Proposed Derrygreenagh Power Project
Environmental Impact Assessment Report

Chapter 13: Soils and Geology

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13.0 LAND, SOILS AND GEOLOGY

13.1 Introduction

13.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) assesses the likely significant effects of the Proposed Development and Overall Project on geology and soils; 'geology and soils' is a collective term used to describe the geological and soil setting and features. Given the brownfield nature of the Proposed Development within Bord na Móna lands historically used in peat harvesting, the assessment includes screening for land contamination.

13.1.2 The Proposed Development is located entirely within Co. Offaly, primarily on Bord na Móna land (i.e., Drumman, Derryarkin and Ballybeg Bogs which are located in the Derrygreenagh Bog Group), with the exception of an area of agricultural land required for a loop-in connection to the Oldstreet-Woodland 400kV line.

13.1.3 The Overall Project (as defined in **Chapter 1** and **Chapter 5** (Section 5.1.3) of this EIAR) includes the Gas Connection Corridor (Chapter 5 Section 5.5), which is not subject of the application for consents (consents will be sought separately by Gas Networks Ireland) but is integral to the Project and is assessed in this EIAR. The Gas Connection Corridor will be through Third Party lands in the counties of Offaly and Westmeath.

13.1.4 A full description of the existing baseline environment is presented in **Chapter 4**: Existing Site and Conditions of this EIAR, while details of the Proposed Development and Overall Project are presented in **Chapter 5**: The Proposed Development and Overall Project of this EIAR.

13.1.5 The nature of the Proposed Development and Overall Project is such that it will disturb the existing ground conditions and, in the absence of mitigating measures, has the potential to result in significant environmental effects.

13.1.6 The Land, Soils and Geology EIAR chapter, reported herein, provides the assessment methodology (Section 13.2), an outline of the legislative and policy framework relevant to the Project (Section 13.3), , the receiving baseline environment ground conditions (Section 13.4), the predicted impacts of the Proposed Development and Overall Project during the construction, operational and decommissioning phases plus any cumulative effects (Section 13.5), any proposed mitigation and enhancement measures (Section 13.6), any residual effects (Section 13.7) and references (Section 13.8).

13.1.7 This chapter is supported by information in the following chapters, figures, and appendices of this EIAR:

- Chapter 4: Existing Site and Conditions;
- Chapter 5: The Proposed Development and Overall Project;
- Chapter 9: Biodiversity;
- Chapter 12: Water Environment;
- Chapter 19. Cumulative Effects and Interactions ;
- Appendix 5A: Construction Environmental Management Plan (CEMP);
- Appendix 12A: Flood Risk and Drainage Assessment;
- Appendix 13A: Ground Investigation Report, and;
- Appendix 13B: Generic Quantitative Risk Assessment (GQRA).

13.1.8 The Technical Team Lead for this chapter is Kevin Forde, BSc (Hons) Geology, MSc (Hydrogeology), and details of his professional experience are presented in EIAR **Appendix 1B** (refer to EIAR Volume II).

13.1.9 The following geo-environmental specialists at AECOM have also contributed to this chapter and/or supporting appendices:

13.1.10 The following geo-environmental specialists at AECOM have also contributed to this chapter and/or supporting appendices:

- Yvonne McCarthy, Environmental Consultant, BSc, MSc; with 4 years of experience in geology, hydrogeology, contaminated land and ground investigation projects.
- Sammy Sieber, Senior Environmental Scientist, DipGeol, MBA, MSc; with 18 years of experience specializing in geo-environmental site investigation and remediation projects.

13.2 Methodology

Data collection

13.2.1 Establishment of the baseline environment has involved reference to existing data sources, consultation with statutory bodies and other organisations, and fieldwork surveys. The following sources of information have been reviewed:

- Geohive website for historical Ordnance Survey of Ireland (OSI) maps of 1:2,500 scale and 1:10,560 scale (1837 to 1913) and aerial photographs (1995, 2000, 2005, 2013 and 2018);
- Geological Survey Ireland (GSI) website for Public Viewer Geoheritage, Geotechnical, Geochemistry, Geohazards, Natural Resources (Minerals/Aggregates) and Groundwater mapping;
- EPA website for groundwater, industrial licencing and land use information mapping;
- Environmental Sensitivity Mapping (ESM) website for soil and water data;
- A geo-environmental site walkover undertaken by AECOM contaminated land specialist on 22 March 2022
- Ground investigation undertaken by IDL at the site during the period 13 April 2023 to 31 July 2023 (Volume II Appendix 13A), comprising trial pits, cone penetrometer boreholes, cable percussion boreholes, rotary boreholes, well installations, geophysical surveys and infiltration tests.
- Previous site investigation reports were also reviewed (Glover 2008, BnM 2009, Anua 2013);
- Local authority web portals (Offaly County Council - Environment portal – Waste Management https://www.offaly.ie/c/waste-management/ accessed 18 August 2023; and
- Previous environmental impact statements for the site were consulted (Mott McDonald 2008 EIAR and interpretive reports).

13.2.2 The purpose of the 22 March 2022 AECOM walkover was to observe local land use, to identify any potential sources of contamination, to identify any receptors with the potential to be affected by development on the Site, identify which pre-existing wells remain accessible for sampling and to assist with the layout of ground investigation locations.

13.2.3 The purpose of the ground investigations was to supplement previous site investigation findings at the power station site and obtain an overview of the ground and groundwater conditions present at the Site, including the presence or otherwise of soil and groundwater contamination.

Sensitivity of receptors

13.2.4 The sensitivity of a geology or soil receptor is established through the identification and evaluation of the susceptibility of the receptors' to changes arising from the Proposed Development and Overall Project, and the value attached to these. Susceptibility relates to the ability of a geology or soil receptor to accommodate change without undue consequences (significant profound negative or adverse impacts, as defined under IGI, 2013 Appendix C) (see Table 13.1).

13.2.5 Examples of sensitive geology or soil receptors (from Appendix C of the IGI, 2013 guidelines) include:

- Soil and geological resources (e.g., international, national, or regionally designated sites, soils of high nature conservation or landscape importance, mineral reserves, demand on waste management infrastructure through disposal of soils); and
- Receptors susceptible to land contamination and ground hazard impacts (e.g., human, vegetation, protected habitats and species, surface water and groundwater receptors).

13.2.6 The overall importance/ sensitivity of these receptors is ranked as Very High, High, Medium, or Low based on such variables as the quality of the receptor or its value as a resource and in accordance with Table C2 (Criteria for Rating Site Importance of Geological Features (NRA, 2008)) in "*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements"* by the IGI (2013). The descriptive scale for the importance/ sensitivity of receptors is presented in Table 13.1.

Magnitude of impact criteria

13.2.7 The magnitude of potential impacts or changes to identified receptors, as associated with the Proposed Development and Overall Project, has been determined using Table C4 in the IGI guidance (Large Adverse, Moderate Adverse, Small Adverse, Negligible, Minor Beneficial, Moderate Beneficial, Major Beneficial), (see rating system in Table 13.2).

Significance of effects

13.2.8 For each of the potential impacts identified, an assessment has been made of the likely level of significance of the resulting effects. The definition of effect significance has been made by combining both the importance/ sensitivity of the receptor and the magnitude of the predicted impact. The overall significance of predicted impacts is described as Large Adverse, Moderate Adverse, Small Adverse or Negligible from Table C5 of the IGI guidance, using the assessment matrix presented in Table 13.3.

13.2.9 In accordance with the IGI guidance, appropriate mitigation measures are identified to remedy potential impacts and residual impacts are determined. (Steps 10 to 12 of the IGI (2013) assessment process).

Table 13.1: Sensitivity Rating of Geological Features

SENSITIVITY	CRITERIA	GEOLOGY	SOIL RESOURCES	CONTAMINATION
Very high	Attribute has a very high quality and rarity on international or national scale or high sensitivity.	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource	Volume of peat and/ or soft organic soil underlying route is significant on a national or regional scale	Degree or extent of soil contamination is significant on a national or regional scale
High	Attribute has a high quality, significance or value on a local Scale	Geological feature of high value on a local scale (County Geological Site) Moderately sized existing quarry or pit Marginally economic extractable mineral resource	Volume of peat and/ or soft organic soil underlying route is significant on a local scale. Well drained and/ or high fertility soils	Degree or extent of soil contamination is significant on a local scale. Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes
Medium	Attribute has a medium quality, significance, or value on a local scale	Sub-economic extractable mineral resource	Moderately drained and/ or moderate fertility soils Volume of peat and/ or soft organic soil underlying route is moderate on a local scale	Degree or extent of soil contamination is moderate on a local scale. Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes
Low	Attribute has a low quality, significance, or value on a local scale	Volume of peat and/ or soft organic soil underlying route is small on a local scale	Volume of peat and/ or soft organic soil underlying route is small on a local scale	Degree or extent of soil contamination is minor on a local scale. Large historical and/ or recent site for construction and demolition wastes Small historical and/ or recent landfill site for construction and demolition wastes

Source: (from IGI, 2013, Table C2)

Table 13.2: Magnitude of Impact on Geology Attribute

MAGNITUDE OF IMPACT	CRITERIA	GEOLOGY	SOIL RESOURCES	CONTAMINATION
Large adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves Removal of entirety of geological heritage feature	Irreversible loss of high proportion of local high fertility soils Requirement to excavate and replace high proportion of peat, organic soils and/ or soft mineral soils beneath alignment	Requirement to excavate/ remediate entire waste site.
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute.	Loss of moderate proportion of future quarry or pit reserves Removal of part of geological heritage feature	Irreversible loss of moderate proportion of local high fertility soils Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.	Requirement to excavate/ remediate significant proportion of waste site
Small adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves Removal of small part of geological heritage feature	Irreversible loss of small proportion of local high fertility soils and/ or high proportion of local low fertility soils Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.	Requirement to excavate/ remediate small proportion of waste site
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.	No measurable changes in attributes	No measurable changes in attributes	No measurable changes in attributes
Minor beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature		
Moderate beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature		
Major beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature		

Source: (from IGI, 2013, Table C4)

Table 13.3: Rating of Significant Environmental Impacts at EIA Stage

	MAGNITUDE OF IMPACT				
Importance of Attribute		**Negligible**	**Small adverse**	**Moderate adverse**	**Large adverse**
	Extremely high	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Significant/ moderate	Profound/ significant	Profound
	High	Imperceptible	Moderate/ Slight	Significant/ moderate	Profound/ significant
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Moderate/ Slight

Source: (from IGI, 2013, Table C6)

Assessment Assumptions and Limitations

13.2.10 The assessment has been based on the Proposed Development and Overall Project description detailed within EIAR Volume I, Chapter 5: The Proposed Development and Overall Project.

13.2.11 The assessment undertaken in this chapter has been based on and is limited to the baseline environment conditions recorded at the time of undertaking a site visit (22 March 2023) and phased ground investigations undertaken between 13 April and 31 July 2023.

13.2.12 An agricultural impact assessment survey has been undertaken for the Proposed Development as it is required due to the nature of portions of the Site (i.e., agricultural land) (see Volume ii Appendix 16A).

13.2.13 The Receiving Environment 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.

Study Area

13.2.14 The study area for the geology and soils assessment is focused on land within the Proposed Development and Overall Project boundary (Power Plant Area and along the Electricity Grid Connection and Gas Connection Corridor) (all as defined in Volume I Chapter 5) and outward to 2km (as specified in Step 2 of the IGI (2013) guidance). This area is considered appropriate for the consideration of historic and current potentially contaminative land uses in the context of the geological / hydrogeological environment as well as the scale and linear nature of Overall Project and aligns with established industry guidance (IGI, 2013) and professional judgment for defining land contamination study areas for the assessment.

Stakeholder Consultation

13.2.15 The consultation response received from the Geological Survey of Ireland on 13 June 2023 indicated there were no County Geological Sites within the proposed development boundary, noted that bedrock aquifers classified as ‘Locally Important’ underlie the proposed development and that groundwater vulnerabilities in the area of the proposed

development are variable. The response also referred the Applicant generally to the online geological mapping resources provided by GSI.

13.3 Regulatory, Policy and Guidance Framework

13.3.1 In addition to guidance listed in Section 13.2.1, the following legislation, planning policy and guidance documents are of direct relevance and have been considered in the preparation of baseline information, the assessment of effects of the Proposed Development and Overall Project on geology and soils, informing the design-development process and when identifying mitigation measures are presented in the sections below, as well as the EIA Regulations relevant to the scheme.

Regulatory

13.3.2 This chapter has been prepared with reference to the following:

- European Union Water Framework Directive (WFD) (2000/60/EC).

13.3.3 The following legislation in Ireland is considered relevant as it 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:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003) as amended in 2014 (S.I. 350/2014) and 2022 (S.I. 166/2022).
- European Communities Environmental Objectives (Surface Water) Regulations, 2009 ('S.I. No. 272 of 2009 as amended'), as amended in 2012 (by S.I. No. 327/2012), 2015 (by S.I. No. 386/2015), 2019 (by S.I. No. 77/2019) and 2022 (S.I. No. 288/2022).
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) as amended in 2012 (by S.I. No. 149/2012) and 2016 (S.I. No. 366/2016).
- European Communities, Environmental Impact Assessment of Projects – Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU) (EC, 2017).
- Planning and Development Act 2000 (S.I. 30 of 2000), as amended.
- Planning and Development Regulations 2001 (S.I. 600 of 2001), as amended.

Guidance

13.3.4 The following guidance has been used to inform the scope and content of this assessment and to assist the identification and mitigation of likely significant effects:

- Environmental Protection Agency (EPA) guidance document 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports', (EPA, 2022).
- European Commission guidance document 'Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report' (European Commission, 2017).
- Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments - Second Edition (Natural Scotland Scottish Executive, 2017).
- The Institute of Geologists of Ireland (IGI) guidance document 'Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013).
- Institute of Environmental Management and Assessment 'A New Perspective on Land and Soil in Environmental Impact Assessment' (IEMA, 2022):

- Department of Housing, Planning and Local Government ‘Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.’ (DoHELG, 2018).
- Environmental Protection Agency ‘Guidance on The Management of Contaminated Land And Groundwater at EPA Licensed Sites’ (EPA, 2013).
- National Roads Authority ‘Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes’ (NRA 2008b).

13.4 Baseline Environmental Conditions and Constraints

13.4.1 The description of baseline environmental conditions as of 2023 covers the following aspects of the geological and soil setting and features for each of the key areas being assessed, those being the Power Plant Area, the Electricity Grid Connection and the Gas Connection Corridor:

- Topography
- Soil geology;
- Subsoil geology;
- Bedrock geology
- Borehole, Well and Spring information;
- Ground stability i.e., potential for subsidence;
- Land Cover Mapping and Agricultural land classification;
- Geological Heritage Areas
- Geotechnical Site Records
- Geological Hazards
- Radon
- Mineral and Aggregate Potential;
- Designated sites;
- Previous Ground Investigation Data;
- 2023 Site Investigation Information including soil chemistry;
- Potential sources of contamination (including historic land use, waste sites, pollution incidents and permitted installations);
- Identified receptors; and
- Conceptual site model.

13.4.2 The assessment of the Gas Connection Corridor is based on desk study information only.

Power Plant Area

Topography

13.4.3 The wider (2km) study area surrounding the Power Plant Area is characterised by a generally low relief and relatively level, featureless peatland terrain. The natural topography of the surrounding area has been extensively modified by the historic extraction of peat, resulting in a difference in level of cut-over peatland areas relative to other aspects of the landscape, such as roadways, by up to 3 m. The surrounding cutover peatlands are also characterised by a network of parallel drainage channels approximately 15 m apart.

13.4.4 The Power Plant Area itself consists of made ground on a 'mineral island', slightly elevated over the levels of the surrounding cut over peatland area, at an elevation between 82 and 87 metres OD (Ordnance Datum Malin Head) and is located on the northeast side of low hill of mineral soil which rises above the surrounding level peatland.

The hill reaches to a maximum height of 92 metres OD in agricultural land to the south of the Power Plant Area.

13.4.5 The northern part of the Power Plant Area is on an area of previously harvested peat.

Soil Geology

13.4.6 According to the Teagasc soils map (available on the GSI map viewer) (see Figure 13.1), the Power Plant Area is largely underlain by Made Ground (i.e. land where natural and undisturbed soils have largely been replaced by man-made or artificial materials) related to the existing BnM Derrygreenagh Works site, which comprises a workshop, stores and office complex that supports Bord na Móna's peat harvesting activities, including workshops for mobile plant overhaul and for wagon and locomotive maintenance. Adjoining areas are underlain by blanket peat (largely cutaway), made ground and deep, well drained mineral (mainly basic) soils (to the south and west).

13.4.7 There is another hill of mineral soils (Knockdrin Hill) rising above the peatland to over 110m OD approximately 1.4km south-east of the Power Plant Area.

13.4.8 Bog iron ore is reported to be exposed in several places on at the surface of Derrygreenagh Bog, to the west of the Power Plant Area and was historically used in iron production (Mott McDonald, 2010 (previous EIAR and interpretive reports) and on GSI Mineral Localities online mapping (Mineral Location ref. 1704)). The soil geology (according to EPA maps) is described mainly as cutover peat, with areas of manmade soil, limestone till (Carboniferous) and sand and gravel (Carboniferous).

13.4.9 The August 2008 Glover Site investigation report (conducted for previous EIAR at the site) and 2010 EIAR chapter indicate the general soil and subsoil stratigraphy encountered at the Power Plant Area was:

- made ground,
- peat and soft clay/silts (only at the northern end of the Power Plant Area) and
- glacial clay,
- completely to highly weathered Limestone and karst clays.

13.4.10 Made Ground was encountered in 2008 in all exploratory holes except BH01, which was located to the west of the Derrygreenagh Works, in what is the Substation Site for the proposed development. Made Ground comprised firm to stiff, occasionally soft, slightly sandy slightly gravelly clay fill, with cobbles, timber, glass, rubber, plastic, steel and metal in places. Made Ground encountered at the northern end of the Power Plant Area included much greater reworked peat content (soft to firm slightly sandy peaty clay or plastic brown peat). The Made Ground was overlain by topsoil, to a maximum depth of 0.25 m.

13.4.11 The 2008 site investigation indicated that the area surrounding the Power Plant Area is underlain by peat deposits, described as plastic to spongy cream to dark brown/black amorphous to fibrous slightly sandy slightly silty occasionally gravelly peat, with occasional to many cobbles and boulders.

Subsoil Geology

13.4.12 According to the Quaternary Sediments map (available on the GSI map viewer) (see 13.2), the Power Plant Area is underlain by Made Ground (Fill) underlain by till derived from limestone and sand and gravels.

13.4.13 Underlying the areas of surface peat deposits, a soft clay/silt or clay layer was usually encountered, with gravel or stiff clay/silt occasionally encountered).

13.4.14 Glacial clay deposits encountered by the 2008 site investigation were described as firm to very stiff, yellow/grey, brown, slightly sandy gravelly clay, with deposits (less than 0.9m thick) of loose to medium-dense gravelly, fine to coarse sand overlying the clay in places.

13.4.15 Medium to very dense, dark brown to black clayey, occasionally sandy fine to coarse gravel with many cobbles and boulders (interpreted as completely to highly weathered limestone) was encountered in all boreholes in the 2008-2010 studies, with proven stratum thickness of between 2.00 m and 22.40 m. Clay deposits within these gravels were interpreted as indicating the presence of clay-infilled karst features within the limestone bedrock underlying the site.

13.4.16 This weathered limestone gravel and clay stratum was directly underlain by limestone bedrock, where proven.

13.4.17 Karst is a name given to a process of dissolution that is often found to have occurred in limestones.

13.4.18 The mapped subsoil geology is shown on Figure 13.2.

Bedrock Geology

13.4.19 According to the GSI's online map viewer (see Figure 13.3), the Power Plant Area is underlain by Carboniferous limestone and shale of the Lucan Formation (commonly known as Calp). This stratum comprises dark grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcareous mudstone.

13.4.20 There are no GSI-mapped karst bedrock features recorded within the 2km study area for the Power Plant Area.

13.4.21 Previous site investigations in 2008 recorded moderately strong to strong grey fine-grained limestone with occasional calcite veining and estimated the karst classification as 'mature' (kIII).

13.4.22 Groundwater strikes in the 2008 site investigations were at depths of between 6 m and 10 m bgl.

13.4.23 The Power Plant Area itself is described as having 'Low' groundwater vulnerability, with some areas mapped as 'Moderate' or 'High' groundwater vulnerability between 1 and 2km of the Power Plant Area (GSI and EPA Maps) corresponding to areas mapped as having till or gravel subsoils.

GSI Verified Boreholes, Groundwater Wells and Springs

13.4.24 There are no verified borehole records available on the GSI map viewer for the Power Plant Area or surrounding 2km study area.

13.4.25 There is one well (232SEW023) recorded within 2km of the Power Plant Area. It is located (within a 1km accuracy) approximately 1.5km to the south west of the Power Plant Area in the townland of Derryarkin, was drilled in 1964 for domestic use, is reported by GSI to be 19.8 m deep and had a 'Poor' yield of 33 m^3/day.

Ground Stability

13.4.26 The nature of the Made Ground is unpredictable due to its variable composition and properties. The 2010 EIAR assessment (Mott McDonald, 2010) stated it was not, therefore, possible to provide general representative design parameters for this material.

Land Cover Mapping

13.4.27 EPA Corine 2018 landcover mapping (available from https://gis.epa.ie/EPAMaps/) describes the landcover in the 2km study area around the Power Plant Area as 'inland wetlands' described as 'peat bog', with an area of 'forest and semi-natural areas' described as 'coniferous forest' 850m north of the site. Peat is found in the Study Area and a small amount can be found in the northern portion of the Power Plant Area. Peat has been stripped from the surrounding areas.

