13. Land, Soils, Geology and Hydrogeology

13.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the potential effects on land, soils, geology and hydrogeology associated with the Construction, Operational and Decommissioning Phases of the Data Centre Development DC3 (referred to as the "Proposed Development") in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). During the Construction Phase, the potential effects on land, soils, geology and hydrogeology associated with the Proposed Development have been assessed. This included construction activities such as earthworks and associated groundwater control measures to create a development platform and construct foundations and underground services.

During the Operational Phase, the potential effects on land, soils, geology and hydrogeology associated with permanent drainage have been assessed.

The assessment has been carried out according to best practice and guidelines relating to land, soils, geology and hydrogeology.

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental effects, where practicable. In addition, feedback received from consultation undertaken throughout the alternatives assessment and design development process have been considered, where appropriate.

The aim of the Proposed Development when in operation is to offer expanded compute capacity to GIL's customers and products. The Proposed Development is described in detail in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction) contains a description of construction and demolition activities.

Refer to Appendix 1.1 for the competency of the author of this Chapter.

13.2 Assessment Methodology

This Section outlines the legislation and guidelines considered, and the adopted methodology for preparing this Chapter and undertaking the land, soils, geology, and hydrogeology assessment.

The potential effects of the Proposed Development on soils, geology and hydrogeology have been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any effect on these attributes.

13.2.1 Relevant Guidance and Policy

This Chapter has been prepared using the following guidelines:

Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Environment Protection Agency (EPA) (EPA, 2022).

Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environmental Impacts Statements (IGI, 2013); and

National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the NRA Guidelines[1]) (NRA, 2008).

A full list of the documents referred to in the course of the assessment is provided in Section 13.7.

[1] Though the NRA is now known as Transport Infrastructure Ireland (TII), for the purpose of this Chapter the guidelines mentioned above are referred to as the NRA Guidelines.

13.2.2 Proposed Development Study Area

The soils, geology and hydrogeology study area for the Proposed Development extends 2 km radius of the Proposed Development site boundary, which is in line with the Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013). The Proposed Development study area is shown on Figure 13.1

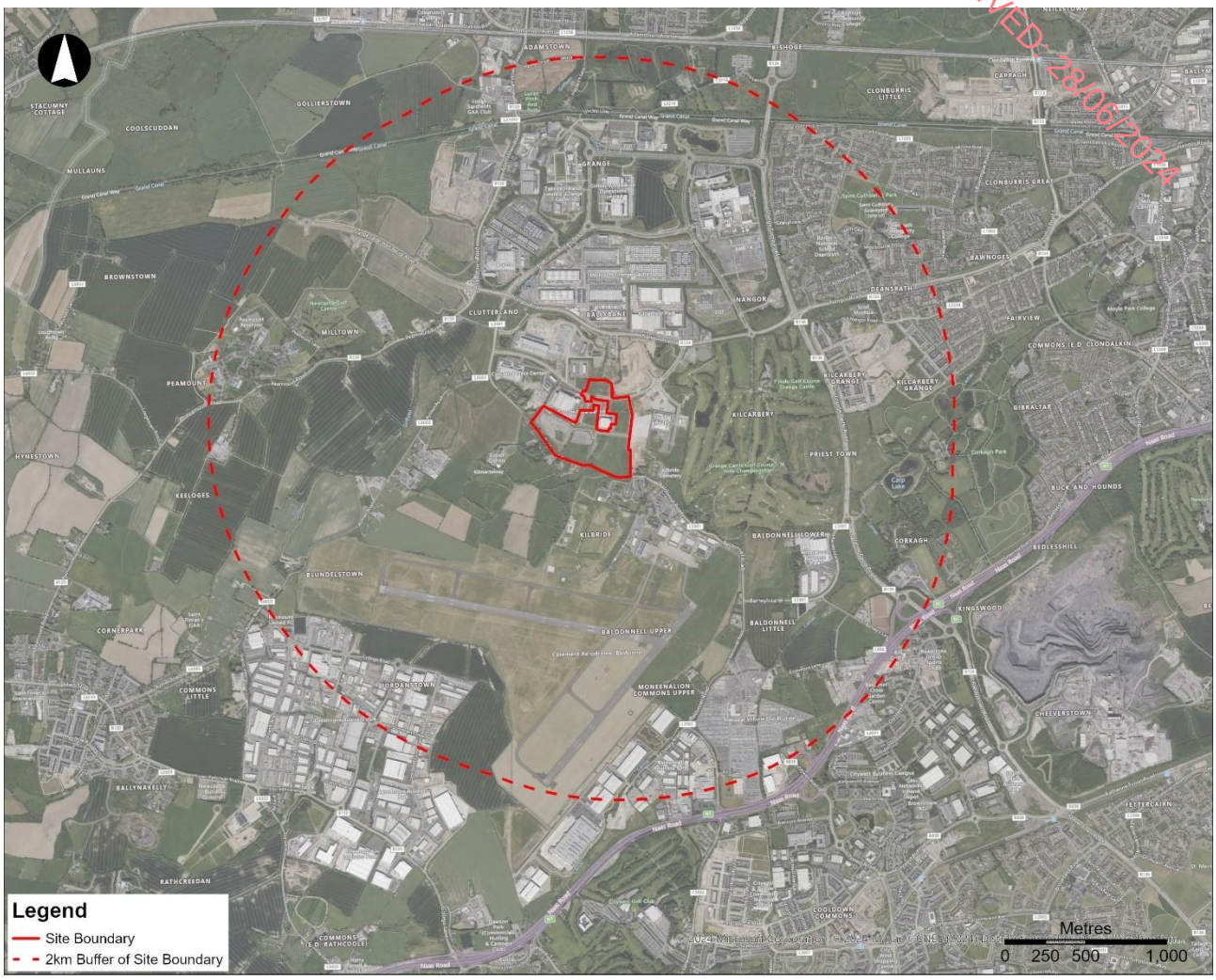

Figure 13.1: Proposed Development study area.

13.2.3 Assessment of Effects Methodology

The likely significant effects have been assessed by classifying the importance of the relevant attributes and quantifying the magnitude of any likely significant effects on these attributes. This has been undertaken in accordance with the guidance (IGI, 2013), which outlines a 13-step methodology that is divided across four distinct elements:

- "Initial Assessment".
- "Direct and Indirect Site Investigations and Studies".
- "Mitigation Measures, Residual Impacts and Final Impact Assessment"; and
- "Completion of the Soils, Geological and Hydrogeological EIAR Chapter".

13.2.3.1 Initial Assessment

The 'Initial Assessment' presents a description of the baseline conditions via a desk study. These include past and present uses of the land within the Proposed Development site or its vicinity, which may have a bearing on the Proposed Development.

This also includes a detailed description of the nature of the ground conditions beneath the site based on existing literature as well available historical site investigation data. Section 13.2.4 provides a methodology for characterisation of the baseline environment.

13.2.3.2 Direct and Indirect Site Investigation

The information gathered on the baseline environment during ground investigations corresponds to the second element of the methodology. It provides site specific data allowing to refine the conceptual site model. Section 13.2.4.3 provides discussion on the data available from the site-specific investigations carried out between 2011 and 2019.

13.2.3.3 Mitigation Measures, Residual Impacts and Final Assessment of Effects

A step by step process then follows to allow the identification of the likely significant effects, the appropriate mitigation measures and the residual effects.

The outcome from examining the available data is a Conceptual Site Model (CSM). The CSM is a summary of geological conditions beneath the Proposed Development that provides basis for the assessment of the likely significant effects resulting from Construction, Operation and Decommissioning of the Proposed Development.

Based on the derived CSM, the geological/ hydrogeological environment within the area of the Proposed Development has been classified in accordance with the IGI guidance (IGI, 2013). The assessment of effects is then undertaken for 'Activities' specified in the 'Activities/Environments Matrix' presented in the IGI guidance (IGI, 2013). The 'Activities' correspond with Construction, Operation or Decommissioning activities associated with the Proposed Development.

The assessment of likely significant effects has been evaluated in accordance with the methodology set out in Section 13.2.5.

Section 13.5 outlines the mitigation measures associated with the works in accordance with the above methodology.

13.2.4 Categorisation of the Baseline Environment

In order to identify and quantify the potential effects of the Construction, Operational and Decommissioning Phases of the Proposed Development, it is first necessary to undertake a detailed study of the (baseline) geological and hydrogeological environment of the Proposed Development study area. The existing soils, geology and hydrogeology conditions in the area have been interpreted from both desk study information and from project specific site investigations.

13.2.4.1 Desk Study Information

As part of the desk study that was undertaken to establish the baseline conditions (i.e. soils, geological and hydrogeological environment), the following sources of information were reviewed:

- Government of Ireland and Tailte Eireann, National Geospatial Data Hub [online], GeoHive Hub, (GoI & ET, 2024) accessed 10/04/2024:
  - Current and historical Ordnance Survey (OS) maps
  - Aerial photography
- Google, Aerial photography [online], Google maps (Google, 2024), accessed 10/04/2024.
- Bing, Aerial photography [online], Bing maps (Bing, 2024), accessed 10/04/2024.
- Geological Survey of Ireland (GSI) (GSI, 2024) [online], Geological maps of the site area produced by the GSI, accessed 10/04/2024, including.
  - Quaternary Maps (GSI)
  - Bedrock Mapping

  - Groundwater Mapping
  - National Landslide Database (GSI)
  - Karst Database (GSI)
  - Historic Mine Sites - Inventory and Risk Classification
  - Mineral Localities
  - Active Quarries and Pits 2014.
  - County Geological Sites (CGS) & Geological Heritage Areas (GHAs) (GSI)
- Geological Survey of Ireland, Memoirs:
  - Explanations to accompany sheet 111 of the maps of the Geological Survey of Ireland, illustrating part of the Counties of Dublin, Kildare, and Meath (Galvan et.al, 1860)
- Ireland Topographic Maps (ITM, 2024) [online], accessed 10/04/2024.
- EPA, EPA maps [online] (EPA, 2024), accessed 10/04/2024:
  - Land datasets including Soil Information System National Soils, Subsoils, Corine 2018
  - Sustainable Economy datasets including Section 4 Discharges, Industrial Emissions Licensing (IEL), Integrated Pollution Control (IPC), Integrated Pollution Prevention and Control (IPPC).
  - Protected Areas datasets including Special Areas of Conservation (SAC), Special Protection Area (SAP) and Natural Heritage Areas (NHA).
  - Drinking Water – Groundwater
  - Groundwater in SAC Habitats and SAP Habitats
  - Waste datasets including Waste Facilities, Waste Boundary, Historic (Closed) Landfills, Dump Sites Boundaries.
  - Radon Risk map of Ireland
- EPA, Office of Radiation Protection and Environmental Monitoring, Historic and Operational Mines project 2020-2021 (EPA, 2023); and
- Department of the Environment, Climate and Communications, Mineral Exploration and Mining maps, (DECC, 2024) [online], accessed 10/04/2024.

13.2.4.2 Walkover

A walkover survey was carried out in December 2023 to verify and ground truth the findings of the desktop study, where feasible. The findings of the Proposed Development site walkover survey including photos and site walkover survey notes are included in Appendix 13.1.

13.2.4.3 Ground Investigation

A number of ground investigations were previously undertaken in the area of the Proposed Development between 2011 and 2019, as detailed in Table 13.1. These investigations covered an area of existing GIL Campus located to the north of the Proposed Development as well as the area of the Proposed Development site. The locations are presented on Figure 13.2. The relevant extracts of the GI factual reports are included in Appendix 13.2.

13.2.4.4 Hydrogeological Assessment

In the absence of specific methodology in Ireland, the methodology to assess quantitative potential effects on groundwater flows and levels adopted for the assessment uses the UK Environment Agency Tier 1 Analytical Tools Excel model to calculate radius of influence and inflows to excavations/ or drainage as a result of groundwater level reduction due to implemented control measures. Refer to Appendix 13.3 for more details. The Tier 1 assessments are appropriate as initial calculations to determine the potential level of effect and where this is low or negligible no further assessment is required. Tier 2 or 3 modelling can be progressed where more significant effects are identified.

13.2.4.5 Land Contamination Assessments

To assess the potential ground contamination risk to the users of the Proposed Development site, UK derived Generic Assessment Criteria (GAC) for the initial screening of contamination testing results with respect to human health have been utilised (in the absence of Ireland or EU assessment criteria). Based on the Proposed Development end use, the most appropriate soil screening criteria for the protection of human health are considered to be current published GAC for a commercial end use:

- Category 4 Screening Levels (C4SLs) (DEFRA, 2014); and
- Land Quality Management Suitable for Use Levels (S4ULs) (where C4SLs have not been derived for particular contaminant species) (LQM, Natanail et al., 2015).

Where the C4SLs or S4ULs do not contain guidance values for specific compounds (e.g. cyanide), Arup has developed inhouse GAC for various land use scenarios which cover a broad range of development scenarios.

Contaminants which are below the assessment criteria do not require further assessment.

There is no published assessment criteria for assessing the risks from asbestos in soils. Asbestos has been assessed under the precautionary principle whereby the presence of asbestos detected at <0.001% is considered further.

In order to inform soils management including reuse, disposal or recovery, the available soil geo-environmental testing results have been compared against the EPA Soil Recovery Facility (SRF) values (EPA, 2020), as well as entered for classification via HazWasteOnline (HazWasteOnline, 2024). HazWasteOnline is a UK based system that classifies soil in accordance with the European Union Waste Framework Directive.

The EPA Guidance on acceptance criteria at authorised soil recovery facilities guidance (EPA, 2020) defines geochemical domains across Ireland. The Proposed Development site is located within "*Domain 2 - Carboniferous limestone and related rocks*". The available soil testing results have been compared to the acceptance criteria (EPA SRF values) Domain 2.

Additionally, the values were entered into HazWasteOnline (HazWasteOnline, 2024) to determine if the materials were deemed Non-Hazardous or Hazardous. Waste Acceptance Criteria (WAC) testing results obtained during the 2019 investigation were then used to determine if the materials are suitable for disposal at an Inert, Non Hazardous or Hazardous landfill.

Figure 13.2: Completed ground investigations.

Table 13.1: Summary of site fieldwork.

Contractor	Year	Factual Report	Scope within Proposed Development	Scope outside Proposed Development
Glover Site Investigations Ltd	2011	Report No. 11-089 Rev A	• 4No trial pits; 2No rotary boreholes; 2No dynamic probes; • 1No groundwater monitoring installation • In-situ geotechnical testing and infiltration tests • Laboratory geotechnical and geo-environmental soil testing	• 2No trial pits ; 1No rotary boreholes; 2No dynamic probes; • In-situ geotechnical testing and infiltration tests • Laboratory geotechnical and geo-environmental soil testing
IGSL Ltd	2012	Report No. 16419	• 18No trial pits; 6No dynamic probes; • In-situ geotechnical testing and infiltration tests • Laboratory geotechnical and geo-environmental soil testing	• 26No trial pits; 6No dynamic probes; • In-situ geotechnical testing and infiltration tests • Laboratory geotechnical and geo-environmental soil testing

Contractor	Year	Factual Report	Scope within Proposed Development	Scope outside Proposed Development
IGSL Ltd	2013	Report No. 17136	• 9No trial pits; 6No rotary boreholes; 6No dynamic probes • 2No groundwater monitoring installations • In-situ geotechnical testing • Laboratory geotechnical and geo-environmental soil testing	• 11No trial pits; 6No rotary boreholes; 8No dynamic probes • 2No groundwater monitoring installations • In-situ geotechnical testing • Laboratory geotechnical and geo-environmental soil testing
IGSL Ltd	2019	Report No. 22000	• 100No trial pits; 30No rotary boreholes; 59No dynamic probes; • 8No groundwater monitoring installations • In-situ geotechnical testing and infiltration tests • Laboratory geotechnical and geo-environmental soil testing (including Waste Acceptance Criteria (WAC))	

13.2.4.6 Technical Limitations

The baseline data described and considered in this assessment includes existing data from desk study information available at the time in the region as well as field surveys completed within the site of the Proposed Development. The data collected provides a comprehensive information on soils, geology and hydrogeology within the Proposed Development study area.

Based on the comparability of the results from the completed investigations within the Proposed Development site and the desk study of existing information on the baseline conditions, the information on the baseline conditions (as described in Section 13.3) is deemed sufficient.

13.2.5 Effects Evaluation Methodology

Having defined the extent and form of the Proposed Development and the baseline conditions, an evaluation is made of its potential likely significant effects on the soils, geology and hydrogeology environments. Mitigation measures are identified to mitigate any significant adverse effects, where practicable.

In accordance with the IGI (IGI, 2013) and NRA Guidance (NRA, 2008) the evaluation of effects is undertaken as follows:

- Step 1: Quantify the importance of a feature for geology (Table 13.2) and hydrogeology (Table 13.3);
- Step 2: Estimate the magnitude of the effect on the feature from the Proposed Development (Table 13.4: Geology, Table 13.5: Hydrogeology); and
- Step 3: Determine the significance of the effect on the feature from the matrix (Table 13.6) based on the importance of the feature and the magnitude of the impact.

Table 13.2: Criteria for rating site importance of geological features. Source: NRA, 2008.

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

Importance	Criteria	Typical Example
High	• Attribute has a high quality, significance or value on a local scale. • 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.	• Contaminated soil on site with previous heavy industrial usage. • Large recent landfill site for mixed wastes. • 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 13.3: Criteria for rating site importance of hydrogeological features. Source: NRA, 2008.

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.

Table 13.4: Estimation of magnitude of effect on geology attribute. Source: NRA, 2008.

Magnitude	Criteria	Typical Example
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.

Magnitude	Criteria	Typical Example
		• 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 13.5: Estimation of magnitude of effect on hydrogeology attribute. Source: NRA, 2008.

Magnitude	Criteria	Typical Example
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 operation.
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 operation.
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 operation.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Changes to aquifer or unsaturated zone not resulting in discernible change to water supply springs and wells, river baseflow or ecosystems. • Risk of pollution to groundwater from routine operation unlikely.

Table 13.6: Rating of significant environmental effects. Source: NRA, 2008.

Importance of Attribute	Magnitude of Effect			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/ Moderate	Profound/ Significant	Profound
High	Imperceptible	Moderate/ Slight	Significant/ Moderate	Profound/ Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

13.3 Baseline Environment

13.3.1 Introduction

This Section describes the existing conditions and important features in terms of soils, geology and hydrogeology within the Proposed Development study area and the Proposed Development site.

A review of the Regional Environment (Section 13.3.2) is followed by a description of the Proposed Development Site-Specific Environment (Section 13.3.3) to provide a CSM and classify the Proposed Development site with respect to the geological and hydrogeological environment (Section 13.4.2).

13.3.2 Regional Environment

This Section presents a regional overview of the land use, topography, geomorphology, soils and solid geology with associated designated geological heritage areas, mineral resources, hydrogeology and its key characteristics with associated groundwater resources within the Proposed Development study area.

13.3.2.1 Regional Historical and Current Land Use

The regional land use is dominated by urban and commercial/industrial development of Dublin to the north, south and east, and agricultural land (pastures and non-irrigated arable land) to the west. The land use within the Proposed Development study area is shown on Figure 13.3.

During the early 19th century to the early 20th century, there was limited development in the Proposed Development study area. The land was mostly used for agricultural purposes with numerous quarries marked on historic 1837-1842 OS map within the region.

Casement Aerodrome, located immediately to the south of the site, was first used in 1917, and it remains operational till present day.

In 1972, Belgard Quarry received a planning permission to undertake quarrying (An Bord Pleanála, 2016). The quarry site is located approximately 2.2km south-east of the site. Refer to Section 13.3.2.7 on regional mineral resources and exploration for more details.

Since the late 1990s and the 2000s, residential and industrial/commercial developments expanded within the Proposed Development study area, including Grange Castle Business Park South, where the Proposed Development site is located and Greenogue Business Park to the south of the Casement Aerodrome, as well as creation of the Grange Castle Golf Club to the east. Areas to the west continue to be used for agricultural purposes.

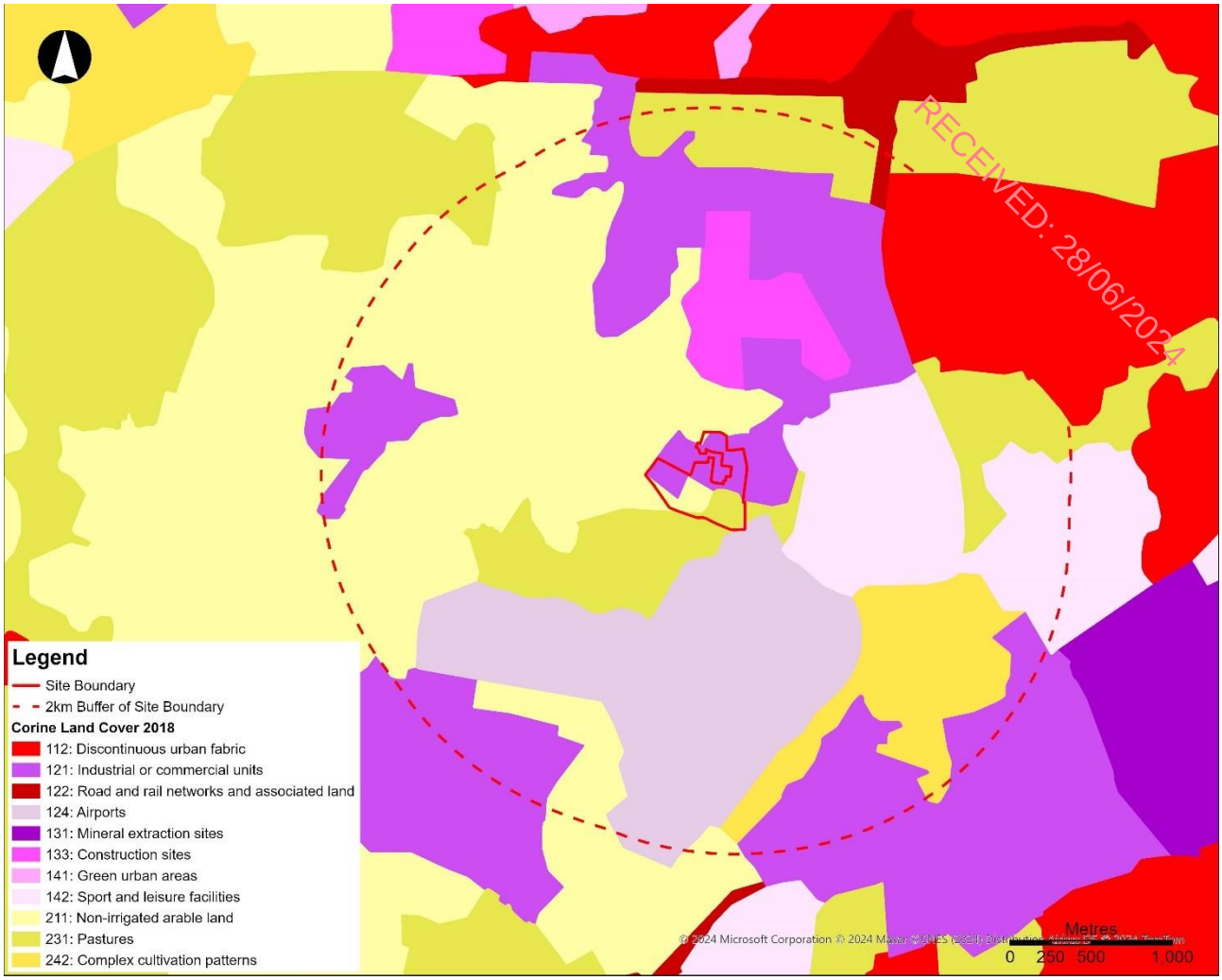

Figure 13.3: Regional land use. Source: EPA, 2024.

13.3.2.2 Regional Geomorphology and Topography

The Proposed Development is located to the west of Dublin in the catchment of the River Liffey, with the River Griffeen, its tributary, flowing approximately 600m to the west of the Proposed Development site. The River Liffey rises in the Wicklow Mountains and flows down westwards, towards Newbridge before changing direction to the north – north-east and flows through the centre of Dublin and into the Dublin Bay, Irish Sea. The regional hydrology is outlined in Chapter 12 (Water).

The topography of the region is dominated by the Wicklow Mountains to the south. The regional topography gently rises towards the mountains from around 50 m Ordnance Datum (OD) in the River Liffey valley to approximately 200mOD at the foot of the mountains. Topography within the study area is shown on the geological conceptual cross sections presented in Figure 13.4.

