

5.0 LAND, SOILS, GEOLOGY & HYDROGEOLOGY

5.1 INTRODUCTION

This Chapter assesses and evaluates the potential impacts of the Proposed Development described in Chapter 2 (Description of the Proposed Development) on the land, soils, geological and hydrogeological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects. The impact on hydrology is addressed in Chapter 6 (Hydrology).

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5.2 METHOD

5.2.1 Criteria for Rating Effects

The Chapter has been prepared in accordance with European Commission's guidelines, *Guidance on the preparation of the Environmental Impact Assessment Report* (2017), the EPA *Guidelines on the information to be contained in EIAR* (2022) and the EU Commissions *Notice on changes and extensions to projects* (2021).

The assessment follows the procedures set out in the Institute of Geologists of Ireland (IGI) Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements (2013) and other relevant guidelines set out below to assess and evaluates land, soils and geology within the context of the Proposed Development. This assessment includes a review of the existing environment, the potential impacts of the Proposed Development, mitigation measures, and the potential impacts.

The appraisal methodology for the EIAR is completed in accordance with 'Guidelines on the Information to be contained in Environmental Impact Statements' (EPA, 2022) and Institute of Geologists of Ireland (IGI) 'Geology in Environmental Impact Statements, a Guide', (IGI, 2002) and 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI 2013). In addition, 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the Transport Infrastructure Ireland (TII, 2009) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental impacts on the land, soils and geological environment is based on the quality, significance, duration, and type of impact characteristic identified. In this EIA assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute. The EIAR guideline tables (EPA, 2022) the IGI and TII criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment.

The Transport Infrastructure Ireland (TII) (formerly National Roads Authority) criteria is used for estimating the importance of the soil, geology and hydrogeological attribute the magnitude of the potential environmental impacts on the land, soil, geological and hydrogeological environment is based on the TII matrix, and the quality, significance and duration of potential impacts are described in this chapter

In assessing likely potential and predicted impacts, account has been taken of both the importance of the attributes and the predicted scale and duration of the likely impacts. Where an impact is identified, planned mitigation measures are identified and assessed.

The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

The principal attributes (and impacts) assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site;
- Landfills & industrial sites & graveyards in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the site;
- Quarries or mines in the vicinity, 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 or requirement to remove it off-site as waste for disposal or recovery;
- High-yielding water supply springs/wells in the vicinity of the site to within a 2 km 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 perimeter area and increased risks presented to them by the proposed development associated with aspects of the development for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in 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
- Fingal County Council - illegal landfill information.
- Fingal Development Plan 2023-2029.

Site specific data was derived from the following sources:

- The proposed development design site plans and drawings; and Consultation with the project design engineers.
- Civil Engineering Pre-Planning Briefing Note, Paul McGrail Consulting Engineers, 2025.
- Site Investigation Report. Proposed New Housing development Naul Road Balbriggan IGSL Ltd (2019).
- EPA (2025). EPA Maps.
- GSI (2025). GSI Map Viewer.

5.2.3 Relevant Legislation & Guidance

The baseline study and impact assessment have will be out in accordance with the following key guidance and established best practice:

- Environmental Protection Agency (EPA) Advice notes on current practice in the preparation of Environmental Impact Statement (EPA, 2003) and Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022a).
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009).
- Transport Infrastructure Ireland - Road Drainage and Water Environment (TII, 2015).
- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW).

Land soil, geology and hydrogeology resource management in Ireland is dealt with in the following key pieces of legislation and guidelines:

- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).
- Waste Management Acts 1996 as amended.

- Environment Agency (EA), Land contamination: risk assessment (EA 2020).
- BS 10175:2011 + A2:2017 Investigation of potentially contaminated sites. Code of practice (British Standards Institute 2017).
- CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice (CIRIA 2001).
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009).
- Transport Infrastructure Ireland, The Management of Waste from National Road Construction Projects (TII 2017).
- Environmental Protection Agency, Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA 2013).
- Local Authority planning guidance as applicable.
- Consolidated EIA Directive 2011/92/EU as amended by 2014/52/EU.
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001).
- Water Framework Directive (WFD) - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies.
- River Basin Management Plan 2018-2021 (including regional plans by Local Authority Waters Programme (Waters and Communities 2020)).
- River Basin Management Plan 2022-2027.
- European Communities Environmental Objectives (Groundwater) Regulations 2010, S.I. No. 9/2010, as amended.
- European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016, S.I. No. 366/2016.
- 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 (Groundwater Directive).
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019.

5.3 BASELINE (RECEIVING) ENVIRONMENT

The receiving environment is discussed in terms of; land geology, soils, hydrogeology, and site history including potential for contamination.

The development will consist of the construction of 815 no. dwellings, open space, ancillary infrastructure, community/retail floorspace and 2 no. creches on an overall combined site area of 24.96 hectares and on multiple portions of separate parcels of land characterized currently by an agricultural function located at Flemington Lane in Balbriggan, North Co. Dublin.

The development site is a greenfield site located approximately 1.6 km west of the Balbriggan town centre. The subject development is partially bounded by the Clonard Road (regional Route R122) and Bridgefoot and adjacent agricultural lands to the south and west, respectively. The site is bounded by Flemington Lane and agricultural lands to the north and by Taylor Hill Grange Residential Estate, among other adjacent / neighbouring residential housing estates to the east.

Figure 5-1: Site Location



5.3.1 Topography and Setting

The topography is relatively consistent with the site generally falling in elevation from northeast to southwest and characterized by minor localized undulations. The elevation falls from approximately 47m AOD (Above Ordnance Datum) to approximately 42m AOD from northeast to southwest. A portion of the central western section of the site located adjacent to the Clonard Road lies on elevated land at approximately 66m AOD.

5.3.2 Areas of Geological Interest, Historic & Current Land-Use

Full details of the site history and previous land are provided in Chapter 14 Cultural Heritage, Archaeology & Architectural Heritage of the EIAR. This section includes an evaluation of the likelihood of the presence of any contamination on soil/ groundwater at the site and an overview of the site development history.

The site is currently a greenfield site characterised with an agricultural function. The vicinity and surrounding context of the site is predominantly characterized by a residential land and agricultural function, coupled with a combination of commercial, recreational, educational / institutional and amenity uses.

Historical Ordnance Survey maps were examined for the purpose of this report to identify any historical sources of contamination. O.S maps are available for the year 1829 - 1842, i.e. historical 6” maps and for 1883 - 1913, i.e. historical 25” map. Furthermore, there are available historic Satellite Aerial Imagery maps

from 1995, 1996 - 2000, 2005 - 2012, 2011 - 2013, and 2013 – 2018. The assessment of site history (OSI, 2025) confirms that the Site has been in agricultural use since the earliest mapping available (1829-1842).

A review of historical aerial satellite imagery spanning from the period 1995 to 2018 indicates that the development of residential land in the vicinity of the site to the east commenced around 2001.

According to the EPA website, the nearest licenced facility in the vicinity of the site is Padraig Thornton Waste Disposal Limited (IEL facility active licence number P1014-01), which is located circa 1.4 km southeast, thereby hydrogeologically cross gradient of the proposed development. The IPC Industry (IPPC) site in closest proximity to the development is the Brooks Group Limited Licenced facility (Active License No: P0780-01), which is located approximately 3.9 km south of the subject development site.

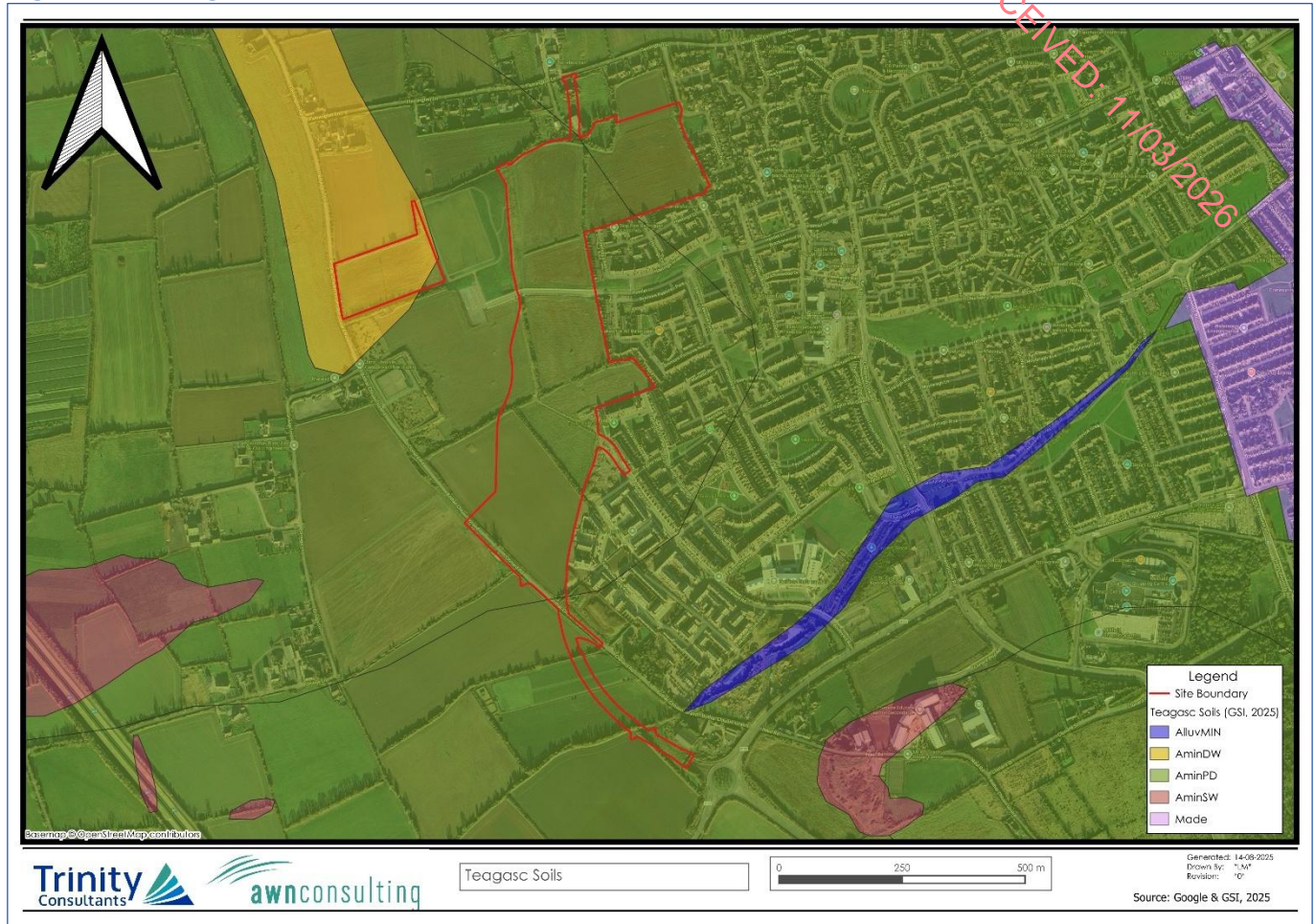
Review of the GSI online data base confirmed that no geological heritage site has been identified in the vicinity of the proposed development site. The closest County Geological Site is Laytown to Gormanstown Coastal Plain, including sea cliffs, which is located c. 1.4 km north-northwest of the site at the point of closest proximity.

