7 LAND, SOILS AND GEOLOGY

7.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides an assessment of the existing environmental setting and the likely significant impacts on land, soil, geological and hydrogeological aspects, associated with this proposed residential development (Phase 1F) at Portmarnock South in the townlands of Maynetown and Portmarnock, Portmarnock, Co. Dublin and partially located in the townland of Stapolin, Baldoyle, Dublin 13.

The characteristics of the potential and predicted impacts during the Construction and Operational Phases of the Proposed Development are assessed and evaluated. Where an impact is identified, appropriate mitigation measures to avoid any identified significant effects to surrounding land, soils, geology and hydrogeology are recommended and the residual impacts of the Proposed Development post-mitigation are assessed.

The principal objectives of this chapter are to identify:

- Land, soil, geological and hydrogeological characteristics at the Site of the Proposed Development,
- Potential impacts that the Proposed Development may have on land, soils, geology and hydrogeology,
- Potential constraints that the environmental attributes may place on the Proposed Development,
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development, and
- Evaluate the significance of any residual impacts.

The Proposed Development (Phase 1F) which consists of 296 no. residential units, described in detail in Chapter 3: Description of Proposed Development and in Section 7.4 below, are situated on lands designated for new residential communities in accordance with the Fingal Development Plan 2023-2029 and previously in the Portmarnock South Local Area Plan 2013 (as extended) which has now expired .

This Chapter was prepared by Colman Horgan (CEng) and reviewed by Martin Cannon (CEng) on behalf of Egis Engineering Ireland Ltd. The authors and reviewer have over 10 years' experience in the preparation of EIAR and planning submissions.

7.2 ASSESSMENT METHODOLOGY

The chapter of the EIAR has been prepared, following the guidance of the Environmental Protection Agency (EPA). The methodology adopted for the assessment takes cognisance of the relevant guidelines, in particular the following.

- Environmental Protection Agency, May 2022. *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).
- Institute of Geologists of Ireland *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements* (IGI, 2013); and
- National Roads Authority, 2009. *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (NRA, 2009).

7.2.1 Principal Data Sources

The following principal data sources were consulted as part of the desktop study undertaken to establish baseline conditions for the Site of the Proposed Development.

Source	Type	Description/Notes
Microsoft Bing	Aerial Photography	Current aerial imagery provided by Microsoft Bing.

Environmental Protection Agency (EPA)	Corine 2018 Water Features Waste Licence Facilities Historic Mines	Corine Land Cover 2018. Rivers and Streams. IEL, IPC, IPPC Licences. Historic mine locations mapped by EPA.
Geological Survey Ireland (GSI)	Quaternary Geology Bedrock Geology Aggregate Potential Mineral Localities Geotechnical Landslide Hazard Quarries and Pits Geological Heritage Sites Groundwater Resources (Aquifers) Groundwater Vulnerability Groundwater Recharge Karst Features Groundwater Wells & Springs	Geological and associated mapping.
Google	Aerial Photography	Current and historical aerial imagery provided by Google.
National Parks & Wildlife Service (NPWS)	Designated Areas	This dataset provides information on national parks, protected sites (SPA, SAC, NHA, pNHA) and nature reserves.
Tailte Éireann	Current and Historical ordnance survey maps and aerial photography	Current and historical survey maps and aerial imagery produced by Tailte Éireann, formerly Ordnance Survey Ireland (OSI).
Teagasc	Soils Data	Surface soils classification and description.

Table 7-1: Principal Data Sources

7.2.2 Ground Investigation Surveys

Site specific information was derived from site investigations carried out in the Proposed Development area and surrounds, and includes: -

- Ground Investigations Ireland Ltd (2024) Ground Investigation Report, Portmarnock Phase 1E & 1F,
- Ground Investigations Ireland Ltd (2022). Ground Investigation Report, Portmarnock,
- Site Investigations Ltd (2018). Site Investigation Report, Portmarnock South-Phase 1B, Portmarnock, Co. Dublin,
- Glover Site Investigations Ltd. (2006). Site Investigation, Proposed Development at Portmarnock, Co. Dublin.

7.2.3 Definition of Study area

In accordance with the recommendation of the '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*' (IGI, 2013) the study area of this assessment comprises a 2 km zone beyond the Site of the Proposed Development, refer to Figure 7-2 below. Potential receptors within a 2 km buffer are considered within this assessment.

Most land, soils and geology attributes are only affected where present within the Site of the Proposed Development or its immediate surroundings. However, a wider 2 km buffer is used, in order

to assess attributes associated with longer potential pathways (in the source-pathway-receptor linkages), such as hydrogeological features.

7.2.4 Methodology

The principal attributes and impacts to be assessed in the vicinity of the Proposed Development include the following: -

- Land classification and cover.
- Soil and subsoil classification, the quality, drainage characteristics and range of agricultural uses of soil, the extent of topsoil and subsoil cover and the potential use of this material on-site as well or requirement to remove it off-site as waste for disposal or recovery.
- Bedrock geology.
- Geological heritage sites.
- Landfills, industrial sites and the potential risk of encountering contaminated ground.
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves.
- Aquifer classification and extent of aquifers underlying the development perimeter area and increased risks presented to them by the Proposed Development e.g. removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality.
- High-yielding water supply springs / wells in the vicinity of the Proposed Development to within a 2km radius and the potential for increased risk presented by the Proposed Development.
- Natural hydrogeological / karst features and potential for increased risk presented by the activities at the Site of the Proposed Development.
- Groundwater dependent terrestrial ecosystems and the increased risk presented by operations.

This assessment of impacts follows guidelines established by Transport Infrastructure Ireland (formerly National Roads Authority before merger with Railway Procurements Agency) in its publication; Appendix C2 NRA Guidance of the Institute of Geologists of Ireland (IGI, 2013). *Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements*, namely: -

- **Step 1** – Quantify the importance of the feature for geology and for hydrogeology (Tables 7-2 and 7-3 respectively).
- **Step 2** – Assess the magnitude of the impact on the feature from the Proposed Development (Tables 7-4 and 7-5).
- **Step 3** – Determine the significance of the impact on the feature by reference to the importance of the feature and magnitude of impact (Table 7-6).

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource.
High	Attribute has a high quality, significance or value on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes.

	Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small 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. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Table 7-2: Criteria for Rating Site Importance of Geological Features.

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

Table 7-3: Criteria for Rating Site Importance of Hydrogeological Features.

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute.	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage feature Requirement to excavate / remediate entire waste site. Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in impact 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 / remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
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 / remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity.	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

Table 7-4: Criteria for Rating Impact Significance – Geology Attribute.

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/or quality and integrity of attribute.	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute.	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute.	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity.	Calculated risk of serious pollution incident <0.5% annually.

Table 7-5: Criteria for Rating Impact Significance – Hydrogeology Attribute.

Importance of Attribute	Magnitude of Impact (Effect)			
	Negligible	**Small Adverse (Low)**	**Moderate Adverse (Medium)**	**Large Adverse (High)**
Extremely High (High)	Imperceptible (Not Significant)	Significant (Slight to Very Significant)	Profound (Moderate to Profound)	Profound (Profound)
Very High (High)	Imperceptible (Not Significant)	Significant / Moderate (Slight to Moderate)	Profound / Significant (Moderate to Significant)	Profound (Very Significant to Profound)
High (Medium to High)	Imperceptible (Not Significant)	Moderate / Slight (Slight to Moderate)	Significant / Moderate (Moderate to Significant)	Profound / Significant (Very Significant to Profound)
Medium (Medium)	Imperceptible (Not Significant)	Slight (Slight)	Moderate (Moderate)	Significant (Significant to Profound)
Low (Low to Negligible)	Imperceptible (Imperceptible to Not Significant)	Imperceptible (Not Significant)	Slight (Not Significant to Slight)	Slight / Moderate (Not Significant to Moderate)

Table 7-6: Rating of Significant Environmental Impacts.

Note the above table has been annotated to reflect the equivalent classification (text in brackets) from Figure 3.4 of the EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports.*

7.3 RECEIVING ENVIRONMENT

The lands, within which this Proposed Development is located, lie to the west of Baldoyle Bay, to the east of the Dublin-Belfast Rail Line, north of Moyne / Mayne Road and south of Station Road.

These lands are being developed, primarily as residential development, on a phased basis, with Phase 1A constructed in 2016 / 2017 (101no. units), Phase 1B constructed in 2020 (150no. units), Phase 1C constructed in 2021 / 2022 (153no. units and a Local Centre), Phase 1D (172no. units) which is currently under construction and Phase 1E (195no. units) which was granted permission in December 2024.

Figure 7-1: Site Location.

The Proposed Development is described below and for the purposes of cumulative assessment will include the current phase under construction (Phase 1D), the development of Phase 1E and the development of a final phase to build out approximately 33no. residential units including public open space, integration of recorded monuments and provision of road and drainage infrastructure.

A number of existing dwellings are present on the periphery of the Portmarnock South lands, namely five houses in the north-east opposite the junction of Station Road, Strand Road and Coast Road as well as three houses further south along Coast Road.

Newly developed residential areas are also present to the west of the Dublin – Belfast Rail Line, to the north of Station Road (including some apartments under construction) and Portmarnock Village itself, located to the northeast of the subject lands across the Sluice River.

The surrounding land to the Site is a mix of remnant agricultural, parkland and residential development. The Site is zoned as RA – 'New Residential'. The objective for these zoned lands is to *"Provide for new residential communities in accordance with approved local area plans and subject to the provision of the necessary social and physical infrastructure."*

Figure 7-2: Study Area

7.3.1 Topography and Setting

The Site of the Proposed Development generally falls from a high contour of 15m mid-way along the western boundary adjoining the rail line to a 13m contour in the south-east corner of the Proposed Development and falling again to a 9.5m contour in the north-east corner.