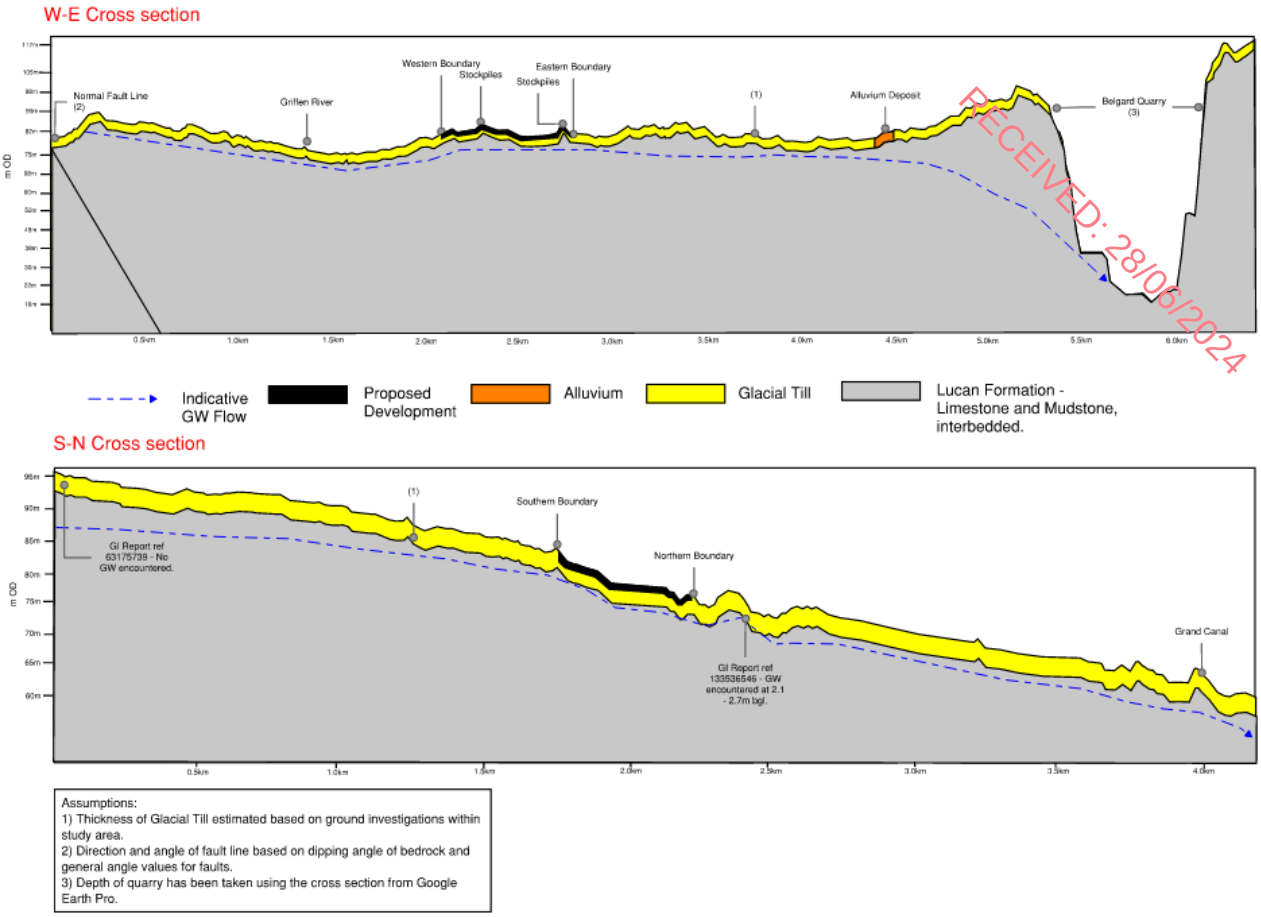

Figure 13.4: Regional conceptual site model.

The landscape principally reflects the erosional and depositional legacy of the last period of glaciation. Glacial erosion of pre-existing topographic features and deposition of glacial drift deposits, mainly till (boulder clay), resulted in areas of rather subdued post-glacial topography away from the topographic highs of the Wicklow Mountains. The post-glacial landscape also reflects the effects of fluvial (river) processes that have altered the topography, albeit only to a small extent in this area, since the ice sheet retreat. A buried meltwater channel is located in this area and roughly follows the path of the River Liffey, located to the north of the Proposed Development study area. A number of subglacial lineation features are present in the wider region however none are recorded within the Proposed Development study area. Quaternary geomorphology for the Proposed Development study area is shown on Figure 13.5.

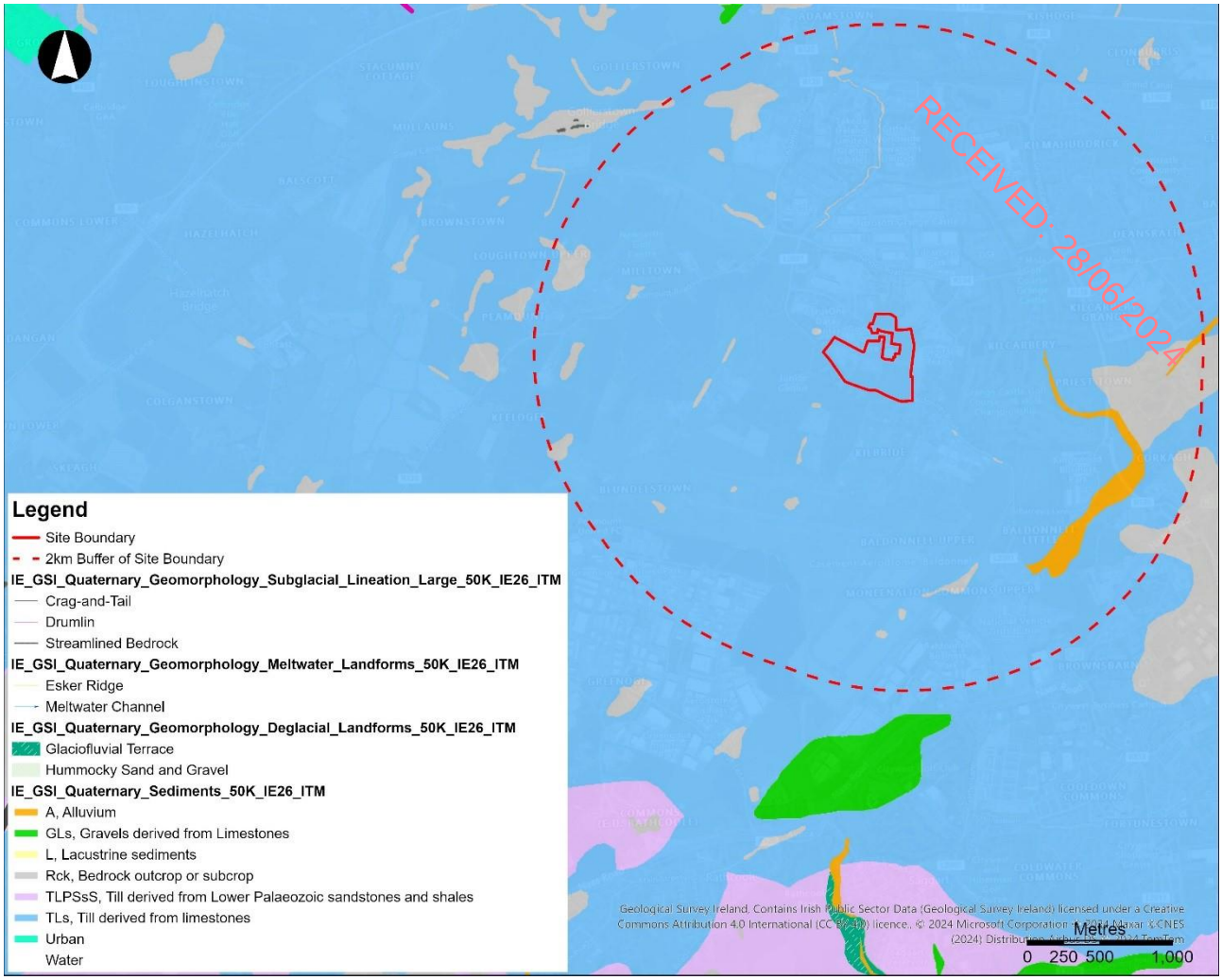

Figure 13.5: Regional quaternary sediments and geomorphology. Source: GSI, 2024.

13.3.2.3 Regional Soils and Subsoils

The majority of the Proposed Development study area is underlain by soils derived from carboniferous limestone till, poorly drained fine loamy drift with limestones comprising surface water gleys (Straffan) in the eastern area of the region and typical luvisols (Elton) in the east. An area of alluvial deposits is present in the eastern part of the study area that may be associated with recent and ancient water bodies. Made ground deposits are located within the region and are associated with the urban development of Dublin. The main soils, as classified by Teagasc (Figure 13.6, EPA, 2024) within the region have been summarised in Table 13.7.

The drift materials comprise glacial till and are the predominant subsoil of the region. On the GSI Quaternary mapping they are described as till derived from limestone. This glacial till extends both north and south of the Proposed Development from the River Liffey to the foothills of the Wicklow Mountains. The subsoils in the Proposed Development study area are shown on Figure 13.6.

Outcropping and sub cropping rock is indicated within the Proposed Development study area where the topography rises. Soils overlying the outcrops comprise shallow and well drained mineral derived from mainly calcareous parent materials.

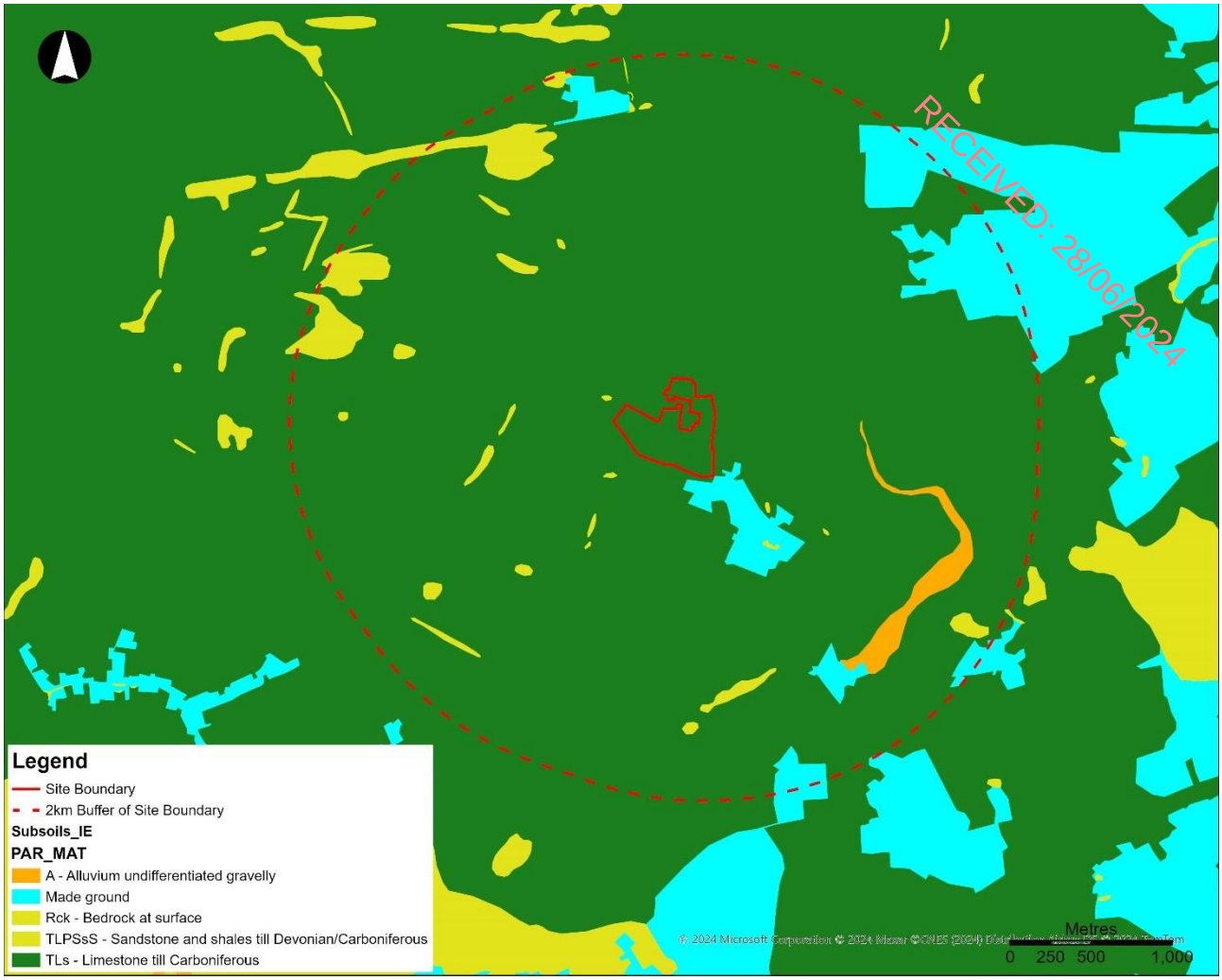

Figure 13.6: Regional Teagasc soil classification. Source: EPA, 2024.

Table 13.7: Regional soils and subsoils. Source: EPA, 2024; EPA, Teagasc, 2024.

Parent material	Teagasc Soils	Description	Importance	Justification
Made	Urban	Made ground associated with urban development	Low	Low fertility soils, potentially contaminated
Til type (TLs)	Straffan	Limestone till (Carboniferous). Surface water gleys. Poorly drained	Low	Poorly drained soils
	Elton	Limestone till (Carboniferous). Luvisols. Poorly drained.	Low	Poorly drained soils
Alluvium (A)	Boyne	Silty river alluvium. Alluvial Gleys.	Low	Poorly drained soils
RckCa	-	Bedrock at surface-Calcareous. Renzinas, Lithosols. Derived from mainly calcareous parent materials. Shallow well drained mineral.	Low	Well drained soils but shallow. Rock close to surface, which limits their value/productivity.

13.3.2.4 Regional Bedrock Geology

The regional geology of the Proposed Development study area as shown on Figure 13.7 is derived from the GSI's bedrock mapping (GSI, 2024 and Sheet 111 (1:63360)) and memoirs. The Proposed Development study area is underlain by the Upper Carboniferous Limestone, known as the Lucan formation or locally as Calp.

A supporting geological memoir by Galvan et.al (Galvan et.al, 1860) gives a typical description and thickness of the formation as "*very dark grey, compact, and evenly bedded limestone, with a conchoidal fracture, having layers and partings of black or dark grey shales between the beds…possible thickness 230m*." Bedding dip of the formation within the study area ranges from 20° to 30° in the southeast direction.

A single fault line is indicated approximately 2.4km west of the site trending southwest-northeast. There are no karst features noted within the Proposed Development study area.

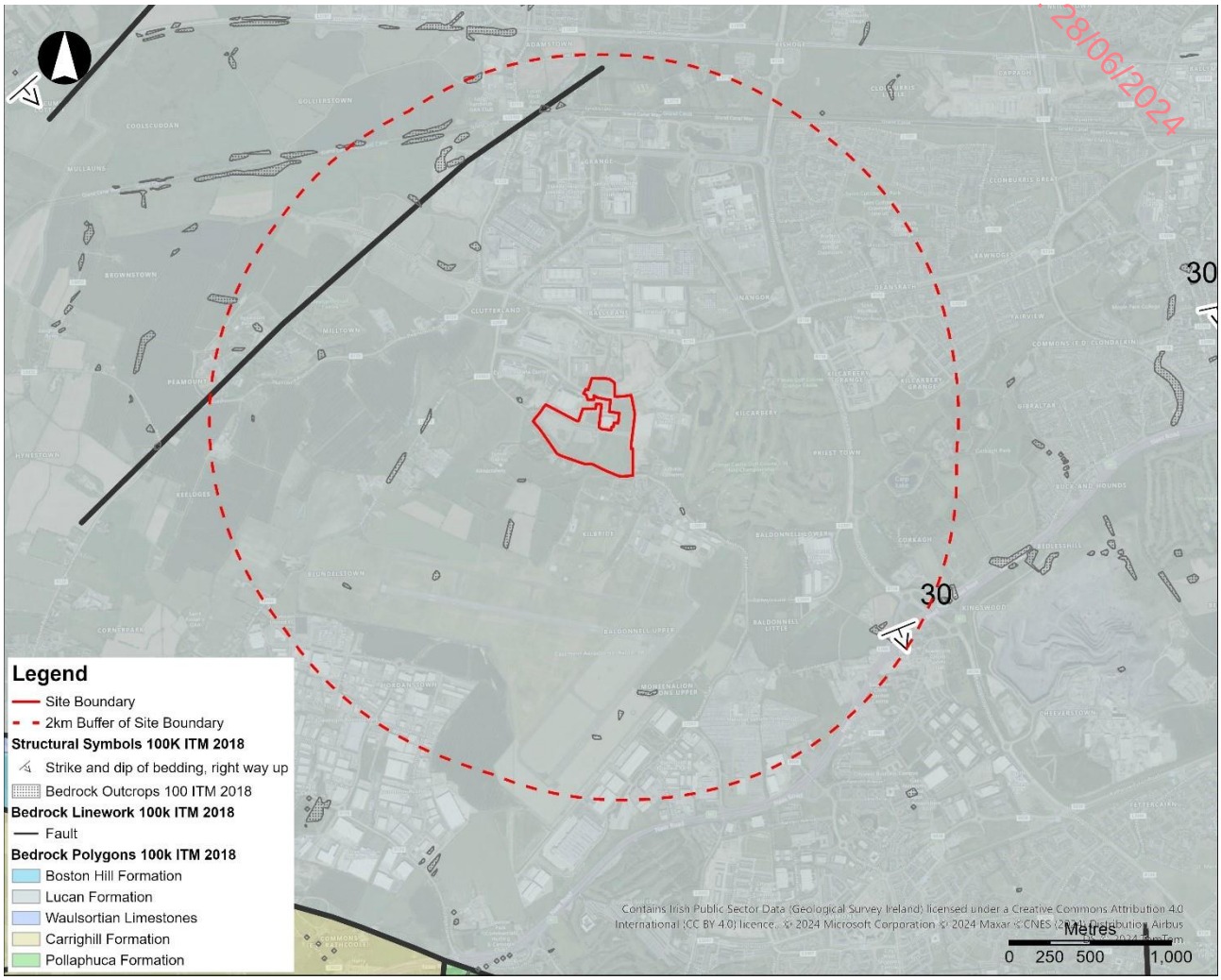

Figure 13.7: Regional Bedrock Geology (GSI, 2024).

13.3.2.5 Regional Contaminated Land

The review of the regional land use has identified a number of historical and current activities that may have resulted in land contamination as outlined below.

The EPA records indicate a historical Section 4 discharge licence, which allowed for either discharge to surface water or groundwater of trade wastewater. The discharge is marked to be located approximately 170m to the east of the Proposed Development site. This location is marked on Figure 13.8. Since 2023, the wastewater discharges from the GIL site are regulated by an Industrial Emissions Licence (IEL) and therefore unlikely to pose a risk of contamination and are not considered further. There are no other discharge licences within the study area.

Industrial and commercial developments are present immediately to the north of the Proposed Development site as well as to the south (beyond the Casement Aerodrome). The Grange Castle Business Park South, which extends to the north of the GIL Campus accommodates a number of facilities operating under IELs, which include other data centres, a pharmaceutical company and an electricity HV (High Voltage) compound, as shown on Figure 13.8. The IEL regulated activities are unlikely to pose a risk of contamination and therefore are not considered further.

There are no historic (closed) landfill sites within the study area. However, an EPA Waste Licensed Activity is recorded within the golf course, approximately 500m to the east of the Proposed Development site (at a nearest point), see Figure 13.8. The licence allowed for import of waste soils and other construction waste for the development of the golf course. The import of these waste materials was a regulated activity and therefore unlikely to pose a risk of contamination and is not considered further. There are no other recorded waste activities within the Proposed Development study area.

Activities that constitute potential sources of contamination that may have impacted the baseline quality of soils and groundwater beneath the Proposed Development site are detailed in Table 13.8.

Table 13.8: Potential sources of contamination within the Proposed Development study area.

Potential source	Location	Description	Importance	Justification for Importance Ranking
Made ground	Proposed Development site (see Appendix 13.5, Figure 2).	Completed GI encountered made ground within the Proposed Development area. Refer to Section 13.3.3.3 for more information. Spoil heaps (likely topsoil and subsoils) are present within the Proposed Development site.	Low	Minor degree of potential contamination – see Section 13.3.3.7.
Casement Aerodrome	Located immediately to the south of the Proposed Development site.	The aerodrome has been active since 1917. Its use e.g. use of refuelling facilities, fuel storage, firefighting activities, may have resulted in contamination of groundwater with hydrocarbons and Perfluoroalkyl and polyfluoroalkyl substances (PFAS). Completed GI indicates groundwater northward flow, in line with a general regional groundwater flow towards the River Liffey. Therefore, there is a potential for contamination migration towards the site and that groundwater beneath the site might be impacted by this potential contamination.	Medium	There is a potential that groundwater beneath the Proposed Development site may have been impacted by contaminants originating from the aerodrome site.

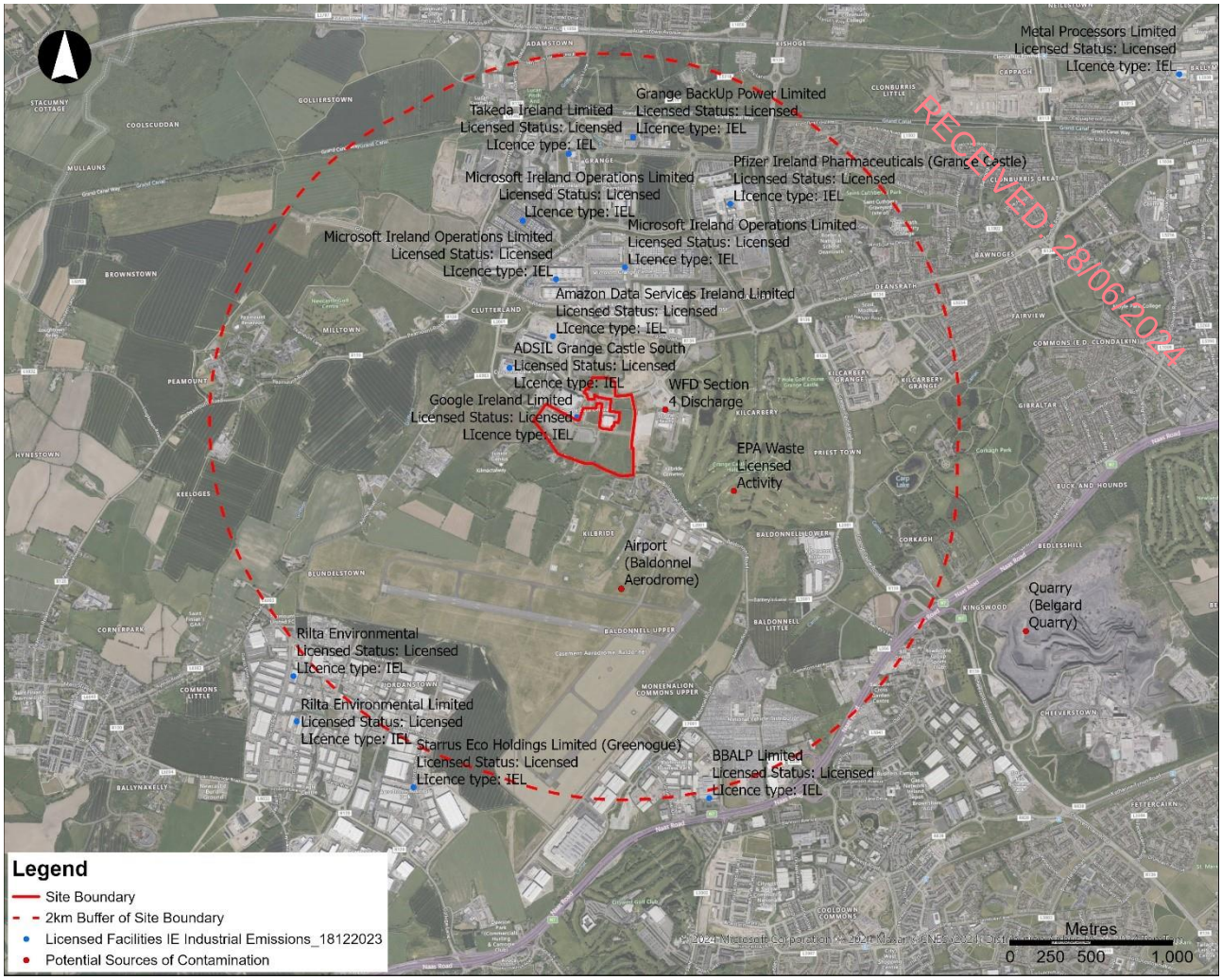

Figure 13.8: Potential sources of contamination. Source: EPA, 2024.

13.3.2.6 Geological Heritage Areas

A review of the Geological Heritage Areas (GSI maps, online) in the Proposed Development study area has indicated no sites of geological interest. The nearest, Belgard Quarry, is located approximately 2.1 km to the south-east of the Proposed Development site, has been identified as having the biggest exposure of the usually poorly exposed Lucan Formation, which underlies Dublin. Location of the quarry site is shown on Figure 13.8.

13.3.2.7 Regional Mineral Resources and Exploration

The DECC records (DECC, 2024) show the Proposed Development study area to be *"open with exploration incentives*", however there are no identified mineral deposits on the Mineral Exploration and Mining viewer. The GSI Aggregate Potential viewer (GSI, 2024) identifies a number of historical quarries and pits within the Proposed Development study area with three small more recent (early to mid 20th century) quarries, with the nearest located 1km to the south of the Proposed Development site.

The following aggregate potential has been identified within the Proposed Development study area:

- Granular aggregate - alluvial deposits present within the study area are identified as of a very low potential; and
- Crushed rock aggregate – shallow bedrock within the study area creates a moderate to very high potential for exploration of crushed rock aggregate.

The overburden within the Proposed Development study area has no aggregate potential.

The GSI mineral localities database show no active metallic mines exist today in the Proposed Development study area. There is no record of underground mining in the area therefore there would be a low risk of potential ground instability issues due to historical mining activities.

There are no active quarries within the Proposed Development study area.

13.3.2.8 Regional Radon Risk

In accordance with the EPA Radon maps (EPA, 2024), the regional radon risk is low to moderate, with the Proposed Development study area largely falling into area of between 1 in 20 and 1 in 10 homes having high radon levels. Isolated areas within the Proposed Development study area have high radon risk with 1 in 5 homes likely to have high radon levels. Refer to Figure 13.9.