5.3.3 Soil and Quaternary Subsoil

The GSI/Teagasc (2025) mapping currently denotes the primary soil type underlying the site as Irish Sea Till (IrSTLPSsS) which is derived from parent material described as Sandstone and shale till (Lower Palaeozoic) with matrix of Irish Sea Basin origin. These deposits are classified as AminPD - Mineral poorly drained (Mainly acidic) soils.

The western portion of the site which is removed / separated form the majority of the subject development lands, is underlain by AminDW which is defined by the GSI as Acid Mineral Soil Deep Well Drained soil, derived from acidic parent material.

Figure 5-2: Teagasc Soils (GSI, 2025)



The regional overburden deposits are reflective of the Quaternary geological period that extends from around 1.5 million years ago to the present day. This can be further sub-divided into the Pleistocene Epoch, which covers the Ice Age period, and which extended up to 10,000 years ago and the Holocene Epoch, which extends from that time to the present day.

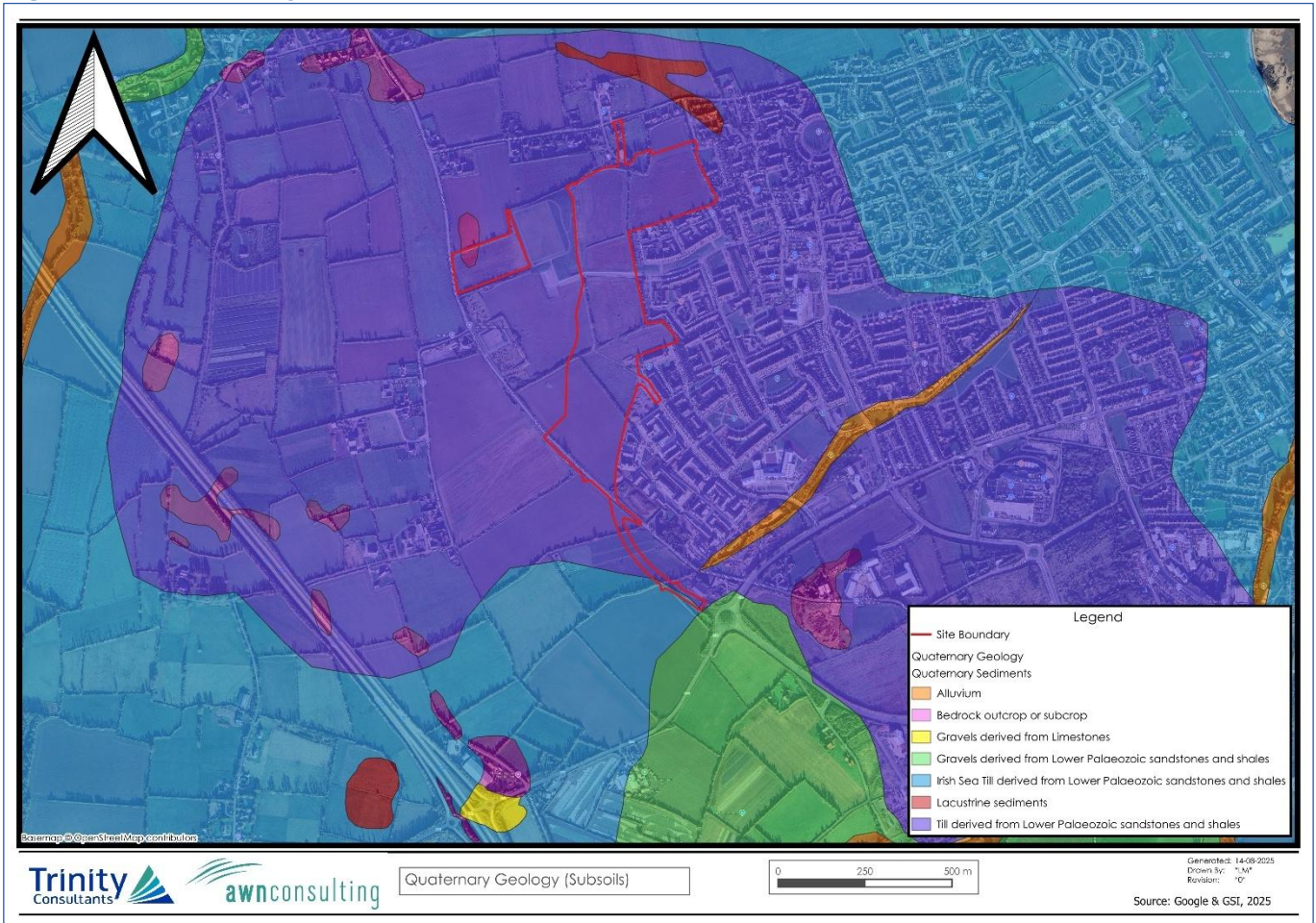
The GSI (2025) mapping database of the Quaternary Sediments / Subsoils in the vicinity of the site indicates one (1) no. principal subsoil type. The predominant subsoil type present across the site is ‘*Till derived from Lower Palaeozoic sandstones and shales (TLPSsS)*’. This till is made up of glacial CLAYS which form a cohesive, low permeability subsoil. According to the GSI (2025) the western portion of the site which is removed / separated from the majority area of the site is partially underlain by a localised zone of ‘*Bedrock outcrop or near surface subcrop*’.

The secondary quaternary subsoil types present within the wider context / region of the subject site include:

- Gravels derived from Lower Palaeozoic sandstones and shales (GLPSsS) underlying the lands to the south of the development; and
- Irish Sea Till derived from Lower Palaeozoic sandstones and shales (IrSTLPSsS) is indicated underlying surrounding lands in the vicinity / region of the site to the northeast and southwest. The GSI (2025) indicates that a minor portion sites southern parts are underlain by these deposits.
- Localised area of Lacustrine Sediment (deposits found at the bottom of lakes/ponds and other standing bodies of water) occur in irregular zones dispersed throughout the surrounding lands, the nearest located c. 75m to the northeast of the site (at Flemington Lane) at the point of closest proximity.

- Lands to the southeast of the site are partially underlain by localized near-linear strip of Alluvium deposits (undifferentiated), which lines the banks of and corresponding to the deposits of the Clonard Brook Stream (EPA Name: CLONARD_or_FOLKSTOWN_GREAT) which flows in a northeast-east direction traversing the lands to the south-southeast of the site. These deposits are located c. 65m to the east of the site (adjacent to Clonard road) at the point of closest proximity. These alluvium deposits are generally granular and characterised by a higher permeability than the predominant subsoils which occupy the region / surrounding lands.

Figure 5-3: Quaternary Sediments / Subsoils (GSI, 2025)



The sequence of subsoils deposits recorded during the site investigation conducted by IGSL (2019) are summarised as follows:

- Ground Conditions included topsoil with some soft sandy Clay extends to depths between 0.2m and 0.5m BGL (Below Ground Level). Cohesive deposits described as firm brown sandy gravelly CLAY were generally encountered across / throughout the site underlying the topsoil and extends/continues to depths ranging from 1.0m to 2.3m BGL. Granular deposits include a thin band of angular gravel which was encountered at the base of BH04A, extending from 2.0m to 2.5m BGL. Rig and excavator refusal in several boreholes and trial pits has indicated the presence of relatively shallow weathered Limestone Bedrock. Rock horizon has been noted at average depths between 1.0m-3.0m BGL.
- The Stratum then increases to stiff consistency and boreholes continued to a final refusal depth ranging from 2.5m to 4.9m BGL. Of the 4 NO. Boreholes drilled, Borehole refusal was recorded at shallow depths in several locations (BH01-BH04). According to IGSL (2019), final refusal depths

should not be taken as indicative of bedrock horizon. Proof core drilling to confirm depth to bedrock (bedrock parameters) was not scheduled for this project.

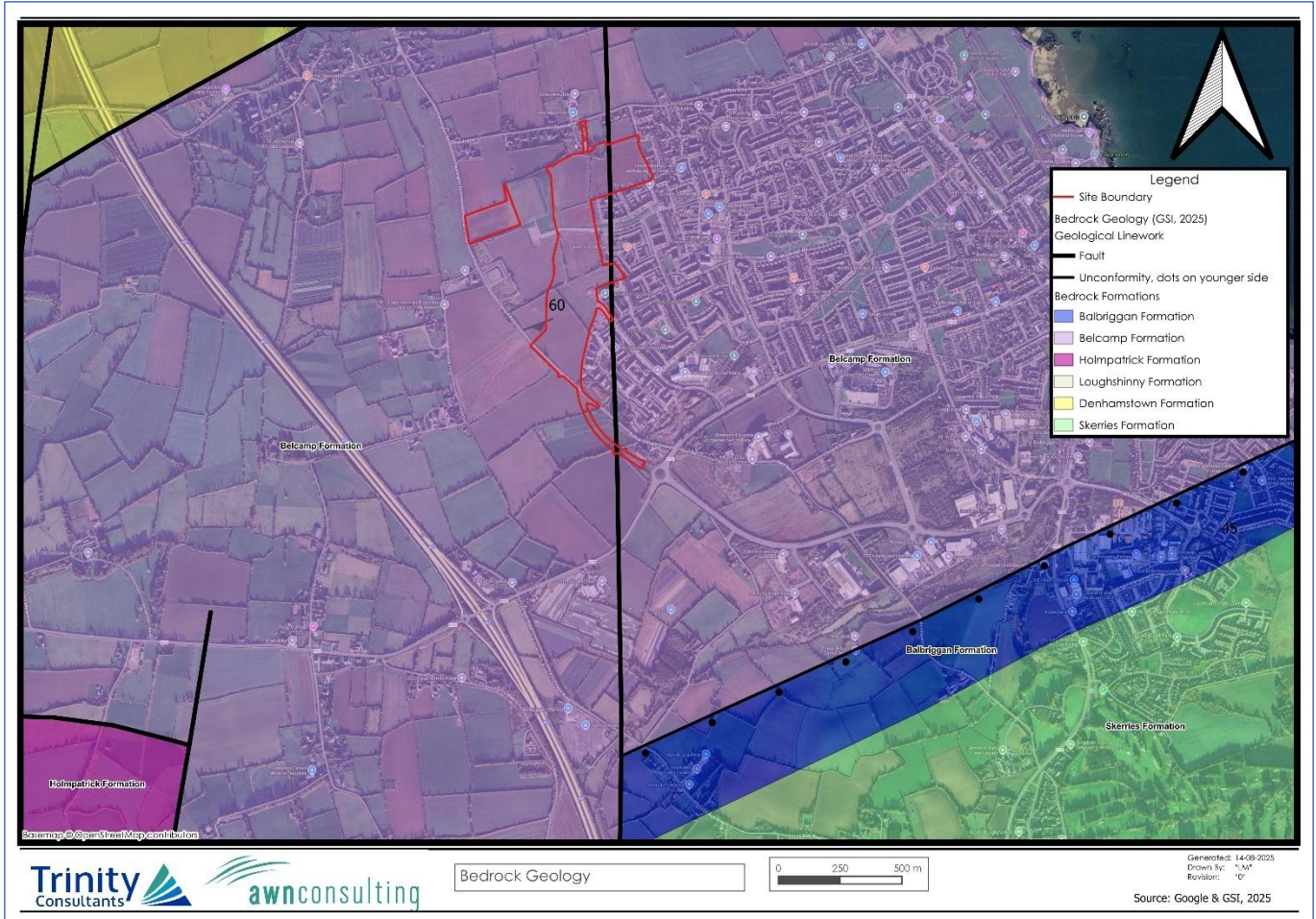
5.3.4 Regional Geology

Inspection of the available GSI mapping (GSI, 2025) shows that the bedrock geology underlying the site belongs to one formation: BECP – Belcamp Formation consisting of ‘Andesite, pillow breccia, mudstone, tuff’. This volcanic (partial) formation is described as Basalt to andesite sheets, pillow breccias and hyaloclastite, tuffs and mudstones. A lower mudstone and tuff-dominant Lowther Lodge Member and an upper pillow breccia and andesite dominant Bremore Member.

