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Hydrological and Hydrogeological Risk Assessment Report

PRESENTED TO

Galway City Council
Phase 1 - Corrib Causeway - Dyke Road

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Environmental Consultancy Services

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1 INTRODUCTION

Enviroguide Consulting (hereafter referred to as EGC) was appointed by the Land Development Agency (hereafter referred to as the LDA), on behalf of Galway City Council (hereafter referred to as GCC), to complete a hydrological and hydrogeological risk assessment for the first phase of the proposed residential-led mixed use development at Dyke Road, Terryland, Co. Galway (hereafter referred to as the 'Proposed Development' and 'Site').

1.1 Project Objective

The project objective was to establish the baseline hydrological and hydrogeological conditions at the site and to identify the potential for any impacts on receptors associated with the Site and the Proposed Development:

- Establish the hydrological and hydrogeological regime and Conceptual Site Model at the proposed development site.
- Determine if there are any potential impacts on the receiving water environmental receptors including those at the site and adjoining downgradient of the site.
- Determine if the proposed development could impact on any designated and protected Natura 2000 sites hydraulically connected with the site.
- Determine if the proposed development could impact on the water quality status assigned by the EPA of the receiving water bodies hydraulically connected with the site for the purposes of the Water Framework Directive.

This hydrological and hydrogeological risk assessment will be used to inform the Appropriate Assessment (AA) Screening Report (Scott Cawley Ltd., 2025a) and Stage Two Natura Impact Statement (NIS) (Scott Cawley Ltd., 2025b). These reports have been prepared and submitted as part of the planning application documentation to assist the competent authority in assessing potential impacts on European sites resulting from the Proposed Development, either alone or in combination with other plans/projects.

1.2 Project Scope of Work

The scope of the hydrological and hydrogeological assessment included the following tasks:

- A desk-based review of published information and information pertaining to the Site and Proposed Development provided by the LDA / GCC.
- Develop a hydrogeological Conceptual-Site-Model and identify any potential source-pathway-receptor linkages.
- Identify and assess any potential impacts associated with the Proposed Development on sensitive receptors associated with the receiving water environment.

The assessment is based on the available design information provided by the LDA / GCC and information provided in the following reports.

- AECOM, 2025a. Phase 1 - Corrib Causeway - Dyke Road Infrastructure Report.
- AECOM, 2025b. Phase 1 - Corrib Causeway - Dyke Road Site Specific Flood Risk Assessment.
- AECOM, 2025c. Phase 1 - Corrib Causeway - Dyke Road Outline Construction Environmental Management Plan.

- ARUP, 2025. Phase 1 - Corrib Causeway - Dyke Road Hydraulic Model Assessment of Proposed Development.
- Ground Investigations Ireland (GII), 2024. Dyke Road Galway Ground Investigation Report.
- Minerex Geophysics Limited (Minerex), 2024. GCC Dyke Road Galway Geophysical Survey.

1.3 Professional Competency

The report was prepared by Warren Vokes Ba MSc MCIWEM C.WEM a Senior Consultant of EGC. Warren is a Chartered Water and Environmental Manager with over 8 years' experience of preparing environmental and hydrological assessments. The report was reviewed by Gareth Carroll BA BEng MIEnvSc CEnv, a Principal Consultant of EGC. Gareth is a Chartered Environmentalist (CEnv) with the Institute of Environmental Sciences (IES) with over 12 years' experience of preparing environmental and hydrogeological assessments for a range of project types and geological and hydrogeological site settings. The report was approved by Patrick Higgins BSc, MSc, MIEnvSc, CEnv. Patrick is a Chartered Environmentalist (CEnv) with IES with over 19 years' experience of preparing environmental and hydrogeological assessments for a range of project types and geological and hydrogeological site settings and who is Technical Director with EGC, is professionally competent and accredited to undertake hydrogeological assessments.

2 METHODOLOGY

2.1 Standards and Regulations

The methodology adopted for this assessment takes cognisance of the relevant standards and regulations pertinent to undertaking a hydrological and hydrogeological assessment in particular the following:

- Council Directive 2006/118/EEC, 2006. On the protection of groundwater against pollution and deterioration. European Parliament and the Council of European Communities.
- Commission Directive 2014/80/EU of 20 June 2014 amending Annex II to Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration.
- EU Water Framework Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy with amendments 2455/2001/EC, 2008/32/EC and 2008/105/EC (Water Framework Directive (WFD)).
- European Commission, 2022. WFD Reporting Guidance 2022. Final Draft V4.
- Environmental Protection Agency, December 2011. Guidance on the Authorisation of Discharges to Groundwater.
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (Groundwater Protection Schemes, 1999).
- Local Government (Water Pollution (Amendment) Act 1977 (as amended).
- Water Services Act 2007 (as amended)
- European Communities (Water Policy) Regulations 2003 (as amended).
- European communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011.
- European Communities (Assessment and Management of flood Risks) Regulations 2010 (as amended).
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended).
- European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended).

2.2 Desk-based Study

A desk-based study was undertaken including a review of relevant information from the following publicly available sources and information provided by GCC:

- Ordnance Survey Ireland Online mapping (OSI, 2025).
- Geological Survey of Ireland Online mapping (GSI, 2025).
- Environmental Protection Agency Online mapping (EPA, 2025).
- National Parks & Wildlife Services, Protected Sites Webmapping (NPWS, 2025).
- Relevant drawings and design reports for the Proposed Development provided by GCC.

2.3 Risk Based Impact Assessment

A risk-based and receptor-focussed approach was adopted to include an assessment of any impact to the receiving hydrological and hydrogeological (water) environment associated with the Proposed Development.

The basis for a risk assessment is the Conceptual Site Model (CSM) or Source-Pathway-Receptor (SPR) model which underpins the Directive 2000/60/EC (Water Framework Directive) amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU that has been transposed to Irish legislation as European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) as amended, as well as EPA guidelines on the protection of groundwater and surface water resources including associated aquatic ecosystems and human health receptors (e.g., groundwater supply users), the EPA Guidance on the Authorisation of Discharges to Groundwater (EPA, 2011) and the EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA, 2013) on the protection of groundwater and surface water resources including associated aquatic ecosystems and human health receptors (e.g., groundwater supply users).

A risk assessment is undertaken to provide an understanding of the risk associated with the presence of any potentially contaminating materials and/or activities on a site. This is informed by the assessment of potential for viable pollutant linkage(s) to be present. A pollutant linkage is established when there is a viable or potentially viable **S**ource, a **P**athway and a **R**eceptor (refer to Section 2.4 below).If one or more of the three elements are missing, the exposure pathway is considered incomplete and there is no risk associated with the activity or contaminant source (i.e., a viable means of exposure is not considered to be present or is unlikely to be present).

The objective of the Water Framework Directive (WFD) is no deterioration of the water quality status, and the “prevent or limit” objective is a key element of achieving that WFD status for all water bodies regardless of the water quality status of the water body. The ‘prevent or limit’ objective is a key element to achieving the WFD status and water quality objectives and in principle, prevent or limit measures (i.e., avoidance and mitigation) are the first line of defence in restricting inputs of pollutants from a development (i.e., ‘source’ removal) and any potential impact or deterioration of water quality status or WFD status of the receiving water body.

In this assessment all three elements of the Source-Pathway-Receptor model will be identified to develop a Conceptual Site Model (CSM), and any potential linkages evaluated and assessed to determine if the development could potentially impact upon any identified receptors including Natura 2000 sites as well as the WFD Status of the water bodies associated with the Site.

2.4 Conceptual Site Model

A CSM represents the characteristics of the Site and identifies the possible relationship and potential risk between contaminant sources (i.e., characteristics of the Proposed Development), pathways and receptors (receiving environment). These three essential elements of the CSM are described as:

- A **source –** a substance that is in, on or under the land and has the potential to cause harm or pollution.

- A **pathway** – a transport route or means by which a receptor can be exposed to, or affected by, a contaminant source; and
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.

The term pollutant linkage is used to describe a particular combination of source-pathway-receptor. Each of these elements can exist independently, but they create a risk only where they are linked together so that a particular contaminant affects a particular receptor through a particular pathway (i.e., a pollutant linkage).

The preliminary CSM for the Site of the Proposed Development is initially defined and this is then revised throughout the risk-based assessment process.

3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The Proposed Development forms part of an overall three phase Development Framework, in the form of the Corrib Causeway Development Framework. The overall Development Framework site extends to 1.78 hectares and is located to the northeast of the city centre, within walking distance from Eyre Square and is within the Headford Road area. The development frameworks aims to deliver a residential-led, mixed-use development. Phase 1, relates to the current, subject proposal; Phase 2, an existing car park south of the site, is intended to be redeveloped for a mix of uses such as civic, commercial, and cultural uses; and Phase 3 is intended to provide additional residential units. The current Phase 1 development, subject of this planning application, has the potential to act as a catalyst to kick-start the regeneration of this three phase development framework but also the redevelopment of the wider area. This particular site has been brought forward for the first phase of development on the basis that the Draft Headford Road Framework Plan (2009) envisioned residential development at this particular location with the more civic and commercial uses to be located further south on the Phase 2 site. The current Development Framework has been prepared to align with this vision.

The Proposed Development (i.e., the Phase 1 development) will consist of the construction of a new residential development of 219 no. apartment units and a childcare facility (approx. 241 sq m) in the form of 1 no. new residential block (5 - 9 storeys over lower ground floor level) with associated car parking, bicycle parking, public and communal open spaces, and all ancillary works on a site area of 1.144 ha.

The Proposed Development will provide for:

a) 219 no. residential apartment units (109 no. 1-bedroom units, 100 no. 2-bedroom units and 10 no. 3-bedroom units) each with an associated private open space area in the form of a balcony/terrace.
b) A new raised pedestrian boardwalk along the western elevation of the building.
c) Open Space (approx. 2,778 sqm) is proposed in the form of (a) public open space (approx. 1,183 sqm) to the west of the proposed building fronting on to Dyke Road accommodating outdoor seating, planting, a sunken garden and pedestrian pathways and connections; and (b) communal open space (approx. 1,605 sqm) to the east of the proposed building in the form of a courtyard including outdoor seating, planting, a children's play area and outdoor sports equipment.
d) A childcare facility (approx. 241 sqm) with dedicated external play area (approx. 60 sqm) at ground floor level.
e) A total of 33 no. car parking spaces at surface level to include 2 no. accessible spaces and 2 no. set down / drop off spaces to serve the childcare facility.
f) A total of 455 no. bicycle parking spaces to include 330 no. standard spaces, 100 no. visitor spaces and 25 no. cargo bicycle spaces all at surface / lower ground floor level.
g) Vehicular access is proposed via Dyke Road at 2 no. locations (to the north west and south west of the site). Pedestrian and Cyclist access is also delivered throughout the site via Dyke Road and includes a pedestrian crossing at Dyke Road. Pedestrian / cyclist connections to adjoining development to the north east and south east are also delivered.
h) The Proposed Development also provides for a further vehicular access point to the south of the main development site to facilitate new access to the existing southern

car park. A total of 12 no. car parking spaces will be removed with 161 no. car parking spaces remaining at this location.

i) 2 no. telecommunications lattice towers (overall height 6.45 m and 7.67 m) affixed to the rooftop supporting 9 no. 2m 2G/3G/4G antennas; 9 no. 0.8m 5G antennas; 6 no. 0.3m microwave transmission links; together with all associated telecommunications equipment and cabinets.

The Proposed Development will also provide for all associated site development works, infrastructure, excavation and clearance works including decommissioning the existing Black Box Theatre waste water pumping station and providing a new pumping station complete with emergency storage, all boundary treatment, public lighting, internal roads and pathways, ESB substations, switch room, water tank rooms, storage room, meter rooms, sprinkler tank room, parcel stores, comms room, bin storage, bicycle stores, hard and soft landscaping, play equipment, below ground attenuation tanks, nature based SUDs features, green roofs, roof plant, site services and connections for foul drainage, surface water drainage and water supply.

The layout of the Proposed Development is presented in Figure 3-1.

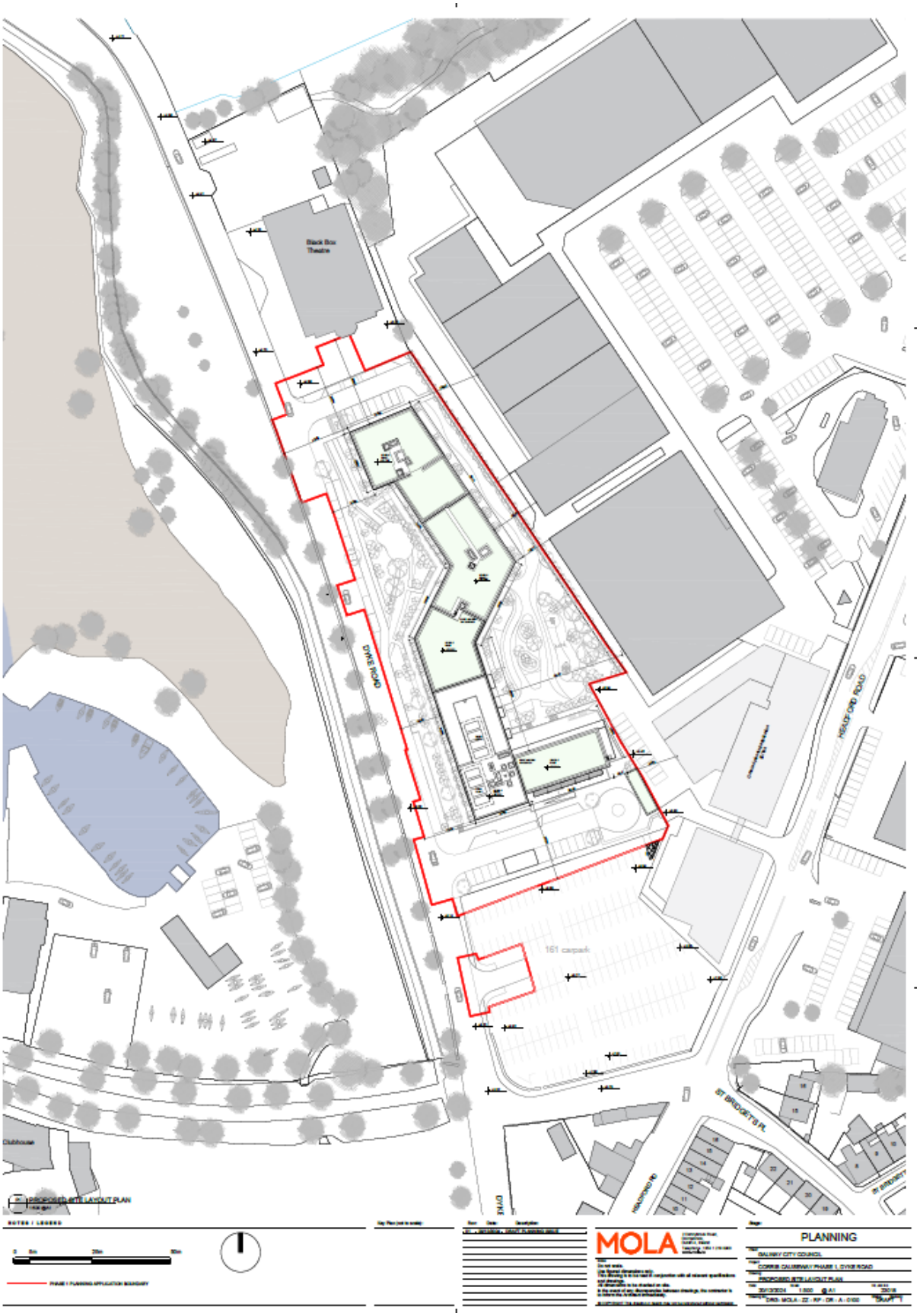

Figure 3-1. Proposed Development Site Layout (MOLA, 2024)

3.1 Construction Phase

The Construction Phase of the Proposed Development will include:

- It is understood that the foundation design will consist of 640mm diameter ODEX piles with reinforced in-situ concrete ground beams between pile caps and suspended slab.
- Stripping of existing macadam layers and road buildup (approximately 3,3037m^3).
- Excavation of soil and subsoil to formation level with the excavation of approximately 2,219m^3 of soils
- Excavation of soil and subsoil for the construction of building foundations, drainage and other infrastructure with excavation of 7,500m^3 of soils.
- It is anticipated that there will be no requirement for the excavation of bedrock during the construction phase of the Proposed Development.
- Where possible, it is intended to reuse suitable excavated soil and subsoil for landscaping and engineering use. However, where required, surplus materials will require removal offsite in accordance with all statutory legislation.
- Temporary stockpiling of excavated material pending re-use onsite or export offsite.
- The importation of 3,750m^3 of aggregate fill materials will be required for the construction of the piling matt.
- The importation of 3,072m^3 of aggregate fill materials will also be required for the construction of the Proposed Development (e.g., granular material beneath road pavement, under floor slabs and for drainage and utility bedding / surrounds etc.).
- Based on the findings of the ground investigation (GII, 2024) and the design requirements for the Proposed Development, it is anticipated that granular deposits may be encountered during excavations for building foundations, drainage and other infrastructure. Any excavations which penetrate the granular deposits will be required to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages.
- There may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels ranging between 0.17mbGL and 2.25mbGL), where encountered during groundworks.
- Construction of new foul and mains water connections in accordance with UE Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03), UE's Code of Practice for Water Infrastructure (IW-CDS-5020-03).
- Construction of new surface water drainage designed in accordance with the principles and objectives of Sustainable Drainage Systems (SuDS) and the requirements of Galway City Council (GCC).
- Diversion of existing surface water pipes within the Site from the footprint of proposed buildings.