The surrounding lands, comprising all phases of the Portmarnock South developments, slope to the north towards the Sluice River, to the east towards the Mayne Estuary and to the south towards the Mayne River. The ground levels around the perimeter are typically; 10m contour in the northwest by the railway station, 4.5m contour in the northeast adjoining Station Road, falling to 3.7m contour toward the estuary and 3.0m contour in the south-east along Moyne Road.

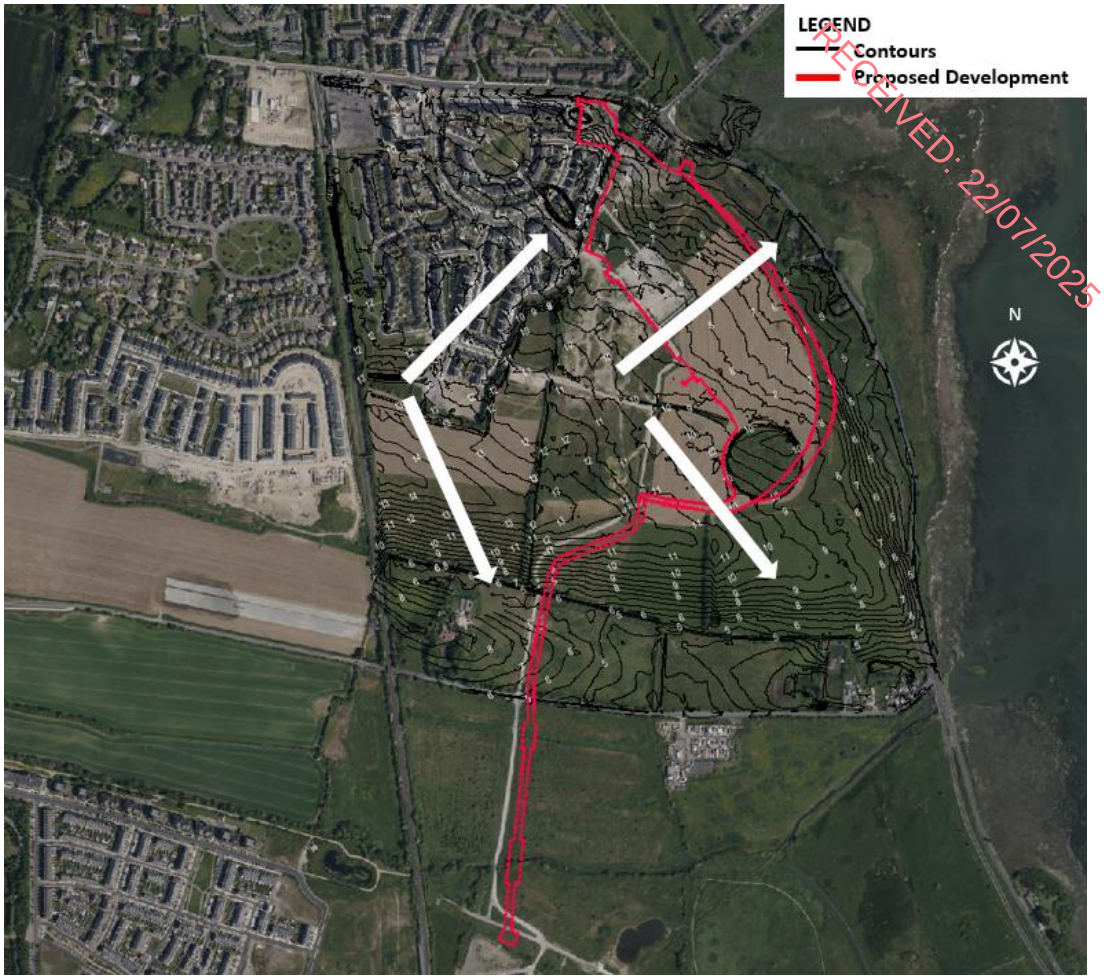

Figure 7-3: Topographical Slopes.

7.3.2 Historic Land Use

The assessment of site history confirms that until recently, the Site of the Proposed Development has been in agricultural use since the earliest mapping available from 1829 – 1841 and 1897 – 1913. The review of historic mapping and aerial photography from Tailte Éireann (formerly Ordnance Survey of Ireland) (Tailte Éireann, 2024) is summarised in Table 7-7.

Date	Information Source	Site Description
1829 - 1841	OSI Map 6 inch 1st Edition	**On Site:** Agricultural Lands **Off Site:** Agricultural Lands bounded by roads, Mayne Bridge to the southeast and Portmarnock House and bridge to the north. Permanent features present include railway and Drumnigh Road to west, Sluice River to the north, Baldoyle Estuary to the east and Mayne River to the south.
1829 - 1841	OSI Map 6 inch Last Edition	**On Site:** No significant change **Off Site:** No significant change
1897 - 1913	OSI Map 25 inch	**On Site:** No significant change **Off Site:** No significant change. Portmarnock Golf Club founded in 1894 to east of development across Baldoyle Estuary.
1995	OSI Aerial Photography	**On Site:** No significant change

		Off Site: Portmarnock Town substantially developed to north, similarly Baldoyle and Howth to south. One off housing to northeast, to east and to south.
1999 - 2003	OSI Aerial Photography	**On Site:** No significant change **Off Site:** No significant change other than car park for railway station to northeast.
2004 - 2006	OSI Aerial Photography	**On Site:** No significant change **Off Site:** No significant change other than Portmarnock House being developed as residential development, also new housing development to west, far side of railway.
2005 - 2012	OSI Aerial Photography	**On Site:** No significant change **Off Site:** No significant change other than increase in new housing developments.
2013 - 2018	OSI Aerial Photography	**On Site:** Phase 1A of Portmarnock South Residential Development under construction in northwest of site. **Off Site:** No significant change other than increase in new housing developments.
2024	Google Maps Aerial Photography	**On Site:** Phase 1A, 1B and 1C of Portmarnock South Residential Development constructed. **Off Site:** No significant change other than increase in new housing developments, Station Road developed on both sides.

Table 7-7: Historic Land Use

7.3.3 Soils

Current land use for the Proposed Development according to Corine 2018 is non-irrigated arable lands (Code_18_211) and comprises of agricultural areas, however, some soils have been previously stripped within the outline of the Proposed Development and part of the area is now in use as a construction compound and a temporary haul road south towards Moyne Road. The land adjacent to the north-east is described as discontinuous urban fabric (Code_18_112) and comprises of artificial surfaces. The area c. 250m east of the Site comprises of salt marshes and intertidal flats. Refer to Figure 7-4. The areas to c. 700m and 350m south of the Proposed Development respectively are described as construction site and green urban areas.

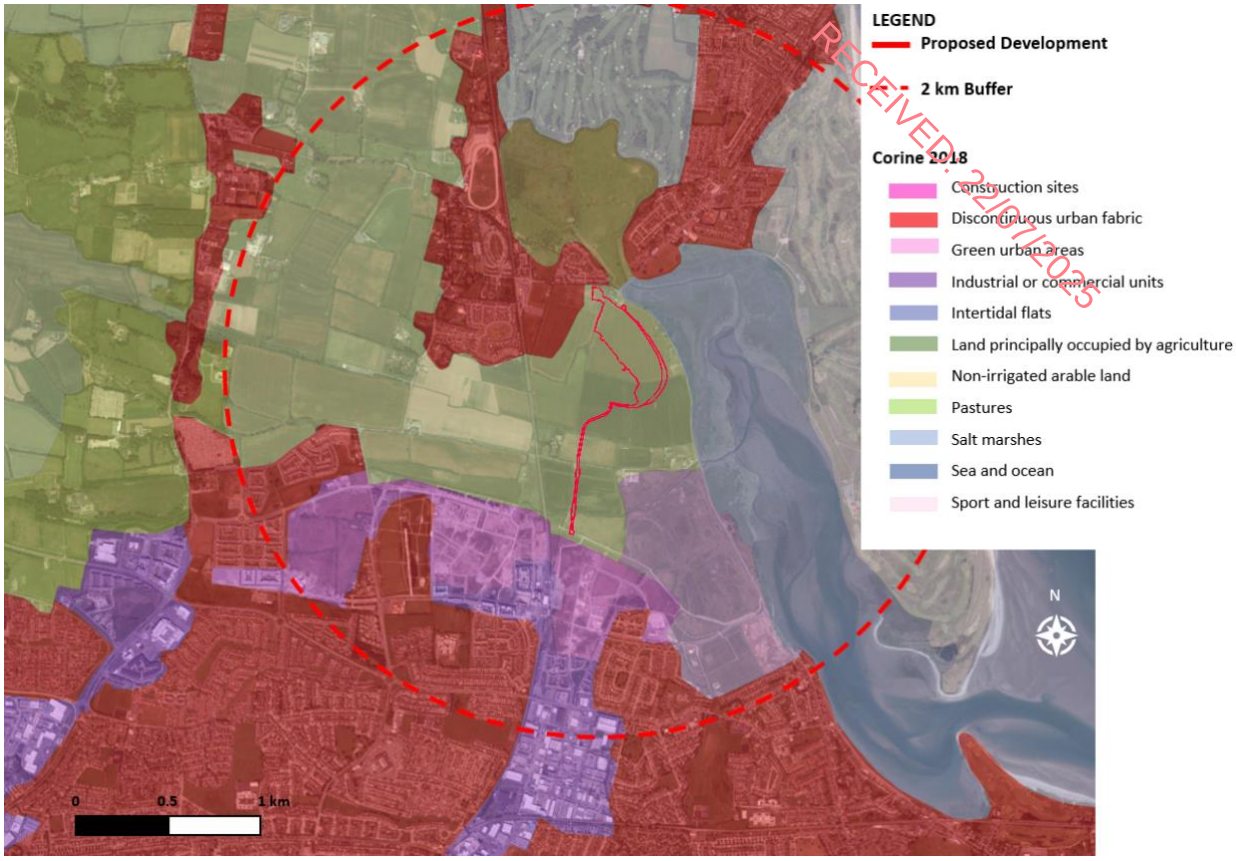

Figure 7-4: Corine Landcover 2018.