During the site Investigation undertaken by IGSL in 2019 onsite, boreholes and trial pits has indicated the presence of relatively shallow weathered Limestone Bedrock, which is not consistent with the Belcamp formation lithology.

In terms of the structural geology of the area, the GSI database shows a structural fault traversing the eastern portion of the southern, central and northern sections of the site. This fault trends in a North-South direction / orientation.

Figure 5-4: Bedrock Geology (GSI, 2025)



5.3.5 Hydrogeology

5.3.5.1 Description of Water Body

Aquifers are generally classified as rocks or other matrices that contain sufficient void spaces, and which are permeable enough to allow water to flow through them in significant quantities. The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km²), well yield (m³/d), specific capacity (m³/d/m) and groundwater transmissivity (mm³/d).

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km²), well yield (m³/d), specific capacity (m³/d/m) and groundwater throughput (mm³/d). There are three main classifications: regionally important, locally important, and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (LI). Similarly, poor aquifers are classed as either generally unproductive except for local zones (PI) or generally unproductive (Pu).

The GSI (2025) classifies the principal aquifer types in Ireland as:

Bedrock Aquifer:

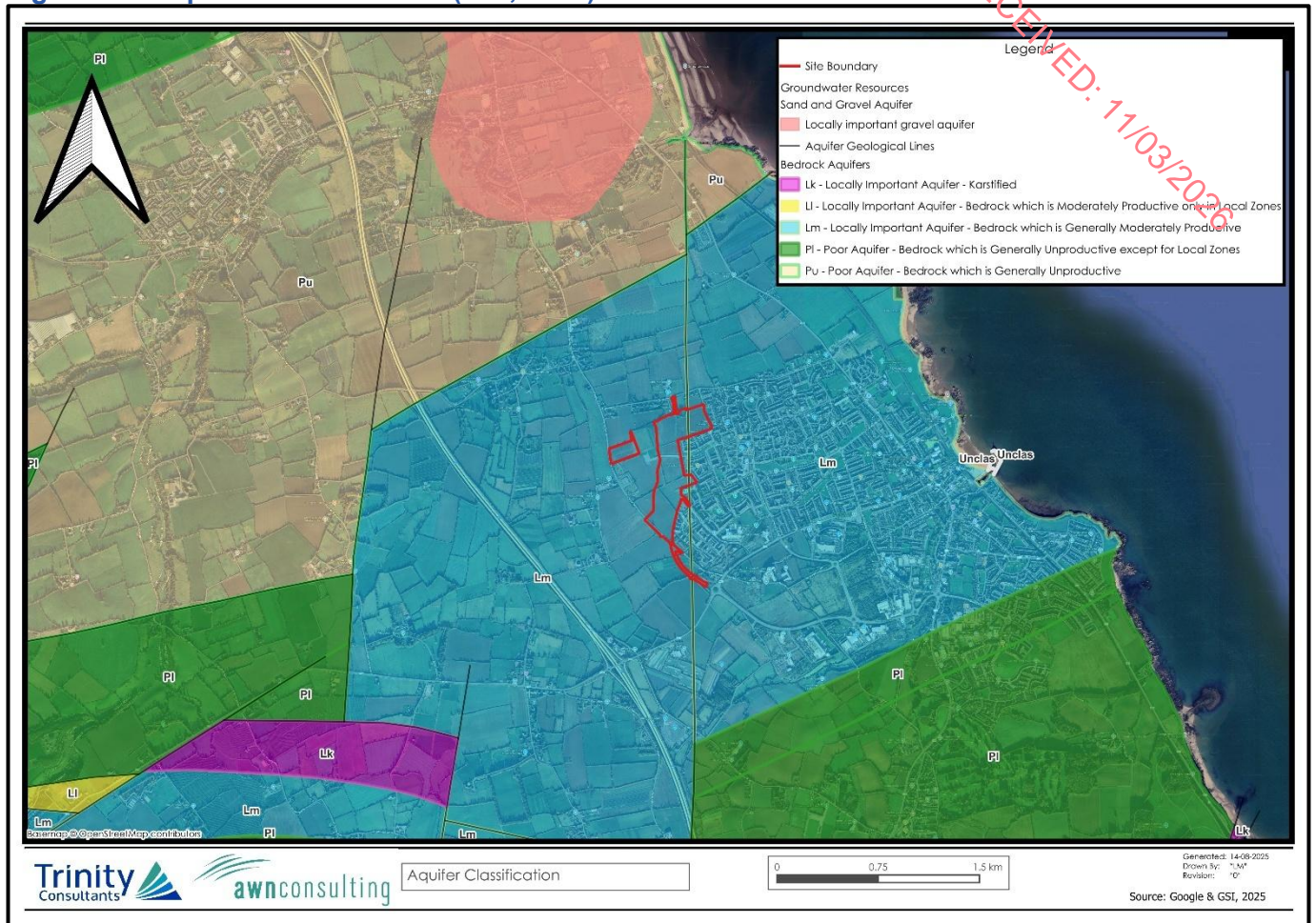
- Rkc – Regionally Important Aquifer – Karstified (conduit)
- Rkd – Regionally Important Aquifer – Karstified (diffuse)
- RK – Regionally Important Aquifer – Karstified
- Rf – Regionally Important Aquifer – Fissured bedrock
- Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive
- Lk – Locally Important Aquifer – Karstified
- LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones
- PI – Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones
- PU – Poor Aquifer – Bedrock which is Generally Unproductive

Gravel Aquifer:

- Lg - Locally Important Aquifer - Sand & Gravel
- Rg - Regionally Important Aquifer - Sand & Gravel

The bedrock aquifer underlying the site according to the GSI (www.gsi.ie/mapping) National Bedrock Aquifer Map is classified as (LM) *Locally Important Aquifer - Bedrock which is Generally Moderately Productive in local zones*. The site is not underlain by any gravel aquifers. Figure 5.5 below presents the current bedrock aquifer map for the area surrounding the Site.

Figure 5-5: Aquifer Classification (GSI, 2025)



The site is underlain by the Balbriggan Groundwater Body (EU code: IE_EA_G_039). Based on the most recent data (www.epa.ie) the Balbriggan GWB for which the Proposed Development is located entirely within, has a WFD status of “Good” (2019-2024) and has obtained a WFD risk score (3rd-cycle) of “Not at Risk”. This indicates very poor connectivity within any fractures in the underlying bedrock and as such no likely off-site pathway within the bedrock aquifer.

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures/ fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of/ or of mixtures of peat, sand, gravel, glacial till, clays, or silts).

The GSI currently classifies the aquifer vulnerability within the subject site as a mixture of *Extreme (E)*, *High (H)*, *Moderate (M)*, and *Low* based on GSI (2025) data (refer to Figure 5-6 below).

During the site Investigation undertaken by IGSL in 2019 onsite, rig and excavator refusal in several boreholes and trial pits has indicated the presence of relatively shallow weathered Limestone Bedrock. Rock horizon has been noted at average depths between 1.0m-3.0m BGL. Final refusal depths ranging from 2.5m to 4.9m BGL suggesting a *High* groundwater vulnerability, as guidelines presented in Table 5-2 below. According to IGSL (2019), final refusal depths should not be taken as indicative of bedrock horizon. Proof core drilling to confirm depth to bedrock (bedrock parameters) was not scheduled for this project.

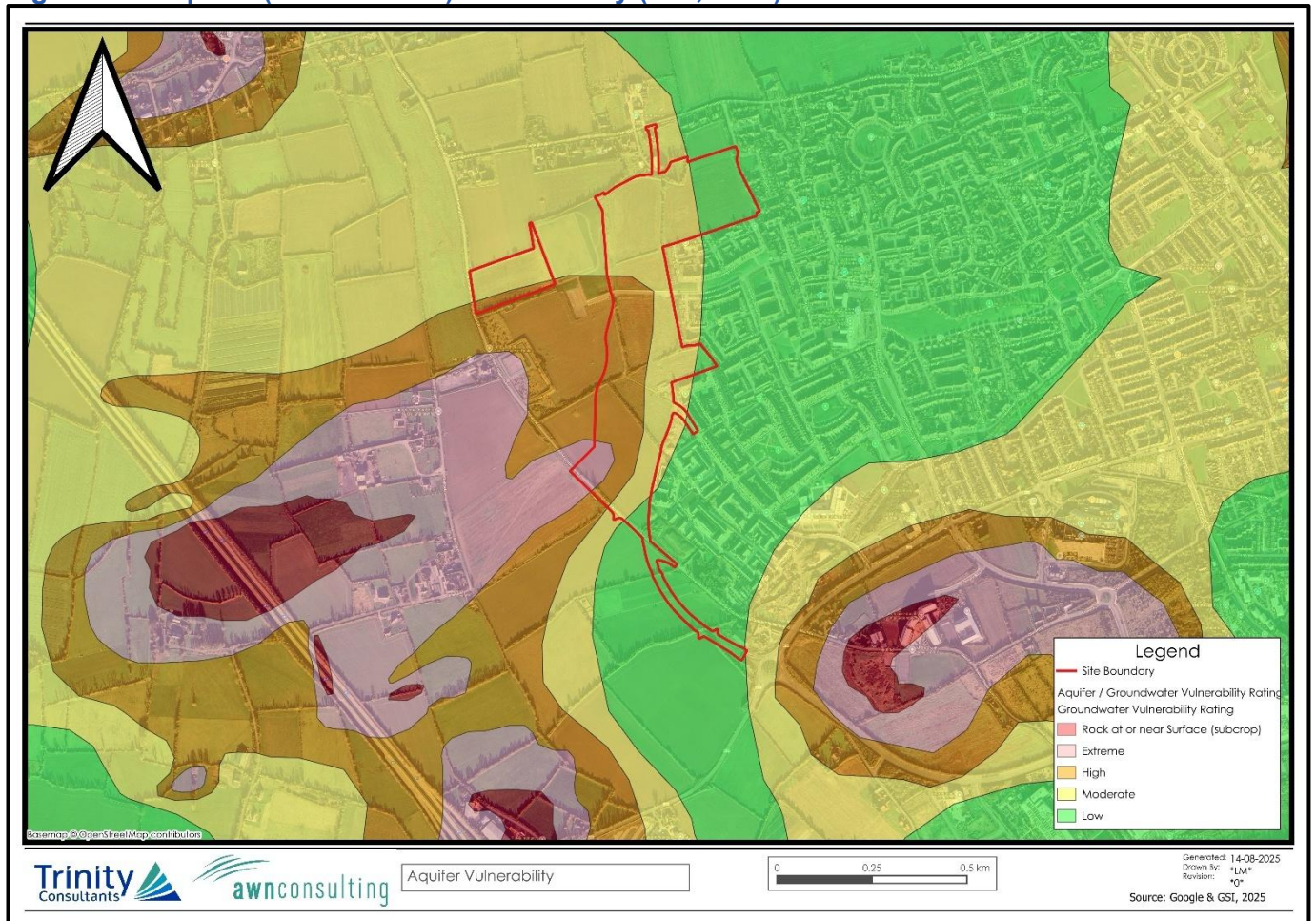
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Table 5-1: Vulnerability Mapping Guidelines

Vulnerability Rating	Hydrogeological Condition				
	Subsoil Permeability (type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate Permeability (e.g. sandy subsoil)	Low Permeability (e.g. clayey subsoil, clay, peat)	(Sand/ gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3 m	0 - 3 m	0 - 3 m	0 - 3 m	-
High (H)	> 3 m	3 - 10 m	3 - 5 m	> 3 m	n/a
Moderate (M)	n/a	> 10 m	5 - 10 m	n/a	n/a
Low (L)	n/a	n/a	> 10 m	n/a	n/a

Notes: (1) n/a: Not applicable
 (2) Precise permeability values cannot be given at present
 (2) Release point of contaminants is assumed to be 1-2 below ground surface

Figure 5-6: Aquifer (Groundwater) Vulnerability (GSI, 2025)



5.3.5.2 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. There are no source protection areas / Zones (SPZs, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution) or recorded groundwater resource protection zones in the immediate area of the proposed site, i.e., zones surrounding a groundwater abstraction area. The Public Water Supply Source Protection Area in closest proximity to the proposed development site is BOG OF THE RING PWS which is located approximately 2.2 km southwest of the site.