3.2 Operational Phase

3.2.1 Surface Water Drainage

As documented in the Infrastructure Report (AECOM, 2025a), the proposed surface water drainage network, which will accommodate surface water runoff from impermeable surfaces in the Proposed Development (including roadways, roofs, and parking areas), will be managed in accordance with the policy requirements of Galway City Council Development Plan 2023-

2029 and the principles and objectives of SuDS and the Greater Dublin Strategic Drainage Study (GDSDS) to treat and attenuate surface water prior to discharging offsite as follows:

- It is proposed to install a new surface water piped gravity network which will discharge, at a restricted rate agreed with GCC of 25l/s, to the existing 600mm diameter concrete pipe which runs from south to north along the western boundary of the site and ultimately discharges to the Terryland Stream located approximately 0.13km north of the site at its closest point.
- As part of the Proposed Development, the LDA on behalf of GCC proposes to install a new separate gravity surface water drainage network to service the Proposed Development, which will discharge into the existing GCC 600mm Ø surface water concrete pipe. GCC confirms this pipe runs south-north along the western boundary of the Proposed Development, and discharges into the Terryland Stream. Preliminary investigations undertaken by LDA and GCC indicate sections of the pipe north of the Proposed Development (i.e., on Phase 3 development lands) may require repairs. GCC advises it will consider any potential future repairs in conjunction with LDA contribution from Phase 1, to ensure the Phase Proposed Development can connect to the existing surface water infrastructure.

The proposed surface water drainage network has been designed to convey run-off associated with a 1 in 5-year return period event without surcharge and a 1 in 100-year return period event without flooding. An additional 20% has been allowed for climate change in relation to rainfall intensities.

As detailed in the Infrastructure Report (AECOM, 2025a), the following attenuation and SuDS measures will be incorporated into the Proposed Development:

- Intensive green roof, providing a maximum storage volume of 131.2m^3.
- Exfiltration permeable paving car parking spaces
- Extensive linear rain gardens / swales (incorporating impermeable liner).
- Two (2No.) shallow reinforcement concrete attenuation tanks (providing a combined storage of 72.8m^3) with a hydrobrake installed at the outfall manhole.
- Class I By-Pass hydrocarbon separator.

The proposed surface water drainage layout and SuDS design are presented Figure 3-2.

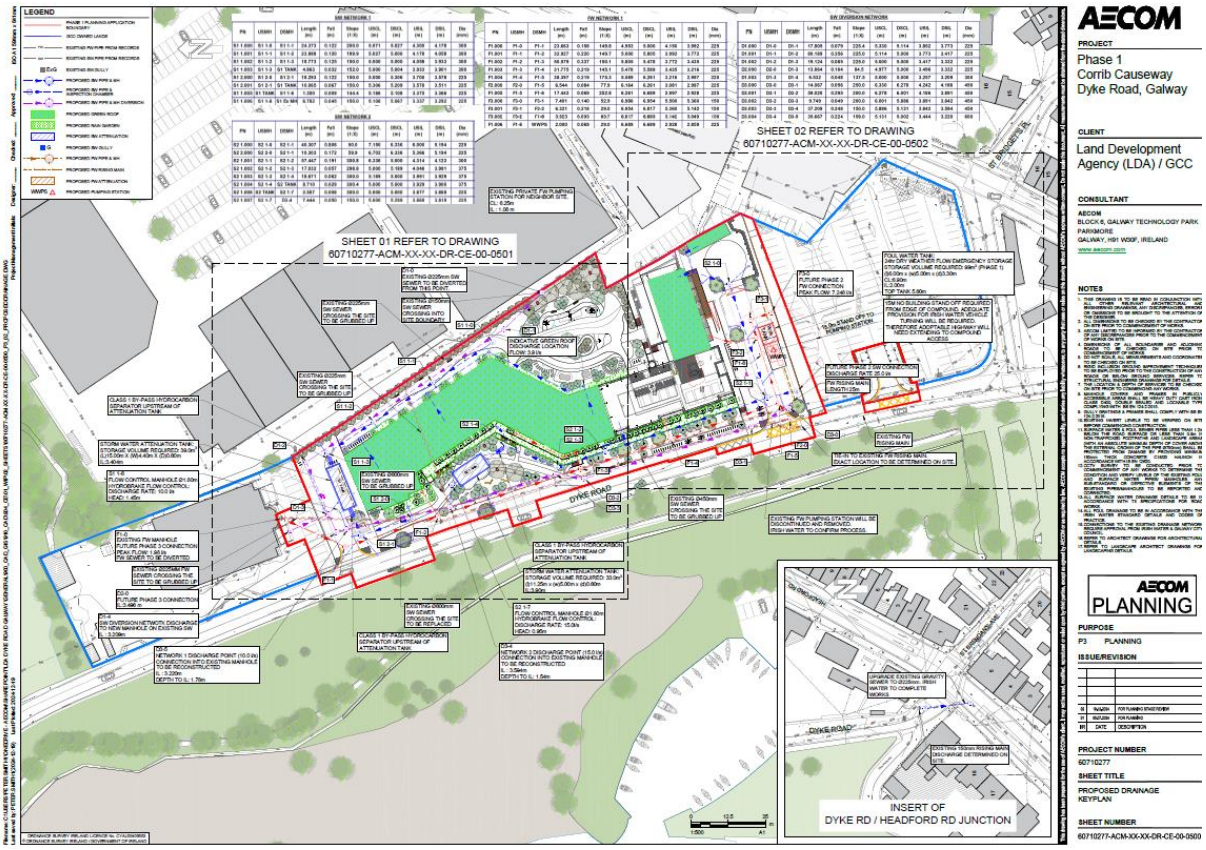

Figure 3-2. Proposed Drainage Layout (AECOM, 2025a)

3.2.2 Foul Drainage

As documented in the Infrastructure Report (AECOM, 2025a), the estimated peak wastewater loading generated by the Proposed Development is estimated at 2.97 l/s.

Uisce Éireann (UE) have confirmed that the existing wastewater pumping station (WWPS) was designed to cater only for the Black Box Theatre and that it doesn't have capacity to cater for any additional flows. Therefore, it is proposed to relay the gravity foul sewer serving the Black Box Theatre and install a new gravity sewer network to serve the Proposed Development. The existing wastewater pumping station (WWPS) that serves the Black Box Theatre is to be decommissioned and a new WWPS constructed (AECOM, 2025a). The new WWPS has been positioned based on the flood extents within the site and to maximize the separation from buildings. The pumping station is located so that it is above the 1 in 100-year return period event water level and as far away from all buildings as possible. In addition, the above ground elements (kiosk and control room) are located above the 1:200-year return period. UE's minimum separation distance to be provided between pumping stations and habitable buildings is 15m which can be achieved within the site. An emergency tank with 24-hour storage capacity at Dry Weather Flow (DWF) has been provided to serve the Proposed Development and the Black Box Theatre (AECOM, 2025a).

As documented in the Infrastructure Report (AECOM, 2025a), the UE Confirmation of Feasibility (CoF) letter states that the proposed foul water connection is feasible subject to upgrades.

The existing 150mm rising main serving the existing WWPS is to be retained and reused. UE have confirmed that a 20m upgrade of a 150mm diameter sewer from Dyke Road to Wood Quay will be required. These works will be funded by the Applicant (AECOM, 2025a). Furthermore, the Applicant will also investigate the separation of storm water and foul water within the site of the Proposed Development and ensure that any existing storm water which is entering into the UE combined system is eliminated. The Applicant will ensure that there is no storm water discharge to the UE network.

A Statement of Design Acceptance (SoDA) has been issued by UE (AECOM, 2025a).

The proposed foul drainage will be designed in accordance with the Technical Guidance Document – Part H of the Building Regulations, UE's Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03), BS EN 752 – Drains and sewer systems outside buildings, Sewers for Adoption, 6th Edition and Micro Drainage Software Pipeline Design (AECOM, 2025a).

It is understood that foul water from the Proposed Development will be treated in the Galway Wastewater Treatment Plant (WWTP) (Discharge Licence No. D0050-01) before ultimately discharging to the Corrib Estuary transitional waterbody (EU Code: IE_WE_170_0700).

3.2.3 Water Supply

As documented in the Infrastructure Report (AECOM, 2025a), it is proposed to take a connection off the existing 300mm watermain on the Headford Road. The new watermain will pass through the Phase 2 lands and loop around all 4 sides of the Proposed Development.

The internal water supply network is based on the requirements of the Uisce Éireann Code of Practice for Water Supply (IW-CDS-5030-02) and the Technical Guidance Document – Part B of the Building Regulations.

Firefighting water supplies and fire hydrants will be provided as required in accordance with the Building Regulations and the requirement of Galway City Fire Service.

The UE CoF letter states that the proposed water supply connection is feasible without infrastructure upgrade from UE (AECOM, 2025a).

A SoDA has been issued by UE (AECOM, 2025a).

4 SITE SETTING

4.1 Site Location and Description

The site of the Proposed Development is located at Dyke Road, Terryland, Co. Galway. The site, which extends to 1.144 hectares (Ha), is accessed by the Dyke Road and is located within the Headford Road area, to the northeast of the city centre and approximately 0.65km walking distance from Eyre Square.

The current land use at the site of the Proposed Development comprises a surface car park of approximately 311No. car parking spaces.

The site of the Proposed Development is bound to the north by the Black Box Theatre (i.e., Phase 3 of the overall Development Framework) which adjoins Terryland Forest Park to the south by Dyke Road Car Park comprising approximately 243No. car parking spaces (i.e., Phase 2 of the overall Development Framework) which adjoins local road Bóthar Na Dige, to the east by Galway Retail Park, and to the west by Dyke Road which adjoins the future greenway that intends to re-establish the old Clifden Railway Bridge and provide a greenway running from Galway City to Moycullen.

The surrounding lands are mainly comprised of low density, low grade commercial buildings with extensive surface car parking.

The site location is presented in Figure 4-1 and the current layout of the site is presented in Figure 4-2.

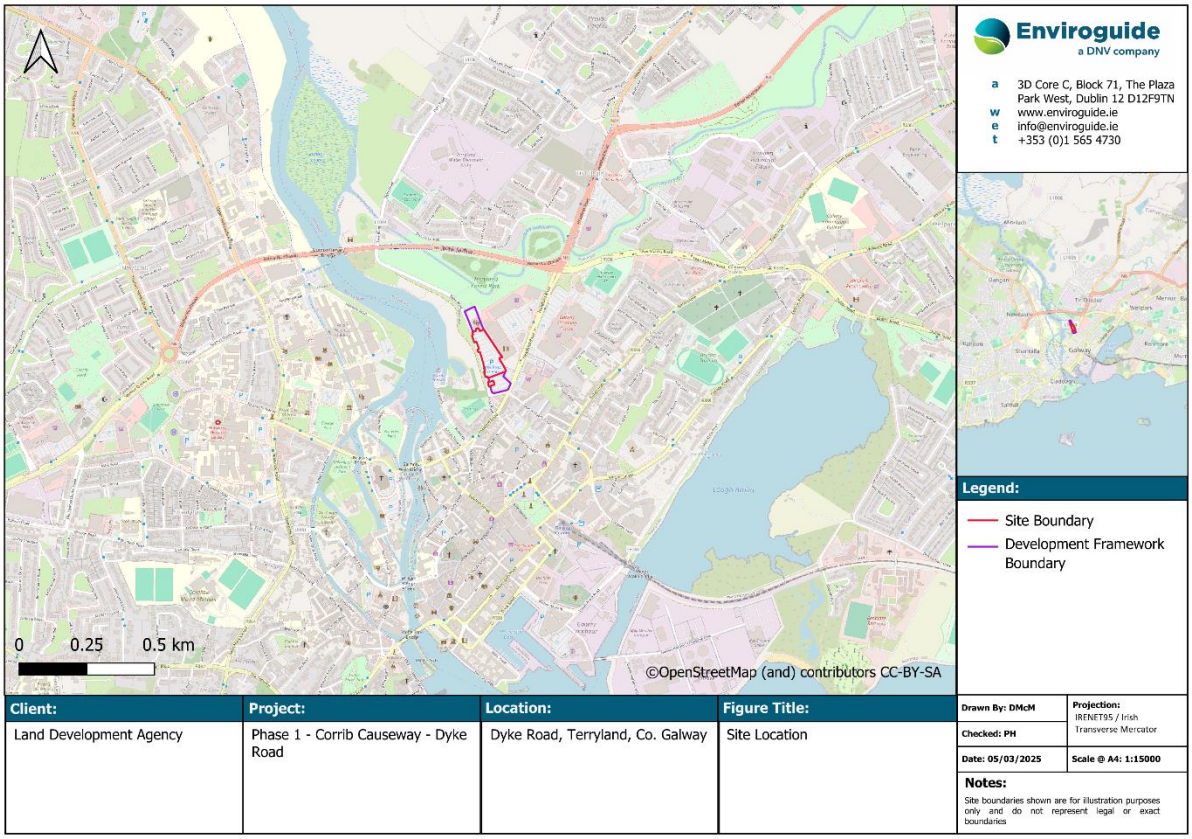

Figure 4-1. Site Location

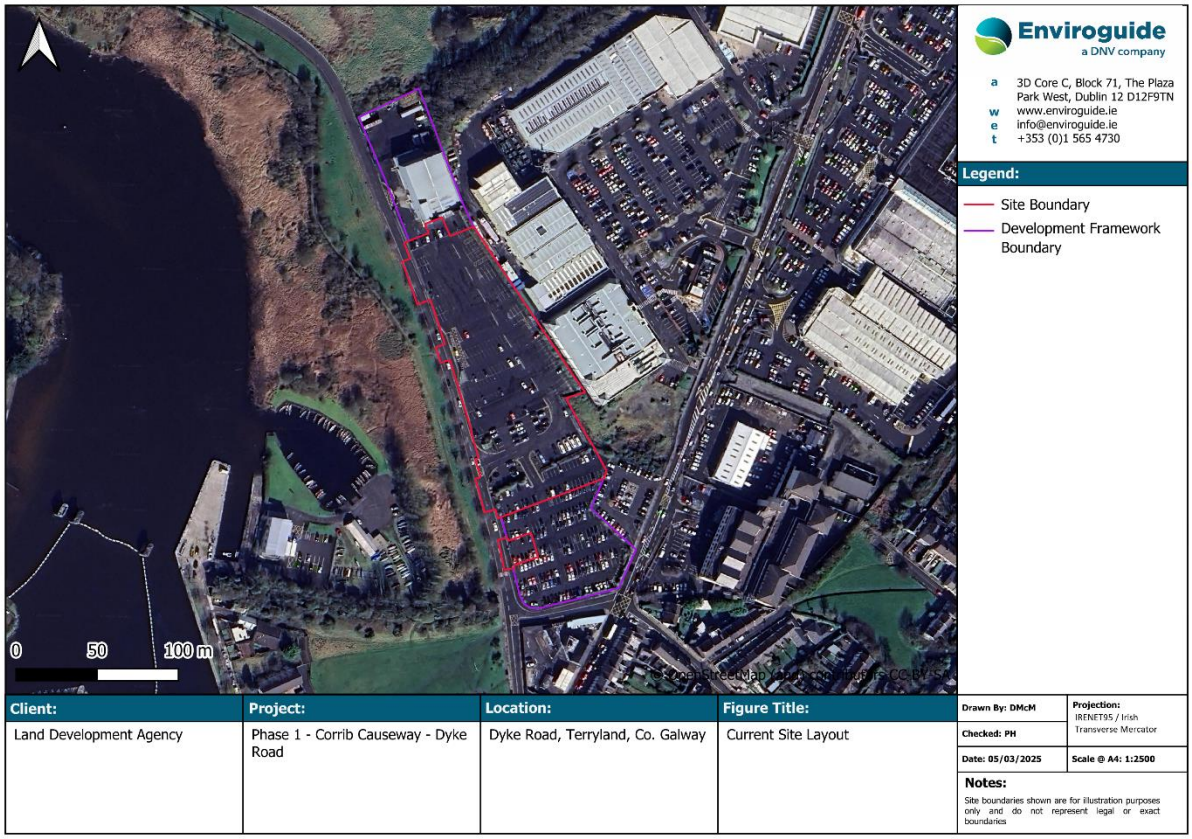

Figure 4-2. Current Site Layout

4.2 Topography

As detailed in the Infrastructure Report (AECOM, 2025a), a topographical survey undertaken by Apex Surveys in October 2023 of the overall Development Framework site indicates that ground levels range from 3.84 meters above Ordnance Datum (mOD) at the northern end of the site to 7.12mOD in the southern portion of the site. There is a small retaining wall in the southern portion of the site where the car park levels step up from about 6.0mOD to approximately 7.0mOD.

