HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT

for

A PROPOSED RESIDENTIAL DEVELOPMENT (LRD) AT BOHERNABREENA ROAD, BOHERNABREENA & OLDCOURT, DUBLIN 24, CO. DUBLIN

Technical Report Prepared For

Capami Ltd.

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Our Reference

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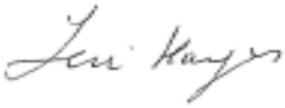
Signature		
Name	Alan Wilson	Teri Hayes
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Date	02 September 2024	02 September 2024

TABLE OF CONTENTS

Figures

Tables

1.0 INTRODUCTION

1.1 Background

AWN have been requested by Capami Ltd. to carry out a Hydrological and Hydrogeological Qualitative Risk Assessment for a Residential Development (LRD) on a site measuring c. 20.3 Ha, located in the townlands of Bohernabreena, Oldcourt, and Killininny, Dublin 24. The development site is located to the east of Bohernabreena Road, north and east of Bohernabreena cemetery, south and south-east of St. Anne's GAA club, south and south-west of the Dodderbrook residential estate, west of the Ballycullen Gate residential development (currently under construction) and west of Oldcourt Road (the R113).

The proposed development consists of 523 no. residential units comprised of 253 no. 2, 3 & 4 bed detached, semi-detached and terraced houses, 208 no. 1, 2 & 3 bed duplex units in 20 no. 2 & 3 storey blocks, and 62 no. 1, 2 & 3 bed apartments in 4 no. 3 & 3-4 storey blocks, along with a 2-storey childcare facility of c. 457sq.m.

Private amenity space for the residential units is provided in the form of rear gardens for houses and ground floor terraces / upper floor balconies for apartments and duplex units. The proposed development provides for c. 7.38Ha of public open space and c.4,797 sq.m of communal open space associated with proposed residential units.

Vehicular access to the development will be via 4 no. access points, as follows: (i) from the west of the site via 2 no. accesses located off Bohernabreena Road, (ii) from the north of the site via 1 no. access at Dodderbrook Place, and (iii) from Oldcourt Road (the R113) to the east, via adjoining residential development. The proposed development includes for pedestrian and cyclist connections and accesses to adjoining lands to the north, east and west, and includes for cycling and pedestrian routes and infrastructure throughout the development.

The proposed development also includes the demolition of existing buildings / structures on the site (c.3,800sq.m), hard & soft landscaping, boundary treatments, SuDs features, drainage infrastructure, services infrastructure, bin stores, bicycle stores, car parking (including EV parking facilities), bicycle parking, public lighting etc. and all associated site development works.

The potential impacts on the receiving water environment considered are:

- Connection to foul sewer and stormwater sewer during operation.
- Management of foul, surface water run-off and accidental oil leaks during construction. No bulk oil storage during operation.

1.2 Hydrological Setting

The subject site, of approximately 20.3 Ha, located at in the townlands of Bohernabreena, Oldcourt, and Killininny, Dublin 24. It is located to the east of Bohernabreena Road, north and east of Bohernabreena cemetery, south and south-east of St. Anne's GAA club, south and south-west of the Dodderbrook residential estate, west of the Ballycullen Gate residential development and west of Oldcourt Road (the R113). A small portion of land to the west of the subject site, and adjacent to the Bohernabreena Cemetery, is currently developed and occupied by several industrial warehouses.

The subject site generally falls from south to north, with a high point of the southern boundary of approximately 119.78m OD Malin. The lowest point along the northern

boundary is approximately 98.12m OD Malin where the site connects into an existing ditch.

The site is traversed by the Bohernabreena, Friarstown Upper and Oldcourt 09 river waterbodies. Many of the field boundaries have drainage ditches which connect to these river waterbodies. A site walkover was carried out to allow a direct inspection of site specific drainage features. Drainage features were consistent with those shown on OS mapping, suggesting there have be no significant changes to the drainage regime in recent times. The channels of the Oldcourt 09 and Friarstown Upper streams vary considerably as they flow through the site, being shallow and ill-defined at some locations and relatively deep and well-defined at others. Field culverts appear undersized and in many cases are in poor repair. Both streams include heavy vegetation. Flows were low in both streams during the site visit. Refer to Kilgallen & Partners Consulting Engineers Site Specific Flood Risk Assessment carried out in 2024 for further information on site specific drainage features.

The site ultimately discharges to the River Dodder c. 1.99 km downstream of the site through the Ballycullen Stream which eventually discharges into the Liffey Estuary Lower transitional waterbody (European Code IE_EA_090_0300). The Liffey Estuary Lower discharges into Dublin Bay coastal waterbody c. 14.9 km north-east of the proposed development site.

Refer to Figure 1.1 below for the site location and regional hydrological environment.