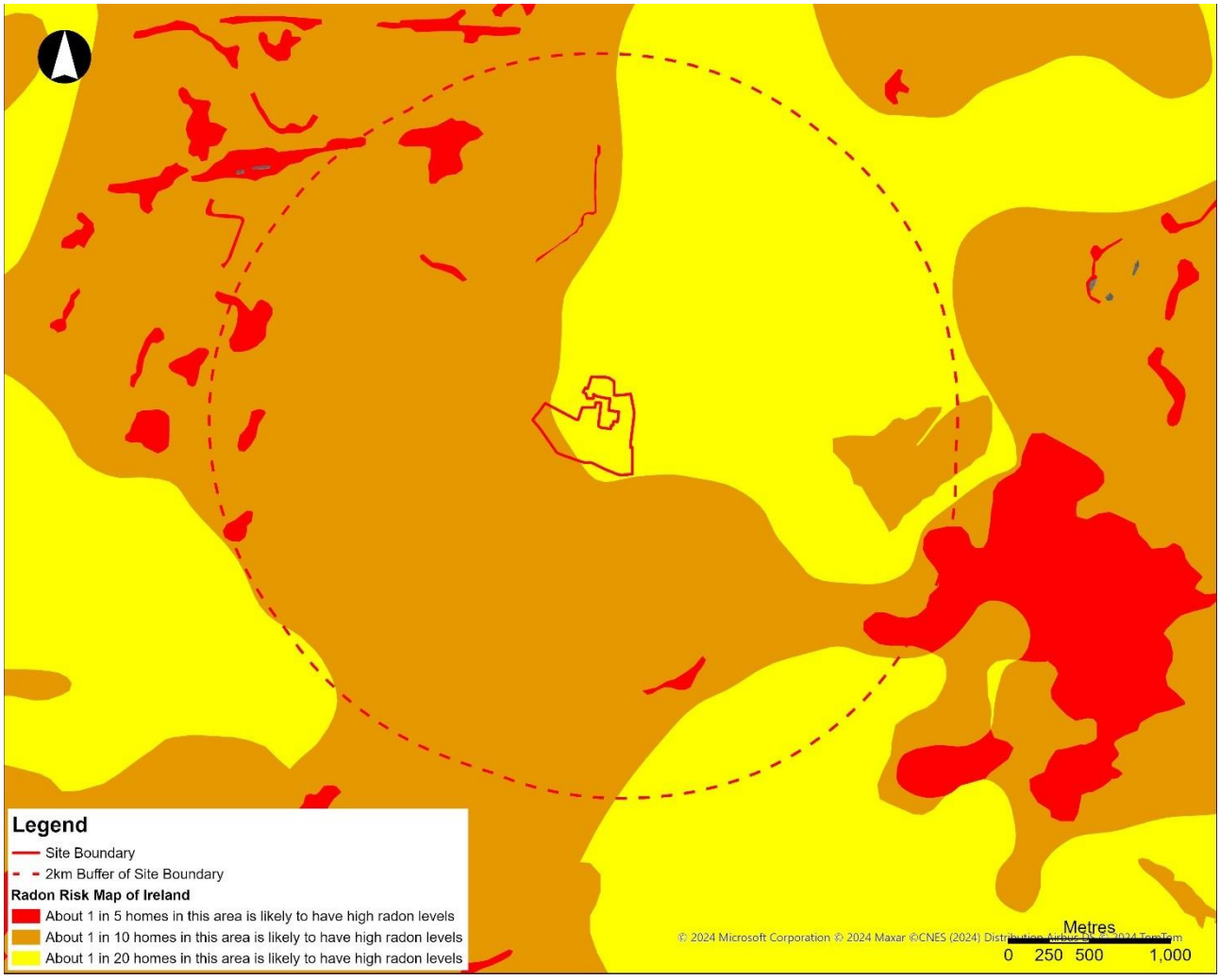

Figure 13.9: Regional radon risk. Source: EPA, 2024.

13.3.2.9 Regional Hydrogeology

Aquifer Type and Classification

The GSI system for classifying the aquifers in Ireland is based on the hydrogeological characteristics, size and productivity of the groundwater resource. There are three principal types of aquifer, corresponding to whether they are major, minor or unproductive resources whereby:

- Regionally Important Aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or excellent yields (>400m^3 /d);
- Locally Important Aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or good yields (100-400m^3 /d); and

- Poor Aquifers are capable of supplying small abstractions (e.g. domestic supplies), or moderate to low yields (<100m^3/d).

The Proposed Development site is underlain by the Lucan formation, which is overlain by a thin layer of till (1-3m) which is in turn variably overlain by topsoil or made ground. The lower permeability till soils which overlay the bedrock (boulder clay) mean slow infiltration and restricted recharge to bedrock aquifers. A summary of the aquifers present within the Proposed Development study area are outlined in Table 13.9 and presented in Figure 13.10.

Table 13.9: Aquifer types within the region. Source: EPA, 2024.

Aquifer Type	Location	Description	Code
Locally Important Aquifer	Widespread	Bedrock which is Moderately Productive only in Local Zones	LI

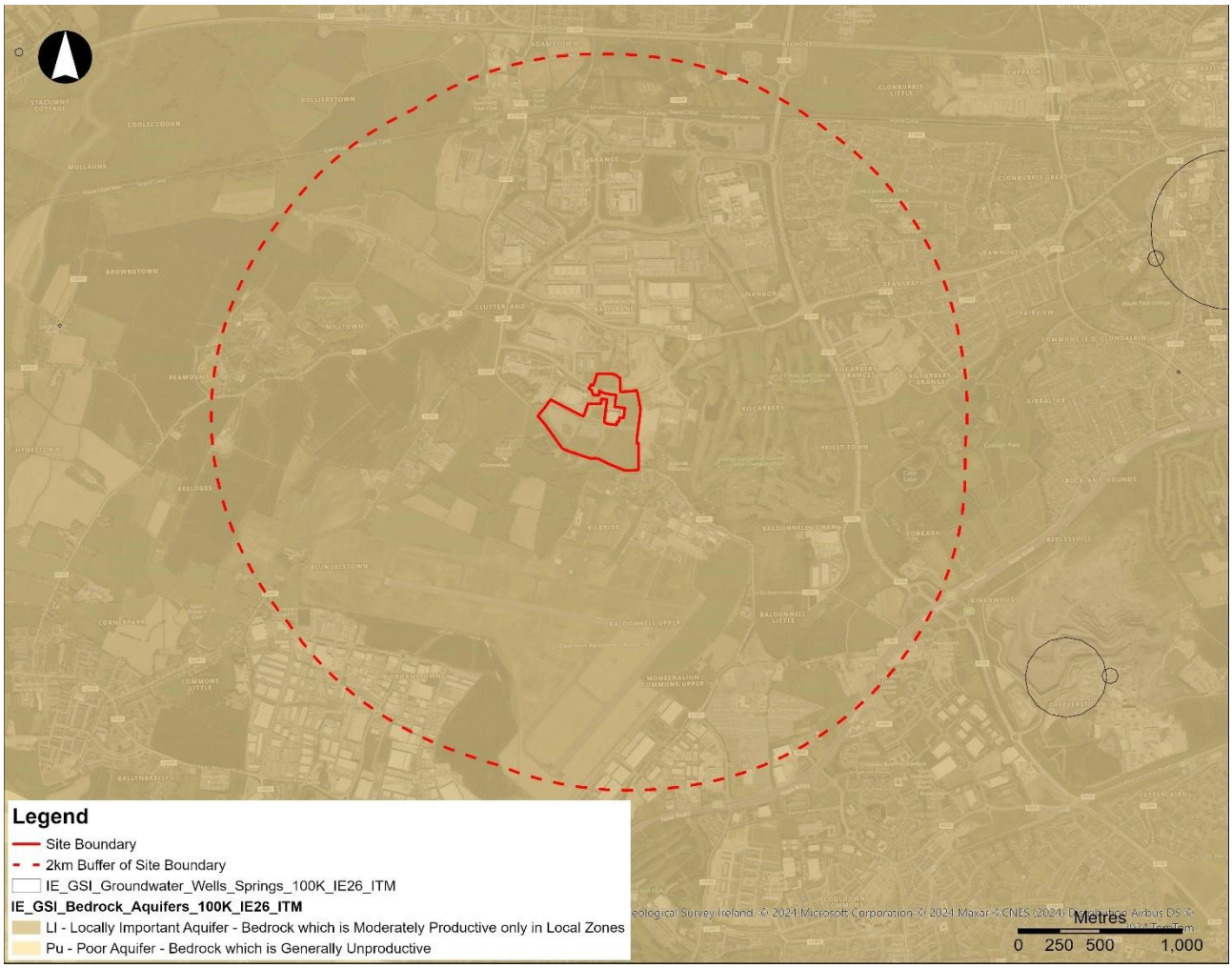

Figure 13.10: Regional aquifer and groundwater resources. Source: EPA, 2024.

Groundwater bodies (GWBs) have been delineated and described by the GSI (GSI, 2024) as Water Framework Directive (WFD) groundwater management units to manage and protect groundwater and linked surface waters. There is one GWB present which covers the Proposed Development study area:

- Dublin GWB, European code IE_EA_G_008.

The Dublin GWB primarily covers the Lucan Formation. According to the GWB description, the majority of groundwater flow will be a rapid flow in upper weathered zone but flow in conduits is commonly recorded at depths of 30 to 50 m below ground level. The flow will be through fractures. The aquifer parameters GSI Aquifer Handbook (Kelly C et al, 2015) reports relatively low average permeability of the Lucan Formation of 9.3 x 10^{-7} m/s.

The groundwater flow direction in the Dublin GWB is towards the coast and also the River Liffey, however the aquifer is not expected to maintain regional flow paths. The EPA records show the WFD overall status of the groundwater body within the Proposed Development study area is 'Good' and is currently 'Under Review' regarding the risk of not maintaining that status.

Regional Groundwater Resources

Groundwater resources describe any large spring, well or borehole which is used as a groundwater abstraction source by domestic, agricultural, commercial, industrial, local authority or group water scheme users.

The GSI keeps a record of groundwater wells drilled, however the record does not state which wells are currently used for abstraction.

There is one licenced groundwater abstraction within the Proposed Development study area. It is associated with the golf course located approximately 380m to the east of the Proposed Development site. The abstraction location is recorded to be approximately 1.2km to the east of the Proposed Development site.

There are no springs or groundwater wells within the Proposed Development study area. The nearest groundwater well recorded by GSI, are located approximately 3km to the south-east of the Proposed Development site, to the south-east of the Belgard Quarry. There are two wells, which were drilled in 1899 and 1962 respectively, and therefore it is uncertain if they remain fully operational, particularly with the ongoing progression of quarry extraction operations (see Section 13.3.2.1 on current and historical use). The potential yield for these wells is recorded to range between 109m^3 /day and 654m^3 /day. Groundwater resources for the region are shown on Figure 13.10.

Regional Aquifer Vulnerability

Aquifer vulnerability of a groundwater body is the term used to describe the intrinsic geological and hydrogeological characteristics which determine the ease with which a groundwater body may be contaminated by human activities.

The vulnerability is determined by the travel time and the attenuation capacity of the overlying deposits. The groundwater vulnerability is determined mainly by the permeability and thickness of the subsoils that underlie the topsoil. For example, bedrock with a thick, low permeability overburden is less vulnerable than bedrock with a thin high permeability, gravel overburden. Aquifer vulnerability classification, as published by the GSI, is presented on Figure 13.11.

The regional groundwater vulnerability is generally high in the north-eastern part of the Proposed Development study area to extreme vulnerability with rock at or near the surface in the remainder of the Proposed Development study area.

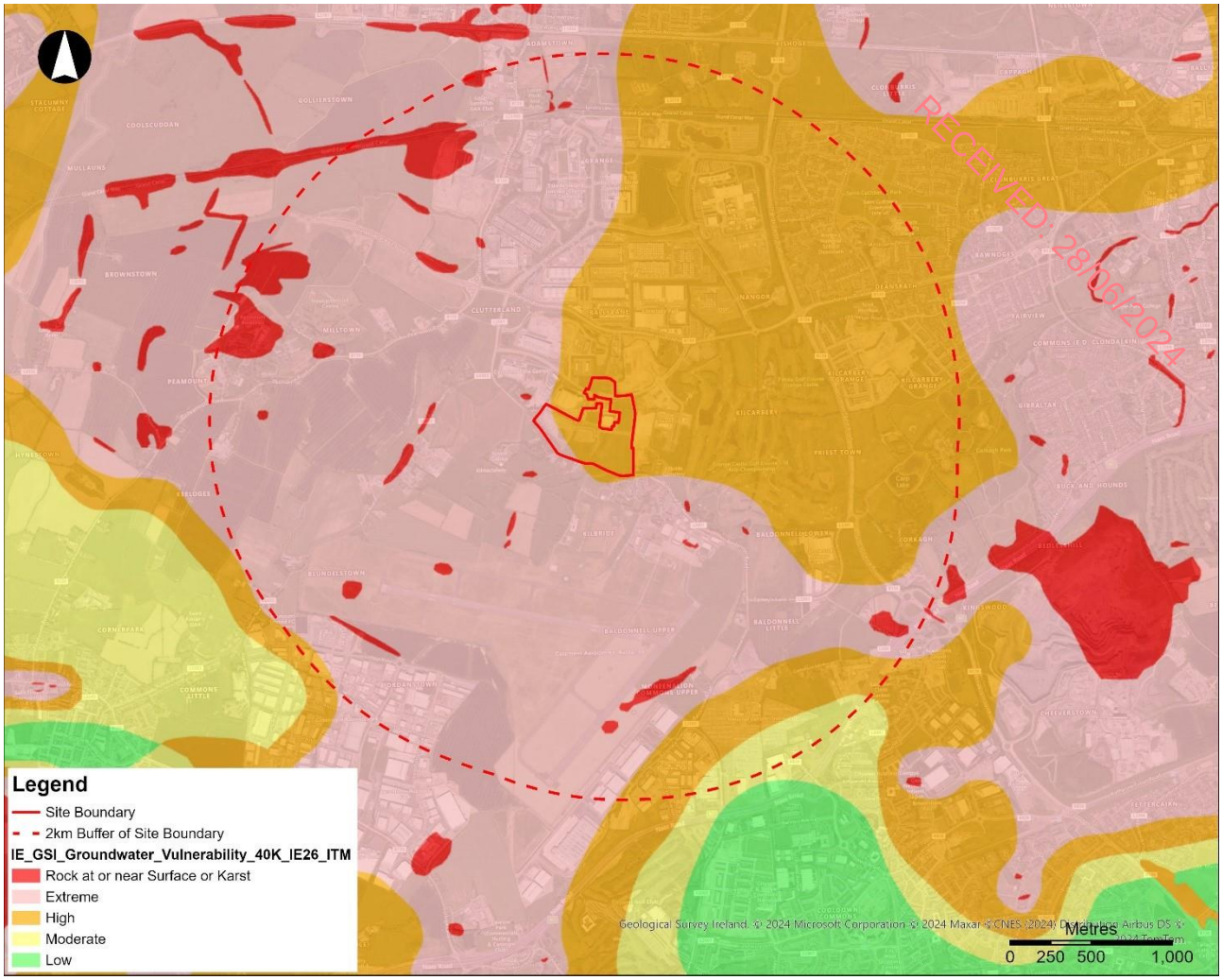

Figure 13.11: Regional aquifer vulnerability. Source: EPA, 2024.

Regional Recharge

Recharge is the amount of rainfall that replenishes the aquifer. It is a function of the effective rainfall (i.e. rainfall minus evaporation and run off), the permeability and thickness of the subsoil and the aquifer characteristics.

The recharge for the locally important aquifer (LI) is in a range of 50 to 200mm/yr. The range of annual groundwater recharge across the Proposed Development study area is presented in Figure 13.12.

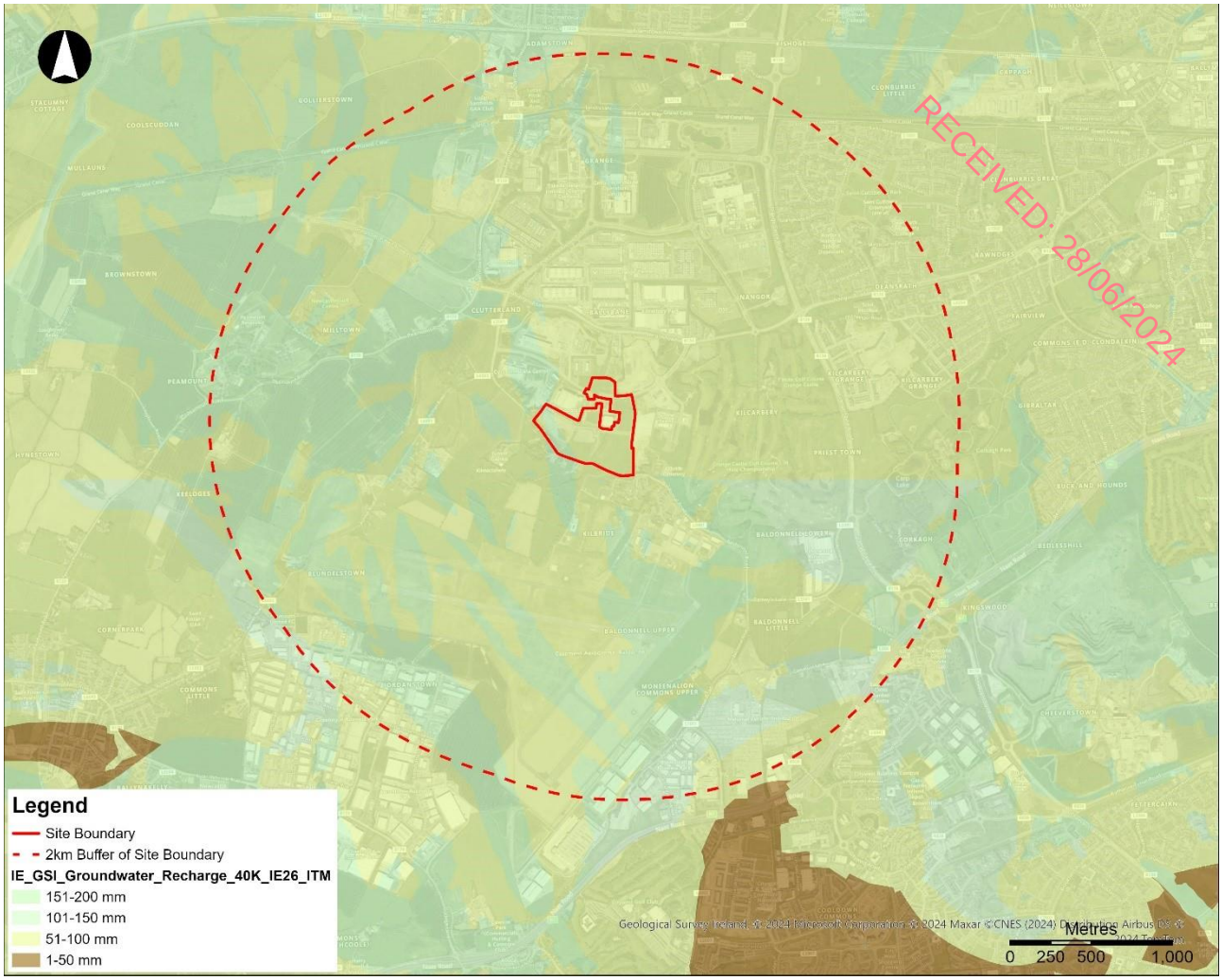

Figure 13.12: Regional aquifer recharge. Source: EPA, 2024.

Regional Hydroecology Designated Sites

The National Parks and Wildlife Services (NPWS) is responsible for the designation of environmentally protected sites in Ireland and maintains a publicly available database of these sites. These sites include Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Natural Heritage Areas (NHAs). In addition to these sites, the NPWS also maintains a database of proposed Natural Heritage Areas (pNHAs), which have a non-statutory status.

Further information regarding the designated sites within the region are detailed in Chapter 11 (Biodiversity). Dublin WFD Groundwater body supports SACs, and therefore EPA maps highlight the Proposed Development study area as groundwater habitat sensitive.

There are no designated environmentally protected sites within the Proposed Development study area which would be considered sensitive to groundwater contribution. The nearest SAC, Rye Water Valley/Carton SAC, is located 5.8km from the Proposed Development site, whereas the nearest SPA, Wicklow Mountains SPA, is located approximately 13km from the Proposed Development site.

There is, however, a pNHA present in the study area, Grand Canal pNHA, as shown on Figure 13.13. The habitats supported by the canal include otters, crayfish, bats. This man-made waterway is fed by numerous supplies, primarily other surface water courses[2] and therefore is unlikely to be groundwater dependent. In addition, due to the nature of the navigation canals, it is likely to be lined to retain water and therefore would have limited or no interaction with groundwater.

[2] https://irishwaterwayshistory.com/abandoned-or-little-used-irish-waterways/the-grand-canal/water-supply-to-the-grand-canal/

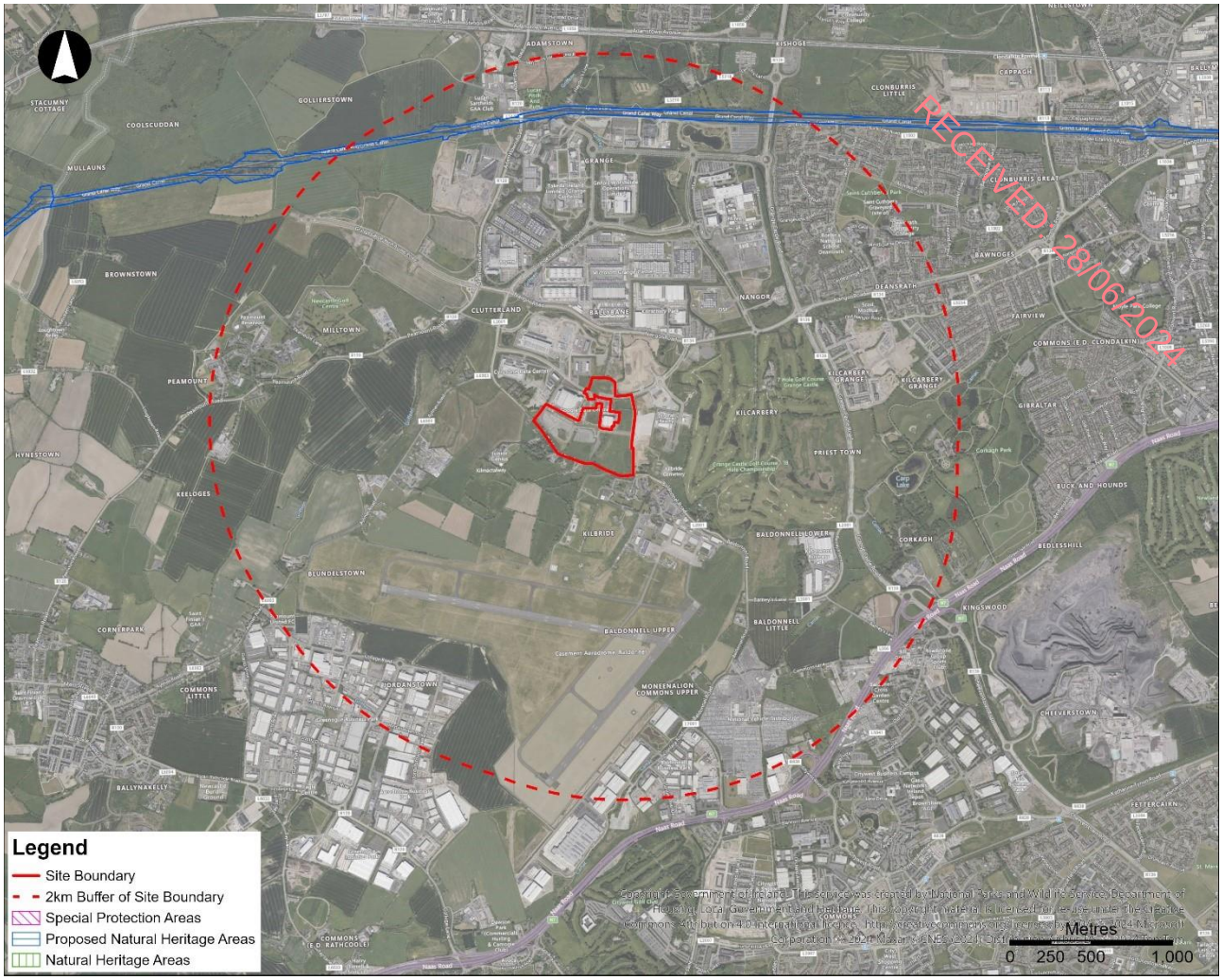

Figure 13.13: Regional designated sites. Source: EPA, 2024.

13.3.3 Proposed Development Site-Specific Environment

13.3.3.1 Historical and Current Land Use

The Proposed Development site remained undeveloped until the late 2000s (as first shown on the 2011 aerial photography), when the GIL Campus development occurred and when the first data centre buildings were developed to the north of the Proposed Development site. The early GIL Campus development included creation of a temporary storage / car parking area within the Proposed Development area, and a network of access roads bounding the site. Aerial photography from that date (GoI & TE, 2024) indicates topsoil stripping in the western and central site areas.

By 2013, further development occurred within the Proposed Development area, comprising a temporary car park and storage area in the western plot during construction of DC2 located immediately to the north. Since then, further temporary car parking and storage was developed in the central part. The remainder of the Proposed Development area remains undeveloped.

The recent walkover recorded the presence of five No. soil heaps in the southern part of the Proposed Development site. Refer to Appendix 13.5 for the location of the soil heaps. Based on aerial photography evidence, it is possible that the spoil heaps contain the topsoil and subsoil stripped during the 2011 and 2013 site development.

13.3.3.2 Geomorphology and Topography

The Ireland Topographic Maps (topographic-map.com, online) indicate the ground elevation within the Proposed Development site to gently rise from approximately 75mOD in the north to approximately 85mOD in the south in line with the regional topography.

As described in Section 13.3.2.2, the geomorphology of the Proposed Development site is predominantly that of a post glaciation environment. To allow for the current and historical development, land modifications may have been undertaken such as cut and fill to create level areas suitable for intended use such as car parking or storage. Completed site investigations of the Proposed Development indicate the presence of reworked natural ground underlying the areas of the car parking gravel surface.

13.3.3.3 Soils and Subsoils

Subsoil deposits were established based on the Irish National Soil Map 1:250,000, the Teagasc Subsoil Map and relevant ground investigation information within the Proposed Development site.