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. This current index shows one Well / Spring (GSI Name: 2925NEW089) within the site. According to observations noted during site inspections/surveys conducted by Altamar (2025), the 'Lady's Well' Springs does not display a surface expression of a well structure, although such a structure could be concealed by the evident overgrowth of vegetation (refer to Figure 5-7 below). This Spring is known as 'Lady Well', is indicated to be located in the Flemington townland within the northern portion of the site (adjacent to the northern boundary, location accuracy to 20m) and was drilled in 1899 to an unknown depth. Given the location of this spring in the northeast margin of the site, coupled with the topography of the site which is characterised by a falling slope in elevation from northeast to south-west, this spring is located upgradient of the proposed development and is located within an area which is underlain by low permeability cohesive glacial clays (Till).

Several wells occupy the wider region. Multiple boreholes with a good yield and used for industrial use are located in the Balbriggan region to the east of the site. The balance of the boreholes to the west and southwest are characterized by a public supply function / use. There is no risk to these water supplies from the site.

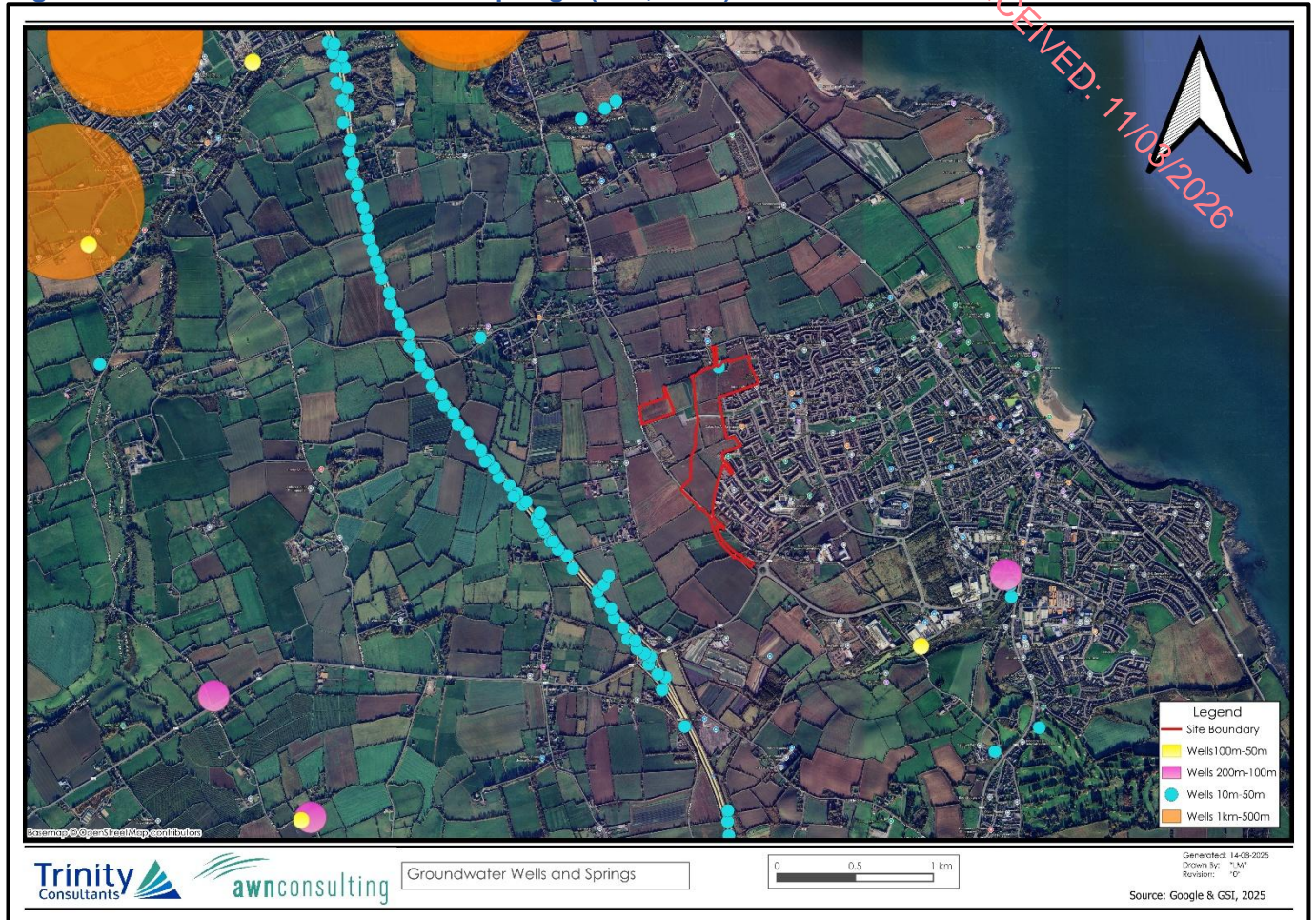
None of the wells listed in the vicinity are categorised as domestic use. The area is serviced by Local Authority / public mains therefore it is unlikely that any wells are used for potable supply.

Figure 5-7 Photo/Image of Lady's Well (Source: Cultural Heritage Chapter of this subject EIA Application, 2025)



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Figure 5-8: Groundwater Wells and Springs (GSI, 2025)



The flow paths and key characteristics within the Balbriggan GWB are described as follows (GSI, 2025):

- ‘The majority of groundwater flow in this area is considered to take place in the upper weathered zone of the aquifer. Groundwater will flow from the recharge mounds in the centre of the body towards the coast and also to adjacent GWBs. Flow paths are not considered to extend further than the nearest surface water feature and will generally not be greater than 500 m. There is evidence of confined groundwater flow in the southern area of the GWB, at Stephenstown, where standing water levels in the rock rise above the top of the bedrock into the thick till that overlies this area.’
- ‘The drainage density is quite low in the centre of this body, which suggests that in this area, which is elevated and has thinner subsoil (as indicated by the location of outcrops in the area) there is a higher rate of recharge and little runoff. Away from this central high there is evidence to suggest that the subsoil thickness increases and there is the emergence of surface channels. The GWB is mostly surrounded by Lower Paleozoic rocks, which are of lower permeability and will act as a barrier to groundwater flow. Hence this may cause groundwater to be forced to the surface along this geological boundary, facilitating the development of surface water streams along this boundary.’
- ‘This GWB is located in northern county Dublin around Balbriggan. The topography of the area slopes towards the coast with some small hills contained within the GWB, which act as sub-catchment level drainage divides. The GWB is composed primarily of moderate permeability rocks, with localized zones of enhanced permeability. The extent of the GWB is defined by the location of the volcanic rocks around Balbriggan. The small areas of volcanic rocks may have a higher

permeability. Recharge occurs diffusely through the subsoils and via outcrops. The aquifers within the GWB are generally unconfined, but they may be locally confined where the subsoil is thicker and/or less permeable. Most flow in this aquifer will occur in a zone near the surface. In general, majority of groundwater flow occurs in the upper 30 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep-water strikes in more isolated faults/ fractures can be encountered. Flow path lengths are relatively short, and in general are between 30 and 300 m. Groundwater discharges to the numerous small streams crossing the aquifer and also directly to the coast.'

Regional groundwater flow would most likely be in line with local topography to the east towards the Balbriggan coastline and Irish Sea. The flow direction in the overburden generally follows no fixed pattern or trend.

These aquifer types are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local to short distances. Therefore, given the local flow paths (<500m) and little connectivity, there is no hydrogeological connection/linkage to the Natura 2000/conservation/protection areas located at the Northwest Irish Sea SPA, located c. 1.7km east of the development at the point of closest proximity.

The flow direction in the overburden generally follows no fixed pattern or trend. Flows of this nature are typical of low permeability clay strata with intermittent fill areas, where often the water level measures represent pore water seepages into the overburden monitoring well (opposed to bedrock wells) or perched groundwater conditions (not bedrock aquifer water). The clay is not considered to be a contamination pathway based on the discontinuous perched/pore water table meaning there is no continuous connectivity of shallow groundwater.

Groundwater baseflow is likely to be in continuity with the Clonard Brook Stream which represents the most significant hydrological feature in the region of the site, running / flowing through the lands bounding the site to the south and given this the inferred groundwater flow direction is likely to be towards the east.

During the site investigation carried out by IGSL onsite in 2019, all trial Pits were dry and stable during the course of the investigation with the exception of TP17 and BH03A where water was noted at 2.0m and 1.5m BGL in weathered rock, respectively. Additionally, water levels were measured/ monitored in the installed standpipes (refer to table 5.3 below).

Table 5-2: Groundwater Monitoring (IGSL, dated 2019-2020)

Groundwater Monitoring						
Site Location	Balbriggan, Co. Dublin					
Project No.	22009					
Engineer	MPA					
	*** - BH03A location vandalised - cover damaged and stick lodged into well.					
	Date of Reading					
	04.09.2019	20.09.2019	22.10.2019	27.11.2019	13.01.2020	
BH01	Dry	Dry	Dry	Dry	Dry	
BH02A	Dry	Dry	Dry	2.20m	2.70m	
BH03A	***	***	***	***	***	
BH04	1.95m	Dry	Dry	1.05m	1.40m	
COMMENTS		Water Sample taken from watercourse to south of site.		Water Sample taken from BH02A, BH04.	Water Sample taken from BH02A, BH04.	

5.3.5.3 Soil Quality

During the Ground investigation undertaken by IGSL (2019), samples were selected from the exploratory holes for a range of environmental testing to RILTA Suite (WAC) parameters to assist in the classification of soils and for laboratory analysis focusing on potential contamination and the classification of the materials for waste disposal purposes. Environmental & Chemical testing was carried out by CHEMTEST Ltd in the UK.

Laboratory analysis was carried out on five (No. 5) soil samples recovered from trial pits TP03, TP06, TP08, TP11, and TP17 at depths ranging between 0.5mbgl and 1.5mbgl. The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen. The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.

The parameters name, chemical formula / abbreviations are listed below:

- Diesel Range Organics (DRO);
- Mineral Oil;
- Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG);
- Metals (As, Cd, Cr, Pb, Se, Cu, Ni, and Zn);
- Polychlorinated Biphenyls (PCB);
- Volatile Organic Compounds (VOC);
- Semi Volatile Organic Compounds (SVOC); and
- Waste Acceptance Criteria (WAC) for inert waste landfills in accordance with the 2002 European Landfill Directive (2002/33/EC).