Figure 1.1 *Site Location and Hydrological Environment (EPA, 2024)*

A review of the EPA (2024) on-line database indicates that the nearest designated land to the site is the Dodder Valley pNHA (Site Code: 000991) c. 1.9 km downstream of the subject site.

There is a source pathway linkage to the following Natura 2000 sites; South Dublin Bay Special Area of Conservation (SAC), North Dublin Bay Special Area of Conservation (SAC), South Dublin Bay and River Tolka Estuary Special Protection Area (SPA), North Bull Island Special Protection Area (SPA) and North-West Irish

Sea Special Protection Area (SPA), located c. 18.7km downstream of the site (10.7km to the north-east - linear distance).

During operation there will be an indirect discharge to Dublin Bay coastal waterbody from the proposed development through the stormwater and foul water site drainage as described in Section 1.4 below.

1.3 Objective of Report

The scope of this desktop review is to assess the potential for any likely significant impacts on receiving waters and protected areas during construction or post development, in the absence of taking account of any measures intended to avoid or reduce harmful effects of the proposed project (i.e. mitigation measures).

In particular, this review considers the likely impact of construction and operation impacts from the proposed development on water quality and overall water body status within Dublin Bay (where the relevant European Sites are located).. The assessment relies on information regarding construction and design provided by Capami Ltd. as follows:

- Engineering Planning Report, Oldcourt LAP Lands, Firhouse, Dublin 24, January 2024.
- Engineering Planning Report, Oldcourt LAP Lands, Firhouse, Dublin 24, September 2024.
- Site Specific Flood Risk Assessment. Residential Development, Bohernabreena, Oldcourt, Ballycullen, Co. Dublin, July 2024.
- Ground Investigations Report. Lands at Oldcourt, Ballycullen – Site Investigation, October 2015.
- Various Site Plans and Drawings.

This report was prepared by Alan Wilson (BSc) and Teri Hayes ((BSc MSc PGeol EurGeol, Adv Dip in Environmental & Planning Law). Alan Wilson is an Environmental Consultant at AWN. Alan holds a BSc Honours in Environmental Management in Agriculture/ Environmental and Geographical Sciences. Alan has worked on a range of large scale projects involving EIA reports, site specific flood risk assessments, baseline studies, hydrological and hydrogeological risk assessments, environmental due diligences, site investigations and groundwater, surface water and soil monitoring on various operational developments and greenfield and brownfield sites. Alan also has previous experience as an Environmental Consultant in Ecology and Forestry related work. Alan is a member of the International Association of Hydrogeologists (IAH) Irish Group.

Teri Hayes is a Director and Senior Hydrogeologist with AWN Consulting with over 25 years of experience in water resource management, environmental assessment and environmental licensing. Teri is a former President of The International Association of Hydrogeologists (IAH, Irish Group) and is a professional member of the Institute of Geologists of Ireland (IGI) and European Federation of Geologists (EurGeol). She has qualified as a competent person for contaminated land assessment as required by the IGI and EPA. Her project experience includes contributions to a wide range of complex Environmental Impact Statements, planning applications and environmental reports for Industry Infrastructure and residential developments. Teri's specialist area of expertise is water resource management, eco-hydrogeology, hydrological assessment and environmental impact assessment.

1.4 Description of Current and Proposed Drainage

Existing and Proposed Surface Water Drainage

The site is traversed by the Bohernabreena, Friarstown Upper and Oldcourt 09 river waterbodies. Many of the field boundaries have drainage ditches which connect to these waterbodies. The site ultimately discharges to the River Dodder c. 1.99 km downstream of the site.

According to South Dublin County Council GIS record Information and site-specific topographical survey, there is an existing Ø450mm surface water sewer on the west of the site. The existing Ø450mm sewer conveys surface water from the Bohernabreena cemetery northwards through the proposed development. The existing Ø450mm surface water sewer shall be diverted to connect to a new proposed surface water pipeline following the proposed development road networks, refer to Figure 6-2. The final detailed design of the diversion within the proposed development road network shall be agreed upon with the SDCC drainage department. Refer to Pinnacle Consulting Engineers drawing; P211102-PIN-XX-XX-DR-C-02100-S2-P01 – Surface Water Diversion Layout.

In order to maintain the functioning of the existing agricultural ditches, several road-crossing culverts shall be designed in line with the Office of Public Works (OPW) requirements and the Arterial Drainage Act 1945. During detailed design, the necessary Section 50 application shall be made for each of the proposed culverts.

The Surface Water Drainage design and SuDS design have been undertaken in compliance with the requirements of the SDCC County Development Plan, the guidelines set by the Greater Dublin Strategic Drainage Study (GDSDS), the CIRIA SuDS Guideline and the Sustainable Drainage Explanatory Design & Evaluation Guide 2022. The concept design intends to employ SuDS drainage measures to manage the post-development surface water runoff in such a manner that the urban drainage network mimics the natural drainage process as far as possible, limiting the impact on the downstream receiving environment. The drainage system will incorporate oil interceptors to manage water quality discharging from the site.