The ground levels at the site of the Proposed Development typically range from 4.8mOD to 5.9mOD with the level in the centre of the site typically being around 5.3mOD.

4.3 Soil and Subsoil

The soils beneath the site of the Proposed Development are mapped by Teagasc (Teagasc, 2025) as made ground (IFS Soil Code: Made). It is noted that the soils beneath the existing Black Box Theatre adjoining the northern boundary of the site are mapped as mineral alluvium (IFS Soil Code: AlluvMIN). As documented in the Infrastructure Report (AECOM, 2025a), it is possible that the site was partially filled in the 1970s and 1980s with rubble from Galway's inner city, which may include medieval and late medieval architecture fragments.

The subsoil or quaternary sediments beneath the site of the Proposed Development are mapped by the GSI (GSI, 2025) as urban. It is noted that the soils beneath the existing Black Box Theatre adjoining the northern boundary of the site are mapped by the GSI (GSI, 2025) as Fen Peat (FenPt).

The GSI (GSI, 2025) mapped soils and quaternary geology at the Site are presented in Figure 4-3 and Figure 4-4.

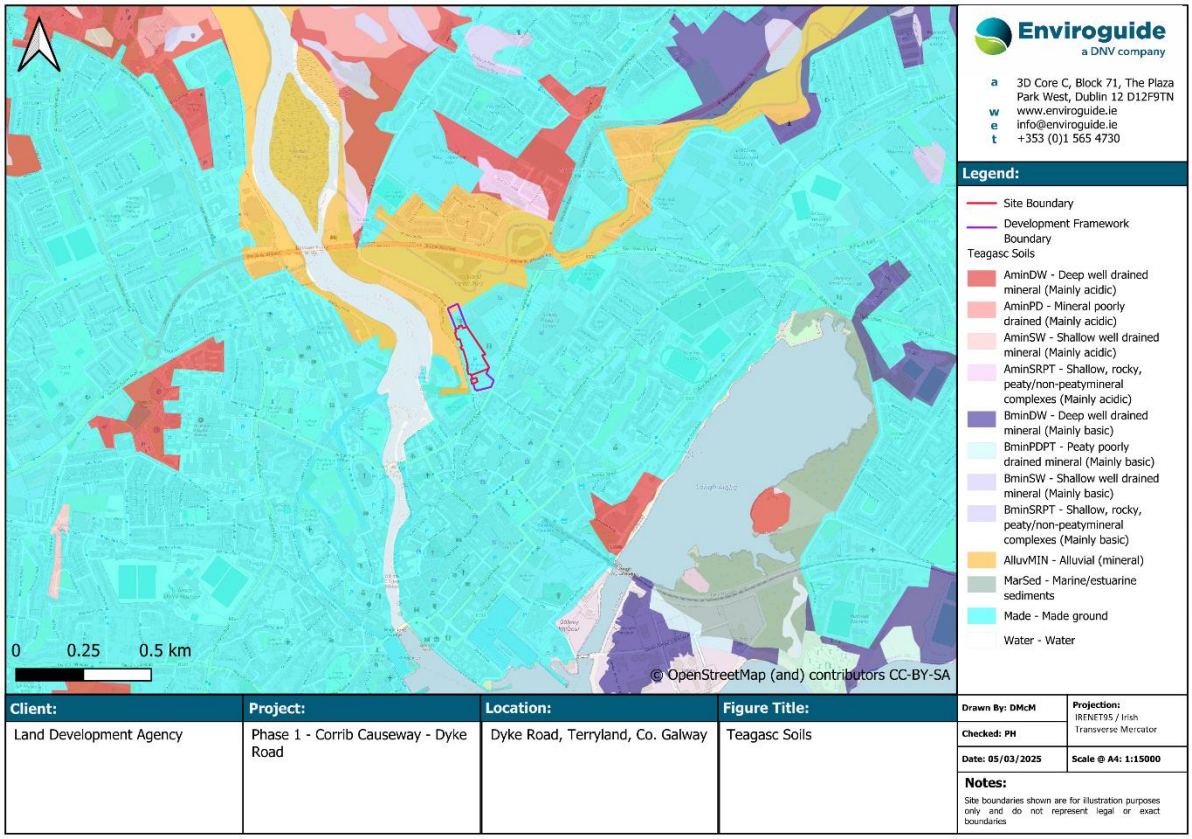

Figure 4-3. Soils

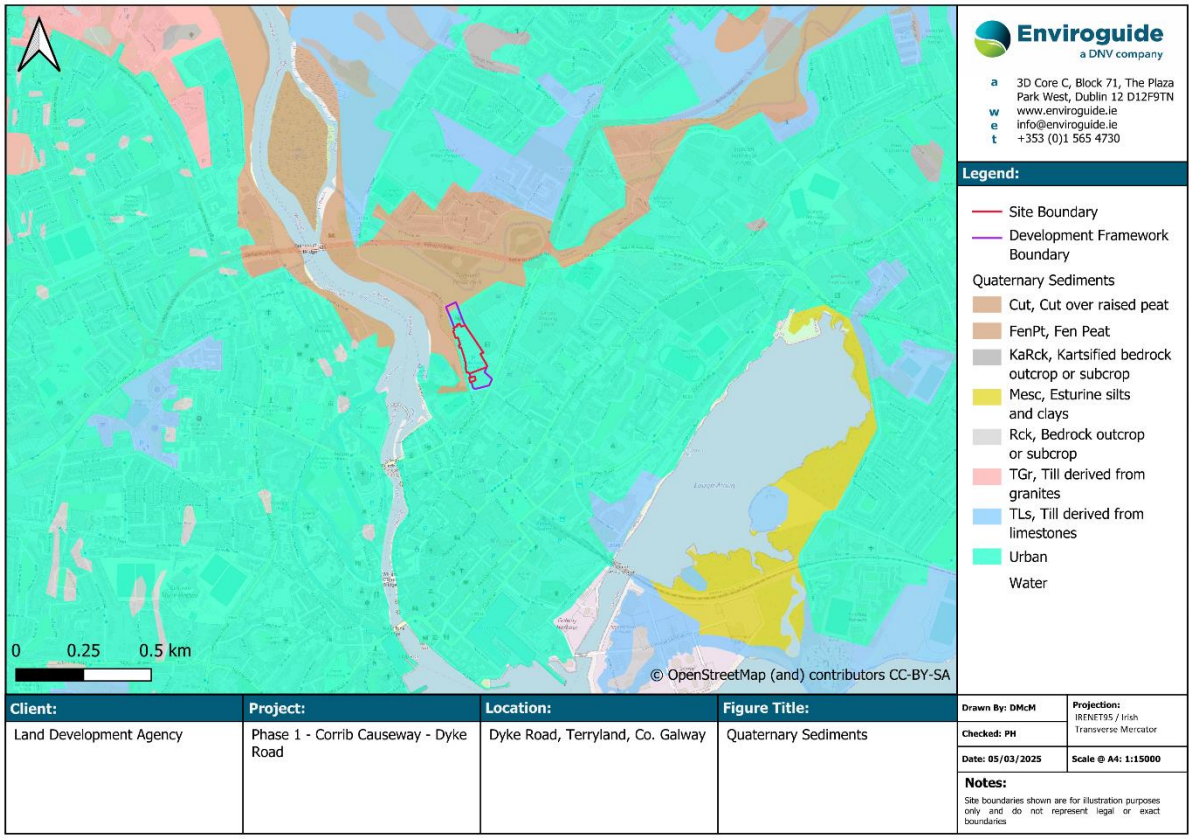

Figure 4-4. Quaternary Soils

4.4 Bedrock Geology

The bedrock beneath the site is mapped by the GSI (GSI, 2025) as the Burren Formation (New Code: CDBURR) described as pale grey packstones and wackestones, but also contains intervals of dark cherty limestones, often associated with oolitic grainstones.

While there are no bedrock outcrops mapped within the site boundary there are a number of bedrock outcrops mapped by the GSI (GSI, 2025) within a 2km radius of the site. The closest bedrock outcrop recorded by the GSI (GSI, 2025) is located approximately 0.36km west of the site. Additional outcropping is recorded approximately 0.87km north of the site.

The bedrock geology is presented in Figure 4-5.

4.4.1 Karst

Galway City and its surrounding areas exhibit a distinctive karst landscape characterised by its unique geological features and limestone formations. Karst weathering is a gradual process occurring over thousands of years, initiated by CO2-enriched rainwater percolating through carbonate bedrock. This slightly acidic water dissolves the rock, forming voids. Over time, these voids can become filled with sub-soils through drop-out subsidence. The region's abundant rainfall, coupled with the presence of carbonate-rich bedrock, has facilitated the development of numerous karst features, including sinkholes, caves, and underground rivers.

There are no karst features mapped by the GSI (GSI, 2025) at the site or within a 2km radius of the site. However, it is noted that the closest karst features to the site, which include two swallow holes (Karst Feature Unique ID: IE_GSI_Karst_40K_890 and IE_GSI_Karst_40K_942) and a cave (Karst Feature Unique ID: IE_GSI_Karst_40K_1048), are located approximately 2.18km northeast of the site at their closest point (refer to Figure 4-5).

As documented in the Galway City County Geological Site Report (GSI, 2020), the two (2No.) swallow holes, described as estavelles, are hydraulically connected to the Terryland Stream (River Waterbody Code: IE_WE_30C020600), located approximately 0.13km north of the site at its closest point, when they act as springs and to the Corrib Estuary transitional waterbody (EU Code: IE_WE_170_0700) via an underground conduit system when they act as sinks. The precise discharge locations of the estavelles are unknown.

As discussed in Section 4.5, Minerex Geophysics Ltd. (MGX) carried out a geophysical survey (Minerex, 2024) at the Site consisting of 2D-Resistivity (ERT), seismic refraction (p-wave) and MASW (s-wave) surveying for the Site. Some high resistivities at depth indicated that there is clean limestone present that is liable to karstification, but it does not have to be karstified. It is noted that the Ground Investigation Report (GII, 2024) did not identify any karst features at the site.

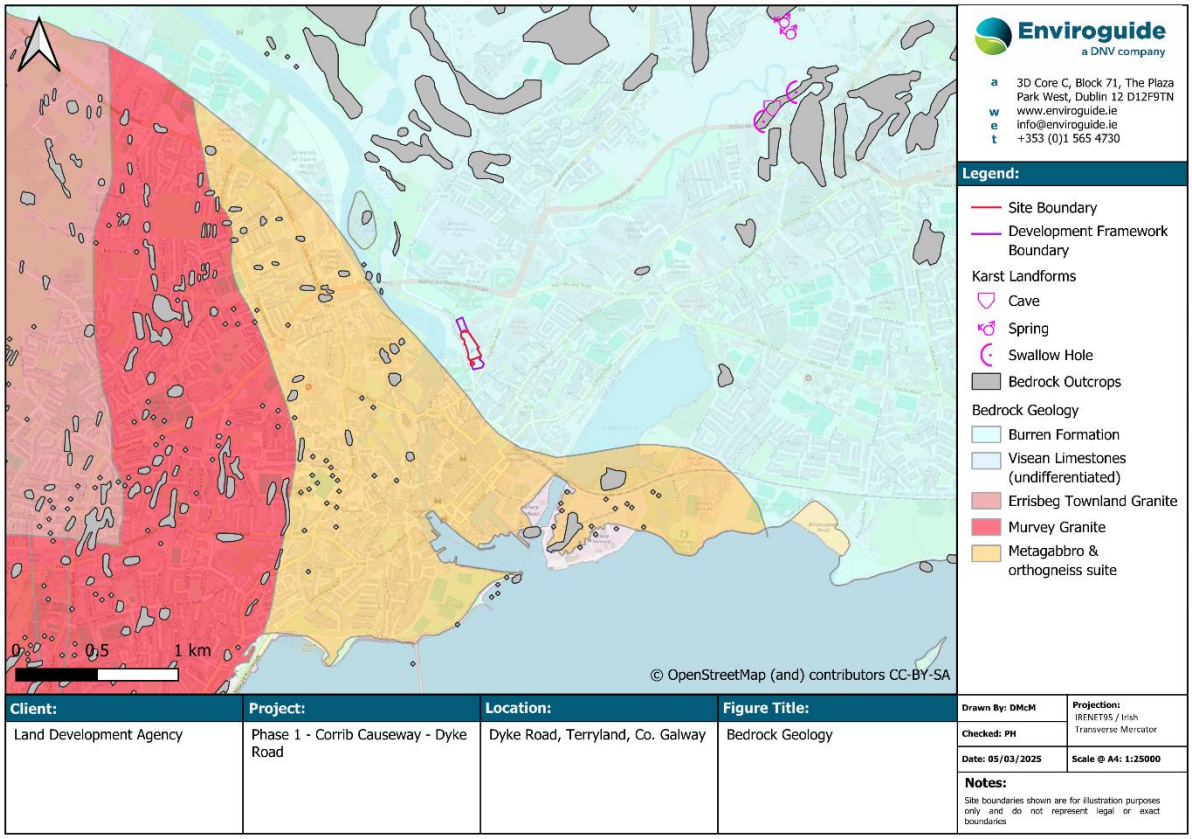

Figure 4-5. Bedrock Geology

4.5 Site Investigation Results

4.5.1 Intrusive Ground Investigations

As documented in the Ground Investigation Report (GII, 2024), the ground conditions across the stie comprise the following:

- SURFACING: Tarmac surfacing was present typically to a depth of 0.06 meters below ground level (mbGL).
- MADE GROUND: Made Ground deposits were encountered beneath the surfacing and were generally present to depths of between 0.5mbGL and 1.0mbGL and a maximum of 3.4mbGL in BRC04. These deposits were described generally as grey Sand and Gravel FILL and contained occasional fragments of tarmacadam occasionally overlying grey slightly sandy gravelly Clay and brownish black gravelly Peat with occasional red brick, ceramic and rubbish fragments.
- ORGANIC DEPOSITS: Organic deposits were generally encountered beneath the Made Ground and were described typically as brownish black slightly clayey slightly gravelly PEAT. The secondary constituents varied across the site, with silt and clay lenses occasionally present in the peat. The strength of the deposits was typically very soft based on SPT N values.
- SOFT COHESIVE DEPOSITS: Soft Cohesive deposits were encountered beneath the organic deposits and were generally described as beige or cream clayey SILT with frequent shell fragments occasionally onto light grey slightly sandy slightly gravelly clayey SILT with occasional cobbles. The secondary sand and gravel constituents

varied across the site and with depth, and peat lenses were occasionally present within the deposits. The strength of the soft cohesive deposits was typically very soft to soft.

- COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the soft cohesive deposits at some locations and were described typically as light grey to grey slightly sandy slightly gravelly silty CLAY with occasional cobbles. The secondary sand and gravel constituents varied across the site and with depth. The strength of the cohesive deposits typically increased with depth and was stiff or very stiff below 6.0m BGL in the majority of the exploratory holes. These deposits had some occasional cobble content, where noted on the exploratory hole logs.
- GRANULAR DEPOSITS: Granular deposits were occasionally encountered at the base of the cohesive deposits and were typically described as grey very sandy subangular to subrounded fine to coarse GRAVEL with occasional cobbles. The secondary sand constituents varied across the site while occasional cobble content was also present were noted on the exploratory hole logs. Based on the SPT N values the deposits are typically medium dense to dense and become dense with depth. Groundwater strikes were occasionally noted in the boreholes on encountering the granular deposits.
- BEDROCK: The rotary core boreholes recovered strong thinly to medium bedded grey fine to medium grained fossiliferous LIMESTONE, with the exception of BRC04 which recovered strong to very strong thinly to thickly banded dark green medium to coarsely crystalline METAGABBRO. Occasional calcite veins were noted during logging. The depth to rock increases to the southeast from 11.2mbGL in BH01 in the north-western corner of the site to a maximum depth of 15.3mbGL in BRC03 in the centre. The depth to rock decreases to 9.4mbGL in BRC06, and further decreases to between 6.6mbGL and 6.1mbGL respectively in BRC04 and BRC05 in the southeastern portion of the site.

As documented in the Ground Investigation Report (GII, 2024), groundwater strikes were recorded between 1.30mbGL and 9.5mGL during borehole drilling. Four (4No.) groundwater monitoring wells were installed at the site (BRC1, BRC02, BRC04 and BRC05) to allow the equilibrium groundwater level to be determined. Groundwater level measurements ranged from 0.17mbGL to 2.25mbGL.