This suite of parameters includes the following:

- Mineral oil;
- Polycyclic aromatic hydrocarbons (PAHs);
- Polychlorinated biphenyls (PCBs);
- BTEX compounds (benzene, toluene, ethylbenzene, and xylenes);
- and methyl tert-butyl ether (MTBE);
- Total organic carbon (TOC);
- Leachable component of a range of organic and inorganic parameters.

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Soil sample analysis results are presented in the IGSL Site Investigation Report (2019), included in this application and are summarized as follows:

- The results / data obtained confirms that all soil samples tested were classified as Inert (clean). No elevated contamination levels were identified. It is subsequently concluded that excavated material can be safely reused within the site boundary or alternatively disposed of to a suitably licensed landfill facility.
- No asbestos traces were detected during the screening of submitted soil samples.
- No elevated Sulphate concentrations were detected. Sulphate content was consistently less than 0.01 g/l and pH values ranged from 6.5 to 7.9 in all 10No. soil samples tested.
- No elevated Chloride concentrations were detected. Chloride content was established for 5No. samples with concentrations all less than 0.01 g/l.
- Additionally, tests on weathered bedrock was conducted by Nicholls-Colton in the UK to establish Sulphate concentration. Of the 5No. samples tested, results confirm very low Sulphate levels and no indication of possible Pyrite presence in the bedrock was identified.

The location of exploratory holes (Trial Pits, TP & Boreholes, BH) as part of the intrusive Site Investigation are depicted in figure 5-8 below.

5.3.5.4 Groundwater Quality

The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy (commonly known as the Water Framework Directive [WFD]). The WFD required 'Good Water Status' for all European water by 2027, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'.

The Groundwater Body (GWB) underlying the site is the Balbriggan GWB (EU Groundwater Body Code: IE_EA_G_039). Currently, the EPA (2025) classifies the Balbriggan GWB as having 'Good Status', as per both the previous WFD cycle (2016-2021) and latest WFD cycle (2019-2024). Presently, the groundwater body in the region of the site (Dublin GWB) is classified as being 'Not at risk' per the WFD Risk Score system which determines that the GWB has achieved its objectives. This classification is attributed to the GWB achieving 'Good' quantitative groundwater status as well as chemical groundwater status.

No groundwater sampling or groundwater chemical / environmental analysis was undertaken during the site investigation conducted by IGSL (2019) on the lands of the development.

Hydrogeological Features

According to the GSI Karst database there is no evidence of karstification (bedrock prone to dissolution leading to underground drainage systems such as caves and large crevices) in this area.

5.3.5.5 Areas of Conservation

There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or immediately adjacent to the facility. The nearest site designated for nature conservation is the North-West Irish Sea SPA (Site Code 004236), which is located approximately 1.7 km to the east. As such, there are no groundwater dependent wetlands within the zone of influence (or downstream) of the proposed development.

As previously mentioned (refer to section 5.3.5.2), the local flow paths (<500m) and little connectivity which are characteristic of this locally important aquifer classification, indicate there is no hydrogeological connection/linkage to the Natura 2000/conservation/protection areas located at the Northwest Irish Sea SPA, located c. 1.7km east of the development at the point of closest proximity.

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In Ireland, seismic activity is recorded by the Irish National Seismic Network operated by the Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) which has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. However, currently there are five permanent broadband seismic recording stations in Ireland operated by DIAS. The seismic data from the stations comes into DIAS in real-time and is 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 MI magnitude) and ~50 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.

5.3.8 Land take

There will be a loss of land available for greenfield/agricultural use due to the development. However, the area of development is relatively small in the context of agricultural land available in the overall region. This change of land use has already been established for the permitted zone of residential development.

5.3.9 Conceptual Site Model

Based on the regional and site-specific information available a Conceptual Site Model has been prepared.

The local CSM cross-sections for the Site are presented below as **Figure 5.10** (A-A': north to south). This figure presents the location of representative cross sections through the site to show the local Land, Soil, Geological and hydrogeology conceptual site model (CSM) which is as follows:

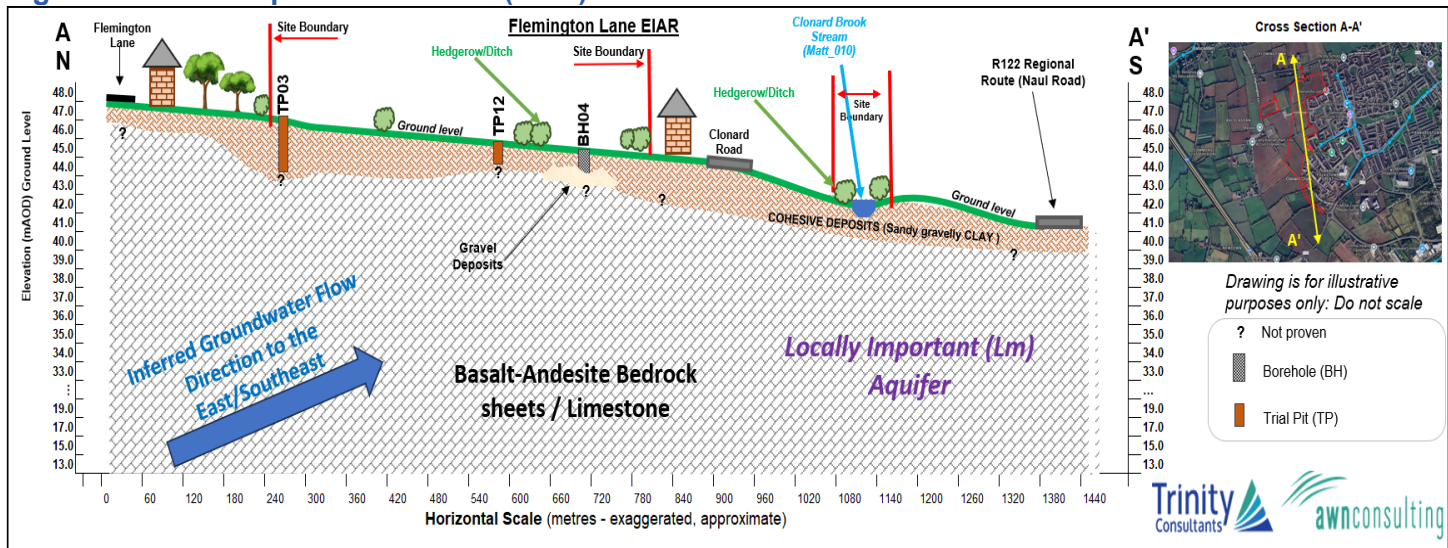
- The topography is relatively consistent with the site generally falling in elevation from northeast to south-west and characterized by minor localized undulations. The elevation falls from approximately 47m AOD (Above Ordnance Datum) to approximately 42m AOD from northeast to southwest. A portion of the central western section of the site located adjacent to the Clonard Road lies on elevated land at approximately 66m AOD.
- The proposed development site has been greenfield/agricultural use historically. There is no evidence of any historical waste disposal or source of contamination. WAC testing has confirmed that the soil can be considered “inert” for disposal purposes and all soil samples analysed were suitable for residential development.

The profile on site is relatively consistent and comprises:

- Soil Type: The predominant subsoil type present across the site is ‘Till derived from Lower Palaeozoic sandstones and shales (TLPSS)’ (GSI, 2025).
- Underlain by Bedrock: ‘Andesite, pillow breccia, mudstone, tuff’ which is considered a (LM) Locally Important Aquifer - Bedrock which is Generally Moderately Productive in local zones. Weathered Limestone noted at TP and BH refusal (IGSL, 2019).
- Rig and excavator refusal in several boreholes and trial pits has indicated the presence of relatively shallow weathered Limestone Bedrock. Rock horizon has been noted at average depths between 1.0m-3.0m BGL. The Stratum then increases to stiff consistency and boreholes continued to a final refusal depth ranging from 2.5m to 4.9m BGL (IGSL, 2019)
- Review of the geology and hydrogeology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, significant public water supplies / Source Protection Zones / Council Group Water Schemes or geological heritage sites within the immediate vicinity which could be impacted by the proposed development.
- The inferred groundwater flow direction is east towards the Irish Sea;

- There are no groundwater-dependent terrestrial ecosystems which have the potential to be impacted by the proposed development. The underlying aquifer is characterised by discrete discontinuous fracturing with short flow paths (less than 500m) and, as such, this combined/coupled with the natural protection (from vertical migration to aquifer) provided by the low permeability clay/tills there is no likely potential for a groundwater (hydrogeological) source-pathway linkage or no potential impact during construction or operation on groundwater quality discharging to the designated Natura 2000 conservation sites located at Northwest Irish Sea SPA.
- Local underground flow paths (<500m) and little connectivity which are characteristic of this locally important aquifer classification, indicate there is no hydrogeological connection/linkage to the Natura 2000/conservation/protection areas located at the Northwest Irish Sea SPA, located c. 1.7km east of the development at the point of closest proximity (i.e. the 1.7km distance of separation between the site and the subject SPA exceeds the <500m local flow paths within the aquifer, thus negating any potential for hydrogeological connectivity / pathway linkage to sensitive receptors.
- There are no high risk (S-P-R) pollutant linkages present.

Figure 5-11: Conceptual Site Model (CSM) Cross-Section



5.3.10 TII Methodology

Based on the TII methodology, the criteria for rating site importance of Soil and Geological features, the importance of the features at this proposed development site is rated as *Low Importance*. This is based on the assessment that the attribute has a low-quality, significance or value on a local scale

Based on the TII methodology, the criteria for rating site importance of hydrogeological features, the importance of the features at this proposed development site is rated as *Medium Importance*. This is based on the assessment that the attribute has a medium-quality significance or value on a local scale and the nature of the aquifer, being classified as a locally important aquifer.

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

In summary, the proposed development will consist of the following:

- Construction of 815 no. dwellings, open space, community/retail floorspace and 2 no. creches on an overall site area of 24.96 hectares.
- The development includes the provision of C-Ring Road to link into the existing R122 roundabout with vehicular access also from the Boulevard, Hamlet Lane, & Flemingington Lane.

- Provision of surface water attenuation measures, connection to water supply, provision of foul drainage infrastructure to Irish Water specifications and all ancillary site development, construction, and landscaping works;
- The proposed development includes a SuDS drainage design, boundary treatments, lighting, servicing and utilities, signage, and associated and ancillary works, including site development works above and below ground. All ancillary site development, landscaping and construction works to facilitate foul, water and service network connections.

A full description of the proposed development is contained in Chapter 2 of the EIAR. The following are the characteristics of the proposed as they relate to the Land, Soils, Geology and Hydrogeology receiving environment

5.4.1 Construction Phase

The key civil engineering works which relate to the land, soil geology, and hydrogeological environment during construction of the proposed development are summarised below:

- During the construction phase, excavated soil and stones (c. 75,038 m³) will be generated from the excavations required to facilitate site levelling to the necessary base level and construction of new foundations. It is anticipated that c. 19,507 m³ of this excavated soil and stone will be reused on site. It is anticipated that c. 55,531 m³ of excavated material will subsequently need to be removed off site and disposed of at a fully authorised soil recovery facility.
- Storage of 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;
- Temporary storage of fuel required on site for construction traffic will be located within temporary bunded areas, double skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.
- 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. Soil requiring removal offsite will be removed from site regularly to ensure there is minimal need for stockpiling. Some of the topsoil will be re-used on site for backfill (levels in some areas need to be raised) and landscaping with some export required. Any surplus topsoil material will be transported off site and disposed of at a fully authorised soil recovery facility / site.
- 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.
- No significant dewatering is anticipated during the construction phase which would result in the localised lowering of the water table.
- No Abstraction of groundwater is included in this development.