Due to the steep nature of the site, a piped surface water conveyance system has been added to the design as a redundancy and shall only be engaged by the overtopping or bypassing upstream SuDS features. The piped conveyance network will seek to capture any surface water that has potentially bypassed or exceeded the SuDS features capacity and discharge the surface water at a safe strategic outlet location, reducing the risk of overland flooding. The subject site, in its current condition, drains northwards via existing ditches which ultimately discharge into the nearby River Dodder c. 1.99 km downstream. The attenuated post-development surface water runoff shall discharge into the existing ditches at a restricted rate equal to the Greenfields runoff rate. Where the subject site shall have multiple surface water outlets in the existing ditches, each sub-catchment shall discharge surface water at a restricted rate, proportional to the area of the contributing sub-catchment.

The SuDs features of the proposed development comprise blue/green roofs, permeable paving, swales, bio-retention tree pits, bio-retention rain gardens, detention basins, petrol/hydrocarbon interceptors and flow control devices. Refer to the Engineering Planning Report (Pinnacle Consulting Engineers, 2024) for further details.

Flood Risk Assessment

According to the site specific flood risk assessment carried out by Kilgallen & Partners Consulting Engineers (2024), the proposed development is not at risk of flooding and will not increase flood risk elsewhere. The proposed development is therefore appropriate from a flood risk perspective. The assessment considered fluvial, pluvial, groundwater and drainage infrastructure. With design measures in place, it was concluded that there is no likely off site flooding risk and is located within Flood Zone C.

Existing and Proposed Foul Water Drainage

According to the Uisce Éireann (Irish Water) GIS records and the site-specific topographical survey, there is an existing Ø225mm foul sewer on the west of the site, draining northwards, providing service to the existing private dwellings. A portion of this existing foul sewer shall remain outside of the site boundary and tie into the new proposed foul sewer network. Where the existing line crosses the subject site, it shall be integrated into the proposed foul network prior to being discharged into the existing foul sewer to the northeast, the discharge shall ultimately outfall at the same location in Allenton Drive.

The foul water from the subject site shall ultimately connect to the existing surrounding public foul water sewer network from where it shall discharge to the Ringsend Wastewater Treatment Works (WWTW). The maximum contribution of foul sewage (peak flow of 17.97 l/s) from the proposed development is 0.1617% of the current peak hydraulic capacity at Ringsend WWTP.

A Pre-Connection Enquiry (PCE) was issued to Uisce Éireann (Irish Water) on the 8th of December 2023 (CDS23009245). Uisce Éireann responded on August 12th 2024 stating the following conditions:

"According to a hydraulic modelling report for the catchment area, currently only Phase 1 (130 residential units) of the Development can be connect to the existing Uisce Éireann network".

"The remaining phases of the Development could be served via installation of interim pumping stations with adequate storage facilities, which would then be decommissioned once the network capacity downstream has been remediated by Uisce Éireann. The temporary pumping station rates and the storage volumes have to be reviewed and agreed at a connection application stage. Telemetry systems must be installed at the pumping station facilities".

"*This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann*".

In line with the Uisce Éireann stipulations in the COF, the eastern most connection (connection 1) shall service 130 units via gravity, discharging into the existing foul water gravity network to the north. The remaining 393 units, creche and 3 external units shall be services by internal gravity networks which will discharge to the existing downstream foul network via temporary foul water pumping stations. The pumping stations shall be designed in detail, should they still be required, at connection application stage and shall be fully compliant with Uisce Éireann (Irish Water) COP Part 5.

The foul drainage from the subject site will be discharged to the existing public foul water network via 3 No. outfall connections. As stated below for ease of reference and depicted in Figure 5-2.

- Connection 1: Gravity connection to the northeast of the site, the connection is proposed into the a existing Ø225mm public sewer in Ely View Road in the northern located residential development.

- Connection 2: Temporarily pumped connection to the north of the site, it is proposed that a connection be made into the existing public Ø225mm foul sewer, located with Dodder Lawn Road in the northern located residential development of OCIL Phase 1.

- Connection 3: Temporarily pumped connection to the north of the site, it is proposed that a connection be made into the existing public Ø225mm foul sewer, located within Ely View Road in the northern located residential development.

All works are to be carried out in accordance with Uisce Éireann's (Irish Water) Code of Practice for Wastewater Infrastructure, July 2020, Document IW-CDS-5030-03 & with Uisce Éireann's (Irish Water) Code of Practice for Water Infrastructure, July 2020 and Document IW-CDS-5020-03.