The Teagasc soil mapping indicates that the soils beneath the proposed site are comprised primarily of deep well drained mineral soil derived from calcareous parent material (BminDW) and poorly drained mineral soil derived from calcareous parent materials (BminPD).

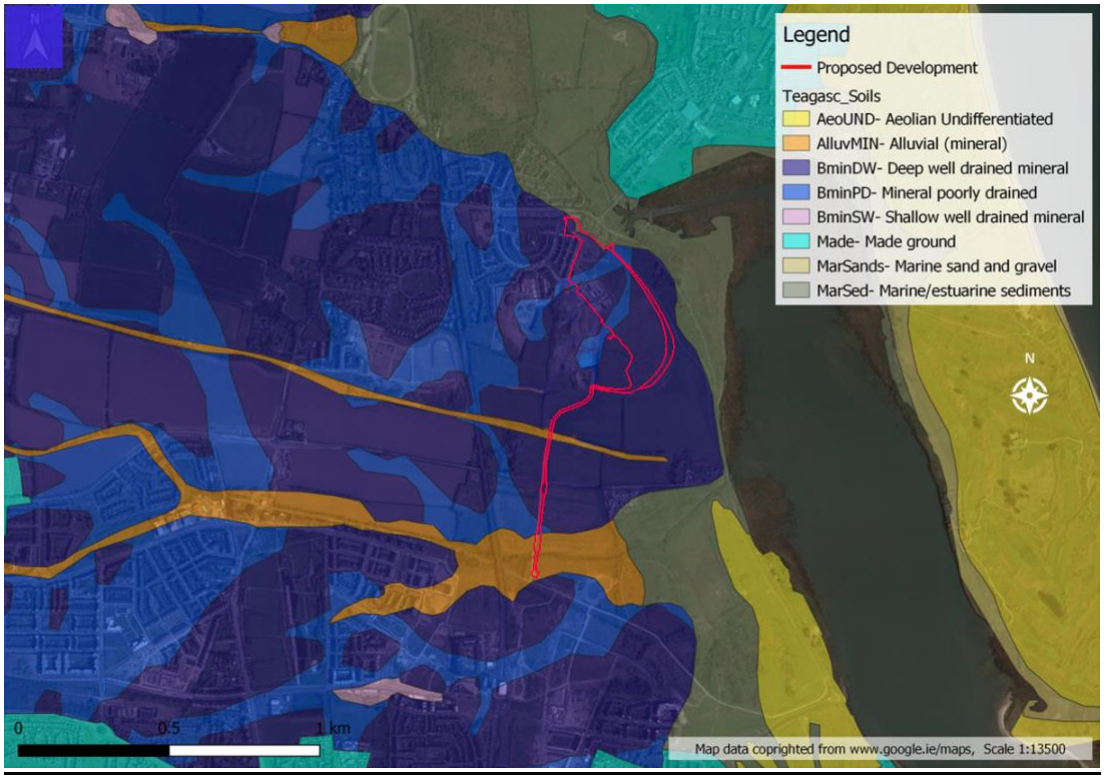

Figure 7-5: Teagasc Soil Cover.

7.3.4 Quaternary Sediments

The GSI Quaternary sediments mapping indicates that the Proposed Development is underlain by Till derived from limestones, as shown in Figure 7-6 with the proposed rising main passing through an area underlain by alluvium.

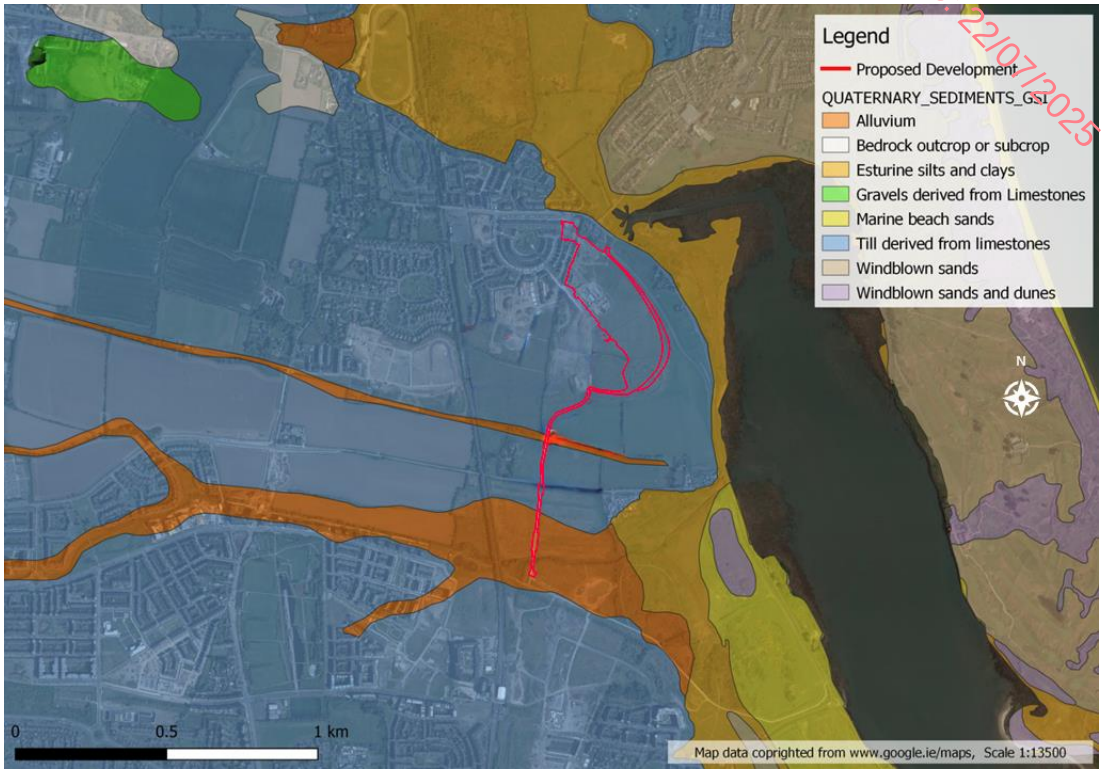

Figure 7-6: Quaternary Sediments.

7.3.5 Bedrock Geology

The GSI Bedrock Geology Map indicates that the Proposed Development is underlain by Lower Carboniferous (Courceyan Stage) Limestones which is referred to as Malahide Formation (Rock Unit code: CDMALH). This geological formation comprises argillaceous bioclastic limestone, shale. The Bedrock Geology Map is shown in Figure 7-7 below.

Figure 7-7: Bedrock Geology.

7.3.6 Economic Geology

GSI aggregate potential mapping indicates the Site is within an area of low crushed rock aggregate potential, and no granular aggregate potential is identified.

The GSI mineral database and EPA Extractive Industry Register were consulted. There are no active or historic quarries within the Proposed Development site. The nearest active quarries in the area include Feltrim Quarry, c. 4.5 km to the north-west and Huntstown Quarry, c. 12.5 km to the west of the development area.

The historic pits and quarries are identified in Table 7-8 below.

Mineral Location Ref.	Type	GSI Comments	Status	Distance from Proposed Development
3258	Pit	Site of brick works that supplied good class red bricks to Dublin.	Historic	550 m NW
10228	Pit	Early to Mid-20thC: Pits	Historic	800 m SE
3259	Pit	Brick field noted on old 6 inch map.	Historic	1000 m NW
10229	Pit	Early to Mid-20thC: Pits	Historic	1000 m SE
10462	Pit	Early to Mid-20thC: Pits	Historic	1550 m SE
2372	Pit	OSI extra gravel pits points	Historic	1400 m N
18698	Quarry	Early to Mid-20thC: Quarries	Historic	1500 m N
10463	Pit	Early to Mid-20thC: Pits	Historic	1750 m SE
4847	Quarry		Historic	1750 m NW
10230	Pit	Early to Mid-20thC: Pits	Historic	1850 m SE
10461	Pit	Early to Mid-20thC: Pits	Historic	1850 m SE

Table 7-8: Historic Pits and Quarries within 2km Buffer Zone of Proposed Development

7.3.7 Geological Heritage

GSI geoheritage mapping was reviewed within 2 km of the Proposed Development. There are no County Geological Sites (CGSs) within the study area.

The nearest Geological Heritage Sites are Malahide Coast and North Bull Island, which are located c. 2.8 km north-east and c. 3.8 km south of the Proposed Development respectively. Feltrim Quarry is also a geological site located c. 4.5 km to the north-west of the development. There is no risk envisaged to the heritage sites due to the project.