It is noted that the Ground Investigation Report (GII, 2024) did not identify any karst features at the site.

4.5.2 Geophysical Survey Results

Minerex Geophysics Ltd. (MGX) carried out a geophysical survey (Minerex, 2024) consisting of 2D-Resistivity (ERT), seismic refraction (p-wave) and MASW (s-wave) surveying for the site. The findings of the geophysical survey are summarised as follows:

- The seismic refraction survey was modelled with a total of four layers:
    - Layer 1 is mainly affected by the road construction. High resistivities near the surface indicate road construction material such as gravel and tarmac. This layer would also contain urban made ground and peat.
    - Layer 2 is interpreted as soft to firm clay and silt or urban made ground or peat. This layer extends down to an elevation of approximately 0mOD across much of the site but extends deeper in the northwest.

  - Layer 3 is described as very stiff or very dense overburden. This layer is only present in the northwest of the site. It may contain some very weathered rock.
  - Layer 4 is interpreted as rock. The depth to the top of this layer is between 4mbGL to 9mbGL across most of the site but 11mbGL to 12mbGL in the northwest in RC BRC01 and BH01. Due to the interference the seismic modelling depth was limited here to around 10m.
- Some high resistivities at depth indicate that there is clean limestone present that is liable to karstification, but it does not have to be karstified (refer to Figure 4-6).

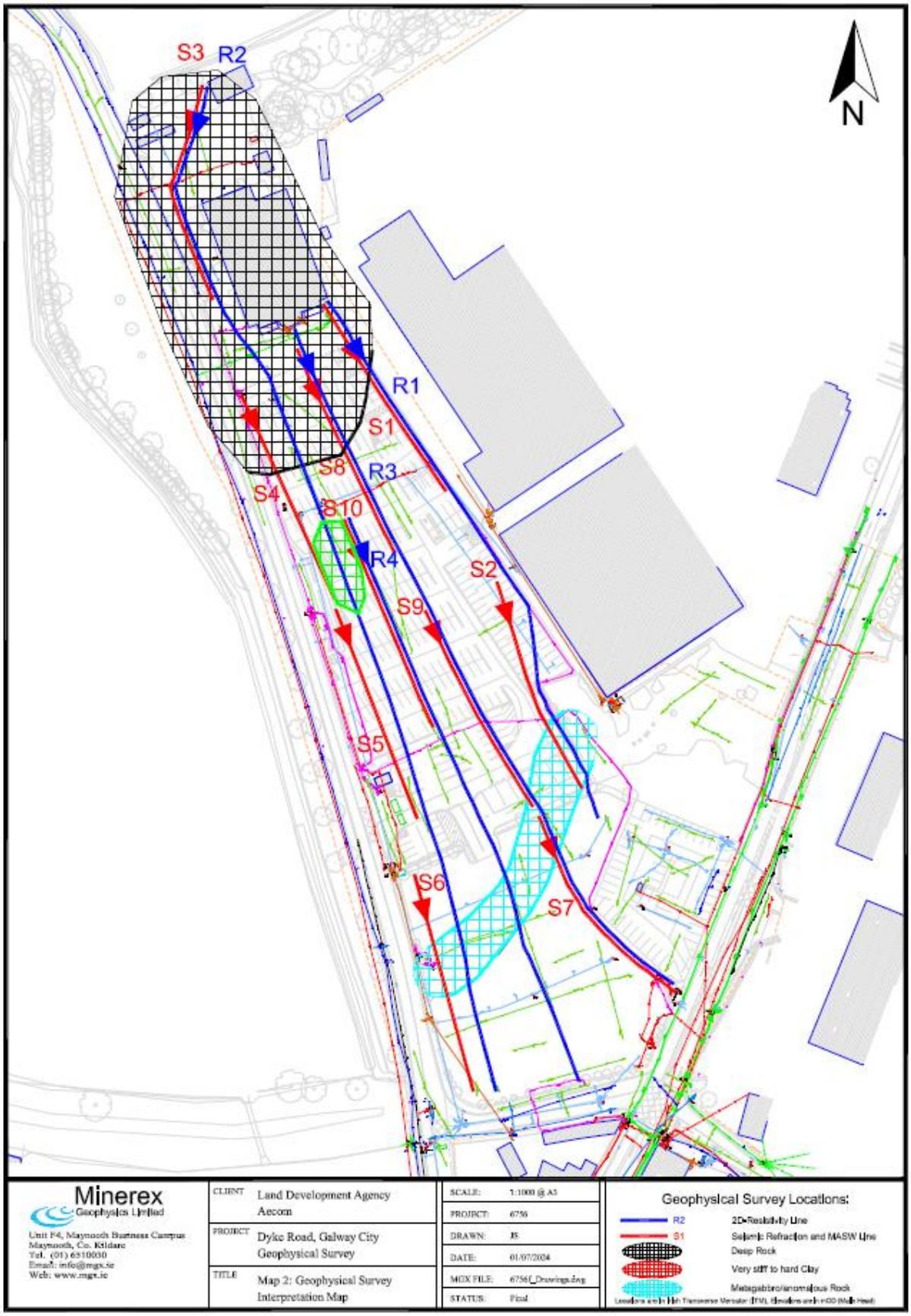

Figure 4-6. Geophysical Survey Interpretation Map (Minerex, 2024)

4.5.3 Soil Quality

Soil analytical data for soil samples collected across the site are provided in the ground investigation report (GII, 2024).

As documented in the ground investigation report (GII, 2024), a total of twenty-eight (28No.) soil samples collected were analysed for a suite of parameters suitable to determine the suitability of soils for disposal to a landfill. Soil analytical data for soil samples collected across the site are provided in the ground investigation report (GII, 2024). It is noted that a waste classification assessment was not included within the ground investigation report (GII, 2024).

Based on a review of the results, there is evidence of low-level anthropogenic contamination in sampled soils across the site:

- Detectable concentrations of Polycyclic Aromatic Hydrocarbons (PAHs), ranging from 0.67mg/kg to 34.54mg/kg, were reported for ten (10No.) samples collected. The reported concentrations of PAHs at remaining sample locations were below the laboratory limit of detection (LOD).
- Detectable concentrations of Total Petroleum Hydrocarbons (TPH), ranging from 69mg/kg to 3192mg/kg, were reported for fifteen (15No.) samples collected. The reported concentrations of TPH at remaining sample locations were below the LOD.
- Detectable concentrations of Extractable Petroleum Hydrocarbons (EPH), ranging from 877mg/kg to 1033mg/kg, were reported for three (3No.) samples collected. The reported concentrations of EPH at remaining sample locations were below the LOD.
- Detectable concentrations of Mineral Oil, ranging from 52mg/kg to 1047mg/kg, were reported for twelve (12No.) samples collected. The reported concentrations of mineral oil at remaining sample locations were below the LOD.
- Detectable concentrations of toluene and/or m/p xylene, of 7ug/kg, were reported for two (2No.) samples collected. The reported concentrations of toluene and m/p xylene at remaining sample locations were below the LOD.
- The reported concentration of Polychlorinated Biphenyl (PCBs) were reported below the LOD.
- The reported concentration of benzene, ethylbenzene and o-xylene were less than the Limit of Detection (LOD).
- Asbestos was reported as ‘no asbestos detected’ for all samples.

4.6 Hydrogeology

4.6.1 Groundwater Body and Flow Regimes

The EPA (EPA, 2025) maps the groundwater body (GWB) beneath the site as the Clare-Corrib GWB (EU Code: IE_WE_G_0020). The Clare-Corrib GWB covers some 642 km2 and occupies an area across Co. Galway, Co. Mayo and Co. Roscommon (GSI, 2025).

The Clare-Corrib GWB Report (GSI, 2025) identifies that diffuse recharge occurs over the GWB via rainfall percolating through the permeable subsoil and point recharge to the underlying aquifer occurs by means of swallow holes and collapse features/dolines.

Groundwater primarily discharges into rivers, large springs, and Lake Corrib (EU Code: IE_WE_30_666a), located approximately 3.55m north of the Site at its closest point. During

winter, it contributes to turloughs and is directed through artificial channels to manage flooding. Contributions to the River Corrib (River Waterbody Code: IE_WE_30C020600), located approximately 0.07km west of the site at its closest point, and the Terryland Stream, located approximately 0.13km north of the site at its closest point, are also considered likely.

The karstic systems within the Clare-Corrib GWB exhibit high levels of interconnection, facilitating regional-scale flow systems. Groundwater can bypass surface water catchments by flowing beneath surface water channels and across catchment divides. Flow paths within karst areas can extend up to 10km in length.

Groundwater flow occurs through various geological features such as fissures, faults, joints, and bedding planes. Notably, in limestone formations, karstification significantly enhances permeability, particularly along structural elements like fold axes and faults. This intricate network of pathways complicates predictions of groundwater flow. While the overall groundwater flow direction generally trends towards the River Clare and Lake Corrib, the highly karstified bedrock introduces significant local variability in flow directions. In the vicinity of the site groundwater flow likely follows a path that ultimately leads towards the River Corrib.

4.6.2 Aquifer Classification

The GSI (GSI, 2025) has classified the bedrock of the Burren Formation beneath the site and within the surrounding areas as a ‘Regionally Important Aquifer - Karstified (conduit) (RKc).

Regionally important aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or ‘excellent’ yields (>400 m3/d). ‘Karstification’ is the process whereby limestone is slowly dissolved away by percolating waters. Karstification frequently results in the uneven distribution of permeability through the rock, and the development of distinctive karst landforms at the surface (e.g. swallow holes, caves, dry valleys), some of which provide direct access for recharge/surface water to enter the aquifer.

The bedrock aquifer beneath the Site is presented in Figure 4-7 below.

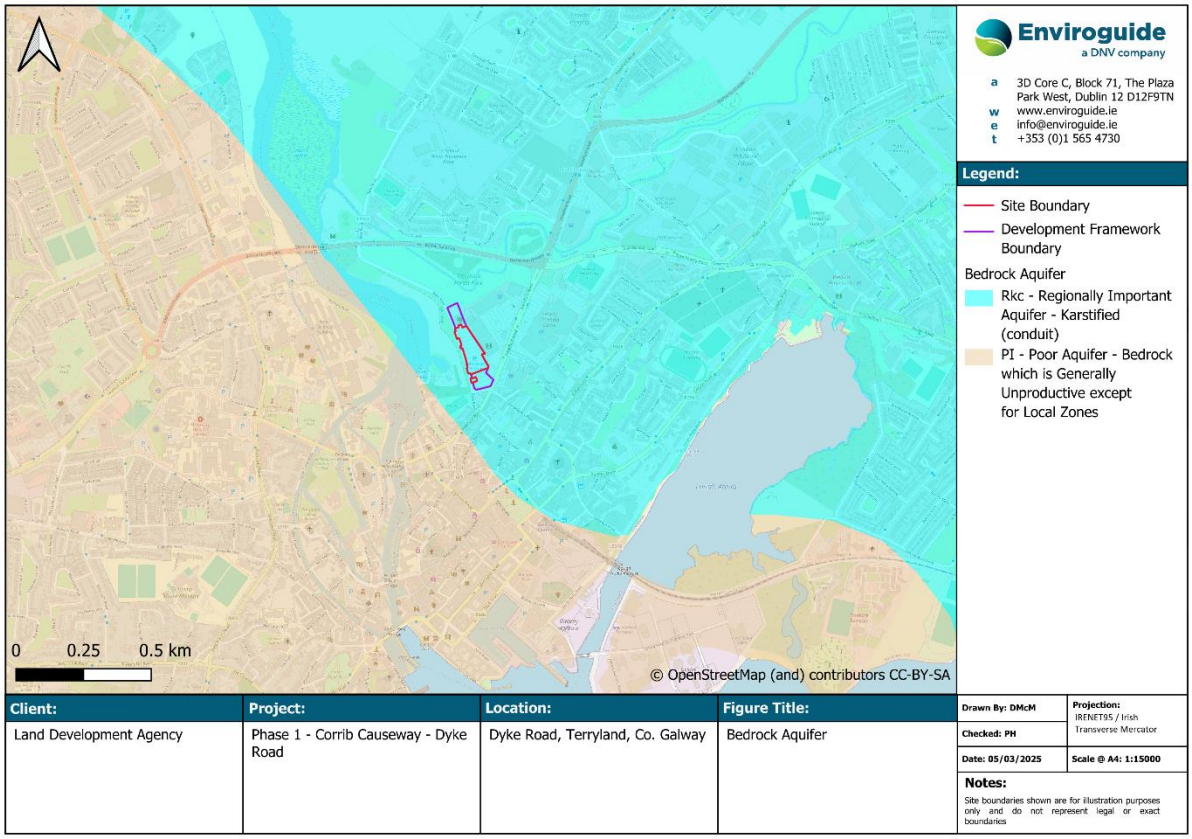

Figure 4-7. Bedrock Aquifer

4.6.3 Groundwater Vulnerability

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes publication (DEHLG/EPA/GSI, 1999) and summarised in Table 4-1. The publications state that *'as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area'.*

Table 4-1. Vulnerability Mapping Criteria

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point recharge	Unsaturated Zone
	Subsoil Permeability & Type			(Swallow holes, losing streams)	(sand & gravel aquifers only)
	High permeability (sand & gravel)	Moderate permeability (sandy subsoil)	Low permeability (clayey subsoil, clay, peat)		
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High

Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.

The GSI (GSI, 2025) has assigned a groundwater vulnerability rating of 'High' for the groundwater beneath the site. The anticipated depth to bedrock based on the high groundwater vulnerability rating and moderate permeability subsoils beneath the site is between 3.0mbGL and 5.0mbGL.

Site Investigations (GII, 2024) recorded a depth to bedrock ranging from 6.1mbGL to 15.3mbGL. Considering the moderate permeability subsoils encountered this indicates a vulnerability rating of 'High'.

The groundwater vulnerability rating map is provided in Figure 4-8.

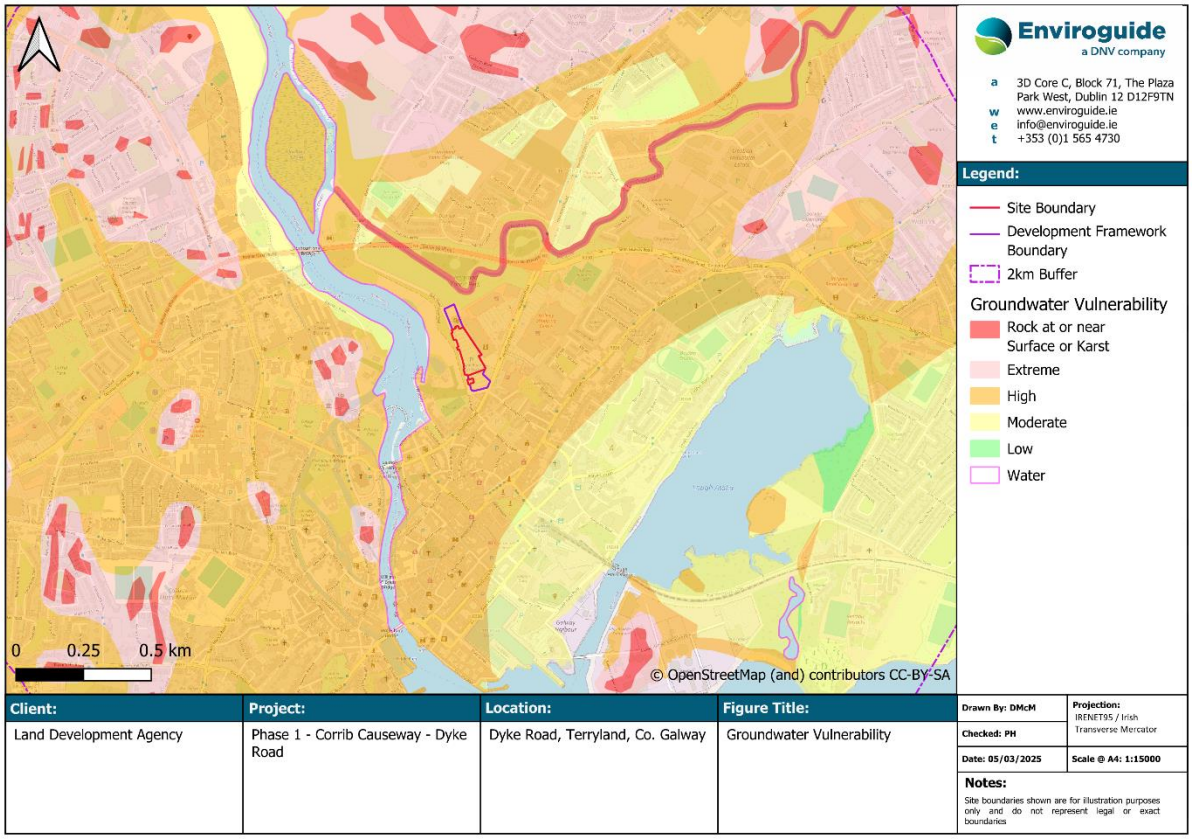

Figure 4-8. Groundwater Vulnerability

4.6.4 Site Hydrogeology

As documented in the Ground Investigation Report (GII, 2024), groundwater strikes were recorded between 1.30mbGL and 9.5mGL during borehole drilling. Four (4No.) groundwater monitoring wells were installed at the site (BRC1, BRC02, BRC04 and BRC05) to allow the equilibrium groundwater level to be determined.