2.0 ASSESSMENT OF BASELINE WATER QUALITY, RIVER FLOW AND WATER BODY STATUS

A reliable Conceptual Site Model (CSM) requires an understanding of the existing hydrological and hydrogeological setting. This is described below for the proposed development site and surrounding hydrological and hydrogeological environs.

2.1 Hydrological Catchment Description

The proposed development site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and River Dodder sub-catchment (WFD name: Dodder_SC_010, Id 09_16) (EPA, 2024).

The Environmental Protection Agency (EPA, 2024) on-line mapping presents the available water quality status information for water bodies in Ireland. The Bohernabreena, Friarstown Upper and Oldcourt 09 river waterbodies belong to the Dodder_040 WFD surface waterbody which has a '*Moderate*' WFD status (2016-2021) and its WFD risk score is '*At risk'* of not achieving good status. This '*Moderate*' status is related to its ecological status or potential. The main pressure associated with the Dodder_040 WFD surface waterbody is urban run-off.

The Bohernabreena, Friarstown Upper, Oldcourt 09, Ballycullen Stream belong to the Dodder_040 WFD surface waterbody and the section of the River Dodder considered in this assessment belongs to the Dodder_040 and Dodder_050 WFD surface waterbodies. The lower reaches of the Dodder_040 and Dodder_050 are '*At Risk'* due to '*Moderate'* ecological status. In the Dodder_040, '*Moderate'* ecological status is driven by invertebrates and chemical status; diffuse urban sources of pollution are the significant pressure. On Dodder_050, ecological status is driven by both invertebrates and fish; nutrients and sediment are the significant issue, and diffuse urban sources of pollution and combined sewer overflows are the significant pressures. The current pressure identified by the EPA on the Dodder_040 is urban run-off. The current pressures identified on the Dodder_050 surface waterbody are from anthropogenic pressures, urban run-off and urban waste water.

The Liffey Estuary Lower transitional waterbody has a '*Moderate*' WFD status (2016-2021) and its WFD risk score is '*At risk'* of not achieving good status. This '*Moderate*' status is related to its ecological status or potential. This '*Moderate*' status is related to its ecological status or potential. The main pressure on the Liffey Estuary Lower WFD surface waterbody is urban waste water.

The Coastal Waterbody Dublin Bay has a WFD status (2016-2021) of '*Good*' and a WFD risk score of '*Not at risk*'. The ecological status (which comprises biological and chemical status) of transitional and coastal water bodies during 2016-2021 for Dublin Bay is classed as '*Good'* (although the chemical status failed wo achieve '*good*' status). The most recent surface water quality data for Dublin Bay on trophic status of estuarine and coastal waters indicate that they are '*Unpolluted*' -based on Water Quality in 2022 (EPA, 2024). Under the 2015 'Trophic Status Assessment Scheme' classification of the EPA, 'Unpolluted' means there have been no breaches of the EPA's threshold values for nutrient enrichment, accelerated plant growth, or disturbance of the level of dissolved oxygen normally present.

The proposed development will have no measurable impact on the water quality in any overflow situation at Ringsend WWTP apart from a minor contribution from foul sewage (maximum contribution of foul sewage (peak flow of 17.97 l/s) from the proposed development is 0.1617% of the current peak hydraulic capacity at Ringsend WWTP).

2.2 Aquifer Description & Superficial Deposits

Mapping from the Geological Society of Ireland (GSI, 2022 http://www.gsi.ie, accessed on 22-07-2024) indicates the bedrock underlying the site is part of the Aghfarrell Formation (Code: OAAGHF) and made up of greywacke siltstone, slate, quartzite. The lithological description comprises Deep marine; Greywacke, shale, sandstone & conglomerate. The GSI also classifies the principal aquifer types in Ireland as:

- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Rkd - Regionally Important Aquifer (karstified diffuse)

Presently, from the GSI (2024) National Bedrock Aquifer Map, the GSI classifies the bedrock aquifer beneath the subject site as a '*Poor Aquifer (Pl) - Bedrock which is Generally Unproductive except for Local Zones*'. The proposed development is within the '*Kilcullen*' groundwater body (Code: IE_EA_G_003) and is classified under the WFD Status (2016-2021) as having a '*Good'* status and a WFD Risk Score of '*At Risk*' of not achieving good status. The Kilcullen groundwater body has a '*Good*' Status for chemical and quantitative categories. Therefore, the overall status is considered Good.

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. The GSI (2024) guidance presently denotes 4 no. vulnerability classifications for the proposed development site. The majority of the site is classified as having a '*High*' (H) vulnerability. The south-east of

the site is classified as having '*Extreme*' (E), the north of the site is classified with '*Moderate*' (M) and '*Low*' (L) vulnerability. The GSI Vulnerability Mapping Guidelines indicate the depth to bedrock as varying across the site ranging from 0-3m for '*Extreme*' (E) vulnerability in the south-east of the site, >3m for '*High*' (H) vulnerability and 5-10m for *'Moderate'* vulnerability through the centre of the site.