13.4.28 There are areas mapped by EPA Corine 2018 as 'mines, dumps and construction sites' and further described as 'mineral extraction sites' at 1km west and 750m northeast of the Power Plant Area. These correspond to two large quarries used for aggregate (sand and gravel) extraction.

13.4.29 Other types of landcover mapped under EPA Corine 2018 within 2km of the Power Plant Area are 'agricultural areas' noted as 'pastures' located 1km south east (Knockdrin Hill) and 1km north west of the site (towards Rochfortbridge and the M6 motorway). Located 1.4km south west of the site are other 'agricultural areas' noted as 'heterogenous agricultural areas' which appear to be a mix of pastures and significant areas of natural vegetation.

13.4.30 An Agricultural Report is included as Volume II Appendix 16A of this EIAR and considers the potential impact on existing agricultural land use as a result of the proposed development. The Agricultural Report indicates that the proposed development will not have a significant impact on agriculture or on land use nationally, at a county level or locally and that the residual impact on agriculture post construction has the potential to be considerably reduced by the return of the remaining areas to agricultural use.

Geological Heritage areas

13.4.31 There are no Geological Heritage Sites (Audited or Unaudited) recorded by GSI within 2km of the Power Plant Area.

Geotechnical Site Records

13.4.32 There are no Geotechnical Site Records recorded by GSI within 2km of the Power Plant Area.

13.4.33 According to the GSI Geological Heritage map viewer the closest County Geological Site (CGS) (Site Code: OY014) is Croghan Hill, a prominent hill which is the remains of a Carboniferous era volcano located 4.8km south of the Power Plant Area. The hill displays a variety of volcanic rocks, including extrusive alkali basalts, limburgites, pyroclastic agglomerates and tuffs interbedded with limestones.

Geological Hazards

13.4.34 There are no Landslide Events recorded within the 2km study area around the Power Plant Area on the GSI online Landslide Susceptibility Mapping (2007-2016).

13.4.35 The Landslide Susceptibility Classification assigned by GSI to the Power Plant Area and immediately surrounding lands is generally 'Low' within 2km of the Power Plant Area, but with a small area mapped as 'Moderately Low' along the west side of the R400 road within 50m of the Power Plant Area boundary. This area is likely associated with a stretch of steep slope between the roadway and the cutover peat bog to the west and is outside the proposed development's redline boundary.

Radon

13.4.36 The EPA Radon Map for Workplaces (at https://gis.epa.ie/EPAMaps/) indicates that the Power Plant Area and the surrounding cutover peat lands are not recorded as 'High

Radon Areas' (as defined under Regulation 66 of S.I. 30 of 2019), however workplace radon testing is recommended. In terms of domestic radon risk the EPA Radon Risk Map of Ireland (post-2022 mapping) indicates that in the Power Plant Area and the majority of the surrounding 2km area 'about 1 in 20 homes in this area is likely to have high radon levels' (this is the lowest rating on the EPA national radon risk scale).

Hydrogeology, Hydrology and Groundwater Resources

13.4.37 These elements are discussed in Chapter 12 Water Environment in this EIAR.

Mineral and Aggregate Potential

13.4.38 GSI online Mineral Locality mapping records one non-metallic mineral locality (GSI mineral location reference 1704) within the 2km study area, located on peatland 600m west of the Power Plant Area, which is described as 'Bog iron ore is exposed in several places on the cut surface of Derrygreenagh Bog'. This bog iron ore is reported as having been worked historically (EIAR, 2010).

13.4.39 Three active Sand and Gravel Quarries are recorded on the GSI Active Quarries database within 2km of the Power Plant Area, as follows:

Table 13.4: Sand and Gravel Quarries within 2km of the Power Plant Area

Quarry Name	GSI quarry reference and unique ID	Operator	Distance and direction from the Power Plant Area
Derryarkin Pit	OY010 (80)	Conor Kilmurray	1.7km to south-west
Drumman Quarry	WH005 (235)	Roadstone Limited	1.2km north-west
Derrygreenagh Quarry	OY012 (234)	Roadstone Limited	1.0km to the west

13.4.40 Two historic quarries are recorded to the west of the Power Plant Area on GSI Aggregate Potential Mapping 2km west and 1km west (corresponding with the present=day Derrygreenagh Quarry). This mapping records 'High' or 'Very High' granular aggregate potentialkm to the north, west and south, encompassing the locations of the three active sand and gravel quarries noted above. Generally, there is 'Low' or 'Very Low' crushed aggregate potential within 2km of the site but there are elongated SW-EW oriented zones with 'Moderate' crushed aggregate potential to the north west (1.2km) and south-east (0.6m).

Previous Ground Investigation Findings

13.4.41 The extensive site investigation by Glover Site Investigation in 2008 completed as part of the 2010 Environmental Impact Assessment and identified a variety of waste materials in the made ground at the Derrygreenagh Works site, including brick rubble, plastic sheets, glass, steel bars, metal, rubbish, pieces of rubber, hardcore fill, domestic waste, pieces of conveyor belt, hydraulic hoses and metal plates The most significant thicknesses of waste materials were encountered in former waste disposal areas in the south of the BnM Derrygreenagh Works site, which are located outside the proposed southern boundary of the Power Plant Area .

13.4.42 A further site investigation by BnM in May 2009 and Anua in June 2013 also targeted on the former waste disposal areas outside the proposed southern boundary of the Power Plant Area. .

13.4.43 Anua assessed Low to Very Low environmental risk associated with the buried wastes and stated that Human Health risks were minimal, due to the presence of clean soil cover and the fact that the area impacted was remote from normal site operations.

13.4.44 Specific mitigation and remediation measures were not considered necessary in order to reduce the potential risks to receptors, therefore no further action such as a detailed quantitative risk assessment (DQRA) or corrective actions were proposed by Anua.

2023 Baseline Ground Investigation Findings

13.4.45 The 2023 ground investigation by IDL concerns the Power Plant Area and the Electricity Grid Connection to the south including associated substation locations.

13.4.46 The site investigation works within the Power Plant Area consisted of:

- 15 cable percussion boreholes to between 3.50 and 10.70m below ground to investigate subsoils and obtain geotechnical and geo-environmental samples or test results.
- 14 rotary core boreholes to between 11.00 and 58.00m below ground, generally as follow-on boreholes to extend the cable percussion boreholes and investigate deeper subsoils, assess depth to rock and establish the nature of the underlying rock.
- 12 trial pits to depths between 0.50 and 4.80m below ground to investigate subsoils and obtain geotechnical and geo-environmental samples or test results.
- 18 cone penetration tests to depths between 0.24 and 17.01m below ground to obtain geotechnical test results.
- Geophysical surveys at the Power Plant Area consisting of a 2-D Resistivity Survey (7 resistivity transects) to investigate ground conditions and a Ground Penetrating Radar survey to detect underground services or structures prior to intrusive investigations.
- Down hole geophysical surveys of 2 rotary core boreholes and 1 pre-existing abstraction well to investigate bedrock composition and groundwater fluid properties (between 7.00 and 65.80 m depth).
- Survey of all borehole and trial pit locations to Irish Transverse Mercator (ITM) grid coordinates and elevations relative to the Ordnance Survey of Ireland Malin Head Datum (Ordnance Datum, OD).

Table 13.5: Power Plant Area Site – 2023 Intrusive Investigation

Type	Total	Names	Description	Comments
Cable percussion boreholes	15	BH101, BH102, BH103, BH104, BH105, BH106, BH107, BH108, BH109, BH110, BH111, BH112, BH116, BH117, BH118	Boreholes to between 3.50 and 10.70m below ground to investigate subsoils and obtain geotechnical and geo-environmental samples or test results	BH113, BH114, and BH115 are outside the redline boundary of the Power Plant Area site and are within the former waste disposal areas.

Type	Total	Names	Description	Comments
Rotary core boreholes	14	BH101, BH102, BH103, BH104, BH105, BH106, BH107, BH108, BH109, BH110, BH111, BH112, BH116, BH117,	follow-on boreholes to extend the cable percussion boreholes and investigate deeper subsoils, assess depth to rock and establish the nature of the underlying rock	BH113, BH114, and BH115 are outside the redline boundary. No follow-on rotary bore was conducted in BH118.
Trial pits	12	TP201, TP202, TP203, TP204, TP205, TP206, TP207, TP208, TP209, TP210, TP211, TP212	to investigate subsoils and obtain geotechnical and geo-environmental samples or test results	TP216, TP217, TP218, TP219, and TP220 are outside the redline boundary. (TP213, TP214 and TP215 are at the 220kV substation which form part of the Electricity Grid Connection Corridor)
Cone penetration tests	11	CPT201, CPT202, CPT203, CPT204, CPT205, CPT206, CPT207, CPT209, CPT211, CPT211A, CPT212,	to obtain geotechnical test results	CPT holes were drilled through the corresponding trial pit locations. CPT216, CPT217, CPT218 and CPT219, are outside the redline boundary. No CPT was performed at location of TP208, TP210, TP214, TP215 or TP220. (CPT213, CPT213A, CPT213B are at the 220kV substation which form part of the Electricity Grid Connection Corridor)
Pumping Well	1	PW301	Pumping Well for hydraulic testing of bedrock	
Soakaway Test	4	ST01, ST02, ST03 and ST04	Soakaway infiltration test	

13.4.47 Soil samples were obtained at regular intervals throughout the soil profile by IDL (between 13 April 2023 and 13 June 2023) and were analysed for an extensive suite of geo-environmental parameters as potential ground contaminants. Soil sample analysis by ALS Laboratories (UK) Limited was for some or all of the following parameters:

- Acid neutralisation capacity (at pH 4 and pH 6)
- Anion suite
- Asbestos (ID and/or quantification)

- CEN Readings
- Chromium (III & VI)
- Coronene (PAH)
- Cyanide (Complex/Free/Total/Thiocyanate)
- Metals suite
- Dissolved Organic/Inorganic carbon
- Extractable Petroleum hydrocarbons (EPH) (CWG and GC-FID)
- Fluoride
- Gasoline Range Organics
- Loss on Ignition
- Magnesium
- Mercury (dissolved)
- Polycyclic Aromatic Hydrocarbon (PAH) suite)
- Poly Chlorinated Biphenyl (PCB) suite
- pH
- Phenols suite
- Sample Description
- Semi-volatile Organic Compound (SVOC) suite
- Total Organic Carbon (TOC)
- Total Sulphate
- Total sulphur
- Total Petroleum Hydrocarbons – Criteria Working Group (TPH_CWG)
- Volatile Organic Compound (VOC) suite

13.4.48 Eighteen selected soil samples from BH101 to BH108, BH110 to BH115, BH301 and BHSS04 and BHSS05 were also subjected to leachate extraction (CEN 10:1) and these eluates was analysed for:

- pH
- Electrical Conductivity
- Chromium (III & VI)
- Metals suite (11 heavy metals in addition to chromium)
- Dissolved Organic Carbon
- Fluoride
- Chloride
- Soluble Sulphate (2:1 extract)
- Total Dissolved Solids

13.4.49 Soil samples results are reported in the Irish Drilling Limited site investigation report in Appendix 13A (refer to EIAR Volume II), and the raw soil and soil leachate chemistry results are screened against relevant Generic Assessment Criteria in the Generic Quantitative Risk Assessment report in Appendix 13B (refer to EIAR Volume II).

13.4.50 Olfactory evidence of contamination was not reported by the drilling contractor during the soil sampling on the Site (i.e., no hydrocarbon or other odours). No on-site screening of soil samples for organic vapours was undertaken during ground investigation.

13.4.51 Non-natural soil material was encountered during the site investigation at the Power Plant Area in the form of fill materials and made ground in certain boreholes and trial pits (undifferentiated fill (BH102, BH103), clay fill (BH105), gravel fill (BH106, BH110), peat & clay fill (BH118, TP204), and reworked peat (TP205, TP311)). These non-natural soils included some anthropogenic materials in a number of trial pit sand boreholes, such as metal fragments (BH103), tar/Type 804 fill/road fill (BH112) and plastic and timber fragments (TP313, along the stormwater discharge route to the Mongagh River).

13.4.52 Soil samples from the site were screened by AECOM against Generic Assessment Criteria (GAC) relevant to Human Health (HH) impacts and the continued Commercial/ Industrial Land use of the Site.

13.4.53 A review of the soil data analysed from the Site shows that most soil results were either below laboratory detection limits or below the relevant GAC (see Appendix 13B (in EIAR Volume II).

13.4.54 Low concentrations of a range of metals, petroleum hydrocarbons and PAHs were reported in near-surface soil samples from across the Power Plant Area but all at below the human health GAC. Soil sample depth ranged from 0.6 to 3.5 m bgl but were typically from between 1.0 and 1.5 m bgl.

13.4.55 The only parameter to exceed a relevant GAC at the Power Plant Area was antimony in the soil leachate samples from BH104 (1.0m) and BH112 (1.6m). Both GAC exceedances for antimony in soil leachate were less than twice the GAC applied (Irish 2014 Drinking Water Standard, DWS, of 5 microgrammes per litre (μg/L)), are below the revised 2023 Irish antimony DWS of 10 μg/L and are therefore considered insignificant.

Designated Sites

13.4.56 There are no statutory designated sites (Special Protection Areas (SPA), Proposed Natural Heritage Areas (pNHA), Natural Heritage Areas (NHA) or Special Area of Conservation (SAC)) within 2km of the Power Plant Area.

13.4.57 Water Framework Directive (WFD) designated features are discussed in Chapter 12 Water Environment of this EIAR.

Historic Land Use

13.4.58 The historical land use of the Power Plant Area has been determined by examining the historical mapping for the area available on the OSi map viewer (GeoHive) and on Google Earth aerial photography.

13.4.59 The historic land use of the Power Plant Area on the historic 6inch mapping (1840s) is primarily as agricultural lands, but with four small buildings (in the present day Derrygreenagh Works site) and several tree lines shown on Derrygreenagh Hill, which is surrounded by undifferentiated bog.

13.4.60 Land use is largely unchanged in the 25inch mapping series (late 1800s to early 1900s) apart from a small quarry noted on the southwest side of what is now the R400 immediately southwest of the Power Plant Area and the absence of the previous small structures.

13.4.61 Aerial photography from 1985 (GoogleEarth) and from 1995 and 1996 (GeoHive) show the Derrygreenagh Works in existence but show no signs of the three sand and gravel quarries currently active in the nearby area.

13.4.62 Aerial photography from 2005, 2007 (GoogleEarth) and from 2001 (GeoHive) show three cylindrical tanks in the lands on the southwest side of the R400 (the proposed Substation Site) at the Derrygreenagh Works and shows the establishment and expansion of the two Roadstone quarries in the vicinity. Derryarkin Pit has not yet commenced operations.

13.4.63 Aerial photography from 2006 (GeoHive) does not show the three cylindrical tanks whereas the 2007 (GoogleEarth) aerial photography, suggesting a discrepancy in the dates of some of the aerial photographic record.)

13.4.64 Aerial photography from 2008 (GoogleEarth) shows Derryarkin Pit has commenced operations and subsequent aerial photography from 2014, 2018, 2019, 2020 and 2022, (GoogleEarth) and from 2013 (GeoHive) shows the three cylindrical tanks at the proposed Substation Site are no longer present and show the operation and expansion of all three quarries.

13.4.65 This review of historical mapping and aerial photography for the Power Plant Area and surrounding study area does not indicate any historical potentially contaminative land uses in the vicinity other than the operation of the Derrygreenagh Works itself.

Waste Sites

13.4.66 There is no active and one former waste licenced facility with 2k of the Power Plant Area.

13.4.67 The former Bord na Mona plc Drumman Materials Recycling and Waste Transfer Facility (Waste licence W0275-01) was located 320m north-west of the Power Plant area and was licenced by the EPA in 2014 to accept 99,000 tonnes per annum of mixed dry recyclables, mixed municipal wastes, construction and demolition (C&D) wastes, commercial and industrial (C&I) wastes and brown bin organic wastes. The proposed facility was never developed, and the waste licence ceased in 2019.

13.4.68 The southern portion of the BnM Derrygreenagh Works contains two former waste disposal areas which have been geo-environmentally assessed by Bord na Mona under an IPC licence requirement (see Paragraphs 13.4.42 to 13.4.44) and no significant environmental risk was reported by Bord na Mona and no remedial actions have been proposed to EPA. An EPA Inspector's Report at the time of the licence for peat extraction in 1999 indicates the EPA considered there was no environmental impact from this area at the Derrygreenagh Works[1].This area is outside of the Proposed Development Red Line Boundary.

Permitted Installations

13.4.69 There are two recorded permitted installations licenced by the EPA under First Schedule of the EPA Act as amended within the Study Area.

13.4.70 The existing Derrygreenagh Works is operated by Bord na Móna Energy Limited (Derrygreenagh) and is managed under EPA IPC licence P0501-01 which enforces control measures to mitigative against potential risk to receptors.

13.4.71 Skeagh Farms (P0938-01) holds an IE Licence approximately at Derryarkin, 1.5km Southwest of the Power Plant Area, for the intensive rearing of pigs.

[1] EPA Board Memorandum of 22 November 1999 re: 'Bord na Móna Energy Limited (Derrygreenagh Group) - Application for IPC Licence'

13.4.72 There are no other recorded Integrated Pollution Control (IPC) or Industrial Emissions licences, licenced waste facilities or historical landfill sites recorded within the 2km Study Area around the Power Plant area.

Pollution Incidents

13.4.73 The existing Derrygreenagh Works is operated by Bord na Móna Energy Limited (Derrygreenagh) and is managed under EPA IPC licence P0501-01 which enforces control measures to mitigative against potential risk to receptors.

13.4.74 Site annual environmental reports for the existing Derrygreenagh Works to the EPA for the period 2018 to 2022 have been reviewed via the EPA LEAP portal and there has been no reported loss to ground at the Derrygreenagh Works during this period.

13.4.75 An EPA Inspector's Report[1] reported a historical oil spillage adjacent to Diesel Oil Store No. 2 in April 1999 due to a in an underground pipeline, which was subsequently repaired.

13.4.76 There is potential for other historical pollution incidents and ground contamination related to the former Derrygreenagh Works operations.

13.4.77 Site investigation findings between 2008 and 2013 indicated minor localised ground contamination by petroleum hydrocarbons and PCBs at the Power Plant Area, associated with fill material used to level the site and with the two former waste disposal areas outside the southern boundary of the Derrygreenagh Works site. The 2023 GQRA has not indicated a human health risk related to the low concentrations of hydrocarbons and other minor soil contaminants reported in the soil samples from the Power Plant Area in 2023.

Identified receptors

13.4.78 The principal soil and geological resource receptors which have the potential to be impacted upon by the Power Plant Area during construction, operation, and decommissioning include:

- Agriculture land and soil resources: the soil resources within the Power Pant Area are classified as made ground land use and of negligible sensitivity. The peatlands and agricultural lands outside the redline boundary but within the 2km study area are not anticipated to be impacted by the proposed development.
- Designated sites: There are no designated sites (SPA, pNHA, NHA or SAC) within the Site or within 5km of the boundaries of the Site, other than Croghan Hill (designated geological site), 4.8km from the site which will not be impacted by the proposed development. The remaining area is considered of local importance and of low sensitivity.

13.4.79 The receptors which could be affected by contamination which is created or affected by construction and/ or operation of the Proposed Development are:

- Geology: The Power Plant Area will not impact on any high sensitivity geological heritage features (i.e., designated sites such as Croghan Hill or major aquifers).
- Surface water: There are no surface water courses within or bordering the Power Plant Area. There is an open water body within the three sand and gravel quarries in the Study Area which are not classified by the EPA under the WFD.
- Rivers 500m to the north the Kiltotan and Collinstown surface water body (Mongagh River (Castlejordan_020 surface water body – Code IE_EA_07C040100) and 1.5km to the south-east (Yellow River (Yellow [Castlejordan] surface water body – Code IE_EA_07Y020100) of the Power Plant area are >500m from the Proposed

Development Site and are both classified by EPA as having Good WFD status downstream of the nearest point to the Proposed Development. The Mongagh River WFD risk projection is shown as 'Review', whereas the Yellow River is stated to be 'Not at Risk' of achieving Good WFD Status downstream of the closest point to the Power Plant Area. The Yellow River has both a Poor WFD Status and is at Risk of not achieving Good WFD Status in its upper reaches, southwest (upstream) of the closest point to the Power Plant Area.

- There are no known surface water abstractions within 2km of the Site.
- There is one recorded domestic groundwater abstraction well within the study area on the GSI well database (GSI well ref: 2323SEW023), which is located 1.94km southwest from the Power Plant Area. This well has been recorded by GSI as having a 'Poor' yield (33m^3/day).
- There are no wells used for public supply or group water schemes within the 2km Study Area of the Power Plant Area according to GSI well records. It should be noted that the GSI database is incomplete and additional private/domestic well supplies may exist within 2km of the Power Plant Area.
- There is one well located in the Power Plant Area - 'PW1' – and one well located approximately 80m outside and to the south of the Proposed Development - the 'Hostel Well' (see Chapter 12 for further details). These wells are not recorded in the GSI well database. PW1 well was drilled to 65mbGL in 2008, has a yield of at least 1,008 m^3/ day from the limestone bedrock aquifer but is not currently in use. The Hostel Well supplies all the current water requirements for the Derrygreenagh Works but there are no details on the well depth, construction, drilled geology or pump testing for this well.
- Surface water and groundwater risks and receptors are discussed further in Chapter 12: Water Environment.