Groundwater level measurements at each of the monitoring wells were recorded by GII relative to ground level on the 26th of June 2024 and are presented in Table 4-2.

Table 4-2. Measured Water Levels (26/06/2024)

Monitoring Location ID	Measured Water Level (mbTOC)
BRC01	0.17
BRC02	0.87
BRC04	2.25
BRC05	1.30

4.7 Hydrology

The site is mapped by the EPA (EPA, 2025) as within the Corrib WFD Catchment (Catchment I.D.: 30), the Corrib_SC_010 WFD Sub-catchment (Sub-catchment I.D.: 30_18) and the Terryland_010 WFD River Sub-Basin (River Waterbody Code: IE_WE_30T010500).

The closest surface water feature is recorded on the EPA database (EPA, 2025) as the Terryland Stream (River Waterbody Code: IE_WE_30T010500), which is located approximately 0.13km north of the site at its closest point.

As detailed in the Galway City County Geological Site Report (GSI, 2020), the Terryland Stream originates from a narrow channel on the east side of Jordan's Island, just north of the ruins of Terryland Castle, and approximately 0.62km northwest of the site. Typically, the Terryland Stream flows eastward toward two stream sinks, which are situated approximately 2.18km northeast of the site at their closest point (refer to Section 4.4.1). Although these sinks are near limestone outcrops, the Terryland Stream continues its course through a low-lying area characterised by substantial overburden. The subsoil's low permeability facilitates the conveyance of surface water across the valley until encountering limestone on the southern side. During periods of elevated groundwater levels, these sinks undergo a transformation into resurgences, releasing groundwater into the Terryland Stream. This augmented flow eventually converges with the Corrib River (River Waterbody Code: IE_WE_30C020600), located approximately 0.07km west of the site at its closest point. This shift from sink to resurgence categorises these features as estavelles. It is understood that these estavelles are connected to Galway Bay or Lough Atalia (i.e., the Corrib Estuary) through an underground conduit system, although the precise discharge locations remain unknown.

The Corrib River flows south before discharging to the Corrib Estuary transitional waterbody (EU Code: IE_WE_170_0700) approximately 0.99km southwest of the Site at its closest point. The Corrib Estuary ultimately discharges to the Inner Galway Bay North coastal waterbody (EU Code: IE_WE_170_0000) located approximately 3.32km southeast of the Site at its closest point.

The local surface waterbodies within a 2km radius of the Site are presented in Figure 4-9.

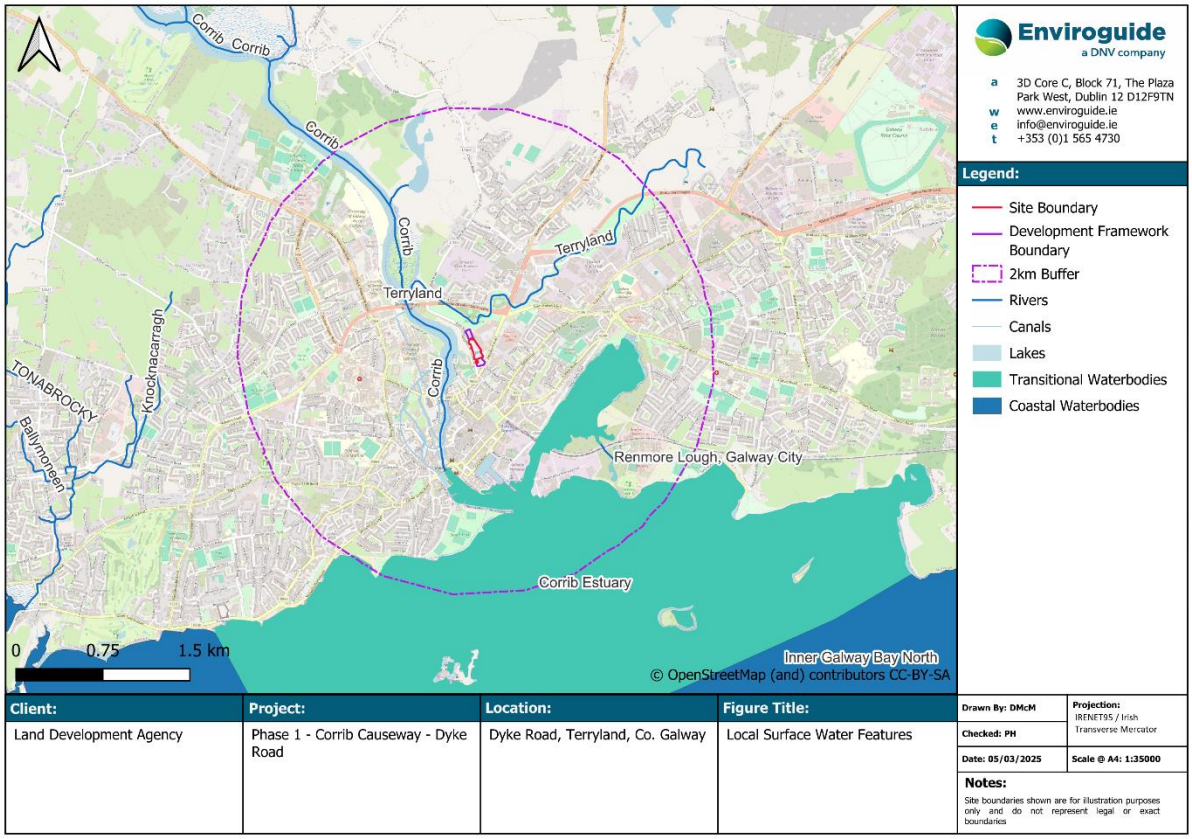

Figure 4-9. Local Surface Water Features

4.7.1 Existing Surface / Storm Drainage

As documented in the Infrastructure Report (AECOM, 2025a), the main surface water pipe running south to north along the western boundary of the site is a 450mm Ø concrete pipe. The pipe starts at an invert level of 5.8m on Bóthar Na Dige Road and falls to an invert level of 3.73m around the middle of the site, where it increases in size to a 525mm Ø concrete pipe and continues northwards until the discharge point. There is also a surface water pipe running through the site which serves the retail development on the Headford Road to the east of the Proposed Development which discharges into this surface water pipe (refer to Figure 4-10).

Based on the information shown on the record mapping (refer to Figure 4-10), and as confirmed by GCC, the existing network runs in a northerly direction along the western boundary of the site before discharging to the Terryland Stream. The bed level of the anticipated discharge point is approximately 2.9mOD (AECOM, 2025a). It is noted that preliminary investigations undertaken by LDA and GCC indicate sections of the pipe north of the Phase 1 site (on Phase 3 lands) may require repairs. As part of the Phase 1 Corrib Causeway Development project, The LDA on behalf of Galway City Council (GCC) proposes to install a new separate gravity surface water drainage network to service the development, which will discharge into the existing GCC 600mm Ø surface water concrete pipe. GCC records shows that this pipe runs south-north along the western boundary of the Phase 1 site, and discharges into the Terryland Stream. Preliminary investigations undertaken by GCC in 2025 indicate sections of the pipe south of the Phase 1 site (on Phase 3 lands) may require repairs. GCC advises it will consider any potential future repairs in conjunction with LDA

contribution from phase 1, to ensure the Phase 1 development can connect to the existing surface water infrastructure.

The carpark site is nearly 100% impermeable and unattenuated flows discharges to the Terryland Steam. The unattenuated run-off rate from the site at 80mm/hour is estimated to be 216 l/s (AECOM, 2025a).

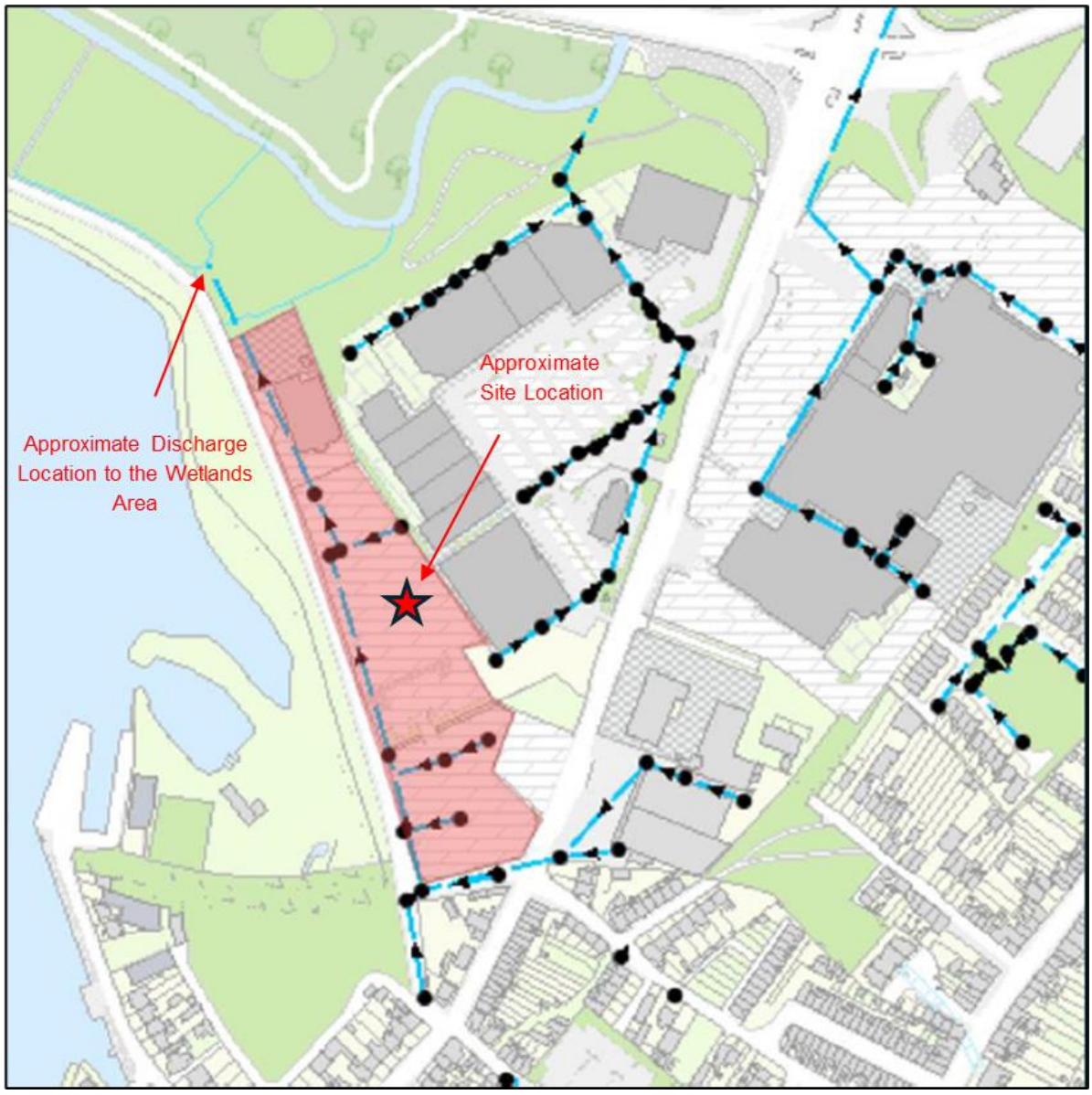

Figure 4-10. Drainage Infrastructure (AECOM, 2025a)

4.8 Flooding

The Site-Specific Flood Risk Assessment (SSFRA) report produced by AECOM (AECOM, 2025b) evaluates the flood risks associated with the Proposed Development. The assessment identifies the primary sources of flood risk as fluvial flooding from the River Corrib and the Terryland Stream, with additional considerations for coastal, pluvial, and groundwater flooding. The site benefits from the Dyke Road flood protection embankment, which provides some defence against the 1% Annual Exceedance Probability (AEP) event, though it lacks

sufficient freeboard and climate change allowances. The Proposed Development includes measures such as setting the finished floor level at 7.28m OD, above the 1% AEP level with climate change and freeboard allowances and maintaining flood storage volume by constructing the building on stilts.

The SSFRA (AECOM, 2025b) also outlines the flood risk management strategies, including the sequential approach to avoid, substitute, justify, and mitigate flood risks. The assessment incorporates the Galway City Council Development Plan 2023-2029, which emphasises the importance of flood risk management through policies and land use zoning. The Proposed Development will include flood mitigation measures such as watertight external services, anti-flood valves, and emergency evacuation routes above the design flood level. The hydraulic modelling conducted by Arup confirms that the Proposed Development will not significantly impact flood levels in the surrounding areas, with a maximum increase of approximately 3mm in water levels during the 1% AEP event. Additionally, the hydraulic model demonstrates that the permeability of the lower ground façade, which includes screens and louvres, does not impede the storage or flow of floodwaters below the building.

In conclusion, the SSFRA (AECOM, 2025b) demonstrates that the flood risks to the proposed development can be adequately managed through the implementation of appropriate mitigation measures and adherence to the guidelines set out in the Galway City Council Development Plan and the Planning System and Flood Risk Management Guidelines. The Proposed Development will not adversely impact flood risk in the surrounding areas, and the inclusion of flood compensatory storage and sustainable drainage systems will ensure that the flood risk to the Proposed Development and adjacent properties is minimised.

4.9 Water Use and Source Protection

A search of the GSI groundwater well database (GSI, 2025) was conducted to identify registered wells and groundwater sources in the surrounding area. There is one (1No.) known groundwater source recorded within a 2km radius of the site. The source use for the supply (GSI Name: 1121NEW005), which is located approximately 0.66km northeast of the site is domestic. The yield for the supply is classified as 'Good' with a reported yield of 141.8m^3/day (GSI, 2025). There are also a small cluster of five (5No.) boreholes of unknown use located approximately 0.72km southeast of the site. The location of the groundwater wells in the vicinity of the site is presented in Figure 4-12.

The site of the Proposed Development is located within an area serviced by mains water supply. There is an existing 9" cast-iron watermain in Dyke Road to the west of the site (refer to Figure 4-11). A water connection feeds the Black Box theatre and the Headford Road shopping centre. It is noted that water supply to the Proposed Development will be via this existing 9" cast-iron watermain in Dyke Road. A 300mm asbestos-cement watermain also runs in Headford Road and Bóthar Na Dige Road, while a shorter section of 100mm uPVC water distribution main runs along a short section of Headford Road (AECOM, 2025a).

There are no groundwater source protection areas located within a 2km radius of the Site (GSI, 2025).

The Corrib River, located approximately 0.07km west of the Site at its closest point, is identified by the EPA (EPA, 2025) as a surface water drinking water sources, under Article 7 of the Water Framework Directive. There are no other surface water drinking water sources recorded within a 2km radius or hydraulically downstream of the Site.

