HERBATA DATA CENTRE, NAAS

EIAR
VOLUME I MAIN TEXT – CHAPTER 6 LANDS AND SOILS

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June 2024

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6 LANDS AND SOILS

6.1 Introduction

This chapter of the EIAR describes the likely significant effects of the Project in relation to soils, geology and hydrogeology. This chapter provides a description of the Project in the context of soils, geology and hydrogeology, the baseline soils, geology and hydrogeology environments for the Project site and a statement of the likely significant impacts associated with both the construction and operation phases of the development. In addition, a 'do nothing' scenario has also been considered. Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, and reinstatement or remedial measures and recommendations for monitoring are included where appropriate predicted residual effects are described.

6.2 Methodology

This chapter has been prepared having regard to the following guidelines;

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018)
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports –(EPA, 2022)
- The Assessment has been carried out generally in accordance with the following guidelines:
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports DRAFT (EPA, August 2017);
- Advice Notes for preparing Environmental Impact Statements DRAFT (EPA, September 2015);
- Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013);
- Geology in Environmental Impact Statements, A Guide (IGI, 2002);
- Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA 2009);
- Control of Water Pollution from Construction Sites (CIRIA, 2001); and Environmental Handbook for Building and Civil Engineering Projects (CIRIA, 2000).
- The assessment followed a phased approach as outlined in Chapter 4.4 of the Advice Note (EPA, 2015) and the IGI Guidelines (IGI 2013).

6.2.1 Initial Assessment

An initial assessment was carried out which defined the Project in terms of location, type and scale, established the baseline conditions; established the type of soil/ geological environment; established the activities associated with the Project and; initial assessment and impact determination. These objectives were achieved by way of a geological desk study and baseline data collection. A full list of sources for the desk study together with relevant legislation are included in Section 6.4 and are briefly listed below:

- Ordnance Survey of Ireland maps;
- Geological Survey of Ireland Groundwater and Geotechnical map viewer;
- Environmental Protection Agency Envision Maps; and

- National Monuments Service maps.

Additional information has been compiled through consultation and feedback from the project/EIAR Team. The information obtained from the above listed sources were utilised to establish the baseline conditions for the site.

6.2.2 Geotechnical and Environmental Investigations

The second phase of the assessment includes the results from a geotechnical investigation which was commissioned by the Applicant and was undertaken in 2022 by IGSL (Report No.: 24330). The site conditions have not changed since the commissioning of this GI and the results are considered to continue to represent the existing conditions. Ground investigations consisted of a combination of: -

- Trial Pits
- Cable percussion (shell and auger) exploratory boreholes
- Dynamic Probing
- Plate Bearing Testing
- Soakaway Testing (to BRE365)
- Resistivity Survey
- Groundwater Monitoring
- Gas Monitoring
- Surveying of Exploratory Hole Locations
- Photographs of U100 samples
- Core photographs
- Laboratory testing
- Standpipe water level readings and
- Variable head permeability test results.

The geotechnical investigation was carried out in accordance with Eurocode 7 – Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as Engineers Ireland Specification for Ground Investigation (2nd Ed, 2016), BS 5930 (2015+A1:2020) and BS 1377 (Parts 1 to 9) and the following European Norms:

- EN 1997-2 Eurocode 7: 2007- Geotechnical Design – Part 2: Ground Investigation & Testing
- EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- EN ISO 14688-2:2017 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2017 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Principles for a classification
- EN ISO 14689-1:2017 Geotechnical Investigation and Testing – Identification, description & classification of rock

The boreholes were carried out in December 2022 while the standpipe water level readings were obtained in June 2023.

The second phase also includes a Detailed Assessment and Impact Determination which was carried out and incorporates the full range of site investigations and studies and a full assessment of any potential impacts. The approach adopted is as per the IGI Guidelines (IGI, 2013) and each potential effect of the Project has been described in terms of Quality, Significance, Extent, Probability and Duration in Table 6.3. Table 6.1 below refers to the potential impacts assessed. The classification of impacts/effects in this chapter follows the definitions provided in the Guidelines (EPA, 2017). Where the Initial Impact Determination concluded that the

level of potential impact is capable of measurable and noticeable consequences it is carried into the next assessment phase.

The Site Investigation Report is provided in Volume II, Appendix 4.2B.

Table 6.1 : Potential Impacts

Activity	Construction Element	Potential Impact Description
Earthworks	Pond Excavation Pond Construction Foundation Construction	Excavation of natural soils and subsoil for roads, foundations, ponds, swales, drainage, etc.
		Airbourne dust arising from soil stockpiles causing nuisance dust on public roads and neighbouring properties
		Imported fill material shall be required as part of works
		Excavation of top soil material
		Excavation of subsoils can serve to reduce the local groundwater levels as the water table naturally lowers to a new equilibrium below the artificial ground level
		Seepage of underlying groundwater
		Discharge of contaminated groundwater to adjacent watercourse
Groundwater Abstraction		Groundwater abstraction associated with temporary dewatering forcing changes in pore water pressures and potential settlement and/ or subsidence in downstream unconsolidated sediments
Groundwater Flow Paths		Groundwater flow paths may be potentially altered due to the construction of sub-surface structures. Groundwater mounding can theoretically occur where large impermeable structures are placed perpendicular to groundwater flow paths
Groundwater Quality		Potentially contaminated water generated within the excavation could impact the Bluebell Stream

6.2.3 Proposed Mitigation Measures

The third phase identifies mitigation measures to address the identified impacts. The development, including all identified mitigation measures (assumed implemented), is then subject to impact assessment, to identify any residual impacts. The Final Impact Assessment presented in Table 6.4 incorporates the outputs from the Detailed Assessment and Impact Determination, Mitigation Measures and Residual Impact Assessment.

The final phase of work was the completion of this chapter and associated figures and appendices which has followed the EPA Guidance Note and Design Team Template.

6.3 Characteristics of the Project

6.3.1 Description of Site

The Project lands are located approximately 3km to the west of Naas town centre in County Kildare. The site is accessed on the Northern side by R409 Regional Road via Naas Town off the M7 motorway to the east or through Caragh village to the West. To the south of the site is the existing Naas M7 Business Park and to the north is the existing Osberstown industrial park. The site is situated adjacent to major infrastructure assets including the M7 Motorway. The subject site currently consists of agricultural lands, residential houses and agricultural buildings to the west of the M7 and Naas town.

There are existing private residential houses and farm buildings located on the site that are to be demolished as part of the Project works. The existing site is predominately a greenfield site being used as agricultural land. The site in level varies between 85.500m AOD and 77.500m AOD, and slopes from its low point in the south of the site along the Bluebell Stream. The Northeast side of the site that corners the R409 and the M7 motorway, slopes in south easterly direction with levels varying from 85.500m to 80.500m. To the south of the site is the Bluebell Stream into which the surface water runoff from the site currently drains.

6.3.2 Difficulties Encountered

No difficulties were encountered during the preparation of this chapter of the EIAR.