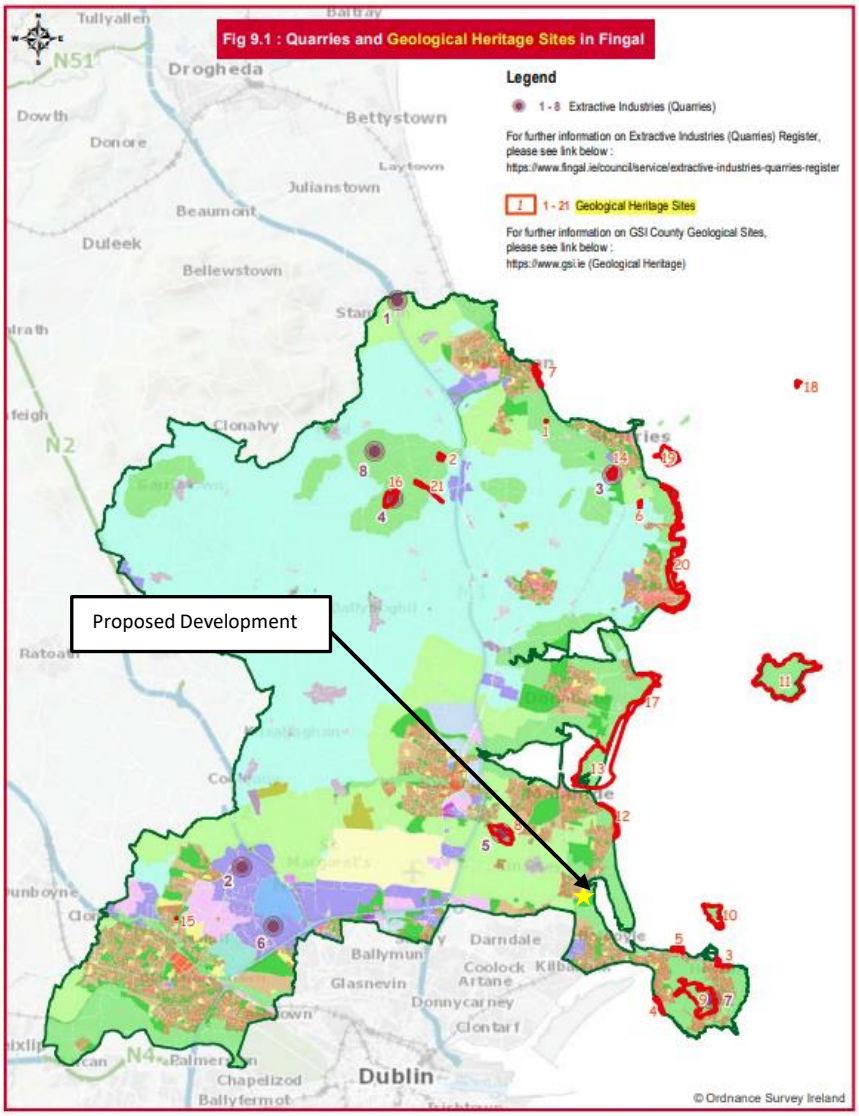

Figure 7-8: Geological Heritage Sites (extract Fingal Development Plan 2023-2029).

7.3.8 NPWS Protected Sites

As identified in Table 7-3, where NPWS Protected Sites are supported by groundwater, they are considered land, soils, geology and hydrogeology attributes.

There are no National Parks & Wildlife Services (NPWS) protected sites within the study area. However, the protected sites in immediate vicinity of the development are summarised in Table 7-9

and described below. These include Special Areas of Conservation (SAC), Special Protection Areas (SPA) and proposed National Heritage Sites (pNHA).

Baldoyle Bay is located 200 m to the east of the Proposed Development. Baldoyle Bay is a tidal estuarine bay protected from the open sea by a large sand-dune system and is a Special Area of Conservation (SAC) – Site Code 000199, designated under the Habitats Directive, and a Special Protection Area (SPA) – Site Code 004016, designated under the Birds Directive, and a pNHA. Both the Sluice River and the River Mayne, which are found to the northeast and south of the Proposed Development respectively, flow into Baldoyle Bay SAC/SPA/pNHA.

The Sluice River Marsh is located 150 m north of the main element of the Proposed Development. The Sluice River Marsh is of importance as a relatively intact freshwater marsh, a habitat that is now rare in County Dublin, and the Sluice River represents a regionally important salmonid system. The Sluice River Marsh is designated as a pNHA.

We note the Natura Impact Statement (NIS) which accompanies this LRD Planning Application includes the Malahide Estuary (004025) and North Bull Island (004006), and North-West Irish Sea (004236) for appraisal as well as the protected sites listed above, however they go on to note that There is no potential for habitat loss within the SPA or for impacts via emissions to surface water. Therefore, they are not included in this assessment.

Site Code	Site Name	Distance from the Proposed Development	Features of Interest
000199	**Baldoyle Bay SAC**	200m east	[1140] Tidal Mudflats and Sandflats [1310] Salicornia Mud [1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows
004016	**Baldoyle Bay SPA**	200m east	A046 Brent Goose (*Branta bernicla hrota)* A048 Shelduck (*Tadorna tadorna)* A137 Ringed Plover (*Charadrius hiaticula)* A140 Golden Plover (*Pluvialis apricaria)* A141 Grey Plover (*Pluvialis squatarola)* A157 Bar-tailed Godwit (*Limosa lapponica)* A999 Wetlands
004236	**North-West Irish Sea SPA**	1300m east	Red-throated Diver (Gavia stellata) [A001] Great Northern Diver (Gavia immer) [A003] Fulmar (Fulmarus glacialis) [A009] Manx Shearwater (Puffinus puffinus) [A013] Cormorant (Phalacrocorax carbo) [A017] Shag (Phalacrocorax aristotelis) [A018] Common Scoter (Melanitta nigra) [A065] Little Gull (Larus minutus) [A177] Black-headed Gull (Chroicocephalus ridibundus) [A179] Common Gull (Larus canus) [A182] Lesser Black-backed Gull (Larus fuscus) [A183] Herring Gull (Larus argentatus) [A184] Great Black-backed Gull (Larus marinus) [A187] Kittiwake (Rissa tridactyla) [A188] Roseate Tern (Sterna dougallii) [A192] Common Tern (Sterna hirundo) [A193] Arctic Tern (Sterna paradisaea) [A194]

			Little Tern (Sterna albifrons) [A195] Guillemot (Uria aalge) [A199] Razorbill (Alca torda) [A200] Puffin (Fratercula arctica) [A204]
000199	**Baldoyle Bay pNHA**	200m east	Designated pNHA
001763	**Sluice River Marsh pNHA**	150m north of Main development	Designated pNHA

Table 7-9: NPWS Sites identified in close proximity of the Proposed Development.

7.3.9 Contaminated Land

According to the EPA data and maps there are no integrated pollution prevention and control or industrial emission licensed (IPPC or IEL) facilities in the vicinity of the Proposed Development nor within the 2km buffer zone. There is no record of any landfills or licenced waste facilities in the vicinity of the Proposed Development nor within the 2km buffer zone.

7.3.10 Radon

According to the EPA data the Proposed Development is located in an area where about 1 in 20 of the homes in this area is likely to have high radon levels.

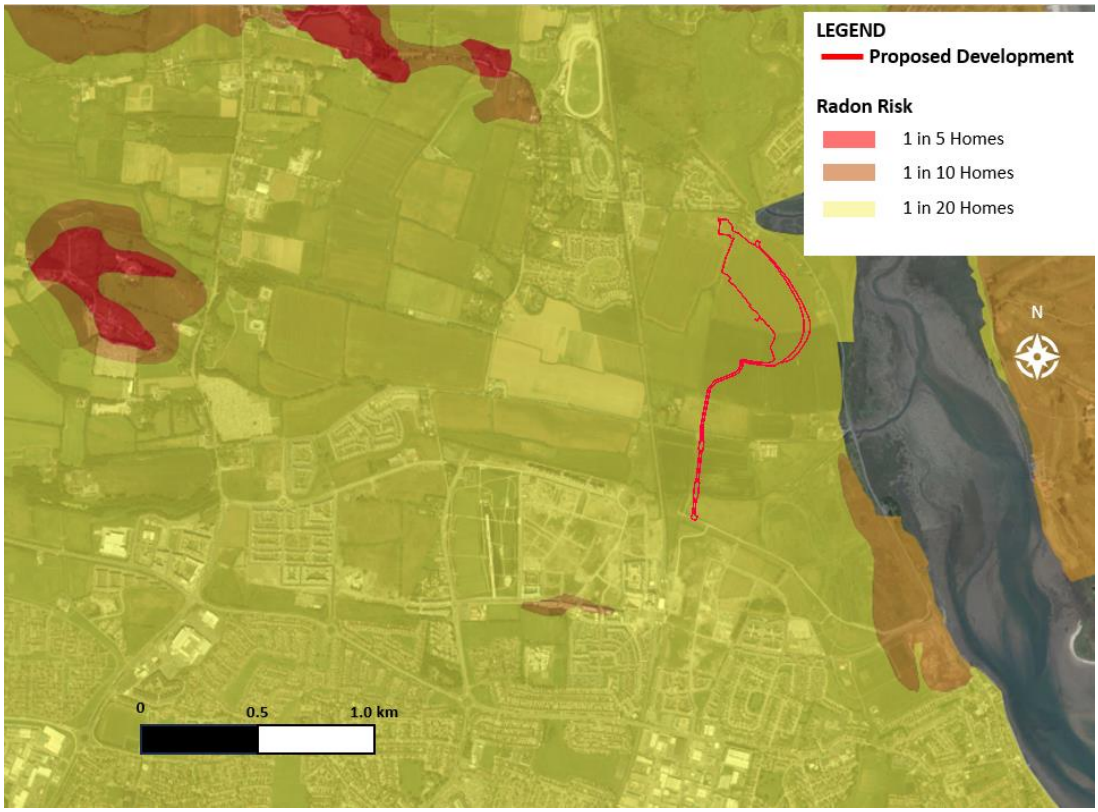

Figure 7-9: Radon Risk Mapping.

7.3.11 Geohazards

GSI landslide vulnerability mapping indicates the Proposed Development is in an area of low landslide vulnerability. Furthermore, the GSI landslide database was consulted and there are no recorded landslides within the study area – the closest recorded landslide occurred over 15 km from the Site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network operated by Dublin Institute for Advanced Studies (DIAS) which has been recording seismic events in Ireland since 1978. There are six permanent broadband seismic recording stations in Ireland operated by DIAS. No events have been recorded within 2 km of the Proposed Development site.

7.3.12 Hydrogeology

7.3.12.1 Aquifer

The Geological Survey of Ireland has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size, and productivity of the groundwater resource. The three main classifications are Regionally Important Aquifers, Locally Important Aquifers and Poor Aquifers. Each of these types of aquifers is further subdivided and has a specific range of criteria such as the transmissivity (m^2/day), productivity, yield and potential for springs associated with it. The sub-divisions are summarised in Table 7-10 below.

