

CHAPTER 05:

LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

05

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5.0 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

5.1 INTRODUCTION

This chapter evaluates the likely significant effects, if any, which the Proposed Development will have on Land, Soils, Geology and Hydrogeology and contains the information as defined in the Environmental Protection Agency (EPA) '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports*' (EPA, 2022), Article 94 and Schedule 6 of the Planning and Development Regulations 2001 (as amended), and Article 5 and Annex IV of the EIA Directive (2011/92/EU, as amended).

The chapter initially provides a description of the receiving environment of the site and the potential impacts of the development. When assessing the potential impacts, this assessment considers the significance of the environmental attributes, and the predicted scale, and duration of the likely effects.

The chapter also outline the proposed mitigation measures that will reduce or eliminate the identified potential impacts, and define the residual effects of the Proposed Development (the effect after the implementation of mitigation measures).

5.2 METHODOLOGY

5.2.1 Criteria for Rating of Effects

The section establishes the criteria, and guidance used to rate the significance of the potential impacts of the Proposed Development project on the land, soil, geological, and hydrogeological aspects of the site and surrounding area.

This chapter is prepared in line with the '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports*' (EPA, 2022) and due consideration is also given to the guidelines provided by the Institute of Geologists of Ireland (IGI) in the document entitled '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*' (IGI 2013).

The document entitled '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*' by the Transport Infrastructure Ireland (TII) formerly National Roads Authority (NRA) (TII, 2009) is referenced where the methodology for assessment of impact is appropriate. Furthermore, in line with the TII Guidelines, an assessment of the attribute importance has been undertaken in order to provide a basis for the assessment of impact provided. The attribute importance considers the potential as well as the existing use of the surface water features as a water resource (i.e., water supply, fisheries and other uses) as well as ecological habitat requirements. The TII criteria for rating the soil and geology, and hydrogeological related attributes are presented in Appendix 5.1.

The quality, significance, and duration of the potential impacts, residual effects, and cumulative effects are described using standard EIA descriptive terminology (EPA, 2022) that is set out in Table 1.2, Chapter 1 of this EIAR.

The principal attributes (and effects) to be assessed include the following:

- Water Framework Directive (WFD) Status and potential for increased risk of deterioration of this status due to the activities of the site;
- Geological heritage sites within the vicinity of/ within the perimeter of the Proposed Development site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural use(s) of subsoil around the site;
- Quarries or mines in the vicinity and the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on site as well as any requirement to remove it off-site as waste for disposal (D) or recovery (R) options;
- High-yielding water supply wells/ springs in the vicinity of/ within the site boundary to within a 2km radius and the potential for increased risk presented by the Proposed Development;
- Classification (regionally important, locally important etc.) and extent of aquifers underlying the site boundary area;
- Increased risks presented to the groundwater bodies by the Proposed Development associated with aspects such as, for example, the removal of subsoil cover, removal of aquifer (in whole or part thereof), spatial drawdown in water levels, alteration in established flow regimes, and changes in local/ regional groundwater quality;
- Natural hydrogeological/ karst features in the area and potential for increased risk presented by the activities at the site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally.

5.2.2 Sources of Information

Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1: 100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information;
- National Parks and Wildlife Services (NPWS) – Protected Site Register; and
- Dublin City Council - illegal landfill information.

Site specific data was derived from the following sources:

- Engineering Services Report – Proposed Office Development at 1 North Wall Quay, Dublin 1. CS Consulting Group (CS, 2024);
- Site-Specific Flood Risk Assessment- Proposed Office Development at 1 North Wall Quay, Dublin 1. CS Consulting Group (CS, 2024);
- Surface Water Management Plan- Proposed Office Development at 1 North Wall Quay, Dublin 1. CS Consulting Group (CS, 2024)
- Outline Construction Management Plan- Proposed Office Development at 1 North Wall Quay, Dublin 1. CS Consulting Group (CS, 2024);

- Basement Impact Assessment Proposed Office Development at 1 North Wall Quay, Dublin 1. CS Consulting Group (CS, 2024);
- The Proposed Development design site plans and drawings; and
- Consultation with the project design engineers.

5.2.3 Difficulties Encountered

There were no difficulties encountered in the preparation of this EIAR report.

5.3 RECEIVING ENVIRONMENT

The site of the Proposed Development is contained within Dublin's North Quays in the eastern city centre, approximately 200m to the west of the Samuel Beckett Bridge and circa 400m to the east of the Custom House. The site is bound by North Wall Quay to the south and Commons Street to the west. Existing commercial and residential buildings adjoin the site to the north and east. Clarion Quay runs immediately adjacent to the northern boundary of the site. The River Liffey is located immediately south of the Proposed Development site (refer to Figure 5.1 below).

The Site is presently occupied by Citigroup Building, a six-storey, over-one-storey-basement office building (total Gross Internal Area of 35,649 m²). This building is currently in use. The existing building is due to be demolished as part of the Proposed Development enabling works. The development site covers an area of approx. 0.9 ha and is located in the operational area of Dublin City Council. The site topography can be described as generally flat / level with slight falls in elevation from a maximum of approx. 3.52m AOD (meters above ordnance datum) along the south-eastern corner of the site to a minimum of c. 3.32m AOD to the south-western boundary of the site, where the access of the existing building is located.



Figure 5.1 Site Location and Surrounding Land Use Map (Source: Google Earth Pro, 2024)

5.3.1 Existing Land Use and Site History

The existing Citigroup Building located at the site is a six storey building, over-one-storey-basement.

Historical Ordnance Survey maps were examined during the preparation of this EIA Chapter (www.OSI.ie) O.S. maps were available from 1830 (the historic 6" maps) and 1900 from the historic 25" maps. According to these maps, the site has been partially occupied by a Bonded Store coupled with multiple residential housing properties which front onto Commons Street and large building structures (possibly warehouses) particularly in the southern and western portions on the site, since the early 1800's.

During this period (19th / 20th century) the site was bounded to the west by Queens Timber Yard and multiple adjacent Goods Storage Shed's on North Wall Quay. Subsequently there is potential for residual contamination of groundwater due to the potential for hydrocarbons from fuel spillages and leaks, due to the materials frequently used on timber yards.

The elevated railway line and station (Connolly Station) are located approximately 380 meters northwest and have been present as the Amien Street Terminus site since the early 19th century.

The Proposed Development site was formed from reclaimed land along the River Liffey as part of the development of North Wall Quay, in the late 17th and early 18th century.

Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development.

5.3.2 Surrounding Land Use

There are no licenced facilities within the site boundary or adjacent to the Proposed Development site. Table 5.1 below shows the closest IE/IPC facilities to the Proposed Development site according to the EPA (2024).

The closest permitted licensed facility is the Brooks Thomas Limited, Dublin 1 which is approximately 0.7 km from the Proposed Development site.

Table 5.1 EPA Licenced facilities nearby to the Proposed Development site

Registration number	Name	Category	License type	Distance (km) & Direction
P0111-01	Independent Newspapers Ltd.	Industry	IEL	0.95 km west
P0345-01	Brooks Thomas Limited	Industry	IPC	0.7 km east
P0468-01	Everlac Paint Limited	Industry	IPC	0.8 km southeast
P0107-01	Van Leer Ireland Ltd.	Industry	IEL	1.2 km south
P0298-01	Cahill Printer Limited	Industry	IEL	1.2 km northeast
P0054-02	Mater Misericordiae University Hospital	Industry	IEL	1.8 km northwest
P0301-04	Diageo Ireland (St. James Gate)	Industry	IEL	2.8 km west

Consultation with Dublin City Council has confirmed that there are no known illegal/historic landfills within 500 metres of the site.

The site is bound by North Wall Quay to the south and Commons Street to the west. Existing commercial and residential buildings adjoin the site to the north and east. Clarion Quay runs immediately adjacent to the northern boundary of the site. The River Liffey lies immediately to the south (c. 25 m) of the Proposed Development

5.3.3 Soils and Subsoils

The GSI/Teagasc mapping in Figure 5.2 below shows that the soil type beneath the site and its surrounding immediate vicinity / locality comprises urban/ made ground.