Figure 4-11. Water Supply Infrastructure (AECOM, 2025a)

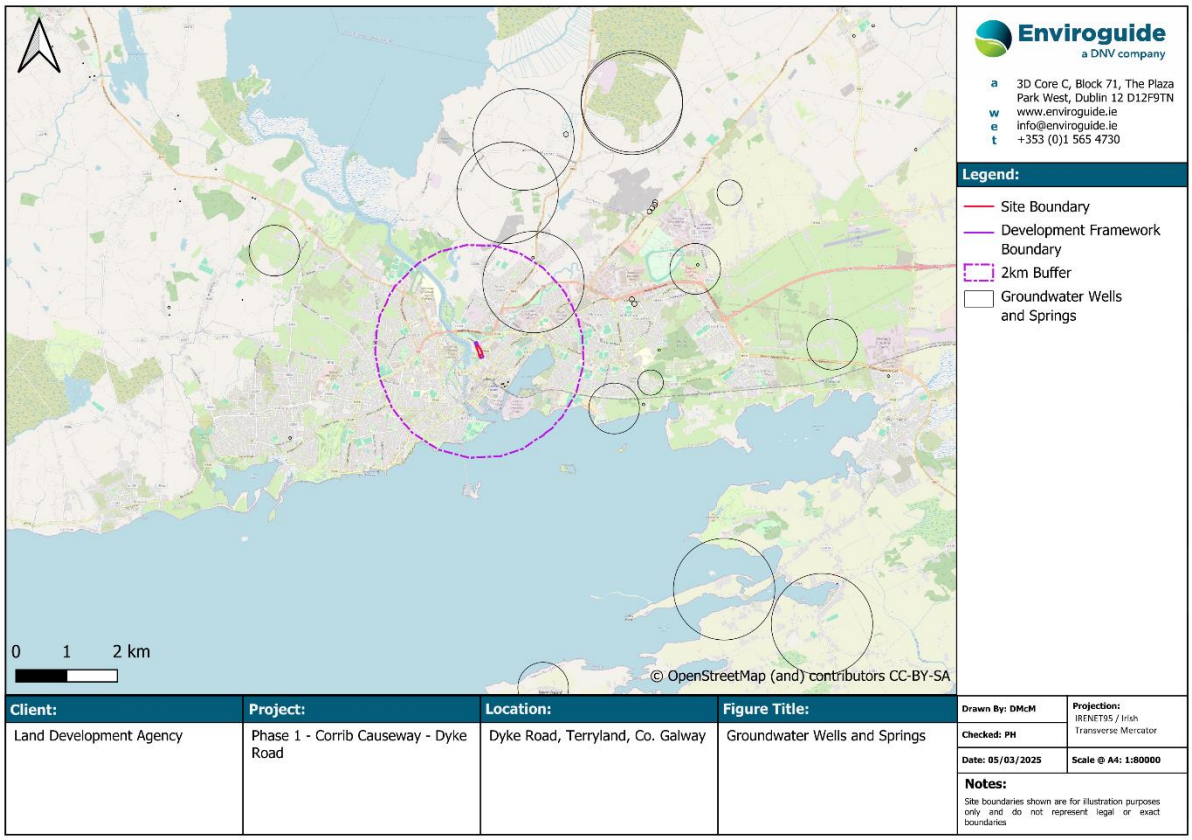

Figure 4-12. Groundwater Wells and Springs within a 2km Radius

4.10 Water Quality

4.10.1 Published Regional Surface Water Quality

The EPA surface water quality monitoring database (EPA, 2025) was consulted. A summary of the most recent published EPA water quality monitoring data (EPA, 2025) for waterbodies which have a potential hydraulic connection to the Site is presented in Table 4-3 below.

The Corrib River flows south before discharging to the Corrib Estuary transitional waterbody (EU Code: IE_WE_170_0700) approximately 0.99km southwest of the site at its closest point. The Corrib Estuary ultimately discharges to the Inner Galway Bay North coastal waterbody (EU Code: IE_WE_170_0000) located approximately 3.32km southeast of the site at its closest point.

Table 4-3. Surface Water Quality

River I.D. (Monitoring Station Location)	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2017)
Terryland Stream (At Terryland Castle -1.88km northeast)	Ammonia-Total (as N)	Annual	Moderate	Upwards	0.166mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Upwards	0.516mg/l
	ortho-Phosphate (as P) - unspecified	Annual	Good	Upwards	0.028mg/l
Terryland Stream (Bridge on Galway-Headford Rd – 1.58km northeast)	Ammonia-Total (as N)	Annual	Moderate	Upwards	0.150mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Upwards	0.516mg/l
	ortho-Phosphate (as P) - unspecified	Annual	Good	Upwards	0.026mg/l
Terryland Stream (50 m d/s Terryland Bridge – 0.75km northeast)	Ammonia-Total (as N)	Annual	Moderate	Upwards	0.110mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	0.398mg/l
	ortho-Phosphate (as P) - unspecified	Annual	High	Upwards	0.016mg/l
Terryland Stream (Br d/s Terryland Br on ring road – 0.36km northwest)	Ammonia-Total (as N)	Annual	High	Downwards	0.032mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	0.288mg/l
	ortho-Phosphate (as P) - unspecified	Annual	High	Downwards	0.007mg/l
Corrib River (Menlough Castle – 2.15km northwest)	Ammonia-Total (as N)	Annual	High	Downwards	0.016mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	0.337mg/l
	ortho-Phosphate (as P) - unspecified	Annual	High	Downwards	0.005mg/l
Corrib River (Quincentennial	Ammonia-Total (as N)	Annual	High	Downwards	0.019mg/l

River I.D. (Monitoring Station Location)	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2017)
Bridge – 0.58km northwest)	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	0.312mg/l
	ortho-Phosphate (as P) - unspecified	Annual	High	Downwards	0.005mg/l
Corrib River (Waterside-Galway - 0.23km west)	Ammonia-Total (as N)	Annual	High	Downwards	0.017mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	0.328mg/l
	ortho-Phosphate (as P) - unspecified	Annual	High	Downwards	0.005mg/l
Corrib River (Salmon Weir Bridge- Galway - 0.45km southwest)	Ammonia-Total (as N)	Annual	High	Upwards	0.018mg/l
	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	0.359mg/l
	ortho-Phosphate (as P) - unspecified	Annual	High	Downwards	0.005mg/l
Corrib Lower Lake (3.56km northwest)	Ammonia-Total (as N)	Annual	High	Upwards	0.026mg/l
	Chlorophyll	Annual	High	Downwards	2.104ug/l
	Total Phosphorus (as P)	Annual	High	Downwards	0.009mg/l
Corrib Estuary (0.99km south)	Chlorophyll	Summer	High	Upwards	2.5mg/m^3
		Winter	High	Downwards	1.4mg/m^3
	Dissolved Inorganic Nitrogen (as N)	Summer	High	Upwards	0.035mg/l
		Winter	High	None	0.288mg/l
	ortho-Phosphate (as P)- unspecified	Summer	High	Upwards	5.9ug/l
		Winter	High	Downwards	7.4ug/l
Inner Galway Bay North (3.32km southeast)	Chlorophyll	Summer	High	Upwards	2.6mg/m^3
		Winter	High	Upwards	1.3mg/m^3
	Dissolved Inorganic Nitrogen (as N)	Summer	High	Upwards	0.034mg/l
		Winter	High	Upwards	0.225mg/l
	ortho-Phosphate (as P)- unspecified	Summer	High	Upwards	5.5ug/l
		Winter	High	Downwards	8.0ug/l
Inner Galway Bay South (6.63km south	(No Chemical Monitoring data available)				
Outer Galway Bay (7.0km southwest)	Chlorophyll	Summer	High	Upwards	1.5mg/m^3
		Winter	High	Downwards	0.5mg/m^3
	Dissolved Inorganic Nitrogen (as N)	Summer	High	None	0.029mg/l
		Winter	High	Upwards	0.148mg/l
	ortho-Phosphate (as P)- unspecified	Summer	High	Downwards	2.5ug/l
		Winter	Good	Downwards	6.6ug/l
Aran Islands, Galway Bay,	(No Chemical Monitoring data available)				

River I.D. (Monitoring Station Location)	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2017)
Connemara (HAs 29;31) (17.06km southwest)					

4.10.2 Published Regional Groundwater Quality

The EPA (EPA, 2025) groundwater monitoring data was reviewed and there are no hydraulically connected groundwater quality monitoring stations within a 2km radius of the Site.

4.10.3 Receiving Water Quality – Galway Wastewater Treatment Plant (WWTP)

Foul water from the Site will discharge via the Galway WWTP to the Corrib Estuary transitional waterbody (EU Code: E_WE_170_0700) and the Inner Galway Bay North coastal waterbody (EU Code: IE_WE_170_0000).

The Galway WWTP is operated under relevant statuary approvals. The most recent available Annual Environmental Report (AER) for the Galway WWTP is 2022 (UE, 2023). The AER identified that the final effluent was compliant with the Emission Limit Values (ELVs) specified in the discharge license (EPA Licence No. D0050-01). The 2022 AER notes the following in relation to ambient monitoring in the Corrib Estuary transitional waterbody and the Inner Galway Bay North coastal waterbody:

'The coastal/transitional ambient monitoring results meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009.

The WWTP discharge was compliant with the ELV's set in the wastewater discharge licence.

The discharge from the wastewater treatment plant does not have an observable impact on the water quality.

The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.'

4.11 Water Framework Directive

The WFD status for river, lake, groundwater, transitional and/or coastal water bodies that have a potential hydraulic connection to the Site as recorded by the EPA (EPA, 2025) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in Table 4-4 and shown in Figure 4-13.

Table 4-4. Water Framework Directive Status

WFD Waterbody Name (EPA Name)	Waterbody EU Code	Location from Site	Distance from Site (km)	WFD Status (2016-2021)	WFD Risk	Hydraulic Connection to the Site
River Waterbodies						
Terryland_010 (Terryland Stream)	IE_WE_30T010500	North	0.13	Moderate	At Risk	Yes, receives surface water drainage from the Site.
Corrib_020 (Corrib River)	IE_WE_30C020600	West	0.07	Good	Not at Risk	Yes, downstream of the Terryland Stream (diurnal flow) and receives groundwater from the Site.
Corrib_010 (Corrib River)	IE_WE_30C020300	Northwest	3.22	Good	Not at Risk	No, hydraulically upstream of the Site.
Lake Waterbodies						
Corrib Lower	IE_WE_30_666a	Northwest	3.56	Good	Not at Risk	No, hydraulically upstream of the Site.
Transitional Waterbodies						
Corrib Estuary	IE_WE_170_0700	South	0.99	Moderate	Review	Yes, downstream of the Terryland Stream (via an underground conduit system) and the Corrib River. Also receives treated effluent from the Galway WWTP
Coastal Waterbodies						
Inner Galway Bay North	IE_WE_170_0000	Southeast	3.32	Good	Not at Risk	Yes, downstream of the Corrib Estuary and receives treated effluent from the Galway WWTP

WFD Waterbody Name (EPA Name)	Waterbody EU Code	Location from Site	Distance from Site (km)	WFD Status (2016-2021)	WFD Risk	Hydraulic Connection to the Site
Inner Galway Bay South	IE_WE_160_0000	South	6.63	High	Not at Risk	Yes, downstream of the Inner Galway Bay North coastal waterbody
Outer Galway Bay	IE_WE_100_0000	Southwest	7.00	High	Not at Risk	Yes, downstream of the Inner Galway Bay North coastal waterbody
Aran Islands, Galway Bay, Connemara (HAs 29;31)	IE_WE_010_0000	Southwest	17.06	High	Review	Yes, downstream of the Outer Galway Bay coastal waterbody
Groundwater Bodies						
Clare-Corrib	IE_WE_G_0020	Underlying Aquifer	n/a	Good	Not at risk	Yes, Underlying Aquifer

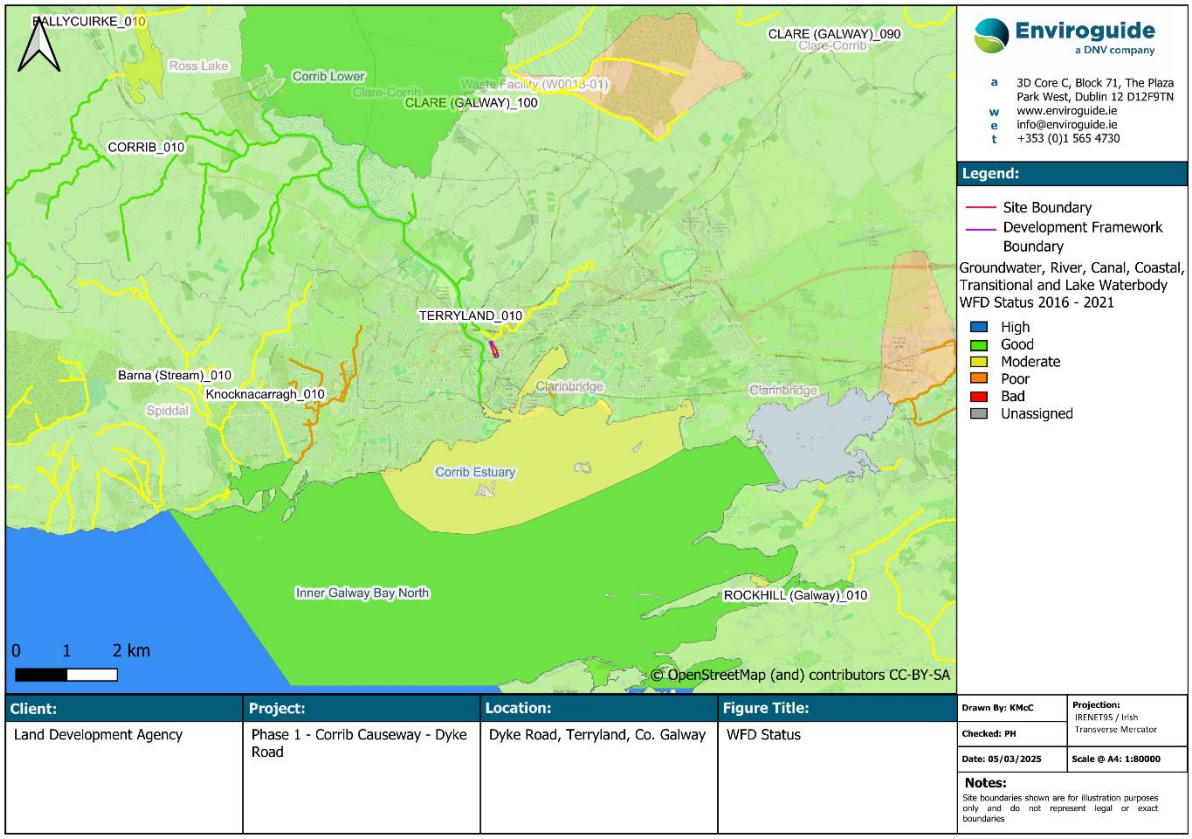

Figure 4-13. Water Framework Directive Status

4.11.1 Nature Conservation

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (2009/147/EC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). SACs and SPAs are collectively known as Natura 2000 or European sites (referred to hereafter as Natura 2000 sites).

Natural Heritage Areas (NHAs) are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with SAC and/or SPA sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

As documented in the AA Screening Report prepared by Scott Cawley (Scott Cawley, 2025a) and submitted with the planning application, the identification of source-pathway-receptor connection(s) between the Proposed Development and European sites essentially is the process of identifying which European sites are within the Zone of Influence (ZoI) of the Proposed Development, and therefore potentially at risk of significant effects. The ZoI is defined as the area within which the Proposed Development could affect the receiving environment such that it could potentially have significant effects on the QI habitats or QI/SCI species of a European site, or on the achievement of their conservation objectives (as defined in CIEEM, 2022).

There are four (4No.) Natura 2000 Sites that are identified with a potential hydraulic connection to the site and located within the ZoI whereby the Proposed Development could affect the receiving environment such that it could potentially have significant effects on the Natura 2000 site or on the achievement of their conservation objectives

- Lough Corrib SAC (Site Code: 000297) – approximately 0.015km west of the Site.
- Lough Corrib SPA (Site Code: 004042) – approximately 2.80km north of the Site.
- Galway Bay Complex SAC (Site Code: 000268) – approximately 0.70km south of the Site.
- Inner Galway Bay SPA (Site Code: 004031) – approximately 0.70km south of the Site.

Other Natura 2000 Sites that are identified with a potential hydraulic connection to the Site but are considered to be located outside of the ZoI include:

- Black Head-Poulsallagh Complex SAC (Site Code: 000020).
- Inisheer Island SAC (Site Code: 001275).
- Inishmaan Island SAC (Site Code: 000212).
- Inishmore Island SAC (Site Code: 000213).
- Inishmore Island SPA (Site Code: 004152).
- Kilkieran Bay And Islands SAC (Site Code: 002111).

There are two (2No.) proposed NHAs identified with a potential hydraulic connection to the Site and considered to be located within the ZoI:

- Lough Corrib (Site Code: 000297).
- Galway Bay Complex (Site Code: 000268).

Other proposed NHAs that are identified with a potential hydraulic connection to the Site but are considered to be located outside of the ZoI include:

- Black Head-Poulsallagh Complex (Site Code: 000020).
- Inisheer Island (Site Code: 001275).
- Inishmaan Island (Site Code: 000212).
- Inishmore Island (Site Code: 000213).

The SACs, SPAs, and pNHAs with a potential hydraulic connection to the Site are presented in Figure 4-14.