The Teagasc soil mapping show the soils underlying the Proposed Development site to be till derived from Limestones comprising poorly drained subsoils. A summary of the subsoil deposits is presented in Table 13.10 and Figure 13.5. No bedrock outcrops and associated soils are mapped within the Proposed Development site.

The till deposits encountered during the ground investigation within the Proposed Development site were described as soft to firm grey and brown sandy gravelly clay and firm to stiff greyish brown slightly sandy and very gravelly clay. The thickness of the till varied from 1.2m to 4.2 m (approximately 78 m OD to 81 m OD). The investigations also encountered topsoil and made ground at surface (including aggregate type materials in the areas of former temporary construction car parking/ storage areas underlain by a white geotextile separator layer in the central extent of the Proposed Development site) and reworked till with anthropogenic inclusions in the western extent of the Proposed Development site.

The soils and subsoils encountered during completed site investigations are detailed in Table 13.10. Site specific geological cross sections are presented in Appendix 13.4.

Table 13.10: Soils and subsoil deposits within Proposed Development site.

Strata	Location Encountered by Completed Site Investigations	Depth to Top of Strata (m OD)	Thickness Range (m)	Notes/Description
Topsoil	Eastern, Central extent of the Proposed Development and Attenuation Ponds	75.5 to 79.9	0.3 to 0.4	Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to medium.
Made Ground	Western and Central extent of the Proposed Development	78.0 to 81.3	0.1 to 0.8	Site Wide: Compact grey sandy GRAVEL with a low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Central Extent: Presence of a white geotextile sheeting underlying. Western Extent: Fragments of wire, wood, plastic or rebar found locally with trial pits.
Till	Widespread	75.1 to 80.8	1.2 to 4.2	Soft to Firm grey, brown sandy gravelly CLAY with a low cobble content. Firm to stiff greyish brown slightly sandy very gravelly silty CLAY with a low to medium cobble content with occasional boulder content.

13.3.3.4 Bedrock Geology

GSI bedrock mapping indicates that the Proposed Development site as well as the wider region, is underlain by the Upper Carboniferous Limestone, known as the Lucan formation. There are no geological faults mapped within the Proposed Development area. Refer to Figure 13.7.

The completed ground investigations, as listed in Section 13.2.4.3, encountered medium to very strong, medium to thinly bedded grey black fine-grained argillaceous or calcisiltite Limestone with interbedded weak Mudstone with a rockhead at between 3-4m bgl (71.2 to 78.4 mOD, thickness unproven).

13.3.3.5 Karst

Karst is a type of geological feature characterised by caves, caverns and other types of underground drainage resulting from the dissolution of the underlying bedrock. This typically occurs in areas of high rainfall with soluble rock.

The GSI Karst database was consulted and no karst features are indicated as being present within the Proposed Development site. The site-specific investigation information for the Proposed Development site does not indicate the presence or potential presence of karst across the Proposed Development area. The Lucan Formation is generally considered not to be susceptible to karst.

13.3.3.6 Soft and/or Unstable Ground

No soft soils are mapped within the Proposed Development area, as shown on Figure 13.5, and none have been encountered during the completed ground investigations, as summarised in Table 13.10.

The GSI database shows no recorded landslide events within the Proposed Development study area. There are no records of mineral exploration or coal mining within the Proposed Development site that may have resulted in unstable ground.

13.3.3.7 Contaminated Land Assessment

The results obtained from completed site investigations of the Proposed Development have been assessed to determine the baseline degree of potential soils contamination within the Proposed Development site. The assessment is presented in Appendix 13.5**.** The results are summarised in Table 13.11.

Table 13.11: Geoenvironmental assessment of completed ground investigation results.[3]

Material	Residential w/t Plant Uptake GAC Exceedances	Commercial GAC Exceedances	EPA SRF values (Domain 2) Exceedances1	Information
Topsoil	N/A	N/A	N/A	Testing will be required to classify the soils. This will be undertaken prior to construction. Topsoil overlying made ground would be considered made ground with respect to reuse/disposal options.
Made Ground	Arsenic and Cyanides exceedances of the applied Residential GAC in relation to human health. No asbestos identified.	No exceedances of the applied Commercial GAC in relation to human health. No asbestos identified.	Arsenic and Chromium	No unacceptable risks to human health in a commercial land use scenario have been identified. A potential risk to human health during construction from elevated arsenic and cyanide concentrations. Exceedances of the EPA SRF value for arsenic and chromium concentration were recorded within soil samples obtained from Made Ground encountered within the Proposed Development site or its vicinity. Made ground containing anthropogenic (or man made) inclusions is not suitable for reuse and would require offsite recycling/disposal.
Till	Arsenic exceedances of the applied Residential GAC in relation to human health.	No exceedances of the applied Commercial GAC in relation to human health.	Arsenic	No unacceptable risks to human health in a commercial land use scenario have been identified. A potential risk to human health during construction from naturally elevated arsenic concentrations. Exceedances of the EPA SRF value for arsenic were recorded in soil samples obtained from the till encountered within the Proposed Development site and its vicinity. Natural materials are considered suitable for reuse within the site or offsite under Article 27.

[3] The maximum concentrations stated in the EPA guidance have been utilised (1.5x the Domain 2 criteria for metals).

The assessment of contamination potential at baseline conditions did not identify unacceptable risks to human health in a commercial land use scenario. However, exceedances of arsenic (five samples) were identified in made ground and underlying till, and cyanides (one sample) in made ground when applying residential without plant uptake assessment scenario. The identified elevated concentrations of arsenic may be indicative of elevated background concentrations of naturally occurring arsenic.

In addition, a number of exceedances of arsenic and chromium have been identified with respect to applied EPA SRF values (EPA, 2020).

HazWasteOnline (HazWaste Online, 2024) has classified both the made ground and till as Non-Hazardous waste.

WAC analysis conducted during the completed GI (2019) has revealed both the made ground and till are suitable for disposal at a Non-Hazardous landfill. 57% (four out of seven) of made ground samples were recorded as suitable for disposal at waste inert facilities. As for the till, 34% (two out of six) of samples were recorded as suitable for inert disposal. The remainder was classed as suitable for disposal to a non-hazardous licenced landfill.

The results of the Waste Classification, WAC analysis and eventual landfill disposal options are summarised below:

- Topsoil: Pre-construction testing will be undertaken to confirm waste classification but anticipated to be classified as non-hazardous waste.
- Made ground: Non-Hazardous waste and suitable disposal at either an Inert licenced landfill or a Non-Hazardous licenced landfill.
- Till: Non-Hazardous waste and suitable disposal at either an Inert licenced landfill or a Non-Hazardous licenced landfill.

13.3.3.8 Mineral/Aggregate Resources

The GSI aggregate potential mapping database indicates the Proposed Development site has a moderate crushed rock aggregate potential, with the south-western corner of the Proposed Development site having a high rock aggregate potential, as summarised in Table 13.12. There are no mineral deposits within the Proposed Development site that would have a granular aggregate potential.

There are no historical or active mines or quarries within the Proposed Development site.

The GSI mineral localities database show no active mines within the Proposed Development site.

Table 13.12: Aggregate potential for the Proposed Development site. Source: GSI, 2024.

Feature	Potential	Location	Importance	Justification for Importance Rating
Crushed rock aggregate potential	Moderate	Widespread	Medium	Sub-economic extractable mineral resource
	High	South-western corner of site	High	Extractable mineral resource

13.3.3.9 Geological Heritage Areas

There are no Geological Heritage Areas in the area of the Proposed Development site.

13.3.3.10 Hydrogeology

Aquifer Type and Classification

As presented in Section 13.3.2.9 on regional Aquifer Type and Classification, the Proposed Development site is underlain by a locally important aquifer. A locally important aquifer has the ability for yields of up to 400m³/day.

Groundwater Vulnerability and Recharge

Groundwater vulnerability within the Proposed Development site is predominantly high with the south-western corner of the Proposed Development – extremely high. This is due to the shallow soils/subsoils cover over the bedrock. Refer to Section 13.3.2.9 on Regional Groundwater Vulnerability.

The average recharge within the majority of the Proposed Development site is 51-100mm/year with effective rainfall of 344mm/year. The soils and subsoils within the Proposed Development site are described as of low permeability and dry. Higher average recharge of 151-200mm/year is mapped in the south-western corner of the site, with the increased recharge coefficient due to the shallow depth (<3m) of the soils and subsoils.

Groundwater Resources

There are no groundwater abstractions within the Proposed Development site. The completed ground investigations within the Proposed Development site encountered groundwater within the Glacial Till and Lucan formations with a minimum and maximum depth below ground level of 1.5m and 4.8m. Rapid groundwater flow was recorded within the western boundary of the Proposed Development site between depth of 1.6m to 2.7m bgl (2012_TP 22, 34, 36, 39, 43 & 44).

As part of the completed ground investigations, groundwater monitoring installations were commissioned with response zones within the Lucan Formation and in areas recorded with no recovery. Monitoring was recorded within the following dates:

- IGSL 2013 - Across three months between the dates of 4th November 2013 to the 17th of January 2014.
- IGSL 2019 - Across a month starting on the 17th of October 2019.

Monitored groundwater levels ranged between 80.7m OD to 73.5m OD across the Proposed Development site. The lowest groundwater levels were recorded to the northwest of the Proposed Development site (2019_RC07) and the western area of the site (2019_RC21), located within the current use car park/storage area. The monitored well in the north-eastern site area indicated groundwater levels to be below the response zone extent.

The groundwater monitoring indicates the general groundwater flow to the north, in line with the regional flow as well as to the east and west, towards the Liffey River tributaries. Refer to Chapter 12 (Water) for more details on the hydrology.

Hydroecology

There are no groundwater dependent ecosystems within the Proposed Development site.

13.3.4 Summary of Features of Geological and Hydrogeological Importance

A summary of the geological and hydrogeological features found within the Proposed Development study area, are presented in Table 13.13 with feature importance ranking based on Table 13.2 and Table 13.3.

Features with an importance ranking of low are not considered further as they will not result in a potential significant effect according to Table 13.6. Features with an importance ranking of medium or higher are summarised in Table 13.13 and the potential effects of the Proposed Development on these features is assessed in Section 13.4.

Table 13.13: Summary of features of geological and hydrogeological importance.

Category	Feature	Location	Description	Importance	Justification for Importance
Mineral aggregate resources	Crushed rock aggregate potential	Proposed Development site	Moderate to high potential	Medium to High	Proven economically extractable mineral resource based on the Belgard Quarry.

Category	Feature	Location	Description	Importance	Justification for Importance
Land Contamination	Casement Aerodrome	Located immediately to the south of the Proposed Development.	Potential for groundwater contamination migration into Proposed Development	Medium	Potential for groundwater contamination from an offsite source. Potential contaminants include hydrocarbons and PFAS/PFAO compounds.
	Made ground	Located within Proposed Development site	Elevated concentrations of arsenic (potentially naturally occurring) and cyanides	Medium	Potential risk in relation to human health
	Till		Elevated concentrations of arsenic (potentially naturally occurring)	Medium	Potential risk in relation to human health
Aquifer	Bedrock -locally Important Aquifer (LI)	Across Proposed Development and study area	Bedrock which is moderately productive only in local zones	Medium	Medium value on a local scale

13.4 Potential Effects

13.4.1 Do-Nothing Scenario

The existing soils, geology and hydrogeology in the Proposed Development study area have been interpreted from desk study information. Climate change may result in changes to seasonal rainfall patterns potentially adversely affecting aquifer recharge and consequent reduction of groundwater levels and deteriorated quality. Hotter and drier summers may impact the vegetation and result in increased dust generation. This might result in increased generation of potentially contaminated dust from areas of made ground and off-site migration, potentially impacting the Proposed Development site neighbours.

The current baseline would represent the 'Do Nothing Scenario' as required under the EC Guidance. A conservative approach would be to assume no major changes to the baseline condition over time.

13.4.2 Proposed Development and Conceptual Site Model

The assessment of the likely effects on geology, soils and hydrogeology is underpinned by a CSM. The CSM was developed based on the desk study review for the regional context and incorporated the ground investigation data for the site-specific context. The regional receiving soils, geology and hydrogeology environment is presented on Figure 13.4.

The CSM plots the data gathered from the ground investigations within the Proposed Development site with existing ground level against the Proposed Development site levels. The model includes the factual data that was gathered during the completed GIs. The information is presented in profile format with the profile illustrating the existing and proposed ground levels, earthworks sections, local ground investigations logs, and summarised in Table 13.14. This is graphically presented in Appendix 13.4. Refer to Appendix 13.2 for all ground investigation data.

The Proposed Development site is predominantly underlain by glacial till overlying bedrock at shallow depth. The Proposed Development will require excavation to at an average depth range of 3 to 4m. Based on the excavation depth and monitored groundwater levels, groundwater control will be required.

Table 13.14: Conceptual Site Model for the Proposed Development.

Site area	Ground level (mOD) (approx.)	Excavation levels (m OD)	FFL (m OD)	Groundwater levels (approx.)	Impacted strata	Construction groundwater control required?	Groundwater interaction during operation?
Southern site area – attenuation ponds	80 – 78	76.3	79	78 – 77	Topsoil, DBC, LF	Yes	Yes
Southern site area – building incl. existing stream	82 - 78	78.5	80	81 - 78	Topsoil/MG, DBC, LF	Yes	Yes
Southern site area – diverted stream	~ 80	78.5 – 77.5	80	78 - 79	Topsoil/MG, DBC	Yes	Yes
Central site area - building	80 - 77	76.8	78.1	77 - 75	Topsoil/MG, DBC, LF	Yes	No
Eastern site area - building	77.5 - 74	75.3	76.8	77 – 754	Topsoil/MG, DBC	Yes	Yes

Hydrogeological conceptual site model is presented in Appendix 13.3. This considers interaction between the monitored groundwater levels and the Proposed Development.

Land contamination risk assessments in relation to the above detailed CSM are underpinned by a site-specific land contamination CSM as presented in Appendix 13.5. This considers relationships between potential receptors, both human health and water environment, and sources of contamination such as the made ground and removed groundwater and considers site specific soil and groundwater quality data.

Environment type

The environment across the Proposed Development study area has been categorized in accordance with the IGI guidelines (IGI, 2013).

It has been classified as a Type A geological/ hydrogeological environment: Passive geological / hydrogeological environments e.g. areas of thick low permeability subsoil, areas underlain by poor aquifers, recharge areas, historically stable geological environments.

Activities/Environment Matrix

The IGI guidelines (IGI, 2013) recommend that an Activities/Environment Matrix be prepared to identify the type of investigations required, which depend on the nature of the baseline environment and the Construction, Operation and Decommissioning activities proposed.

Table 13.15 outlines the required activities that would be undertaken during Construction, Operation and Decommissioning, and the investigations, assessments and surveys that have been carried out to consider those activities.

[4] no groundwater monitoring data available. Groundwater levels assumed as per central site area.

Table 13.15: Details of works required under the IGI guidance and how they are to be undertaken within the Proposed Development.

Work required under Activity and Type Class (based on IGI guidance (IGI, 2023))	Details of Works Completed to Date
Earthworks	
Invasive site works to characterise nature and thickness of soil and subsoil e.g. trial pits or augering.	Ground investigations carried out across the Proposed Development.
Storage /transmission of leachable and/or hazardous materials	
Establish nature and quantity of leachable materials.	Collection of soil samples. Analysis for quality, including WAC and waste classification screening.
Site works to characterise nature, thickness, permeability and stratification of soils, subsoils and bedrock geology e.g. trial pits, boreholes.	Ground investigations carried out across the Proposed Development.
Works to determine groundwater level, e.g. mapping, monitoring in stand pipes, piezometers, or boreholes.	Ground investigations carried out across the Proposed Development with installation of groundwater monitoring standpipes and monitoring.
Excavation of materials above the water table	
Site works to characterise nature, thickness, permeability and stratification of soils and subsoils e.g. trial pits, augering	Ground investigations carried out across the Proposed Development.
Site works to fully characterise the bedrock geology and in order to delineate the resource volume/weight according to The PERC Reporting Standard e.g. trenching, drilling, geophysics.	Ground investigations carried out across the Proposed Development.
Works to determine groundwater level, flow direction and gradient; e.g. monitoring in stand pipes, piezometers, or boreholes.	Ground investigations carried out across the Proposed Development with installation of groundwater monitoring standpipes and monitoring.
Excavation of materials below the water table (in addition to the above)	
Characterisation of groundwater chemistry and quality.	Ground investigations carried out across the Proposed Development with installation of groundwater monitoring standpipes and sampling and testing.
Lowering of groundwater levels by pumping or drainage	
Site works to characterise nature, thickness, permeability and stratification of soils, subsoils and bedrock geology.	Ground investigations carried out across the Proposed Development.
Establish proposed daily abstraction rate.	Ground investigations carried out across the Proposed Development.

13.4.3 Construction Phase

This Section presents the assessment of likely potential effects on soils and geology during the Construction Phase. Construction methodologies for the various elements of the Proposed Development are presented in Chapter 5 (Construction).

The likely potential Construction effects of the Proposed Development on the geological and hydrogeological attributes identified in Section 13.3.4 are listed below under the following headings:

- Removal of mineral resources due to earthworks
- Earthworks resulting in ground instability.
- Mobilisation and exposure to contaminants during earthworks
- Lowering of groundwater level during earthworks; and
- Pollution of water environment due to earthworks.

Effects from the Decommissioning Phase of the Proposed Development are considered to be no greater than those identified during the Construction Phase and are therefore assessed to be the same as Construction effects as a likely worst case scenario. Please refer to Chapter 4 (Description of the Proposed Development) for information on the Decommissioning Phase.

13.4.3.1 Loss of Mineral Resources

The Proposed Development will result in removal of future opportunity to explore the moderate to high potential aggregate resources within the Proposed Development site, which will result in a loss of future available aggregate. However, such potential is beneficial during construction as material can be sourced on site removing the need to import suitable / acceptable material during the Construction Phase in its place. The assessment of effects associated with resources and waste management is presented in Chapter 16 (Resources and Waste Management).

Considering the abundance of limestone resource in the region, the construction of the Proposed Development will result in negligible magnitude of the potential effect on the moderate potential for mineral aggregate resources, which underlies the majority of the Proposed Development site. The rock with the high potential for mineral aggregate resources is only present in the south-western corner of Proposed Development site and therefore the magnitude of the potential effect is considered also to be Negligible.

The significance of this likely potential effect is Imperceptible.

13.4.3.2 Mobilisation and Exposure to Contaminants During Earthworks

The preliminary land contamination risk assessment (as presented in Appendix 13.5), identified the following Potential Pollution Linkages (PPL) during the Construction Phase, where preliminary land contamination risk was identified as 'Moderate/Low' or 'Moderate' and requiring further assessment:

- Risk to construction workers from soils, dust and asbestos fibres, generated during earthworks, and groundwater (PPL 1).
- Risk to site neighbours from dust and fibres generated during earthworks (PPL 2).

The quantitative land contamination assessments (as presented in Appendix 13.5) indicated elevated concentrations of arsenic in both made ground and underlying natural soils. No asbestos was identified within the tested samples. Although these may be indicative of background natural levels, they will need to be considered by the contractor in their health and safety risk assessments and measures e.g. dust control or personal protective equipment e.g. gloves. Subject to implementation of control measures in line with current legislation and industry good practice, a low level of risk from soils to construction workers and Proposed Development site neighbours is anticipated. Unexpected contamination will be managed through Construction Environmental Management Plan (CEMP). The magnitude of potential effect is considered to be Negligible.

The significance of this likely effect is Imperceptible.

13.4.3.3 Lowering of Groundwater Level During Earthworks

Dewatering and over pumping are likely to be required to allow for excavation to achieve the required sub-foundation level. Therefore, groundwater flow and groundwater levels may be temporarily affected during the Construction Phase.

The hydrogeological Tier 1 assessment, as presented in Appendix 13.5, derived the drawdown zone of influence of approximately 7m, which may increase to 26m allowing for the increased permeability of the bedrock. This is based on the maximum required drawdown during the earthworks (approximately 2.5m), which would occur in the southern Proposed Development site area. The total estimated dewatering rate for the Proposed Development is 42m^3/d. The assessment of effects on surface water environment as a result of the dewatering works is presented in Chapter 12 (Water).

The magnitude of this potential effect is negligible due to the potential effect on the attribute being insufficient in magnitude to affect either use or integrity of the groundwater aquifer. There are no hydrogeological features of importance within the calculated one of influence.

The lowering of groundwater level may pose a potential risk of subsidence. As presented above, the dewatering activities during construction could impact area up to 26m away from the construction area. The nearest buildings are located approximately 50m away from the site and therefore the effect on ground stability on the surrounding buildings due to dewatering works is considered Negligible.

The significance of this potential likely effect is Imperceptible.

13.4.3.4 Pollution of Water Environment due to Earthworks.

The preliminary risk assessment (as presented in Appendix 13.5), identified the following PPL during construction, where preliminary land contamination risk was identified as 'Moderate' and requiring further assessment:

- Risk to surface water from discharge of removed groundwater during earthworks (PPL 3).

The quantitative land contamination assessments did not identify elevated concentrations of potential contaminants within the groundwater that may potentially impact the quality of surface water if directly discharged.

Based on regional land contamination review, there is a potential risk of contaminants being, or having previously been released into the groundwater, related to the use of firefighting foams (PFAS/PFAO compounds) at the nearby Casement Aerodrome. This is located upgradient of the Proposed Development site and therefore may be migrating into the Proposed Development site area. The assessment of potential effects associated with discharges to surface water during construction is presented in Chapter 12 (Water).

There is also potential for the contamination of groundwater as a result of certain activities during the Construction Phase. There are numerous substances likely to be used during the Construction Phase that have the potential to contaminate groundwater including fuel and hydrocarbons, lubricants and cement. The washing of construction vehicles also poses a risk due to the potential release of contaminated runoff into groundwater. The requirements with respect to pollution control and prevention are presented in the CEMP, refer to Section 13.5. The magnitude of this effect is Small Adverse as it may result in a low risk of pollution to the groundwater.

The significance of this likely effect on the groundwater aquifer is Negative, Slight and Short-Term.

13.4.3.5 Summary of Construction Potential Effects

Table 13.16 summarises the predicted likely effects during the Construction Phase of the works.

Table 13.16: Summary of likely construction effects on geological and hydrogeological features at the Proposed Development site.

Category	Feature	Importance[5]	Magnitude of Potential Effect		Significance of Effect
			Ranking	Justification	
Mineral aggregate resources	Crushed rock aggregate potential	Medium to high	Negligible	Loss of small proportion of the resource	Imperceptible
Land Contamination	Casement Aerodrome	Medium	Potential effect assessed in Chapter 12 (Water)		
	Made ground	Medium	Negligible	No significant contamination encountered, Risk can be managed by standard health and safety measures.	Imperceptible
	Till	Medium	Negligible		Imperceptible
Aquifer		Medium	Small Adverse	Low risk of pollution	Slight Negative Short-Term

[5] Refer to Table 13.13 for sensitivity ranking justification.

Category	Feature	Importance[5]	Magnitude of Potential Effect		Significance of Effect
			Ranking	Justification	
	Bedrock -locally Important Aquifer (LI)		Negligible	Unlikely to affect either use or integrity of the groundwater aquifer.	Imperceptible

13.4.4 Operational Phase

The likely potential effects on geological and hydrogeological attributes during the Operational Phase are listed below:

- Exposure to contaminants during Operational Phase.
- Lowering of groundwater level due to permanent drainage beneath proposed buildings; and
- Pollution of water environment.

13.4.4.1 Exposure to Contaminants

The preliminary risk assessment (as presented in Appendix 13.5), identified the following PPL during the Operational Phase, where preliminary land contamination risk was identified as 'Moderate/Low' or 'Moderate' and requiring further assessment:

- Risk to end users and maintenance workers from soils, dust and fibres, and/or groundwater (PPL 4 and PPL 5); and
- Risk to building fabric from chemical attack on buried concrete (PPL 8).

The quantitative land contamination assessments indicated no elevated concentrations of contaminants with respect to end site users and no asbestos was encountered within the analysed samples. However, elevated concentrations of arsenic in both made ground and underlying natural soils were identified, which may pose a risk to future maintenance workers. Although these may be indicative of background natural levels, they will need to be considered by the appointed Contractors in their health and safety risk assessments and measures e.g. dust control or personal protective equipment for example, gloves. Subject to implementation of control measures in line with industry good practice, a low level of risk from soils to maintenance workers is anticipated. The magnitude of potential effect is considered to be negligible.

The risk of chemical attack on buried concrete is managed through engineering design, which has identified the appropriate concrete class suitable for the ground conditions underlying the Proposed Development site. Therefore, no effects on building fabric are envisaged during the Operational Phase.

The operation of the Proposed Development may result in accidental spillage of potentially polluting substances such as fuels, oils or other chemicals used or stored on the Proposed Development site. It is unlikely that the pollution would occur in areas of landscaping where exposed soils will be present. In addition, the operation of the Proposed Development will be regulated in accordance with the IE licence. The potential magnitude of the potential effect is likely to be Negligible.

The significance of likely effect of exposure to contaminants or contamination of soils is Imperceptible.

13.4.4.2 Change to Groundwater Level and Flows

The Proposed Development foundations and slab will be at or below the groundwater level, particularly within the southern part of the Proposed Development site. Therefore, the design will incorporate a drainage blanket beneath the building slabs, where required, to collect the groundwater and prevent groundwater ingress into the building. The drainage design will incorporate the existing stream channel, which will be backfilled with drainage material. This will maintain the baseline hydrogeological and hydrological regime within the Proposed Development site area and surface water catchment whereby shallow groundwater discharges from the upper weathered bedrock to the stream channel. The collected drainage water will be discharged into the surface water system to ensure there is no net change in the water balance for the Proposed Development site. The likely effects on surface water are considered within Chapter 12 (Water).