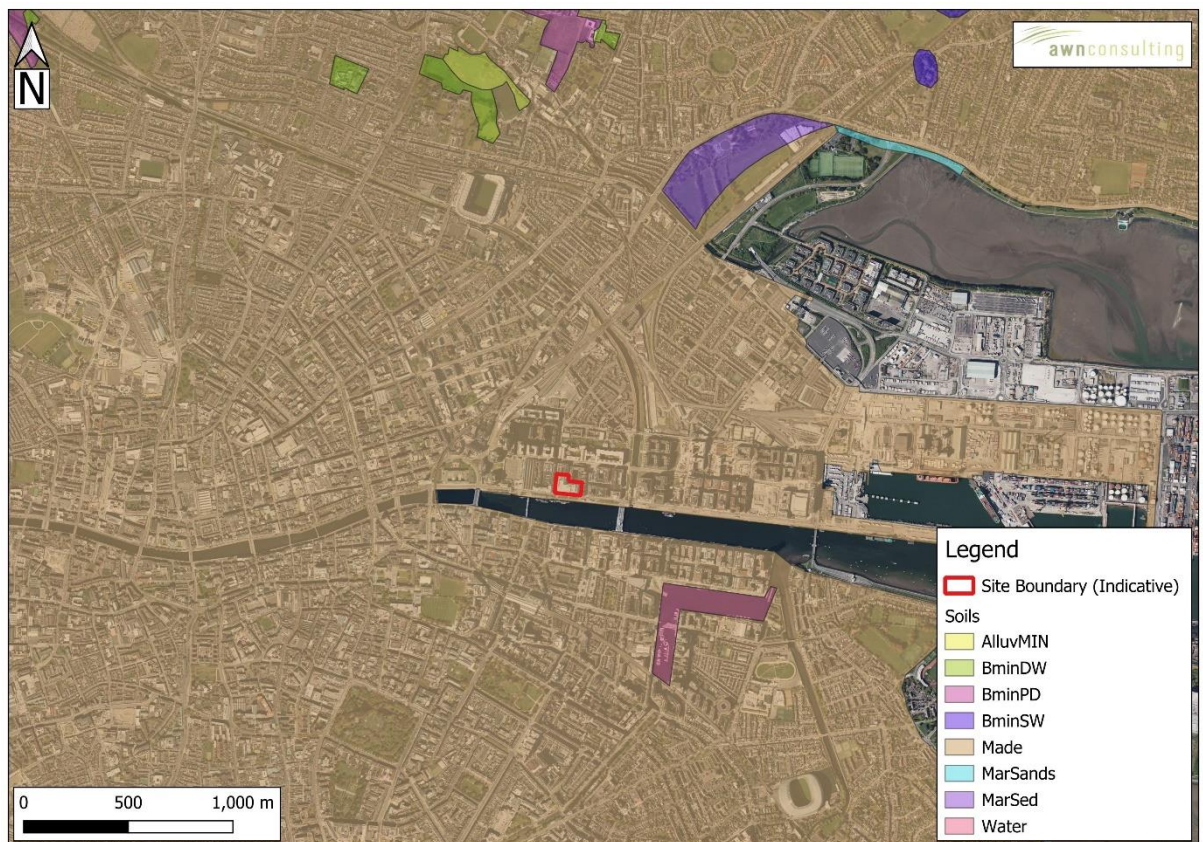


Figure 5.2 Teagasc Soils Map (Source: GSI, 2024)

The GSI/Teagasc mapping database of the subsoils underlying Proposed Development site indicates urban subsoil type, as shown in Figure 5.3 below.

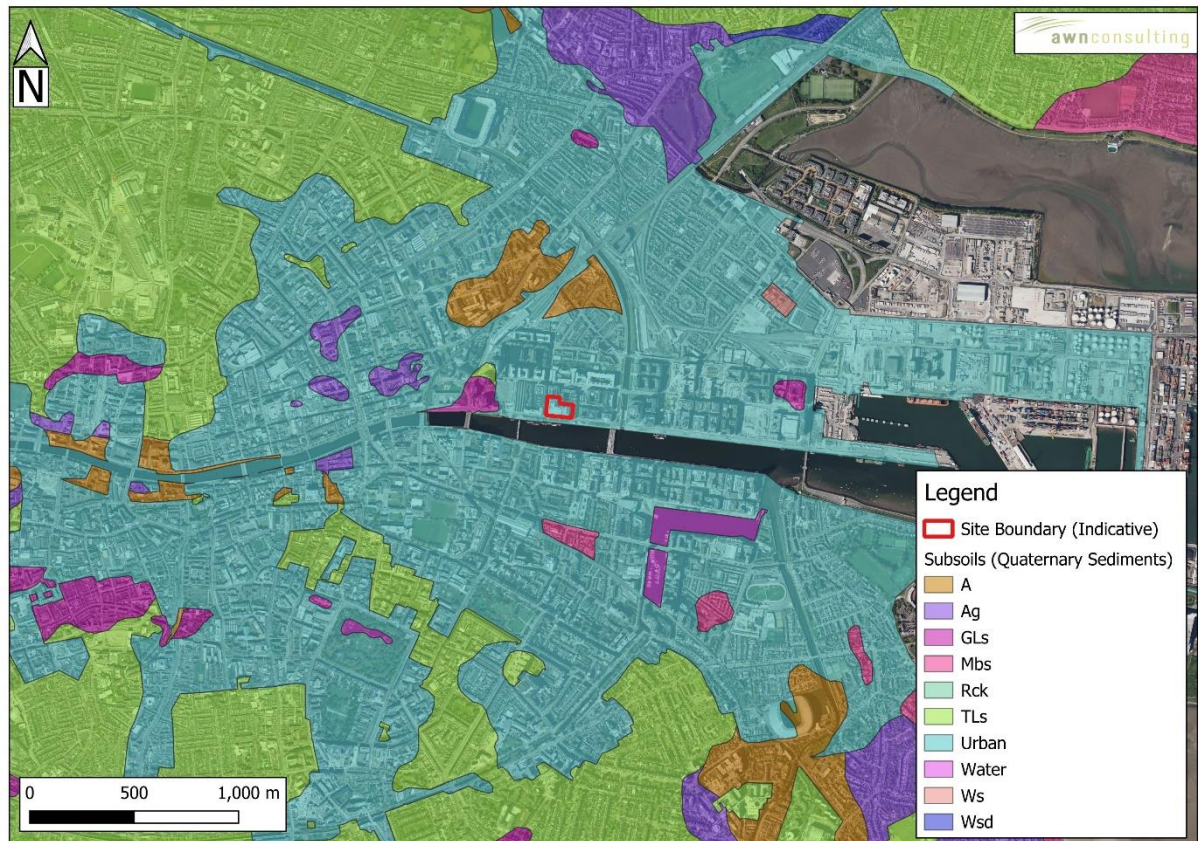


Figure 5.3 Subsoils Map (Source: GSI, 2024)

5.3.3.1 Site Investigations

A ground investigation study will be conducted following the demolition of the existing office building currently occupying the site, and prior to the installation of the secant pile wall around the site perimeter. Given the water table being generally shallow within the gravel stratum in this area and the close proximity to the River Liffey, a tidal influence on groundwater levels is anticipated.

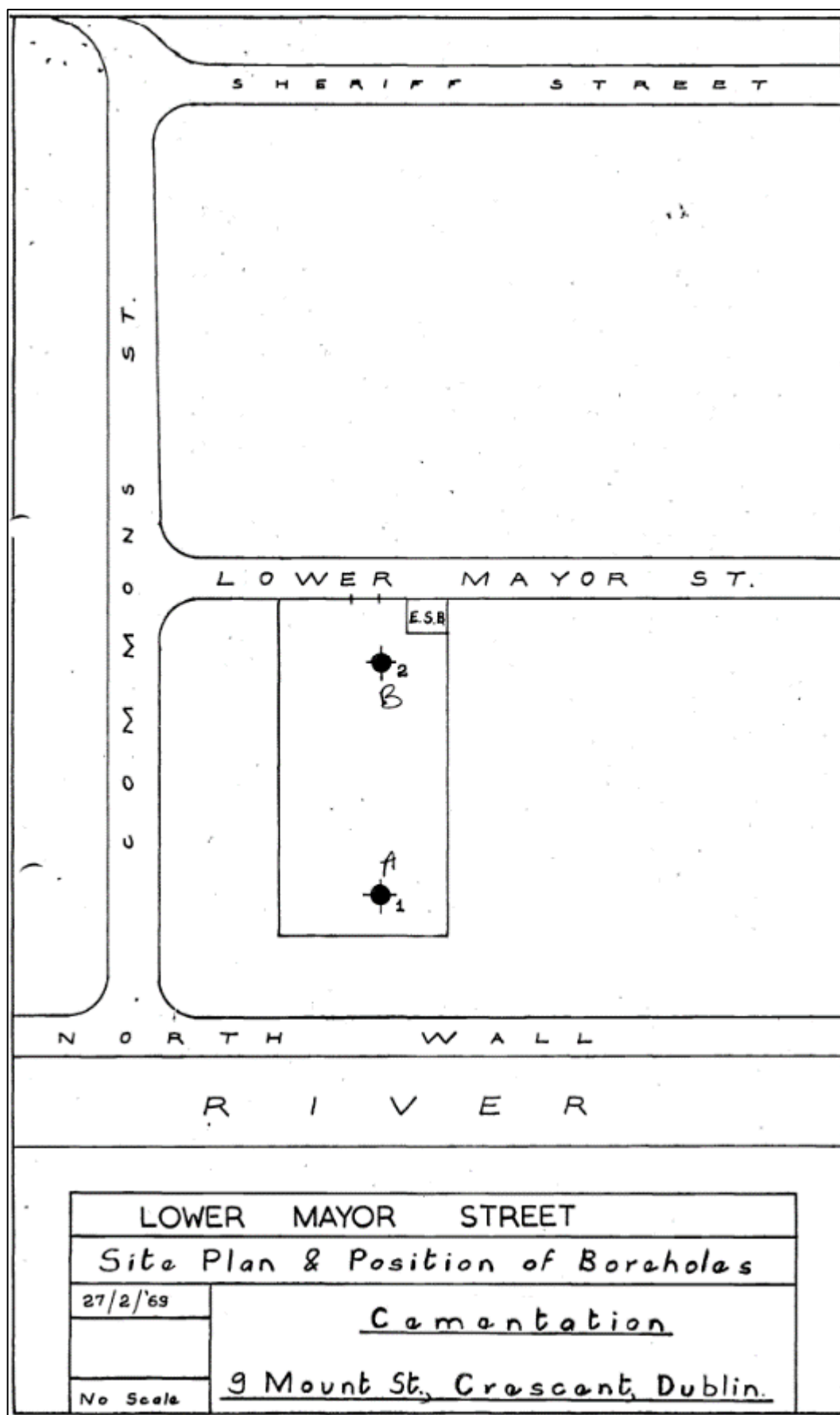
Two historical site / ground investigations have previously been carried on and in the vicinity of the Proposed Development site by The Cementation Co (Ireland) Ltd between 1968 and 1971 (Appendix 5.2). The sequence of subsoils deposits recorded during the site investigations in the vicinity, adjacent sites and immediate surrounding area are cumulatively displayed as follows:

- Site Investigation report no 631732451 (Dated 1972), which has been extracted from Geological Survey of Ireland (GSI) website. The full extent of the Proposed Development site is located within the area where this site investigation was carried out.
 - A relatively uniform soil profile characterized by soft grey sandy clayey silt was found at the depths till 4.4m below ground level, underlaid by coarse clayey gravel up to a depth of 5.0m.
 - various strata of fine to coarse sandy gravel with shell fragments and cobbles and firm black silty clay at depths of 47.7m to 12.8m.
 - The groundwater was encountered at a typical depth of 4.3m below ground level.