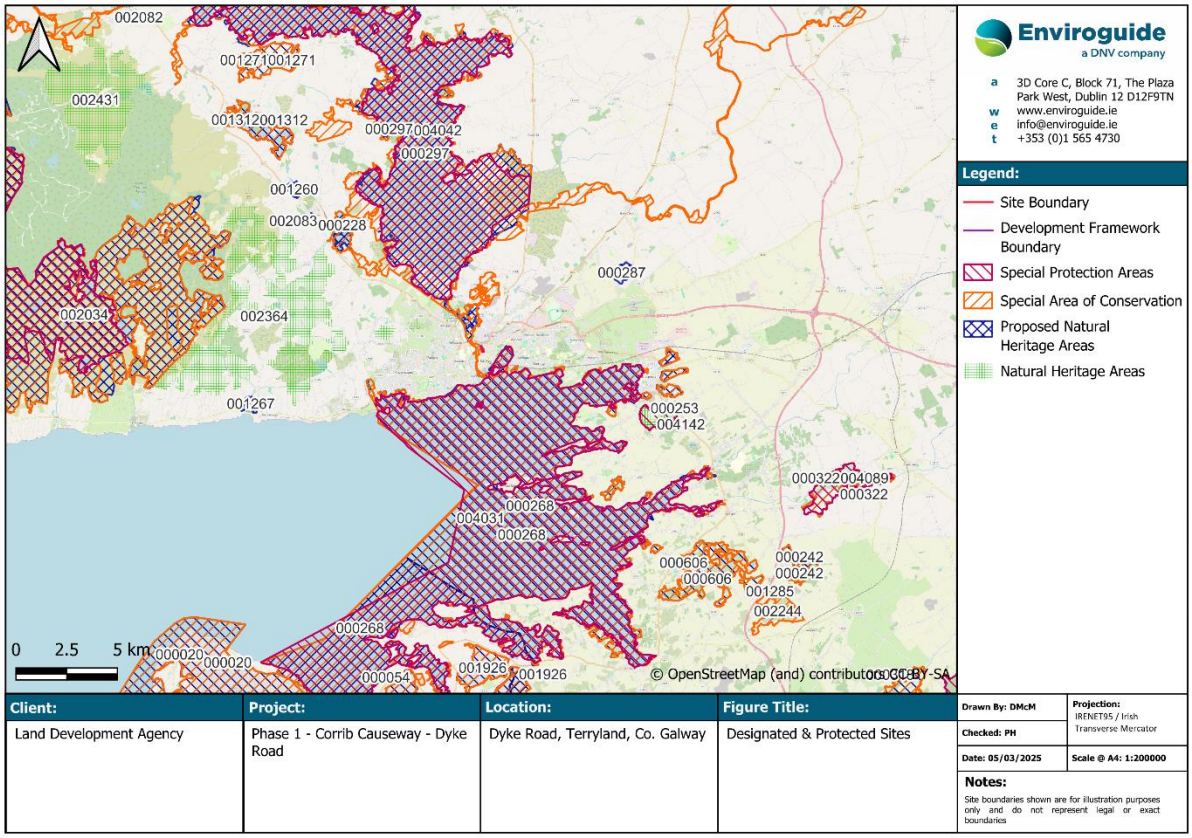

Figure 4-14. Designated and Protected Areas

4.11.2 Drinking Water

The river drinking water protected areas (DWPA) are represented by the full extent of the WFD river waterbodies from which there is a known qualifying abstraction of water for human consumption as defined under Article 7 of the WFD.

As stated in Section 4.9, the CORRIB_020 river ~120m to the west is identified by the EPA (EPA, 2025) as a surface water drinking water sources, under Article 7 of the Water Framework Directive. There are no other surface water drinking water sources recorded within a 2km radius or hydraulically downstream of the site.

4.11.3 Shellfish Areas

Although the Shellfish Waters Directive (SWD) has been repealed, areas used for the production of shellfish that were designated under the SWD, are protected under the WFD as 'areas designated for the protection of economically significant aquatic species'.

The requirement from a WFD perspective is to ensure that water quality does not impact on the quality of shellfish produced for human consumption. In Ireland, 64 areas have been designated as shellfish waters (S.I. No. 268 of 2006, S.I. No. 55 of 2009, S.I. 464 of 2009).

The closest designated Shellfish Area location is Clarinbridge/Kinvara Bay approximately 7.5km downstream of the site across Galway Bay. There are also two SWD along the southern shore of Galway Bay, Ballyvaughan/Poulnaclough Bay and The Bay at Aughinish.

4.11.4 Nutrient Sensitive Areas

EU member states are required under the Urban Wastewater Treatment Directive (91/271/EEC) to identify nutrient-sensitive areas. These have been defined as "natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken".

There are no Nutrient Sensitive Areas directly upstream, downstream or within 2km of the Site.

4.11.5 Bathing Waters

Bathing waters are designated under Regulation 5 of Directive 2006/7/EC. Designated Bathing Waters exist under S.I. No. 79/2008 and S.I. No. 351/2011 Bathing Water Quality (Amendment) Regulations 2011. The EC Bathing Water Profiles - Best Practice and Guidance 2009 provides additional guidelines for maintaining and improving bathing water quality.

Ballyloughane Beach and Grattan Road Beach are located approximately 2.5km and 5.3km downstream of the Site respectively with Grattan Road Beach being located 1.5km from the primary emission point for the Galway City WWTP. Salthill Beach is approximately 5.3km downstream of the Site, to the west of Grattan Road Beach, and approximately 2.1km from the primary emission point for the Galway City WWTP. The EPA bathing water quality monitoring database (EPA, 2025) classifies the current water quality of Ballyloughane Beach and Salthill Beach as 'excellent' and of Grattan Road Beach as 'good'.

5 ASSESSMENT OF POTENTIAL IMPACTS

5.1 Conceptual Site Model

As outlined in Section 2.4, the conceptual site model (CSM) represents the characteristics of the Site and identified the possible relationship and potential risk between the contaminant sources, pathways and receptors.

The CSM and identified sources, pathways and receptors associated with the Proposed Development are outlined in Section 5.2 and Section 5.5.

5.2 Potential Sources

The potential sources associated with the Proposed Development during construction and operational phases are discussed below.

5.2.1 Construction Phase

During the construction phase there will be no direct discharges to surface water or groundwater at the Proposed Development with the exception of rainfall which will continue to infiltrate to ground during the construction phase.

Based on the findings of the Ground Investigation (GII, 2024), there may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels ranging between 0.17mbGL and 2.25mbGL), where encountered during groundworks. There will be no unauthorised discharge of water (groundwater or surface water runoff) to ground, drains or water courses during the construction phase.

Foul water discharge from the temporary welfare units at the Site during the construction phase will be either tankered offsite in accordance with waste management legislation or discharged under temporary consent to the UE mains foul network for treatment at Galway WWTP subject to agreement with UE.

Other potential sources of contamination that could impact on water quality during the construction phase based on the design of the Site include:

- Storage and use of fuel, oils and chemicals used during construction which in the event of an accidental release through the failure of secondary containment or a materials handling accident could infiltrate to the underlying groundwater.
- Use of concrete and cementitious materials during construction in particular for installation of below ground infrastructure and piled foundations where shallow groundwater will likely be encountered.
- Suspended sediment and other contaminants entrained in runoff arising from groundworks, stockpiling of materials and other construction works at the Site.
- Sediment or other material on construction vehicles could potentially be tracked offsite to external public roads.
- Accidental release of wash-water or foul water from facilities at the Site (e.g., wheel wash and temporary welfare facilities).

- Release of foul water from existing foul water drainage during connection to live sewers.

5.2.2 Operational Phase

During the operational phase there will be no discharges to groundwater from the Proposed Development.

Surface water runoff from the Proposed Development, which will be managed in accordance with the principles and objectives of SuDS, will be treated and attenuated prior to discharge from the Site.

Foul water from the Proposed Development will be treated in the Galway WWTP before ultimately discharging to the Corrib Estuary transitional waterbody and the Inner Galway Bay North coastal waterbody. The increase discharge to the Galway WWTP as a result of the Proposed Development will reduce the overall available capacity of the facility. Foul water from the Proposed Development will only be discharged to Uisce Eireann (UE) foul sewer under agreement from UE and other applicable statutory consents verifying capacity at the Galway WWTP for the Proposed Development. The UE CoF notes that the foul water connection is feasible subject to infrastructure upgrades. The Applicant will ensure that these upgrades are completed prior to any connections from the Proposed Development. A SoDA has been issued by UE.

There will be no requirement for bulk storage of petroleum hydrocarbon-based fuels during the operational phase as the main operating system for heating will be natural gas.

The Site is located within Flood Zone A where the probability of flooding is high. As documented in the SSFRA (AECOM, 2025b) and summarised in Section 4.8, when in operation in a future climate scenario, all proposed structures will be defended from flooding to an appropriate standard. As such, the risk of contamination of surface waters exacerbated during a future climate scenario flood event is considered low.

The most plausible, albeit worst case, source scenarios are outlined below:

- Fuels or other potentially hazardous materials released in the event of an accidental spill or leak from a vehicle (assumed 500 litres) is considered a worst-case source at the Site. This potential source is considered to be a short-term event in a worst-case scenario and while unlikely to occur, this scenario will be considered in the assessment.
- Suspended sediment entrained in runoff is considered a low-risk source of contamination at the Site for the Operational Phase of the Proposed Development.

5.3 Pathways

The following potential pathways are identified and evaluated below:

- **Vertical Migration to the Underlying Bedrock and Lateral Migration within the Aquifer to Downgradient Receiving Surface Waterbodies**

Galway City and its surrounding areas are characterised by a unique karst landscape defined by limestone formations and geological features. While no evidence of karst features were identified during the ground investigation (GII, 2024), the geophysical survey undertaken for the site (Minerex, 2024) indicated the potential presence of karstified rock.

During the construction phase of the Proposed Development, there will be a temporary reduction in impermeable surfaces across the Site and the groundwater vulnerability is expected to temporarily increase. In karstified limestone areas like the Clare-Corrib GWB, there is a high degree of interconnection between groundwater and surface water. Furthermore, groundwater storage in karstified bedrock is low, limiting the potential for contaminant attenuation in such aquifers. During the construction phase the release of contaminants used onsite could enter the underlying aquifer and rapidly migrate towards receiving watercourses including the Terryland Stream, the Corrib River and the Corrib Estuary.

- **Introduction of Preferential Pathways During Piling**

Piling in karstified aquifers presents unique challenges and risks due to the characteristics of karst landscapes. Karst terrain is characterised by soluble bedrock such as limestone, which can form conduits, caves, and sinkholes through dissolution by groundwater over time. Piling during the construction phase of the Proposed Development, may potentially create pathways for contaminants to enter underlying groundwater systems more rapidly and directly than in non-karst areas. The risk of piling in karstified aquifers lies in the potential for contaminants used during construction, such as grout or other materials, to infiltrate quickly into the groundwater through existing conduits, fractures, or dissolution features created by the piling process. These contaminants can then spread rapidly through the interconnected network of underground pathways characteristic of karst landscapes to receiving watercourses including the Terryland Stream, the Corrib River and the Corrib Estuary.

- **Surface Water Runoff and Migration Offsite to Downstream Surface Waterbodies**

The excavation, handling, stockpiling, reprofiling and removal offsite of soils and subsoils could result in generation of runoff with entrained sediment or other contaminants which could potentially impact on the receiving water quality and WFD status of the Terryland Stream, the Corrib River and downstream waterbodies via existing surface water drainage within the site.

- **Discharge of Water (Groundwater and/or Surface Water) to Mains Sewer and Downstream Receiving Surface Waterbodies**

Based on the findings of the Ground Investigation (GII, 2024), there may be a requirement for management of surface water (rainwater) and shallow groundwater (recorded at levels ranging between 0.17mbGL and 2.25mbGL), where encountered during groundworks and/or during the operational phase of the Proposed Development.

Where required, groundwater and surface water runoff (rainwater) during the construction phase will be discharged offsite in accordance with the necessary discharge licences issued by UEunder Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer (and ultimately the Irish Sea via the Galway WWTP) or from GCC under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water (and ultimately the Terryland Stream, the Corrib River, the Corrib Estuary and downstream receiving waterbodies).

During the operational phase, attenuated and treated surface water runoff from the Proposed Development will ultimately outfall to the Terryland Stream.

Therefore, the pathways to the Terryland Stream, the Corrib River, the Corrib Estuary and associated downstream watercourses and receptors are considered valid for this assessment.

- **Foul Water Discharge to Main Sewer and Receiving Surface Waterbodies**

Foul water during the Construction Phase of the Proposed Development will be either removed by tanker in accordance with waste management legislation and managed accordingly or discharged under consent to the mains UE drainage network and ultimately discharged to the receiving surface waterbodies (i.e., the Corrib Estuary transitional waterbody and the Inner Galway Bay North coastal waterbody via the Galway WWTP). Foul water from the site will only be discharged to the UE network under the appropriate consents from UE and therefore, the Proposed Development will not cause a potential impact at any receiving waterbody or Natura 2000 sites associated with discharges from the Site.

5.4 Receptors

The receptors considered in this assessment include the following:

- Groundwater
    - Underlying poor bedrock Regionally Important Aquifer - Karstified (conduit) (RKc)which is part of the Clare-Corrib GWB

It is noted that there is (1No.) domestic groundwater source located approximately 0.66km northeast of the Site. In the vicinity of the Site groundwater flow likely follows a path that ultimately leads towards the River Corrib. Therefore, for the purpose of this assessment this known domestic groundwater source is considered upgradient of the Site and therefore there is no perceived pathway.

- Surface Water:
    - Terryland Stream.
    - Corrib River.
    - Corrib Estuary.
    - Inner Galway Bay North.
    - Inner Galway Bay South.
    - Outer Galway Bay.
- Natura 2000 Sites:
    - Lough Corrib SAC (Site Code: 000297).
    - Lough Corrib SPA (Site Code: 004042).
    - Galway Bay Complex SAC (Site Code: 000268).
    - Inner Galway Bay SPA (Site Code: 004031).
- Other Protected Sites:
    - Lough Corrib (Site Code: 000297).
    - Galway Bay Complex (Site Code: 000268).

It is noted that there are other Natura 2000 sites and other protected and designated sites or areas with a potential hydraulic connection to the Site, however, those hydraulically closest to the Site and located within of the ZoI are considered as the most sensitive sites for this assessment.

5.5 Risk Evaluation of Source-Pathway-Receptor Linkages

A risk-based assessment of the Source-Pathway-Receptor Model and the potential risk linkages associated with the Construction Phase and Operational Phase of the Proposed Development was undertaken. The results were evaluated to determine if the Proposed

Development could potentially impact any potential receptors which could be effected by the Proposed Development (refer to Section 5.4).

Table 5-1. Conceptual Site Model (Source- Pathway Receptor) and Risk Evaluation

Source	Pathway	Receptor	Risk Evaluation and Avoidance
Construction Phase			
Discharge of Contaminants to Ground / Groundwater	Vertical and Lateral Groundwater Migration in Bedrock Aquifer	Underlying Bedrock Aquifer Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	Low to Moderate Risk (worst-case unmitigated scenario) During groundworks and excavations, the groundwater vulnerability will be increased and there will be a more direct pathway for surface contaminants to enter the underlying bedrock aquifer and migrate towards downgradient receiving surface water bodies. The Clare-Corrib GWB beneath the site is considered to have high levels of interconnection between groundwater and surface water with limited potential for attenuation of dissolved phase contaminants which have the potential to rapidly migrate towards receiving watercourses and Natura 2000 sites. In a worst-case scenario during either the Construction Phase (e.g., accidental release of fuels, chemicals or oils through the failure of secondary containment or a materials handling accident) in the absence of any mitigation measures there is potential for discharge of contaminants to groundwater. The groundwater within the Clare-Corrib GWB will be impacted and taking account of the limited attenuation within the aquifer, it is considered that there is an indirect risk to the downstream receiving waterbodies (i.e., Corrib River, the Corrib Estuary, Galway Bay and Natura 2000 sites). During the construction phase, all works will be undertaken in strict accordance with the CEMP which will detail appropriate design avoidance and mitigation measures to prevent any potential impact to the receiving water quality.
Piling	Introduction of Preferential Pathways During Piling	Underlying Bedrock Aquifer Receiving surface waterbodies (i.e.,	Low to Moderate Risk Piling during the construction phase of the Proposed Development, may potentially create pathways for

Source	Pathway	Receptor	Risk Evaluation and Avoidance
		the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	contaminants to enter underlying groundwater. Pilling also has the potential to alter karstic flow paths linking downstream waterbodies with pollutants. In the worst-case scenario drilling fluids used during piling could potentially be introduced to the subsurface and groundwater and rapidly migrate to the receiving waterbodies including the Terryland Stream, the Corrib River, the Corrib Estuary and downstream receiving waterbodies. Given the vulnerability of the underlying groundwater at the site, the shallow groundwater table, the potential presence of karst landforms and the detectable concentrations of hydrocarbons in shallow soils (GII, 2024), it is recommended that a piling risk assessment is completed by the main contractor at detailed design stage and in advance of construction works commencing onsite. The proposed piling methodology (informed by the piling risk assessment) will minimise the potential for the introduction of any temporary conduit between any potential sources of contamination at the ground surface and underlying groundwater.
Discharge of Entrained Sediment or Other Contaminants in Surface Runoff	Lateral Migration at the Site to the Onsite Drainage and Migration Offsite	Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	Low to Moderate Risk Potential risk of runoff with contaminants migrating offsite via existing surface water drainage within the site. Potential impact to water quality and WFD status of the Terryland Stream, the Corrib River and downstream waterbodies. During the construction phase, all works will be undertaken in strict accordance with the CEMP which will detail appropriate design avoidance and mitigation measures to prevent any potential impact to the receiving water quality.
Dewatering During Excavation	Changes to Hydrogeological Regime	Underlying Bedrock Aquifer	Low Risk to Moderate Risk Appropriate construction measures to enable working in the dry during excavations, and methods to