5.4.2 Operational Phase

In relation to Land Soil, Geology and hydrogeology the relevant characteristics are as follows:

- The proposed application development will result in the increase in hardstanding area.
- During operation measures there is no requirement for bulk fuels or chemical storage
- There is no requirement for discharge to ground and no requirement for abstraction of groundwater.
- No long-term dewatering during is anticipated for this development.

- Provision of underground attenuation tanks and associated infrastructure as part of the surface water systems along with installation of bypass hydrocarbon / petrol interceptors.

5.5 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

This section details the potential impacts to land, soil and groundwater associated with 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, excavation and infilling activities required to facilitate construction of the proposed development.

5.5.1 Do-Nothing Impact

There are no predicted impacts should the proposed development not proceed. If the proposed development were not to go ahead (i.e., in the Do-Nothing scenario) there would be no excavation or construction or operational impact at this site. There would, therefore, be a **neutral** effect on the land, geological and hydrogeological environment.

The site is zoned for development, and it is likely that in the absence of this subject proposal, that a development of a similar nature would be progressed on the site that accords with national and regional policies and, therefore, the likely effects would be similar to this proposal, as described in the following sections.

5.5.2 Construction Phase

5.5.2.1 Potential Impacts on Land, Soil, Geology, and Hydrogeology

Excavation & Infilling

Levelling of the ground and excavation for foundations (c. 75,038 m³) for the main buildings will require the excavation of topsoil, subsoil and potentially bedrock (if encountered). It is anticipated that c. 19,507 m³ of this excavated soil and stone will be reused on site. It is anticipated that c. 55,531 m³ of excavated material will subsequently need to be removed off site and disposed of at a fully authorised soil recovery facility. Import of c. 74,754 m³ of clean engineering fill material will be required.

The expected average depth of excavation is approximately 2.0 mBGL.

The geotechnical site / ground investigations findings indicate that bedrock excavation (rock breaking) will be required during the excavation works to achieve formation level. Localised bedrock excavation is anticipated in the northern portion of the site down to a maximum of 1.0 mBGL into fractured rock. For this reason, no significant dewatering is anticipated. Groundwater drawdown is therefore not considered to be a risk to adjacent buildings side slopes.

The risk of contaminated soils being present on-site is low based on previous site use and confirmed by on-site soil sampling and analysis. Material that is exported from site, if not correctly managed or handled, could impact negatively on human beings (on-site and off-site) as well as water and soil environments.

There is no requirement for any significant or long-term groundwater dewatering during construction.

Accidental Spills & Leaks

As with all construction projects, there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water arising from

construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction, if contaminated water is allowed to percolate to the aquifer.

There is potential for shallow soils to become contaminated with pollutants. There is minimal risk of aquifer contamination due to the nature and thickness of soil cover present at the site providing a natural level of protection to accidental discharges or spillages during the construction phase.

During the construction of the proposed development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage; and
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Accidental spillages that are not mitigated may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoils and impact the underlying groundwater. Any soil stripping will further reduce the thickness of subsoil and the natural protection they provide to the underlying aquifer.

Soil requiring removal offsite will be removed from site regularly to ensure there is minimal need for stockpiling. All of the topsoil will be re-used on site for backfill (levels in some areas need to be raised) and landscaping with some export required. Any soils, subsoils and stone removed from the site will be transported off site and disposed of at a fully authorised soil recovery site.

There is potential for groundwater to become contaminated with pollutants associated with construction activity. Contaminated groundwater which arises from construction sites can pose a significant short-term risk to the underlying Balbriggan GWB quality for the duration of the construction if contaminated water is allowed percolate to the aquifer. During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Excavation of soil and near-surface rock head will be required for levelling of the site to render it suitable for building the building platform. Local removal and reinstatement (including infilling) of the 'protective' topsoil and subsoil cover across the development area at the site will not change the overall vulnerability category for the site. Capping significant areas of the site by hardstand/building following construction and installation of drainage will minimize the potential for contamination of the aquifers beneath the site.
- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled. This can lead to run-off with high suspended solid content which can impact on water bodies. The potential risk from this indirect impact to water bodies and/or habitats from contaminated water would depend on the magnitude and duration of any water quality impact.
- Due to the historical greenfield use at the site, the risk of contaminated soils being present onsite is considered low.
- Soil sample results confirmed soils/subsoils onsite are not contaminated. However, in the event of any evidence of soil contamination being found during either the excavation or the construction works, appropriate remediation measures will be employed. Any contaminated soil will be delineated, removed and stored on impervious quarantine areas pending testing to confirm appropriate removal and disposal to permitted licensed waste facilities. Records of disposal will be retained on site for inspection by Fingal County Council (FCC).

- 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 sources if discharged incorrectly. The establishment and use of welfare facilities and connection to the existing foul sewer within the site, ensures that there are no potential significant impacts; therefore, no additional mitigation is required.
- A Construction Drainage Control System will be put in place so that all silt laden water will be diverted to temporary settlement storage tanks prior to discharge. This discharge, and the associated pollution control measures, will be subject to the approval of the Local Authority.
- Temporary construction surface drainage and sediment control measures, including the use of SUDS, will be provided before earthworks commence. The drainage design follows the natural topography of the site and utilises petrol/hydrocarbon/oil interceptors, silt traps along all gullies, house inspection chambers and SuDS manholes. Accordingly, all discharges to surface waters will be suitably treated through silt remediation (silt traps) and petrol/hydrocarbon/oil interceptors prior to discharge. There will be no direct discharge of surface water from any element of the works without proper attenuation and treatment.

Given the location of the Ladys Well spring (as outlined in Section 5.3.5.2) in the northeast margin of the site, coupled with the topography of the site which is characterised by a falling slope in elevation from northeast to south-west, this spring is located upgradient of the proposed development and is located within an area which is underlain by low permeability cohesive glacial clays (Till), The low permeability nature of the overburden limits the potential for vertical or lateral migration of any contaminants or pollutants in the event of an accidental spill or leakage during construction activities. The upgradient location of the spring reduces the potential for the Ladys Well to be impacted by such an event during the construction phase.

There is no excavation of soil/subsoil proposed at the Lady's Well location, thereby minimising any potential pathway of potential contaminants / pollutants to the spring during the construction phase.

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.

Loss of Agricultural Land

There will be a local loss of agricultural soil; however, the area of development is small in the context of the overall agricultural land available in the region. The entire site is zoned for development. Within the overall context of Ireland's available farmland, the loss is negligible. There will be no impact to mineral resources in the area as a result of the proposed development.

5.5.2.2 Source-Pathway-Receptor Linkage with Northwest Irish Sea SPA

There are no source pathway linkages with any ground water dependent ecosystems. However, the groundwater body underlying the proposed development does discharge to the estuary. No likely exceedance of groundwater threshold concentrations at the Northwest Irish Sea is likely based on the loading, pathway (over burden thickness, cohesive/low permeability type, local flow paths and low fracture connectivity within the aquifer) together with attenuation and dilution within the pathway prior to discharge to the SPA.

Without the consideration of mitigation measures, the construction phase of the proposed development will likely have a **neutral, imperceptible** and **short-term** impact on the S-P-R linkage with the Northwest Irish Sea.

5.5.2.3 Potential Impacts on Human Health and Populations

The site is not located near any public groundwater supplies or group schemes. As previously mentioned, there are no groundwater source protection zones, Groundwater Drinking Water Protection Areas (Public Supply Source Protection Areas OR Group Scheme Preliminary Source Protection Areas) in the immediate vicinity of the site. Given 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).

There is no source pathway linkage to the underlying aquifer or any Public Drinking Water Supply scheme or Source Protection Zone (SPZ). The nature and thickness of soil cover present at the site provides a natural level of protection. No bulk oil storage is required during site operation. The site is not located within any source protection zones (SPZs), public groundwater supplies or group schemes with the Public Supply Source Protection Area in closest proximity to the proposed development site is BOG OF THE RING PWS which is located approximately 2.2 km southwest of the site. The proposed site is outside of the zone of contribution of this supply.

A reduction in groundwater quality via unmitigated pollutants entering the soil and migrating to the underlying Balbriggan GWB would have potential to lead to negative impacts on human health and populations if a pathway existed. 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.

None of the wells listed in the immediate vicinity of the site 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 Lady's Well is a historical spring that is not currently being utilised for potable water supply.

No likely impact on the groundwater quality is foreseen due to low potential loading, natural attenuation within overburden and lack of geological faulting / fracture connectivity and local underground flow paths (<500m), thereby reducing potential for off-site migration.

The waste soil classification (WAC) classified the majority of samples as non-hazardous / inert.

Given this greenfield land has historically been utilized for agricultural purposes, and the lack of documented / recorded illegal historic landfills in the vicinity, the potential risk of extensive contamination is considered low.

Any contaminated / hazardous soils encountered onsite will be removed from site and sent to a licenced treatment / disposal facility that accepts the corresponding soil classification / category, while clean soils maybe be reused onsite for backfill of landscaping. Therefore, on this basis 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**.

5.5.2.4 Potential Impacts on Water Framework Directive Status

There is a potential of accidental discharges during the construction phase (as previously set out in Section 5.5.1), however no likely impact on the underlying aquifer due to the low permeability cohesive soil cover present on the site.

Even in the absence of mitigation measures, the potential impact on Water Framework Directive status of the Balbriggan GWB or its potential to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and third RBMP 2022-2027 during the construction phase is considered to be **neutral, imperceptible** and **short term (temporary)**.

5.5.2.5 Overall Impact of Construction Phase

Without the consideration of mitigation measures, the construction phase of the proposed development will likely have a negative, short-term, slight impact without mitigation in place.

5.5.3 Operational Phase

The following risks have been considered in relation to the operational phase of the proposed Project:

- There is a potential for leaks and spillages from vehicles along roads and in parking areas. Any accidental emissions of oil, petrol or diesel could cause soil / groundwater contamination if the emissions are unmitigated.
- A proportion of the Site will be partially covered in new hardstanding. This will provide protection to the underlying aquifer but also reduce local recharge in this area of the aquifer. As the area of the aquifer is large, this reduction in local recharge will have a not significant change in the natural hydrogeological regime.
- Groundwater abstraction does not form part of the proposed Project. There will be no impact on local or regional groundwater resources (abstraction) as a result of the proposed Project.

These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined in Section 9.6.

There will be no direct discharges to the ground or abstractions from the bedrock aquifer during the operation of the development. The potential impacts of the development post development in relation to land soils and environment have been assessed under the following headings:

- Localised and Minor Accidental Emissions to ground from a car leak/delivery vehicle or truck.
- Increase in hardstanding area will result in a localised alteration / reduction in recharge to the aquifer due to a decrease in local recharge (percolation to ground). As the area of aquifer is large this reduction in local recharge will have no significant change in the natural hydrogeological regime. This provides protection to the underlying aquifer but also ultimately reduces local recharge in this area of the aquifer.

SUDS features such as green roofs, and the inclusion of modular permeable paving, swales, bioretention systems, detention basins, petrol/hydrocarbon interceptors which will provide a surface water treatment train and promote source control throughout the development while also providing attenuation storage at source and facilitate recharge to ground. Surface water drainage will be directed to attenuation storage and flow control for discharge from the catchment will be achieved via the employment and incorporation hydrobrake (vortex flow control device).