GSI Aquifer Classification	Sub-division
Regionally Important (R)	Karstified bedrock with diffuse flow (Rkd)
	Karstified bedrock with conduit flow (Rkc)
	Fissured Bedrock (Rf)
	Extensive sand and gravel (Rg)
Locally Important Aquifers (L)	Generally moderately productive bedrock (Lm)
	Moderately productive bedrock only in local zones (Ll)
	Smaller sand and gravel aquifers (Lg)
	Karstified (limited degree/area) (Lk)
Poor Aquifers (P)	Bedrock unproductive except for local zones (Pl)
	Generally unproductive (Pu)

Table 7-10: GSI Aquifer Classifications and Sub-Divisions.

The Proposed Development is underlain by Locally Important Aquifer (Ll), bedrock which is moderately productive only in local zones, as shown in Figure 7-10 below.

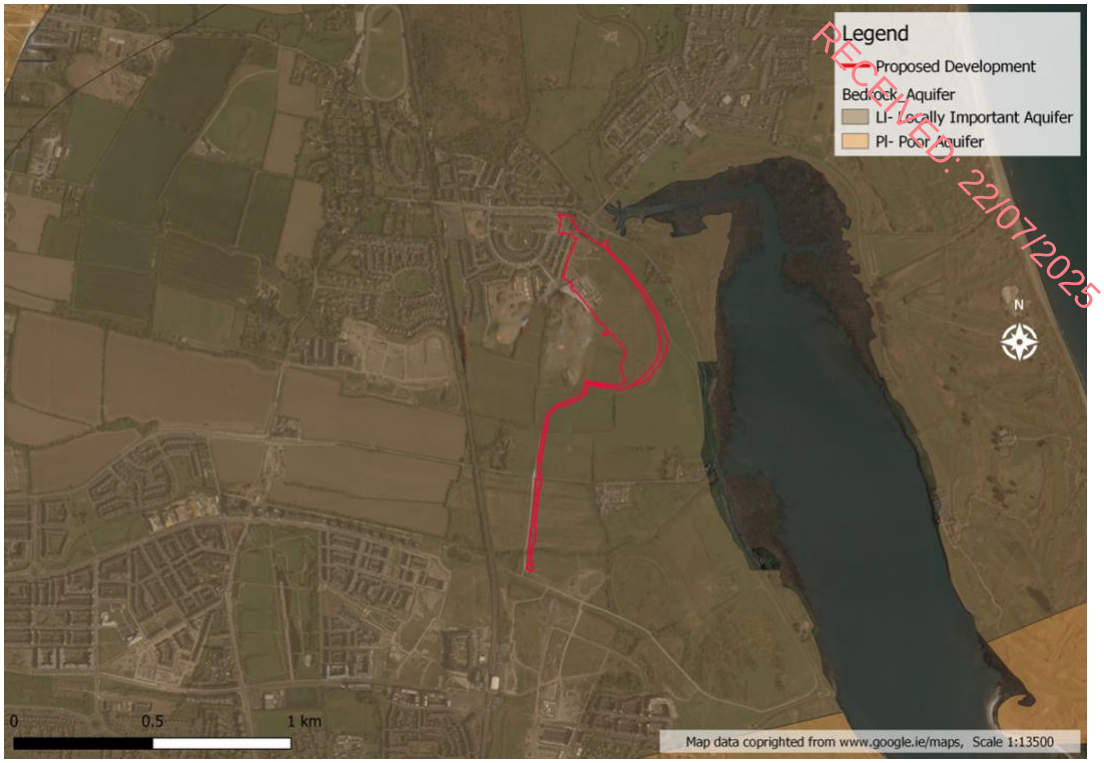

Figure 7-10: Bedrock Aquifer.

7.3.12.2 Groundwater Vulnerability

Groundwater in the bedrock aquifer is most at risk in areas where subsoils are thin or absent, and where karst features such as swallow holes are present. This is due to the ability of potential contaminants to reach the aquifer following a low travel time and with little or no contaminant attenuation due to the thin or absent overburden. The classification guidelines, as published by the GSI, are given in Table 7-11 below.

Vulnerability Rating	**Hydrogeological Conditions**				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (e.g. sand/gravel)	Medium Permeability (e.g. sandy subsoil)	Low Permeability (e.g. clayey subsoil, clay, peat)	Sand/gravel aquifers only)	(<30m radius)
Extreme (X)*	0-1 m	0-1 m	0-1 m	0-1 m	
Extreme (E)	1-3.0 m	1-3.0 m	1-3.0 m	1-3.0 m	-
High (H)	>3.0 m	3.0-10.0 m	3.0-5.0 m	>3.0 m	N/A
Moderate (M)	N/A	>10.0 m	5.0-10.0 m	N/A	N/A
Low(L)	N/A	N/A	10.0 m	N/A	N/A

Notes: N/A = not applicable

Precise permeability values cannot be given at present.

Release of point contaminants assumed to be 1-2 m below ground surface.

*X = rock at or near surface, also associated with a point recharge feature and for a 15m radius around a swallow hole, and 10m buffer of a sinking stream

Table 7-11: GSI Vulnerability Mapping Guidelines (adapted from DoELG, EPA and GSI, 1999).

Groundwater Vulnerability maps for the Proposed Development are presented in Figure 7-11 below. The GSI online database was consulted for groundwater vulnerability and the underlying aquifer type for the Proposed Development. The groundwater vulnerability at the Site is classified as 'low' which indicates an overburden depth of c. 10m of low permeability soil is present.

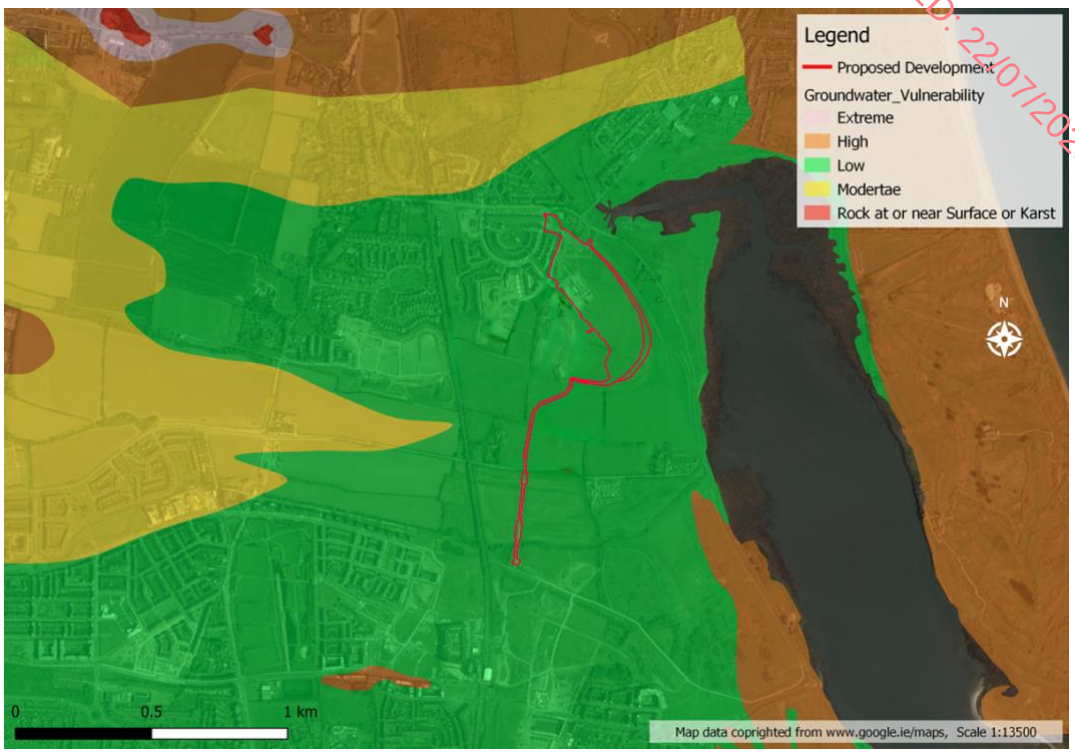

Figure 7-11: Groundwater Vulnerability.

7.3.12.3 Groundwater Resources and Flow

Groundwater wells and springs as identified by GSI are presented in Figure 7-12. The nearest borehole (3223SWW001) is located c. 2.0 km to the south-west of the development. The well is under industrial use and has a good yield as per the GSI data viewer.

There are no group scheme preliminary source protection areas, or public supply source protection areas, within the study area. The nearest drinking water protection area is located 22km west of the Site in Co. Meath at the Dunboyne public water supply.

The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. The EPA Water Maps indicate that the groundwater body WFD status 2013-2018 for all groundwater bodies across the development area is 'Good'. Currently, the groundwater body risk status is classified 'under review' for the area as per the EPA data.

Groundwater Dependent Terrestrial Ecosystems (GWDTE) are habitats / species that rely upon groundwater to maintain their required environmental conditions. Groundwater may have a direct input, for example in the case of turloughs, fens, petrifying springs, or alternatively the groundwater may have an indirect influence in maintaining high and stable water levels for the habitat/ species, for example in the case of raised bogs.

The European Water Framework Directive (WFD) (2000/60/EC) requires that member states provide protection for GWDTE. To date, GWDTEs within Special Areas of Conservation (SAC) as designated under the European Habitats Directive (92/43/EEC) have been the main priority of work. The EPA have developed the report, *A Framework for the Assessment of Groundwater – Dependent Terrestrial Ecosystems under the Water Framework Directive 2007-2013* which has identified Annex I habitats, and Annex II species that are considered to be GWDTE.

There are no GWDTE within the qualifying interests for Baldoyle Bay SAC hence they will not be affected by the Proposed Development.