13.4.80 Human Health: The land use within the Power Plant Area is brownfield/industrial with the associated human health considered to be of medium sensitivity. Construction workers also represent additional high sensitivity human receptors during the construction phase only. Road users by their very nature are transient and are therefore considered to represent a lower risk.

Table 13.6: Sensitive Receptors Summary

RECEPTOR TYPE	KEY RECEPTORS	SENSITIVITY	POTENTIAL TO BE IMPACTED		
			CONSTRUCTION PHASE	OPERATIONAL PHASE	DECOMISSIONING PHASE
Agricultural soil resources	No agricultural soils within the Proposed Power Station Area Development	Negligible	x	x	x
Designated geological sites	Croghan Hill	High	x	x	x
Surface water	Flooded, cutover peatland	Low – due to naturally elevated heavy metals – non-potable	✓	x	✓
	Tributaries of WFD classified watercourse	Low	✓	x	✓
Groundwater	Superficial deposits aquifer (granular Made	Low	✓	✓	✓

RECEPTOR TYPE	KEY RECEPTORS	SENSITIVITY	POTENTIAL TO BE IMPACTED		
			CONSTRUCTION PHASE	OPERATIONAL PHASE	DECOMISSIONING PHASE
	ground, and Limestone Tills)				
	Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (Lucan Formation limestones)	High	✓	✓	✓
Human Health	Industrial land use (Derrygreenagh Works)	Medium	✓	✓	✓
	Residential (1,200m+ southeast and 1,800m northwest of the site)	High (if potable wells present)	✓	✓	✓
	Construction workers	High	✓	x	✓

Conceptual Site Model

13.4.81 A Conceptual Site Model (CSM) defines the plausible contaminant source, pathway, and receptor linkages, which are integral to identifying potential impacts of the Power Plant Area. The CSM presents details of potential sources of contamination, potential receptors and potential contaminant migration pathways that have been identified for these sites. Table 13.7 lists the potential contaminant linkages and associated risks identified for the Proposed Power Plant Area Development.

Table 13.7: Potential sources-pathways-receptors of contamination associated with the Power Plant Area

POTENTIAL SOURCE	DESCRIPTION	PATHWAY	DESCRIPTION	POTENTIALLY EXPOSED RECEPTORS
Existing soil contamination	Existing minor contamination in the made ground and superficial deposits, as a result of historic minor pollution incidents associate with fuel storage and vehicle maintenance activities could be exposed and disturbed during construction across the Site, depending on the depth of excavations.	Dermal contact	Direct contact with contaminated ground soils, soil derived dust, soil leachate and perched water in the made ground/ subsoil.	- Construction workers
		Inhalation	Inhalation of made ground derived dust, organic vapours or ground generated gas.	- Construction workers - Off-site industrial and residential land users

POTENTIAL SOURCE	DESCRIPTION	PATHWAY	DESCRIPTION	POTENTIALLY EXPOSED RECEPTORS
		Leaching and infiltration into water environment	Rainfall infiltration can generate and mobilise made ground soil/ mining spoil-derived leachate into groundwater within underlying aquifers.	- Surface watercourses - Groundwater - Known/ unknown water supplies
Existing groundwater contamination	[Groundwater sampling of 8 on-site wells in 2023 (4 rounds) indicates that no significant existing groundwater contamination exists at the Power Plant Area (see Chapter 12). Detection of a PAH compound, fluoranthene at 0.04 µg/l, was below the relevant GTV (for Total Polycyclic Aromatic hydrocarbons of 0.075 µg/l). Other determinands were generally below the laboratory limits of detection or within typical ranges for a peat,	Abstraction via potable water well on site (i.e., the "Hostel Well")	Consumption of potentially impacted groundwater.	- Construction workers - Operational Staff (potable groundwater supply)
		Migration vertically via subsoils to fractured bedrock aquifer (Lucan Formation) and lateral migration via bedrock+	Pollution incidents on-site during construction could result in contamination reaching soil and groundwater in direct contact with Power Station infrastructure or services.	- Surface watercourses - Groundwater - Known/ unknown water supplies
Off-site sources	Pollution incidents at off-site sources could result in contamination reaching soil and/ or groundwater in direct contact with Power Station abstraction well, infrastructure or services.	Introduction of new sources of contamination to subsurface	Pollution incidents at off-site sources could result in contamination reaching soil and groundwater in direct contact with Power Station infrastructure or services.	- Construction workers - Surface watercourses - Groundwater - Known/ unknown water supplies
On-site sources	Construction activities with the potential to contaminate soils and groundwater on the Site.		Pollution incidents on-site during construction could result in contamination reaching soil and groundwater beneath the Site.	

Electricity Grid Connection

Topography

13.4.82 The proposed 220kV Substation Site at the northern end of the Electricity Grid Connection is located to the west of the R400 roadway and is at an elevation between 79 and 84 metres OD, slightly lower than the Power Plant Area at 82 and 87 metres OD.

13.4.83 The Electricity Grid Connection route runs southward from the 220kV Substation Site and the overhead portion traverses relatively level Cutover Peatland, with pylon bases at elevations between 74 and 80 metres OD, to the line-cable interface compound (at close to 79 m OD), where the cables run underground to the 400kV Substation Site (at 78-79 m OD).

13.4.84 The overhead line (OHL) portion of the Electricity Grid Connection route consists of 19 proposed electricity pylon locations (double circuit suspension pylon towers (13 no.) and strain pylon towers (6 No)).

13.4.85 South of this point the Electricity Grid Connection transmission route runs underground for 3.4km via underground cable (UGC) alongside/beneath existing machine pass roads or rail line and through agricultural land to the 400kV substation, where it loops into the National Grid Oldstreet-Woodland transmission line.

Soil Geology

13.4.86 According to the Teagasc soils map (available on the GSI map viewer) (see Figure 13.1), the OHL of the Electricity Grid Connection route is almost totally underlain by 'Cut Peat' and the UGC section crosses some minor areas mapped as various types of 'Till derived chiefly from limestone', consisting of either poorly drained peaty gley soils or deep well drained mineral soil, depending on grain size. These non-peat areas are all located along the southern underground cable section of the Electricity Grid Connection route.

13.4.87 There are low hills to both the east (i.e., Clonin Hill 136 m OD) and west (i.e., Croghan Hill (234m OD) of and within 2km of the Electricity Grid Connection route which are mapped as a mix of calcareous (limestone-derived) or non-calcareous mineral soils.

13.4.88 Peat probing conducted in 2013 for the Yellow River Wind Farm EIAR indicated a presumed peat thickness of 0 to 3.6 m at the locations of proposed structures for that development. The Peat Risk Assessment for that study indicated a Peat Slide Hazard Ranking between 1 and 4 (on a scale of 0-25) indicating a Hazard Ranking Level of 'Insignificant'.

13.4.89 The EGC route largely crosses cut-over peatland and the site investigations conducted in 2023 (trial pits and boreholes at substation and pylon locations) found residual peat at these locations is generally <1.0m thick, with the majority of the central portion of the OHL section of the EGC route reporting logged peat thicknesses of less than 0.5m (see EIAR Volume 2 Appendix 5B - Peat and Spoil Management Plan). Thicker peat is logged at the northern and southern ends of the Electricity Grid Connection route (over 2.0m thick, which may represent areas of unharvested peat close to the edges of Derrygreenagh and Ballybeg Bogs).

Subsoil Geology

13.4.90 According to the Quaternary Sediments map (available on the GSI map viewer) (see Figure 13.2), the Power Plant Area is underlain by Cut over raised peat.

13.4.91 Underlying the peat deposits, previous studies indicate that peaty, clayey subsoil overlies a natural sequence of glacial sands and gravels.

13.4.92 The mapped subsoil geology is shown on Figure 13.2.

Bedrock Geology

13.4.93 According to the GSI's online map viewer (see Figure 13.3), the majority of the Electricity Grid Connection is underlain by Carboniferous limestone and shale of the Lucan Formation (commonly known as Calp – see Section 13.4.19). This stratum comprises dark grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcareous mudstone.

13.4.94 There is a karst spring mapped 1.1km east of the Grid Connection Substation (Karst Feature Unique ID IE_GSI_Karst_40K_3886, Historic GSI Karst Feature ID 2323SEK001) at Tobardaly. This is the only karst feature located within 2kn of the Electricity Grid Connection route.

13.4.95 An 800m section of the above ground Electricity Grid Connection route, beginning 750m south of the Power Plant Area, is located over a north-east to south-west-oriented area of volcanic bedrock, mapped as a mix of Basalt (generally massive black olivine basalts, weathered to various degrees) and Volcaniclastic agglomerates. These rocks are beneath the peat and subsoil cover but are the same rock types that outcrop at the surface at Croghan Hill, further to the south.

13.4.96 Bedrock faults are mapped in the vicinity of the Electricity Grid Connection which appear to form an orthogonal fracture pattern, with fracture sets orientated northeast: southwest and northwest: southeast. The Electricity Grid Connection OHL crosses a mapped bedrock fracture of both orientations at 1.6km south of the Power Plant Area

GSI Verified Boreholes, Groundwater Wells and Springs

13.4.97 There are no verified borehole records available on the GSI map viewer for the Electricity Grid Connection route or surrounding 2km Study Area.

13.4.98 There is one borehole (232SEW023) recorded within 2km of the Electricity Grid Connection. It is located (within a 1km accuracy) approximately 1.5km to the south west of the Power Plant area in the townland of Derryarkin, was drilled in 1964 for domestic use, is reportedly 19.8 m deep and had a 'Poor' yield of 33 m^3/day.

13.4.99 The Inner and Outer Source Protection Zones for the Tobardaly Public Water Supply source are located 680m east of the Electricity Grid Connection route and is sources from a spring known as Pool Well (GSI ref (232SEW002) which typically extracts groundwater at a rate of 2,500 m^3/day.

13.4.100 Two other springs at Tobardaly (Heavey's Well ((232SEW031) and Mount Well ((232SEW032)) are reportedly not used for public supply. Heaveys Well was formerly used for public supply and Mount Well used to supply the nearby former ESB Rhode Power station. The three spring wells at Toberdaly are located close to the contact between the Lucan Formation limestones to the west and the Allenwood Formation Limestones to the east and are also close to a mapped NE-SW trending bedrock fault, which may provide important groundwater flow paths to the springs. These springs are classed as 'tepid springs' by GSI, with a groundwater temperatures 2-3^{o}C higher than typical groundwaters, which may suggest some deep geothermal input.

Ground Stability

13.4.101 The nature of the peatland areas is unpredictable due to its variable thickness, water saturation and composition therefore, it is not possible to provide general representative design parameters for this material. Ground investigation data acquired along the OHL section of the EGC route in 2023 indicated that peat the land is relatively level and peat thickness reported was between <0.5 and 1.0m thick, with short sections of thicker peat (up to 2.0m thick) and the northern and southern ends of the OHL. Ground stability for pylon footings and temporary access tracks will be addressed at detailed design phase.

Land Cover Mapping

13.4.102 EPA Corine 2018 landcover mapping describes the landcover in th e2km study area around 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 north of the Grid Connection Substation site. Peat has been stripped from the areas traversed by the Electricity Grid Connection route.

13.4.103 There is an area mapped by EPA Corine 2018 as 'Artificial Surfaces' and further described as 'discontinuous urban fabric' at the town of Rhode, 2.4km east of the Electricity Grid Connection route.

13.4.104 Other types of landcover mapped under Corine 2018 within 2km of the Electricity Grid Connection route include significant areas of 'agricultural areas' noted as 'pastures' located 1-2km to both the west and east of the route and some smaller areas, principally on the east side of Knockdrin Hill 1.8+km east of the route, reported as:

- Agricultural Areas - Land principally occupied by agriculture with significant areas of natural vegetation.
- Forest and semi-natural areas - Transitional woodland scrub
- Forest and semi-natural areas - Coniferous forests

13.4.105 An Agricultural Report is included as Volume II Appendix 16A of this EIAR and considers the potential impact on existing agricultural land use as a result of the proposed development. The Agricultural Report indicates that the proposed development, including the EGR, will not have a significant impact on agriculture or on land use nationally, at a county level or locally and that the residual impact on agriculture post construction has the potential to be considerably reduced by the return of the remaining areas to agricultural use.

Geological Heritage areas

13.4.106 There are two Geological Heritage Sites (Audited or Unaudited) recorded by GSI within 2km of the Electricity Grid Connection route.

- Croghan Hill (OY014) is a prominent hill 1.87km west of the route rising from an otherwise flat landscape and represents the remains of a volcano that erupted from the sea covering this region in the Carboniferous Era (see Section **Error! Reference s ource not found.**).
- Tobardaly spring (ref: OY028) at Tobardaly village 0.82km east of the UGC section of the EGC route consists of three closely-spaced natural freshwater springs, one of which supplies the Rhode rural water supply scheme and all three are classed as a 'tepid springs' with slightly elevated groundwater temperature values.

Geotechnical Site Records

13.4.107 There are no Geotechnical Site Records recorded by GSI within 2km of the Electricity Grid Connection route.

Geological Hazards

13.4.108 There is one Landslide Event recorded within 2km of the Electricity Grid Connection route on the GSI online Landslide Susceptibility Mapping (2007-2016). The Daingean1975 landslide (GSI_LS03-0066) occurred in 1975 and involved a peat flow following a rupture of a 400m section of cutover peat close to the Grand Canal (at ITM 649340 729528, 1.85km southwest of the Grid Connection Substation) which had 'no apparent impact'.

13.4.109 The Landslide Susceptibility Classification assigned by GSI to the Electricity Grid Connection route and immediately surrounding lands is generally 'Low' within 2km of the Electricity Grid Connection route, but with a small area mapped as 'Moderately Low', largely located along the Yellow River. Including where the Electricity Grid Connection route crosses the river.

Radon

13.4.110 The EPA Radon Map for Workplaces indicated that the Electricity Grid Connection and the surrounding cutover peat lands are not recorded as 'High Radon Areas' however workplace radon testing is recommended. In terms of domestic radon risk, the EPA

Radon Risk Map of Ireland indicates that along the EGC route 'about 1 in 20 homes in this area is likely to have high radon levels' (this is the lowest rating on the EPA national radon risk scale).

13.4.111 In the surrounding 2km study area, there are areas of High Radon Risk where either bedrock is mapped as being at/close to the surface or which are underlain by the Allenwood Formation limestone bedrock. Domestic radon risk within the study area similarly varies with soil/rock type, ranging from '1 in 20' to '1 in 5' homes likely to have radon levels above guideline values.

13.4.112 The area of the 400kV Substation is on mineral soils and has a slightly higher domestic radon risk ranking ('about 1 in 10 homes in this area is likely to have high radon levels').

Hydrogeology, Hydrology and Groundwater Resources

13.4.113 These elements are discussed in Chapter 12 Water Environment in this EIAR.

Mineral and Aggregate Potential

13.4.114 GSI online Mineral Locality mapping records a non-metallic mineral locality (GSI mineral location reference 1704) on peatland 600m west of the northern end of the Electricity Grid Connection, which is described by GSI as '*Bog iron ore is exposed in several places on the cut surface of Derrygreenagh Bog'*. This bog iron ore is reported as having been worked historically (EIAR, 2010, O'Carroll, E. and Mitchell, F.J.G, 2013).

13.4.115 Three active Sand and Gravel Quarries are recorded on the GSI Active Quarries database within 2km of the Electricity Grid Connection route, as follows:

Table 13.8: Sand and Gravel Quarries within 2km of the Power Plant Area

Quarry Name	GSI quarry reference and unique ID	Operator	Distance and direction from the closest point on the Electricity Grid Connection
Derryarkin Pit	OY010 (80)	Conor Kilmurray	1.3km to south-west
Drumman Quarry	WH005 (235)	Roadstone Limited	1.2km north-west
Derrygreenagh Quarry	OY012 (234)	Roadstone Limited	1.0km to the west

13.4.116 Two historic quarries are recorded to the west of the Power Plant Area on GSI Aggregate Potential Mapping 2km west and 1km west (corresponding with the present day Derrygreenagh Quarry). This mapping records 'High' or 'Very High' granular aggregate potentialkm to the north, west and south, encompassing the locations of the three active sand and gravel quarries noted above. Generally, there is 'Low' or 'Very Low' crushed aggregate potential within 2km of the site but there are elongated SW-EW oriented zones with 'Moderate' crushed aggregate potential to the northwest (1.2km) and south-east (0.6m).

Previous Ground Investigation Findings

13.4.117 Site investigations were undertaken in 2013 for the SSE Yellow River windfarm, a 29-turbine wind power scheme which is currently under construction (mid-2023). Turbine locations T1 to T12 are located on Derrygreenagh bog, Derryarkin bog and Derryiron bog, within 2-3km of the Electricity Grid Connection route. Peat probing conducted in 2013 for the windfarm EIAR at these locations indicated a presumed peat thickness of 0.05 to 3.0 m at these proposed turbine locations, however the EIAR noted that mechanically-powered site investigations were not conducted and therefore peat

thicknesses could be underestimated by that study. The Peat Risk Assessment for that study indicated a Peat Slide Hazard Ranking between 1 and 4 (on a scale of 0-25) indicating a Hazard Ranking Level of 'Insignificant'.

13.4.118 Ground investigation data acquired along the OHL section of the EGC route in 2023 indicated that peat the land is relatively level and peat thickness reported was between <0.5 and 1.0m thick, with short sections of thicker peat (up to 2.0m thick) and the northern and southern ends of the OHL. Ground stability for pylon footings and temporary access tracks will be addressed at detailed design phase.

Soil Chemistry – 2023 Site investigations

13.4.119 The 2023 ground investigation by IDL concerned the EGC route to the south as well as associated 220kv and 400kV substation locations and the Interface Cable Compound. The overall site investigation works are summarised in Section 13.4.45 and the Ground Investigation report is included as EIAR Volume II Appendix 13A.

13.4.120 Along the Electricity Grid Connection Route, a borehole and a trial pit were constructed by IDL close to each of the proposed nineteen locations of a pylon.

13.4.121 In total, the 2023 intrusive site investigation works along the Electricity Grid Connection Route and at the associated 220kV and 400 kV substations, interface cable compound and borrow pit area consisted of 35 boreholes and 70 trial pits, as follows:

Table 13.9: Summary of Ground Investigation Locations along the EGC

Section/Area	Type	Naming	Depth Range
OHL	18 boreholes (pylon locations)	BHT01 to BHT 18	
UGC	0 boreholes	n/a	n/a
220kV Substation	7 boreholes	BHSS01 to BHSS06 and BHSSM07	
400kV Substation	8 boreholes	BHSS101 to BHSS107 and BHSS1M08	
Interface Cable Compound	2 boreholes	BHCC01 and BHCC02	
Borrow Pit	0 boreholes	n/a	n/a
OHL	18 trial pits (pylon locations)	TPT01 to TPT18	
UGC	18 trial pits	TPC01 to TPC18	n/a
220kV Substation	8 trial pits	TPSS01 to TPSS06 and TP214 and TP215	
400kV Substation	7 trial pits	TPSS101 to TPSS107	
Interface Cable Compound	1 trial pit	TPCC01	
Borrow Pit	8 trial pits	TPBP01 to TPBP08	
Process Discharge	10 Trial Pits	TP301 to TP310	

13.4.122 Borehole and trial pit logs and ground investigation location maps are provided in EIAR Volume II Appendix 13A.

13.4.123 No olfactory evidence of contamination was reported by the drilling contractor during the soil sampling at locations along the EGC route or at the associated substations and other sites.

13.4.124 Anthropogenic material was encountered during the ground investigation at the Electricity Grid Connection in the form of fragments of timber, plastic, glass and discarded hand tools in a trial pit along the UGC section of the EGC only (TPC02, TPC03, TPC04 and TPC05, see trial pit logs in Volume II Appendix 13A).

13.4.125 Soil sample results from the EGC ground investigation locations were screened by AECOM against Generic Assessment Criteria (GAC) relevant to Human Health (HH) impacts and the continued Commercial/ Industrial Land use of the lands.

13.4.126 A review of the soil data analysed from the EGC ground investigation locations shows that most soil results were either below laboratory detection limits or below the relevant GAC (see EIAR Volume II Appendix 13B – soils GQRA report).

13.4.127 The only parameter to exceed a relevant GAC in samples from EGC ground investigation locations was antimony in the soil leachate samples from BHSS4 (3.5m and BHSS05 (2.5m) in the 220kV substation. Both GAC exceedances for antimony in soil leachate were less than twice the GAC applied (Irish 2014 Drinking Water Standard, DWS, of 5 microgrammes per litre (μg/L)), are below the revised 2023 Irish antimony DWS of 10 μg/L and are therefore considered insignificant.

Designated Sites

13.4.128 There are no Special Protection Areas (SPA), Natural Heritage Areas (NHA) or Special Area of Conservation (SAC) within the 2km study area of the Electricity Grid Connection.

13.4.129 There is one Proposed Natural Heritage Areas (pNHA) within 5km of the Electricity Grid Connection. The Grand Canal PNHA (code 002104) is located 400m south of the proposed 400kV Grid Connection Substation and comprises the canal channel and the banks on either side of it and is designated on the basis of the diversity of species it supports along its linear habitats than in the presence of rare species.

13.4.130 Water Framework Directive (WFD) designated features are discussed in Chapter 12 Water Environment and associated appendices of this EIAR.

Potential sources of contamination

Historic Land Use

13.4.131 The historical land use of the Electricity Grid Connection and associated substation areas has been determined by examining the historical mapping for the area available on the OSi map viewer (GeoHive) and on Google Earth aerial photography.

13.4.132 The historic land use of the Electricity Grid Connection on the historic 6inch mapping (1840s) is primarily as undifferentiated bog but with agricultural lands at the southern end close to the proposed 400kV loop-in Substation, with three small buildings present 170m south of the proposed substation (at location of present-day farmyard).