The site investigation carried out by Causeway Geotech Ltd. (CGL) in October 2015 is consistent with the GSI vulnerability classifications, Bedrockwas encountered at depths between 3.1m BGL and 5.24m BGL generally overlain by very stiff brown sandy gravelly clay. Typically localised seepages were encountered within lenses of sands and gravels within the Glacial Till. Groundwater strikes were encountered in 2 no. boreholes at 2m BGL (BH04) and 3.1m BGL (BH11). There is no likely continuous water table within overburden. Refer to the Ground Investigations Report (October, 2015) prepared by CGL for further information. The GSI aquifer vulnerability classifications in the region of the site are presented as Figure 2.1 below.

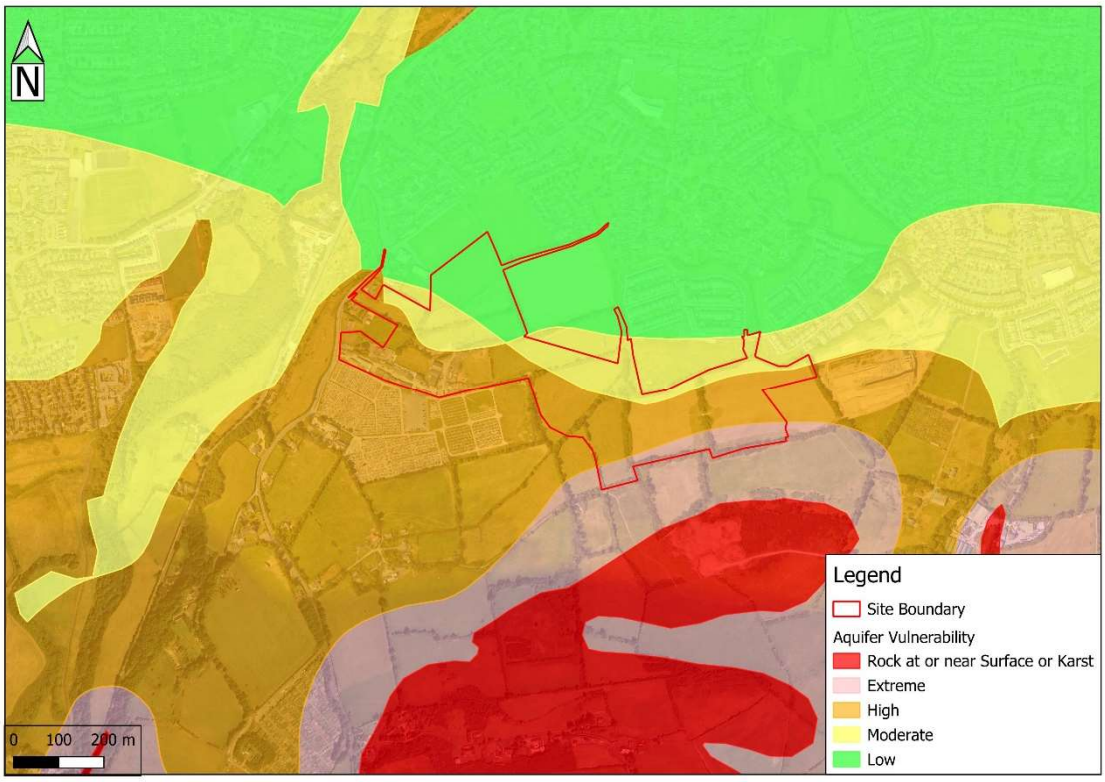

Figure 2.1 *Aquifer Vulnerability (GSI, 2024)*

The GSI/ Teagasc (2024) mapping database of the quaternary sediments in the area of the site indicates the principal subsoil type in the area comprises Limestone till Carboniferous (TLs, i.e. Till derived from limestones) with some Alluvium (A) subsoils located in the western portion of the site along the River Dodder. The lithology described in the Ground Investigations Report (October, 2015) prepared by Causeway Geotech Ltd comprised c. 200-300mm topsoil underlain by sandy gravelly clay with low cobble content and pockets of granular material occurring locally.

3.0 CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is developed based on a good understanding of the hydrological and hydrogeological environment, plausible sources of impact and knowledge of receptor requirements. This in turn allows possible Source Pathway

Receptor (S-P-R) linkages to be identified. If no S-P-R linkages are identified, then there is no risk to identified receptors.

3.1 Assessment of Plausible Sources

Potential sources during both the construction and operational phases are considered. For the purposes of undertaking the potential of any hydrological/ hydrogeological S-P-R linkages, all potential sources of contamination are considered *without taking account of* any measures intended to avoid or reduce harmful effects of the proposed project (mitigation measures as outlined in the CEMP) i.e., a worst-case scenario. Construction sources (short-term) and operational sources (long-term) are considered below.