Figure 7-12: Groundwater Supply.

7.3.12.4 Groundwater Recharge

The GSI groundwater recharge map indicates rates of recharge to the bedrock aquifers under the Site are between 1-50 mm/yr. An excerpt of the GSI groundwater recharge is presented in Figure 7-13.

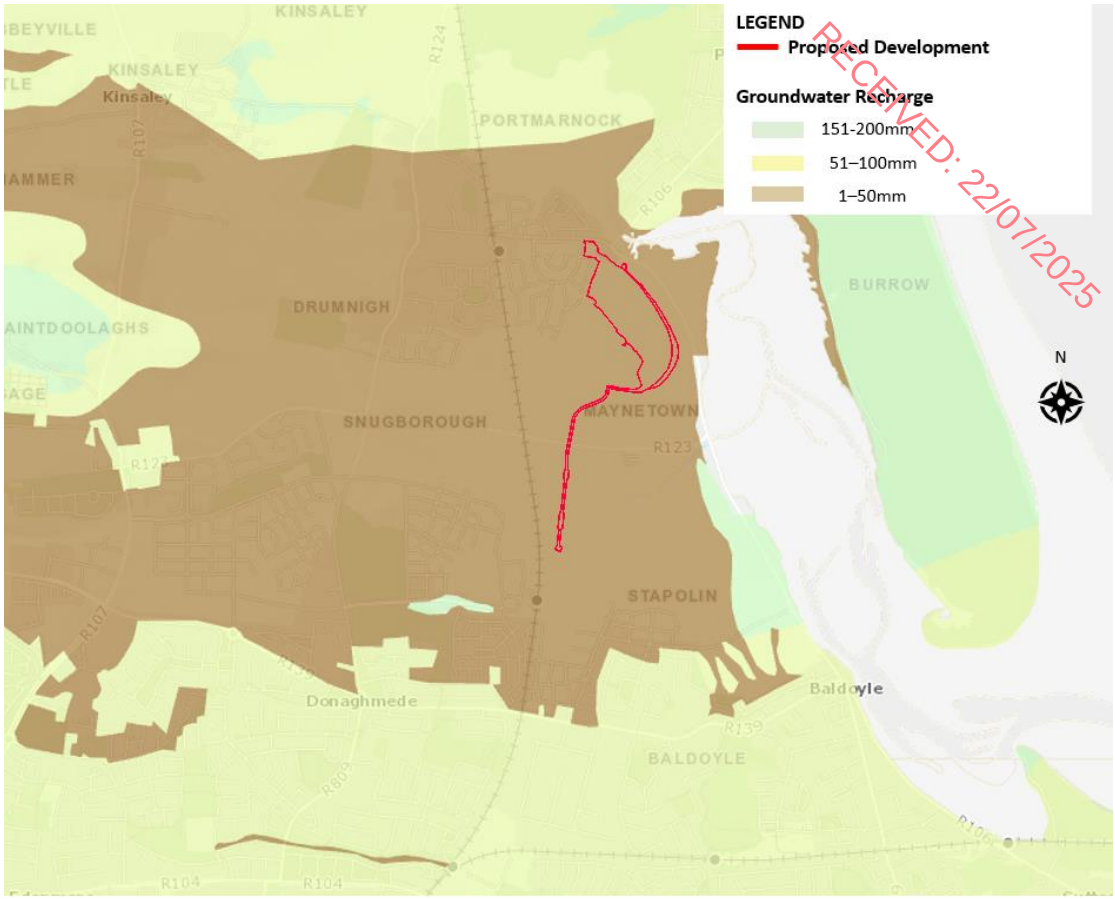

Figure 7-13: Groundwater Recharge.

7.3.12.5 Karst Features

The closest identified Karst Landform is St. Doolaghs Well, approx. 2.35km to the west, which is a spring (IE_GSI_Karst_40K_339). St Doolagh's well is encountered in an area of Waulsortian Limestones rather than rock from the Malahide Formation.

7.3.13 Existing Ground Investigations

Ground Investigations were carried out across the lands in which the Site of the Proposed Development can be found. These investigations were completed in 2006 by Glover Site Investigations Ltd, in 2018 by Site Investigations Ltd, in 2022 by Ground Investigations Ireland Ltd, and again in 2024 by Ground Investigations Ireland Ltd, across a range of the development phases, as shown in Figure 7-14. The scope of the works included cable percussive boreholes, trial pits with plate tests and soakaway tests.

During the 2006 investigations 6no. cable percussive boreholes were undertaken to a depth of 10.00m below existing ground level (m bgl). The 2018 investigation comprised 4no. cable percussive boreholes which were terminated at depth ranging between 6.8 – 8.30m bgl due to obstruction from boulders. The 2022 investigation consisted of 12no. dynamic probes and 10no. plate bearing tests to ascertain soil strength/density characteristics and subgrade modulus respectively. Finally, the 2024 investigation comprised 9 no. cable percussive boreholes to a maximum depth of 7m and 25no. Trial Pits.

Specific site investigation within the Site of the Proposed Development includes;

- 1 no. Borehole as part of the 2006 Site Investigation,
- 2 no. Trial Pits as part of the 2006 Site Investigation,

- 1 no. Percolation Test as part of the 2006 Site Investigation,
- 4 no. Boreholes as part of the 2024 Site Investigation,
- 14 no. Trial Pits as part of the 2024 Site Investigation.

The underlying ground was found to be consistent throughout the overall development lands and therefore the generalised ground model in Table 7-12 below has been prepared with reference to site investigation findings within surrounding phases also.

Stratum*	Description	Range Encountered		Generalised Model	
		Depth to Top (m bgl)	Thickness (m)	Depth to Top (m bgl)	Thickness (m)
Topsoil (TS)	Topsoil	0.00	0.25 - 0.40	0.00	0.33
Cohesive Glacial Till (CGT) – Brown Boulder Clay	Firm to stiff brown slightly sandy gravelly CLAY containing smooth sub-rounded cobbles. Gravel is sub-angular fine to coarse.	0.25-0.40	1.60–1.90	0.33	1.70
Cohesive Glacial Till (CGT) – Black Boulder Clay	Stiff to very stiff black sandy gravelly CLAY containing occasional smooth sub-rounded cobbles and boulders. Gravel is sub-angular fine to coarse.	1.80-2.30	7.30 -8.00	2.00	7.77

** Note; the 2024 investigation indicated Made Ground deposits to depths between 0.50m to 1.75m bgl, however subsequent specific investigation as part of Phase 1E preparatory works, indicates this not to be the case, but will be similarly monitored for Phase 1F.*

Table 7-12: Generalised ground model- for Phase 1F.

No water was encountered in any of the boreholes and trial pits during the fieldwork period in 2018. However, during 2006 site investigations groundwater was encountered in one out of six boreholes. Groundwater was encountered at 7.40m bgl and rose to 7.00m bgl. The area where this borehole was undertaken has already been built over as part of Phase 1B of the development.

Similarly for the 2024 site investigation groundwater was encountered in TP08 (seepage at 2m bgl), TP19 (seepage at 1.5m bgl), TP54 (seepage at 3.0m bgl), BH01 (5.8m bgl), BH03 (5.1m bgl) and BH05 (4.4m bgl). With the exception of TP19 (located in proximity to interim pumping station) and TP54 (located centrally in proposed development), the remainder are located in Phase 1E.

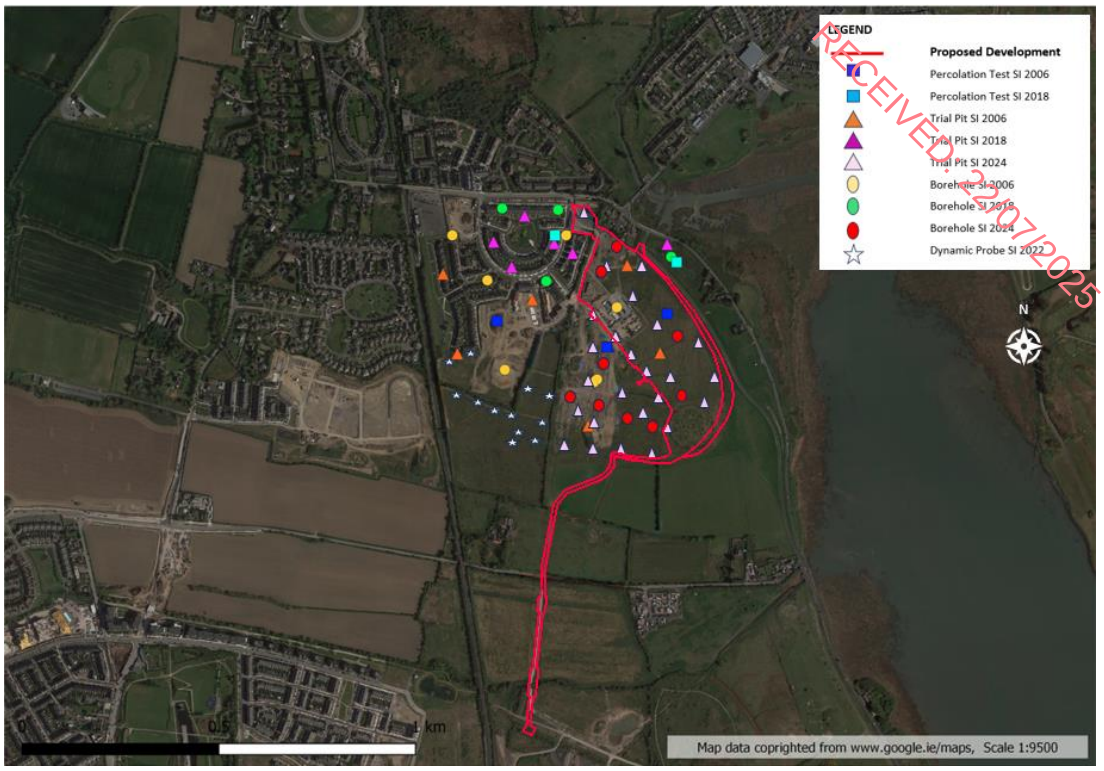

Figure 7-14: Site Investigations.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

7.4.1 Proposed Development

The Proposed Development (Phase 1F), comprises in summary of the following components: -

- 296no. residential units consisting of 42no. duplex / apartments and 254no. houses ranging in heights between 1.5 and 3 storeys.
- Public Open Space including southern Monument Park.
- A total of 267no. car parking spaces and 1,446no. bicycle parking spaces.
- Vehicular access to serve the development is proposed off Monument View (Phase1E).
- Proposed temporary Rising Main to serve this phase and previous development phases (1A to 1E inclusive) c1.7km long, connecting Interim Pumping station (upgraded as part of Phase 1D development) to the North Fringe Sewer to the south, crossing both Moyne Road and Mayne River, including upgrading of interim pumping station and storage as required.
- All associated and ancillary site development, infrastructural, landscaping and boundary treatment works.