6.3.3 Consultation

Pre-planning discussions were held in April 2023 between representatives from Donnachadh O'Brien & Associates, BSM and David Hall of Kildare County Councils in relation to the proposed Surface Water Strategy, including the provision of a 6.0l/s/ha surface water discharge rate based on the site conditions once a minimum two-stage surface water treatment process was designed and implemented.

In addition, consultation has taken place with Uisce Eireann (UE) through meetings and a Pre-Connection Enquiry. UE issued a Confirmation of Feasibility letter which confirmed that a connection from the Project to the existing wastewater and water supply networks can be facilitated.

6.4 Baseline

6.4.1 Overview

This section describes the baseline environments for land use and soils, to establish the factors which may be directly affected by the Project.

6.4.2 Existing Land Use and Topography

The Project is to be located on an existing greenfield site which is bound to the north by the R409 road, to the east by the M7 Motorway and to the south by the M7 Business Park, with agricultural land to the west. The site is currently used as agricultural land with 3 No. existing domestic properties along the northern boundary.

The site topography in level varies between +85.500m AOD and +77.500 AOD, and slopes generally from North to South. The Northeast corner slopes towards the eastern boundary. The existing Site topography is indicated below in Figure 6.1.

Figure 6.1: Existing Site Topography

6.4.3 History and Land Use

A number of historical maps for the Project location were obtained from Ordnance Survey Ireland (OSI).

- OSI 6-inch mapping series, 1829- 1842,
- OSI 6-inch Cassini series, 1830-1930 and
- OSI 25-inch mapping series, 1888- 1913.