- Site Investigation report no 5632 (Dated: 1968), which has been extracted from Geological Survey of Ireland (GSI) database. A small section along the northern boundary of the Proposed Development site is located within the area where this site investigation was carried out, and one borehole was drilled / undertaken within the boundary of the subject study area.
 - Typically, the ground conditions are of reinforced concrete overlying fill gravel and clay materials. The concrete surface overlies approx. 4.75m of clay gravel fill.
 - Compact coarse gravel with cobbles was noted below the made ground and extended to about 6.10m. Compact coarse gravel with cobbles were encountered at 6.1m.
 - The groundwater was encountered at a typical depth of 4.5m below ground level.

The sequence of subsoils deposits recorded during the site investigations in the vicinity, adjacent sites and immediate surrounding area are cumulatively displayed / shown in Table 5.1 below and can be summarized as superficial deposits of fluvial alluvium and cohesive glacial till (Dublin Boulder Clay) underlain by Carboniferous Limestone.

Site investigation points are illustrated in Figure 5.4 below.

**Figure 5.4**

Site Investigation Points (Source: Cementation Co Ltd, Ground Investigation Boring Locations, 1968- 1969).

5.3.4 Bedrock Geology

Inspection of the available GSI (2024 on-line mapping database) shows that the site is entirely underlain by Dark Limestone and Shale of the Lucan formation, which comprises Carboniferous dark limestone and shale ('Calp') Age Bracket (Late Chadian to Asbian), Rock Unit code (CDLUCN).

This geological formation consists of dark grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar (refer to Figure 5.5 below).

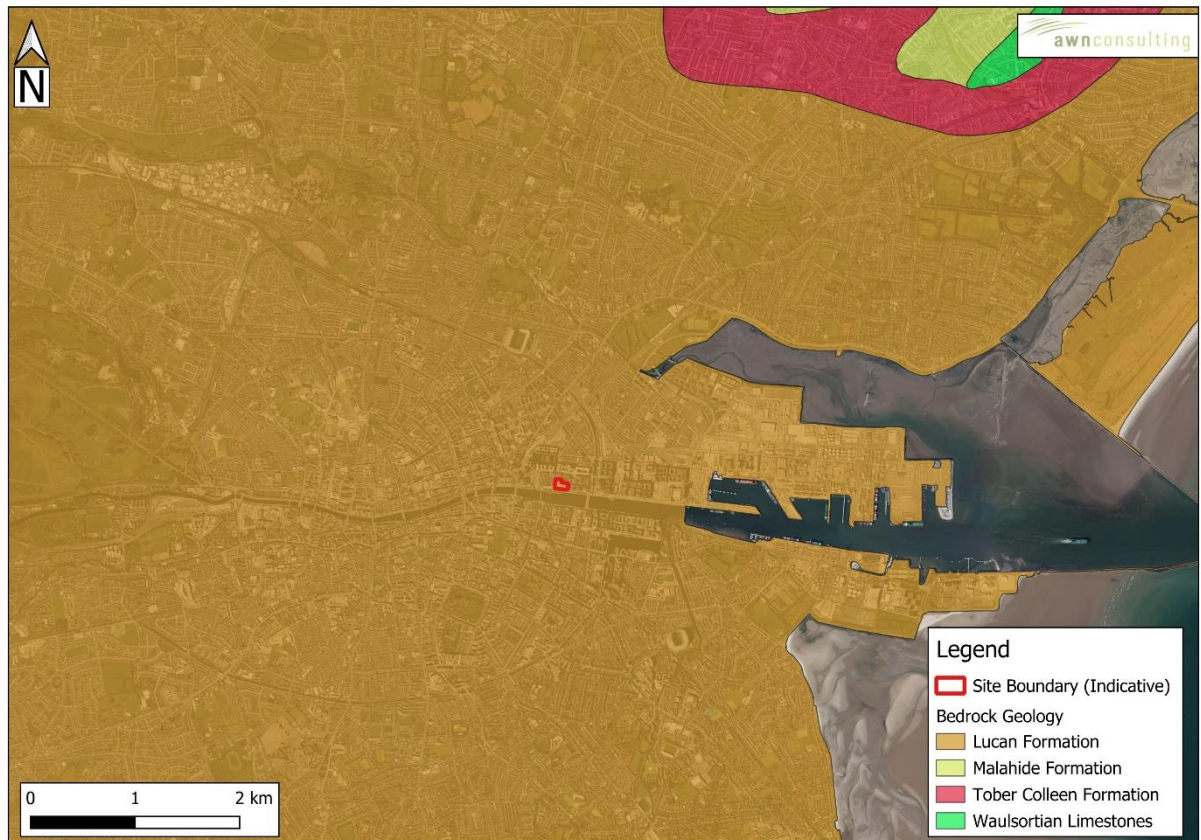


Figure 5.5 Bedrock Geology Map (Source: GSI, 2024)

5.3.5 Regional Hydrogeology

The bedrock aquifers underlying the Proposed Development site and the surrounding area, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map, are classified as a “*Locally Important Aquifer – Bedrock which is Generally Moderately Productive*” which is described by the GSI as bedrock as ‘*Moderately Productive only in Local Zones*’ (refer to Figure 5.6 below). The site is also underlain by a locally important gravel aquifer.



Figure 5.6 Aquifer Classification Map (Source: GSI, 2024)

The Proposed Development is located entirely within the Dublin Ground Water Body (GWB) (EU Reference Code: IE_EA_G_008).

Groundwater source protection zones (SPZ) are obtained by integrating the Source Protection Areas (SPA) with the groundwater vulnerability categories. The SPZ includes the complete pathway, both vertical and horizontal, for recharge and any entrained contaminants to the abstraction point. According to the GSI (2024) database, there are no designated Public or Group Scheme Source Protection Areas (SPAs) for groundwater supply (public or private) under or in the immediate vicinity of the site.

Above bedrock, the ground within the site principally comprises sandy silty gravel with alluvial deposits; this is classified by the GSI as a locally important gravel aquifer.

5.3.6 Aquifer Vulnerability

The GSI currently denotes a 'Low' (L) vulnerability classification underlaying the entire Proposed Development site indicating +10m overburden of low permeability soils. This is consistent with site investigation data obtained from the site investigations carried out in the vicinity of the site by The Cementation Co. (Ireland) Ltd between 1968-1971 (GSI, 2024), where the bedrock / rock head or boulders were encountered in the area at depths from 13.0 and 14.6 mbgl. Refer to section 5.3.3.1 above and Figure 5.7 below.