A full project description is provided in Chapter 3: Description of Proposed Development.

The Proposed Development and future development phases, subject to relevant planning permissions being granted, will be constructed along the following timeline: -

- Phase 1D – 172no. units – Under construction Q1 2024 and nearing completion.
- Phase 1E – 195no. units – Granted permission in December and due to commence construction Q3 2025.
- Phase 1F – 296no. units – Commence construction Q2 2026.
- Remaining Phase – 33no. units (conservatively) – Commence Construction Q2 2027.

7.4.1.1 Construction Phase

As noted, this development is a residential development with building heights ranging from 1.5 to 3 storeys, therefore the key construction activities involved are: -

- Excavation for drainage and service infrastructure – depths vary but less than 3.5m.
- Excavation for strip footing foundations to residential units.
- Excavation for roads, parking and paths – typically depth to formation less than 1m.
- Excavation for rising main, primarily cut and cover construction, however directional drilling will be utilised to cross beneath the Mayne River and potentially beneath Moyne Road also.
- General excavation to facilitate final layout and level of Proposed Development, and although re-use of suitable material will be facilitated, it is estimated that nominally 16,500m^3 of material (incl. material excavated for drainage, services, foundations, roads, parking and paths) will be removed from site.
- Construction of new drainage and services infrastructure to facilitate the development.
- Construction of buildings (brickwork/blockwork/timber frames, precast concrete floors and frames, in-situ concrete footings, columns and beams where required, render finishes).
- Construction of boundary walls and fencing.
- Placing of fill to achieve required levels.
- Construction of roads, parking and footpaths.
- Landscaping.
- Imported fill, stone, aggregates are required to complete the development, and this is estimated at 24,600m^3.

The existing construction compound used for the current phase of the development (Phase 1D) will be retained and used for the construction of this Proposed Development also, although as development proceeds this will be reduced in scale and eventually constructed over.

7.4.1.2 Operational Phase

On completion of the Construction Phase, the development becomes a residential estate.

There are no specific operational elements for consideration other than surface water drainage and foul drainage infrastructure to function as designed, which in turn requires maintenance in accordance with acknowledged standards for same i.e.: -

- Cleaning of gullies.
- Inspection of drainage lines at suitable intervals.
- Monitoring and cleaning of petrol interceptors at planned intervals.
- Monitoring and maintenance of interim foul pumping station and rising until such time as it is decommissioned.
- Inspection and maintenance of SuDS features as per the requirements of the SuDS Manual, CIRIA 753, 2015 and Section 3.6 of Fingal County Council's *Green/Blue Infrastructure for Developments Guidance Note*.

7.4.2 Cumulative Development

Within the context of this EIAR, the relevant cumulative development (for assessment purposes) consists of the current phase under construction (Phase 1D), the Phase 1E, this Proposed Development (Phase 1F) and the development of a final phase to build out approximately

(conservatively) 33no. residential units including public open space, integration of recorded monument and provision of road and drainage infrastructure.

The nature of these developments will be similar in character to the Proposed Development Phase 1F.

There is residential development being carried out by others to the west of the railway line (and in turn to the west of the Proposed Development) and of similar characteristics. It is noted however, these works are substantially complete and therefore not considered further.

7.4.2.1 Construction Phases

The construction methodology for the current and future phases will be similar to that described above, with excavation depths of a similar order and cut fill volumes pro-rata to the house numbers being constructed under each future phase.

It is noted that the construction compound and marketing suite will be scaled down and relocated as this Proposed Development gets developed but will remain within the overall development lands and be proximate to the remaining phase.

The Haul Road will eventually be superseded by the permanent access road to Moyne / Mayne Road, being constructed as part of Phase 1D and nearing completion, which will serve the same function in the context of construction traffic i.e. mitigate public safety issues and reducing traffic congestion on Station Road.

7.4.2.2 Operational Phase

As before, on completion of the Construction Phase for each phase of the development, each phase of the development then becomes a residential estate.

The maintenance and inspection elements described earlier will also apply for each consecutive phase of the development.

7.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding ‘effect’ throughout this Section is described in 7.2.4 .

The importance of the land, soils, geology and hydrogeology attributes are summarised in Table 7-13 below.

Attribute	Importance	Justification
Soils and subsoils	Low to High	Poorly drained and/or low fertility soils. and Well drained and/or high fertility soils.
Locally important aquifer	Medium	Locally Important Aquifer
Baldoyle Bay SPA/SAC/pNHA	Very High	Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status.
Sluice River Marsh	Very High	Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status.

North-West Irish Sea SPA	Very High	Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status.

Table 7-13: Importance of land, soils, geology and hydrogeology attributes based on methodology in 7.2.4.

7.5.1 Construction Phase

There are a number of elements associated with the construction of the development which have the potential to impact the land, soils, geological and hydrogeological environment.

7.5.1.1 Loss of Soil Cover, Soil Erosion and Compaction

The removal of topsoil and overburden material, and the treatment of those materials, shall require their temporary storage, handling and re-use within the construction of the Proposed Development.

Where possible these soils are re-used on site in bunds, landscaping etc, nevertheless there will be a net loss in soil cover, though small in overall depth with respect to current depth of overlying soils i.e. c.10m.

Erosion may occur to stockpiles if left exposed for long periods of time, but not considered to be likely, given the duration of the works and in particular the proposed sub-phasing.

During construction, vehicles and plant will track over areas of topsoil and subsoil. The vehicle and plant movements have the potential to erode soil cover and/or compact the underlying subsoil (following topsoil removal), however these movements are mostly confined to proposed road alignments and are temporary in nature.

The loss of soil cover, soil erosion, and soil compaction will have a temporary, negative, not significant impact.

7.5.1.2 Excavation of Soil

Excavation and removal of soils and subsoils will be required to accommodate the installation of services, drainage, rising main, foundations of the buildings and levelling of the Site. Rock excavation is not anticipated on the Site. Any impact resulting from excavation will be negligible in magnitude and imperceptible in significance.

During construction, aquifer vulnerability may be slightly increased due to a reduction in depth of overburden in areas of excavation which may increase the potential for migration of contaminants (from accidental spills) to the underlying bedrock aquifer. However, due to the thickness of low permeability overburden (>10 m)) and the “low” groundwater vulnerability classification (Low), the impact of the reduction in overburden depth on the groundwater quality will be negligible in magnitude and imperceptible in significance and highly unlikely as there are no proposed discharges to ground.

7.5.1.3 Potential Surplus and Unsuitable Soils arising from Earthworks

Impacts on receptors relevant to soils and geology associated with excavation, handling and storage on-site of sub-surface material are considered in this section. Consideration of impacts related to the transport and the off-site re-use or disposal of excavated materials is included in Chapter 14 (Material Assets: Traffic & Transport) and Chapter 14 (Material Assets: Resource & Waste Management), respectively.

A cut and fill analysis for the Proposed Development was carried out. It is anticipated that c. 16,500 m^3 of soil will be exported from site, which will have a direct and permanent impact on soils and geology. Surplus materials requiring removal off-site will be removed in accordance with all statutory obligations.

Off-site re-use of material will be prioritised to minimise the removal to landfill as waste. The re-use of soil off-site will be undertaken in accordance with all statutory requirements and obligations including, where appropriate, re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27).

Any surplus soil not suitable for re-use will be removed off-site by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures. As such, it is considered that off-site removal of surplus soil will have an indirect neutral, imperceptible long-term impact on the receiving sites and facilities.

7.5.1.4 Karst Features

As discussed in 7.3.12.5, no karst features were identified within the study area - the closest karst feature identified was 2.35 km from the Proposed Development. The bedrock underlying the Proposed Development is not a lithology where karst features are typically expected. As such, no karst features will be impacted by the Proposed Development, and they shall not be considered further in this EIAR.

7.5.1.5 Groundwater Users

The closest groundwater well identified is 2.0 km from the Proposed Development, and the closest public supply is 22 km from the Proposed Development. There is no groundwater abstraction proposed as part of the Proposed Development. Consequently, there will be no impact on groundwater users, and it shall not be considered further within this EIAR.

7.5.1.6 Accidental Spillages - Contamination of Soils and Groundwater

Potential impacts during the Construction Phase include the leakage or spillage of construction related materials/fluids on site. For example, raw or uncured concrete and grouts, wash down water from exposed aggregate surfaces, cast-in-place concrete from concrete trucks, fuels, lubricants and hydraulic fluids for equipment used on the development site, bitumen and sealants used for waterproofing concrete. These have the potential to impact on groundwater quality and soils.

These localised accidental spillages may result in the requirement to excavate/remediate a small proportion of contamination or result in a low risk of pollution.

Therefore, with respect to soils (of low to high importance), localised accidental spillages would result in small adverse magnitudes of impact, of temporary duration, on soils, resulting in imperceptible to moderate significance, depending on the nature of the incident.