The drainage system will result in permanent localised lowering of groundwater levels within the upper transition zone of the underlying bedrock aquifer. The calculated zone of influence of the drainage system on groundwater level has been estimated to be in a range of 7 to 26m for the worst case scenario of a 2.5m drawdown. No sensitive groundwater dependent receptors have been identified within the extent of the zone of influence. The magnitude of the proposed under slab drainage effect is Negligible due to the potential effect on the attribute being insufficient in magnitude to affect either use or integrity of the groundwater aquifer.

The construction of the Proposed Development and associated hard standing/impermeable areas has the potential to lead to a reduction in groundwater recharge to the underlying bedrock aquifer. Based on the shallow water table and observed groundwater flow direction from groundwater monitoring it is considered this recharge would have discharged locally to the stream on the Proposed Development site as baseflow.

As the storm water drainage from the Proposed Development site will also be discharged to the tributary of the Baldonnell Stream in accordance with IE licence requirements, there is no net potential effect to site water balance.

The significance of likely effects on the aquifer is Imperceptible.

13.4.4.3 Pollution of Water Environment

The preliminary risk assessment (as presented in Appendix 13.5), identified the following PPL during Operational Phase, where preliminary land contamination risk was identified as 'Moderate' and requiring further assessment:

- Risk to surface water from discharge of drainage water (PPL 9).

There are no proposed discharges to groundwater associated with the Proposed Development such as soakaways, percolation areas or trade effluent discharges.

The quantitative land contamination assessments did not identify elevated concentrations of potential contaminants within the groundwater that may potentially affect the quality of surface water if directly discharged.

Based on regional land contamination review, there is a risk release of contaminants related to the use of firefighting foams (PFAS/PFAO compounds) at Casement Aerodrome into the groundwater, which may be migrating into the Proposed Development site area. Groundwater quality will be considered as part of the review of the IEL for the Proposed Development. The assessment of potential effects associated with discharges to surface water during operation is presented in Chapter 12 (Water).

The operation of the Proposed Development may result in accidental spillage of potentially polluting substances such as fuels, oils or other chemicals used or stored on the Proposed Development site. The operation of the Proposed Development will be regulated in accordance with a revised IE licence and therefore the accidental spillages during routine operation are likely to be localised and unlikely to result in groundwater pollution. The potential magnitude of the potential effect is likely to be Negligible.

The significance of likely effect of pollution of water environment during the Operational Phase is Imperceptible.

13.4.4.4 Summary of Operational Potential Effects

Table 13.17 summarises the predicted likely effects during the Operational Phase of the Proposed Development.

Table 13.17: Summary of operational effects on geological and hydrogeological attributes at the Proposed Development site.

Category	Feature	Importance[6]	Magnitude of Effect		Significance of Effect
			Ranking	Justification	
Mineral aggregate resources	Crushed rock aggregate potential	Medium to high	No potential effects	No potential effects anticipated during operational phase	None
Land Contamination	Casement Aerodrome	Medium	Potential effects assessed in Chapter 12 (Water)		
	Made ground	Medium	Negligible	No significant contamination encountered. Risk to maintenance workers can be managed by standard health and safety measures.	Imperceptible
	Till	Medium	Negligible		Imperceptible
Aquifer	Bedrock -locally Important Aquifer (LI)	Medium	Negligible	Unlikely risk of accidental spillages under routine operation	Imperceptible
			Negligible	Unlikely to affect either use or integrity of the groundwater aquifer.	Imperceptible

13.4.5 Decommissioning Phase

Potential effects during the Decommissioning Phase are likely to be similar to those described for the Construction Phase.

13.5 Mitigation and Monitoring Measures

13.5.1 Construction Phase

13.5.1.1 Loss of Mineral Resources

Excavated material, where possible will be reused within the Proposed Development. The PSCS and appointed Contractors will ensure acceptability of the material for reuse for the Proposed Development with appropriate handling, processing and segregation of the material in accordance with the CEMP (refer to Appendix 5.1). Refer to Chapter 16 (Resources and Waste Management).

Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff. Any surplus suitable material excavated that is not required for the Proposed Development, will be reused/recycled as set out in Chapter 16 (Resources and Waste Management).

13.5.1.2 Excavation of Made Ground

Any excavations within made ground will follow the criteria outlined in the CEMP. The CEMP will be updated by the PSCS and the appointed Contractors prior to the commencement of construction.

Excavations in made ground will be monitored by an appropriately qualified person to ensure that any localised areas of contamination encountered are identified, segregated and disposed of appropriately and to ensure soils are consistent with the descriptions and classifications according to the waste acceptance criteria testing carried out as part of the site investigations.

[6] Refer to Table 13.13 for sensitivity ranking justification

Any identified localised areas of contamination will be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage.

Care will be taken to ensure that the contaminated material does not cross-contaminate clean soils elsewhere throughout the site.

Samples of ground suspected of contamination will be tested for contamination and ground excavated from these areas will be disposed of to a suitably licensed or permitted site in accordance with the current Irish waste management legislation.

Any dewatering in areas of contaminated ground will be designed to minimise the mobilisation of contaminants into the surrounding environment. Where dewatering in such areas is unavoidable the water will be adequately treated prior to discharge.

13.5.1.3 Pollution of the Water Environment

The CEMP will be updated by the PSCS and the appointed Contractors prior to the commencement of construction.

Good construction management practices will be employed to minimise the risk of transmission of hazardous materials as well as pollution of the diverted watercourse and groundwater.

The construction management of the Proposed Development site will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams et al., 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures to be implemented to minimise the risk of spills and contamination of soils and waters will include:

- Employing only competent and experienced workforce, and site specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
- Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g. by a roll-over bund, raised kerb, ramps or stepped access.
- The location of any fuel storage facilities will be considered in the design of all construction compounds and will be fully bunded. These are to be designed in accordance with relevant and current guidelines and codes of best practice at the time of construction.
- Good housekeeping will be maintained at the site (daily site clean-ups, use of disposal bins, etc.) during the entire construction phase.
- All concrete mixing and batching activities will be located in designated areas away from the watercourse and drains.
- Potential pollutants will be adequately secured against vandalism in containers in a dedicated secured area.
- Provision of proper containment of potential pollutants according to relevant and current codes of practice and legal requirements.
- Thorough control during the entire construction stage to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and
- Spill kits to be provided and to be kept close to the construction area and temporary construction compounds. Staff to be trained on how to use spill kits correctly.

13.5.1.4 Monitoring

Excavations in made ground will be monitored by an appropriately qualified person to ensure that any contaminated material is identified, segregated, and disposed of appropriately. Any material from identified localised areas of contamination shall be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage.

Care will be taken to ensure that the localised area of contamination does not cross-contaminate clean soils elsewhere. All excavations will be monitored in accordance with good practice and guidelines at the time of the works.

Any excavation and stockpiled material shall be monitored during earthworks to ensure the stability of slopes and to ensure that the soils excavated for disposal are consistent with the descriptions and classifications according to the waste acceptance criteria testing carried out as part of the Proposed Development site investigations.

Implementation of the CEMP will be monitored on an ongoing basis.

13.5.2 Operational Phase

No significant effects have been identified and therefore no mitigation or monitoring is considered necessary. The site will continue to operate under the conditions of a revised IE licence.

13.5.3 Decommissioning phase

Mitigation measures outlined to minimise potential effects during the Construction Phase will be employed during the Decommissioning Phase, where appropriate.

13.6 Residual Effects

On application of mitigation measures, the identified likely effects during the Construction and Decommissioning Phases, as summarised in Table 13.18, would be Imperceptible and Short-term on all geological and hydrogeological features of concern. As outlined in Section 5.7, decommissioning activities will need to be undertaken in accordance with the requirements of a revised IE licence.

No significant operational effects are likely to arise.

Table 13.18: Summary of residual construction and operational effects on geological and hydrogeological features at the Proposed Development site.

Category	Feature	Importance[7]	Magnitude of Potential Effect[8]	Significance of Effect Prior to Mitigation	Mitigation	Magnitude of Potential Effect Post Mitigation8	Significance of Effect Prior to Mitigation
Construction / Decommissioning Phases							
Mineral aggregate resources	Crushed rock aggregate potential	Medium to High	Negligible	Imperceptible	Materials management during construction to maximise reuse as aggregate	Negligible	Imperceptible
Land Contamination	Casement Aerodrome	Medium	Effects assessed in Chapter 12 (Water)				
	Made ground	Medium	Negligible	Imperceptible	CEMP	Negligible	Imperceptible
	Till	Medium	Negligible	Imperceptible	CEMP	Negligible	Imperceptible
Aquifer	Bedrock -locally Important Aquifer (LI)	Medium	Small Adverse	Slight Negative Short-Term	CEMP	Negligible	Imperceptible
			Negligible	Imperceptible	-	Negligible	Imperceptible
Operational Phase							
Mineral Aggregate Resources	Crushed rock aggregate potential	Medium	No potential effect	None			
Land Contamination	Casement Aerodrome	Medium	Potential effect assessed in Chapter 12 (Water)				
	Made ground	Medium	Negligible	Imperceptible	-	Negligible	Imperceptible
	Till	Medium	Negligible	Imperceptible	-	Negligible	Imperceptible
Aquifer	Bedrock -locally Important Aquifer (LI)	Medium	Negligible	Imperceptible	-	Negligible	Imperceptible
			Negligible	Imperceptible	-	Negligible	Imperceptible

[7] Refer to Table 13.13 for sensitivity ranking justification

[8] Refer to Table 13.16 and Table 13.17 for justification of the magnitude of effect pre mitigation

13.7 References

An Bord Pleanala (2016) *Inspector's Report, Further development of a quarry at Fortunestown, Tallaght, Dublin 24, Roadstone Ltd 27*

Bing Maps (2024) *Bing Maps*

Department for Environment and Rural Affairs (DEFRA) (2014), *Development of Category 4 Screening levels for assessment of land affected by contamination, SP1010, Final Project report (Revision 2)*

Department of the Environment, Climate and Communications (DECC) (2024) *Mineral Exploration and Mining.*

Environment Protection Agency (EPA) (2022) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports, EPA, Dublin, Ireland.*

Environment Protection Agency (EPA) *EPA Maps.*

Environment Protection Agency (EPA) (2023) *Office of Radiation Protection and Environmental Monitoring Historic and Operational Mines project 2020-2021. EPA, Wexford, Ireland*

Environment Protection Agency (EPA) (2020) *Guidance on waste acceptance criteria at authorised soil recovery facilities, EPA, Wexford, Ireland*

Environment Protection Agency (EPA), Teagasc (2024) *Teagasc Soils Data - Surface Soils Classification and Description*

Government of Ireland and Tailte Eireann (GoI & TE) (2024) *National Geospatial Data Hub, GeoHive Hub*

Google Maps (2024) *Google Maps*

Geological Survey Ireland (GSI) (2024) *GSI Spatial Resources*

GSI (2024) *Aggregate Potential Mapping*

GSI. C.Galvan, G. N. (1860) *Explanations to accompany sheet 111 of the maps of the Geological Survey of Ireland, illustrating part of the Counties of Dublin, Kildare, and Meath. Alexander Thom & Sons, Dublin, Ireland.*

HazWasteOnline™ (2024) *Hazardous Waste Classification Software and Training for both the UK & EU regulatory environments.*

Ireland Topographic Maps (ITM)

Institute of Geologists of Ireland (IGI) (2013) *Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environmental Impact Statements, IGI, Dublin, Ireland.*

Kelly, C., Hunter Williams, T., Misstear, B.M., Motherway, K. (2015) *Irish Aquifer Properties – A reference manual and guide. Prepared on behalf of the Geological Survey of Ireland and the Environmental Protection Agency.*

Land Quality Management (LQM), Paul Natanail et al., (2015) *The LQM/CIEH S4ULs for Human Health Risk Assessment, Version 1.0, 2015, UK*

Masters-Williams H, Heap H, Kitts H, Greenshaw L, Davis S, Fisher P, Hendrie M and Owens D (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532D), CIRIA, London*

National Roads Authority (NRA) (2008) *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.*

Directives and Legislation

Directive 2000/60/EC (2002) *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*

Directive 2006/118/EC (2006) *Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration*

S.I. No. 122/2014 - European Union (Drinking Water) Regulations (2014)

S.I. No. 149/2012 - European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2012 (2012)

S.I. No. 219/2008 - European Communities (Water Policy) (Amendment) Regulations 2008 (2008)

S.I. No. 261/2018 - European Union (Water Policy) (Abstractions Registration) Regulations 2018 (2018)

S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (20090

S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations 1988 (1988)

S.I. No. 327/2012 - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (2012)

S.I. No. 350/2014 - European Union (Water Policy) Regulations 2014 (2014)

S.I. No. 366/2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (2016)

S.I. No. 386/2015 European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015 (2015)

S.I. No. 389/2011 - European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2011 (2011)

S.I. No. 413/2005 - European Communities (Water Policy) (Amendment) Regulations 2005 (2005)

S.I. No. 464/2017 - European Union (Drinking Water) (Amendment) Regulations 2017 (2017)

S.I. No. 722/2003 - European Communities (Water Policy) Regulations 2003 (2003)

S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 (2010)

S.I. No. 93/2010 - European Communities (Water Policy) (Amendment) Regulations 2010 (2010)

Water Services Acts (2007 to 2017)

14. Archaeology, Architecture and Cultural Heritage

14.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the potential effects on archaeology, architecture and cultural heritage associated with the Construction, Operational and Decommissioning Phases of the Data Centre Development DC3 (referred to as the Proposed Development) in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

During the Construction Phase, the potential effects on archaeology, architecture and cultural heritage associated with the Proposed Development have been assessed. This included construction activities such as earthmoving activities comprising topsoil removal, trench excavation and installation of services.

No further effect will take place in relation to archaeology during the Operational Phase of the Proposed Development.

The aim of the Proposed Development when in operation is to offer expanded compute capacity to GIL's customers and products. The Proposed Development is described in detail in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction) contains a description of construction and demolition activities.

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental effects, where practicable. In addition, feedback received from consultation undertaken throughout the alternatives assessment and design development process have been considered, where appropriate.

This Chapter was prepared by Margaret McCarthy, Consultant Archaeologist (further details provided in the Competent Experts Summary in Appendix 1.1) as part of an archaeological, architectural, and cultural heritage assessment of potential effects due to the Proposed Development. The Proposed Development will be constructed on a mixture of brownfield and greenfield sites within the existing GIL Campus, Grange Castle Business Park South, Dublin 22, in the townlands of Aungierstown and Ballybane, and Kilbride.

Refer to Appendix 1.1 for the competency of the author of this Chapter.

14.2 Assessment Methodology

14.2.1 General

The assessment has been undertaken in order to evaluate the archaeological, architectural and cultural heritage potential of the area of the Proposed Development and to identify constraints or features of archaeological and architectural significance within or adjacent to the subject lands. The assessment was carried out according to the methodologies specified in the Environmental Protection Agency (EPA) guidance documents (EPA, 2022).

The Transport Infrastructure Ireland (TII) Cultural Heritage Impact Assessment of TII National Road and Greenway Projects (TII, 2024) refers to the criteria in the EPA guidance for rating the magnitude and significance of effects at EIA stage on archaeological, architectural, and cultural heritage sites. On this basis, EPA guidance is relied on for the assigning of significance criteria to potential effects.

14.2.2 Legislative Framework

Ireland has committed to the protection of its archaeological and architectural heritage by being a signatory to two international conventions that aim to protect cultural heritage. These are:

- The 1985 European Convention on the Protection of Architectural Heritage (The Granada Convention), which aims to make provision for the protection of monuments, groups of buildings and sites that are of *"historical, archaeological, artistic, scientific, social or technical interest"*.

- The 1992 European Convention on the Protection of the Archaeological Heritage (The Valetta Convention), which aims to *"protect the archaeological heritage as a source of the European collective memory and an instrument for historical and scientific study"*.
- Provisions made in these conventions have been written into Irish Law via the National Monuments (Amendments) Acts 1930-2004, the Heritage Act 1995, the Cultural Institutions Act 1997, the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, Architectural Heritage Protection Guidelines 2004 and the various Planning and Developments Acts 2000-2018. It should be noted that the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023, while it was enacted in October 2023 and now in law, this Act awaits commencement orders from Minister for Housing, Local Government and Heritage to replace the National Monuments Acts (1930-2014). The National Monuments Act 1930 and its subsequent amendments of 1954, 1987, 1994 and 2004 provide for the protection of the archaeological heritage which includes monuments, buildings, shipwrecks, and archaeological artefacts. A level of universal protection is afforded to all monuments listed in the Record of Monuments and Places (RMP) which was established under Section 12 of the National Monuments (Amendment) Act 1994. While all known monuments are included on the RMP, a lesser number are entered on the Register of Historic Monuments established under Section 5 of the National Monuments (Amendment) Act 1987. Monuments that are considered to be of national significance are afforded the highest level of protection and are referred to as National Monuments.

14.2.3 South Dublin County Development Plan 2022-2028

South Dublin County Development Plan (SDCDP) 2022-2028 outlines a number of policies and objectives relating to archaeological, architectural and cultural heritage. The Council is committed to the preservation and protection of its rich archaeological and architectural resource and has regard to the recommendations of the Department of Housing, Local Government and Heritage (DHLGH).

The Planning Authority recommends that potential developers ensure that archaeological and architectural concerns can be integrated into development proposals. The SDCDP states that:

"Development in the vicinity of archaeological sites shall accord with the requirements of the Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999) and shall be designed to have minimal impact on archaeological features. There is a presumption in favour of in-situ preservation of archaeological sites and monuments and avoiding developmental impacts on archaeological heritage.

Regard shall be had in relation to the Emerging Historic Landscape Character Assessments contained within the Landscape Character Assessment of South Dublin County (2021) when assessing relevant planning applications. Regard shall also be had in relation to archaeological concerns when considering proposed infrastructure and roadworks located in close proximity to Recorded Monuments and Places."

14.2.4 Desktop Assessment

A number of documentary and cartographic sources were utilised to identify all known archaeological sites and other structures of architectural and cultural heritage interest within the Proposed Development area. The principal sources used for identifying the archaeological and architectural resource are listed below:

- Record of Monuments and Places for Dublin (RMP);
- Sites and Monuments Record for Dublin (SMR);
- National Museum of Ireland Topographical Files;
- Townland search of the annual Excavations bulletin;
- All three editions of the OS 6" scale sheets;
- Down Survey map for Co. Dublin;
- South Dublin County Development Plan 2022-2028;
- National Inventory of Architectural Heritage (NIAH);
- Aerial photographs (Ordnance Survey of Ireland osi.ie); and

- Excavations Bulletin (excavations.ie)

A number of these are discussed further below.

14.2.4.1 The Record of Monuments and Places

This is a list of archaeological sites known to the National Monuments Service of the Department of Housing, Local Government and Heritage with accompanying RMP maps, based on OS 6" Sheets, which indicate the location of each recorded site. The list is based on the Sites and Monuments Record (SMR) files which are kept in the National Monuments Service and are updated on a regular basis. The SMR are lists with accompanying maps and files of all known archaeological sites and monuments mainly dating to before 1700AD. These lists were initially compiled from cartographic, documentary, and aerial photographic sources.

14.2.4.2 National Museum of Ireland Topographical Files

This is the national archive of all known antiquities recorded by the National Museum and consists of a catalogue of objects reported to that institution since 1928. These files mostly contain information on finds but there are also references to monuments and sites of archaeological significance. A record of all previous archaeological excavations undertaken in Ireland is also available from the National Museum.

14.2.4.3 County Development Plan

County Development Plans are made in accordance with the requirements of the Local Government (Planning and Development) Acts, 2000-2015. The plans set out each council's policy for the conservation and enhancement of a county's natural and built environment and list items of special environmental or archaeological interest. The SDCDP 2022-2028 outlines a number of objectives and policies with regard to archaeology and heritage and was consulted in the preparation of this Chapter. It also includes a Record of Protected Structures (RPS), which is a list of buildings which may not be altered or demolished without grant of permission under the Planning and Development Acts, 2000 to 2018 (as amended).

The Department of Housing, Local Government and Heritage has published Architectural Heritage Protection, Guidelines for Planning Authorities (2004) and A Government Policy on Architecture 2009-2015, which contains policy and advice for the protection of architectural heritage, including protected structures and architectural conservation areas. Each Local Authority has a legal responsibility to include a RPS in its Development Plan.

14.2.4.4 Cartographic Sources and Aerial Photography

The Down Survey and all editions of the Ordnance Survey maps for the area have been consulted as well as the OSI aerial photography which can be accessed online at www.osi.ie.

14.2.4.5 Excavation Bulletins

Excavation Bulletins are annual bulletins which contain summaries of all licensed archaeological excavations undertaken in Ireland from 1985 to 2023. The database is available on at www.excavations.ie.

14.2.4.6 The National Inventory of Architectural Heritage (NIAH)

The National Inventory of Architectural Heritage is a state initiative under the administration of the Department of Housing, Local Government and Heritage. The database has been compiled and published on a county-by-county basis and it lists some of the architecturally significant buildings and items of cultural heritage significance. The NIAH for Co. Dublin (www.buidlingsofireland.ie) was consulted for townlands within and in the environs of the Proposed Development.

14.3 Baseline Environment

The Proposed Development is located in Grange Castle Business Park South, Dublin 22, in the townlands of Aungierstown and Ballybane, and Kilbride, between the N7 and M4 motorways. It is bounded by the Baldonnel Road to the south and Profile Business Park to the east, with residential properties to the west and south.

The surrounding land is one of mixed-use development comprising commercial and industrial properties along with some agricultural land. Grange Castle Golf Course is located to the east of the Proposed Development site and Casement Aerodrome is to the immediate south (Figure 14.1).

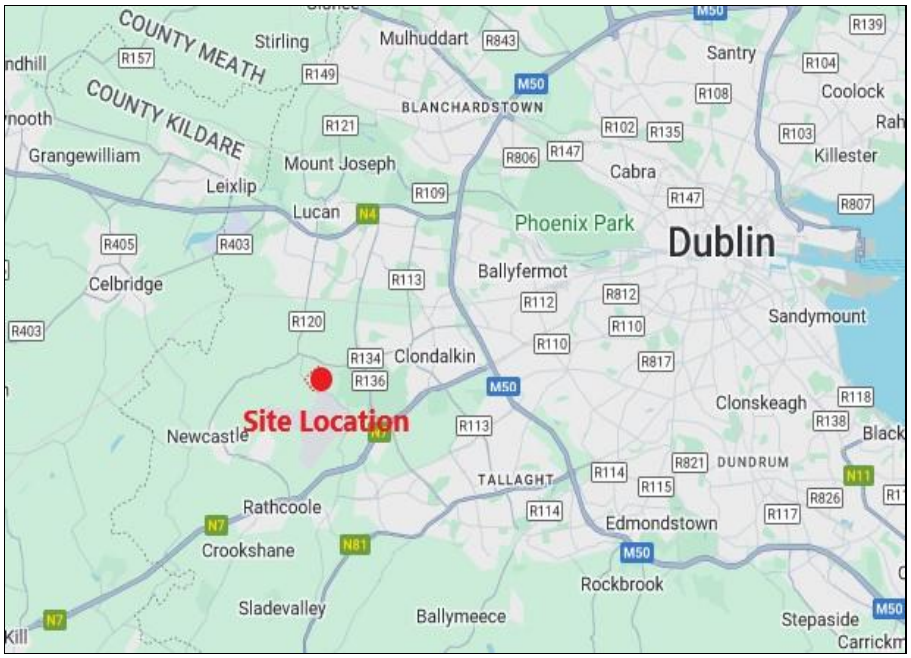

Figure 14.1: Proposed Development site location. Source: Google Maps.

14.3.1 Field Survey Results

The GIL Campus encompasses approximately 25 hectares and hosts two existing data centre buildings (DC1 and DC2). During the development of the area where DC1 and DC2 are located, nothing of archaeological significance was found.

The field survey for the Proposed Development was undertaken on the 10 April 2024. The Proposed Development coverage area is approximately 20.4 hectares in four greenfield areas to the south, east and northeast of the existing DC1 and DC2 buildings. For ease of recording and clarity, the fields were assigned individual numbers; refer to Figure 14.2. The objective of the field survey was to inspect the Proposed Development site and assess its potential for the known archaeological resource and potential indirect visual effects on archaeological monuments or features of architectural and cultural heritage merit in the wider environs. The conditions for site inspection were good in that there was little vegetation cover in the areas proposed for development. The townland boundary for Aungierstown/Ballybane and Kilbride runs through the Proposed Development site and it currently survives as a substantial earthen bank overgrown with trees and vegetation (Figure 14.2, Figure 14.3) where it has not currently been impacted upon.

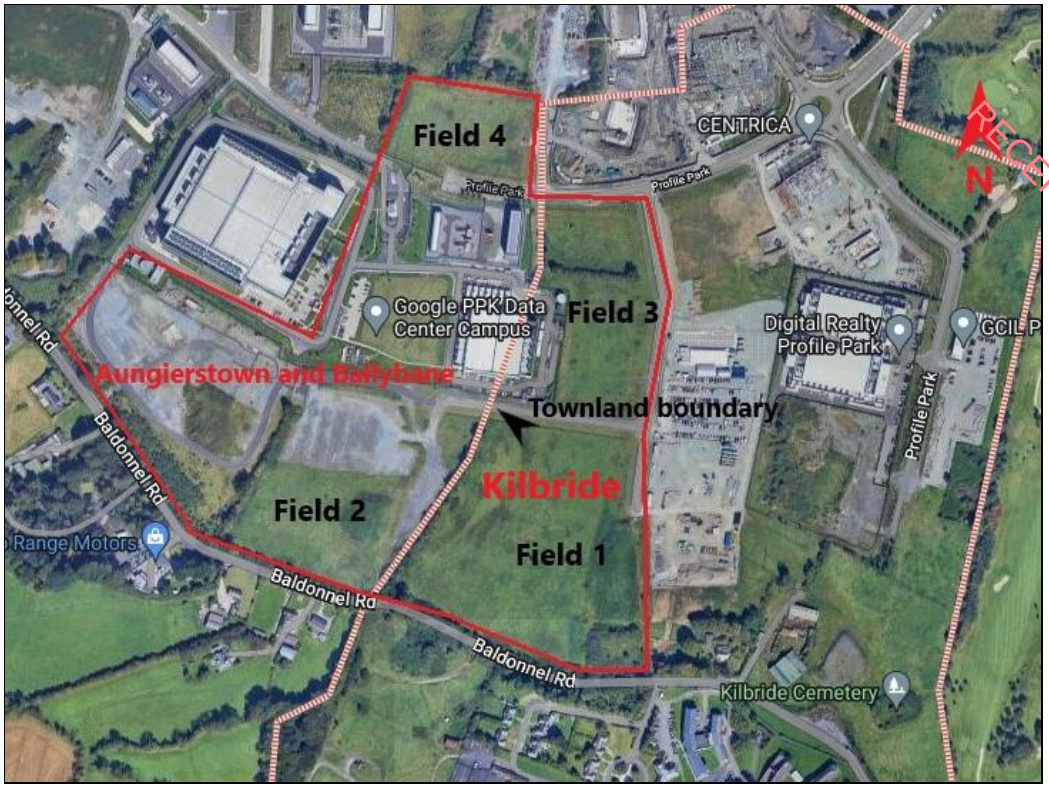

Figure 14.2: Aerial image of Proposed Development site. Source: Google Earth.