13.4.133 A small water body (Lough Nashade) is shown within the bog within the eastward expansion of Electricity Grid Connection Route (at ITM 650738 734257). The Yellow River and Grand Canal are shown in their current configurations.

13.4.134 Land use is largely unchanged in the 25inch mapping series (late 1800s to early 1900s) apart from Lough Nashade being shown as a smaller area of open water surrounded by willow trees (oziers). A spring and some structures are noted at ITM 650849 732197.

The small structures within the 400kV substation site are no longer evident. Lough Nashade is not shown as a lake water body on present-day EPA and OSI mapping, however the former location of Lough Nashade is crossed by 2 streams or drainage ditches, one of which turns north-south just east of the EGC red line boundary, is annotated on OSI 1:50k mapping as 'Canal Supply' and is shown as flowing from south to north on EPA water feature mapping.

13.4.135 Aerial photography from 1985 (GoogleEarth) appears to show Derryarkin Bog and the west side of Ballybeg Bog are undeveloped whereas Drumman Bog and the east side of Ballybeg bog appear to have been harvested for peat.

13.4.136 Aerial photography from 1995 and 1996 (GeoHive) show Derryarkin Bog and Ballybeg Bog appear to have been completely harvested for peat. The Derrygreenagh Works to the east of the R400 road is in existence but the aerial photographs show no signs of the three sand and gravel quarries currently active in the nearby area.

13.4.137 Aerial photography from 2005, 2008, 2009, 2014, 2015, 2016, 2018, 2019 2020 and 2022 (GoogleEarth) and from 2001, 2006 and 2013 (GeoHive) show little change close to the Electricity Grid Connection other than the establishment and expansion of the two Roadstone quarries (pre-2005) and Derryarkin Pit (2008) and increased dispersed rural housing along the L1010 Togher Road (Rhode to Croghan).

13.4.138 This review of historical mapping and aerial photography for Electricity Grid Connection Route and surrounding study area does not indicate any historical potentially contaminative land uses in the vicinity other than the operation of the Derrygreenagh Works at the northern end of the route.

Waste Sites

13.4.139 There is no active and one former waste licence (associated with a proposed but never developed facility) with 2km of the Electricity Grid Connection Route.

13.4.140 The proposed, but never developed, Bord na Mona plc Drumman Materials Recycling and Waste Transfer Facility (Waste licence W0275-01) was to have been located 320m north-west of the Electricity Grid Connection Route, was licenced by the EPA in 2014 to accept 99,000 tonnes per annum of mixed wastes. The waste licence ceased in 2019.

13.4.141 The southern portion of the BnM Derrygreenagh Works contains two former waste disposal areas which are outside the Power Plant Area boundary and which have been geo-environmentally assessed by Bord na Mona under an IE licence requirement (see Paragraphs 13.4.42 to 13.4.44). No significant environmental risk was inferred, and no remedial actions have been proposed to EPA.

Permitted Installations

13.4.142 There are five recorded permitted installations licenced by the EPA per the First Schedule of the EPA Act as amended within the Study Area (four active and one surrendered lE licences).

13.4.143 The existing Derrygreenagh Works is operated by Bord na Móna Energy Limited (Derrygreenagh) and is managed in compliance with IPC licence P0501-01.

13.4.144 Bord na Mona Biomass Limited is licenced to carry out activities in compliance with P0503-01 on approximately 18,416Ha of mostly contiguous, but some isolated, bogs, principally within counties Offaly and Kildare (Allen Group) south of the Derrygreenagh Group of bogs and the Grand Canal.

13.4.145 Skeagh Farms (P0938-01) holds an IE Licence approximately at Derryarkin, 1.5km West of the Electricity Grid Connection and Derryarkin Bog, for the intensive rearing of pigs.

13.4.146 SSE Generation Ireland Limited (Rhode) (P0694) operate a gas/oil fired peaking power plant within part of the former ESB Rhode peat fired Power Station, east of the OHL and Ballybeg Bog,

13.4.147 ESB operated the Rhode milled peat power station from 1960 to 2003. The power station was demolished in 2004 and the IE licence (P0628-01) was withdrawn.

13.4.148 There are no other recorded licences per First Schedule of the EPA Act as amended, licenced waste facilities or historical landfill sites recorded within the 2km Study Area around the Electricity Grid Connection.

Pollution Incidents

13.4.149 Site annual environmental reports for the existing IPC Licence P0501-01 to the EPA for the period 2018 to 2022 have been reviewed via the EPA LEAP portal and there has been no reported loss to ground within the Licence boundary and specifically areas which form of the Power Plant Area and Electricity Grid Connection during this period.

Identified receptors

13.4.150 The principal soil and geological resource receptors which have the potential to be impacted upon by the Electricity Grid Connection during construction, operation, and decommissioning include:

- Agriculture land and peatland soil resources: the Electricity Grid Connection crosses cut-over peatland, short sections of industrial access roads and railways serving the former peat harvesting areas and agricultural lands at the 400kV Substation site which are typical of the area. As the peatland has already been extensively worked for fuel it is considered to be of moderate sensitivity.

Designated sites: There are no SPA, pNHA, NHA or SAC within 5km of the Route and one pNHA 400m south of the southern end of the route. The Grand Canal pNHA is of regional importance as a diverse habitat and is therefore considered to be of High or Very High sensitivity. Croghan Hill is a geological heritage site 1.87km from the EGC route and 400kV substation. Neither The Grand Canal pNHA nor Croghan Hill are considered to be at risk from the land and soils aspects or the proposed construction activities.

13.4.151 The receptors which could be affected by contamination which is created or affected by construction and/ or operation of the Proposed Development are:

- Geology: The Proposed Development will impact on a high sensitivity soil (peat) environment.
- Surface water: There are four surface water courses along or bordering the Electricity Grid Connection Route.
- The following surface water courses are within 500m of the Electricity Grid Connection Route:

Table 13.10: Surface water courses close to Electricity Grid Connection Route

Map Name	EPA Name	European code	WFD Status 2016-2021	WFD Risk Projection	Location relative to Electricity Grid Connection Route
Mongagh River	Castlejordan_020	IE_EA_07C040100	Good	'Review'	500m to north
Yellow River	Yellow [Castlejordan]	IE_EA_07Y020100	Good	Not at Risk	Crossed by route at ITM 649781 736408
Unnamed	Castletown Tara Stream_010	IE_EA_07C080190	Moderate	Not at Risk	Crossed by route at ITM 650418 733137, tributary of Yellow River
Canal supply	Esker Stream_010	IE_SE_14E010100	Moderate	'Review'	Three tributaries - 1.1km west and 0.8 and 2km east of 400kV Substation
Grand Canal	Grand Canal Main Line West (Barrow)	IE_14_AWB_GCMLW	Good	'Review'	360m south of 400kV Substation

- There are no surface water abstractions for public water supply within 2km of the Site.
- There is one recorded groundwater spring well in use for public supply at Tobardaly (Pool Well - GSI ref 232SEW002), 680m east of the Electricity Grid Connection route.
- In addition to the Tobardaly spring, there are six groundwater wells within 1km of the EGC route according to GSI well records, with the closest three being within 1km of the 400 kV substation. Details of the wells are provided in Chapter 12, however the GSI database is incomplete and other private well supplies may exist in the vicinity.
- Surface water and groundwater risks and receptors are discussed further in Chapter 12: Water Environment.
- Human Health: The land uses close to the Electricity Grid Connection route are brownfield/industrial (cutover peatland) or agricultural, therefore risks with the associated human health considered to be of low sensitivity. Construction workers represent additional high sensitivity human receptors during the construction phase only. Road users and agricultural workers by their very nature are transient and are therefore considered to represent a lower risk.
- The following table indicates the identified potentially sensitive receptors to land and soils aspects of the EGC construction and operational phases. It is envisaged that the EGC will form part of the National Grid post-construction, therefore decommissioning of the EGC is not envisaged as part of this scheme and it is excluded from the following table.

Table 13.11: Sensitive receptors

RECEPTOR TYPE	KEY RECEPTORS	SENSITIVITY	POTENTIAL TO BE IMPACTED	
			CONSTRUCTION PHASE	OPERATIONAL PHASE
Agricultural soil resources	Agricultural soils present at 400kV Substation site	Low	✓	✓
Designated geological sites	Croghan Hill	High	x	x
Surface water	Flooded, cutover peatland	Low – due to naturally elevated heavy metals – non-potable	✓	x
	Tributaries of WFD classified watercourse	Low	✓	x
Groundwater	Superficial deposits aquifer (granular Made ground, and Limestone Tills)	Low	✓	✓
	Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (Lucan Formation limestones)	High	✓	✓
Human Health	Industrial land use (Derrygreenagh Works)	Medium	✓	✓
	Residential (mainly along L1050)	High (if potable wells present)	✓	✓
	Construction workers	High	✓	x

Conceptual Site Model

13.4.152 A Conceptual Site Model (CSM) defines the plausible contaminant source, pathway, and receptor linkages, which are integral to identifying potential impacts of the Electricity Grid Connection route. The CSM presents details of potential sources of contamination, potential receptors and potential contaminant migration pathways that have been identified for the route. Table 13.12 lists the potential contaminant linkages and associated risks identified for the proposed Electricity Grid Connection route.

Table 13.12: Potential sources-pathways-receptors of contamination associated with the Proposed Development

POTENTIAL SOURCE	DESCRIPTION	PATHWAY	DESCRIPTION	POTENTIALLY EXPOSED RECEPTORS
Existing soil contaminations	Soils along the entire Electricity Grid Connection Route are uncontaminated natural soils (cutover peatland or agricultural soils (pastures) with no significant soil contamination reported other than leachable antimony form two soil samples from the 220kV substations. Small amounts of anthropogenic materials (wood, plastic, glass) encountered at the previously excavated Borrow Pit area.	Dermal contact	Direct contact with contaminated ground soils, soil derived dust, soil leachate and perched water in the made ground/ subsoil.	- Construction workers
		Inhalation	Inhalation of made ground derived dust, organic vapours or ground generated gas.	- Construction workers - Off-site industrial and residential land users
		Leaching and infiltration into water environment	Rainfall infiltration can generate and mobilise made ground soil/ mining spoil-derived leachate into groundwater within underlying aquifers.	- Surface watercourses - Groundwater - Known/ unknown water supplies
Existing groundwater contamination	Groundwater aquifers (in the superficial deposits and limestone bedrock) uncontaminated.	Dermal contact	Direct contact with contaminated groundwater.	- Construction workers
		Mobilisation and migration along preferential flow paths in superficial or bedrock aquifers	Rainfall infiltration can mobilise contaminated groundwater further into the subsurface from there to other water environment receptors.	- Surface watercourses - Groundwater - Known/ unknown water supplies
Off-site sources	Pollution incidents at off-site sources could result in contamination reaching soil and/	Introduction of new sources of contamination to subsurface	Pollution incidents at off-route sources could result in contamination	- Construction workers

POTENTIAL SOURCE	DESCRIPTION	PATHWAY	DESCRIPTION	POTENTIALLY EXPOSED RECEPTORS
	or groundwater in direct contact with power transmission infrastructure along the Electricity Grid Connection route - unlikely.		reaching soil and groundwater in direct contact with power transmission infrastructure or services.	- Surface watercourses - Groundwater - Known/ unknown water supplies
On-site sources	Construction activities with the potential to contaminate soils and groundwater along the Electricity Grid Connection route.		Pollution incidents on-site during construction could result in contamination reaching soil, groundwater or surface water receptors along the Electricity Grid Connection route.	

Gas Connection Corridor

Topography

13.4.153 The Gas Connection Corridor runs north west from the Power Plant Area and is characterised by a 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 (at approximately ITM 643002 741819). It crosses the M6 at ITM 647113 739408 and the R446 at ITM 645873 740062.

Soil Geology

13.4.154 According to the Teagasc soils map (available on the GSI map viewer) (see Figure 13.1), the southernmost 2km end of the Gas Connection Corridor covers blanket peat (largely cutaway) and the remainder largely traverses grey-brown podzolic till soils derived from limestones, with short sections of undifferentiated alluvium and/or peaty gley soils in river valleys close to the R446 and Castlelost West.

Subsoil Geology

13.4.155 Quaternary Sediments mapping (available on the GSI map viewer) (see Figure 13.2) is very similar to the Teagasc Soil mapping and records that the southernmost 2km end of the Gas Connection Corridor covers cut-over raised peat and the remainder largely traverses till derived from limestones, with short sections of undifferentiated alluvium and/or peaty gley soils in river valleys close to the R446 and Castlelost West.

13.4.156 The mapped subsoil geology is shown on Figure 13.1.

Bedrock Geology

13.4.157 According to the GSI's online map viewer (see Figure 13.3), the Gas Connection Corridor is largely underlain by Carboniferous limestone and shale of the Lucan Formation (dark

grey to black, fine-grained, occasionally cherty, micritic limestones with rarer interbedded calcarenitic limestones and calcareous mudstones).

13.4.158 The Gas Connection Corridor traverses a 750m section of Volcaniclastic agglomerate bedrock between the Mongagh River and the M6.

13.4.159 Just north of the M6 the older Waulsortian Limestone Formation is faulted against the Lucan Formation by a series of NE-SW trending bedrock faults. The Gas Connection Corridor traverses a 2km section of Waulsortian Limestone Formation bedrock southwest of Rochfortbridge, with a transitional boundary with the overlying Lucan Formation to the northwest. The Lucan Formation underlies the remainder of the Gas Connection Corridor to the northwestern interface with the national Gas Grid ("Gas Pipeline to the West" (BGE/77)).

13.4.160 There are no mapped karst features in the Gas Connection Corridor Study Area.

13.4.161 The southern end of the Gas Connection Corridor, which overlies peatland, is described as having 'Low' groundwater vulnerability. The remainder which traverses tills and alluvium is generally assigned 'Moderate' to 'High' groundwater vulnerability.

GSI Verified Boreholes, Groundwater Wells and Springs

13.4.162 There are no verified borehole records available on the GSI map viewer for the Gas Connection Corridor or surrounding 2km Study Area.

13.4.163 There is one borehole (2323NWW015) recorded within 2km of the GGC route. It is located (within a 1km accuracy) approximately 850m to the south of the GGC in the townland of Piercetown, was drilled in 1999 for agricultural and domestic use, is reportedly 61 m deep, encountered bedrock at 1.8 m bgl and no well yield or abstraction rate date is reported in the GSI database.

Ground Stability

13.4.164 There are no Landslide Event records available on the GSI map viewer for the Gas Connection Corridor or surrounding 2km Study Area.

Land Cover Mapping

13.4.165 EPA Corine 2018 landcover mapping records the landcover in the 2km study area around the Gas Connection Corridor largely as 'Agricultural Areas' described as 'Pastures', other than the peatland areas at the southeastern 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'.

13.4.166 Within the 2km Study Area for the Gas Connection Corridor there are also areas mapped by EPA Corine 2018 as 'mines, dumps and construction sites' (see Section 13.4.28) and 'Forest and semi-natural areas' (see Section 13.4.104).

13.4.167 An Agricultural Report is included as Volume II Appendix 16A of this EIAR and considers the potential impact on existing agricultural land use as a result of the proposed development. The Agricultural Report indicates that the proposed development, including the EGR, will not have a significant impact on agriculture or on land use nationally, at a county level or locally and that the residual impact on agriculture post construction has the potential to be considerably reduced by the return of the remaining areas to agricultural use.

Geological Heritage areas

13.4.168 There are no Geological Heritage Sites (Audited or Unaudited) recorded by GSI within 2km of the Gas Connection Corridor.

Geotechnical Site Records

13.4.169 There are two Geotechnical Site Records (3694 and 3697) recorded by GSI within 2km of the Gas Connection Corridor, which both appear to be associated with the existing Gas Grid Main at the northwestern end of the Gas Connection Corridor. The full geotechnical reports are not available via the GSI mapping site; however, it does indicate the locations and depth of trial pits and boreholes along the existing gas main route. Trial pits in the immediate vicinity of the grid connection location were between 0.7 and 2.8 m deep and did not intersect rock. One borehole is recorded at ITM 641884 742820 which was 6.90m deep and did not intersect rock.

Geological Hazards

13.4.170 There are no Landslide Events recorded within 2km of the Gas Connection Corridor on the GSI online Landslide Susceptibility Mapping (2007-2016).

13.4.171 The Landslide Susceptibility Classification assigned by GSI within 2km of the Gas Connection Corridor is 'Low', except for a small area mapped as 'Moderately Low' to 'Moderately High' on a south-facing hillside close to ITM 643002 741518, approximately 300m south of the proposed Gas Connection route near Kilbrennan.

Radon

13.4.172 The EPA Radon Map for Workplaces indicated that the Gas Connection Corridor and the surrounding lands are not recorded as 'High Radon Areas'. In terms of domestic radon risk the EPA Radon Risk Map of Ireland indicates that in the 2km area surrounding the Gas Connection Corridor either 'about 1 in 10 or 'about 1 in 20 homes in the area is likely to have high radon levels'.

Hydrogeology, Hydrology and Groundwater Resources

13.4.173 These elements are discussed in Chapter 12 Water Environment in this EIAR.

Mineral and Aggregate Potential

13.4.174 GSI online Mineral Locality mapping records one non-metallic mineral locality (GSI mineral location reference 4949) 880m north from the northwestern end of the Gas Connection Corridor, which is described as an outcrop of 'Dolomite (dolostone)' recorded on historical geological mapping.

13.4.175 There are three active Sand and Gravel Quarries recorded on the GSI Active Quarries database within 2km of the south-eastern end of the Gas Connection Corridor, as described in Section 13.4.39.

Previous Ground Investigation Findings

13.4.176 There are no known previous site investigations along the route of the Gas Connection Corridor.

Designated Sites

13.4.177 There are no statutory designated sites (Special Protection Areas (SPA), Proposed Natural Heritage Areas (pNHA), Natural Heritage Areas (NHA) or Special Area of Conservation (SAC)) within 2km of the Gas Connection Corridor.

13.4.178 Water Framework Directive (WFD) designated features are discussed in Chapter 12 Water Environment of this EIAR.

13.4.179 According to the GSI Geological Heritage map viewer there are no audited or unaudited Geological Heritage Sites within 2km of the Gas Connection Corridor.

Potential sources of contamination

Historic Land Use

13.4.180 The historical land use along the Gas Connection Corridor has been determined by examining the historical mapping and aerial photographs for the area available on the OSi map viewer (GeoHive) and on Google Earth aerial photography.

13.4.181 The historic land use along the Gas Connection Corridor on the historic 6inch mapping (1840s) and 25inch mapping series (late 1800s to early 1900s) is primarily as agricultural lands apart from the bog land noted from Derrygreenagh Hill to approximately 500m north of Mongagh Bridge.

13.4.182 Aerial photography from 1985, 2005, 2006, 2008, 2009, 2013, 2014, 2018, 2019, 2020, 2021 and 2022 (GoogleEarth) and from 1995, 1996, 2001, 2006 and 2013 (GeoHive) show little change in land use along the Gas Connection Corridor other than the construction of the M6 between 1985 and 1995, the expansion of Rochfortbridge to the southwest along the R446 and the construction of rural one-off housing.

Waste Sites

13.4.183 There is no active and one former waste licence (for a proposed but never constructed facility) within 2km of the Gas Connection Corridor (proposed Bord na Mona plc Drumman Materials Recycling and Waste Transfer Facility (Waste licence W0275-01).

13.4.184 The southern portion of the BnM Derrygreenagh Works, within 2km of the GGC contains two capped former waste disposal areas (see Section 13.4.68).

Permitted Installations

13.4.185 There are three recorded permitted installations licenced by the EPA under the IE Licence within 2km of the southern end of the Gas Connection Corridor Study Area (see Section13.4.69).

Pollution Incidents

13.4.186 Site annual environmental reports for the existing Derrygreenagh Works to the EPA for the period 2018 to 2022 have been reviewed via the EPA LEAP portal and there has been no reported loss to ground at the Derrygreenagh Works during this period, however historical pollution incidents and ground contamination exist at the site (see Sections 13.4.76 and 13.4.77).

Identified receptors

13.4.187 The principal soil and geological resource receptors which have the potential to be impacted upon by the Proposed Development of the Gas Connection Corridor during construction, operation, and decommissioning include:

- Agriculture land and soil resources: the soil resources within the Gas Connection Corridor are agricultural lands of moderate sensitivity.
- Designated sites: There are no designated sites (SPA, pNHA, NHA or SAC) within the Site or within 2km of the boundaries of the Site.

13.4.188 The receptors which could be affected by contamination which is created or affected by construction and/ or operation of the Proposed Development are:

- Geology: Impact of shallow (1-2m deep) pipe trench on farmland. The Proposed Development will not impact on any high sensitivity geological heritage features.