In relation to the groundwater quality within the underlying aquifer, the vulnerability classification of the underlying aquifer has been classified as “Low” based on site specific information (Boreholes BH04, BH05 and BH06 of the 2006 Site Investigation) although this could rise to “Moderate” in the less probable, though not impossible scenario that a pollution incident occurs in conjunction with a deep excavation.

The percolation test (P2) of the 2006 Site investigation demonstrated almost no permeability with zero infiltration over 4 hours, with surrounding tests showing same.

Therefore, the impact on groundwater water quality from localised accidental spillages is predicted to be negligible to small adverse (under conservative scenario above) in magnitude and imperceptible to slight in significance, temporary in duration and unlikely given no suitable pathway between source (spillage) and receptor (aquifer).

7.5.1.7 Summary

Source	Impact / Path	Potential Receptor	Significance
Earthworks	Loss of Soil Cover, Soil Erosion, Compaction	Land, Soils, Geology	Imperceptible
	Excavation	Land, Soils, Geology	Imperceptible
		LI Aquifer	Imperceptible
	Surplus and Unsuitable Soils	Land, Soils, Geology	Imperceptible
Accidental Spillages	Infiltration	Land, Soils Geology	Imperceptible/Moderate
		LI Aquifer	Imperceptible/Slight

Table 7-14: Summary of Potential Impacts of the Proposed Development – Construction Phase.

7.5.2 Operational Phase

There will be no direct discharges to or abstractions from the soil and hydrogeological environment during the Operational Phase. Minor accidental spills which may occur from vehicles are mitigated by the presence of petrol interceptors and SuDS measures, which form part of the Proposed Development.

7.5.2.1 Economic Geology

As discussed in 7.3.6, there is low aggregate potential in the area. In addition, and with reference to the zoning of these and surrounding lands, it is highly unlikely that any existing reserves would be developed, due to the location of the Proposed Development. Therefore, the potential impact on economic geology will not be considered further within this chapter.

7.5.2.2 Geological Heritage

There are no sites of geological heritage within or in the vicinity of the Proposed Development. Therefore, the potential impact on geological heritage will not be considered further within this chapter.

7.5.2.3 Reduction in Recharge Area

The Proposed Development will incorporate the creation of approximately 4.5 hectares of impermeable surfaces (roofs, roads and hardstanding areas). This will result in a reduction in recharge to the aquifer. The Site is underlain by >10 metres of low permeability overburden which would severely restrict recharge regardless. When compared to the overall recharge area to the aquifer, which amounts to thousands of hectares, the reduction in recharge area is insignificant. Taking into account the fact that the aquifer is only locally important (medium importance attribute) and that there are very few groundwater users, the overall magnitude of impact on the groundwater resource due to loss in recharge area will be negligible and thus imperceptible in significance.

7.5.2.4 Summary

Source	Impact / Path	Potential Receptor	Significance
Reduction in Recharge	Increase in Impermeable Area	LI Aquifer	Imperceptible

Table 7-15: Summary of Potential Impacts of the Proposed Development – Operational Phase.

7.5.3 Do-Nothing Impact

In the event that the Proposed Development does not proceed, then the Site will remain in its current greenfield state and as a consequence there will be no potential for any significant impact to either hydrogeological or geological features.

7.5.4 Cumulative Impacts

The potential impacts for both the Construction Phase and the Operational Phase of the Proposed Development, equally apply for future phases and their cumulative impacts under the headings above are not considered to change the significance of impact to the relevant attributes.

7.6 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

7.6.1 Construction Phase

Undertaking appropriate mitigation and monitoring measures will help minimise the potential impacts discussed earlier. And despite no significant impacts being identified, mitigation measures will be implemented as good practice and to reduce further the potential impacts on the land, soils, geology and hydrogeology of the receiving environment during the Construction Phase.

The following mitigation measures have been identified, which form part of the Construction Environmental Management Plan (CEMP) which includes measures for reduction or elimination of pollution of soils and groundwater. A site-specific Waste Management Plan will be produced for the Proposed Development, which will include a waste forecast identifying options for reuse, recycling and avoidance of landfill and to record actual waste. Refer to the CEMP prepared for this LRD Planning Application for further details.

7.6.1.1 Loss of Soil Cover, Soil Erosion and Compaction

Subsoil removal is an unavoidable consequence of the construction works. To mitigate densification of the soil due to construction activities, all topsoil shall be removed and stored in advance of earthworks for each sub-phase of the Proposed Development, the surface shall be scarified, and where suitable the topsoil replaced and reseeded upon completion.

Soil including topsoil and subsoil will be segregated and stored appropriately to prevent deterioration of soil structure and quality to ensure the material will be suitable for re-use onsite.

The principal mitigation measure regarding the compaction of soils is to prohibit the unnecessary trafficking of topsoil and overburden either before stripping or when in a stockpile. When the construction cut level has been achieved, the underlying overburden shall not be left exposed for long periods of time before construction and refilling of the excavations.

7.6.1.2 Excavation of Soil

Soft materials and surplus soils that are excavated will be reused where possible, for general fill, bunds, landscaping etc.

Material that is suitable for re-use will be stored appropriately to prevent deterioration of soil structure and quality. Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Site. In addition, regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

In recognition of national policy and sustainability, where material cannot be re-used as part of the on-site development works and requires transfer off site, consideration will be given to the transfer of this material as a by-product under Article 27.

Material that is not suitable for re-use will be removed off site for treatment, recycling or disposal at an authorised waste management facility under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended.

7.6.1.3 Accidental Spillages - Contamination of Soils and Groundwater

Contractor Guidance set out in the Control of Water Pollution from Construction Sites (CIRIA, 2001) shall be adhered to. Good construction management practices will be employed. During the Construction Phase, all potentially harmful substances (e.g. oils, diesel, herbicides, pesticides, concrete etc.) will be stored in accordance with the manufacturer's guidelines regarding safe and secure buildings / compounds: -

- Designated impermeable cement washout areas will be provided or prohibited from site.
- All oils and fuels will be stored in bunded tanks with the provision of a storage / retention capacity of 110% of tank storage. Care and attention will be taken during refuelling and maintenance operations.
- Adequate means to absorb or contain any spillages of these chemicals will be available at all times on site.
- Any soil contaminated from an accidental spillage will be contained and treated appropriately and disposed of in accordance with the Waste Management Act 1996 – 2011.

Refer to CEMP prepared for this LRD Planning Application for further details.

7.6.2 Operational Phase

As there are no Operational Phase significant impacts (or indeed perceptible impacts) on the land, soils, geology and hydrogeological environments due to the Proposed Development, no mitigation is proposed.

7.6.3 Cumulative Mitigation

The proposed mitigation measures for this phase of the Proposed Development equally apply to the future phases and will have the same reduction in the significance of the potential impacts.

7.7 RESIDUAL IMPACT OF THE PROPOSED DEVELOPMENT

The residual effects are the final predicted or intended effects that occur after the proposed mitigation measures have been implemented to avoid or reduce adverse impacts. There are no significant residual impacts on land, soils, geology and hydrogeology anticipated for the Proposed Development.

7.7.1 Construction Phase

The predicted overall residual impact of the Proposed Development on land soils and hydrogeology during the Construction Phase will be neutral / imperceptible.

The magnitude of impact of Accidental Spillages with respect to both soils and groundwater water quality is considered to reduce to negligible as a result of good construction practice and management of hazardous materials/fuels etc. on site, and as consequence the significance of impact is considered to be imperceptible.

Source	Impact / Path	Potential Receptor	Significance
Earthworks	Loss of Soil Cover, Soil Erosion, Compaction	Land, Soils, Geology	Imperceptible
	Excavation	Land, Soils, Geology	Imperceptible
		LI Aquifer	Imperceptible
	Surplus and Unsuitable Soils	Land, Soils, Geology	Imperceptible
Accidental Spillages	Infiltration	Land, Soils Geology	Imperceptible
		LI Aquifer	Imperceptible

Table 7-16: Summary of Residual Impacts of the Proposed Development – Construction Phase.

7.7.2 Operational Phase

The predicted overall residual impact of the Proposed Development on land soils and hydrogeology during the Operational Phase will be neutral / imperceptible.

Source	Impact / Path	Potential Receptor	Significance
Reduction in Recharge	Increase in Impermeable Area	LI Aquifer	Imperceptible

Table 7-17: Summary of Residual Impacts of the Proposed Development – Operational Phase.

7.7.3 Cumulative

The predicted overall residual impact of the cumulative development on land, soils, geology and hydrogeology during the Construction and Operational Phases will be imperceptible.

7.8 MONITORING

7.8.1 Construction Phase

During Construction Phase the following monitoring measures will be implemented and whilst not strictly necessary, are considered to be good practice:

- Inspections and monitoring will be undertaken during excavations and groundworks to ensure that any geotechnical design measures are implemented and effective.
- Routine monitoring and inspections during refuelling to ensure correct procedures are followed to reduce risk of accidental spillages.
- Monitoring and site audits will be undertaken regularly by the contractor to check for issues associated with excavation and or off-site removal of soil or rock, such as dust, noise, and vibrations.
- Materials management and waste audits will be carried out at regular intervals to monitor the management of surplus soils on site and for removal off-site, including traceability of all materials both to and from site, and acceptability of soils at their end destination.
- Regular inspections of surface water run-off and any sediment control measures e.g. silt traps will be carried out during the Construction Phase. Regular auditing of construction / mitigation measures will be undertaken e.g. concrete pouring, refuelling in designated areas etc.

7.8.2 Operational Phase

No specific monitoring proposed, other than to note maintenance regime to be implemented.

7.8.3 Cumulative

Monitoring to continue for future phases as per this proposed phase.

7.9 REINSTATEMENT

Not relevant.

7.10 DIFFICULTIES ENCOUNTERED

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