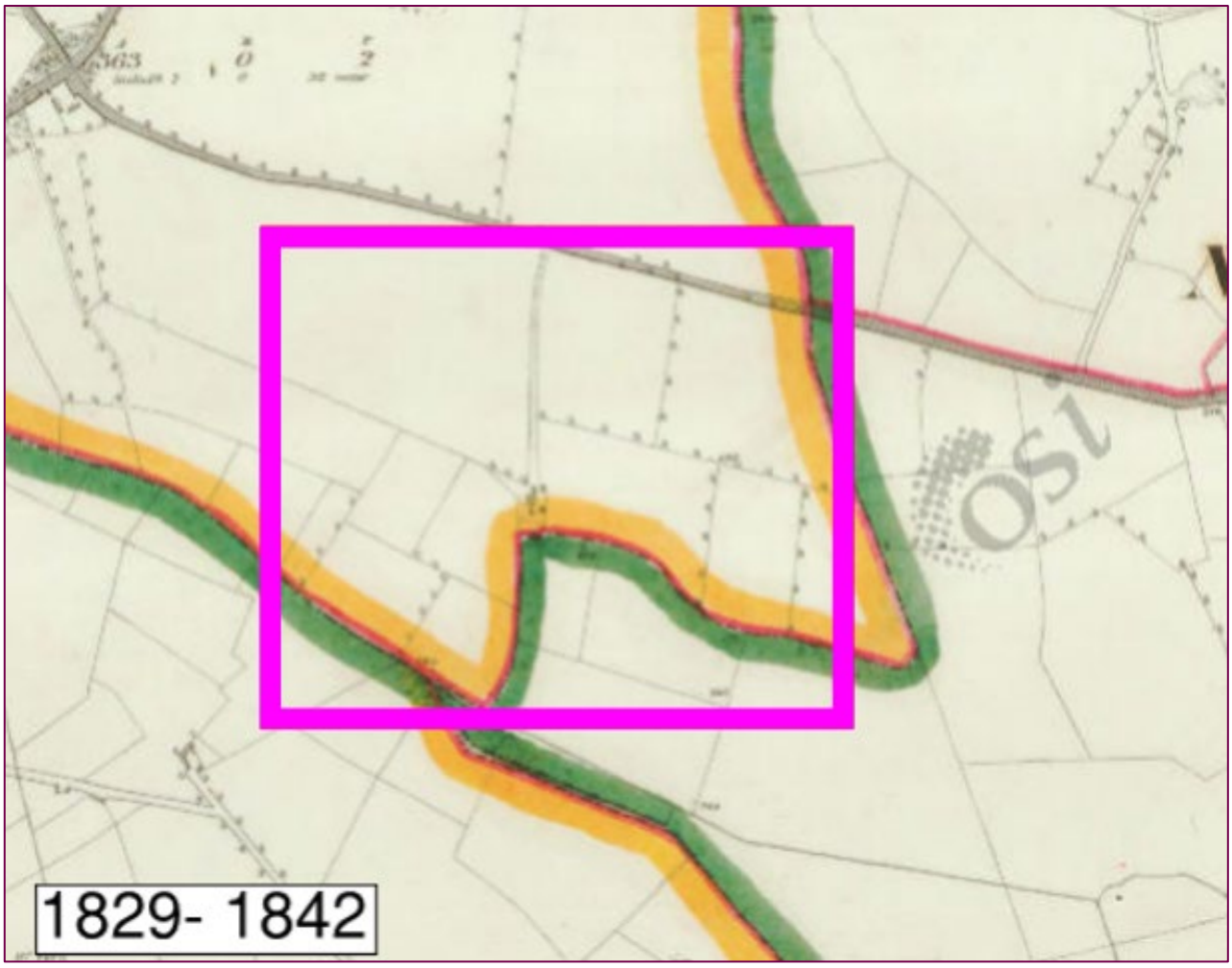

Figure 6.2: OSI 6-inch Mapping Series 1829- 1842

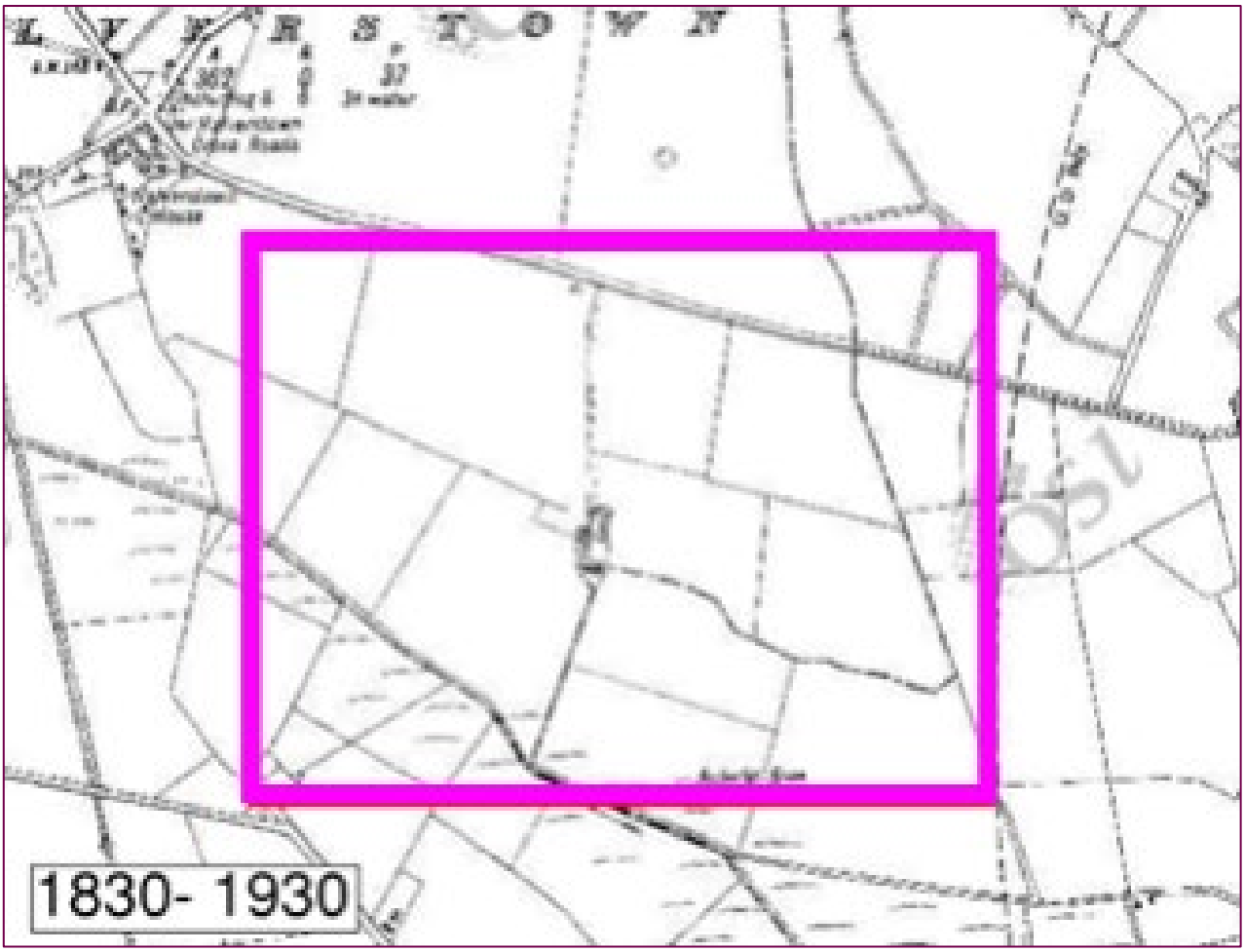

Figure 6.1: OSI 6-inch Cassini Series 1830-1930

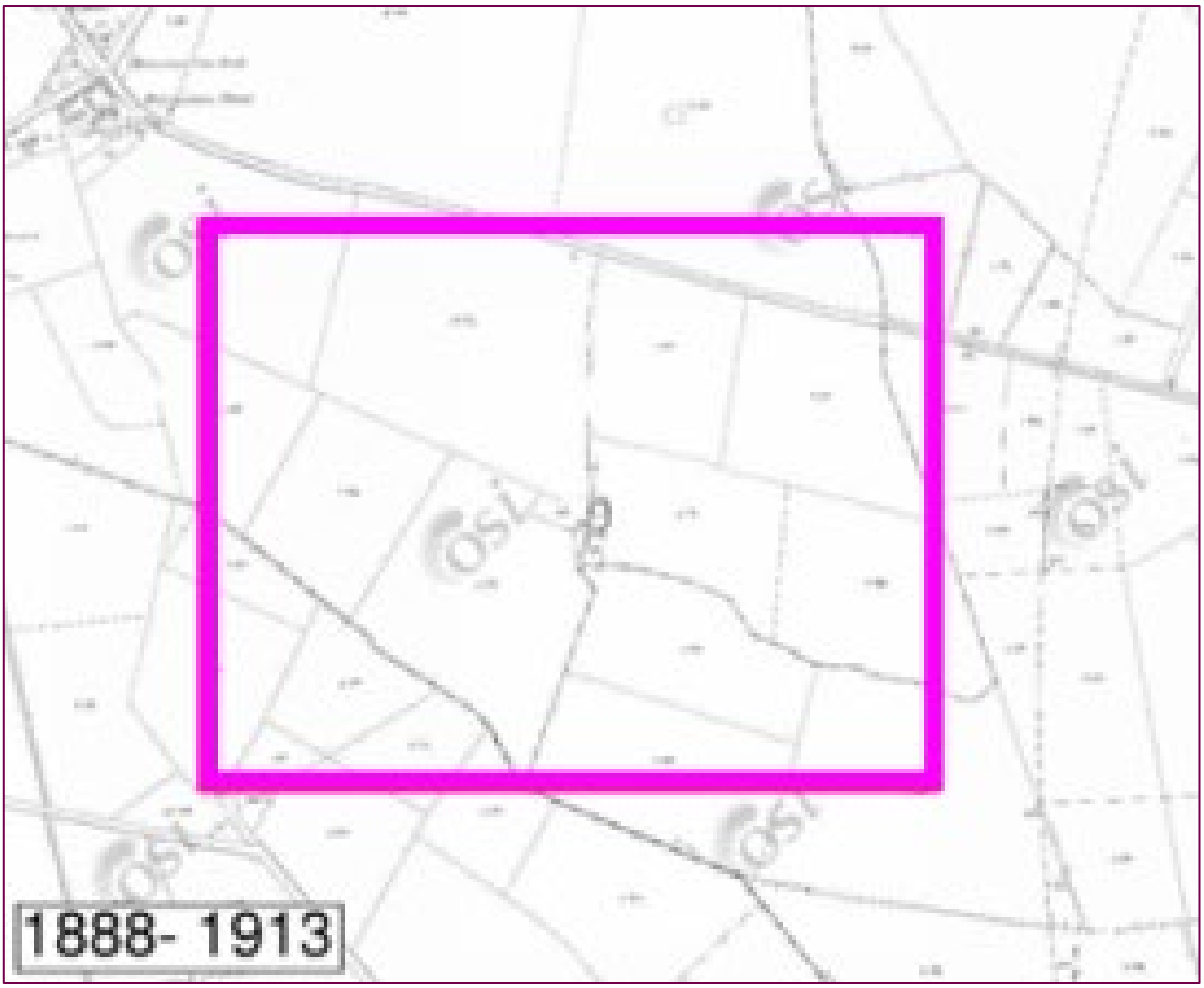

Figure 6.4: OSI 25-inch Mapping Series 1888-1913

Overall, the area appears as undeveloped land in all of the above maps. It is important to note that there is a watercourse (Bluebell Stream) running along the Southern boundary of the site in all three figures above.

6.4.4 Aerial Photography

Aerial Photographs of the site area were obtained from OSI records.

- A colour aerial photograph from 2005 with 1m pixel

Figure 6.5: OSI Aerial Photograph of Site- 2005

Comparing the obtained aerial image to the current site, there have been no major developments within the site. Development of the general area has progressed to the north of the site with the introduction of the Osberstown Business Park and development to the south within the M7 Business Park. In recent years, the M7 motorway has also undergone a road widening scheme increasing each direction of motorway by 1 no. lane. This road widening has not affected the site boundary adjacent to the motorway from 2005.