Source	Pathway	Receptor	Risk Evaluation and Avoidance
			minimise the volume of dewatering water generated that will require management will be considered in the detailed design and the contractors construction methods. Where water must be pumped from the excavations, it is considered that there will be a temporary drawdown of local groundwater levels during the dewatering operations. However, the extent of the impact is considered to be temporary and localised to the immediate area surrounding the excavations.
Dewatering During Excavation	Discharge of water (groundwater / surface water runoff) to ground, sewer or watercourses	Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	Low Risk There will be no discharge of groundwater to ground. Unauthorised discharge of water (groundwater / surface water runoff) to sewers or watercourses will also not be permitted. The main contractor will ensure that the discharge of water to sewers or watercourses will be in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from Galway County Council under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water and ultimately discharged to the receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River or Galway Bay via Galway WWTP).
Foul Water Discharge	Discharge to Mains Sewer	Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	Low Risk Foul water during the Construction Phase of the Proposed Development will be either removed by tanker in accordance with waste management legislation and managed accordingly or discharged under consent to the mains UE drainage network and ultimately discharged to the receiving surface waterbodies (i.e., Galway Bay via Galway WWTP). Foul water from the Site will only be discharged to the UE network under the appropriate consents from UE and therefore, the Proposed Development will not cause a potential impact at any receiving waterbody or Natura 2000 sites

Source	Pathway	Receptor	Risk Evaluation and Avoidance
			associated with discharges from the site.
Operational Phase			
Discharge of Surface Water Runoff	Discharge to Surface Water Drainage Network	Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	Low to Moderate Risk (worst-case unmitigated scenario) During the Operational Phase of the Proposed Development, there is limited potential for discharge of any contaminated runoff to the receiving water courses associated with surface water runoff from the Site. However, in a worst-case scenario during the Operational Phase (e.g., failure of SuDS) in the absence of any mitigation measures there is potential for discharge of contaminants to receiving surface water receptors (i.e., the Terryland Stream and downstream receptors). Surface water runoff from roofs and paved areas will be managed and treated in accordance with SUDS and pass through petrol interceptor and attenuation tanks prior to discharging to the Terryland Stream.
Discharge of Contaminants to Ground / Groundwater	Vertical and Lateral Groundwater Migration in Bedrock Aquifer	Underlying Bedrock Aquifer Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	No Identified Risk Based on the design of the Proposed Development there is limited potential sources of contamination during the Operational Phase and there will be limited potential for discharge of contaminants associated with surface water runoff to ground via unpaved, permeable areas due to the low infiltration potential at the Site. Furthermore, the proposed attenuation design does not allow for infiltration due to poor ground conditions, a high-water table and the potential presence of karst features beneath the site. Surface water will be managed in accordance with the principles and objectives of SuDS to treat and attenuate water prior to discharging offsite. Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be incorporated into the overall management strategy for the Proposed Development. This will ensure that there are no impacts on

Source	Pathway	Receptor	Risk Evaluation and Avoidance
			water quality during the Operational Phase of the Proposed Development.
Foul Water Discharge	Discharge to Mains Sewer	Receiving surface waterbodies (i.e., the Terryland Stream, the Corrib River, the Corrib Estuary, and Galway Bay) Natura 2000 Sites	Low Risk Foul water during the Operational Phase of the Proposed Development will be discharged to the UE drainage network and ultimately discharged to Galway Bay via Galway WWTP. Foul water from the Site will only be discharged to the UE network under the appropriate consents from UE. The Galway WWTP (EPA Licence No. D0050-01) was identified by UE to have sufficient capacity to accept foul water from the Proposed Development subject to provision of the new WWPS and upgrade works to the existing 150mm diameter sewer from Dyke Road to Wood Quay, which will be completed in advance of any connection from the Site. Therefore, the Proposed Development will not cause a potential impact at any receiving waterbody or Natura 2000 sites associated with discharges from the Site.

5.5.1 Design Avoidance and Mitigation

The assessment of the potential impacts on the receiving environment takes account of the embedded design avoidance measures and standard good practice construction methods to reduce the potential for impacts to the water environment. These are outlined below together with additional specific measures based on the findings of this assessment.

5.5.1.1 Construction Phase

During the Construction Phase, all works will be undertaken in accordance with the Construction Environmental Management Plan (CEMP) (AECOM, 2025c). Following appointment, the contractor will be required to further develop the CEMP to provide detailed construction phasing and methods to manage and prevent any potential emissions to ground and surface water with regard to the relevant industry standards (e.g., Guidance for Consultants and Contractors, CIRIA-C532', CIRIA, 2001). The CEMP will be implemented for the duration of the Construction Phase, covering construction and waste management activities that will take place during the Construction Phase of the Proposed Development. Mitigation works will be adopted as part of the construction works for the Proposed Development. These measures will address the main activities of potential impact which include:

- Control and Management of surface water runoff.
- Control and management of shallow groundwater during excavation and dewatering.
- Management and control of soil and materials.

- Appropriate fuel and chemical handling, transport and storage.
- Management of accidental release of contaminants at the site.
- Control and handling of cementitious materials.

The main contractor will produce a Pollution Prevention Plan (or similar document). This will include procedures and diagrams for:

- Dewatering of excavations.
- Temporary soil storage.
- Fuel storage/refuelling.
- Concrete wash-out area.
- Controlling surface water entering Site.
- Preventing existing drainage features becoming pathways for construction run-off.
- Reducing soil exposure and reinstating as rapidly as possible.
- Contingency measures.

Surface water runoff management will be required to prevent runoff entering excavations during construction. Surface water will require diversion around the open excavations using standard temporary drainage methods to ensure that surface water is effectively conveyed around works areas.

The dewatering methodology to be implemented by the main contractor will ensure that any dewatering is confined to the localised zone and does not extend towards the Site boundaries. Where required, shallow recharge wells will be utilised to ensure the existing hydrogeological regime is maintained by allowing water to infiltrate back into the ground, ensuring that groundwater levels remain stable.

There will be no authorised discharge of water to ground during the construction phase. Where water must be pumped from the excavations, water will be discharged by the contractor, following appropriate treatment (e.g., settlement or hydrocarbon interceptor) to sewer in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from GCC under Section 4 of the Local Government (Water Pollution) Act 1977, as amended for discharges to surface water. Under no circumstances will any untreated wastewater generated onsite (from equipment washing, road sweeping etc.) be released offsite. Where required, all existing drainage channels and public sewers will be protected to ensure that any untreated wastewater generated onsite does not enter the public sewers. Drainage channels will be clearly identified on site and shown on method statements and site plans.

Where required, standard design and construction measures (i.e., groundwater drainage around impermeable subsurface structures) will ensure that groundwater flow across the site is maintained and that there will be no impact on groundwater levels.

During the construction phase, fuelling and lubrication of equipment will be carried out in accordance with the procedures outlined in the CEMP in a designated area of the site away from any watercourses and drains (where not possible to carry out such activities offsite). Any diesel, fuel or hydraulic oils stored onsite will be stored in designated areas. These areas will be bunded and located away from surface water drainage and features. Bunds will have regard to Environmental Protection Agency guidelines ‘Amendment to IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities’ (EPA, 2013). The main contractor

will maintain an emergency response action plan and emergency procedures will be developed by the main contractor in advance of any works commencing.

Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Proposed Development site. Only emergency breakdown maintenance will be carried out on-site. Drip trays and spill kits will be available on-site to ensure that any spills from vehicles are contained and removed off-site.

There may also be the requirement for use of portable generators or similar fuel containing equipment during the construction phase of the Proposed Development, which will be placed on suitable drip trays. Regular monitoring of drip tray content will be undertaken to ensure sufficient capacity is maintained at all times.

Emergency procedures will be developed by the main contractor in advance of works commencing and spillage kits will be available on-site including in vehicles operating on-site. Construction staff will be familiar with emergency procedures in the event of accidental fuel spillages. Remedial action will be immediately implemented to address any potential impacts in accordance with best practice standards and legislative requirements including but not limited to the Environmental Protection Agency Act, 1992 (as amended), Waste Management Act, 1996 (as amended) and the Safety, Health and Welfare at Work Act, 2005 (as amended):

- Any required emergency vehicle or equipment maintenance work will take place in a designated impermeable area within the site.
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants.
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained.
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Proposed Development site and compliantly disposed of off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and standards.
- All construction works staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- All construction works staff on-site will be fully trained on the use of equipment.

Pumping of concrete will be monitored to ensure that there is no accidental discharge. All work will be carried out in the dry and effectively isolated from any onsite drains. A suitable risk assessment for wet concreting will be completed prior to works being carried out. There will be no mixer washings or excess concrete discharged onsite. All excess concrete is to be removed from site and all washout of concrete chutes to be captured in a tank which will be removed offsite for disposal at an authorised waste facility.

Given the vulnerability of the underlying groundwater at the Site, the shallow groundwater table, the potential presence of karst landforms and the detectable concentrations of hydrocarbons in shallow soils (GII, 2024), a piling risk assessment will be completed by the main contractor at detailed design stage and in advance of construction works commencing onsite. The proposed piling methodology, will give cognisance to the Environment Agency's (EA) guidance on 'Piling into Contaminated Sites' (EA, 2002) and 'Piling and Penetrative

Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention' (EA, 2001), (or similar best practice) in order to minimise the potential for the introduction of any temporary conduit between any potential sources of contamination at the ground surface and underlying groundwater. The piling method will also include procedures to ensure any potential impact to water quality is prevented including preventing surface runoff or other piling/drilling fluids from entering the pile bores and surrounding formation. Where there is a requirement to use lubricants, drilling fluids or additives the contractor will use water-based, biodegradable, and non-hazardous compounds under controlled conditions.

All below ground drainage infrastructure will be constructed in accordance with current UE requirements to ensure that there are no potential impacts to groundwater quality.

The main contractor will prepare method statements for weather and tide/storm surge fore-casting and continuous monitoring of water levels in the River Corrib and Corrib Estuary. These will be made available to the local authority where requested. The Contractor will also provide method statements for the removal of site materials, fuels, tools, vehicles, and persons from flood zones in order to minimise the risk to persons working on the Site as well as poten-tial input of sediment or construction materials into the waterbodies during flood events

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. Foul drainage from temporary welfare facilities during the construction phase of the Proposed Development will either be discharged to temporary holding tank(s), the contents of which will periodically be tankered off site to a licensed facility or discharged to public sewer in accordance with the necessary temporary discharge licences issued by UE. The Galway WWTP is operated in accordance with relevant statutory approvals issued by UE. The increase discharge to the Galway WWTP as a result of the Proposed Development is considered to be insignificant in terms of the overall scale of the facility. The increased load does not have the capacity to alter the effluent released from the WWTP to such an extent as to result in likely significant effects on its receiving waters. Therefore, there will be no potential impact on water quality and the WFD status of receiving waterbodies and any Natura 2000 sites associated with discharges from the Site.

5.5.1.2 Operational Phase

Based on the design of the Proposed Development there is limited potential sources of contamination during the operational phase. Furthermore, the proposed attenuation design does not allow for infiltration to ground. Surface water will be managed in accordance with the principles and objectives of SuDS and the GDSDS to treat and attenuate water prior to discharging offsite. Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be incorporated into the overall management strategy for the Proposed Development. This will ensure that there are no impacts on water quality and quantity (flow regime) during the operational phase of the Proposed Development.

Foul water during the operational phase of the Proposed Development will ultimately discharge via the Galway WWTP to Galway Bay under the appropriate consents from UE. As mentioned above, the Galway WWTP, which is operated in accordance with relevant statutory approvals issued by UE. Foul water from the site will only be discharged to the UE network under the appropriate consents from UE, and therefore, the Proposed Development will not cause a potential impact on water quality and the WFD status of receiving waterbodies and any Natura 2000 sites associated with discharges from the site.

5.5.2 Potential Impact on Natura 2000 Sites

Based on the findings of this assessment, it is considered that in the absence of any mitigation or avoidance measures that there would be a potential impact on water quality of the Corrib River, the Corrib Estuary and associated downstream Natura 2000 sites including the Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC and Inner Galway Bay SPA. Considering the distance downstream and the significant dilution which will occur, it is considered that there is no perceived impact on any further downstream Natura 2000 sites.

The mitigation measures as outlined above, including the provision of SuDS in accordance with the GDSDS and construction mitigation measures, will prevent any impact on the receiving groundwater and surface water environment.

- The construction phase will be managed in accordance with the CEMP (AECOM, 2025c) which will be further developed by the main contractor and will include appropriate avoidance and mitigation measures to prevent any potential impact on the receiving water bodies and associated Natura 2000 sites.
- During the operational phase, surface water from the site will be managed in accordance with the principles and objectives of SuDS to treat and attenuated water prior to discharge to ground through infiltration. Therefore, there will be no impact on baseline conditions at any Natura 2000 sites associated with the discharge of surface water from the Proposed Development.
- During the operational phase, foul water from the site will discharge via the Galway WWTP to the Corrib Estuary transitional waterbody and Inner Galway Bay coastal waterbody. The WWTP is operated in accordance with relevant statutory approvals and therefore, there will be no impact on baseline conditions at any Natura 2000 sites associated with foul discharges from the proposed development.

5.5.3 Water Framework Directive Status

The findings of the risk-based assessment identified that in the absence of any mitigation and avoidance measures there could be a potential impact on the water quality within receiving water bodies associated with the Proposed Development, specifically within the Clare-Corrib GWB, the Terryland_10 and the Corrib_020 river waterbodies, the Corrib Estuary transitional waterbody and the Inner Galway Bay North coastal waterbody. There is no identified potential impact to the Inner Galway Bay South and Outer Galway Bay coastal waterbodies attributed to the separation distances and anticipated assimilation capacity of the receiving water bodies taking account of the existing baseline conditions and WFD Status.

The mitigation measures as outlined above, including the implementation of a robust CEMP during the construction phase and the incorporation of SuDS in the design of the Proposed Development, will prevent any impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009, as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

The Proposed Development will not cause a deterioration in the status of waterbodies hydraulically connected with the Proposed Development, taking account of design avoidance

and mitigation measures that will be implemented. The Proposed Development will not jeopardise the objective to achieve ‘good’ surface water status or good ecological potential.

There will be no impact to the existing WFD status of water bodies associated with the Proposed Development including the Terryland_10, Corrib_020, the Corrib Estuary, the Inner Galway Bay North, the Inner Galway Bay South, the Outer Galway Bay and the Clare-Corrib GWB as a result of the Proposed Development taking account of design avoidance and mitigation measures.

6 CONCLUSIONS

EGC has carried out a risk-based hydrological and hydrogeological impact assessment for the Proposed Development to determine if there is any potential for significant impacts on the receiving water environment and designated Natura 2000 sites in the absence of avoidance and mitigation measures.

The CSM was developed identifying plausible S-P-R linkages for the Proposed development and receiving water environment. The CSM formed the basis of the evaluation of any potential impacts to receptors including waterbodies, GWDTEs and Natura 2000 sites associated with the Proposed Development. The assessment assumed a worst-case scenario and in the absence of any mitigation measures intended to avoid or reduce potential harmful effects.

Based on the findings of this assessment the following can be concluded:

- The underlying aquifer has been identified as “Regionally Important Aquifer - Karstified (conduit) (RKc)” which has inherent pathways for potential pollutants pathways within the GWB and to migration to receiving waterbodies including the Corrib River and Corrib Estuary.
- In the unmitigated scenario, there is a potential risk associated with the discharge of contaminants to ground affecting both the underlying aquifer and downstream waterbodies including the Corrib River, the Corrib Estuary and associated downstream Natura 2000 sites including the Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC and Inner Galway Bay SPA. Considering the distance downstream and the significant dilution which will occur, it is considered that there is no perceived impact on any further downstream Natura 2000 sites.
- In the unmitigated scenario, there is also a potential risk associated with the indirect (mains drainage) discharge of surface water runoff from the Proposed Development on the receiving water quality of the Terryland Stream, the Corrib River, the Corrib Estuary and associated downstream Natura 2000 sites including the Lough Corrib SAC, Lough Corrib SPA, Galway Bay Complex SAC and Inner Galway Bay SPA.
- There is no identified risk to water quality via foul water drainage or discharges from the Proposed Development that will ultimately be discharged to the Corrib Estuary transitional waterbody and the Inner Galway Bay North coastal waterbody via the Galway WWTP under appropriate consent from UE.
- The appropriate standard design measures for the construction phase and operational phase of the Proposed Development including implementation of the CEMP and SuDS measures within the drainage design will prevent, limit and mitigate any the potential for the worst-case scenario to occur. These design avoidance measures will ensure there is no risk to water quality of the receiving watercourses.
- Overall, there is no identified impact to the existing WFD status of water bodies associated with the Proposed Development including within the Clare-Corrib GWB, the Terryland_10 and the Corrib_020 river waterbodies, the Corrib Estuary transitional waterbody and the Inner Galway Bay North coastal waterbody as a result of the Proposed Development taking account of design avoidance and mitigation measures that will be implemented as described.

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