- Surface water: There are four surface water courses along or bordering the Gas Connection Corridor.
- The following surface water courses are crossed by the Gas Connection Corridor:

Table 13.13: Surface water courses close to Gas Connection Corridor

MAP NAME	EPA NAME	EUROPEAN CODE	WFD STATUS 2016-2021	WFD RISK PROJECTION	LOCATION RELATIVE TO ELECTRICITY GRID CONNECTION ROUTE
Mongagh River	Kiltotan_and Collinstown	IE_EA_07C040100	Good	'Review'	The gas connection crosses the Mongagh River at Mongagh Bridge ITM 648530 738865
Unnamed tributary of River Derry	Castlejordan 07	IE_EA_07C040050	Poor	At Risk	Crossed by route close to ITM 646324 740054
Unnamed tributary of River Derry	Rochfortbridge Stream_010	IE_EA_07R040300	Moderate	At Risk	Crossed by route close to ITM 644048 741561
Unnamed tributary of River Brosna/ Lough Ennell	Rochfortbridge Demense Brosna_040	IE_SH_25B090200	Moderate	At Risk	Crossed by route close to ITM 642111 742336

- There are no known surface water abstractions within 2km of the Gas Connection Corridor.
- There is one recorded agricultural and domestic groundwater abstraction well (GSI well ref: 2323NWW015 at Piercetown) and no wells uses for public supply or group water schemes within 2km of the Gas Connection Corridor according to GSI well records, however the GSI database is incomplete and private well supplies may exist in the vicinity of the Gas Connection Corridor.
- Surface water and groundwater risks and receptors are discussed further in Chapter 12: Water Environment.
- Human Health: The land uses close to the Gas Connection Corridor are brownfield/industrial (cutover peatland) or agricultural lands, therefore risks with the associated human health considered to be of low sensitivity. Construction workers represent additional high sensitivity human receptors during the construction phase only. Road users and agricultural workers by their very nature are transient and are therefore considered to represent a lower risk.
- The following table indicates the identified potentially sensitive receptors to land and soils aspects of the EGC construction and operational phases. It is envisaged that the EGC will form part of the National Grid post-construction, therefore decommissioning of the EGC is not envisaged as part of this scheme and it is excluded from the following table.

Table 13.14: Sensitive receptors

RECEPTOR TYPE	KEY RECEPTORS	SENSITIVITY	POTENTIAL TO BE IMPACTED	
			CONSTRUCTION PHASE	OPERATIONAL PHASE
Agricultural soil resources	Agricultural soils present along most of Gas Connection Corridor	Moderate	✓	x
Designated geological sites	None	N/A	x	x
Surface water	Flooded, cutover peatland	Low – due to naturally elevated heavy metals – non-potable	✓	x
	Tributaries of WFD classified watercourse	Low	✓	x
Groundwater	Superficial deposits aquifer (granular Made ground, and Limestone Tills)	Low	✓	x
	Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (Lucan Formation limestones)	High	✓	x
Human Health	Industrial land use (Derrygreenagh Power Station)	Medium	✓	✓
	Residential	High (if potable wells present)	✓	✓
	Construction workers	High	✓	x

Conceptual Site Model

13.4.189 A Conceptual Site Model (CSM) defines the plausible contaminant source, pathway, and receptor linkages, which are integral to identifying potential impacts of the Proposed Gas Connection Corridor Development. The CSM presents details of potential sources of contamination, potential receptors and potential contaminant migration pathways that have been identified for these sites. Table 13.15 lists the potential contaminant linkages and associated risks identified for the Proposed Gas Connection Corridor Development.

Table 13.15: Potential sources-pathways-receptors of contamination associated with the Proposed Development

POTENTIAL SOURCE	DESCRIPTION	PATHWAY	DESCRIPTION	POTENTIALLY EXPOSED RECEPTORS
Existing soil contamination	No existing contamination in the superficial deposits anticipated.	Dermal contact	Direct contact with contaminated ground soils, soil derived dust, soil leachate and perched water in the made ground/ subsoil.	- Construction workers
		Inhalation	Inhalation of dust or ground generated gas.	- Construction workers - Residential land users
		Leaching and infiltration into water environment	Rainfall infiltration can generate and mobilise made ground soil/ leachate into groundwater within underlying aquifers.	- Surface watercourses - Groundwater - Known/ unknown water supplies
Existing groundwater contamination	No existing contamination in the shallow groundwater anticipated	Dermal contact	Direct contact with contaminated groundwater.	- Construction workers
		Mobilisation and migration along preferential flow paths in superficial or bedrock aquifers	Rainfall infiltration can mobilise contaminated groundwater further into the subsurface from there to other water environment receptors.	- Surface watercourses - Groundwater - Known/ unknown water supplies
Off-site sources	Pollution incidents at off-site sources could result in contamination reaching soil and/ or groundwater in direct contact with gas transmission infrastructure - unlikely	Introduction of new sources of contamination to subsurface	Pollution incidents at off-site sources could result in contamination reaching soil and groundwater in direct contact with gas transmission infrastructure.	- Construction workers - Surface watercourses - Groundwater - Known/ unknown water supplies
On-site sources	Construction activities with the potential to contaminate soils and groundwater on the route.		Pollution incidents on-site during construction could result in contamination reaching soil and	

POTENTIAL SOURCE	DESCRIPTION	PATHWAY	DESCRIPTION	POTENTIALLY EXPOSED RECEPTORS
			groundwater beneath the route.	

13.5 Predicted Impacts

Do Nothing Scenario

13.5.1 In the absence of the Proposed Development, no significant changes to soil and geological resource receptors are likely to occur. 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).

13.5.2 Subsoils or rock are not currently being extracted from the Derrygreenagh Works site or along the grid and gas connection corridors. As discussed in Sections 13.4.38, 13.4.114 and 13.4.174, there is however current extraction of sands and gravels as a mineral resource at several sites within 2km of the Proposed Development.

Impact Assessment for Power Plant Area

Construction Phase

13.5.3 The scoping process has identified that the introduction of the Proposed Development would potentially result in different types and durations of impact on soils and geological receptors, during the construction phase. Likely predicted impacts are described below.

13.5.4 As outlined in EIAR Volume I, Chapter 5: The Proposed Development, there are below ground elements to the Proposed Development with the potential to result in impacts on soils and geological receptors. These consist of elements of the main thermal power plant area and gas AGI east of the R400 road, on-site groundwater abstraction and water treatment infrastructure, the process water discharge pipe which will extend west of the R400 before ultimate discharge south into the Yellow River and the surface water discharge pipe which extends north of the Power Plant Area before discharging into the Mongagh River.

13.5.5 The new thermal power plants (CCGT and OCGT units) and associated foundations and subsurface infrastructure will be constructed on the site of the existing Derrygreenagh Works following demolition of existing structures. The primary fuel for both will be natural gas from the national gas network and the secondary fuel will be distillate and will be stored in 2 no. tanks within a bunded area to the south of the Power Plant Area.

13.5.6 The construction work will include piled foundations for the turbine hall HRSG and shallow foundations elsewhere.

13.5.7 The site will have 2 No. emergency Diesel Generators with integral bunded fuel tanks on the north east of the power plant area to allow safe shutdown of the plant in the event of a loss of grid power, which are potential risks to the subsurface environment in the event of a loss to ground.

13.5.8 During the construction phase, the following predicted impacts on soils and geological receptors are likely to occur, without the proposed mitigation:

- Impacts on soil structure as a result of soil excavation, smearing and compaction;
- Removal of agricultural land
- Impacts on soils and surface and groundwater water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals/ wastewater, or through mobilisation of contamination following disturbance of contaminated ground, sediments, or groundwater, or through uncontrolled site run-off;
- Impact on due to dewatering during construction;
- Impacts of construction on ground stability

- Impacts on off-site receptors, such as road users, residents and construction workers, through the inhalation of dust and dermal contact with soils following ground disturbance.

13.5.9 Impact resulting from construction activities in relation to risk of groundwater flooding or recharge as a result of any below ground excavations and on fluvial and overland flow paths as a result of works associated with the PPA construction are assessed under Chapter 12.

Impacts on Land and Soils due to removal of agricultural land

13.5.10 No impact to or removal of agricultural land is proposed or to soil resources is envisaged and all works are on unvegetated Made Ground therefore there will be negligible impacts in relation to Land and Soils to agricultural lands which will be of **Imperceptible** significance.

Impacts on Land and Soils due to soil excavation works

13.5.11 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance or removal 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 potential contaminants, particularly in the vicinity of the existing Derrygreenagh Works. The potential impacts of fine sediment on water quality, flora and fauna are addressed in Chapter 12: Water Environment, while the potential impacts of soil contaminants on water quality are addressed herein.

13.5.12 Construction of the Power Plant area will involve excavation to a depth of 1.5 m for areas to be covered by buildings and plant (over an area of 66,000m^2, resulting in an excavation volume of 118,800m^3 including side slopes and bulking factor) and to a depth of 0.5m in green areas within the PPA red line boundary (over an area of 39,354m^2, resulting in an excavation volume of 23,612m^3 including side slopes and bulking factor). The overall excavation volume at the PPA is 142,412m^3 including allowance for side slopes and bulking factor, which will be deposited to a depth of 1 m across the Peat and Spoil Deposition Area. Excavation of soils at the PPA will result in a **small, adverse**, but **permanent** impact on a geological environment of **Medium** sensitivity (peat or soft organic soils and minor local pre-existing soil contamination); which combined would result in a **slight** effect on this receptor.

13.5.13 No on-site excavations for borrow pits are envisaged for the construction on the Power Plant area.

13.5.14 Construction of the Power Plant area will involve vehicle movements and stockpiling of materials which may result in localised smearing and compaction of peat and clay subsoils, however this site is currently in industrial use and natural soils across the majority of the PPA are covered in a layer of Gravel Fill made ground 0.3 to 2.9m thick, therefore smearing and compaction of peat and clay subsoils at the PPA will result in a **small, adverse**, but **permanent** impact on a geological environment of **Medium** sensitivity (peat or soft organic soils and minor local pre-existing soil contamination); which combined would result in a **slight** effect on this receptor

13.5.15 Imported materials for construction of the PPA shall be stored at either the PPA site or at the substation compounds and will be transported to the works zone immediately prior to construction.

13.5.16 Where possible site-won excavated materials will be reused on-site (i.e., to reinstate access tracks). If the material is considered unsuitable for reuse on-site, an outlet for offsite reuse will be sought. If reuse is not possible the material will be removed to an authorised facility by authorised waste contractors for composting or disposal as appropriate.

13.5.17 Storage of stockpiles of material has the potential to cause compaction of underling soil structure, generate sediment-laden runoff and give rise to dust issues during dry weather.

13.5.18 A permanent Peat Deposition Area (PDA) will be designed and constructed provided on cut-over peatland to the northeast of the Power Plant Area (refer Appendix 2A, Drawing Ref: S7060-8310-0006) to store excess peat and overburden soil material which cannot be used in localised landscaping or as backfill. It is estimated that approximately 300,000m3 of excess peat and soil from across the entire Scheme will be required to be stored within the permanent PDA.

13.5.19 Peat will be deposited to a maximum height of 1m above ground level across a 222,410m² area cut-over peatland. Once excavations are completed and following the commissioning of the project, the PDA will be allowed to naturally revegetate.

13.5.20 Overall, the management of imported or excavated materials during construction presents a **small, adverse, temporary** effect on a Geological environment of **Medium** sensitivity (excavation and removal or replacement of a small proportion of peat, organic soils or soft mineral soils beneath the PPA); which combined would result in a **Slight** effect on this receptor.

Impacts on soils and groundwater chemistry as a result of spillages or through the mobilisation of existing contamination during construction

13.5.21 During construction, fuel, hydraulic fluids, solvents, grouts, detergents, and other potentially polluting substances will be stored and/ or used on site. Spillages of these substances could pollute nearby surface watercourses or underlying aquifers if their use or removal is not carefully controlled, and spillages enter existing flow pathways or waterbodies directly. Disturbance of existing soils at the PPA which have low concentrations of a number of potential contaminants may lead to leaching of potential contaminants (such as antimony) to deeper soils and shallow/perched groundwater. The potential impacts of spillages on water quality, flora and fauna are addressed in Chapter 12: Water Environment. The potential impacts of the migration of these spillages or leaching from disturbed soil or fill material during construction within the subsurface on groundwater quality will result in a **small, adverse, temporary** impact on a geological environment of **Low** sensitivity (low permeability peats and superficial deposits overlying bedrock aquifer); which combined would result in a **slight** effect on this receptor.

Impact of dewatering during construction;

13.5.22 During construction, groundwater may potentially be encountered in excavations and dewatering may be required. The potential impacts of construction dewatering and subsequent discharging on surface and groundwater receptors are addressed in Chapter 12: Water Environment.

13.5.23 Site groundwater well level data indicates that construction excavation (proposed to a depth of 2m bgl at the PPA) is unlikely to intersect the water table, so construction site dewatering is unlikely to be required, however pumping test data in July and August 2023 at PW1 indicated a potential dewatering effect on nearby subsoils/superficial deposits due to prolonged borehole pumping, which is unlikely to significantly impact on water levels and resource availability in the underlying bedrock Athboy WFD groundwater body and in nearby Ground Water-Dependent Terrestrial Ecosystems (GWDTEs) (see

Chapter 12). Dewatering via pumping at the PPA may therefore result in a **negligible, temporary** impact on a geological environment of **High** sensitivity (Athboy WFD groundwater body); which combined would result in an **imperceptible** effect on this receptor, and also a **small, adverse** impact on a geological environment of **Medium** sensitivity (GWTDEs - consisting of the Knockdrin Garr Cutover (including Drumman Bog) and Bunsallagh Cutover complexes (including Derryarkin Bog)); which combined would result in an **slight** effect on this potential receptor.

13.5.24 The potential impacts of construction dewatering on ground stability have been scoped out of the impact assessment for the following reasons:

- Depth to Groundwater measured in standpipes installed on the Power Plant Area on 18 July 2023 were between 4.57 and 13 .04 meters below pre-construction ground level suggesting that construction excavations to depths of 2.0 m bgl will not intersect groundwater and will therefore not require significant dewatering, other than removal of rainwater.
- The proposed construction methodology includes piled foundations for the major elements of the proposed Power Plant Area.
- There are no records of historic mine workings or reported karst features within the Site.

Impacts of construction on ground stability

13.5.25 The potential impacts of construction activities on ground stability have been scoped into the impact assessment for the following reasons:

- While there are no recorded collapse features within the 2km Study Area, no historic mine shafts or mines within the Site and no mapped karst features mapped within 1-2km of the Site, the thick, dense limestone gravels, which extend to over 25-30 m below ground level beneath much of the Power Plant Area and up to 58 m below ground level at BH101, are interpreted as deeply weathered limestone and clay horizons which may potentially indicate the presence of karst features at the site
- A single, partially-infilled cavity, interpreted as a karst feature, was identified between 47.0 and 49.3 m bgl in bedrock in borehole BH104 drilled on the Site in 2023 (refer to EIAR Volume II Appendix 13A), so enlarged conduits in the fractured limestone bedrock at depth cannot be ruled out.
- Given the thick subsoils and weathered rock cover, it is very unlikely that ground instability as a result of underlying karst would be an issue during construction, operation, or decommissioning of the Proposed Power Plant Development. Ground stability would result in a negligible, permanent impact on a geological environment of Medium sensitivity (potentially karstified bedrock); which combined would result in an **imperceptible** effect on this receptor,

Impacts on off-site receptors through the inhalation of dust and dermal contact with soils

13.5.26 Construction activities at the PPA could potentially impact on off-site receptors, such as road users, residents and construction workers, through the inhalation of dust or via dermal contact with soils following ground disturbance, however extensive soil sampling during the 2023 ground investigations at the PPA did not report any potential contaminants in soils at concentration which are assessed as posing a potential risk to Human Health (see Volume II Appendix 13B) therefore the pre-existing, minor soil contamination at the PPA would result in a negligible impact on a human health receptor of High sensitivity (Local population); which combined would result in an **imperceptible** effect on this receptor

Impacts on Designated Sites

13.5.27 There are no designated Sites within 2km of the Power Plant Area therefore construction activities at the PPA are not anticipated to result in land and soils impacts to Designated Sites. Predicted impacts are therefore negligible and of Imperceptible significance.

Operational Phase

13.5.28 The introduction of the Proposed Development would potentially result in different types and durations of impact on soils and geological receptors, during the operational phase. During the operational phase of the Proposed Development, the following likely predicted impacts on soils and geology receptors are likely to occur, without the proposed mitigation:

- Impacts on soil chemistry as a result of accidental spillages or leakages
- Impacts on surface and groundwater quality through the migration of introduced contamination.

Impacts on agricultural land

13.5.29 No impact to agricultural land is predicted during the Operational phase therefore there will be negligible impacts in relation to Land and Soils to agricultural lands which will be of **Imperceptible** significance.

Impacts on soil chemistry through accidental spillages or leakages

13.5.30 Impacts on soil and groundwater chemistry as a result of accidental spillages or leakages from stored backup fuel (distillate fuel or Hydrotreated Vegetable Oil (HVO)) or maintenance/cleaning chemicals into the subsurface therefore the accidental spillages or leakages at the PPA would result in a **moderate, adverse, temporary** impact on a Geological receptor of **Medium** sensitivity (peat and soft organic soils underlying the PPA); which combined would result in **Moderate** significance.

Impacts on Designated Sites

13.5.31 There are no designated Sites within 2km of the Power Plant Area therefore operational activities at the PPA are not anticipated to result in land and soils impacts to Designated Sites. Predicted impacts are therefore negligible and of **Imperceptible** significance.

Decommissioning Phase

13.5.32 Prior to any decommissioning, a Decommissioning Plan (including a Decommissioning Environmental Management Plan) will be produced and agreed with the EPA as part of the IE Licence and licence surrender process. An environmental Baseline Assessment report at time of commencement of operations will be referred to and updated to determine if any contamination has occurred and what, if any, rehabilitation is required prior to IE Licence surrender.

13.5.33 The predicted impacts on soils and geological receptors likely to occur during the decommissioning phase are anticipated to be similar to those likely to occur during the construction phase with the exception of the impacts relating to unidentified contamination. The likely predicted impacts are as follows without the proposed mitigation:

- Temporary impacts of soil structure due to soil stripping, smearing and compaction;
- Temporary impacts on soil chemistry as a result of spillages of oils, fuels, or other construction chemicals, or through the mobilisation of contamination following ground disturbance; and

- Temporary impacts on surface and groundwater quality through the migration of introduced contaminants as a result of spillages.

13.5.34 Impact type, receptor sensitivity and unmitigated effects will be as for the PPA Construction phase.

Impact Assessment for Electricity Grid Connection

Do Nothing scenario

13.5.35 The do-nothing situation relevant to soils and geology for Electricity Grid Connection is one where Bord na Móna manage the lands, with no further peat harvesting, and potentially with restoration of areas of cut-over peat. Subsoils or rock are not currently being extracted for aggregate from the ECG route itself however commercial sand and gravel extraction for aggregate use does occur at three quarries in the vicinity of the Electricity Grid Connection.

Construction Phase

13.5.36 The proposed development is characterised by the following civil engineering works to provide the necessary infrastructure to complete the wind farm as described in Chapter 5, Description of the Proposed Development:

13.5.37 The major construction elements of the Electricity Grid Connection are:

- Construction of the 220kV Substation at the northern end and of the 400kVSubstation at the southern end of the Electricity Grid Connection route
- Construction to the approximately 3.4km Underground Cable Connection (UGC) to the Cable Compound (CC), with variations on this design to adapt to service crossings and watercourse crossings.
- Construction of the CC to transition from the UGC to the Overhead Line (OHL) section of the Electricity Grid Connection, which consists of 19 masts and towers in total across c. 5km of cut-over peatland to the 220kV GIS -AIS Substation.
- Construct 220kV GIS -AIS Substation adjacent to the Power Plant area.

13.5.38 Ground impacts associated with construction activities include:

- Construction of access roads (permanent and temporary) to the towers, substations and cable compound;
- Construction of temporary compounds, including hard stands, construction material storage areas and site offices;
- Management of excavated materials;
- Excavation for tower foundations, hardstanding foundations and substation foundations;
- Excavation for cable ducts; and
- Construction of surface water drainage system along the new roads and at the substations and cable compounds.

13.5.39 The direct and indirect effects of the construction activities, and their expected duration are discussed further in the following sections. The effect on use of land and on natural resources required to carry out the works which relate to soils and geology is also discussed.

Impacts on Land and Soils due to removal of agricultural land

13.5.40 The majority of the EGC is constructed on cutover peatland not classified as agricultural land however the construction of the 400kV substation is on mineral soils used as grassland will be a small adverse permanent impact in relation to Land and Soils to agricultural lands which will be of **Slight** significance.

Excavation of Borrow Pits, Processing of Materials and Reinstatement

13.5.41 No borrow pit locations are envisaged to be required for the Proposed Development, despite one area adjacent to the EGC route having been investigated as a potential borrow pit, and aggregates for temporary and permanent works will be sourced from local aggregate providers.

Construction of access routes

13.5.42 Construction of access tracks for construction of the towers is envisaged, using floating roadways where required on soft ground.

13.5.43 Construction of access routes has the potential to cause damage to land through compaction and rutting of soft surfaces, in particular peat surfaces.

13.5.44 Construction of access tracks may channel runoff which may convey runoff towards local water courses.

13.5.45 Soil removal and grading of access routes may changes to ground level locally.

13.5.46 Preliminary volume calculations provide an approximate estimation of fill required for the roads. It is estimated access roads outside of peatland area will cover an total area of 18,235m^2 and will be built up as floating roads to a depth of 1.50 above grade on peatland, resulting in the importation of 27,353 m^3 of fill material.

13.5.47 Fill material will be obtained from local approved quarries.

13.5.48 Soil sealing is the covering of a soil with an impermeable material; it often affects agricultural land, puts biodiversity at risk and increases the risk of flooding. This is an inevitable direct effect to some extent of most types of construction.

13.5.49 Permeable geotextile is usually placed at the base of the access tracks, along with other infrastructure, as part of their typical design.

13.5.50 Overall, the construction of the tower access roads presents a **small, adverse, permanent** effect on a Geological environment of **Medium** sensitivity resulting in an overall); which combined would result in a **Moderate** effect on this receptor due to the relatively small footprint of access infrastructure and its location.