Construction Phase

The following potential sources are considered plausible risk scenarios for the proposed construction site:

(i) Hydrocarbons or any hazardous chemicals will be stored in specific bunded areas. Refuelling of plant and machinery will also be carried out in bunded areas to minimise risk of any potential being discharged from the site. As a worst-case scenario, a rupture of a 1,000-litre tank to ground is considered in this analysis which disregards the effect of bunding. This would be a single short-term event.

(ii) Leakage may occur from construction site equipment. As a worst-case scenario an unmitigated leak of 300 litres is considered. This would be a single short-term event.

(iii) Use of wet cement is a requirement during construction. Run-off water from recent cemented areas will result in highly alkaline water with high pH. As this would only occur during particular phases of work this is again considered as a single short-term event rather than an ongoing event.

(iv) Construction requires soil excavation and removal. Unmitigated run-off could contain a high concentration of suspended solids and contaminants such as hydrocarbons during earthworks, given the presence of contamination beneath the site according to site investigations. These could be considered intermittent short-term events, i.e., on the basis that adequate mitigation measures which are already incorporated in the Construction Environmental Management Plan (CEMP) fail.

(v) During the excavations for foundations, there may be localised pumping of perched groundwater within the subsoils and surface run-off from the excavations during and after heavy rainfall events to ensure that the excavation is kept relatively dry. No significant bedrock will occur given the expected depths of bedrock.

Operational Phase

The following sources are considered plausible post construction:

(i) The proposed development does not require any bulk chemical storage and therefore the potential for water quality impact is negligible.

(ii) Leakage of petrol/ diesel fuel may occur from individual cars in parking areas; run-off may contain a worst-case scenario of 70 litres for example. Any corresponding risk here will be mitigated by the proposed oil/ petrol interceptor at the site.

(iii) The stormwater drainage system follows SuDS measures that comprises blue/green roofs, permeable paving, swales, bio-retention tree pits, bio-retention rain gardens, detention basins, petrol/hydrocarbon interceptors and flow control devices. Refer to the Engineering Planning Report (Pinnacle Consulting Engineers, 2024) for further details. This system has been designed in order to discharge following the characteristics of a greenfield run-off into the public sewer. As such the potential for silt laden runoff is low. It should be noted that the worst-case scenario (70 litres) under consideration here disregards the effect of SuDS and petrol interceptors.

(iv) The development will be fully serviced with separate foul and stormwater sewers which will have adequate capacity for the development and discharge limits as required by Irish Water licencing requirements. Discharge from the site to the existing public foul sewer will be sewage and grey water only due to the residential nature of the proposed development. The foul discharge from the site will join the public sewer and will be treated at the Uisce Éireann Ringsend WWTP prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence (D0034-01) and meet environmental legislative requirements as set out in such licence. It is noted that a planning permission for a new upgrade to this facility was received in 2019 and is currently in the process of construction/ implementation. As stated in Section 1.4 above, the maximum contribution of foul sewage (peak flow of 17.97 l/s) from the proposed development is 0.1617% of the current peak hydraulic capacity at Ringsend WWTP.

(v) This plant at Ringsend operates under an EPA licence (D0034-01) and is currently in the process of being upgraded to a PE of 2.4 million to meet the increased demand of the wider Dublin area. The most recent Annual Environmental Report (AER 2022) shows it is currently operating for a PE peak loading of 2.21 million while originally designed for 1.64 million. The current maximum hydraulic load (854,201 m^3/day) is less than the peak hydraulic capacity as constructed (959,040 m^3/day) i.e., prior to any upgrade works. Overflows have occurred following heavy rainfall events.

(vi) Uisce Éireann is working to provide infrastructure to achieve compliance with the Urban Wastewater Treatment Directive for a population equivalent of 2.1million in the second half of 2023. When all the proposed works are complete in 2025, the Ringsend Wastewater Treatment Plant will be able to treat wastewater for up to 2.4 million population equivalent.

(vii) These upgrade works (described in section 3.4 below) have commenced and comprise a number of phases, are ongoing and are expected to be fully completed by 2025.