6.4.5 Geology

6.4.5.1 Quaternary Deposits

GSI Quaternary maps indicate that superficial drift deposits consist predominantly of Till derived from Limestones (TLs) as indicated in Figure 6.6 and Figure 6.7 below. The surrounding superficial deposits within 1km proximity of the site further include Gravels derived from Limestones (GLs), and Alluvium, which runs along the Bluebell Stream bank.

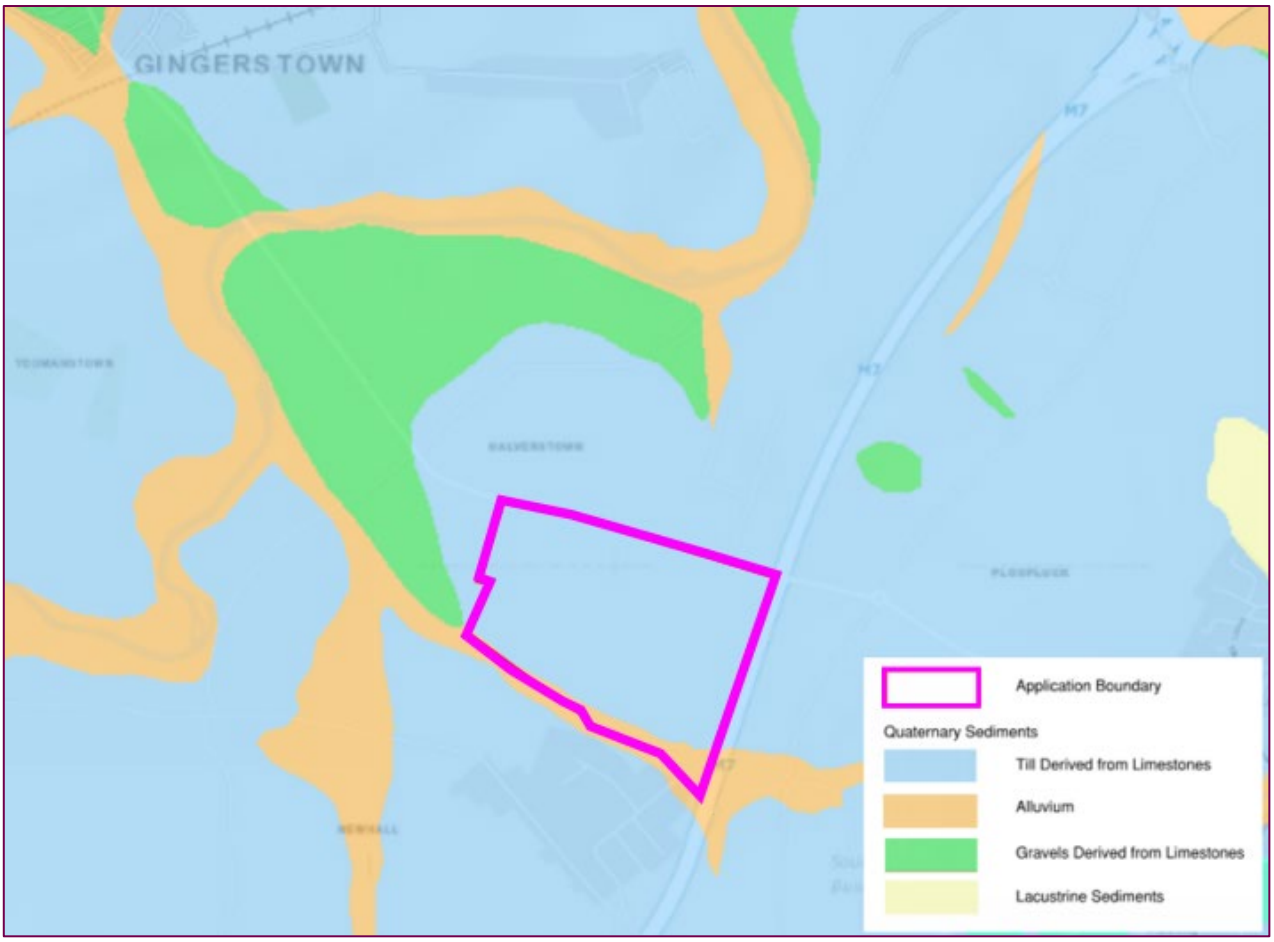

Figure 6.6: Extract from GSI Quaternary Mapping 1

Figure 6.7: Extract from GSI Quaternary Mapping 2

6.4.5.2 Bedrock

Reference to the GSI map for the area in Figure 6.8 indicates that the site is underlain by Carboniferous, Viséan-aged Rickardstown formation. The rock formation consists of cherty often dolomitised limestone. No outcrops were found on site during IGSL's site investigation.