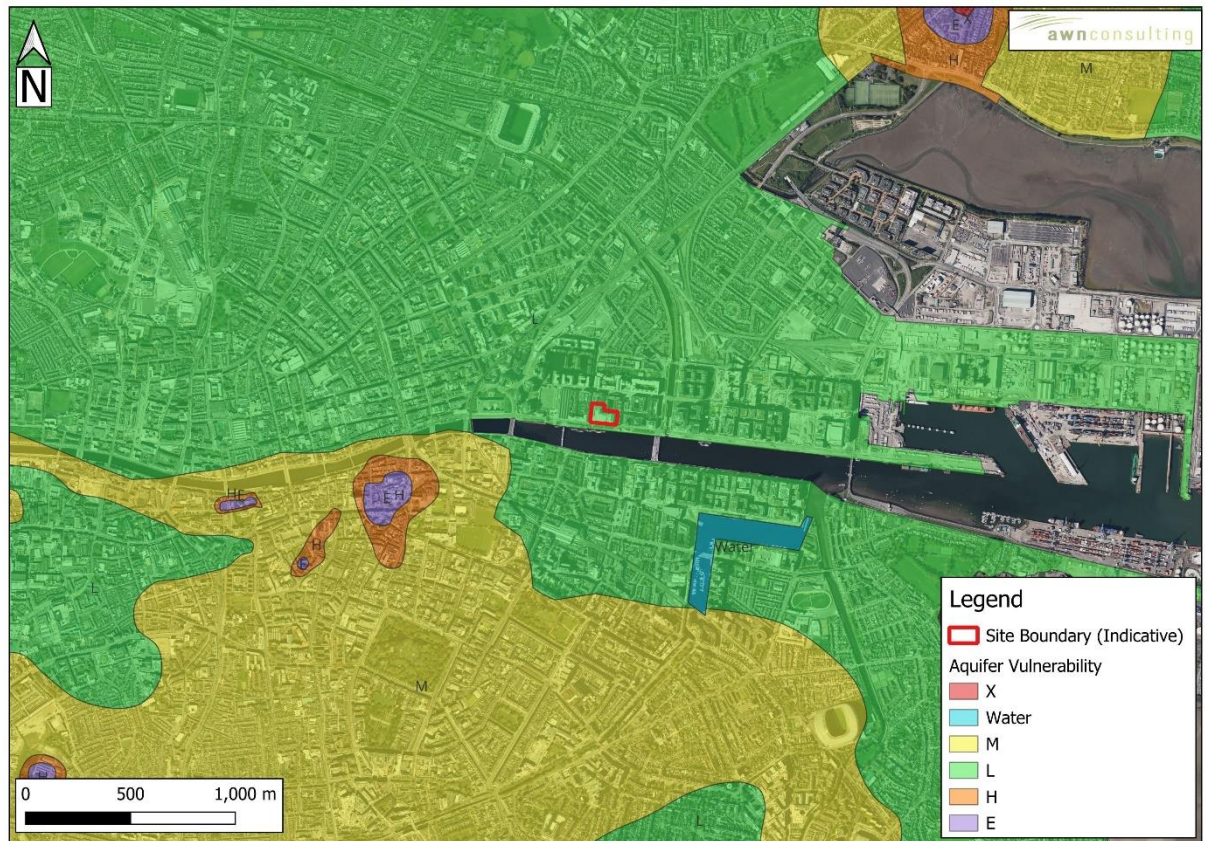


Figure 5.7 Aquifer Vulnerability Map (Source: GSI, 2024)

5.3.7 Groundwater Wells and Flow Direction

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland.

This current index shows multiple wells in the vicinity of the Proposed Development site. 1 no. Borehole (GSI Name: 2923SEW054) is located c. 0.9 km southeast of the site, adjacent to Barrow Street and Grand Canal rail line station. None of the wells listed are categorised as domestic use. The area is serviced by Local Authority mains therefore it is unlikely that any wells are used for potable supply.

The site is not located near any public groundwater supplies or group schemes. There are no groundwater source protection zones in the immediate vicinity of the site. The zone in closest proximity to the site is c. 17 km north-west (DUNBOYNE_PWS) and the proposed site is outside of the zone of contribution of this supply.

Figure 5.8 below presents the GSI well search for the area surrounding the site (note this source does not include all wells) and Table 5.2 summarises the details of recorded wells present within this search area.

Regional groundwater flow is likely to be in line with the local topography, to the south/southeast towards the River Liffey and Dublin Bay (SPA/SAC/pNHA). However, given the close proximity to the Liffey and the elevation of the site, there is probably a strong tidal influence in the groundwater levels which probably also influences the groundwater flow direction.



Figure 5.8 GSI Well Search Map (Source: GSI, 2024)

Table 5.2 GSI Well Card Index (Source: GSI, 2024)

GSI NAME	ORIGNAME	TYPE	EASTING	NORTHING	TOWNLAND	COUNTY
2923SEW013	Unknown	Borehole	315,400.00	234,300.00	ORMOND QUAY	Dublin
2923SEW012	Unknown	Borehole	315,950.00	235,050.00	PARNELL STREET	Dublin
2923SEW014	Unknown	Borehole	317,540.00	233,680.00	BARROW STREET	Dublin
2923SEW054	MW 5/99	Borehole	317,450.00	233,560.00	BARROW STREET	Dublin
2923SEW029	Unknown	Borehole	317,420.00	234,700.00	SHERRIFF STREET UPPER	Dublin

5.3.8 Groundwater Quality

5.3.8.1 Regional Scale

The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present. 'Good Status' was to be achieved in all waters by 2015, as well as maintaining 'high status' where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

Presently, the groundwater body in the region of the site (Dublin GWB - IE_EA_G_008) is classified under the WFD Risk Score system (EPA, 2024) as under “Review” meaning the GWB is being reviewed to determine whether or not the GWB has achieved its objectives and has either no significant trends or improving trends. The Dublin GWB was given a classification of “Good” status for the last WFD cycle (2016-2021).

5.3.9 Economic Geology

The GSI (2024) mineral database was consulted to determine whether there were any mineral sites in close proximity to the study area. There were 3 mineral sites identified in the surrounding area associated with Clay Brick, Lead and Limestone. The location and description of these mineral localities in relation to the site are presented in Table 5.3 below.

Table 5.3 GSI Mineral Localities (Source: GSI, 2024)

Mineral Location Ref	Mineral Type	Key Mineral	Description	Comments	Location	County
16	PB	Lead	Metallic	N/A	Circa 2.3 km East	Dublin
3249	CLBR	Clay, Brick	Non-metallic	Site of clay pits and brick works	Circa 4.4 km south-west	Dublin
4936	LS	Limestone	Non-metallic	Limestone quarry which was active about 1830. Quarry filled in and now exists as a park	4.7 km south-west	Dublin

5.3.10 Geological Heritage

The Geological Survey of Ireland (GSI) Public Viewer (www.gsi.ie/mapping) was reviewed to identify sites of geological heritage for the site and surrounding area. The Museum Building, Trinity College (Site Code: DC006) c. 0.8 km to the southeast is the audited site in closest proximity to the Proposed Development. The building is a very fine demonstration of rocks in building construction and ornamentation, especially the original interior, completed in 1857.

5.3.11 Geohazards

The GSI landslide database was consulted and the nearest landslide to the Proposed Development was 8.7 km to the west / northwest of the site, referred to as the Diswellstown1990 which occurred at Knockmaroon Glen Quarry Diswellstown, Strawberry Bedson on the 24th of December 1990. There have been no recorded landslide events at the site. Due to the local topography and the underlying strata, there is a negligible risk of a landslide event occurring at the site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. Currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic

data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the proposed location was in the Irish sea (1.0 – 2.0 Ml magnitude) and ~55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the Proposed Development site.

There are no active volcanoes in Ireland so there is no risk from volcanic activity.

5.3.12 Areas of Conservation

The NPWS (2024) on-line database have been reviewed to determine the location of areas of conservation within proximity to the propose development site, and there are no Special Protected Areas (SPA) established under the EU Birds Directive (79/409/EEC), or Special Areas of Conservation (SAC) established under the Habitats Directive on or within the boundary of the Proposed Development site. Furthermore, there are no Natural Heritage Areas (NHA), or proposed Natural Heritage Areas (pNHA) established under the Wildlife Acts, 1976 and 2000 (as amended) on or within the boundary of the Proposed Development.

The European sites in closest proximity to the Proposed Development are as follows:

- The South Dublin Bay SAC (000210) – c. 2.6 km to the east of the site.
- The South Dublin Bay & River Tolka SPA (0004024) – c. 2.6 km to the northeast of the site.
- North Bull Island SPA (004006) – c. 4.5 km to the northeast of the site.
- North Dublin Bay pNHA/SAC (000206) – c. 4.6 km to the northeast of the site.
- North-West Irish Sea SPA (004236) – c. 6.5 km to the east of the site.

Given the nature of the proposed construction works and the subject site's proximity to the River Liffey (approximately 25m), due to the risk of surface water and dust entering the River Liffey directly, out of an abundance of caution it is considered that there is a direct hydrological pathway to designated conservation sites located within Dublin Bay, downstream of the River Liffey.

The site also has an indirect hydrological pathway or connection with the Liffey Estuary and the SPA and SAC sites associated with Dublin Bay through the local surface water drainage network (refer to Chapter 6 – Hydrology) and the River Liffey / Liffey Estuary which flows in an easterly direction before ultimately discharging downstream into Dublin Bay, which is subsequently hydrologically connected / linked to conservation Natura sites such as North Bull Island SPA, North-West Irish Sea SPA, and North Dublin Bay pNHA/ SAC. Figure 5.9 below presents the location of these protected areas in the context of the Proposed Development site.

In addition to being a European sites, Tolka Estuary and North Bull Island are also proposed Natural Heritage Areas, and Ramsar Sites thereby further reinforcing the environmental value and sensitivity of the area. The Ramsar site is defined as a characteristic example of a marine and coastal wetland, this open sea bay includes sand and shingle shores, extensive saltmarshes, eelgrass beds, intertidal sand and mud flats encompassing the estuaries of the rivers¹.

Figure 5.9 below presents the location of these protected areas in the context of the Proposed Development site.