3.2 Assessment of Pathways

The following pathways have been considered within this assessment with impact assessment presented in Section 3.4:

(i) Vertical migration from any localised diesel/ fuel oil spills during either construction or operational phases to the underlying aquifer is possible due to the '*High*' (H) vulnerability classification through the centre of the site and

'*Extreme*' (E) vulnerability classification in the south-east, paired with localised seepages encountered within lenses of sands and gravels within the Glacial Till and groundwater strikes encountered in 2 no. boreholes at 2m BGL (BH04) and 3.1m BGL (BH11) during the site investigation carried out by CGL in 2015. Mitigation measures will be implemented and adhered to in full during the construction and operational phases of the proposed development. However, any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site. The site is also underlain by the '*Kilcullen*' groundwater body (Code: IE_EA_G_003), which is a '*Poor Aquifer (Pl) - Bedrock which is Generally Unproductive except for Local Zones*'. This aquifer is generally characterised by having low permeability and porosity with little connectivity rather than large and connected fractures which are more indicative of regional aquifers. As such, flow paths are generally local.

(ii) There is no direct hydrological linkage for construction and operation run-off or any small hydrocarbon leaks from the site to Dublin Bay coastal waterbody and the Natura sites located herein. There is an indirect connection through the existing and proposed storm water network, and through the existing drainage ditches and streams on site (Bohernabreena, Friarstown Upper and Oldcourt 09), which ultimately discharge to the River Dodder c. 1.99 km downstream of the site through the Ballycullen Stream.

(iii) There is no direct pathway for foul sewage to any receiving water body. There is however an 'indirect pathway' through the existing Ø225mm foul sewer which ultimately discharges to the Ringsend WWTP prior to final discharge to Dublin Bay post treatment.

3.3 Assessment of Receptors

The receptors considered in this assessment include the following:

(i) Underlying (Poor) Bedrock Aquifer;
(ii) Dodder_040 WFD Surface Waterbody (Bohernabreena, Friarstown Upper, Oldcourt 09, Ballycullen Stream & River Dodder pNHA);
(iii) Dodder_050 WFD Surface Waterbody (c. 7.2 km downstream / linear distance: c. 5 km);
(iv) Liffey Estuary Lower Transitional Waterbody (c. 16 km downstream / linear distance: c. 11.8 km);
(v) South Dublin Bay and River Tolka Estuary SPA [Site Code: 004024], located c. 10.7 km north-east of the site; and
(vi) South Dublin Bay SAC [Site Code: 000210], located c. 10.7 km north-east of the site.

Other Natura 2000 Sites within Dublin Bay that may be hydrologically connected to the proposed development site, but are located further away are North Dublin Bay SAC [Site Code: 000206], North Bull Island SPA [Site Code: 004006], North-West Irish Sea SPA [Site Code: 004236], Dalkey Islands SPA [Site Code: 004172], Rockabill to Dalkey Island SAC [Site Code: 003000], Howth Head SAC [Site Code: 000202] and Howth Head Coast SPA [Site Code: 004113].

These Natura 2000 sites were excluded from the assessment due to their distance from the proposed development site, the potential loading of contaminant from the site (risk scenarios presented in Section 3.1) and significant dilution through its pathway.

3.4 Assessment of Source Pathway Receptor Linkages

Table 3.1 below summarises the plausible pollutant linkages (S-P-R) considered as part of the assessment and a review of the assessed risk is also summarised below.

Construction Phase

The potential for impact on the aquifer is *Low* based on the absence of any bulk chemical storage on site. The low permeability nature of the till and a lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges to ground at the site. As such there is no potential for a change in the groundwater body status or significant source pathway linkage through the aquifer to any Natura 2000 site.

During construction phase, there is no direct open-water source pathway linkages between the site and Dublin Bay coastal waterbody and the Natura sites located herein. There is an indirect pathway through the existing Ø225mm foul sewer on the west of the site which drains northwards, providing service to the existing private dwellings, eventually discharging into the Ringsend WWTP. An indirect source pathway linkage also exists between the proposed development site and Dublin Bay coastal waterbody through the on-site drainage ditches and streams (Bohernabreena, Friarstown_Upper, Oldcourt 09), which discharge to the River Dodder through the Ballycullen Stream. Should any silt-laden stormwater from construction or hydrocarbon-contaminated water from a construction vehicle leak/tank leak manage to enter into the storm water sewer network, or the existing ditches and streams on-site refer to Section 1.2 above), the suspended solids will naturally settle. In the event of a worst case hydrocarbon leak of 1,000 litres this would be diluted to background levels (water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019) by the time the water reaches the nearest Natura 2000 sites mentioned in Section 3.3 above (South Dublin Bay and River Tolka Estuary SPA [Site Code: 004024] and South Dublin Bay SAC [Site Code: 000210], located c. 10.7 km north-east of the site.

Operational Phase

During operation, the potential for a release is low as there is no bulk fuel/chemical storage and no silt laden run-off. Stormwater will be collected by a drainage system which includes SuDS measures, an attenuation system and oil/ petrol interceptors prior to discharge off-site (albeit these measures have been disregarded for this analysis). In addition, the potential for hydrocarbon discharge is quite minimal based on an individual vehicle (70 litres) leak being the only source for hydrocarbon release. However, even if the operation of the proposed SuDS and interceptor systems are excluded from consideration, there is no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019) in the worst-case scenarios described above at section 3.2 and there will be no significant effect on any European site. The volume of contaminant release is low and combined with the significant attenuation within the local drainage network, hydrocarbons will dilute to background levels with no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019 at any Natura 2000 sites.