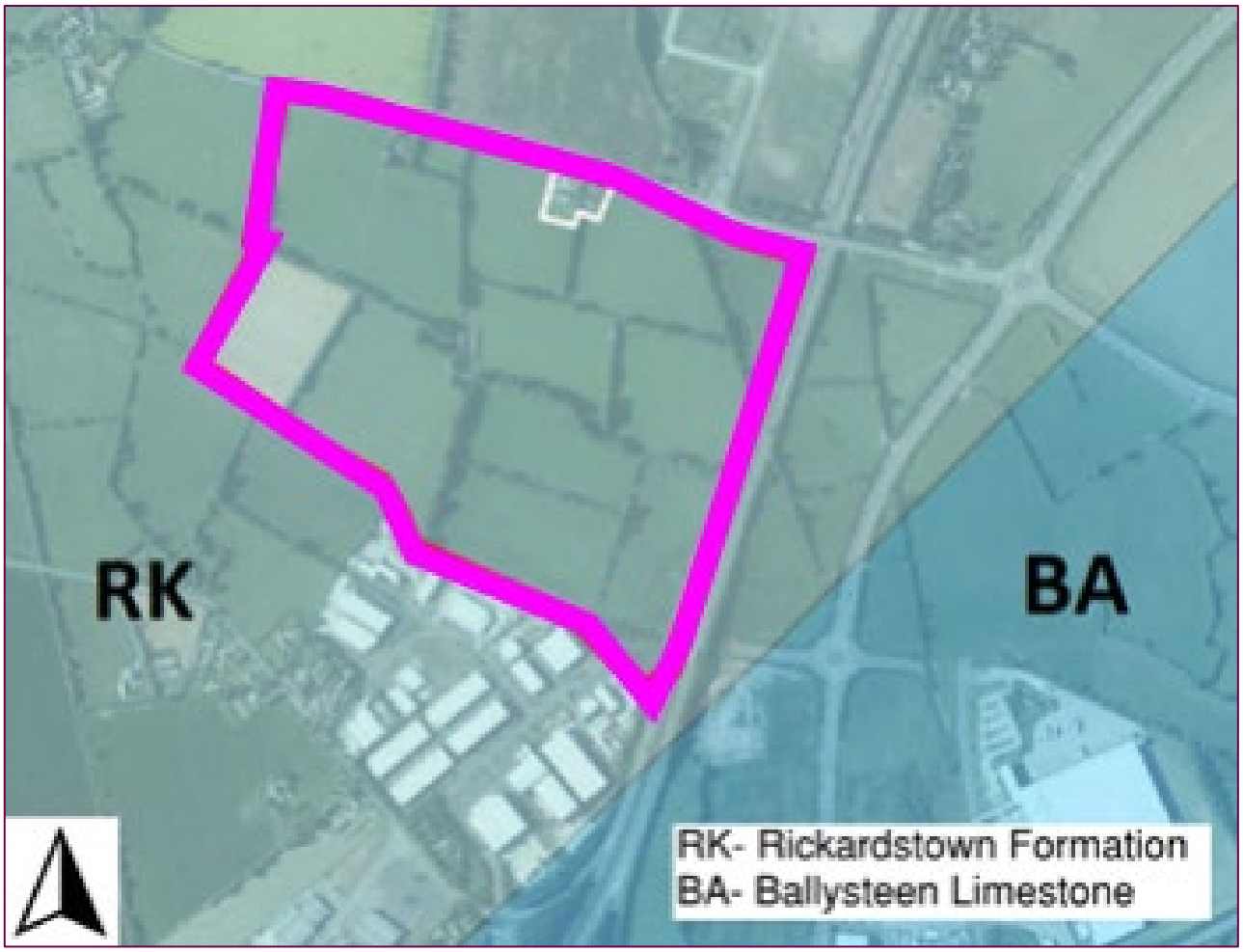

Figure 6.8: Extract from GSI Bedrock Mapping

6.4.5.3 Fluvial Flooding

There are currently OPW Eastern Catchment Flood Risk Assessment and Management Study (CFRAM) maps covering the site which shows that there have been no flood events on the Project lands. The Eastern CFRAMS mapping shows the site outside of the 0.1%, 1% and 10% AEP flood events. Along the Bluebell Stream, there are three recorded nodes, 09BLUE00160J, 09BLUE00105 and 09BLUE000671. A summary of these nodes' various AEP flood levels is outlined below in Figure 6.9.

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09BLUE00204	79.78	N/A	79.94	N/A	80.28	N/A
09BLUE00186al	78.19	0.58	78.83	1.07	80.02	1.84
09BLUE00160J	77.66	N/A	77.87	N/A	78.05	N/A
09BLUE00105	75.94	N/A	76.17	N/A	76.39	N/A
09BLUE00067I	75.10	N/A	75.52	N/A	75.68	N/A
09BLUE00027D	74.59	N/A	74.89	N/A	75.15	N/A
09BLUE00009	74.59	1.08	74.89	1.99	75.14	3.13

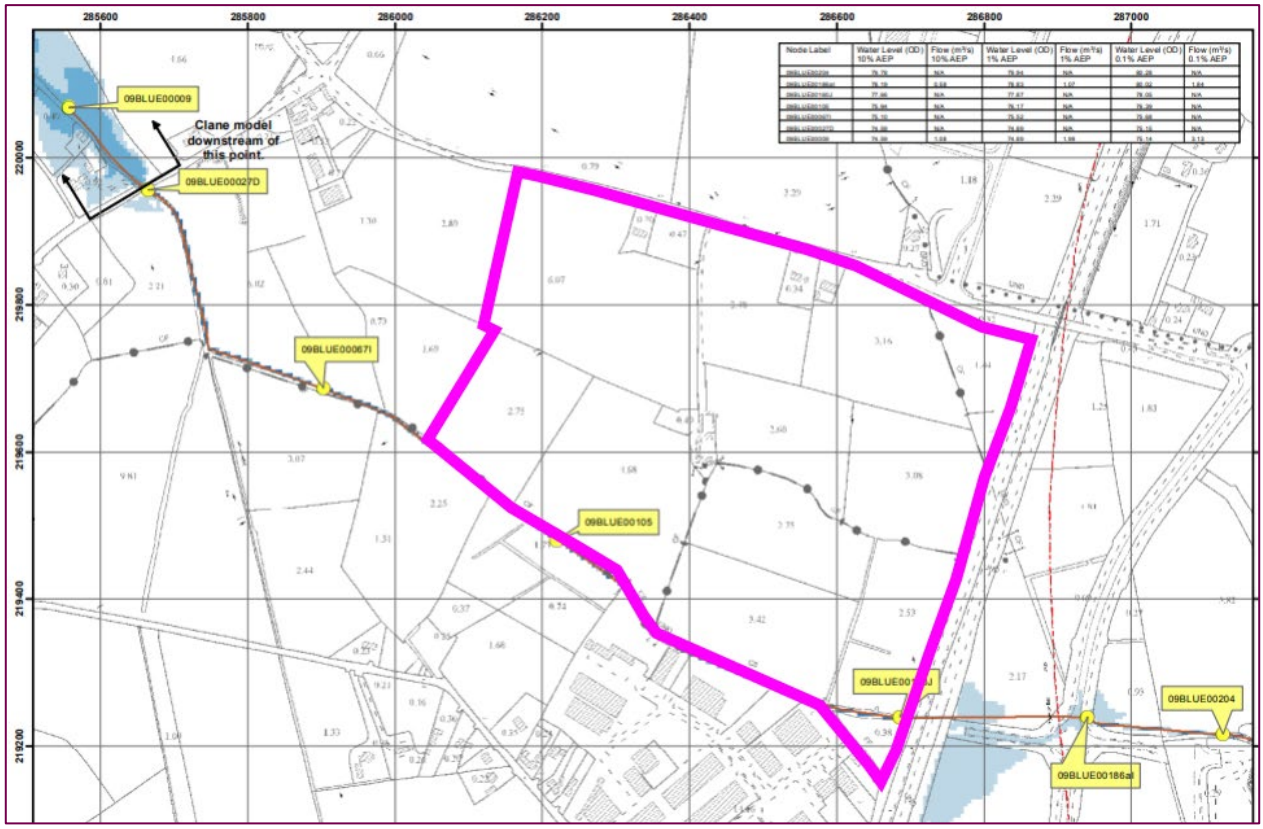

Figure 6.9: Extract from CFRAM Mapping Indicating Site Location and Levels

6.4.5.4 Subsoil Permeability

The Groundwater Subsoil Permeability map classifies how easy water can infiltrate subsoils downwards at any point in the land surface. Permeability across the country is classified as either 'High', 'Moderate' or 'Low'. Figure 6.10 identifies the Site as directly overlying moderate permeability deposits. A small zone of High permeability is located along the southern boundary and to the west of the site. Sections of higher permeability to the south are likely reflecting thinner subsoil associated with gravels.