Figure 14.3: Townland boundary between Aungierstown/Ballybane and Kilbride townlands extending north-south through the Proposed Development site.

14.3.1.1 Field 1

This field occupies the eastern half of the Proposed Development site and is located within the townland of Kilbride. It comprises a substantial N-S oriented roughly rectangular-shaped field that was under a shallow grass cover at the time of the field survey. It is bounded to the north by an internal access road, to the south by the Baldonnel Road and to the west by the townland boundary with Aungierstown and Ballybane.

Grass cover was low which allowed for easy recognition of potential archaeological sites with little surface expression (Figure 14.4). No above ground features of archaeological significance were noted during the site inspection (Figure 14.5 and Figure 14.6). A few topsoil mounds in the southeast corner of the field are clearly modern in origin and relate to previous construction activities (Figure 14.7).

Figure 14.4: Field 1 – looking southwest towards townland boundary.

Figure 14.5: West side of Field 1 – showing townland boundary to right of image and looking south.

Figure 14.6: North side of Field 1 – looking northeast towards Baldonnel Road.

Figure 14.7: Grass covered topsoil mounds in southeast corner of Field 1.

14.3.1.2 Field 2

This square-shaped field is located to the immediate west of Field 1 and south of DC1. It is bound to the east by the townland boundary with Kilbride, to the south by the Baldonnel Road, and to the west by a mature ditched hedgerow (Figure 14.8 and Figure 14.9). The southern half of the field was covered in an abundant growth of grass at the time of the site walkover and was rough underfoot in places. No above ground features of potential archaeological merit were observed. The central and east side of the fields contain some grassed over earthen mounds created from the clearance of ground at the northern side of the field (Figure 14.10). Parts of the northern and eastern areas of the field have been cleared and surfaced with stone during the construction of the two existing data centre buildings and the associated internal road network (Figure 14.11 and Figure 14.12).

Figure 14.8: South side of Field 2 – looking southwest.

Figure 14.9: West side of Field 2 showing townland boundary – looking south.

Figure 14.10: Grassed over topsoil mounds in central area of Field 2 – looking south.

Figure 14.11: Surfaced area at northern side of Field 2 – looking northeast.

Figure 14.12: Surfaced area at eastern side of Field 2 – looking southeast towards townland boundary.

14.3.1.3 Field 3

This undeveloped greenfield area is located in the northeast corner of the Proposed Development site to the immediate east of the DC1 building. The townland boundary would have formed the western boundary to this field, but it was removed during the construction of DC1. The area is currently under grass and no above ground features of potential archaeological merit were observed during the field survey (Figure 14.13 and Figure 14.14).

Figure 14.13: Field 3 – looking northeast.

Figure 14.14: Field 3 – looking south.

14.3.1.4 Field 4

This square-shaped plot of pastureland is located to the immediate north of the internal access road directly opposite the entrance gates to the data centre. It is currently under grass and site inspection did not reveal any above ground features of archaeological potential (Figure 14.15 and Figure 14.16).

Figure 14.15: Field 4 – looking northwest.

Figure 14.16: Field 4 – looking south.

14.3.2 Archaeology, Architectural and Cultural Heritage Background

14.3.2.1 Archaeological Monuments in the Vicinity of the Subject Lands

While there are no recorded archaeological monuments within the Proposed Development site, a number of recorded sites are present in the surrounding landscape to provide evidence for prehistoric, early medieval and medieval settlement in the area (Table 14.1, Figure 14.17). The closest recorded archaeological monument is located 132m from the southeast corner of the Proposed Development site and it is listed in the Record of Monuments and Places for Co. Dublin as a castle (DU021-004). No trace of the original building survives, and the area is now built over with modern farm buildings. The Anglo-Norman invasion of Ireland in the middle of the twelfth century marked a significant change in the social structure of the island with the colonisers introducing new types of fortifications, buildings and language. The major settlements in this area of Dublin during the medieval period developed around Castle Bagot, Kilbride Castle, Grange Castle, Nangor Castle and Adams Castle.

The medieval parish church (DU021-00501) of Kilbride is located c.320m east of the Proposed Development

Figure 14.17). This is situated within a circular graveyard (DU021-00502) which may be part of an earlier ecclesiastical enclosure (DU021-00503). The chapel was dedicated to St. Bridget and belonged to St. Patrick's Cathedral.

The medieval parish church (DU021-00301) of Kilmactalway is located in the grounds of Castle Bagot approximately 600m to the south of the Proposed Development site. It is situated at the highest point of a circular walled graveyard (DU021-00302) surrounded by farmland. There is a bank against the inside wall which may be part of the original ecclesiastical enclosure (DU021-00303). The church of Kilmactalway was dedicated to St. Magnenn and in 1366 it was annexed to St. Patrick's cathedral (Ball, 1906). In 1615 and 1630 the graveyard and church were recorded as being in good repair but the church now survives just to the eaves except for the north wall. There is also a record of a baptismal font being located in the church (DU021-003004), but this no longer survives.

Table 14.1: Recorded archaeological monuments in the vicinity of the Proposed Development.

RMP No.	Townland	Site Type
DU021-00301	Kilmactalway	Church
DU021-00302	Kilmactalway	Graveyard
DU021-00303	Kilmactalway	Ecclesiastical enclosure
DU021-00304	Kilmactalway	Font
DU021-112	Kilmactalway	Enclosure
DU017-082	Nangor	Field system
DU017-037	Nangor	Castle-unclassified
DU021-00501	Kilbride	Church

RMP No.	Townland	Site Type
DO021-00502	Kilbride	Graveyard
DU021-00503	Kilbride	Ecclesiastical enclosure
DU021-004	Kilbride	Castle – unclassified
DU021-108	Ballybane	Concentric enclosure
DU021-109	Ballybane	Enclosure

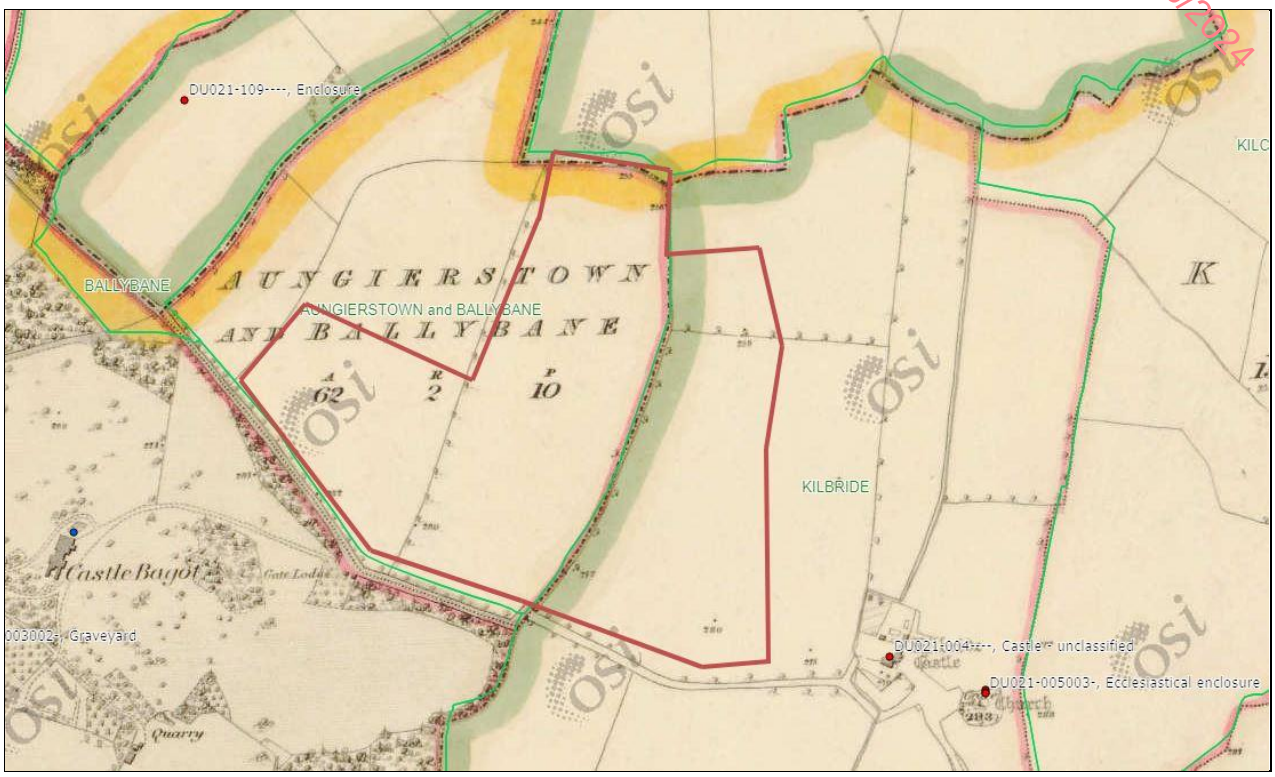

Figure 14.17: Boundary of Proposed Development site showing archaeological monuments to east and northwest. Source: OSI.

14.3.2.2 Cartographic Background

A review of historic mapping is an invaluable tool in showing how the landscape has changed over time and the comparison of various editions can indicate how some landscape features have been created, altered or removed. In some instances, topographical features that appear on these early maps are found to be of potential archaeological significance during field survey. The 17th century Down Survey map indicates the townland of Ballybane but not the parish churches of Kilbride and Kilmactawley (Figure 14.18). Cartographic evidence indicates that the landscape surrounding the Proposed Development has not altered significantly in configuration since the early nineteenth century with the system of field boundaries appearing mostly unaltered. The pre-Famine 1st edition OS map (1843) for the Proposed Development area shows an open agricultural landscape forming part of the Castle Bagot demesne (Figure 14.19). The later revised 25" edition (1911-12) indicates that the system of field boundaries remained largely unaltered (Figure 14.20). No features of archaeological, architectural or cultural heritage significance are indicated on the OS maps.

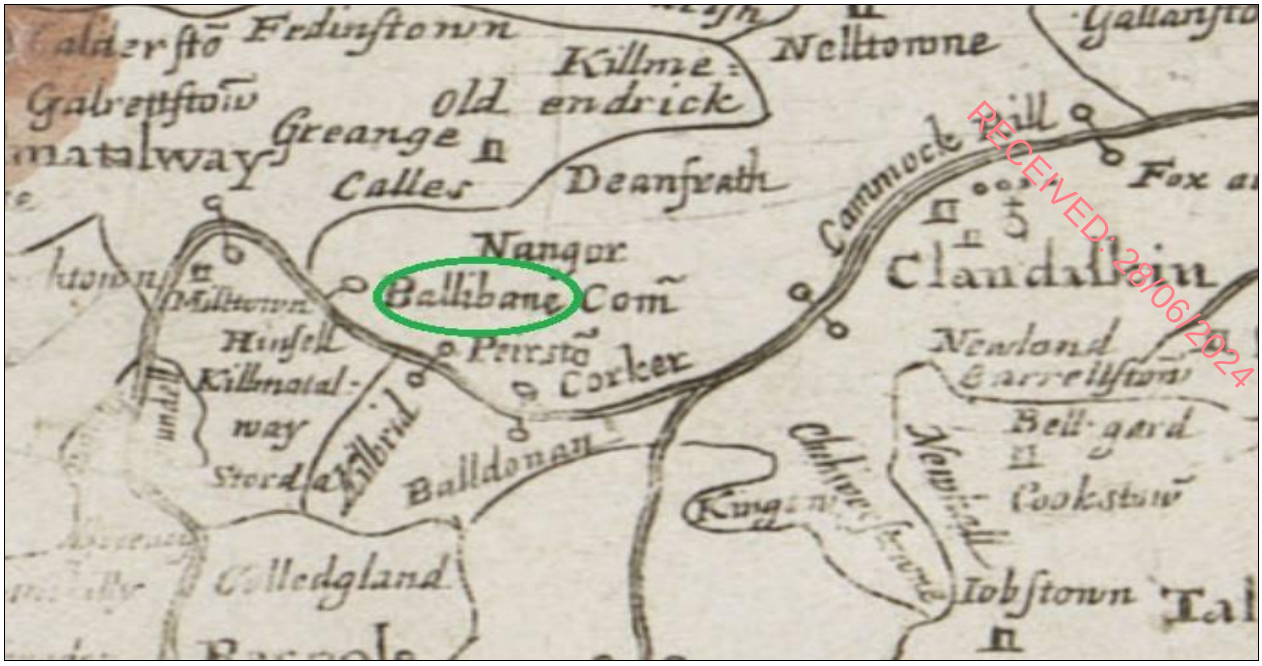

Figure 14.18: Down Survey map showing Ballybane (*Ballibane*) townland. Source: OSI.

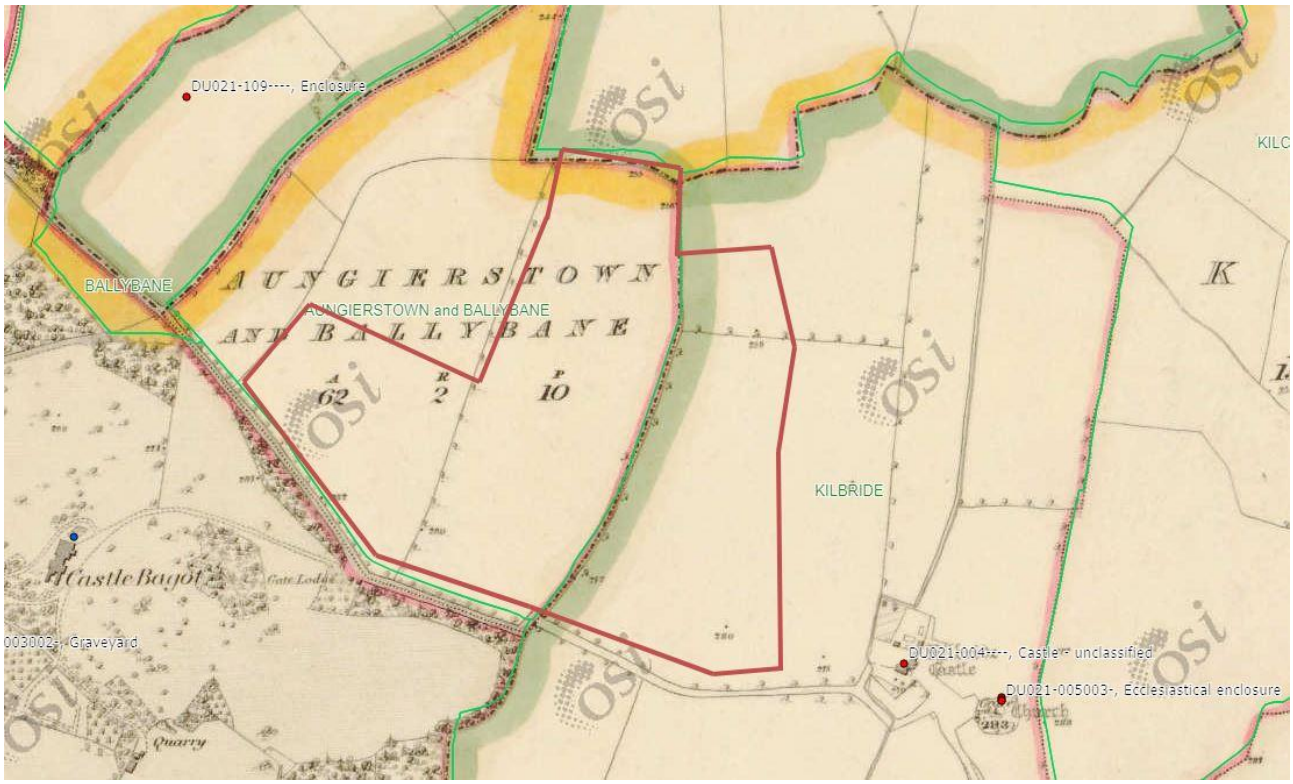

Figure 14.19: Extract from 1st edition OS map (1838) showing boundary of Proposed Development site. Source: OSI.

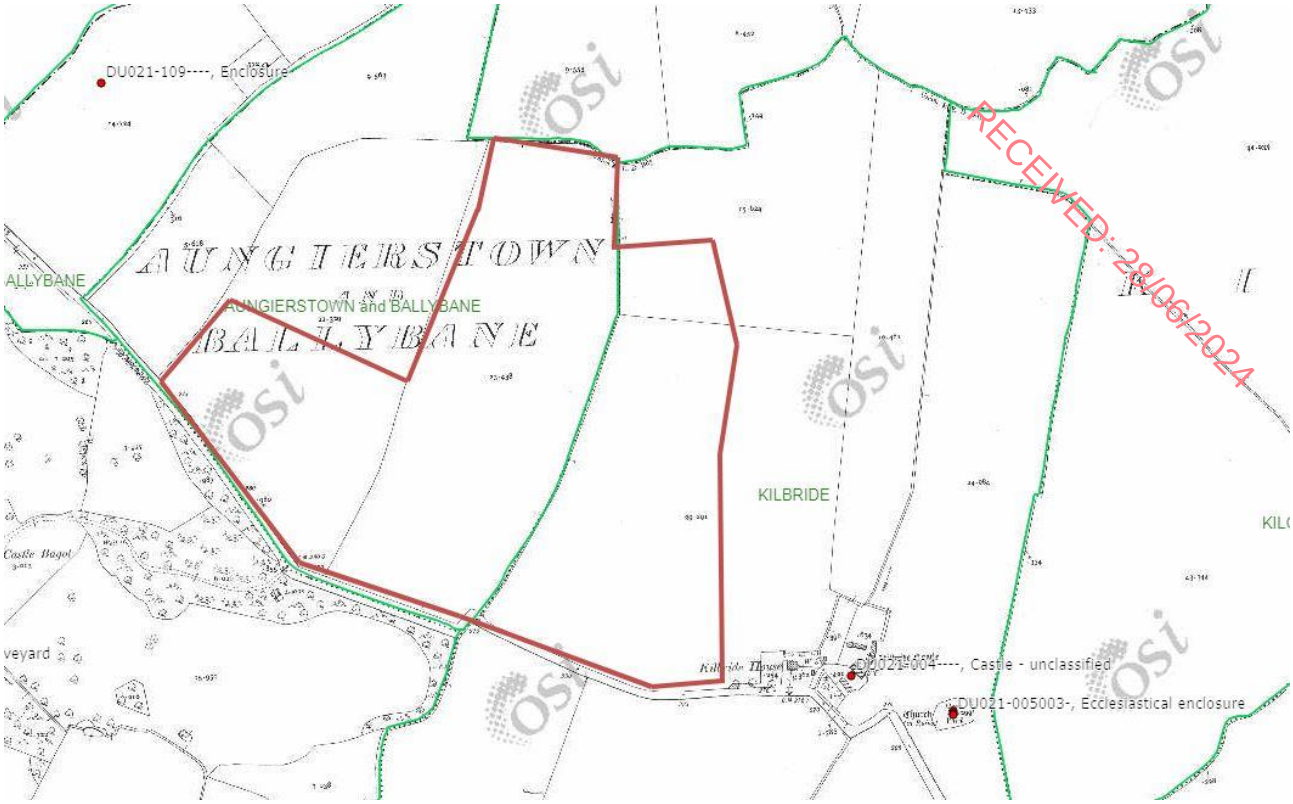

Figure 14.20: Extract from 25 inch edition OS map showing boundary of Proposed Development site. Source: OSI.

14.3.2.3 Record of Protected Structures

The South Dublin County Development Plan 2022-2028 provides a full list of all its protected structures. The plan recognises the status of these buildings as sites of architectural merit and all are afforded legal protection. There are no protected structures within the lands proposed for development. Castle Bagot House (Reg. No. 180), Kilmactawley Church and Graveyard (Reg. No. 182), Kilbride Church and Graveyard (Reg. No. 184) and the complex of buildings at Casement Aerodrome complex (Reg. No.188) located approximately 200m southeast of the Proposed Development area are included in the record.

14.3.2.4 National Inventory of Architectural Heritage (NIAH)

A search of the database of the National Inventory of Architectural Heritage indicated that no buildings or other features considered of architectural or cultural merit are recorded for the Proposed Development site. A cluster of buildings listed to the south of the Proposed Development site are associated with Casement Aerodrome (Reg. No. 11208028) constructed in 1937 and include stone buildings, offices and hangars. Castle Bagot (Reg. No. 11208010) and Kilcarbery House (Reg. No. 11209001) in Grange Castle Golf Club are also included in the inventory. Castle Bagot is described as a detached five-bay three-storey former country house constructed c. 1800 and named after its owner, Mr Bagot. The entrance gates to Castle Bagot are directly opposite the southern boundary of the Proposed Development site on the Baldonnel Road (Figure 14.21).

Figure 14.21: Entrance gates to Castle Bagot on Baldonnel Road.

14.3.2.5 Previous Archaeological Work Undertaken Within and in the Environs of the Proposed Development Area

The Excavations Bulletin is both a published annual directory and an online database that provides summary accounts of all the excavations carried out on the island of Ireland from 1970 to 2023. The western environs of Dublin have been subject to considerable development and infrastructural works in recent years and several archaeological investigations in Grange Castle International Business Park and Profile Park since the 1990s have revealed a large amount of previously unknown archaeological sites. Over 16 archaeological licences have been issued for the general area of Grange Castle and Kilbride and the excavations revealed features dating from the prehistoric to the early medieval and medieval periods. These include Bronze Age cooking sites, prehistoric enclosures and settlements, burial pits and souterrains (Table 14.2). The density and chronologically variable nature of the sites is an indicator of the potential for archaeological features to be present in the lands forming the subject of this Chapter. In 2021, archaeological testing at a development site in Profile Park to the immediate north of the GIL campus identified the remains of a possible prehistoric enclosure that may have been used for ritual activity. Investigations in the same year adjacent to the Grange Castle South Access Road revealed a substantial cistern or well that was filled with charcoal and animal bone.

Table 14.2: Archaeological excavations undertaken in the vicinity of the Proposed Development site.

Excavation No.	Townland	Site Type
96E0273	Kilmahuddrick	Nangor Castle
97E0116	Kilmahuddrick	Linear features
97E0116ext	Kilmahuddrick	Medieval ditches
00E0718	Kilmahuddrick/Nangor	Burnt spreads and deposits
00E0448	Kilmahuddrick	Ring barrow
00E0061	Grange and Kishoge	Linear feature
01E0718ext.	Grange and Kishoge	Neolithic house
01E0754	Nangor	Medieval ditch
03E1210	Grange	Mill

Excavation No.	Townland	Site Type
03E0023	Grangecastle	Pits and drains
03E0229	Grange	Burnt mounds
13E0435	Grange/Ballybane/Nangor	Furnace and charcoal clamp
13E0471	Ballybane	Circular enclosure and burnt mounds
18E0484	Aungierstown, Ballybane and Milltown	Medieval linear features
21E0061	Kilbride	Enclosure
21E0692	Kilbride	Pit

14.4 Potential Effects

14.4.1 'Do Nothing' Scenario

In the 'do nothing' scenario, there would be no effect on the archaeological heritage as there would be no works and no ground disturbance.

14.4.2 Construction Phase

The Construction Phase of any development involves substantial earthmoving activities comprising topsoil removal, trench excavation and installation of services. The potential for uncovering previously unknown prehistoric sites and settlements as well as later early medieval and medieval farming complexes within the Proposed Development site is therefore high.

14.4.2.1 Direct Effects on Potential Sub-surface Archaeological Features

The lands forming the subject of this assessment comprise a substantial greenfield area of mostly undisturbed ground which is considered to be of high archaeological potential given the density of archaeological sites discovered in the townlands of Aungierstown/Ballybane and Kilbride in recent years. While there are no recorded archaeological monuments within the Proposed Development site and the field survey did not identify any potential visible archaeological monuments, the surrounding area has witnessed several archaeological investigations over the last 30 years. It is possible that previously unknown archaeological features may survive below the surface. The potential for an effect on the archaeological resource would arise therefore during ground works at the initial Construction Phase. Therefore, there is considered to be potential for a Negative, Significant and Permanent effect to arise, in the absence of mitigation and monitoring measures.

14.4.2.2 Direct Effects on Architectural and Cultural Heritage

There are no protected structures within the surveyed area and the NIAH does not list any upstanding buildings or structures within the boundary of the Proposed Development lands. There will therefore be no Adverse Significant direct effects on any known architectural heritage sites.

14.4.2.3 Indirect Effects on Architectural and Cultural Heritage

There are no protected structures or buildings of architectural and cultural heritage of merit within the boundary of the Proposed Development. The Proposed Development is unlikely to cause any Adverse Significant indirect effects on the curtilage of nearby structures due to the visual screening that is provided (refer to Chapter 5 (Construction)). There will therefore be no Adverse Significant indirect effects on the architectural and cultural heritage resource.