¹ <https://rsis Ramsar.org/ris/834>

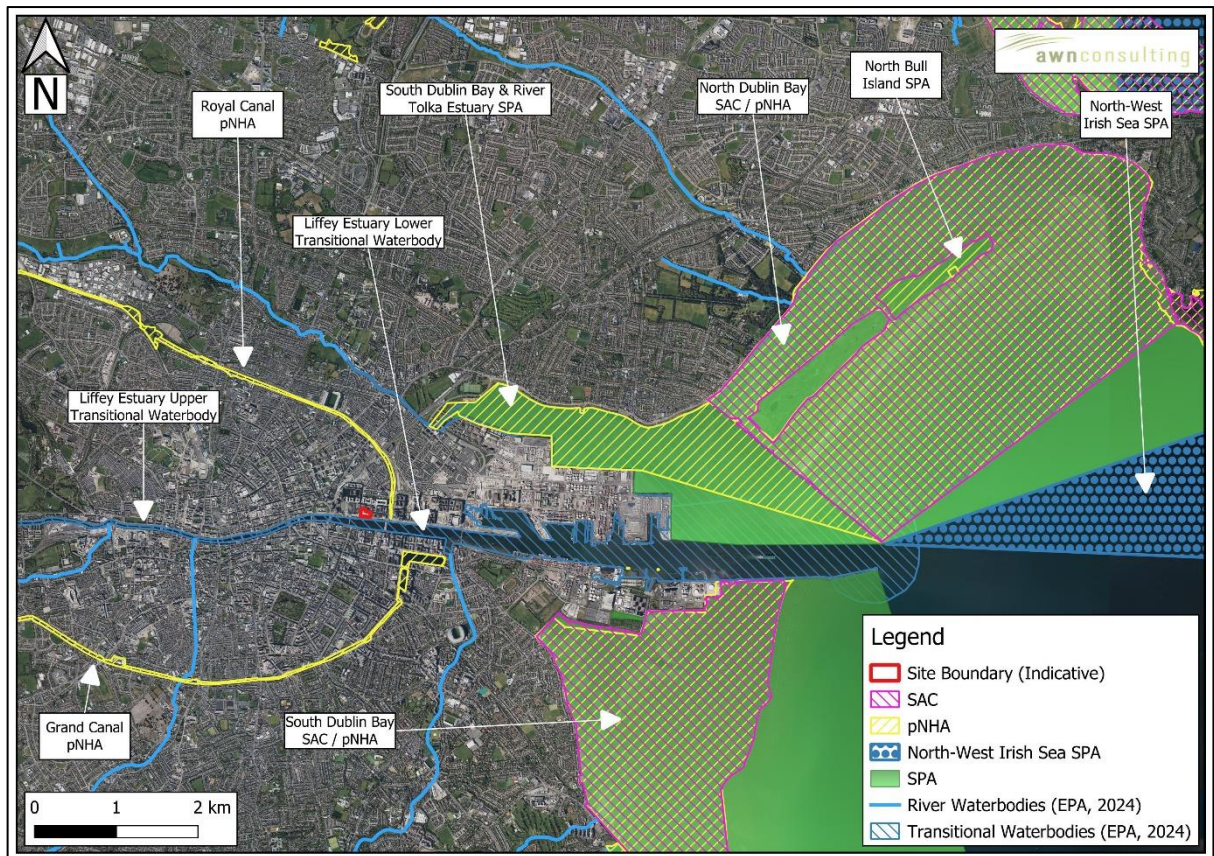


Figure 5.9 Natura 2000 Conservation Sites in the context of the Proposed Development site

5.3.13 Conceptual Site Model

- The GSI/ Teagasc mapping indicates that the soil type beneath the site is comprised entirely of made ground which is consistent with the shell and auger boring undertaken in the ground investigation carried out by The Cementation Co Ltd (1968-1969), which reportedly reinforced concrete, hardcore and clay gravel fill material.
- According to GSI database (2024), the subsoil underlying the site is 'Urban'. However, further ground investigation carried out by The Cementation Co Ltd (1968-1971) indicate that the subsoil in the vicinity of the development site comprises a mixture of MADE GROUND, CLAY, GRAVEL (lenses), and SAND to varying depths and proportions across the region.

Bedrock consisted primarily of Carboniferous-aged limestone (Dinantian Upper Impure Limestone) forming part of the Lucan formation, typically described as weak to medium strong to strong dark grey argillaceous limestone with laminations varying in thickness.

The site is underlain by a "Locally Important Aquifer – Bedrock which is Generally Moderately Productive" which is described by the GSI as bedrock as 'Moderately Productive only in Local Zones'.

- The GSI currently indicates that the site and its immediate vicinity overlies an aquifer which has been classified as have low Vulnerability.

A Local Cross Section can be seen in Figure 5.10 below.

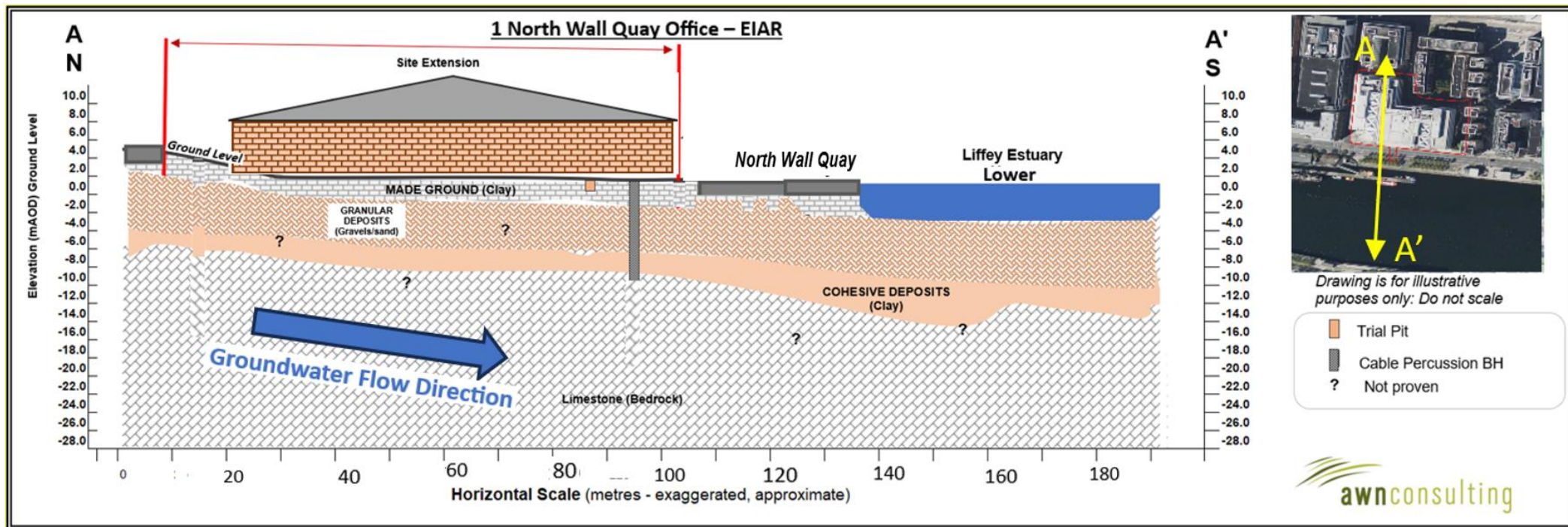


Figure 5.10 Local CSM Cross Section

5.3.14 Rating of Importance of Geological and Hydrogeological Attributes

Based on the TII (previously NRA) methodology (2009), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as '*Low Importance*' due to local geological attribute has a low quality, significance or value on a local scale.

Based on the TII methodology (2009) (See Appendix 5.1) the importance of the hydrogeological features at this site is rated as '*medium importance*' based on the assessment that the attribute has a medium quality significance or value on a local scale. The aquifer is a *locally important aquifer* and is not widely used for public water supply or generally for potable use. In addition, as explained in Section 5.3.12 above, there is a *direct* and *indirect* hydrogeological connection between the site and any protected conservation areas / sites associated with Dublin Bay.

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The purpose of this section is to provide an overview of the key relevant details of the construction phase and operational phase of the Proposed Development particularly in areas where potential impacts to land, soils, geology, and hydrogeology may occur. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. Therefore, it should be read in conjunction with the full planning application package. For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the Proposed Development.

As outlined below the activities required for the construction phase of the Proposed Development represents the greatest risk of potential impact on the geological and hydrogeological environment. These activities primarily pertain to the site preparation / enabling works, excavation, dewatering, and infilling activities required to facilitate construction of the Proposed Development.

5.4.1 Construction Phase

Demolition

The site is currently occupied by the Citigroup Building. The existing structure over basement will be demolished as part of the Proposed Development Works.

All demolition material will be removed from site by a licenced contractor.

Site Levelling and Excavations

There will be soil, stones made ground excavated to facilitate construction of new foundations, basement, and the installation of underground services. The project engineers (CS Consulting) have estimated that 120,000m³ of material will need to be excavated to do so. It is currently envisaged there are be limited options for reuse onsite, and therefore all the excavated material will removed from the site. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

To permit construction of the proposed basement, excavation will be required to a total

depth of approx. 15 m below the surrounding ground level. As the depth to bedrock within the site has been established / anticipated at greater than 10m below ground level, some rock breaking may be necessary. This will be confirmed by the site investigations that will take place post-demolition.

Storage of soils and aggregates

Aggregate materials such as sands and gravels will be stored in clearly marked receptacles in a secure compound area within the contractors' compound on site.

Temporary storage of spoil will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and solid matter. Any excavated material temporarily stockpiled onsite for re-use during reinstatement will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

Storage of Hazardous Material

Temporary storage of fuel required for on site for construction traffic. Liquid materials i.e., fuel storage will be located within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.

Construction activities will necessitate storage of cement and concrete materials, temporary oils, and fuels on site. Small localised accidental releases of contaminating substances including hydrocarbons have the potential to occur from construction traffic and vehicles operating on site.