Figure 6.2:Extract from GSI Subsoil Permeability Mapping

6.4.5.5 Groundwater Vulnerability

The site is located in an area of moderate groundwater vulnerability as indicated as shown in Figure 6.11 below which is an extract from the Geological Survey of Ireland (GSI) groundwater map viewer.

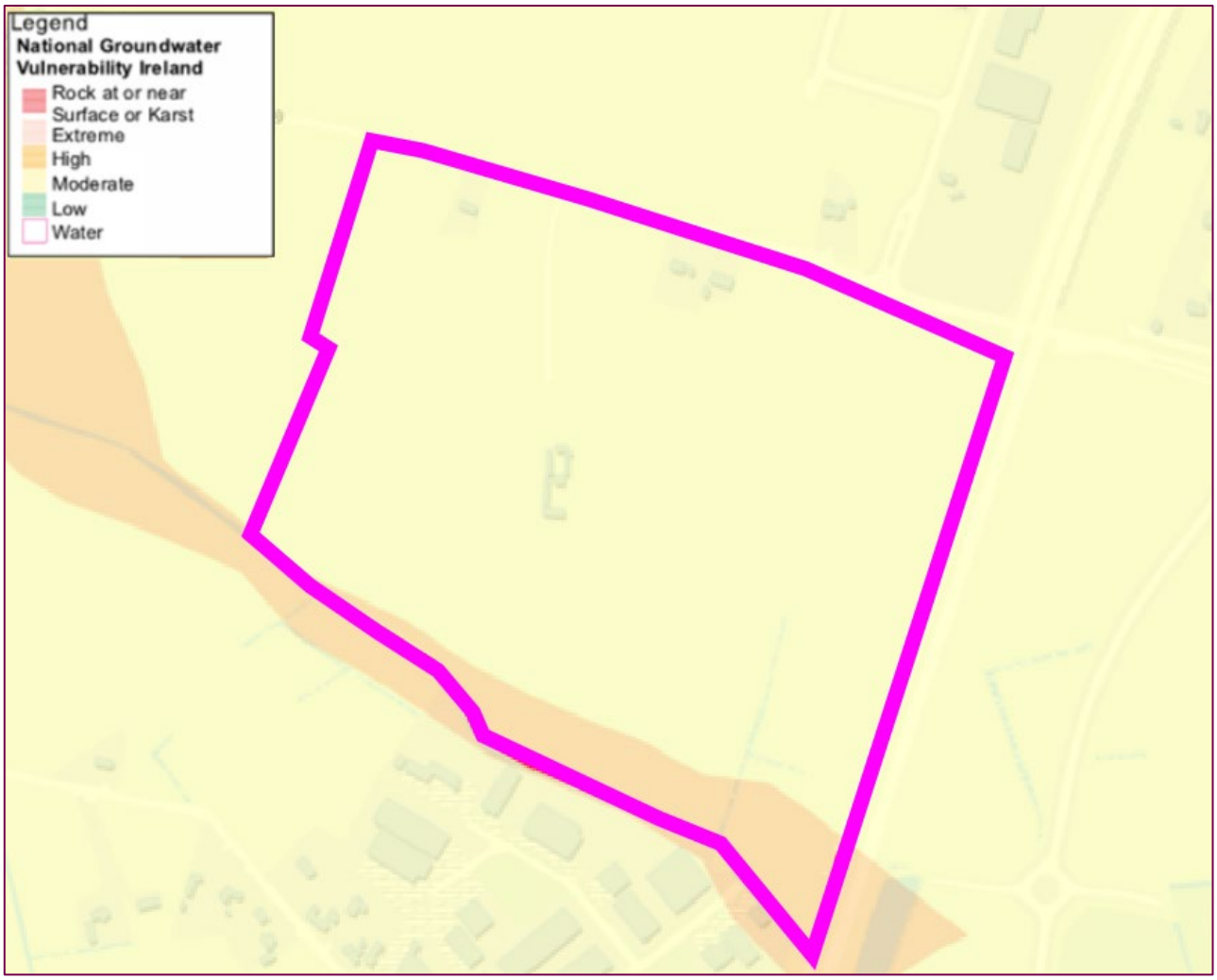

Figure 6.3: Extract from GSI Groundwater Vulnerability Mapping

6.4.5.6 Groundwater Recharge

The GSI groundwater recharge map provides an estimate of the average amount of rainwater that percolates down through the subsoils to the water table over a year. It is a function of the subsoil permeability, groundwater vulnerability and bedrock aquifer type. The majority of the site is located within areas of modearte groundwater recharge. With the north eastern corner be considered to also be moderate , but with wet soils. The average annual recharge for the iste is approximatey 251-300mm/yr with the north each experiencing a rate of 51-100mm/yr.

Figure 6.12: Extract from GSI Groundwater Recharge Mapping

6.5 Impact Assessment

6.5.1 Do Nothing Scenario

In the 'Do Nothing' scenario, if the construction of the development at the proposed site does not take place, the existing baseline conditions will remain and there would be no resulting additional impacts on the Soils or Geology in the area of the Project site.

6.5.2 Likely Significant Environmental Effects

There are a number of effects on the land, geological and hydrogeological environments that will occur due to the Project as follows: -

- Land use – change of use agricultural to Commercial/ Data Centre Use
- Soil excavation – removal of soil to facilitate the construction the foundations/ Pond Structures and underground services infrastructure.

In line with EIAR guidance, each potential impact for the development should be described in terms of its Quality, Significance, Extent, Probability, and Duration. The potential impacts, mitigation measures and resulting residual impacts have been combined in a Detailed Assessment Table in Table 6.2 presented in Section 6.6.4.1 and are outlined below.

6.5.2.1 Construction Phase

Below is a summary of the likely potential impacts throughout the Construction Phase:

- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction phase. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled. This can lead to run-off with high suspended solid content which can impact on water bodies. The potential risk from this indirect impact to water bodies and/or habitats from contaminated water would depend on the magnitude and duration of any water quality impact.
- There is a potential for dust from demolition works, excavations or stockpiles to impact on air quality. This is discussed further in Chapter 8 Air Quality and Climate.
- Construction phase dewatering will likely be required to excavate the foundations/ pond structures and to maintain dry working conditions in the excavation due to rainfall and potential groundwater ingress as the excavation progresses with depth. Pumped surface water shall require treatment as part of the surface water strategy during construction as discussed further in Chapter 13 Material Assets: Built Services.
- Noise and vibration will be generated through the construction phase particularly during excavation work. Given that rock excavation may be required, excavation of the same may require rock breaking via pneumatic hammers attached to large tracked excavators. Noise and vibration impacts are considered in detail in Chapter 9 Noise and Vibration.
- The construction phase which includes the importing or exporting of material to the site (as part of excavation or infilling works) will have implications for traffic in the surrounding road network. These impacts are considered further in Chapter 12 Material Assets Traffic and Transport.
- There is potential for surface water and/or groundwater to become contaminated with pollutants associated with construction activity. Contaminated water arising construction sites may pose a significant short-term risk to groundwater quality for the duration of the construction should it be permitted percolate to the aquifer. The potential sources of contaminants include the following: -
    - Contaminated groundwater within the site from previous site activities,
    - Suspended solids arising from excavation and ground disturbance,
    - Hydrocarbons arising from accidental spillages from construction plant or onsite storage,
    - Cement/concrete arising from construction materials,
    - Wastewater arising from poor on-site toilet and washrooms.