14.4.3 Operational Phase

No significant potential effects on archaeology, architecture and cultural heritage are considered likely to arise will during the Operational Phase of the Proposed Development.

It is considered that the overall visual impact on buildings and structures of archaeological, architectural, and cultural heritage significance of any further development within the industrial park is negligible.

14.4.4 Decommissioning Phase

No likely new significant effects on archaeology, architecture and cultural heritage are likely to arise during the Decommissioning Phase.

14.5 Mitigation and Monitoring Measures

In order to prevent accidental damage to the archaeological resource including any potential sub-surface archaeological finds or features, the below mitigation strategies are proposed.

14.5.1 Pre-Construction Phase Mitigation

While there are no recorded archaeological sites within the lands proposed for development, the discovery of numerous archaeological sites during recent infrastructural work in the wider area highlights the archaeological potential of the Proposed Development. In this regard, the following pre-Construction Phase mitigation is proposed:

- Given the overall size of the Proposed Development site, it is proposed that a comprehensive geophysical survey be undertaken within the undisturbed greenfield land.
- The geophysical survey will inform where anomalies exist, and such anomalies will subsequently be investigated by means of a comprehensive programme of archaeological test trenching. This work will be undertaken by a suitably qualified archaeologist licensed by the Department of Housing, Local Government and Heritage. Test trenching will determine if sub-surface archaeological features are present and the extent to which they may be affected by the construction of the Proposed Development. In the event of archaeological features being exposed during testing, further work on the Proposed Development site will require consultation with the archaeological staff of the National Monuments Service, Department of Housing, Local Government and Heritage. Should archaeological artefactual material be uncovered, the requirements of the National Museum of Ireland with regard to such items shall be implemented; and
- A comprehensive photographic and descriptive record of the townland boundary extending north-south through the Proposed Development site should be undertaken by the archaeologist contracted to undertake the test excavation.

14.5.2 Construction Phase Mitigation

The Construction Phase of any development involves considerable ground disturbance, therefore, the greatest potential effects on the archaeological resource will occur during the removal of topsoil and the reduction of ground levels. It is possible that archaeological features may exist in those areas not tested during the pre-Construction Phase of investigation.

The following mitigation measures are proposed during the Construction Phase:

- All topsoil removal operations shall be fully monitored by a qualified archaeologist. In addition, the monitoring archaeologist should be present to record the removal of the townland boundary that is required as part of the development. The archaeologist will require an excavation licence for archaeological monitoring, to be issued by The National Monuments Service, Department of Housing, Local Government and Heritage and approved by the National Museum of Ireland. Sufficient time will be allowed for the archaeologist to obtain an archaeological licence prior to the commencement of construction works, usually four weeks. The timescale for the Construction Phase shall be made available to the archaeologist at an early stage with information on where and when topsoil stripping will take place;
- The monitoring archaeologist shall be empowered to halt the development if buried archaeological features or finds are uncovered. If archaeological remains are encountered, these sites will be protected by the National Monuments legislation. Further work on the site will require consultation with the archaeological staff of The National Monuments Service; and
- Provision, including financial and time, shall be made to facilitate any excavation or recording of archaeological material that may be uncovered during the developmental works.

The excavations shall be undertaken in compliance with any measures that the National Monuments Service and the National Museum of Ireland deem appropriate. Following completion of monitoring, and other possible archaeological investigations, the archaeologist shall submit a report to the National Monuments Service and the National Museum of Ireland.

14.5.3 Operational Phase

No mitigation or monitoring measures further to those outlined for the Construction Phase are required during the Operational Phase.

14.5.4 Decommissioning Phase

No mitigation or monitoring measures further to those outlined for the Construction Phase are required during the Decommissioning Phase.

14.6 Residual Effects

All archaeological and cultural heritage issues will be resolved by mitigation during the pre-Construction Phase or Construction Phase as outlined in Section 14.5, in advance of the Operational Phase, therefore no other significant residual effects have been identified.

14.7 References

Ball, F.E. (1902) (reprinted 1995) *A History of the County of Dublin, Vol. 1, The HPS Library, Dublin.*

Department of Housing, Local Government and Heritage (DHLGH) (2011) *Architectural Heritage Protection*

Department of Housing, Local Government and Heritage (DHLGH) (2011) *Government Policy on Architecture 2009-2015*

Department of Housing, Local Government and Heritage (DHLGH) (2004) *Architectural Heritage Protection, Guidelines for Planning Authorities*

Environmental Protection Agency (EPA) (2022) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports (May 2022) (EPA Guidelines).*

South Dublin County Development Plan (SDCDP) (2022) *SDCDP 2022-2028*

Transport Infrastructure Ireland (2024) *Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects*

14.7.1 Other sources

- Department of Housing, Heritage, and Local Government
- Excavations.ie, database of Irish excavation reports. Available at http://www.excavations.ie.
- National Monuments Service
- OSI Ireland mapping website
- South Dublin County Council Library website

15. Landscape and Visual

15.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the likely direct and indirect significant effects of the landscape associated with the Construction, Operational and Decommissioning phases of the Data Centre Development DC3 (referred to as the "Proposed Development") in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

During the Construction Phase, the potential landscape and visual effects associated with the Proposed Development have been assessed. This included construction activities such as site clearance, excavation, operation of construction machinery and tools.

During the Operational Phase, the potential landscape and visual effects associated with day to day activities, drainage, surface water management and lighting and maintenance have been assessed.

The aim of the Proposed Development when in operation is to offer expanded compute capacity to GIL's customers and products. The Proposed Development is described in detail in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction) provides a description of the construction and demolition activities.

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental effects, where practicable. In addition, feedback received from consultation undertaken throughout the alternatives assessment and design development process have been considered, where appropriate.

This Chapter reviews the potential landscape and visual effects of the proposed DC3 data centre development. It presents the results of the Landscape and Visual Impact Assessment (LVIA) and the potential effects on the character of the landscape and on people's views and visual amenity.

Refer to Appendix 1.1 for the competency of the authors of this Chapter.

15.2 Assessment Methodology

15.2.1 Assessment Standards

The following documents have influenced the methodology for this assessment and are considered best practice within the industry. They set out a clear and systemic approach in documenting the baseline landscape and visual conditions, potential impacts, and mitigation. The assessment conforms with the direction offered by the following guidance documents:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR), (Environmental Protection Agency, 2022);
- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3), (Landscape Institute and Institute of Environmental Management and Assessment, 2013);
- An Approach to Landscape Character Assessment, (Natural England, 2014);
- Assessing landscape value outside national designations, Technical Guidance Note 02/21, (Landscape Institute, 2021);
- Visual Representation of Development Proposals, Technical Guidance Note 06/19 (Landscape Institute, 2019).

15.2.2 Assessment Approach

There are clear differences between landscape effects and visual effects and the following distinctions have been made:

- **Landscape effects** relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities, and landscape character; and
- **Visual effects** relate to changes to existing views of identified visual receptors ('people'), from the loss or addition of landscape features within their view due to the Proposed Development.

Landscape effects and visual effects have therefore been assessed and reported separately.

This LVIA follows an iterative process where key issues, constraints and mitigation related to the landscape character and visual assessment are integrated into the Proposed Development.

15.2.3 Establishing the LVIA Study Area

The LVIA Study Area takes into consideration an area extended 5km from the Proposed Development site boundary. The Zone of Theoretical Visibility (ZTV) is then used to appraise the potential visibility of the Proposed Development. Other information sources referred to during the refinement of the LVIA Study Area included aerial photography, local planning zones and landscape character.

Fieldwork was subsequently undertaken to verify the findings of the desk study and establishment of the LVIA Study Area in order to identify landscape and visual receptors that have potential to be affected by the Proposed Development.

15.2.4 Fieldwork Surveys

Fieldwork surveys were undertaken on 24 April 2024 by qualified and experienced landscape architects to record the characteristics, features and views towards the site. The purpose of this fieldwork was to review the key characteristics defined in the published landscape character assessments and to identify, record and map characteristics of the landscape not covered by published landscape character assessments.

Fieldwork surveys were also completed to clarify the identified visual receptors, representative viewpoint locations and the extent of views, taking into account of the effect of intervening features such as buildings and vegetation.

15.2.5 Landscape Character Assessment Approach

To enable the assessment of impacts on landscape character, the Landscape Character Assessment of South Dublin County Council, 2021 has been used to inform the identified Landscape Character Areas (LCAs) and baseline landscape sensitivity value for this report.

Landscape magnitude of change refers to the scale, nature and duration of the change and the degree to which the effect can be mitigated. It considers factors of the Proposed Development such as:

- Scale;
- Nature of development e.g. negative (adverse) or positive (beneficial) impacts;
- Duration of change e.g. short, medium, long term permanent or temporary impacts; and
- Mitigation e.g. the degree to which mitigation would reduce the effect.

The overall landscape character impact rating of the Proposed Development on any given Landscape Character Area is based on the determined level of sensitivity and magnitude of change. The level of sensitivity of a Landscape character area is defined by the Local Authority within SDCC Development Plan Chapter 3 Figure 3.1 and supported by a desktop study and site visit to establish the baseline via identify elements and features, identify key characteristics and consider value attached to the landscape per the guidance defined with GLVIA3. The landscape magnitude criteria that informs the assessment are illustrated in Table 15.1. which is aligned with GLVIA3.

Table 15.1: Landscape magnitude of change level definitions. Source: GLVIA3, 2013.

High adverse	Total loss or large-scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features or elements.
Moderate adverse	Partial loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic noticeable features and elements.
Low adverse	Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features or elements.
Negligible adverse	Barely noticeable loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
No change	No noticeable loss, damage or alternation to character or features or elements.
Negligible beneficial	Barely noticeable improvement of character by the restoration of existing features, and/or the removal of uncharacteristic features, or by the addition of new characteristic features.
Low beneficial	Slight improvement of character by the restoration of existing features, and/or the removal of uncharacteristic features, or by the addition of new characteristic features.
Moderate beneficial	Partial or noticeable improvement of character by the restoration of existing features, and/or the removal of uncharacteristic features, or by the addition of new characteristic features.
High beneficial	Large scale improvement of character by the restoration of features, and/or the removal of uncharacteristic features, or by the addition of new distinctive features.

15.2.6 Zone of Theoretical Visibility

A computer-generated Zone of Theoretical Visibility [ZTV] has been prepared, refer to Figure 15.. GLVIA3 defines ZTV as *"a map, usually digitally produced, showing areas of land within which a development is theoretically visible"*. ZTVs do not indicate how much of the Proposed Development will be visible. The purpose of the ZTV is to:

- Identify the theoretical extents of visibility of the Proposed Development i.e., areas from which it would not be visible and areas from which it could potentially appear in existing views;
- Assist in the identification of the LVIA Study Area;
- Identify visual receptors likely to be affected by the Proposed Development;
- Identify locations that are representative of the views experienced by visual receptors at different locations within the LVIA Study Area (representative viewpoints); and

- Inform the design and the extent and type of proposed mitigation.

ZTVs have been modelled using the 'Viewshed' tool in ESRI ArcMap GIS Software. A bare earth ZTV was prepared using Digital Terrain Model (DTM) data with a resolution of 2m. This ZTV represent a worst-case scenario as it does not include features such as existing buildings or vegetation which can screen or filter views.

For all ZTVs, an assumed viewing height of 1.7m above ground level has been used to simulate the eye level of a person at the top of the range, as set out in the GLVIA3, to represent the worst-case scenario. Viewsheds are generated from geospatially located 'points' on the top of the four corners of the building and from each individual viewpoint to inform the assessment and degree of visual impact.

15.2.7 Visual Receptors and Representative Viewpoints

Following a thorough desktop study, review of landscape character, review of the ZTV and ground-truthing site visits, representative viewpoints are identified and selected for further analysis.

Viewpoints are selected to illustrate:

- A range of receptor types including public and private domain views including residents, motorists, and users of public open space;
- A range of view types including elevated, panoramic, filtered, static views and views from sequential points along the routes;
- Potential for cumulative views of the Proposed Development in conjunction with other developments;
- A range of viewing distances from the proposal; and
- Key or protected views identified within planning documents.

Visual receptors have been categorised into the following types:

- **Residential** receptors are scattered along the Baldonnel Road to the south of the site. The ZTV shows limited visibility from the area due to the screening vegetation along the Baldonnel Road;
- **Employment** Receptors include the commercial premises along the Baldonnel Road and the businesses within the Grange Castle Business Park;
- **Transport** Receptors using the existing roads including the Baldonnel Road and the R134 New Nangor Road; and
- **Recreational** Receptors using the Grange Castle Golf Club to the east and the adjacent Corkagh Park.

Where a collection of visual receptors in the same category are likely to experience similar views, they have been grouped.

To understand the visual sensitivity, the GLVIA3 explains that *"the particular person or group of people likely to be affected at a specific viewpoint, should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views"*, (GLVIA3). The sensitivity of visual receptors results from a combination of parameters, such as:

- The activity/ occupation/ pastime of the receptors at particular locations;
- The extent to which their attention or interest may be focused on the views; and
- The visual amenity they experience.

Consideration has been given to the:

- Location, focus and orientation of the view;
- Features or characteristics of value within the view;
- Principal or secondary interests within the view;

- Static or kinetic nature of views; and
- Duration of the view from visual receptors.

Table 15.2 sets out the criteria referred to in determining the visual sensitivity of each representative viewpoint.

Table 15.2: Visual sensitivity level definitions. Source: GLVIA, 2013.

High Sensitivity	• Views within or across an internationally or regionally designated landscapes and/or specific views designated in national or regional policy. • Views with few or no detracting features and which may also have strong cultural associations supported by evidence, for example links to historical events or people, or representation in art or literature. • Visitors to tourist hotspots, heritage assets or other attractions, par ticularly at specific viewpoints or viewing places, where views of the landscape are important to the experience. • People engaged in specific activities for enjoyment of dark skies. • Residents at home. • People engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views, for example those using promoted walking and cycling routes. • People travelling along promoted scenic routes.
Medium Sensitivity	• Views across landscapes which are unlikely to be designated but may exhibit some indicators of value which are identified in the develop ment plan or evidence base and are important at the community level. • Views may have some detracting features and cultural associations supported by evidence. • People engaged in outdoor recreation or travelling along public rights of way or local roads, which are not promoted routes but where an appreciation of the surrounding landscape are relevant to the experience. • People working outdoors. • People working or attending schools and other institutional facilities, and their outdoor areas.
Low Sensitivity	• Views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base. • Views are likely to have some detracting features and lack cultural associations supported by evidence. • People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape. • People travelling on major road, rail or other transport routes which are not recognised as scenic routes. • People working indoors.
Negligible Sensitivity	• View across landscapes which are neither designated, nor identified in the development plan or evidence base, and without cultural asso ciations. • The landscape in the view is in poor condition or notably detracts from the experience of the view. • Limited numbers of viewers or infrequently accessed viewpoints. • Users with passing interest in their surroundings. • Users of minor roads and views from the air.

Visual magnitude of change relates to the scale, nature and duration of the change and the degree to which the effect can be mitigated. The assessment considers:

- Size and scale – with respect to the loss of existing features or addition of new features;
- Geographical extent of influence – where the proposed changes would be visible and to what extent; and

- Duration and reversibility – the time over which the change would occur and if these changes are reversible, set out on the following scale: short (weeks); medium (months); and long (years).

The criteria set out in Table 15.3 has been referred to in determining the magnitude of visual effects.

Table 15.3: Visual magnitude of change level definitions. Source: GLVIA, 2013.

High	The Proposed Development will result in extensive changes to the character and composition and will become the dominant feature of the landscape within the view. There may be longer term impacts, permanent or reversible.
Moderate	The Proposed Development will change the character and composition of discrete parts of the landscape within the view. There may be medium term impacts, permanent or reversible.
Low adverse	The Proposed Development will cause small changes to the character and composition of the landscape within the view. There may be short to medium term impacts, permanent or reversible.
Negligible adverse	The Proposed Development will cause barely perceptible changes in the character and composition of the landscape within view. May be short term impacts, permanent or reversible.
No change	No part of the Proposed Development, or work or activity associated with it, is discernible.

Consistent with the landscape character assessment approach, the overall rating of effects due to Proposed Development on any given viewpoint is based on the determined level of sensitivity and magnitude of change, refer to the matrix in Table 15.4.

The viewpoints represents the visual composition of the views and assesses the level of sensitivity for each viewpoint. The development is superimposed into the view in accordance with GLVIA3 guidance and these photomontages are used to assess the level of magnitude of change for each viewpoint.

These representative viewpoints and photomontages are analysed to determine the effects of the Proposed Development using the landscape and visual effects assessment matrix.

Table 15.4: Landscape and visual effects assessment matrix. GLVIA, 2013.

Sensitivity	Magnitude				
		High	Moderate	Low	Negligible
	High	High effect	High-Moderate effect	Moderate effect	Negligible
	Moderate	High-Moderate effect	Moderate effect	Moderate-Low effect	Negligible
	Low	Moderate effect	Moderate-Low effect	Low effect	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

15.2.8 Photography

A number of photographs were taken to record the views towards the Proposed Development from the identified representative viewpoint locations. These photographs were taken with a Sony α7R V full-frame camera with a Zeiss Loxia 50mm F/2.0 - Sony E lens [50mm equivalent focal length].

A camera height of 1.6m is used (average standing eye level). Notes are made of the exact location and ground level of the camera using GPS equipment and relevant maps. The direction the camera is pointed in, the lighting conditions, the elevation and direction of the sun etc, and the date and time the photograph was taken are also noted. Survey information is also recorded for significant, easily distinguishable objects (lampposts, trees, corners of buildings etc.) visible within each view, to be used as "control" when perspective matching the photograph. These surveyed objects when correctly matched with the base photograph ensure that the proposed render of the 3d model and the existing photograph are accurately merged together.

Where multiple shots were taken in the same location, each photograph was taken with a minimum 40 per cent to maximum 70 per cent overlap to allow for merging into panoramas. All photographs and photomontages have been prepared in accordance with Landscape Institute TGN 06/19 (Landscape Institute, 2019).

15.2.9 Photomontages

Photomontages were prepared for the assessment of the Proposed Development on the landscape, refer to Viewpoints 01-07. These photomontages are intended to illustrate the general location, scale and relationship of key visual elements with the surrounding landscape. These simulations were created using site photographs, computer modelling, and photo editing as follows:

- The camera details, position, angle of view, direction, tilt, etc. are imported into the rendering software and the photographs are used as background images in the virtual camera view. A suitable representation was then modelled for the surveyed "control" objects visible in each view and these were accurately aligned with their corresponding images in the background photograph. A 3D computer model was developed based on a DTM (Digital Terrain Model) with one metre contour data. The digital terrain model included buildings and vegetation. The model was positioned over the existing photograph using the GPS coordinates of the location, and a minimum of three existing elements within the photograph as reference points;
- Once the process of perspective matching was complete, the 3D model of the proposed development was set up for rendering. The lighting conditions noted from when the photographs were taken were simulated, and each perspective matched view of the 3d model was rendered; and
- The rendered image of the model was then superimposed onto the existing photograph in Adobe Photoshop. Those portions of the model that should be obscured by foreground objects i.e. buildings, cars, trees etc, were removed. Items in the photograph at the same distance from the camera as the proposed model were compared with the render to determine if it shows the same sharpness, blurriness, blueing-out, etc. Adjustments were made to the rendered model as appropriate to produce the final photomontage. There was an element of judgment used in the changes shown in these photomontages. The location of these visual simulations was selected to illustrate the range of potential effects likely for the proposal.

15.2.10 Assumptions and Limitations

This section sets out the assumptions which have been made and the limitations which inform the scope of the LVIA.

- Photographs were taken in April 2024 when vegetation was not in full foliage. The worst-case scenario for visual impacts is during the winter months, when the absence of leaves on the trees can open up more distant views. The LVIA has taken this into account the extent of visibility and the impact on views during winter months, using professional judgement and experience from other similar projects;
- No detailed nighttime assessment has been undertaken. However, potential effects associated with the lighting requirements are considered and an assessment of each representative viewpoint is included; and

- The Zone of Theoretical Visibility (ZTV) analysis is determined using a DTM used for topographic mapping. This was based on 2m resolution LiDAR data with an accuracy assessment within +/-200mm. The ZTV takes heights from the surface and does not consider screening by vegetation and buildings. Consequently, the ZTV presents a worse-case scenario and visibility of the Proposed Development on the ground would be less due to screening.

15.3 Baseline Environment

This section summarises the information gathered to inform the landscape and visual impact assessment study area and provide context of the Application Site and its surrounding environments.

15.3.1 Local Planning Authority Landscape Character Assessment

Landscape Character Types (LCTs) and LCAs are identified in the Landscape Character Assessment published by South Dublin County Council (SDCC) and prepared by Minogue and Associates in May 2021.

The Proposed Development site is located within predomintely LCA 2: Newcastle Lowlands. The LCA is considered as Medium Sensitivity ad defined by the SDCC Landscape Character Assessment (refer to Figure 15.) and its key characteristics are described as:

- Low-lying and gently undulating agricultural lands over limestone;
- Established communication corridors include the Grand Canal and railway corridor traverse east to west and two aerodromes at Weston and Baldonnel;
- Agricultural landuse primarily pasture and tillage;
- Increasing influence of urban activities closer to the motorways, national roads and regional roads;
- Long history of historic settlement and human activity with medieval landscape complex associated with Newcastle village and surrounds; and
- Number of demesnes associated with former country houses and institutions including reuse of older country houses at sites such as Peamount and Baldonnel.

The forces for change and impact to landscape character are outlined as:

- Increasing urban influences that impact on the rural landscape character;
- Fragmentation of agriculture-related habitats through piecemeal development;
- Rural housing pressures;
- Loss of separation distance between established urban and rural character; and
- The relatively flat and open landscape is vulnerable to adverse visual and landscape impacts of development.

While no specific landscape objectives apply to the site, the SDCC 2022-2028 County Development Plan (CDP) does include the following general objectives, which are of relevance to Landscape:

Green Infrastructure Objectives :

G2 Objective 1: 'To reduce fragmentation of the Green Infrastructure network and strengthen ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, park and open spaces and the wider regional Green Infrastructure network.'

G2 Objective 2: 'To protect and enhance the biodiversity value and ecological function of the Green Infrastructure network.'

G2 Objective 6: 'To protect and enhance the County's hedgerow network, in particular hedgerows that form town/and, parish and barony boundaries, and increase hedgerow coverage using locally native species.'

G2 Objective 9: 'To preserve, protect and augment trees, groups of trees, woodlands and hedgerows within the County by increasing tree canopy coverage using locally native species and by incorporating them within design proposals and supporting their integration into the Green Infrastructure network.'

G3 Objective 3 'To ensure the protection, improvement or restoration of riverine floodplains and to promote strategic measures to accommodate flooding at appropriate locations, to protect ground and surface quality and build resilience to climate change.

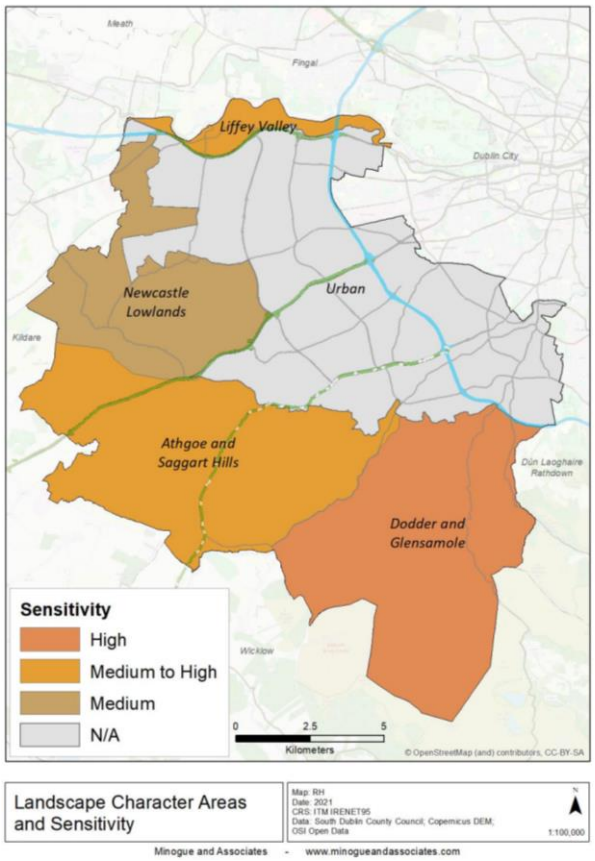

Figure 15.1: SDCC Landscape Character Areas in relation to the Application Site.

Several LCTs are located within its municipal district area (refer to Figure 15.) which determines the assigned LCT 'sensitivity' values applied in this LVIA.

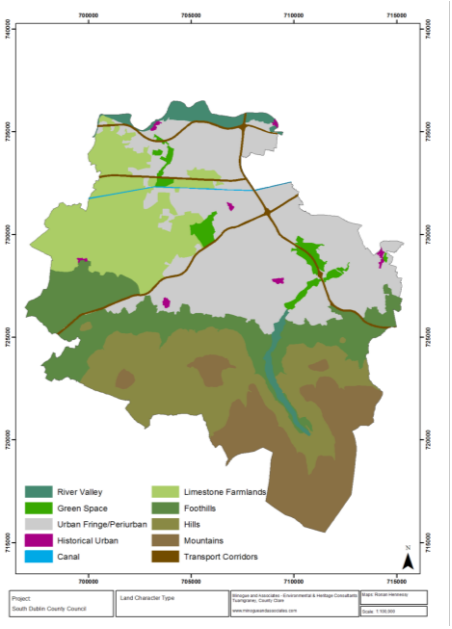

Figure 15.2: SDCC Landscape Character Types in relation to the Proposed Development Site.