Management of imported or excavated materials

13.5.51 Imported materials for construction of the EGC shall be stored at either the substation compounds and will be transported to the works zone immediately prior to construction.

13.5.52 Where possible site-won excavated materials will be reused on-site (i.e., to reinstate access tracks). If the material is considered unsuitable for reuse on-site, an outlet for offsite reuse will be sought. If reuse is not possible the material will be removed to an authorised facility by authorised waste contractors for composting or disposal as appropriate.

13.5.53 Storage of stockpiles of material has the potential to cause compaction of underling soil structure, generate sediment-laden runoff and give rise to dust issues during dry weather.

13.5.54 Overall, the management of imported or excavated materials during construction presents a **small, adverse, temporary** effect on a Geological environment of **Medium**

sensitivity (excavation and removal or replacement of a small proportion of peat, organic soils or soft mineral soils beneath the EGC route); which combined would result in a **Moderate** effect on this receptor due to the relatively small footprint of the proposed infrastructure and its location.;

Excavation for tower foundations

13.5.55 For each leg of the 19 No. masts and strain relief towers (84 legs in total), a foundation circa. 4.5m x 4.5m x 3.5m deep is required.

13.5.56 To allow for safe construction, where ground conditions are good, the excavation will be stepped back, which requires additional area to be excavated.

Table 13.16: Excavation and Fill volumes associated with each Tower Foundations and with the associated Access Roads

INFRASTRUCTURE ELEMENT	PLAN AREA FOR EXCAVATION (m^2)	ASSUMED AVERAGE EXCAVATION DEPTH (m)	EXCAVATION VOLUME (m^3) - INC. SIDE SLOPE	EXCAVATION VOLUME (m^3) -FACTORED FOR BULKING (20% - TOTAL)	FILL VOLUME (m^3) - INC. SIDE SLOPE
Tower	1,701	3.50	5,954	7,144	5,954
Tower Access road (1.5m floating road over bog)	18,235	0	0	0	27,353

13.5.57 A total construction pad area of 260m^2 at each mast/tower is envisaged.

13.5.58 In the cut away bog, where ground conditions are likely be poor, sheet piles will be used to support the mast foundation excavations.

13.5.59 The excavated material will be temporarily stored close to the excavation and excess material will where possible be used as berms along the site access roads.

13.5.60 Concrete trucks will pour concrete directly into each excavation in distinct stages and the mast footings will be finished 300mm above the finished ground level.

13.5.61 All surplus excavated material will be removed from the mast locations and either stored in berms for reuse across the construction site or transported to the PDA.

13.5.62 To facilitate erection of the mast body, a hardstand area for the crane will be created at each tower location by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate. No soil removal to form these hardstand crane pads is envisaged. The aggregate and geogrid will be removed once the mast is in place.

13.5.63 Overall, the excavations for tower foundations presents a **small, adverse, permanent** effect on a geological environment of Medium sensitivity (excavation and removal or replacement of a small proportion of peat, organic soils or soft mineral soils beneath portions of the EGC route); which combined would result in a Moderate effect on this receptor due to the relatively small footprint of the proposed infrastructure and its location.

Substations and Associated Access Road Foundations

13.5.64 At the Substation sites, a drainage system will be excavated and installed around the compound area.

13.5.65 Topsoil and subsoil will be removed from the footprint of the 220kV compound to a depth of 1.0 to 2.0 metres and to a depth of 2.0m along the permanent access road to the 220kV substation.

13.5.66 Topsoil and subsoil will be removed from the footprint of the 400kV compound to a depth of 0.2 to 0.5m metres and to a depth of 1.5m along the permanent access road to the 220kV substation.

13.5.67 Excavated soils will be temporarily stored in adjacent berms for later use during reinstatement works or transported to the PSA.

13.5.68 A layer of geotextile material will be laid over the footprint of the compound and a 1.0 to 2.0 m thick (220kV substation) or 1m thick (400kV substation) aggregate base layer of Clause 804 material will be laid, followed by a 6F2 capping layer which will provide the finished surface. Both layers will be compacted using a vibrating roller.

13.5.69 Total construction excavation areas, anticipated depths of excavation and anticipated excavation and fill material volumes are presented in the table below for the 220 kV substation, the 400 kV substation and the substation access roads.

Table 13.17: Excavation and Fill volumes associated with the Substations and associated Access Roads

INFRASTRUCTURE ELEMENT	PLAN AREA FOR EXCAVATION (m^2)	ASSUMED AVERAGE EXCAVATION DEPTH (m)	EXCAVATION VOLUME (m^3) - INC. SIDE SLOPE	EXCAVATION VOLUME (m^3) -FACTORED FOR BULKING (20% - TOTAL)	FILL VOLUME (m^3) - INC. SIDE SLOPE
220kV Substation	20,656	1.00 to 2.00	29,756	35,707	29,756
Access road to 220kV substation	1,851	2.00	3,702	4,442	3,702
400kV Substation	31,300	0.20 to 0.50	6,806	8,167	29,250
400kV Substation Access Road	9,785	1.50	14,678	17,613	14,678

13.5.70 Overall, the excavations for substations and substation access road foundations presents a **small, adverse, permanent** effect on a Geological environment of Medium sensitivity (excavation and removal or replacement of a small proportion of peat, organic soils or soft mineral soils beneath the substations and associated access roads); which combined would result in a Moderate significance due to the relatively small footprint of the proposed infrastructure and its location.

Underground Cable route

13.5.71 The Underground Cable Connection route is approximately 2.4km long, runs in Bord Na Mona lands and will consist of a 2 No. parallel trenches, each containing 3 No. power cable ducts, 2 No. communications ducts and 1 No. Earth Continuity Conductor (ECC) duct.

13.5.72 Each excavated trench will be typically 825mm wide by 1425mm deep, with variations on this design to adapt to service crossings and watercourse crossings, etc. Following duct installation, the trenches will be reinstated using imported CL804 fill material and in accordance with Bord Na Mona/Offaly County Council specifications.

Table 13.18: Excavation and Fill volumes associated with the Underground Cable route

INFRASTRUCTURE ELEMENT	PLAN AREA FOR EXCAVATION (m^2)	ASSUMED AVERAGE EXCAVATION DEPTH (m)	EXCAVATION VOLUME (m^3) - INC. SIDE SLOPE	EXCAVATION VOLUME (m^3) -FACTORED FOR BULKING (20% - TOTAL)	FILL VOLUME (m^3) - INC. SIDE SLOPE
Underground cable route	2,400	1.50	3,600	4,320	3,600

13.5.73 Joints Bays, Communication Chambers and Earth Sheath Link chambers will be installed approximately every 550 - 750m along the UGC route to facilitate the jointing of cables. Joint Bays for 220kV are typically 2.5m x 8m x 1.75m deep pre-cast concrete structures installed below finished ground level.

13.5.74 Overall, the excavations for underground cables and associated structures presents a **small, adverse, permanent** effect on a Geological environment of Medium sensitivity (excavation and removal or replacement of a small proportion of peat, organic soils or soft mineral soils beneath the substations and associated access roads); which combined would result in a **Moderate** effect on this receptor due to the relatively small footprint of the proposed infrastructure and its location.

Impacts on Designated Sites

13.5.75 The only Designated Site within 2km of the Electricity Grid Connection is the Grand Canal pNHA 400m south of the 40kV Substation therefore construction activities at the PPA are not anticipated to result in land and soils impacts to Designated Sites. Predicted impacts are therefore negligible to a Very High sensitivity receptor and of **Imperceptible** significance.

Operational Phase

13.5.76 During the operational phase of the Electricity Grid Connection impacts to soils and geology are not envisaged, unless via routine or emergency maintenance of elements of the power transmission infrastructure.

13.5.77 Potential impacts during such works are anticipated to be similar to those arising during constructions and be similar to those envisaged during construction.

13.5.78 Impact type, receptor sensitivity and unmitigated effects will be as for the EGC Construction phase.

Decommissioning Phase

13.5.79 The Electricity Grid Connection will be managed by the transmission asset operators (TAO) and transmission service operators (TSO) (ESBNI and EirGrid for electricity) as part of the national grid electricity. Upon decommissioning of the Power Plant Area, the 220 kV substation and 400 kV substation and associated transmission infrastructure will remain in-situ and form part of the national grid infrastructure. Effects of the decommissioning of the Electricity Grid Connection therefore have not been considered, as it is not anticipated to occur.

Impact Assessment for Gas Connection Corridor

Construction Phase

13.5.80 The Gas Connection Corridor is a below ground pipeline approximately 9.6km in length, up to 400mm in diameter with a maximum design operating pressure of up to 85 barg (see EIAR Chapter 5: The Proposed Development).

13.5.81 There will be an Aboveground Gas Installation (AGI) at the northern end, for connection to the BGE/77 Main Gas pipeline, and an 85m x 85m AGI at the southern end within the within Derrygreenagh Power Plant area (termed the Power Plant Area AGI or Derrygreenagh AGI).

13.5.82 The southern AGI will include a Pressure Reduction Station (PRS) regulate gas pressure and temperature to a level suitable for use in power station operations and will also include gas metering, 4x boiler houses, a compressor house, hardstanding roadways, control and communications equipment, backup power facilities and welfare facilities.

13.5.83 The pipeline will mainly be installed through an open cut method whereby a trench will be excavated, and the pipe laid approximately 1.2m below ground.

13.5.84 The temporary corridor width required for open cut pipeline construction is 30m. This width allows topsoil, subsoil and spoil to be excavated and stored adjacent to point of generation, stringing and welding of sections of pipe, access along the route, and laying of the pipe within the trench prior to backfilling.

13.5.85 Once the pipeline is installed, the trench will be backfilled and the land and associated drainage reinstated as far as possible to its original condition, and all banks, walls and fences will be reinstated and marker posts and cathodic protection test posts will be installed, resulting in a small adverse permanent impact to a medium sensitivity environment, which is Moderate significance.

13.5.86 Spoil material, overburden and topsoil excavated during construction will be stored temporarily within the Site.

13.5.87 If necessary suitable measures will be put in place to prevent sediment being washed off site, and the stockpiles will be monitored/ measured for wash away to determine whether maintenance and/or remedial action is required.

13.5.88 The underground gas pipeline construction has the potential to disrupt existing land drainage features, which will need to be reinstated.

13.5.89 The construction of the northern AGI will require stripping and storing topsoil and excavation to approximately 1m below the depth of the existing gas main. A concrete pad and supports for the existing gas main either side of the connection point will then be installed together with a new ‘tee’ piece and construction valve. The existing gas main will then connected into and, following installation of below ground infrastructure, the area will be backfilled and the northern AGI completed.

13.5.90 The civils works at the Derrygreenagh AGI will include a concrete / tarmacadam road into the AGI and several concrete bases to support pipe fittings, pipe supports and pigging facilities, as well as paved footpaths, fencing and lighting columns.

13.5.91 The remainder of the AGI site will be covered in a layer of Terram and chippings spread over it. This is to provide a sufficiently high enough contact resistance for personnel to minimise touch potential risks when working on above ground pipework and prevent excess vegetation growth.

13.5.92 Overall, the excavations for underground gas pipeline and associated AGIs for the GCC presents a **small, adverse, permanent** effect on a Geological environment of Medium

sensitivity (excavation and removal or replacement of a small proportion of organic soils or soft mineral soils beneath the pipeline route); which combined would result in a Moderate effect on this receptor due to the relatively small footprint of the proposed infrastructure and its location.

Operational Phase

13.5.93 A permanent easement of 18m (9m either side) will be required for the pipeline to allow access for maintenance during the operational phase of the development.

13.5.94 No storage of liquid fuels or other chemicals is envisaged during routine operations at the AGI sites.

13.5.95 During the operational phase of the Gas Connection Corridor additional impacts to soils and geology are not envisaged, unless via routine or emergency maintenance of elements of the gas transmission infrastructure.

13.5.96 Potential impacts during such maintenance works would be similar to those envisaged during construction.

13.5.97 Impact type, receptor sensitivity and unmitigated effects will be as for the Gas Connection Corridor Construction phase.

Decommissioning Phase

13.5.98 The gas connection 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. Effects of the decommissioning of the Gas Connection Corridor therefore have not been considered separately in this chapter.

<u>Interaction of Effects between the Various Elements of the Proposed Development and Overall Project</u>

13.5.99 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 Soils and Geology. Due to the proximity, scale and timelines associated with each element, there is potential for cumulative effects with the Proposed Development and Overall Project.

13.5.100 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 thorough 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 Land and Soil environment.

Power Plant Area

13.5.101 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 Land and Soil environment impacts, in terms of concurrent open excavations, stockpiles of excavated materials, fuel and chemical storage, site vehicle movements causing soil compaction and interconnected subsurface utilities.

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

13.5.103 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

13.5.104 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 Land and Soil environment impacts, in terms of concurrent open excavations, stockpiles of excavated materials, fuel and chemical storage, site vehicle movements causing soil compaction and interconnected subsurface utilities.

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

13.5.106 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

13.5.107 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 Land and Soil environment impacts, in terms of concurrent open excavations, stockpiles of excavated materials, fuel and chemical storage, site vehicle movements causing soil compaction and interconnected subsurface utilities.

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

13.5.109 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

13.5.110 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.

13.5.111 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 overall project, none are closer than 150m to the Overall Project and therefore there is considered to be no likelihood of in-combination effects with the Land and Soil environment receptors addressed in this Chapter following mitigation measures outlined in respective projects.

13.5.112 The scale and location of each of the projects listed have been considered cumulatively with each other and the construction and operation of the Proposed Development and Overall Project in Chapter 19 Cumulative Effects and Interactions.

13.5.113 Chapter 19 indicates that any impacts arising will result in **No Significant** impacts to any land, soils and geology receptors over those already identified and considered in each assessment.

13.5.114 The Proposed Development and Overall Project is therefore not predicted to give rise to any cumulative impacts in terms of land, soils or geology at the site and surrounding area at either the construction, operational or decommissioning phases.

13.6 Mitigation and Enhancement Measures

13.6.1 The following mitigation measures have either been incorporated into the design (i.e., embedded mitigation) or are standard construction or operational practices. These measures have, therefore, been taken into account during the impact assessment.

Power Plant Area

Construction Phase

13.6.2 An outline Construction Environmental Management Plan (CEMP) has been prepared which outlines the mitigation measures that will be implemented during the construction phase and is provided in Appendix 5A (refer to EIAR Volume II). A final construction programme will be prepared by the Engineering and Construction (E&C) Contractor and presented in a Construction Environmental Management Plan (CEMP). 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 soil and geological receptors.

13.6.3 To minimise the potential for adverse impacts to soil structure and quality during construction, the following general mitigation measures will be in place (see EIAR Appendix 5A for more detail, refer to EIAR Volume II):

- Spoil material will be stored temporarily within the Site in managed stockpiles that will not be allowed to dry out, to avoid generation of wind-blown dust;
- Any stockpiled material will be managed in accordance with best practise guidelines (such as Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009)). When required, pre-earthwork drainage will be put in place to avoid sediment being washed off site as outlined in CEMP; and
- The Construction Traffic Management Plan (CTMP) contains provisions to minimise to site traffic and, where relevant, damage to soil structure from smearing and compaction (see EIAR Chapter 14: Traffic for more detail and Appendix 14D for the CTMP).

13.6.4 To minimise the potential for adverse impacts to soil chemistry and to water quality during construction, the following mitigation measures will be in place (see EIAR Appendix 5A – CEMP and in Chapter 12: Water Environment):

- The construction of the Proposed Development will be as detailed in Chapter 5: The Proposed Development.
- The E&C Contractor will be required to include measures in the CEMP for minimising erosion by reducing disturbance and stabilising exposed materials. The plan will also consider control measures to minimise the release of mobilised sediment such as stockpile profiling, silt dams on water courses and silt fences. The CEMP will also include methods of handling and storing chemicals and fuels, followed by an Emergency Response Plan to be implemented in the event of a spill or leak.
- Water quality monitoring of surface water courses will be undertaken pre and during-construction, details of which will be included in the CEMP. This will be based on a combination of visual observations, in situ testing using handheld water quality probes, and periodic sampling for laboratory analysis.
- The E&C Contractor will be required to ensure the safe storage of any hazardous materials or chemicals required onsite. Storage areas for flammable/ toxic/ corrosive materials will be located in a separate, locked, impermeable bunded and fenced off

area. Material data sheets will be available for all these materials and the COSHH (Control of Substances Hazardous to Health) assessments kept within the relevant Risk Assessment for the task, all subject to the Applicant's approval. Storage will not be within 50m of a watercourse and designated storage areas will be bunded to 110% of storage capacity to contain the effects of any spills. These areas will be cleared and re-instated following completion of the Site.

- A Resource and Waste Management Plan (RWMP) (to be incorporated into the Contractor's CEMP) will be prepared and all relevant contractors will be required to seek to minimise waste arising at source and, where such waste generation is unavoidable, to maximise its recycling and reuse potential. Recycling of materials will take place offsite at appropriately licensed facilities where noise and dust are more easily managed and less likely to impact on surrounding properties.
- Should significant contamination occur as a result of construction stage activities, Offaly County Council and the EPA will be notified, and appropriate corrective actions will be agreed and undertaken.
- If water is encountered during below ground construction, suitable best practice de-watering methods will be used. Depth to water in all site investigation trial pits and boreholes undertaken at the power Plant site in mid-2023 was greater than 4.0m below ground, other than at TP205 where groundwater ingress was associated with a peat layer, therefore significant groundwater dewatering is not anticipated but, if required, will be undertaken as outlined in Chapter 12: Water Environment.
- Construction works will be carried out in such a way as to prevent, contain, or limit, as far as reasonably practicable, any adverse effects arising from the presence of contaminated land or materials (if encountered) in compliance with the CEMP. These measures will include:
  - The E&C Contractor will ensure that any significant soil contamination not identified during previous site investigations is recorded and dealt with in line with the EPA's "Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites";
  - Should ground with significant levels of unknown contamination be encountered during construction, working methods and procedures for handling and disposal of material will be employed to minimise risk in line with the EPA's "Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites". If required, the material will be disposed of at a suitably licensed waste facility;
  - 'Clean' and 'dirty' (contaminated) work areas will be divided by internal fencing where contamination is encountered;
  - Personal Protective Equipment (PPE) will be worn by ground workers and other staff (see below for more detail on PPE);
  - Those potentially at risk will be made aware of potential site hazards via site safety induction procedures; and
  - No excavated material will be exported off site without a Soil Waste Classification assessment to determine the correct disposal route compliant with waste regulations.

13.6.5 To minimise the potential for adverse impacts to off-site receptors and construction workers, the following outline mitigation measures that will be in place (see Appendix 5A, EIAR Volume II and Chapter 7: Air Quality and Climate, EIAR Volume II for more detail):

- The Contractor has a duty under the Safety, Health and Welfare at Work Act 2005 and the Control of Substances Hazardous to Health (COSHH) Regulations 2002 to protect their employees against hazardous substances encountered at work.
- To that end and in accordance with CIRIA guidance R132 *A guide for safe working on contaminated sites* (1996), the Contractor will be required undertake a COSHH assessment before any work is carried out at the Site which is likely to expose staff to substances hazardous to health.
- No hazardous substances were identified during the site investigation; however, it would be best practice for the Contractor to ensure that all employees (construction workers) are issued with PPE appropriate to the hazards identified. PPE could consist of hazard-specific gloves, eye protection and respiratory protective equipment (RPE).
- The Contractor will implement embedded mitigation measures set out in the CEMP (Appendix 5A, EIAR Volume II) to minimise the amount of dust produced during the construction phase, including the preparation of a Dust Management Plan (DMP) in the Final CEMP. There will be a Duty of Care on the E&C Contractor to ensure that dust-raising activities are located away, and upwind where possible, from sensitive receptors, that the duration of dust generation be kept to a minimum when in proximity to a receptor, and for the spread of dust be controlled by judicious use of water, the most effective and efficient way being in the form of a fine spray.

13.6.6 Comprehensive site investigations have been undertaken as described above and the existing ground conditions are therefore understood and have informed the siting and layout of the Proposed Development.

13.6.7 The Proposed Development will be constructed in accordance with current engineering standards, including site investigation and understanding of ground conditions to inform construction works and design. No excavated material will be exported off site.

13.6.8 Mitigation measures for construction works including soil handling are incorporated into the CEMP (EIAR Volume II Appendix 5A) which will form the basis of the final CEMP to be implemented by the E&C Contractor who will conduct the works. Should GCC consider independent supervision of these works to be required at the expense of the developer, the Applicant would be agreeable to this being implemented through an appropriately-worded planning condition.

Operational Phase

13.6.9 To minimise the potential for adverse impacts to soil chemistry and water quality, the following is an outline of the general mitigation measures that will be in place (see Appendix 5A, and EIAR Chapter 12: Water Environment for more detail):

- The Proposed Development will follow the standards set out in the IE Directive (IED) under 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 Proposed Development will be operated in line with appropriate standards and the operator will implement and maintain an Environment Management System (EMS) which will be certified to International Standards Organisation (ISO) 14001. The EMS will outline requirements and procedures required to ensure that the Proposed Development is operating to the appropriate standard.
- When required, sampling and analysis of pollutants will occur. This includes monitoring emissions levels 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 to reduce the risk of equipment failures; bunded or double skinned storage areas; good and regular housekeeping; and spill kits stored on Site.
- No hazardous materials will be stored unbunded within the Site.

13.6.10 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 periodic sampling for laboratory analysis.

Decommissioning Phase

13.6.11 As the predicted impacts on soils and geological receptors likely to occur during the decommissioning phase are anticipated to be similar to those likely to occur during the construction phase (with the exception of the soil stripping and excavations and impacts relating to unidentified contamination), the measures to avoid, minimise and reduce these impacts are similar and are outlined in Section 13.5 Predicted Impacts: Power Plant Area – Construction Phase.