Any accidental release of hydrocarbons from trafficked areas will discharge through oil/petrol interceptors on the stormwater drains rather than to ground.

Refer to 'Chapter 6- Hydrology' for a detailed outline of the proposed surface water (stormwater) drainage design / strategy.

In the absence of mitigation measures, the operational phase of the proposed development will likely have a **neutral, imperceptible**, and **long-term** impact on land, soils, geology and hydrogeology in the receiving environment.

5.6 MITIGATION MEASURES

This section outlines the measures that will be employed in order to minimise the impact on land, soils, and groundwater of the proposed development.

5.6.1 Construction Phase

A Preliminary Construction & Environmental Management Plan (CEMP) has been prepared in respect of the proposed development by Paul McGrail Consulting Engineers Ltd, included (See Appendix D, Volume III of the EIAR). It contains the best practice measures and protocols to be implemented during the construction phase of the proposed development to avoid / minimise environmental impacts, as well as any additional measures required pursuant to planning conditions which may be imposed. This document outlines the best practice construction techniques and methodologies which will be implemented onsite during construction of the proposed development including measures to protect waterbodies. The CEMP 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 CEMP and this EIAR will be employed on site during the construction phase by the Contractor.

The CEMP and mitigation measures set out in this EIAR 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 and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures.

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

- Construction Industry Research and Information Association (CIRIA, 2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016);
- 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).

To ensure the CEMP remains fit for purpose, it will be regarded as a live document. The appointed contractor will be responsible for updating the CEMP, as required, e.g. to reflect the publication of relevant new or revised guidelines and / or new statutory requirements. The full schedule of environmental commitments (i.e. all mitigation measures set out in the CEMP, Environmental Impact Assessment Report and Natura Impact Statement submitted as part of the planning application, as well as any applicable conditions of development consent) will be included in the CEMP by the appointed contractor.

According to the subject CEMP, all existing surface water drainage elements shall be maintained free from waste materials generated during the construction of the proposed development, including the initial site clearance and excavation. Routine visual inspections by the contractor shall reduce any risk of excess construction materials causing obstructions to surface water drainage and any potential flooding occurring. A maintenance schedule and operational schedule must be established by the contractor for silt and pollution control measures during the construction period. This should be undertaken in consultation with the relevant statutory authorities.

The CEMP provides actions and measures which will be undertaken for the purpose of environmental management and pollution prevention during the construction phase. As there is potential for run-off to indirectly discharge to the local drainage network consisting of drainage ditches which convey flow and discharge to the Bremore River (and its tributaries, the Clogheder Stream and Clonard Brook Stream). In

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order to manage the potential impact associated with sediment and sediment runoff the following mitigation measures will be implemented during the construction phase:

- SuDS will be constructed in line with manufacturer's guidelines / best practice methods.
- Foul drainage from site offices and compound, where not directed to the existing wastewater network, will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations to prevent the pollution of watercourses.
- Process water used during construction will be disposed of appropriately. Rainwater will also accumulate on the site during construction. This water will be discharged directly via suitable pollution control and attenuation measures either directly to ground within the site or to foul sewer systems via portions of the existing wastewater network.
- Where available proposed permanent connections to the public sewer systems required for the operational phase may be used temporarily for the construction phase, to optimise efficiencies and avoid the creation of new outfalls for temporary construction only.
- A Construction Drainage Control System will be put in place so that all silt laden water will be diverted to temporary settlement storage tanks prior to discharge. This discharge, and the associated pollution control measures, will be subject to the approval of the Local Authority.
- Temporary construction surface drainage and sediment control measures, including the use of SUDS, will be provided before earthworks commence. The drainage design follows the natural topography of the site and utilises petrol/hydrocarbon/oil interceptors, silt traps along all gullies, house inspection chambers and SuDS manholes. Accordingly, all discharges to surface waters will be suitably treated through silt remediation (silt traps) and petrol/hydrocarbon/oil interceptors prior to discharge. There will be no direct discharge of surface water from any element of the works without proper attenuation and treatment.
- Pipe systems and orifices will be checked for blockages or partial blockages.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available on site.
- 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.

5.6.1.1 Soil Management

The strategy for controlling and mitigating potential adverse environmental issues related to soil and contamination during construction will include the following, as appropriate:

- Identification and assessment of the potential for residual ground contamination to be presented prior to the start of any excavation works.
- Minimisation of potential risks to site workers as required by the Safety, Health and Welfare (Construction Regulations) 2013.
- Testing and sampling of excavated soils in order to assess the suitability of materials for re-use on site.
- Soils will be stabilised and protected from erosion whilst planting becomes established. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.
- The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- Pollution control measures will be implemented to control run-off from the site and prevent run-off which is potentially contaminated with sediments or hazardous chemicals entering the drainage network.
- Dust suppression from any contaminated soils by the regular use of water spray during any dry conditions, sheeting of haulage vehicle loads.
- Stockpiling of contaminated materials will be avoided where possible.

- Stockpiles will be treated to prevent windblown dust.
- The handling and storage of any potentially hazardous liquids on site, e.g. fuels and chemicals, will be controlled and best practice guidelines. Storage tanks/container facilities will have appropriate bunding within the designated area.
- 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.
- If hazardous liquids escape, remedial action will be taken as soon as possible.
- Where unforeseen contamination is identified during the course of the work, specific investigations will be carried out in the areas in question and appropriate health and safety procedures will be implemented during the removal of the material. A strategy will be prepared to identify, analyse, segregate and control existing contaminated materials on site. In addition to the measures above, 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.

5.6.1.2 Run Off & Suspended Solids

- It is anticipated that there will be 10m minimum buffer zone to the water course which on the site which comprise field drainage ditches (no main water courses / river waterbodies exist within the extent of the site boundary).
- Run-off from the working site or any areas of exposed soil shall be channelled and intercepted at regular intervals for discharge to silt remediation / settlement measures. A temporary positive drainage system shall be installed prior to the commencement of the construction works, to collect surface water runoff from the site during construction. A temporary surface water management will throttle runoff and allow silt and suspended solids to be settled out and removed before being discharged in a controlled manner to the agreed outfall.
- During construction, any surfaces which are intended to enable infiltration must be protected from compaction. This includes protecting from heavy traffic or storage materials.
- Any surface water run-off collecting in excavations will likely contain a high sediment load. This will not be allowed to discharge directly to the local drainage network.
- Water contaminated with silt will not be allowed to enter a watercourse or drain as it can cause pollution. All parts of the drainage system will be protected from construction runoff to prevent silt clogging the system and causing pollution downstream. Silt reduction measures to prevent this include, early construction of sediment management basins, channelling runoff away from watercourses and surface water drains and erosion prevention measures. Following construction, subsoil that has been compacted during construction should be broken up prior to the re-application of topsoil to reinstate the natural infiltration performance of the ground.
- During construction, any surfaces which are intended to enable infiltration must be protected from compaction. This includes protecting from heavy traffic or storage materials.
- Silt deposited during construction will be removed.
- Soils will be stabilised and protected from erosion whilst planting becomes established.
- Hydrocarbons or any hazardous chemicals will be stored in specific bunded areas. Refuelling of plant and machinery will also be carried out in bunded areas to minimise risk of any potential pollutants being discharged from the site.

- Pollution control measures will be implemented to control run-off from the site and prevent run-off which is potentially contaminated with sediments or hazardous chemicals entering the drainage network.
- Foul drainage from site offices and compound, where not directed to the existing wastewater network, will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations to prevent the pollution of watercourses.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available on site. Construction staff will be familiar with the emergency procedures and use of the equipment.
- 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 and settlement measures (e.g. silt traps and settlement tanks/ponds or equivalent);
- 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;
- 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 50-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.

5.6.1.3 Sources of Fill and Aggregates

- Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination.
- All fill and aggregate for the proposed development will be sourced from reputable suppliers per the project Contract and Procurement Procedures. All suppliers will be vetted for:
 - Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development;
 - Environmental Management status; and
 - Regulatory and Legal Compliance status of the Company.

5.6.1.4 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. Washouts 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 Irish Water / FCC.

Pouring of cement-based materials for works will only be carried out in dry conditions. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings and excess concrete will not be discharged directly into the drainage network. Concrete washout areas will be created to avoid any accidental discharge from the proposed development site.

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.

5.6.1.5 Hydrocarbons and other construction chemicals

The following mitigation measures will be implemented during the construction phase to prevent any spillages to ground of fuels and other construction chemicals and prevent any spillages 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 bowsers 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 bowsers 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). 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.

Establishing a minimum of a 10m work-free zone (or buffer zone) around a natural spring (Lady's Well) during construction is critical to prevent contamination, protect the water source, and maintain the integrity of the ecosystem. Best practices for protecting springs during development generally recommend a fenced area, to separate the water source from construction activities and surface runoff.

5.6.2 Operational Phase

During the operational phase of the proposed Project, there is limited potential for Site activities to impact on the geological and hydrogeological environment of the area. There will be no impact on local or regional groundwater resources (abstraction) as a result of the proposed Project.

The proposed development does not include for any bulk chemical storage including fuel storage. As the site will be paved and drained, any fuel spills from cars will drain to the hydrocarbon interceptors on the stormwater drainage system. All stormwater drainage is through the permitted attenuation.

The proposed development design includes hardstand cover across the site and the proposed surface water drainage system for this development has been designed as a sustainable urban drainage system (SuDS). The surface water design has been designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works and Sewers for adoption. The drainage network will consist of attenuation to the green-field runoff using a flow control device (hydrobrake) from the site. Any localised car leaks will therefore be intercepted by and discharge to the proposed surface water / stormwater drainage network and be treated in Petrol interceptors (oil separators) prior to outfalling into the main system and downstream catchment. Therefore, the risk of accidental discharge has been adequately addressed through design. The purpose of these SuDS features is to treat runoff and remove pollutants to improve quality, restrict outflow and control quantity and increase overall amenity value.

For further information on the surface water (stormwater) drainage design / strategy, refer to Chapter 6-Hydrology.

5.7 RESIDUAL IMPACTS

5.7.1 Construction Phase

5.7.1.1 Land, soils, Geology, Hydrogeology

The implementation of the mitigation measures outlined in Section 5.6 of this chapter will ensure that targeted rates of impact to land, soils and ground water are achieved at the site of the Proposed Development during construction and operational phases. When mitigation measures are implemented throughout construction the predicted impact on the environment will be short-term, imperceptible, and neutral. With the measures outlined in the EIAR and CEMP, the predicted impact will be **neutral, imperceptible, and short-term**.

5.7.1.2 Human Health and Population

The implementation of the mitigation measures outlined in Section 5.6 of this chapter will ensure that the potential impacts on human health and populations during the construction phase are adequately mitigated. The residual effect on during the construction phase is considered to be **neutral, imperceptible, and short-term**.

5.7.1.3 Water Framework Directive

Even in the absence of the mitigation measures detailed in Section 5.6, there will be no predicted degradation of the current Balbriggan (GWB) groundwater body (chemically, ecologically, 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 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 and as such will not impact on trends in water quality and over all status assessment.

The residual effect on Water Framework Directive Surface and Groundwater bodies during the construction phase is considered to be **neutral, imperceptible** and **short-term**.

5.7.2 Operational Phase

5.7.2.1 Land, soils, Geology, Hydrogeology

The implementation of the mitigation measures detailed in Section 5.6, 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 of the EIAR**) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered **negligible**.

5.7.2.2 Human Health and Population

The implementation of the mitigation measures detailed in Section 9.6, 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**.