The Proposed Development site is predominately located within the LCT Limestone Farmlands:

- **Limestone farmland**: (Medium Sensitivity- SDCC Landscape Character Areas) – Gently undulating low-lying (generally below 100m) with limestone bedrock. Land use includes tillage and pasture. Generally dispersed settlement pattern. This LCT represents a significant agricultural resource but is vulnerable to urbanising pressures. It represents an important agricultural and green infrastructure buffer between the heavily urbanised eastern parts of the county.

To support this LCT, the following recommendations are made within this assessment:

- Enhance and support the agricultural character by maintaining the integrity of this type;
- Control urban expansion, ribbon development and other types of erosion and fragmentation of landscape character; and
- Its' character as a rural landscape provides a distinct and important identity to this area and requires site planning guidance on the use of appropriate vernacular styles and treatments in new developments.

The Proposed Development site is also in close proximity to LCTs characterised as:

- **Urban Fringe** (No Sensitivity): Transitional lands that were largely rural, transforming into suburban or urban derived land use. Land use is built land comprising transport, retail/business parks, quarries and urban derived housing; and
- **Green Space:** (High Sensitivity) This refers specifically to the larger areas of parkland that function as both ecological refuge and green space for the urbanised lowlands. These can comprise former demesnes as in the case of Corkagh Demesne or Tymon Park or the green space associated with rivers such as the Dodder Valley Park. Essential for recreation and health of the population, quality of life and image of the county. Key characteristics are variety of habitats, some include formal amenity space such as pitches and playgrounds, other spaces are more naturalistic and comprise a variety of habitats including water courses, ponds, woodlands.

15.3.2 Environmental Context

The SDCC CDP (SDCC, 2022) highlights two designated riparian corridors within the LVIA Study Area (refer to Figure 15.). They traverse the landscape north-east towards the River Liffey. An open stream flows through the southern extents of the immediate site and is lined with a mature hedgerow. The site contains amenity grassland, dry meadows and grass verges and the southern and western boundaries are defined by hedgerows and treelines.

The Grand Canal is designated as a proposed Natural Heritage Area (pNHA) and is located 1.7km north of the immediate site extents.

15.3.3 Land Use, Settlement and Transport

Land use varies within the surrounding transitionary, peri-urban landscape. The immediate site is zoned as Enterprise and Employment (EE) related uses under the SDCC CDP. Neighbouring lands on the north, east, and west are also zoned EE and include various data centres, substations, and other ancillary buildings. This zone is described as *"to provide for enterprise and employment related uses"*, (SDCC, 2022-2028). The northwest is also dominated by commercial buildings with large warehouses associated with data centre developments.

The surrounding land comprises commercial and industrial properties, agriculture and recreational open space. The area directly south of the site is zoned as Rural (RU) and aims to *"protect and improve rural amenity and to provide for the development of agriculture"*, (SDCC, 2022-2028). Casement Aerodrome (Baldonnel), operated by the Department of Defence, is directly south of the site.

Directly east of the site is the Grange Castle Golf Club and Corkagh Park both of which are zoned as Open Space (OS) with the aim to *"preserve and provide for open space and recreational amenities"*, (SDCC, 2022-2028). The 120-hectare park is comprised of a wide range of recreational facilities and tourist attractions including a cycle racing track, play areas, sport pitches and an adjoining caravan park.

The site is located west of the M50, and in between the N4 and N7 Naas Road. The immediate site is connected by Profile Park Road and Grange Castle Road extending east towards the nearest residential area, Kilcarbery Grange.

Figure 15.3: SDCC CDP 2022 – 2028 Land Use Context. Source: South Dublin County Development Plan (SDCC, 2022)

15.3.4 Landscape Character and Visual Context

Seven representative viewpoints have been selected on the basis that they represent a range of viewing distances, elevations, and orientations from locations with different viewing experiences of the Proposed Development, refer to Figure 15.4. It includes the surrounding areas within which the Proposed Development may give rise to landscape and visual effects.

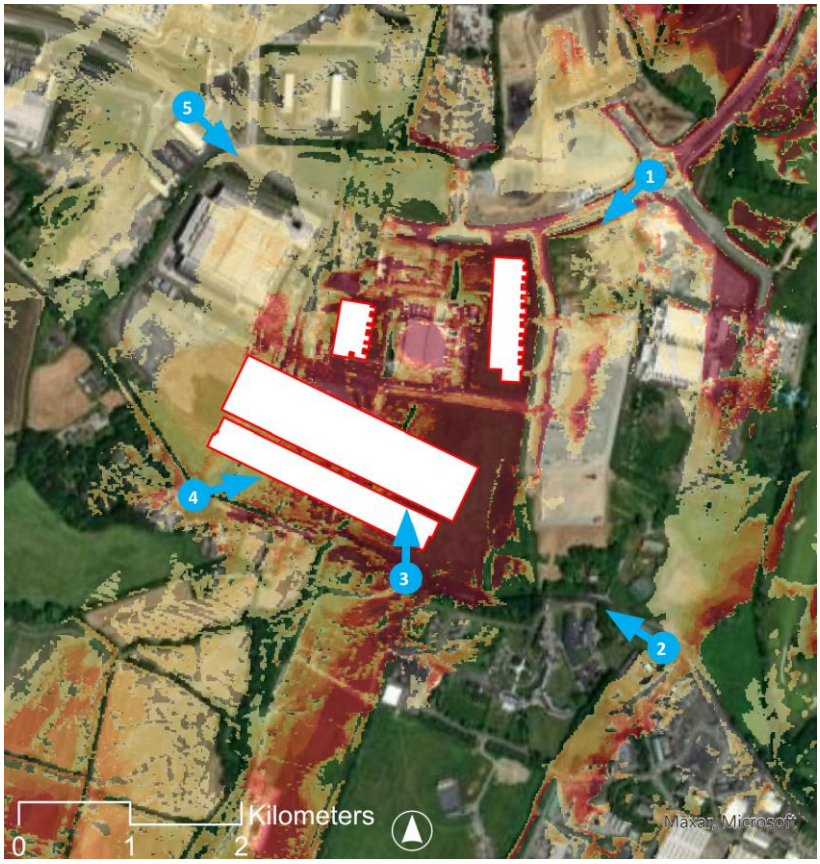

Figure 15.4: Viewshed generated from GIS using a Digital Terrain Model illustrating the ZTV.

15.3.5 Representative Viewpoints

A series of representative viewpoints have been selected to assess the potential effects of the Proposed Development on landscape and visual amenity with emphasis on 'worst case' views wherever possible, refer to Figure 15. for view locations. This is in line with best practice for landscape and visual impact assessment. The description and the rationale for the selection of each view is included in Table 15.5.

Table 15.5: Representative Viewpoints.

Ref No.	Viewpoint	Description	Receptor Type	Receptor Sensitivity	Geographic Co-ordinates (m)
1	R134 New Nangor Road entrance to Profile Park	The view looks southwest from the roundabout at the R134, New Nangor Road, 160m from the Site. The view is dominated by a large blue and grey façade building and road infrastructure typical of the Profile Park with pedestrian fences and grass verges on either side of the road. New Nangor road is an access road to the Proposed Development site and adjacent similar industrial function sites. The is limited expectation of this road to be used by other users than users related to the operation of the Proposed Development and adjacent industrial functions.	Transport and Employment	Low	E703739.6 N730617.5

Ref No.	Viewpoint	Description	Receptor Type	Receptor Sensitivity	Geographic Co-ordinates (m)
		In the long distance, part of the existing DC1 is visible.			
2	Casement Aerodrome Entrance and Kilcabery Cemetery Entrance	The view extends northwest from the entrance to Kilcabery Cemetery Entrance and the Casement Aerodrome Entrance at the Baldonnel Road, 540m from the Site. The foreground of the view is made up of road infrastructure lined by hedgerow on the right side and a grass verge and industrial fence on the left. Sites and Monuments records DU021-004(castle) and DU021-005002 (graveyard) are present in the foreground of the view. In the long distance, commercial buildings within Profile Park are visible. Currently, small glimpse of the existing DC2 structure is visible in the gap between trees directly above the existing dwelling. (DU021-004)	Transport	Low	E703818.7 N729976.5
3	Baldonnel Road / Casement Aerodrome	The view extends north from the Casement Aerodrome at Baldonnel Road approximately 15m from the Site. The view is characterised by road infrastructure lined with established hedgerow vegetation which helps to soften and screen the Profile Park and the Site from the private and commercial dwellings along the Baldonnel Road. Overhead powerlines are visible running alongside vegetation in the middle-ground of the image. In the background, a small glimpse of the existing building is visible through the gaps in the vegetation.	Residential and Transport	Moderate	E703059.4 N730299.5
4	Top Range Motors and Residential Property	The view is looking north from the entrance to the Top Range Motors and residential property at Baldonnel Road approximately 15m from the Site. The view has a characteristic roadside character with road running through the foreground of the view lined with grass verges and mature vegetation screening the Site.	Residential and Employment	High	E703151.5 N730177.6

Ref No.	Viewpoint	Description	Receptor Type	Receptor Sensitivity	Geographic Co-ordinates (m)
		Existing hedgerow is interrupted with an electricity pole in the middle ground of the view. No long-distance views are available from this location.			
5	Grange Castle Business Park South Entrance to the Site	The view extends southeast towards the side from the Grange Castle Business Park South Entrance approximately 400m from the Site. Currently the site is visible from this location. The view is characterised by commercial buildings and fencing screened by landscaped mounds and tree planting. The foreground is dominated by road infrastructure with pathways and grass verges either side of the road.	Transport and Employment	Low	E703109.1 N730736.4
6	R134 New Nangor Road and R120 Peamount Road Junction	The view extends southeast from the junction of R134 New Nangor Road and R120 Peamount Road approximately 1080m from the Site.	Transport and Employment	Low	E702609.2 N731170.8
7	Corkagh Park	The view extends northwest from the Corkagh Park approximately 2300m from the Site. The view has a typical parkland character with mature tree avenue forming the foreground. Long distance views are screened by mature tree line and hedgerows. Currently the site is not visible from this location.	Recreational	High	E705794.3 N729615.7

15.4 The Proposed Development

15.4.1 Characteristics of the Proposed Development

Refer to Chapter 4 (Description of the Proposed Development) for a full description of the Proposed Development and Chapter 5 (Construction) for a description of construction activities.

15.4.2 Proposed Landscape Design

The proposed landscape design aims to protect and enhance the existing vegetation and the development of ecological focused landscape spaces to strengthen the green infrastructure of the site and its surrounding.

Landscape design for the Proposed Development site include:

- Existing vegetation of the site would be retained and enhanced to maintain screening function during the construction and operation;
- Berms to the south and the south-east of the site;
- Areas of native woodland to the south, east and north of the site;

- Area of wildlife refuge in the north of the site to enhance visual amenity and ecological value and connectivity;
- Enhanced hedgerow to the south of the site;
- Wildflower meadow planting throughout the site;
- Riparian planting to the proposed open stream crossing the site in the south east corner, planted swales and attenuation ponds;
- Bee mounds, log piles, bird and bat boxes to provide targeted habitat creation; and
- Integration of nature based solutions / sustainable urban drainage systems to drain additional hard standing areas in a sustainable manner.

15.4.3 Mitigation Embedded Design Process

As part of an iterative design process, the Proposed Development aims to embed mitigation factors within the project design process in a holistic manner to best incorporate considerations of landscape, biodiversity and aesthetics of the architecture of the Proposed Development has been integral to the design of the Proposed Development.

The following key aspects have reduced potential adverse landscape and visual effects and introduce enhancements to the site:

- Careful siting of the data centre building to maximise integration within the existing landscape pattern and integrate the massing of the project into the wider context;
- The data centre building finished floor level and associated acoustic screen are positioned at a lower level than the level of Baldonnel Road, this enables natural integration of the building into the landscape to minimise visual effects on residents on Baldonnel Road;
- As far as possible, retaining existing vegetation within and on the boundaries of the site including the hedgerows to retain enclosure and visual screening;
- New berm tree and shrub planting along the southern boundary facing the road, to provide visual buffer and provide additional habitats for wildlife; and
- Tree planting integrated throughout the site amenity areas to visually soften the area and assist with water attenuation.

15.5 Potential Effects

This section discusses the effects of the Proposed Development on the study area. This is carried out by assessing landscape and visual effects separately and then assessed holistically as potential cumulative effects.

15.5.2 'Do Nothing' Scenario

Should the Proposed development not proceed there will be no immediate change to the landscape and visual environment.

15.5.3 Potential Landscape Effects

15.5.3.1 Construction Phase

Some existing mature trees contained within identified mature hedgerows will be removed from the site to enable the development to occur. These are internal to the site, made up of two hedgerows of approximately. 180m and 150m in length which are connected to the existing hedgerow that will be retained and the third isolated hedgerow to the north-east of the site. No significant trees or vegetation will be removed from the perimeter of the site. The trees, hedgerow and plantings of significance on site are being retained, most notably along Baldonnel Road.

Site construction works will require establishment of construction fencing, hoarding, compounds, removal of soils, earthworks, grading of site, provision of roads and services etc. Although mainly ground based activity, this will involve traffic and machinery movements, creation and movement of soil and material stockpiles, provision of site lighting and general site constructional activity.

The change of use of the site from its current state to that of a construction site has the potential to result in the following landscape effects:

- Landscape effects due to vegetation removal and the site disturbance and from the introduction of new structures, access roads, machinery, materials, storage, associated earthworks, car parking, lighting and hoarding; and
- Change of landscape character due to the change in use.

15.5.3.2 Operational Phase

New buildings and a range of associated structures will be established on the site and in the receiving environment. Operational aspects will include daily access and egress by traffic, site management activities, external and internal lighting and development of the proposed landscape. Significant areas of the site are proposed for landscape design measures that includes habitat creation, retention of existing key vegetation, creation of a riparian zone, areas of native woodland, dry meadows, attenuation ponds, swales and augmentation and protection of hedgerows. Due to these aspects, the Proposed Development protects and enhances the green infrastructure on and surrounding the site.

- Landscape impacts due to the introduction of new building and built structures, new roads, mechanical plant and lighting; and
- Change in character due to the change in use.

Refer to Table 15.6 for further details.

Table 15.6 Landscape Character Assessment

Landscape Character Area / Type	Sensitivity	Description of Effect	Magnitude of Change	Potential Effect
Newcastle Lowlands	Moderate	The Proposed Development is located within the area of 'Newcastle Lowlands' Landscape Character area. Within this area, the site is situated within Grange Castle Business Park South, which is an established character of large scale information technology data storage facilities, bio-pharmaceutical technology and food research development. Due to the existing industrial character of this area surrounding the site and the surroundings of the Industrial Estate, effects on Landscape character are considered to be minor for both the Commercial/industrial character area of Grange Castle Business Park South and the effects on the wider Newcastle lowlands landscape character area are minor due to mitigating factors. There will be minor direct physical effects upon the character and attributes of this LCA arising from the proposed development.	Low	Moderate – low

Landscape Character Area / Type	Sensitivity	Description of Effect	Magnitude of Change	Potential Effect
Athgoe and Saggart Hills	Moderate	The Proposed Development is located within the neighbouring LCA. The Proposed Development would not be visible at this location as shown in ZTV. There will be no direct physical effects upon the character and attributes of this LCA arising from the Proposed Development.	Negligible	Negligible
Limestone Farmlands	Moderate	The Proposed Development is located within the area of 'Newcastle Lowlands'. There will be no direct physical effects upon the character and attributes of this LCA arising from the Proposed Development.	Low	Moderate – low
Green Space	High	The Proposed Development is located within the neighbouring LCA. The Proposed Development would not be visible at this location as shown in the centre of the view. There will be no direct physical effects upon the character and attributes of this LC arising from the Proposed Development.	Negligible	Negligible
Urban Fringe	Low	The Proposed Development is located within the neighbouring LCA. The Proposed Development would not be visible at this location as shown in the centre of the view. There will be no direct physical effects upon the character and attributes of this LC arising from the Proposed Development.	Negligible	Negligible

15.5.4 Potential Visual Effects

This section summarises the likely visual effects due to the Proposed Development. This assessment has been made with reference to the visual receptors and representative viewpoints identified within the study area through a review of ZTVs and fieldwork surveys as defined within Section 15.3.

15.5.4.1 Construction

Some existing mature trees contained within identified mature hedgerows will be removed from the site to enable the development to occur. These are internal to the site, made up of two hedgerows of approximately 180m and 150m in length which are connected to the existing hedgerow that will be retained and the third isolated hedgerow to the north-east of the site. Approximately 130m of willow scrub will be removed from site along the southern area of the site which borders Baldonnel Road. There is a series of temporary beams/mounds from previous construction on site that will be removed to facilitate tie in between the proposed project and the existing landscape.

Site construction works will require establishment of construction fencing, hoarding, compounds, removal of soils, earthworks, grading of site, provision of roads and series etc. Although mainly ground based activity, this will involve traffic and machinery movements, creation and movement of soil and material stockpiles, provision of site lighting and general site constructional activity.

The change of use of the site from its current state to that of a construction site has the potential to result in the following visual effects:

- Visual effects due to vegetation removal and the site disturbance and from the introduction of new structures, access roads, machinery, materials, storage, associated earthworks, car parking, lighting and hoarding; and
- Change of landscape character due to the change in use.

15.5.4.2 Operational Phase

The existing landscape environment is of low sensitivity and the effects of the development are assessed as being low magnitude. Therefore, it is considered that the proposed project does not impact negatively on the existing visual character of the site and the surrounding area.

Where high sensitivity receptors are present, trees, hedgerow and plantings of significance to the perimeter of the site are been retained and enhanced along with the creation of mounds and berm planting to create vegetation buffers to maintain the current visual characteristics which will provide significant visual buffer. Therefore we conclude the proposed development will be extensively screened from sensitive receptors.

New buildings and a range of associated structures will be established on the site and in the receiving environment. Operational aspects will include daily access and egress by traffic, site management activities, external and internal lighting and development of the proposed landscape.

- Visual impacts due to the introduction of new building and built structures.
- Visual impacts due to the introduction of new roads, mechanical plant and lighting
- Visual impacts of landscape proposals, earth modelling, trees and vegetation etc.

Refer to Table 15.7 for further details.

Table 15.7: Potential visual effects.

Ref No.	Location	Receptor Sensitivity (Viewpoint)	Assessment of Change	Magnitude of Change	Potential Effect
1	R134 New Nangor Road entrance to Profile Park	Low	The Proposed Development would be visible at this location as shown in the centre of the view. The proposed structures are of similar height to the existing buildings within the area with the MYD structures exposed to the surroundings.	Moderate	Moderate-Low effect
2	Casement Aerodrome Entrance and Kilcabery Cemetery Entrance	Low	The Proposed Development will be visible from this location through the gaps in the vegetation. The Proposed Development is consistent with the form and materiality within the site's context and the proposed landscape proposal includes vegetated berms and accounts for a year round coverage softening and minimising the landscape and visual impact.	Low	Low Effect
3	Baldonnel Road / Casement Aerodrome Pedestrian Path	Low	The Proposed Development will be visible from this location through the gaps in the vegetation. The Proposed Development is consistent with the form and materiality within the site's context and the proposed landscape proposal includes vegetated berms and accounts for a year round coverage softening and minimising the landscape and visual impact.	Low	Low Effect

Ref No.	Location	Receptor Sensitivity (Viewpoint)	Assessment of Change	Magnitude of Change	Potential Effect
4	Baldonnel Road - Resident Property and Car Dealership (Top Motors)	High	The Proposed Development will not be visible from this view as shown on the visual. The existing vegetation screens the proposed development and will be complemented with additional native hedgerow and woodland planting to enhance biodiversity and green infrastructure as per SDCC Development Plan 2022-2028 Objectives.	Low	Moderate effect
5	Grange Castle Business Park South Entrance to the Site	low	At this location the Proposed Development would be visible in the far distance however the Proposed Development is consistent in the form and materiality with the existing structures. Proposed landscaped berms will soften and screen long distance views and the impact on landscape and visual character.	Low	Moderate effect
6	R134 New Nangor Road and R120 Peamount Road Junction	Low	The Proposed Development would be slightly visible at this location as shown in the centre of the view. The proposed structures are of similar height to the existing buildings within the view and sits within the current skyline character.	Negligible	Negligible Effect
7	Corkagh Park	Low	The Proposed Development would not be visible at this location as shown in the centre of the view. The proposed structures are of similar height to the existing buildings within the area with the MYD structures exposed to the surroundings.	Negligible	Negligible Effect

15.6 Mitigation and Monitoring

Refer to Section 15.4 for the description of how mitigation is embedded into the design process and has informed the Proposed Development design. Further mitigation measures are provided for the Construction and Operational Phases in the following sections.

15.6.1 Construction Phase

The following measures are proposed to mitigate the potential negative landscape and visual impacts in the Construction Phase:

- The site compound, car park and storage areas are located so as to minimize the impact to the existing vegetation to be retained;
- Securing of the construction site with fencing and hoarding to screen low level views of site works and construction;
- Provision of fencing in accordance with BS5837: 2012 for the protection of all existing vegetation to be retained; and
- Retention of topsoil for the creation of landscape berms and for reinstatement of disturbed landscape areas.

15.6.2 Operational Phase

The following measures are proposed to mitigate the potential negative landscape and visual effects in the Operation Phase:

- Retention of the existing vegetation along the south boundary of the site;
- Extension of the existing hedgerow planting to enhance and screen the site to the east and south. Proposal includes native evergreen species to ensure year round cover and integration within the wider green infrastructure context;
- Landscaped and vegetated berms throughout the site to screen the development;
- Provision of large wildflower meadow areas to ensure wildlife enhancement and protection and contribution to the wider green infrastructure network;
- Provision of a biodiversity refuge in the north of the site to compensate for vegetation loss resulting from the development;
- Nature based wet and dry attenuation ponds will be provided; and
- Sustainable drainage systems, including swales will be integrated to provide ecological value.

15.6.3 Decommissioning Phase

During the Decommissioning Phase of the Proposed Development, the potential effects of the Proposed Development on biodiversity are likely to be similar to those arising during the Construction Phase. The relocated watercourse will remain in its revised location.

15.6.4 Monitoring and Reinstatement

The implementation and reinstatement of all landscape proposals will be monitored during implementation and inspected, maintained and monitored for the twelve-month defects period. Any materials or plants which fail within this period will be replaced. Thereafter the landscape at the Proposed Development will be maintained as part of the overall landscape aftercare operations across the entire site owned by GIL.

15.7 Residual Effects

15.7.1 Landscape

The assessment findings are set out within the carious tables above and summarised in tables and record the significance of effects upon the character, views and visual receptors. Whilst the significance of the effects varies greatly from receptors, the site has provided a considerable number of measures to mitigate impacts to sensitive receptors. Where impacts have not been mitigated fully, the development will reinforce an emerging new local character that is appropriate to the development and the immediate neighbouring sites.

Given the scale of the proposed buildings and associated structures, it is inevitable that there will be significant change to the site landscape which will change from existing scrub vegetation to an operational industrial site , however the proposed project will provide large areas of landscaped areas to provide a more biodiverse and richer environment that relates well to the surrounding landscape character and the urban edge and aims to improve the biodiversity value of the site.

Due to the existing industrial character of the site and surroundings of Profile Park Industrial Estate, effects on Landscape character are considered to be minor for both the Profile Park Commercial/industrial character area and the wider Newcastle lowlands landscape character area.

Beyond the immediate surrounding, both the scale of effects and the geographical extent of effects would be small and the Proposed Development would not be likely to have a perceptible impact on character, refer to Table 15.8.

Table 15.8: Summary Table of Landscape Effects

Landscape Character Area / Type	Sensitivity	Residual Effect
Newcastle Lowlands	Medium	Negligible
Athgoe and Saggart Hills	Medium to High	Negligible
Limestone Farmlands	Medium	Negligible
Green Space	High	Negligible
Urban Fringe	Low	Negligible

15.7.2 Visual

Due to the existing industrial visual character of the site and surroundings of Grange Castle Business Park South, effects on visual character are considered to be minor for all receptors identified. Proposed tree planting and greening at the site boundaries would add positive visual amenity and green infrastructure to Baldonnel Road to maintain and enhance the existing character while ensuring the Proposed Development is screened from adjoining residents, refer to Table 15.9.

Table 15.9: Summary Table of Visual Effects

Receptor	Representative Viewpoint	Residual Effect
Residential receptors are scattered along the Baldonnel Road to the south of the site. The ZTV shows limited visibility from the area due to the screening vegetation along the Baldonnel Road.	VP03, VP04	Moderate – low
Employment Receptors include the commercial premises along the Baldonnel Road and the businesses within the Grange Castle Business Park.	VP01, VP04, VP05, VP06	Moderate – low
Transport Receptors using the existing roads including the Baldonnel Road and the R134 Nangor Road.	VP01, VP02, VP03, VP05, VP06	Moderate – low
Recreational Receptors using the Grange Castle Golf Club to the east and the adjacent Corkagh Park.	VP07	Negligible

The decommissioning of the Proposed Development will be regulated by the EPA. As outlined in Section 5.7 of Chapter 5 (Construction), decommissioning activities will need to be undertaken in accordance with the requirements of the revised IE licence.

15.8 References

British Standard (BS) (2012) *Provision of fencing in accordance with BS5837for the protection of all existing vegetation to be retained.*

Environmental Protection Agency (EPA) (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR).*

Guidelines for Landscape and Visual Impact Assessment (GLVIA3) (2013) *Landscape Institute and Institute of Environmental Management and Assessment, 3rd Edition 2013.*

Landscape Institute (2021) *Assessing landscape value outside national designations, Technical Guidance Note 02/21.*

Landscape Institute (2019) *Visual Representation of Development Proposals, Technical Guidance Note 06/19.*

Nature England (2014) *An Approach to Landscape Character Assessment.*

South Dublin County Council (SDCC), 2022. *South Dublin County Development Plan 2022-2028.*

South Dublin County Council (SDCC) (2021) *Landscape Character Types (LCTs) and LCAs are identified in the Landscape Character Assessment.*