13.6.12 Prior to removing the plant and equipment, all residues and operating chemicals will be cleaned out from the plant in accordance with the IE Licence Decommissioning Plan and disposed of in accordance with national waste management requirements.

13.6.13 Prohibited materials such as asbestos, polychlorinated biphenyls (PCBs), ozone depleting substances and carcinogenic materials will not be allowed within the design of the Proposed Development, and other materials recognised to pose a risk to health (but which are not prohibited) will be subject to detailed risk assessment.

13.6.14 The prevention of contamination is a specific requirement of the IE Licence for the Proposed Development. Therefore, it is being designed to not create any new areas of ground contamination or pathways to receptors as a result of construction or operation. Once the plant and equipment has been removed to ground level at decommissioning stage any areas of hardstanding and sealed concrete will be left in place.

13.6.15 A Decommissioning Plan will be produced and agreed with EPA as part of the IE Licencing and licence surrender process. The plan will include all potential Land and Soils environmental risks on the Site and contain guidance on how risks can be removed or mitigated, which are anticipated to be similar to the in line with mitigation proposed for the Power Plant Area Construction phase activities. In addition, the IE Licence Baseline Assessment Report will be referred to and updated to determine if any post-construction contamination has occurred and what, if any, remediation is required prior to IE Licence surrender.

13.6.16 Decommissioning activities will be conducted in accordance with the appropriate guidance and legislation at the time of closure. All decommissioning activities will be carried out in accordance with the waste hierarchy and materials and waste produced during decommissioning and demolition will be stored in segregated areas to maximise reuse and recycling. All materials that cannot be reused or recycled will be removed from the Site and transferred to suitably permitted waste recovery/ disposal facilities. It is intended that a large proportion of the materials resulting from the decommissioning will be recycled, and a record will be kept demonstrating that the maximum level of recycling and reuse has been achieved.

13.6.17 To ensure work is done in accordance with requirements, when the decommissioning programme is completed, including any remediation works that might be required, EPA will conduct an Exit Audit inspection post-decommissioning. All records from the decommissioning process will be made available for inspection by the EPA and other relevant statutory bodies, in accordance with the IE Licence requirements.

Electricity Grid Connection

Construction Phase

13.6.18 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 soil and geological receptors. An CEMP is provided in Appendix 5A (refer to EIAR Volume II).

13.6.19 The same general mitigation measures that will be in place in the CEMP during construction of the Power Plant Area to minimise the potential for adverse impacts to soil structure and quality, soil chemistry and to water quality, 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).

Excavation of Borrow Pits, Processing of Materials and Reinstatement

13.6.20 No borrow pit locations are envisaged to be required for the Proposed Development and aggregates for temporary and permanent works will be source from local aggregate providers.

Construction of access routes

13.6.21 Access routes will be carefully selected to avoid damage to land. Local consultation will be carried out with the relevant landowners to ensure that any potential disturbance will be minimised.

13.6.22 The routes will be constructed as floating roads only. Founded roads are excavated down to and constructed up from a competent geological stratum, whereas floated roads are built directly on top of the peat and soft soils.

13.6.23 Prior to the commencement of construction, the contractor will assess all access routes and determine the requirement for bog mats. Any such requirements will be incorporated into the relevant method statement.

13.6.24 Access tracks on the consented land (only if required due to ground conditions and/or landowner requirements) will consist of timber or aluminium bog mats (on peatland) or crushed rock on a geotextile (on mineral soils) to spread the weight of machinery over a greater area to prevent damage to the ground.

13.6.25 If necessary, low ground pressure machinery may also be utilised to spread the vehicle's weight across a wider area thereby reducing the pressure exerted on the ground.

13.6.26 No invasive works, such as removal of peat or topsoil, will be undertaken when placing the matting.

13.6.27 Upon completion of the works, all mats will be removed immediately.

13.6.28 Access routes for construction traffic will be carefully selected to avoid any damage to land. Local consultation will be carried out with the relevant landowners to ensure that any potential disturbance will be minimised. Prior to the commencement of construction, the contractor will assess all access routes and determine the requirement for bog mats. Any such requirements will be incorporated into the relevant method statement.

Management of excavated materials

13.6.29 The following measures may be supplemented by further specific environmental protection measures that will be included in method statements prepared for specific tasks during the works and will form part of the detailed Final CEMP that will be provided prior to construction.

- All materials shall be stored either at the temporary compound (see CEMP temporary construction compound details) or within the substation sites 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 treated prior to discharge;
- 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 visual examinations of local watercourses from 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 Environmental Clerk of Works 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;
- Concrete or potential concrete contaminated water run-off will not be allowed to enter any watercourses. Any pouring of concrete (delivered to site ready mixed) will only be carried out in dry weather. Washout of concrete trucks shall not be permitted on site.
- 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 or areas of standing water or fenland;

- 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.

Excavation for tower foundations,

13.6.30 To allow for safe construction, where ground conditions are good, the excavation will be stepped back, which requires additional area to be excavated.

13.6.31 In the cut away bog, where ground conditions are likely be poor, sheet piles will be used to support the mast foundation excavations.

13.6.32 The excavated material will be temporarily stored close to the excavation and excess material will be used as berms along the site access roads.

13.6.33 Concrete trucks will pour concrete directly into each excavation in distinct stages and the mast footings will be finished 300mm above the finished ground level.

13.6.34 All surplus excavated material will be removed from the mast locations and stored in berms for reuse across the construction site.

13.6.35 No soil removal to form the hardstand crane pads is envisaged. The aggregate and geogrid will be removed once the mast is in place.

Hardstanding, Substations and Cable Compound Foundations

13.6.36 At the Substation and cable compound sites, a drainage system will be excavated and installed around the compound area. Topsoil and subsoil will be removed from the footprint of the compound and will be temporarily stored in adjacent berms for later use during reinstatement works.

13.6.37 A layer of geotextile material will be laid over the footprint of the compound and an aggregate base layer of Clause 804 material will be laid, followed by a 6F2 capping layer which will provide the finished surface. Both layers will be compacted using a vibrating roller.

Cable route

13.6.38 Prior to excavations for installation of Joints Bays, Communication Chambers and Earth Sheath Link chambers, the area around the chamber to be used by heavy vehicles will be surfaced with a geotextile cover if required and stone aggregate to minimise ground damage.

13.6.39 Any roadside drains within the temporary works area will be culverted and check dams made from stone or sandbags covered with Terram will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works.

13.6.40 If the ground slopes from the working area toward a watercourse or if there is evidence of solids washing off the works area toward nearby watercourses or drains, a silt fence with straw bales, will be interposed between the works area and the watercourse. All excavated material will be stored near the excavations and be reused for reinstatement works. Any soil required for reinstatement that will be temporarily stockpiled on site will be placed at least 15m back from the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing with straw bales will be added in line with the relevant ECM.

13.6.41 If a joint bay needs to be dewatered, the abstracted water will be pumped to a percolation area if the soil is not saturated, otherwise a settlement tank will be used to remove any solids from the water abstracted for the dewatering process to comply with the ECM.

13.6.42 The risk of concrete reaching surface waters is considered very low given that all concrete will be pre-mixed offsite and will be poured into the pit excavated for the joint bay so that any spills will be contained. The basic requirement therefore is that all pouring operations be constantly supervised to prevent accidental spillages occurring outside the chamber pit.

13.6.43 Temporary storage of cement bound sand (if required) will be on hardstand areas only where there is no direct drainage to surface waters and where the area has been bunded e.g., using sand-bags and geotextile sheeting or silt fencing to contain any solids in run-off.

Operational Phase

13.6.44 The mitigation measures that will be in place during operational phase of the Electricity Grid Connection to minimise the potential for adverse impacts to soil chemistry and to water quality will be similar to the mitigation measures required for the construction phase of the Electricity Grid Connection and will apply in the event of any maintenance being required to the power transmission infrastructure or to the switching equipment.

Decommissioning Phase

13.6.45 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 220 kV substation and 400 kV 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.

Gas Connection Corridor

Construction Phase

13.6.46 Prior to construction starting onsite, a Final CEMP for the GCC 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 soil and geological receptors.

13.6.47 For the Gas Connection corridor, typical mitigation measures will be implemented in relation to:

- Reinstatement of impacts to fencing, walls and hedges or any feature from within any part of the working width
- 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.
- 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.
- Track and road crossings and some water course crossings maybe by either open cut trenches, auger boring, tunnelling or directional drilling, depending on the length and risk of the crossing. In all cases the trenches/pits, bores will be appropriately backfilled with excavated materials and, if required, the surface of the road / track / ditch will then be reinstated appropriately and in a timely fashion.
- The pipeline trench will then be backfilled with the excavated, graded subsoil.

- Spoil material, overburden and topsoil excavated during topsoil stripping of the working width and from trench construction will be segregated during excavation and stored temporarily within the Site close to the point of origin.
- Soil storage will be managed to minimise impacts on soil structure and quality, and appropriate measures to minimise short term and long-term impacts on land drainage will be discussed and agreed with each landowner. Reinstatement of soil impacts may include deep cultivation or ripping of the subsoil if it has been significantly compacted and spreading of the stored topsoil, subject to agreement with the project stakeholders, including the landowners / tenants.
- 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.
- The gas pipeline trench will be backfilled with the excavated subsoil. Graded soil will be used for backfill operations.
- In areas of poor soil conditions, topsoil stripping may be omitted in favour of temporary roadways constructed with a geotextile material and / or aggregate laid over the ground to prevent damage to the soil structure.

Operational Phase

13.6.48 After the gas pipeline has been commissioned, it will be operated and maintained by GNI in accordance with its established procedures to ensure its integrity and safe operation.

13.6.49 A walkover survey will be carried out at an agreed number of years along the entire length of the cross-country pipeline route to check the condition of the marker posts and identify if there has been any ground movement that could affect the integrity of the buried gas pipeline.

Decommissioning Phase

13.6.50 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.

13.6.51 Decommissioning of the Gas Connection Corridor is therefore not envisaged, as it will be managed by Gas Networks Ireland (GNI) and will become an important part of the national gas network infrastructure. Consequently, no mitigation measures are proposed.

13.7 Residual Effects

Power Plant Area

Construction Phase

Agricultural land and soil resources

13.7.1 No impact to or removal of agricultural land is proposed or to soil resources is envisaged and all works are on unvegetated Made Ground therefore there will be negligible impacts in relation to Land and Soils to agricultural lands which will be of **Imperceptible** significance.

13.7.2 Mobilisation of existing ground contamination or introduction of new contamination due to construction activities may give rise to a Small Adverse impact on site soils of **Slight** significance.

Designated sites – SAC, SPA NHA, and pNHA designations

13.7.3 There are no designated sites on or within 2km of the Power Plant Area. Further assessment of impacts to designated habitats and species within 15km of the Site is provided in EIAR Chapter 9: Biodiversity. The Construction activities are anticipated to give rise to negligible impacts to soil of **Imperceptible** significance.

Surface Water

13.7.4 There is a possibility that soil contamination exposed or disturbed during construction could reach the identified WFD-classified surface water receptors. Potential sources of water potentially containing contaminants include rainfall runoff generated by rainfall falling on land and coming into contact with stockpiles of excavated material, areas of exposed soil for trenching or crossings and powdered grouts and cements, where used.

13.7.5 With the implementation of mitigation measures outlined above and in Chapter 12 Water, there is negligible potential for contamination from the Site to runoff from construction areas into local surface water bodies or their tributaries. There are no known surface water abstractions from these watercourses within 5km of the site and they are not classified as river drinking water protected areas (DWPA) under WFD. Therefore, **no predicted significant direct or indirect impacts** are anticipated to these potential receptors. Residual impacts for run-off from the Power Plant Area construction phase are therefore considered to be of **imperceptible** significance. This is in line with the assessment of residual impacts on surface water quality in Chapter 12: Water Environment).

13.7.6 In addition, there is a possibility that contaminants could be introduced to the subsurface as a result of spillages and could potentially migrate towards and into surface water receptors via groundwater pathways. Underlying natural clay and peat subsoils are unlikely to be significantly permeable pathways. If unmitigated by implementation of appropriate containment measures and operational controls, chemical spillages could seep into the ground and migrate downwards to the water table (anticipated to be at greater than 4-5m below the final site level) where the superficial deposits meet the extensively weathered top of the limestone bedrock.

13.7.7 Given the implementation of the mitigation measures as described in Section 13.6 (and in EIAR Chapter 12: Water Environment), including implementation of the CEMP, and the fact that there are no direct works to surface watercourses, the impact of any existing or introduced contaminants in the subsurface migrating into surface water receptors would be negligible to these rivers. Using the assessment criteria in Table 13.3 this would give a negligible effect for all of the waterbodies. As a medium importance receptor, this would be of **imperceptible** significance (see also EIAR Chapter 12: Water Environment).

Groundwater

13.7.8 There is the potential for contamination exposed or disturbed during construction to reach the identified groundwater receptors and for contaminants to be introduced to the subsurface as a result of spillages, and to migrate into groundwater receptors. Rain falling on exposed soil could wash or leach construction-related contaminants into the soil and downwards into the superficial deposits, aquifer, and to the water table, which is anticipated to be greater than 4m from the pre-construction surface elevation of the site. If unmitigated, chemical spillages could seep into ground and migrate downwards to the water table. From there the contaminants could migrate along the water table in the direction of groundwater flow within the bedrock.

13.7.9 With the implementation of embedded mitigation measures outlined in Section 13.6 (and in Chapter 12: Water Environment), including implementation of the CEMP, the magnitude of potential impact to groundwater quality through the mobilisation of existing contaminants in soil and the migration of introduced contaminants in soil, as a result of spillages, into groundwater receptors is likely to be negligible impact on a high sensitivity receptor (Karstified Limestone Bedrock Aquifer) and of Imperceptible significance.

Human Health – Construction Workers and Off-Site Receptors

13.7.10 Should contaminated soil or groundwater be encountered in the course of the excavation and construction work, potential impacts on human receptors may occur via contaminated dust and dermal contact with contaminated soil for the construction workers, and inhalation of contaminated dust for the off-site receptors.

13.7.11 With the embedded mitigation measures outlined in Section 13.6 (and in the CEMP, Appendix 5A, refer to EIAR Volume II) in place, the impact magnitude on construction workers (high importance), off-site residential receptors (very high importance) and off-site urban/ industrial land users (medium importance) is likely to be negligible, with no further requirements for control measures to reduce risks to human health/ make land suitable for intended use. This would be impact of **Imperceptible** significance.

13.7.12 The potential impacts of ground conditions on the design of the Proposed Development have been scoped into the impact assessment, as it is likely that minor ground contamination relating to the former industrial use of the site may be encountered during construction, as the Application Site is a brownfield site associated with the Derrygreenagh Works. Elevated concentrations of contaminants relating to historical industrial activities were encountered in the soils during the ground investigation, but at soil concentration which are not of concern in relation to Human Health and would therefore give rise to a negligible impact to a High sensitivity Receptor and would be of **Imperceptible** significance.

Operational Phase

Agricultural land and soil resources

13.7.13 The Power Plant Area will not result in a loss of agricultural land or change in land use classification.

13.7.14 However, there is a likelihood that contaminants could be introduced to the subsurface and soil resources as a result of operational phase leakages from fuel and chemical storage areas of the Power Plant Area. This would result in a **small adverse effect** on Urban grade land of **Slight** significance.

Designated sites

13.7.15 There are **no predicted direct or indirect impacts** to the designated sites during the operational phase of the Power Plant Area.

Human Health – Off-Site Receptors

13.7.16 There are **no direct or indirect impacts** in relation to Land and Soils anticipated on off-site human health as a result of the Power Plant Area operation during the operation phase and would therefore give rise to a negligible impact to a High sensitivity Receptor and would be of **Imperceptible** significance.

Decommissioning Phase

Agricultural land and soil resources

13.7.17 The soil resources within the Site are classified as *Urban* type soils, under the Irish Soils Information System classification, underlain by *Made Ground subsoils* and are of negligible sensitivity. The predicted impacts on soils and geological receptors likely to occur during the decommissioning phase would be similar to those likely to occur during the construction phase (with the exception of the impacts relating to unidentified contamination). The impact magnitude of temporary damage to soil structure and introduction of new contamination as a result of spillages is anticipated to be small adverse (due to their temporary nature), resulting in a **small adverse effect** on low sensitivity Urban grade land. These effects are considered to be of **Imperceptible** significance.

Designated sites – SAC, SPA, NHA, and pNHA and designations

13.7.18 No impacts arising from Land and Soils to designated sites are anticipated during the Decommissioning Phase on or within 2km of the Power Plant Area. Further assessment of impacts to designated habitats and species within 15km of the Site is provided in EIAR Chapter 9: Biodiversity.

Surface water

13.7.19 Given the restricted nature of the decommissioning works in comparison to construction, as well as the implementation of best practice, the impact magnitude of introduced contaminants in the subsurface migrating into surface water receptors would be negligible (in line with Chapter 12: Water Environment). These effects are considered to be **Imperceptible** and therefore no additional mitigation is required, over and above that set out above.

Groundwater

13.7.20 Potential spillages to soil during decommissioning are unlikely to migrate into groundwater receptors due to presence of peat, clay, or silt-dominated subsoils beneath the made ground beneath the majority of the Power Plant Area, resulting in a negligible impact on the medium sensitivity superficial deposit and bedrock limestone aquifers. These effects are considered to be of **Imperceptible** significance.

Human Health

13.7.21 Given the restricted nature of the decommissioning works in comparison to construction, as well as the implementation of best practice and worker PPE, the impact of inhalation of any potentially contaminated dust and dermal contact within potentially contaminated soil to high sensitivity human health receptors is anticipated to be negligible, and is therefore of **Imperceptible** significance.

<u>Electricity Grid Connection</u>

Construction Phase

Agricultural land and soil resources

13.7.22 The construction of the Electricity Grid Connection will take place principally across lands classified Peat type soils, under the Irish Soils Information System classification,

underlain as *Cutaway/Cutover Peat subsoils* by Teagasc and are of negligible sensitivity in relation to agriculture.

13.7.23 The Construction phase replacement of natural peat, subsoils and rock at the sites of the tower leg foundations with gravels and concrete for the construction of the power transmission infrastructure (permanent) will result in a local change in ground conditions within these small areas of the Proposed Development Site. Overall, this residual effect on a medium sensitivity cut-over peatland receptor is a **small adverse impact** which is **permanent**, and therefore of **Slight** significance.

13.7.24 The trial pits showed that there are likely minor, localised peat stability issues that will need to be managed during the construction of the Electricity Grid Connection. Following mitigation procedures, the residual impact in relation to peat stability will be a small adverse impact of short term on a medium sensitivity cut-over peatland receptor, and is therefore of **Slight** significance.

13.7.25 All other potential Construction phase effects of the Electricity Grid Connection on the soil and geological environment will be mitigated through good site practice; use of floating roadways for vehicular movements, protection of drainage, avoidance of hydrocarbon release, sustainable use of natural resources, human health, etc. as discussed previously. Overall, the residual impacts from these other aspects will be **negligible to small adverse** impacts of **short-term duration** impacts on Medium sensitivity receptors and therefore of **Imperceptible to Slight** significance.

Designated sites – SAC, SPA, NHA, and pNHA designations

13.7.26 Construction phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to Designated Sites and these effects are considered to be **Imperceptible.**

Surface Water

13.7.27 Construction phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to surface waters and these effects are considered to be **Imperceptible**.

Groundwater

13.7.28 Construction phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to groundwater and these effects are considered to be **Imperceptible.**

Human Health – Construction Workers and Off-Site Receptors

13.7.29 Construction phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to Human Health and these effects are considered to be **Imperceptible.**

Operational Phase

Agricultural land and soil resources

13.7.30 Operational phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to agricultural land and soil resources and these effects are considered to be **Imperceptible.**

Designated sites – SAC, SPA, NHA and pNHA designations

13.7.31 Operational phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to Designated Sites and these effects are considered to be **Imperceptible.**

Surface Water

13.7.32 Operational phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to surface waters and these effects are considered to be **Imperceptible.**

Groundwater

13.7.33 Operational phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to surface waters and these effects are considered to be **Imperceptible.**

Human Health – Construction Workers and Off-Site Receptors

13.7.34 Operational phase Land and Soils residual effects of the Electricity Grid Connection are anticipated to result in **negligible impact** to Human Health and these effects are considered to be **Imperceptible.**

Decommissioning Phase

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

Gas Connection Corridor

Construction Phase

Agricultural land and soil resources

13.7.36 Construction phase Land and Soils residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** to agricultural land and soil resources and these effects are considered to be **Imperceptible.**

Designated sites – SAC, SPA, NHA and pNHA designations

13.7.37 Construction phase Land and Soils residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** to Designated Sites and these effects are considered to be **Imperceptible.**

Surface Water

13.7.38 Construction phase Land and Soils residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** and these effects are considered to be **Imperceptible.**

Groundwater

13.7.39 Construction phase Groundwater residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** and these effects are considered to be **Imperceptible.**

Human Health – Construction Workers and Off-Site Receptors

13.7.40 Construction phase residual effects on the human health of construction workers or off-site receptors of the Gas Connection Corridor are anticipated to result in **negligible impact** and these effects are considered to be **Imperceptible.**

Operational Phase

Agricultural land and soil resources

13.7.41 Operational phase agricultural land and soil resources residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** and these effects are considered to be **Imperceptible.**

Designated sites – SAC, SPA, NHA and pNHA ad designations

13.7.42 Operational phase residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** on Designated Sites and these effects are considered to be **Imperceptible.**

Surface Water

13.7.43 Operational phase residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** on surface waters and these effects are considered to be **Imperceptible.**

Groundwater

13.7.44 Operational phase residual effects of the Gas Connection Corridor are anticipated to result in **negligible impact** on Groundwater and these effects are considered to be **Imperceptible.**

Human Health – Construction Workers and Off-Site Receptors

13.7.45 Operational phase residual effects on the human health of construction workers or off-site receptors of the Gas Connection Corridor are anticipated to result in **negligible impact** and these effects are considered to be **Imperceptible.**

Decommissioning Phase

13.7.46 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

13.7.47 The assessment of residual effects takes into account the mitigation and enhancement measures identified within Section 13.6. A summary of likely significant residual effects is outlined in **Error! Reference source not found.**.