6.5.2.2 Operational Phase

During the Operational Phase of the Project there is limited impact on the geological environment of the area. The site has been designed to mitigate any soil contamination which may occur during the operational phase of the Project.

6.5.2.3 Worst Case Scenario

The “worst-case” scenario is the accidental release of diesel fuel or spillage of other similar hazardous materials occurring on site during the Construction phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur in an open excavation it could lead to these materials infiltrating through the soil contaminating the soil zone and any underlying groundwater which is an adverse, significant and temporary effect. Appropriate remediation measures would then be required depending on the nature and extent of any contamination caused under such a scenario and may include the excavation and treatment of contaminated soil and associated in-situ remediation techniques.

6.5.3 Summary

Table 6.2 below summarises the identified likely significant effects during the construction phase of the Project before mitigation.

Table 6.2: Summary of Likely Significant Effects during Construction Before Mitigation

Qual- **Quality**
Sig.- **Significance**
Ext.- **Extents**
Prob.- **Probability**
Dur.- **Duration**
Neg.- **Negligible**
Mod.- **Moderate**
Cert.- **Certain**
Per.- **Permanent**
Reg.- **Regional**

Activity	Construc. Element	Potential Impact Description	Qual.	Sig.	Ext.	Prob.	Dur.	Type
Earthworks	Pond Ex. Pond Construc. Found Construc.	Excavation of natural soils and subsoil for roads, foundations, ponds, swales, drainage, etc.	Neg.	Mod.	Local	Cert.	Per.	Irreversible
		Airbourne dust arising from soil stockpiles causing nuisance dust on public roads and neighbouring properties	Neg.	Slight	Local	Unlikely	Short	Worst Case
		Imported fill material shall be required as part of works	Neg.	Slight	Local	Likely	Per.	Irreversible
		Excavation of top soil material	Pos.	Slight	Local	Likely	Per.	Irreversible
		Excavation of subsoils can serve to reduce the local groundwater levels as the water table naturally lowers to a new equilibrium below the artificial ground level	Neg.	Mod.	Local	Likely	Per.	Worst Case
		Seepage of underlying groundwater	Neg.	Slight	Local	Likely	Short	Worst Case
		Discharge of contaminated groundwater to adjacent watercourse	Neg.	Slight	Local	Likely	Short	Worst Case
Groundwater Abstraction		Groundwater abstraction associated with temporary dewatering forcing changes in pore water pressures and potential settlement and/ or subsidence in downstream unconsolidated sediments	Neg.	Sig.	Local & Reg	Unlikely	Short	Worst Case
Groundwater Flow Paths		Groundwater flow paths may be potentially altered due to the construction of sub-surface structures.	Neg.	Sig.		Likely	Per.	Worst

		Groundwater mounding can theoretically occur where large impermeable structures are placed perpendicular to groundwater flow paths			Local & Reg			Case
Groundwater Quality		Potentially contaminated water generated within the excavation could impact the Bluebell Stream	Neg.	Sig.	Local & Reg	Likely	Short	Worst Case

6.5.4 Cumulative Effects

6.5.4.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. A number of planning applications (permitted, submitted but undetermined and under construction) have been identified within the locale of the Project site. Many of these projects are associated with the retail and industrial complexes located to the north and south of the Project site. It is not likely that the Project will result in any negative significant cumulative effects on Lands and Soils in combination with these projects.

6.5.4.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

A desktop review of the proposed high pressure gas pipeline route was undertaken to assess potential impacts on lands and soils along the most likely route.

The works associated with the proposed new pipeline involve the excavation of a trench to install the new pipe, circa 1.2m deep for approximately 10.5km through agricultural lands, road crossings and along footpaths and verges. The excavated materials will be removed from site and disposed of at appropriately licenced waste facilities. Additionally, works through agricultural lands will also require excavation of topsoils and construction of temporary haul roads and hardcore working platforms in a corridor circa 14m in width along the route of the pipe. The topsoils will be stockpiled and reinstated along the route as the works progress, following removal of the temporary haul roads and working areas. The impact of these works on Lands and Soils will be Slightly Negative, localised to the works short term and Temporary in nature and are reversible with reinstatement works.

In conclusion, much of the likely pipeline route will follow existing gas pipelines and other services. There are no predicted negative significant cumulative effects on Lands and Soils as a result of these associated projects.

6.6 Mitigation

6.6.1 Incorporated Design Mitigation

The design of the pond structures and foundations will be such that the depths are of a minimum in relation to fluvial flood levels, thus maintaining the excavations required at a minimum also. This, in addition to a design that has tried to balance the cut and fill required for the development shall serve to reduce the volume of soils to be exported off-site and therefore reduce the quantity of imported materials. The Contractor shall seek to export waste arising from the Construction Phase to licensed facilities as close to the site as possible to minimise the carbon footprint associated with handling of the material.

6.6.2 Construction Phase Mitigation

The following sections describe the mitigation measures which shall be adopted as part of the construction works on site to reduce the potential impacts on the soils, geology and hydrogeological environment.

6.6.2.1 Control of Excavations and Export of Material Arising from the Site

The proposed works shall incorporate, as identified in the Construction Environmental Management Plan (Volume II, Appendix 4.5), the reduce, reuse and recycle approach in relation to the excavation of soil on site. All excavation arisings shall be, where possible, reused on site. Stockpiles have the potential to cause negative impacts on air and water quality, therefore, the effects of soil stripping and stockpiling shall be mitigated through the implementation of an appropriate earthworks handling protocol implemented by the Contractor during the Construction Phases. Stockpiles shall be formed within the boundary of the excavation zone and there shall be no direct link or pathway from this zone to any surface water body. Only local/low level of stockpiling shall occur as the bulk of the material to be excavated shall be paced directly into haulage vehicles for transport off site to an appropriately licensed facility or, where possible, will be reused in other areas of the site as fill. The Contractor shall implement dust suppression measures, vehicle wheel washes, road sweeping and general housekeeping to ensure that the surrounding environment is free of nuisance dirt and dust dirt on roads.

6.6.2.2 Export of Material Arising from Site

Where demolition and construction material, such as excavated material, cannot be reused on site it shall be transported for recovery/disposal at an appropriately licenced facility as outlined in the Construction Environmental Management Plan. Following the geo-environmental sampling and associated laboratory testing, the waste classification completed on the soils has found that all results indicate that the materials are free from asbestos and are classified as a non-hazardous soil waste suitable for disposal at an inert landfill facility. Additional Soil Classification shall be carried out as part of the Construction Phases and waste shall be delivered by the Contractor to licensed Waste facilities which are authorised under the Waste Management Act 1996, as amended, and which hold the appropriate certificate of registration, Waste facility permit or EPA licence.

