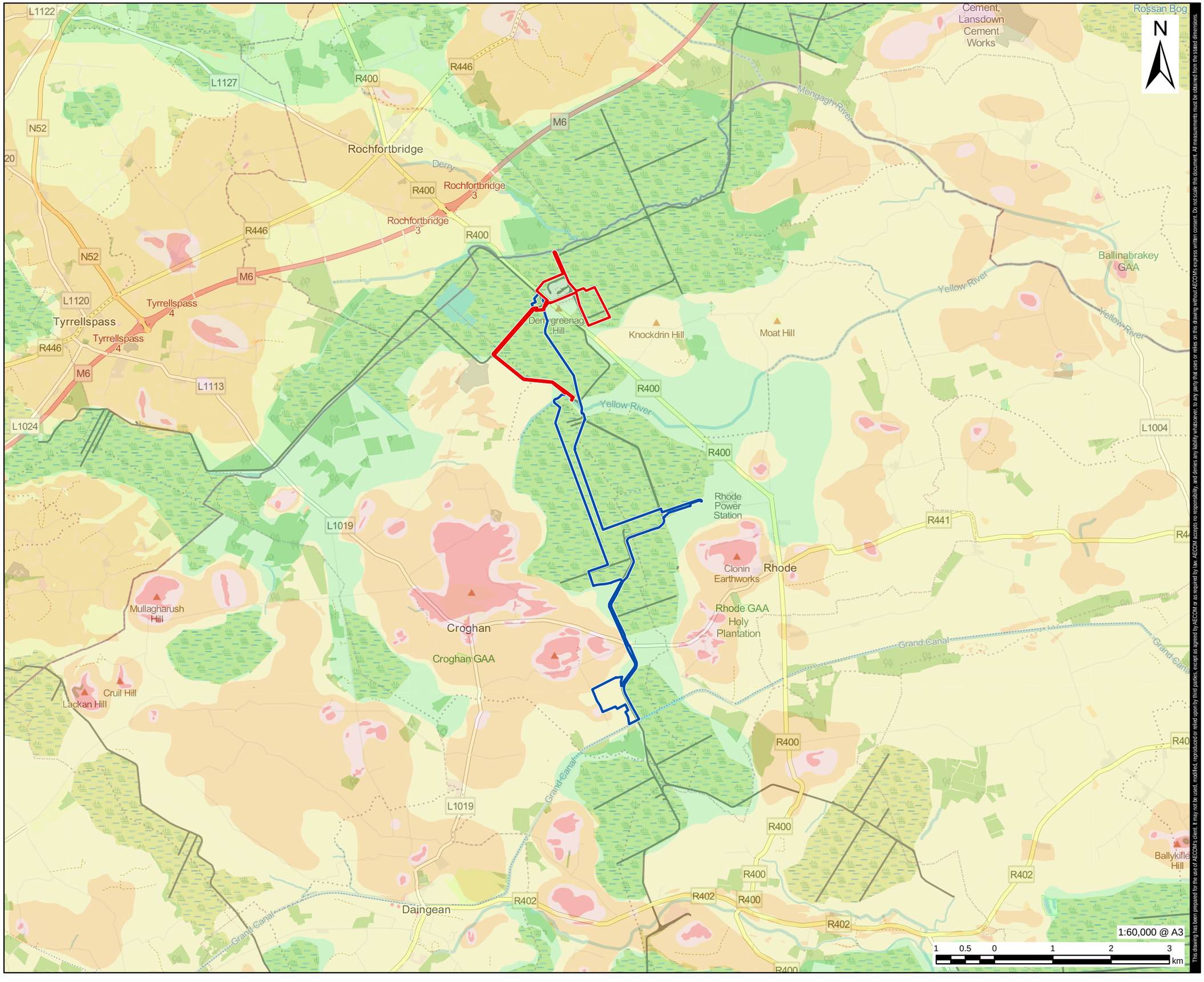

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LEGEND

- Power Plant Area Boundary
- Electricity Grid Connection Boundary

Groundwater Vulnerability

- Rock at or near Surface or Karst
- Extreme
- High
- Moderate
- Low
- Water

NOTES

ISSUE PURPOSE

FOR ISSUE

PROJECT NUMBER

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FIGURE TITLE

Groundwater Vulnerability

FIGURE NUMBER

Figure 12.3