Table 13.19: Assessment of Significant Residual Effects

RECEPTOR TYPE	RECEPTORS AND SENSITIVITY	DESCRIPTION OF IMPACT	PRE-MITIGATION MAGNITUDE OF IMPACT AND SIGNIFICANCE	MITIGATION AND ENHANCEMENT MEASURES	POST-MITIGATION IMPACT AND RESIDUAL SIGNIFICANCE
Power Plant Area - Construction phase					
Agricultural land and soil resources	Urban/ industrial land/ Low	Removal of Agricultural Land	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
		Soil Excavation	Small adverse permanent **Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small adverse permanent **Slight**
		Mobilisation of existing contaminants in soil as a result of ground disturbance.	Small adverse **Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small adverse **Slight**

RECEPTOR TYPE	RECEPTORS AND SENSITIVITY	DESCRIPTION OF IMPACT	PRE-MITIGATION MAGNITUDE OF IMPACT AND SIGNIFICANCE	MITIGATION AND ENHANCEMENT MEASURES	POST-MITIGATION IMPACT AND RESIDUAL SIGNIFICANCE
		Introduction of new contamination to the subsurface as a result of spillages.	Small adverse **Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small adverse **Slight**
		Dewatering impacting on Aquifers and GWDTEs	Negligible to Small adverse **Imperceptible to Slight**	Water level monitoring in selected wells as described in Chapter 12	Negligible to Small adverse **Imperceptible to Slight**
		Ground Stability	Small adverse impact of short term **Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Negligible, **Imperceptible**
		Inhalation of dust and dermal contact with soils	Negligible to small adverse **Imperceptible to Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Negligible, **Imperceptible**
Designated Sites – SAC, SPA, NHA and pNHA	No Designated Sites within 2km of power plant site	None anticipated	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
Power Plant Area - Operational phase					
Agricultural land and soil resources	Urban/ industrial land: Negligible	Impacts on agricultural lands	Negligible – **Imperceptible**	No further mitigation required.	Negligible – **Imperceptible**
		Impacts on soil and groundwater chemistry through accidental spillages or leakages	Moderate adverse, temporary **Moderate**	No further mitigation to that described in Section 13.6.	**Imperceptible**
Designated Sites – SAC, SPA, NHA and pNHA	No Designated Sites within 2km of power plant site	None anticipated	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**

RECEPTOR TYPE	RECEPTORS AND SENSITIVITY	DESCRIPTION OF IMPACT	PRE-MITIGATION MAGNITUDE OF IMPACT AND SIGNIFICANCE	MITIGATION AND ENHANCEMENT MEASURES	POST-MITIGATION IMPACT AND RESIDUAL SIGNIFICANCE
Power Plant Area - Decommissioning phase					
Agricultural land and soil resources	ALC Grade urban/ industrial land: Negligible	Temporary damage to soil structure through smearing and compaction.	Small adverse temporary impact. **Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Negligible **Imperceptible**
		Introduction of new contamination to the subsurface as a result of spillages.	Small adverse **Slight**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Negligible **Imperceptible**
Designated Sites – SAC, SPA, NHA and pNHA	No Designated Sites within 2km of power plant site	None anticipated	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
Electricity Grid Connection - Construction phase					
Agricultural land and soil resources	Cutover peat land Medium	Removal of agricultural land at 400 kV substation.	Small adverse **Slight**	No further mitigation proposed.	Small adverse **Slight**
		Borrow Pits (none proposed), Processing of Materials and Reinstatement	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
		Construction of access routes	Small, adverse, permanent **Moderate**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small, adverse, permanent **Moderate**
		Management of imported or excavated materials	Small, adverse, temporary **Moderate**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small, adverse, temporary **Moderate**
		Excavation for tower foundations	Small, adverse, permanent **Moderate**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small, adverse, permanent **Moderate**
		Substations and Associated Access Road Foundations	Small, adverse, permanent **Moderate**	Mitigation as described in the outline CEMP and	Small, adverse, permanent **Moderate**

RECEPTOR TYPE	RECEPTORS AND SENSITIVITY	DESCRIPTION OF IMPACT	PRE-MITIGATION MAGNITUDE OF IMPACT AND SIGNIFICANCE	MITIGATION AND ENHANCEMENT MEASURES	POST-MITIGATION IMPACT AND RESIDUAL SIGNIFICANCE
				outlined in Section 13.6.	
		Underground Cable route	Small, adverse, permanent **Moderate**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small, adverse, permanent **Moderate**
Designated Sites – SAC, SPA, NHA and pNHA	Designated Site within 2km of the EGC (Grand Canal pNHA) Very High	None anticipated	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
Electricity Grid Connection - Operational phase					
Agricultural land and soil resources	Cutover peat land Medium	None anticipated under normal operations	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
		Maintenance works potentially involving access and construction requirements as per the construction phase	Small, adverse, temporary **Moderate**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small, adverse, temporary **Moderate**
Designated Sites – SAC, SPA, NHA and pNHA	Designated Site within 2km of the EGC (Grand Canal pNHA)	None anticipated	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
Electricity Grid Connection - Decommissioning phase					
Effects of the decommissioning of the Electricity Grid Connection therefore have not been considered, as it is not anticipated to occur.					
Gas Connection Corridor - Construction phase					
Agricultural land and soil resources	Agricultural lands.	Installation of underground pipeline across largely agricultural lands.	Small adverse Permanent **Moderate**	To be defined in GCC CEMP	Small adverse Permanent **Moderate**
		Construction of AGIs on the pipeline in agricultural lands.	Small adverse Permanent **Moderate**	To be defined in GCC CEMP.	Small adverse Permanent **Moderate**

RECEPTOR TYPE	RECEPTORS AND SENSITIVITY	DESCRIPTION OF IMPACT	PRE-MITIGATION MAGNITUDE OF IMPACT AND SIGNIFICANCE	MITIGATION AND ENHANCEMENT MEASURES	POST-MITIGATION IMPACT AND RESIDUAL SIGNIFICANCE
Gas Connection Corridor - Operational phase					
Agricultural land and soil resources	Agricultural lands.	None anticipated under normal operations	Negligible **Imperceptible**	No further mitigation required.	Negligible **Imperceptible**
		Maintenance works potentially involving access and construction requirements as per the construction phase	Small, adverse, temporary **Moderate**	Mitigation as described in the outline CEMP and outlined in Section 13.6.	Small, adverse, temporary **Moderate**
Gas Connection Corridor - Decommissioning phase					
Effects of the decommissioning of the Gas Connection Corridor have not been considered, as it is not anticipated to occur.					

13.8 References

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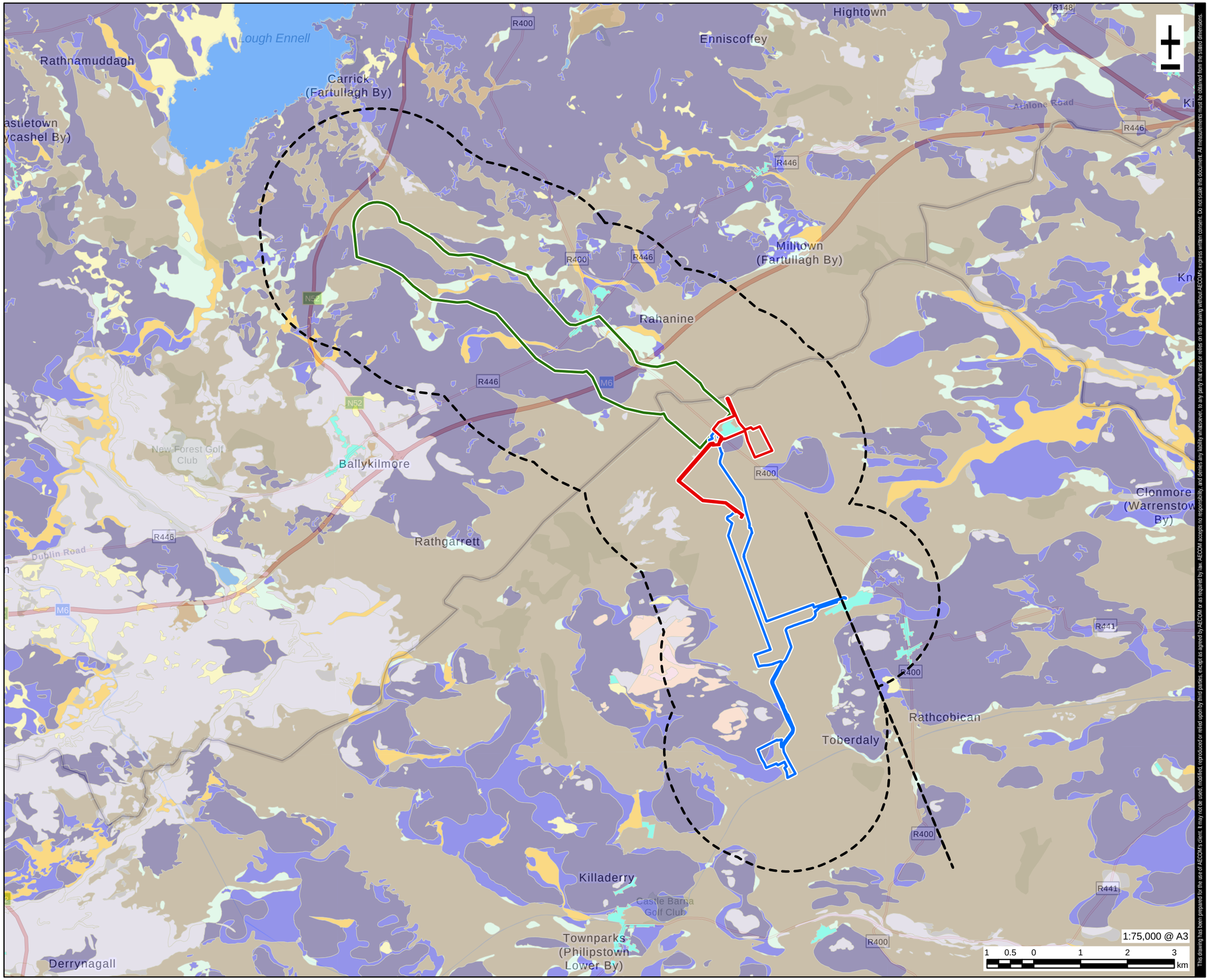
Revision: P01 Drawn: JB Checked: KF Approved: AB Date: 2024-01-04



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PROJECT

Derrygreenagh Power Station

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LEGEND

- Power Plant Area Boundary
- Electricity Grid Connection Boundary
- Gas Connection Corridor Boundary
- 2km Study Area

TEAGASC Soil Classification

- AminSW - Shallow well drained mineral (Mainly acidic)
- AminSP - Shallow poorly drained mineral (Mainly acidic)
- AminSRPT - Shallow, rocky, peaty/ non-peatymineral complexes (Mainly acidic)
- BminDW - Deep well drained mineral (Mainly basic)
- BminPD - Mineral poorly drained (Mainly basic)
- BminPDPT - Peaty poorly drained mineral (Mainly basic)
- BminSW - Shallow well drained mineral (Mainly basic)
- BminSP - Shallow poorly drained mineral (Mainly basic)
- BminSPPT - Shallow peaty poorly drained mineral (Mainly basic)
- BminSRPT - Shallow, rocky, peaty/ non-peatymineral complexes (Mainly basic)
- FenPt - Fen peat
- Cut - Cutover/cutaway peat
- AlluvMIN - Alluvial (mineral)
- Lac - Lacustrine type soils
- Made - Made ground
- Water - Water

NOTES

ISSUE PURPOSE

FOR ISSUE

PROJECT NUMBER

60699676

FIGURE TITLE

TEAGASC Soil Classification

FIGURE NUMBER

Figure 13.1

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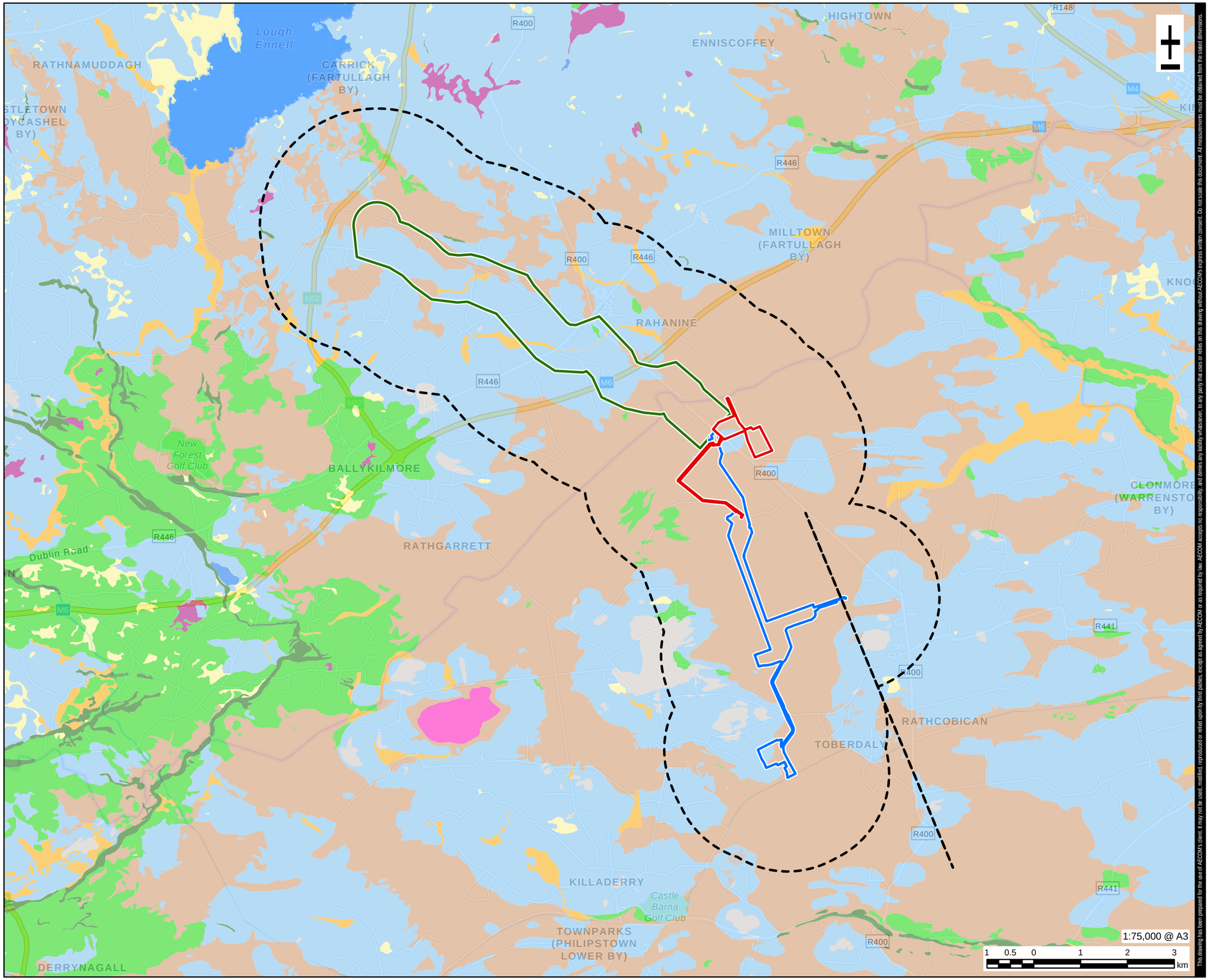

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LEGEND

- Power Plant Area Boundary
- Electricity Grid Connection Boundary
- Gas Connection Corridor Boundary
- 2km Study Area

Quaternary Sediments

- A, Alluvium
- BasEsk, Eskers comprised of gravels of basic reaction
- Cut, Cut over raised peat
- FenPt, Fen Peat
- GLs, Gravels derived from Limestones
- KaRck, Kartsified bedrock outcrop or subcrop
- L, Lacustrine sediments
- Rck, Bedrock outcrop or subcrop
- RsPt, Raised Peat (intact)
- TLs, Till derived from limestones
- Urban
- Water

NOTES

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ISSUE PURPOSE

FOR ISSUE

PROJECT NUMBER

60699676

FIGURE TITLE

Quaternary Sediments

FIGURE NUMBER

Figure 13.2

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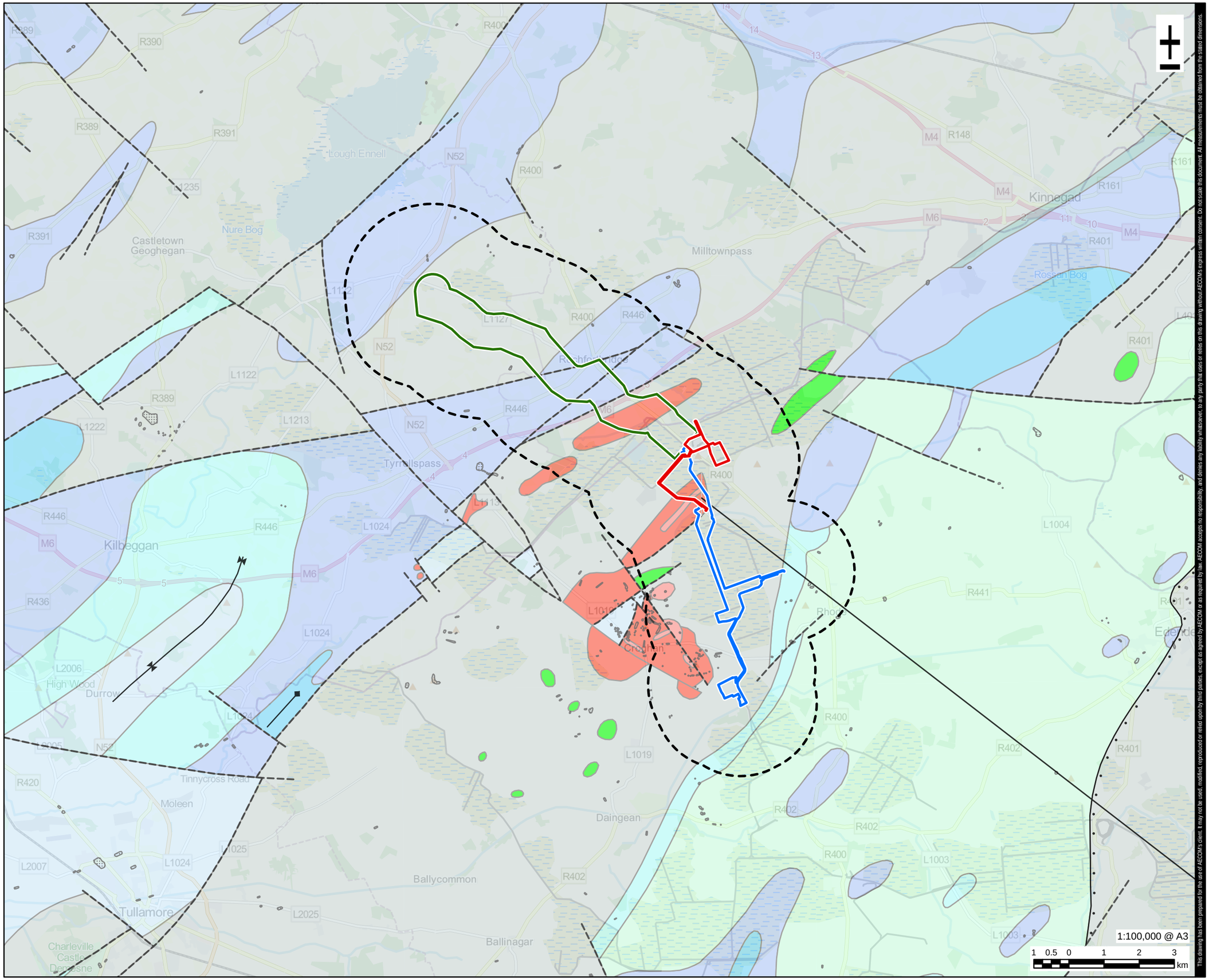
Revision: P01 Drawn: JB Checked: KF Approved: AB Date: 2024-01-04



AECOM

PROJECT

Derrygreenagh Power Station

CLIENT

Bord na Móna

CONSULTANT

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LEGEND

- Power Plant Area Boundary
- Electricity Grid Connection Boundary
- Gas Connection Corridor Boundary
- 2km Study Area

Bedrock Linework

- Anticlinal Axis
- Fault
- Ghost Line
- Synclinal Axis
- Unconformity, dots on younger side
- X-Section

Bedrock Outcrops

- Bedrock Outcrops

Bedrock Geology Type

- Allenwood Formation
- Ballysteen Formation
- Edenderry Oolite Member
- Lucan Formation
- Tober Colleen Formation
- Visean Limestones (undifferentiated
- Waulsortian Limestones
- Agglomerate
- Basalt
- Volcanics

NOTES

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FIGURE TITLE

Bedrock Geology

FIGURE NUMBER

Figure 13.3

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