5.7.2.3 Water Framework Directive Status

There is no potential for adverse or minor temporary or localised effects on the Balbriggan groundwater body (GWB) as a result of the Proposed Development. 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 third RBMP 2022-2027.

Even in the absence of the mitigation measures detailed in Section 9.6, 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 third RBMP 2022-2027.

There are appropriately designed mitigation and design measures which will be implemented during the construction and operation 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.

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The residual effect on Water Framework Directive Surface and Groundwater bodies during the ~~construction~~operational phase is considered to be **neutral, imperceptible** and **long-term**.

5.7.3 Residual Impacts on the Lady’s Well Spring

Complementary, the below table (Table5-3) presents a hydrological and hydrogeological **Source-Pathway Receptor Assessment** during the construction and operation phases with respect to the Lady’s Well Spring.

Table 5-3 Source-Pathway-Receptor Linkage Assessment in relation to the onsite Lady’s Well Spring

<u>Source</u>	<u>Pathways</u>	<u>Receptors Considered</u>	<u>Risk of Impact</u>	<u>Mitigation Measures</u>
Construction Impacts				
<p><u>Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle (1,000 litres worst case scenario).</u></p> <p><u>Discharge to ground of runoff water with High pH from cement process/ hydrocarbons from construction vehicles/run-off containing a high concentration of suspended solids</u></p>	<p><u>Pathway to the Lady’s Well Spring via overland flow or surface runoff during periods of heavy rainfall.</u></p> <p><u>Pathway to the Lady’s Well Spring via baseflow</u></p>	<p><u>Lady’s Well Spring located at the northeastern portion/margin of the site</u></p>	<p><u>Very Low risk of migration given the upgradient location of the Spring and the natural attenuation within the overburden due to the underlying low permeability cohesive glacial clays (Till) which limits the potential for vertical or lateral migration of any contaminants or pollutants in the event of an accidental spill or leakage during construction activities.</u></p> <p><u>No likely impact on the Spring due to low potential loading and discrete nature of fracturing reducing vertical and lateral migration of baseflow</u></p>	<p><u>Only potential for temporary impacts due to accidental releases. Mitigation measures outlined in Chapter 5 (Section 5.6.1) and Chapter 6 (Section 6.6.1), and also in the CEMP which sets out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent conditions relevant to the proposed development. These include management of soils, re-fuelling of machinery and chemical handling, control of water during the construction phase and treatment of discharge water where required.</u></p> <p><u>Establishing a minimum of a 10m work-free zone (or buffer zone) around a natural spring (Lady’s Well) during construction shall provide additional protection to the Spring from contamination and maintain the integrity of the ecosystem. Best practices for protecting springs during development recommend a fenced area, to separate the water source from construction activities and surface runoff.</u></p>
Operational Impacts (Summary)				
<p><u>Foul effluent discharge to sewer</u></p>	<p><u>No Pathway exists as foul effluent shall be discharged directly to</u></p>	<p><u>Lady’s Well Spring located at</u></p>	<p><u>No perceptible risk</u></p>	<p><u>Wastewater discharge to be agreed with Uisce Eireann in a</u></p>

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<u>Source</u>	<u>Pathways</u>	<u>Receptors Considered</u>	<u>Risk of Impact</u>	<u>Mitigation Measures</u>
<u>Discharge to ground of hydrocarbons from carpark leak (70 litres worst case scenario)</u>	<u>Balbriggan WwTP for treatment.</u> <u>No pathway exists due to the Springs location outside of any designation car parking areas or access roads. Additionally, the proposed SuDS surface water drainage system/design shall intercept such discharge thereby negating any potential pathway</u>	<u>the northeastern portion/margin of the site</u>	<u>No perceptible risk – taking into account the springs upgradient location which is outside of roads and carparking zones and the natural attenuation within the overburden due to the underlying low permeability cohesive glacial clays (Till) which limits the potential for vertical or lateral migration of any contaminants or pollutants in the event of an accidental spill</u>	<u>Wastewater Connection Application.</u> <u>The proposed surface water drainage system is designed to ensure the protection of the hydrological and hydrogeological environment via providing interception, attenuation, use of oil/hydrocarbon interceptors on the stormwater system and the use of SuDS techniques. In order to limit the surface water discharge from the site to pre-development, greenfield rates, and to ensure improvement in the overall surface water quality before ultimate discharge the principles of SuDS are to be implemented.</u>

The residual effect on Lady’s Well Spring during the construction phase is considered to be **neutral, imperceptible and short-term.**

The residual effect on Lady’s Well Spring during the operational phase is considered to be **neutral, imperceptible and long-term.**

5.8 MONITORING OR REINSTATEMENT

The management of land, soils and ground water during the construction phase will be monitored by the Contractor to ensure compliance with above-listed mitigation measures, and relevant waste management legislation and local authority requirements.

5.8.1 Construction Phase

During construction phase the following monitoring measures will be implemented:

- Soil sampling to confirm disposal options for excavated soils in order to avoid contaminated run-off; and
- Regular inspection of construction / mitigation measures (e.g., concrete pouring, refuelling, etc). Pouring of cement-based materials for works will only be carried out in dry conditions.
- Regular inspection of surface water run-off and sediments controls (e.g., settlement & silt remediation measures e.g. silt traps / distilling tanks);

5.8.2 Operational Phase

There will be no requirement for groundwater monitoring as there is no likely discharge to ground, long term dewatering or abstraction of groundwater.

Maintenance of the surface water drainage system, including hydrocarbon interceptors, and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to soil or groundwater.

5.9 INTERACTIONS

This section discusses interactions between this Chapter and other specialist environmental topics considered in this EIA. The main interactions of importance to land, soils, geology, and hydrogeology relate to Biodiversity (Chapter 4), Hydrology / Water (Chapter 6), and Air Quality (Chapter 7) as follows:

5.9.1 Biodiversity

The proposed development may have temporary negative impacts on biodiversity at site level during construction due to excavation and removal of soil with resultant impact on local biodiversity. It will not impose any significant impact on European Designated sites due to the treatment integrated in the surface water (stormwater) and foul (wastewater) drainage strategy and associated mitigation measures (as previously outlined in section 6.6 of Chapter 6- Hydrology) coupled with the large distance involved in the pathway and significant dilution factor downstream in the catchment and the Northwest Irish Sea.

5.9.2 Hydrology

As mentioned above, there is a close inter-relationship between soils, geology, hydrogeology and Chapter 6 - Hydrology. During construction of the proposed development, there will be soil excavation that could impact surface water quality if not adequately mitigated.

There are no potentially significant interactions identified between land, soils, geology and hydrogeology, and Hydrology during the operational phase.

Therefore, all mitigation measures discussed are considered applicable to both components. Adherence to the mitigation measures presented above and in Chapter 6 – Hydrology will ensure the effect is **negative, imperceptible** and **short-term**.

5.9.3 Air Quality

During construction of the proposed development, there will be a proportion of dust created during excavation (enabling works) and construction activities that could impact air quality if not adequately mitigated.

5.9.4 Cultural Heritage, Archaeology, & Architectural Heritage

Excavation could result in the discovery / finding or unearthing of shallow subsurface archaeology. Prior to any subsurface excavations, the site will be assessed by an archaeologist and appropriate mitigation measures agreed accordingly.

5.9.5 Waste

Waste: Excavation could result in encountering contaminated soil. This will undergo environmental testing and be disposed of at a suitable licenced waste facility as required.

5.9.6 Traffic and Transportation

Local Traffic and transportation will be implemented by the additional vehicle movements generated by the volume of excavated soil that will have to be transported off site, resulting in an increase of heavy good vehicles (HGVs) during construction. The increase in vehicle movements as a result of excavated soil removal during the construction phase will be temporary in duration. Traffic-related impacts during the construction and operational phases are addressed in Traffic & Transportation chapter of this EIAR.

5.10 INDIRECT AND/OR SECONDARY IMPACTS

The proposed development requires excavation works which if not managed appropriately could give rise to the generation of dust.

In accordance with EPA Guidelines (2022), secondary or indirect impacts refer to environmental effects that occur away from the project site or through complex impact pathways. Having regard to the nature, scale and location of the proposed residential development, and the specific works involved during construction and operation, there is no potential for significant indirect or secondary impacts on land, soils, geology or hydrogeology. The development does not rely on functionally interdependent activities occurring off-site that would give rise to such effects.

5.11 CUMULATIVE IMPACTS

A list of developments in the vicinity of the subject lands is contained in Chapter 17 of this EIAR. All cumulative developments that are already built and in operation contribute to our 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 cumulative developments has been assessed in the preceding sections of this chapter.

5.11.1 Construction Phase

There are existing residential and commercial developments close by, along with the multiple permissions in the area. This chapter has been prepared with reference to the list of other developments in the locality.

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

- soil and groundwater contamination due to accidental hydrocarbon/cement leakage to ground.

A Construction Environmental Management Plan (CEMP) (2025) is included with the application documentation (see Appendix D, Volume III of the EIAR). This together with the mitigation measures set out in Section 5.6 outlines the best practice construction techniques and methodologies which will be implemented during construction of the proposed development to minimise potential for contamination.

The CEMP 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 and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures.

The works contractors for other planned or permitted developments will also 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, S.I. 366 of 2016 and S.I. 287 of 2022).

The implementation of mitigation and monitoring measures detailed in Section 5.6; and 5.8 as well as the compliance of the above permitted development with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the land, soils, geology, hydrogeological environment

during the construction phase of the proposed development. 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**.

5.11.2 Operational Phase

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

- Increased hard standing areas will reduce local recharge to ground and increase surface water run-off potential if not limited to the green field run-off rate from the Site. Cumulatively this development and others in the area will result in localised reduced recharge to ground and increase in surface run-off;
- Increased risk of minor accidental discharge of hydrocarbons from car parking areas and along roads is possible unless diverted to surface water system with petrol interceptor;
- There will be a small loss of greenfield area locally as part of the proposed Project.

The proposed development and the other permitted development listed in close proximity will result in an increase in hard standing which will result in localised reduced recharge to ground. The aquifer underlying the site is “Locally Important Aquifer (Lm) –Bedrock which is Generally Moderately Productive in local zones”. The implementation of SuDs measures on site will mitigate against and reduce the recharge rate to ground.

All nearby developments will also 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, S.I. 366 of 2016 and S.I. 287 of 2022)).

The implementation of mitigation measures detailed in Section 5.6 as well as the compliance of the above permitted development 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. 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**.

5.11.3 Cumulative Impacts in relation to Lady’s Well during the construction and operational phases

The works contractors for other planned or permitted developments will be obliged to ensure that measures are in place to protect surface water and groundwater quality in compliance with legislative standards for receiving groundwater quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 as amended by S.I. 366 of 2016 and by S.I. 287 of 2022) and surface water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019)).

The implementation of mitigation measures detailed in in Chapter 5 (Section 5.6.1 & 5.6.2) and Chapter 6 (Section 6.6.1 & 6.6.2), as well as the compliance of the above permitted development with their respective planning conditions, will ensure there will be minimal/negligible cumulative potential for change to the hydrological and hydrogeological environment around the Lady’s Well Spring during the construction and operational phases of the Proposed Development.

5.12 DIFFICULTIES ENCOUNTERED

There were no significant difficulties encountered in compiling the specified information for this EIA Chapter.

5.13 SUMMARY

There will be **no long-term residual impact** on land soil geology and hydrogeological receptors, either within or in the vicinity of the proposed development as a result of the proposed development.

5.14 REFERENCES

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