Import/Export of Materials

There will be a requirement for deliveries of imported engineering fill (sands and gravels), and other construction materials include, steel structure, concrete, cladding, ducting and piping. Construction materials will be brought to site by road.

A 'Just in Time' delivery system will operate to minimise storage of materials. Construction materials will be transported in clean vehicles. Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials and spoil to prevent the escape material along the public roadway. Where possible it is proposed to source general construction materials from the local area to minimise transportation distances.

Soil requiring removal offsite will be removed from site regularly to ensure there is minimal need for stockpiling. Surplus topsoil, subsoil, and stones material will be transported off site and disposed of at a fully authorised soil recovery site. It is predicted that c. 120,000m³ of excavated material will be removed from the Site.

Collection and disposal of collected water (rainfall run-off and perched groundwater)

A secant pile wall will be installed around the perimeter of the development site. This is socketed into unbroken bedrock and provides a barrier to lateral groundwater ingress. The development site will be excavated to a depth of approximately 15 m below present surrounding ground level and pumping out of standing water may be necessary. Localised perched groundwater within the gravel deposits/ weathered bedrock, or pooling surface water during and after heavy rainfall events is expected. Dewatering (removing of perched groundwater) is necessary to create a dry working

environment and prevent water from seeping into the excavation and flooding the construction site.

The dewatering will occur via suitably installed dewatering wells/sumps containing pumps to abstract groundwater and surface water (rainfall landing on the site).

Depending on the quality of the construction water the discharge of treated water will occur to either; to surface water (via the storm water network to the River Liffey); or to Ringsend WWTP (via the combined foul wastewater network). Where required, a wastewater discharge licence will be applied for to manage surface water on site during the construction phase. This shall permit the discharge of trade effluent arising from groundwater/surface water ingress on the construction site. Discharge is proposed to the existing sewers in Commons Street and Clarion Quay at the development site's western and northeastern boundary. The discharge to surface water sewer is subject to agreement with Dublin City Council (DCC). In case of any exceedances of discharge permit conditions, water will be retreated on site, or disposed of to a licenced facility. The treatment and monitoring of this water prior to disposal will occur within the construction site (See Chapter 6 (Hydrology), of this EIAR Section 6.6.1 for further details).

5.4.2 Operational Phase

The Proposed Development site is currently occupied by the Citi Group building, therefore there will be no changes in the hardstanding areas and no local effect on groundwater recharge is foreseen.

The proposed surface water drainage strategy comprises a sustainable drainage system that is to be integrated with the developments landscaping features and will be composed of flow control devices (hydrobreak or equivalent), Green Blue roof design and associated Blue Roof attenuation storages. All surface water runoff is to be attenuated and treated within the new development site boundary, before ultimately discharging to the existing stormwater sewers in Clarion Quay and Commons Street, to the northeast and west of the development site, respectively. Refer to Chapter 6 for further details.

There is no requirement for bulk fuels or chemical storage, no requirement for discharge to ground and no requirement for abstraction of groundwater during operational phase.

5.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

5.5.1 Construction Phase

5.5.1.1 Potential impacts on Land, Soils, Geology and Hydrogeology

There are no records of recent/historical contamination in the area, there are no licenced sites nearby, so no contamination is expected within the soils eventually reaching the regional aquifer. However, the planned site investigation during post demolition phase will confirm this. In case contamination is detected, the mitigation measures presented in Section 5.6.1 will address this issue.

There is potential for the underlying groundwater to become contaminated with pollutants associated with construction activity. If a spill occurs, contaminated water and collected surface water run-off which arises from construction sites can pose a short-term risk to the underlying perched water table if contaminated water is allowed

percolate to the aquifer unmitigated. Based on the thickness of overburden present there is no potential for impact on the bedrock water table. The potential of contamination is associated with the following sources:

- Suspended solids (muddy water with increase turbidity (measure of the degree to which the water loses its transparency due to the presence of suspended particulates)) – arising from exposed ground, erosion, stockpiles, dewatering, access roads, and ground disturbance.
- Cement/concrete (increase turbidity and pH) – arising from concreting works, concrete washout water, and other concrete additives.
- Hydrocarbons and other construction chemicals (ecotoxic) – accidental spillages from construction plant or stored fuels, oils, and materials.
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

In the absence of mitigation, rainfall run-off and potential dewatering water during the construction phase may contain increased silt levels or otherwise become polluted from construction activities. Suspended solids in runoff water may result in an increase in suspended sediment load, resulting in increased turbidity, which may in turn impact on downstream infrastructure or watercourses. Concreting operations pose a potential risk of discharging concrete materials into exposed surfaces and percolate to the underlying groundwater. Concrete, especially the cement component, has a high alkalinity level. There is also the potential risk of unintentional discharge of stored materials like fuels, oils, and paints, which could have negative impacts on surface waters on-site and downstream from the site. It is necessary for the measures (set out in Section 5.6.1) to be implemented to reduce and prevent accidental discharges from occurring during construction, including the implementation of effective containment and monitoring procedures.

Accidental discharges can also occur from welfare facilities during construction activities. Wastewater can contain high levels of bacteria, chemicals and organic matter, which could contaminate nearby water courses if discharged incorrectly. The establishment and use of welfare facilities and connection to the existing combined foul sewer, ensures that there are no potential significant impacts; therefore, no additional mitigation is required.

In addition to the unintentional spillages of the primary sources of contaminants mentioned above, there is also a risk that rainfall run-off and dewatering water from excavation activities becomes contaminated by these sources. If not appropriately mitigated through containment, management, and monitoring, this could result in the mobilisation of these contaminants, leading to more widespread impacts on the surrounding environment. It is the intent to take necessary measures (set out in Section 5.6.1) to prevent such accidental discharges from occurring during construction, including the implementation of effective containment and monitoring procedures.

As mentioned above, it is expected that localised groundwater dewatering will be required as part of the excavation works. Given the anticipated depth of bedrock underlying the site (+10m below ground level) and the projected excavation levels (up to 15 mbgl), the expected dewatering would be associated with perched groundwater within the overburden gravel deposits and the bedrock. It can also be expected minor ingress of rainfall in the excavations will also occur during construction phase. The Basement Impact Assessment undertaken by CS Consulting Group (2024) demonstrates that the construction of the proposed basement development will not adversely / unduly impact on the underlying groundwater conditions, groundwater or surface water flow, existing patterns of surface water drainage (including infiltration into

groundwater), and that groundwater quality, quantity and classification will be protected.

A secant pile wall will be installed around the perimeter of the development site. This is socketed into unbroken bedrock and provides a barrier to lateral groundwater ingress. The Proposed Development's basement shall be constructed within this existing secant pile wall and shall bear directly onto the underlying bedrock. The proposed basement shall therefore have no impact on existing lateral groundwater flows. Refer to the Basement Impact Assessment undertaken by CS Consulting Group (2024) for further details.

In the absence of mitigation measures the potential impacts during the construction phase on land, soils and geology, hydrogeology (groundwater) are **negative, not significant** and **short term**.

5.5.1.2 Potential Impacts on Human Health and Populations

A reduction in groundwater quality via unmitigated pollutants entering the soil or Dublin GWB (as set out in Section 5.5.1.1) has the potential to lead to negative impacts on human health and populations. Hydrocarbons and petroleum products for example have the greatest risk for human health when they are in drinking water. Furthermore, humans can also be exposed to petroleum hydrocarbons or other contaminants by inhaling the fumes / dust from contaminated soil. Depending on the type of contaminant and the level of exposure, soil contamination can have serious health implications.

Section 5.3.7 identified that none of the wells listed are categorised as domestic use. The area is serviced by Local Authority mains therefore it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or group schemes.

Section 5.3.7 identified that there are no groundwater source protection zones in the immediate vicinity of the site, due to the separation distance between the Proposed Development site and the nearest groundwater source protection zones there are no potential impacts on groundwater source protection zones (proposed site is outside of the zone of contribution of this supply).

Therefore, in the absence of mitigation measures the potential impacts during the construction phase on human health and populations due to changes to the potential for contamination of soil and groundwater are **neutral, imperceptible, and short term**.

5.5.1.3 Potential Impacts on Water Framework Directive Status

AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report for the Proposed Development (see Appendix 6.2 of this EIAR). The WFD assessment states that there is no potential for adverse, temporary, or localised on the Dublin groundwater body. Therefore, it has been assessed that the Proposed Development will not cause any significant deterioration or change on its groundwater body status. Furthermore, the Proposed Development will not prevent attainment, nor impact the potential to achieve the WFD objectives or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

As mentioned above, the Proposed Development will probably involve groundwater dewatering. This dewatering will be mainly associated with perched groundwater within the subsoils and some strikes from the upper weathered bedrock. In case of

occurrence, this dewatering will be a short-lived event and will not impact on the groundwater regime of the Dublin GWB and on the quantitative aspects of waterbody status such as baseflow for hydrological waterbodies.

No further assessment of WFD is deemed necessary given that no significant deterioration or change in water body status is expected based on the understanding of the Proposed Development during construction.

There is a potential of accidental discharges during the construction phase (as set out in Section 5.5.1.1), however these are temporary short-lived events that will not impact on the water status of the underlying bedrock aquifer long-term and as such will not impact on trends in water quality and overall WFD status.

There is no potential for the Proposed Development to impact on the current WFD status of the Dublin GWB during the construction phase, therefore no specific mitigation measures are required.