6.6.2.3 Control of Water During the Construction Phases

The Contractor shall carry out the earthwork and excavation activities such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing silts. The Contractor shall exercise care to ensure that exposed soil surfaces are stable in order to minimise erosion and that all exposed soil surfaces shall be within the main excavation site thus limiting the potential for any offsite impacts. All surface water run-off shall be prevented from directly entering into any water courses whatsoever in accordance with the Construction Environmental Management Plan. During the excavation of the existing site for the pond structures and foundation excavations, surface water shall pond in the excavations. The Contractor shall implement pre-treatment and silt reduction measures on site and shall include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks) and hydrocarbon interceptors (as outlined in the Construction Environmental Management Plan). Qualitative and

quantitative monitoring shall be implemented, with the client's Environmental Consultant auditing the Contractor's regular sampling and analysis results.

6.6.2.4 Sources of Fill Material / Aggregates for the Site

The Contractor shall source all imported fill and aggregate for the Project from reputable suppliers and shall ensure the following

- Aggregate Declarations of Performance for the classes of material specified,
- Environmental Management status and the Regulatory and Legal Compliance status of the proposed suppliers.

The Contractor may consider recycled or recovered materials as aggregates for the Project where appropriate.

6.6.2.5 Fuel and other Hazardous Substance Handling, Transport and Storage

The Contractor shall implement the following mitigation measures on site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Dedicated bunded refuelling areas,
- Provision of spill kits for hazardous substances,

Diesel/ petrol powered equipment to be placed on suitable drip trays.

6.6.2.6 Construction Environmental Management Plan

A Construction Environmental Management Plan for the Project is provided in Volume II, Appendix 4.5. The Construction Environmental Management Plan sets out the minimum requirements which will be adhered to during the construction phase of the Project to help ensure that construction activities are planned and managed in accordance with the environmental requirements identified within and the relevant guidance and legislation.

The Construction Environmental Management Plan will form part of the Contract Documents for the construction stage to ensure that the Contractor undertakes the works required to implement mitigation measures.

6.6.3 Operational Phase Mitigation

As noted above there is limited impact on the geological environment of the area expected during the operational phase of the development. The site has been designed to mitigate any soil contamination which may occur during the operational phase of the Project. This includes bunding of all chemical and fuel containers, the discharge of waste process water to the foul drainage network, the containment of firefighting water run-off in detention ponds and the provision of oil and fuel interceptors on drainage networks.

6.6.4 Residual Impacts

6.6.4.1 Construction Phase

The predicted impacts of the construction phase are described in Table 6.3 in terms of quality, significance, extent, probability and duration. The relevant mitigation measures are detailed and the residual impacts are determined which take account of the mitigation measures.

The construction impact is assessed to be a slight negative short-term impact which is unavoidable given the nature, requirement and design of the Project.

Table 6.3: Construction Phase Impact Determination

Qual.- **Quality**
Sig.- **Significance**
Ext.- **Extents**
Prob.- **Probability**
Dur.- **Duration**
Neg.- **Negligible**
Mod.- **Moderate**
Cert.- **Certain**
Per.- **Permanent**
Reg.- **Regional**

Activity	Construc. Element	Potential Impact Description	Qual.	Sig.	Ext.	Prob.	Dur.	Mitigation	Residual Impact
Earthworks	Pond Ex. Pond Construc. Found Construc.	Excavation of natural soils and subsoil for roads, foundations, ponds, swales, drainage, etc.	Neg.	Mod	Local	Cert.	Per.	The minimum amount of space required in order to construct the works have been allowed for. Excavated material, where possible, shall be reused on the site	Moderate Negative
		Airbourne dust arising from soil stockpiles causing nuisance dust on public roads and neighbouring properties	Neg.	Slight	Local	Unlikely	Short	The contractor shall implement dust suppression measures to minimise the generation of dust during dry weather periods. Dust monitoring shall be carried out by the contractor throughout the excavation works. Construction vehicle wheel wash facilities shall be provided on all site exits and the contractor shall implement a road sweeping programme for the duration of the works.	Imperceptible Negative
		Imported fill material shall be required as part of works	Neg.	Slight	Local	Likely	Per.	The contractor shall only source fill material with the requisite declarations of performance to ensure material supplied complies with the relevant project material specifications.	Imperceptible Negative
		Excavation of top soil material	Pos	Slight	Local	Likely	Per.	The contractor shall implement environmental sampling and testing of top soil to assess its potential suitability for landfills in the Republic	Slightly Positive

								of Ireland via comparison against the Landfill Waste Acceptance Criteria Limits.	
		Excavation of subsoils can serve to reduce the local groundwater levels as the water table naturally lowers to a new equilibrium below the artificial ground level	Neg.	Mod.	Local	Likely	Per.	The contractor shall install groundwater monitoring wells which shall be continuously monitored during earthworks on site. The impact of lowering the groundwater levels shall be minimum.	Imperceptible Negative
		Seepage of underlying groundwater	Neg.	Slight	Local	Likely	Short	The contractor shall implement the localised lowering of the water table through pumping of wells	Imperceptible Negative
		Discharge of contaminated groundwater to adjacent watercourse	Neg.	Slight	Local	Likely	Short	The contractor shall design on-site pre-treatment of groundwater prior to its discharge to the adjacent watercourse	Imperceptible Negative
Groundwater Abstraction		Groundwater abstraction associated with temporary dewatering forcing changes in pore water pressures and potential settlement and/ or subsidence in downstream unconsolidated sediments	Neg.	Sig.	Local & Reg	Unlikely	Short	Condition surveys should be completed on neighbouring properties and neighbouring sites and should be monitored during the construction works	Imperceptible Negative
Groundwater Flow Paths		Groundwater flow paths may be potentially altered due to the construction of sub-surface structures. Groundwater mounding can theoretically occur	Neg.	Sig.	Local & Reg	Likely	Per	Local dewatering will be required as the excavations remove overlying low permeability clays which act as a confining layer.	Imperceptible Negative

		where large impermeable structures are placed perpendicular to groundwater flowpaths							
Groundwater Quality		Potentially contaminated water generated within the excavation could impact the Bluebell Stream	Neg.	Sig.	Local & Reg	Likely	Short	In order to avoid the inadvertent pollution of Surface and groundwater resources, all runoff should be prevented from directly entering watercourses. Best- practices and correct handling and storage of potentially polluting substances should be adhered. Water should be collected in a centralised sump and will be treated prior to discharge; The sump should be lined appropriately to avoid contaminant ingress to the groundwater system should current confining conditions be breached	Imperceptible Negative

6.6.4.2 Operational Phase

During the Operational Phase of the Project there is a negative permanent imperceptible impact on the local and regional geological environment

6.7 Interactions

The design team have produced a coordinated design to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the Project.