5.5.2 Operational Phase

5.5.2.1 Potential impacts on Land, Soils, Geology and Hydrogeology

There is no abstraction of groundwater proposed. There are no discharges to ground included in the design.

The development site and its surrounding area have in their recent history generally comprised impermeable surfaces, with minimal opportunity for direct infiltration of surface water to ground. Stormwater runoff is discharged to the existing public combined sewers in adjacent streets. The Proposed Development shall include a stormwater attenuation system, thereby reducing runoff flows during intense rainfall events. At the request of Uisce Éireann, it is proposed to discharge surface water runoff from the Proposed Development to 3 no. connections to the stormwater sewer in Clarion Quay and 3 no. connections to the stormwater sewer in Commons Street, to the northeast and west boundaries of the site, respectively.

The proposed incorporation of hardstand area post-excavation and the use of SUDS design measures will have a minor effect on local recharge to ground, relative to the construction phase; however, the impact on the overall groundwater regime will be insignificant considering the proportion of the site area in relation to the total aquifer area. It is noted that the site is currently occupied by a functioning office building and is completely covered by impermeable surfaces.

In the absence of mitigation measures the potential impacts during the operational phase on land, soils, geology and hydrogeology are **negative, not significant, and long-term**.

5.5.2.2 Potential Impacts on Human Health and Populations

There are no abstractions of ground water, or discharges of contaminated waters to ground proposed during the operational phase, therefore there is no potential for impact on drinking water resources. There is no sensitive economic, or historical geology at the site. The Basement Impact Assessment undertaken by CS Consulting Group (2024) confirms that proposed basement shall have no impact on existing lateral groundwater flows during the operational phase of the Proposed Development.

During the operational phase of the Proposed Development there is no potential for impact on human health and populations due to changes in land, soil, geology and hydrogeology.

Therefore, on this basis in the absence of mitigation measures the potential impacts during the operational phase on human health and populations due to the potential for contamination of soil and groundwater are **neutral**, **imperceptible** and **long term**.

5.5.2.3 Potential Impacts on Water Framework Directive Status

AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report (see Appendix 6.2 of this EIAR).

There is no long-term discharge proposed which could have an impact on the current, or future, status of Dublin GWB and Liffey Estuary transitional water body. In the scenario of an accidental release (unmitigated leaks mentioned above) there is potential for a temporary impact only which would not be of a sufficient magnitude to effect a change in the current water body status.

There is no potential for adverse or minor temporary or localised effects on the Dublin GWB during the operational phase. Therefore, it has been assessed that it is unlikely that the Proposed Development will cause any significant deterioration or change in water body status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

No further assessment of WFD is recommended given that no significant deterioration or change in the current status of the Dublin GWB and Liffey Estuary Transitional water body is expected based on the current understanding of the Proposed Development during operation. There is no potential impact on Water Framework Directive status, therefore no specific mitigation measures are required.

5.6 MITIGATION MEASURES

The project design team has carefully considered the potential impacts of the Proposed Development, and as a result, avoidance and mitigation measures have been incorporated to address potential effects on the surrounding land, soils, geology and hydrogeology environment. This EIA Report highlights the interrelationship, and interactions of the land, soils, geology, hydrogeology, hydrological environment, and biodiversity, and consequently, there is a coherence between the mitigation measures outlined in Chapters 5 (Land, Soils, Geology and Hydrology), 6 (Hydrology), and 7 (Biodiversity).

5.6.1 Construction Phase

CS Consulting Group have prepared an *Outline Construction Management Plan* (OCMP) (2024) in respect of the Proposed Development that is included with the application documentation. It contains best practice measures and protocols to be implemented during the construction phase of the Proposed Development to avoid / minimise environmental impacts. This outline and explains the construction techniques and methodologies which will be implemented during construction of the Proposed Development.

Construction works and the proposed mitigation measures are informed by best practice guidance from Inland Fisheries Ireland on the prevention of pollution during development projects including but not limited to:

- Construction Industry Research and Information Association (CIRIA), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532);
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (4th edition), (C741); and
- Enterprise Ireland Best Practice Guide, Oil Storage Guidelines (BPGCS005).

The OCMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, Resource Manager, and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures.

The OCMP sets out the proposed procedures and operations to be utilised on the proposed construction site to protect water quality. The mitigation and control measures outlined in the OCMP will be employed on site during the construction phase. All mitigation measures outlined within this EIAR, and within the OCMP will be implemented during the construction phase, as well as any additional measures required pursuant to planning conditions which may be imposed.

5.6.1.1 Land, Soils, Geology, Hydrogeology

Excavation and Contamination

Following demolition of the existing building as part of the Proposed Development works, a watching brief will be maintained by qualified person(s) who will visually examine the soil during site investigations and excavation and assess for signs of possible contamination such as staining or strong odours. All potential signs of contamination will be noted in the watching brief.

Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor. See Chapter 13 (Material Assets – Waste Management), Appendix 13.1 for further information contaminated soil management.

Suspended Solids

As there is potential for run-off to directly and indirectly discharge / recharge to a watercourse / groundwater (Liffey Estuary / Dublin GWB) underlying the site and in order to manage the potential impact associated with sediment and sediment runoff the following mitigation measures will be implemented during the construction phase.

- During earthworks and excavation works care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.
- Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds).

- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate,
- A stabilised entranceway consisting of an aggregate on a filter cloth base that is located at any entry or exit point of the construction site.
- Aggregate will be established at the site entrance points from the construction site boundary extending for at least 10 m.
- The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- Construction materials, including aggregates etc. will be stored a minimum of 20-meter buffer distance from any surface water bodies and surface water drainage points.
- Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination.
- Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.
- Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations.
- Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site.
- Any surface water run-off collecting in excavations will likely contain a high sediment load. This will be diverted to an onsite treatment system and will not be allowed to directly discharge directly to the stormwater sewer.

Cement/concrete works

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil.

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within 10 meters of an existing surface water drainage point. Wash-outs will only be allowed to take place in designated areas with an impervious surface where all wash water is contained and removed from site by road tanker or discharged to foul sewer submit to agreement with Uisce Éireann.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures.

Hydrocarbons and other construction chemicals

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground of fuels and other construction chemicals and prevent any resulting to surface water and groundwater systems:

- Designation of bunded refuelling areas on the Site;
- Provision of spill kit facilities across the Site;
- Where mobile fuel bowzers are used, the following measures will be taken:
 - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;

- The pump or valve will be fitted with a lock and will be secured when not in use;
- All bowzers to carry a spill kit and operatives must have spill response training;
- Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be stored within temporary bunded areas, doubled skinned tanks or bunded containers to a volume of 110% of the capacity of the largest tank/container. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area or within the construction compound (or where possible off the site) which will be away from surface water gulleys or drains (minimum 20 m buffer zone). In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures.

Disposal of collected water (rainfall run-off and perched water)

Rainfall at the construction site will be managed and controlled for the duration of the construction works until the permanently intercepted and attenuated surface water drainage system of the proposed site is complete. Dewatering water from excavation works within overburden deposits will be contained within the site, treated (if required) and discharged.

Where required, a wastewater discharge licence will be applied for to manage surface water on site during the construction phase. This shall permit the discharge of trade effluent arising from groundwater/surface water ingress on the construction site. The discharge to surface water sewer is subject to agreement with DCC; and the discharge to the existing stormwater sewer is subject to agreement with Uisce Éireann .

Contaminated waters, if encountered on site, shall be treated using best practice and appropriate measures/controls dependent on the nature of the contamination, prior to discharge to the surface water network. There shall be no direct pumping of contaminated water from the works to the surface water drainage at any time. The treatment and monitoring of this water prior to disposal will occur within the construction site. See Chapter 6 (Hydrology) of this EIAR Section 6.6.1 for further details.

Wastewater Management

Foul wastewater discharge from the site will be managed and controlled for the duration of the construction works.

Site welfare facilities will be established to provide sanitary facilities for construction workers on site. The main contractor will ensure that sufficient facilities are available at all times to accommodate the number of employees on site. Foul water from the offices and welfare facilities on the site will discharge into the existing sewer on site (the cabins may initially need to have the foul water collected by a licensed waste sewerage contractor before connection to the sewer line can be made).

The construction contractor will implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be adequately and suitably trained in the implementation of the procedures.

5.6.1.2 Human Health and Populations

It has been established (Section 5.3.7) that there are no recorded groundwater boreholes for domestic use within the vicinity of the site, and the site is not located near or in close proximity of any public groundwater supplies or group schemes, or groundwater source protection zones. On a precautionary basis, the mitigation measures set out in Section 5.6.1.1, will be implemented during the construction works for the protection of human health and populations.

Furthermore, as stated in Section 5.6.1.1 all excavated materials will be visually assessed by suitably qualified persons for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor. All sampling and soil handling will be undertaken by suitably qualified and trained persons using suitable personal protective equipment to avoid risks to human health.

5.6.1.3 Water Framework Directive Status

AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report (see Appendix 6.2 of this EIAR). It has been established (Section 5.5.1.3) that while, there is a potential of accidental discharges during the construction phase this will not impact on trends in water quality and overall WFD status. The WFD Screening Report outlines that the project-specific OCMP includes robust mitigation measures to protect the underlying hydrogeological environment. On a precautionary basis, the mitigation measures set out in Section 5.6.1.1, and the OCMP, will be implemented during the construction works for the protection of groundwater quality.

5.6.2 Operational Phase

5.6.2.1 Land, Soils, Geology, and Hydrogeology

The Proposed Development design includes hardstand cover across the entire site and as set out in the CS Consulting Group Engineering Services Report (2024) the proposed/existing surface water drainage system for this development has been designed as a sustainable urban drainage system (SuDS) and uses green blue roofs for attenuation together with a flow control device (hydro-brake) and petrol interceptors. Therefore, the risk of accidental discharge of hydrocarbons or potential operational contamination sources has been adequately addressed through design.

5.6.2.2 Human Health and Populations

It has been established (Section 5.3.7) that there are no recorded groundwater boreholes for domestic use within the vicinity of the site, and the site is not located near any public groundwater supplies or group schemes, or groundwater source protection zones. On a precautionary basis, the mitigation measures set out in Section 5.6.2.1, will be implemented during the operational phase for the protection of human health and populations.

5.6.2.3 Water Framework Directive Status

AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report (see Appendix 6.2 of this EIAR). There are best practice measures incorporated into the design (i.e. sustainable urban drainage systems) that will, protect the hydrological and hydrogeological environment. In terms of the operational phase and design measures included, the risk to the aquifer is considered to be low due to the use of oil interceptors on the stormwater system prior to discharge from the site.

It has been established (Section 5.5.2.3) that while, there is a potential of accidental discharges during the operational phase this will not impact on trends in water quality and overall WFD status assessment. On a precautionary basis, the mitigation measures set out in Section 5.6.2.1 will be implemented during the operational phase to control of the accidental spills. It is noted that, as detailed further in Chapter 6 (Hydrology) the surface water discharges from the site are indirect, and will be adequately attenuated via SuDS measures, hydrobrake (or equivalent) and oil/water interceptor to ensure there is no long-term negative impact to the WFD water quality status of the River Liffey / Liffey Estuary.

5.7 MONITORING

5.7.1 Construction Phase

During construction phase the following monitoring measures will be implemented:

- Regular inspection of surface water run-off and sediments controls (e.g., silt traps);
- Soil sampling to confirm disposal options for excavated soils in order to avoid contaminated run-off;
- Maintenance of a watching brief during the excavation phase to record any signs of potentially contaminated soil
- Regular inspection of construction / mitigation measures (e.g., concrete pouring, refuelling, etc).

5.7.2 Operational Phase

Maintenance of the surface water drainage system, including separators / interceptors, and foul sewers is recommended to minimise any accidental discharges to soil or groundwater.

5.8 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

5.8.1 Construction Phase

5.8.1.1 Land, Soils, Geology, Hydrogeology

The implementation of the mitigation and monitoring measures detailed in Section 5.6.1 and 5.7.1, will ensure that the potential impacts on land, soils, geology, hydrogeology during the construction phase are adequately mitigated. The residual effect on surface water quality during the construction phase is considered to be **neutral, imperceptible** and **short-term**.

Following the TII criteria (refer to Appendix 5.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered **negligible**.

5.8.1.2 Human Health and Populations

The implementation of the mitigation and monitoring measures detailed in Section 5.6.1 and 5.7.1, will ensure that the potential impacts on human health and populations during the construction phase are adequately mitigated. The residual effect on surface water quality during the construction phase is considered to be **neutral, imperceptible** and **short-term**.

5.8.1.3 Water Framework Directive Status

AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report (see Appendix 6.2 of this EIAR). The WFD Screening Report concludes that the potential effects on the WFD status to the groundwater bodies are considered no impact i.e. no change to the WFD status or elements in terms of the underlying hydrogeological environment. There is no potential for adverse or minor temporary or localised effects on the Dublin groundwater body. Therefore, it has been assessed that it is unlikely that the Proposed Development will cause any significant deterioration or change on its water body status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

Even in the absence of the mitigation and monitoring measures detailed in Section 5.6.1 and 5.6.2., there will be no predicted degradation of the current groundwater body (chemically, ecological and quantity) or any impact on its potential to meet the requirements and/or objectives in the second RBMP2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

There are appropriately designed mitigation measures which will be implemented during the construction phase to protect the hydrogeological environment. There is a potential of accidental discharges during the construction phase, however these are temporary short-lived events that will not impact on the water status of groundwater bodies long-term and as such will not impact on trends in water quality and over all status assessment.

The residual effect on human health and populations during the construction phase is considered to be **neutral, imperceptible** and **short-term**.

5.8.2 Operational Phase

5.8.2.1 Land, Soils, Geology, Hydrogeology

The implementation of the mitigation and monitoring measures detailed in Section 5.6.2 and 5.7.2, will ensure that the potential impacts on land, soils, geology, hydrogeology once the Proposed Development is constructed and operational are adequately mitigated. The residual effect on surface water quality during the operational phase is considered to be **neutral, imperceptible** and **long-term**.

Following the TII criteria (refer to Appendix 5.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered **negligible**.

5.8.2.2 Human Health and Populations

The implementation of the mitigation and monitoring measures detailed in Section 5.6.2 and 5.7.2, will ensure that the potential impacts on human health and populations once the Proposed Development is constructed and operational are adequately mitigated. The residual effect on human health and populations during the operational phase is considered to be **neutral, imperceptible** and **long-term**.

5.8.2.3 Water Framework Directive Status

AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report (see Appendix 6.2 of this EIAR). The WFD Screening Report concludes there is no potential for adverse or minor temporary or localised effects on the Dublin groundwater body. Therefore, it has been assessed that it is unlikely that the Proposed Development will cause any significant deterioration or change on its water body status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

Even in the absence of the mitigation and monitoring measures detailed in Section 5.6.2 and 5.7.2, there will be no predicted degradation of the current water body (chemically, ecological and quantity) or any impact on its potential to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

There are appropriately designed mitigation and design measures which will be implemented during the construction phase to protect the hydrogeological environment. There is a potential of accidental discharges during the construction and operational phases, however these are temporary short-lived events that will not impact on the water status of underlying aquifer long-term and as such will not impact on trends in water quality and over all status assessment.

There are no planned discharges to groundwater during the operational phase and no long-term groundwater dewatering for the project.

There is no abstraction of groundwater proposed.

5.9 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

The cumulative impact of the Proposed Development with any relevant other planned or permitted developments are discussed below. For details on the developments considered refer to Chapter 2, Appendix 2.1 of this EIA Report.

Existing developments that are already built and in operation contribute to the characterisation of the baseline environment. As such any further environmental impacts that the Proposed Development may have in addition to these already constructed and operational developments has been assessed in the preceding sections of this chapter.

5.9.1 Construction Phase

In relation to the potential for cumulative impacts on land, soils, geology and hydrogeology during the construction phases, the construction works which would have potential cumulative impacts are as follows:

- Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses.
- Stockpiled material will be stored on hardstand away from surface water drains, and gullies will be protected during works to ensure there is no discharge of silt-laden water into the surrounding surface water drainage system.
- Contamination of local water sources from accidental spillage and leakage from construction traffic and construction materials is possible unless project-specific measures are put in place for each development and complied with.

A review of the permitted and proposed developments set out in Chapter 2, Appendix 2.1 of this EIA Report has been undertaken to identify any substantial projects that are concurrent with the construction phase of the Proposed Development that may result in cumulative effects in respect of land soils geology and hydrogeology.

The subject development itself has minimal potential to affect groundwater flows or surface water flows in its vicinity, given that its basement pile wall will be in place. There is therefore a negligible risk of the subject development producing a long-term cumulative effect on these environmental factors in conjunction with the nearby developments.

The implementation of mitigation and monitoring measures detailed in Section 5.6.1; and 5.7.1 as well as the compliance of proposed and permitted developments noted in Chapter 2, Appendix 2.1 with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the land, soils, geological and hydrogeological environment during the construction phase of the Proposed Development.

It is also acknowledged that the works contractors for other planned or permitted developments will be obliged to ensure that measures are in place to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016)).

The residual cumulative impact of the Proposed Development in combination with other planned or permitted developments can therefore be considered to be **neutral, imperceptible** and **short-term**.

5.9.2 Operational Phase

In relation to the potential cumulative impact on land, soils, geology and hydrogeology during the operational phases, the operational activities which would have potential cumulative impacts are as follows:

- Increased risk of accidental discharge of hydrocarbons from car parking areas, and along roads is possible unless diverted to surface water system with petrol interceptor.

A review of the permitted and Proposed Developments set out in Chapter 2, Appendix 2.1 of this EIA Report has been undertaken to identify any substantial projects that are concurrent with the operational phase of the Proposed Development that may result in cumulative effects in respect of land, soils, geology and hydrogeology.

The implementation of mitigation and monitoring measures detailed in Section 5.6.1; and 5.7.1 as well as the compliance of proposed and permitted developments noted in Chapter 2, Appendix 2.1 with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the land, soils, geology, hydrogeological environment during the operational phase of the Proposed Development.

Furthermore, all developments listed in Chapter 2, Appendix 2.1 of this EIA Report are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislation (Water Framework Directive and associated legislation) such that they would be required to manage run-off and fuel leakages.

The residual cumulative impact of the Proposed Development in combination with other planned or permitted developments can therefore be considered to be **neutral, imperceptible** and **long-term**.

5.10 REFERENCES

- CIRIA (2005). Environmental Good Practice on Site (C650).
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- GSI (2024). GSI Map Viewer.
- Institute of Geologists of Ireland (2013). Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.
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