It can be concluded that the in-combination effects of surface water arising from the proposed development taken together with that of other permitted developments will not be significant based on the in-combination low potential chemical and sediment expected loading. Therefore, based on the loading of any hazardous material considered in the worst-case scenarios mentioned in Section 3.1 above during construction and operation phases, there is subsequently no potential for impact on

aforementioned Natura 2000 sites (South Dublin Bay and River Tolka Estuary SPA [Site Code: 004024] and South Dublin Bay SAC [Site Code: 000210], located c. 10.7 km north-east of the site.

The peak wastewater discharge is calculated at 17.97 l/s (Pinnacle Consulting Engineers, 2024). The sewage discharge will be licensed by Uisce Éireann, collected in the public foul sewer (refer to Section 1.4 above), and treated ultimately at Irish Water's WWTP at Ringsend prior to discharge to Dublin Bay. As outlined in section 3.1 (iv), upgrade works commenced in 2018 and are expected to be fully completed by Q4 2025. The upgrade works will result in treatment of sewage to a higher quality than current, thereby ensuring effluent discharge to Dublin Bay will comply with the Urban Wastewater Treatment Directive.

Note: The following additional information is provided with regard to the Uisce Éireann WWTP at Ringsend, Dublin and in the context of the subject site calculated discharges. When all the proposed works are complete in 2025, the Ringsend Wastewater Treatment Plant will be able to treat wastewater for up to 2.4 million population equivalent while meeting the required standards.

Works is proceeding on the upgrade of the 24 existing secondary treatment tanks to provide additional capacity and nutrient reduction, which is essential to protect the nutrient-sensitive Dublin Bay area.

The [WWTP upgrade] project is being progressed in stages to ensure that the plant continues to treat wastewater to the current treatment levels throughout the delivery of the upgrade. The project comprises three key elements and underpinning these is a substantial programme of ancillary works:

- *Provision of additional secondary treatment capacity with nutrient reduction (400,000 population equivalent);*
- *Upgrade of the 24 existing secondary treatment tanks to provide additional capacity and nutrient reduction, which is essential to protect the nutrient-sensitive Dublin Bay area; and*
- *Provision of a new phosphorous recovery process.*

In February 2018, the work commenced on the first element, the construction of a new 400,000 population equivalent extension at the Ringsend Wastewater Treatment Plant. After commissioning stages, the Capacity Upgrade facility began accepting flows for treatment in November 2021). This facility will enable current treatment levels to be maintained during the remainder of the upgrade of the existing secondary treatment tanks.

The 2019 planning permission facilitated upgrading works to meet nitrogen and phosphorus standards set out in the licence, which are temporarily exceeded currently. Works on the first of four contracts to retrofit the existing treatment tanks with aerobic granular sludge technology commenced in November 2020 and was completed in December 2021. In September 2021, the second contract was awarded, and its construction works commenced in November 2021 and is expected to take approximately 2 years to complete. In November 2021, the third contract was awarded, and its Construction works are anticipated to commence in late 2022 (this has not yet been confirmed by Uisce Éireann). The fourth contract was scheduled to commence in mid-2023, which has also not been confirmed by Uisce Éireann to date.

The application for the upgrade of the WWTP in 2012 and the revised upgrade in 2018 was supported by a detailed EIAR. As outlined in the EIAR, modelling of water quality in Dublin Bay has shown that the upgrades (which are now currently

underway) will result in improved water quality within Dublin Bay. The 2018 EIAR predicts that the improvement in effluent quality achieved by the upgrade will compensate for the increase in flow through the plant. The ABP inspector's report summarises the positive findings of the modelling for the post WWTP upgrade scenario on Dublin Bay water quality in sections 12.3.5 and 12.3.12 of his report and the overall positive impact for human health and the environment in his conclusions in section 12.9.1.

In addition, the EIAR report acknowledges that under the do-nothing scenario "the areas in the Tolka Estuary and North Bull Island channel will continue to be affected by the cumulative nutrient loads from the river Liffey and Tolka and the effluent from the Ringsend WWTP", which could result in a deterioration of the biological status of Dublin Bay (Irish Water, 2018). Nevertheless, these negative impacts of nutrient over-enrichment are considered "unlikely" (Uisce Éireann, 2018). This is because historical data suggests that pollution in Dublin Bay has had little or no effect on the composition and richness of the benthic macroinvertebrate fauna. Therefore, the do-nothing scenario predicts that nutrient and suspended solid loads from the WWTP will "continue at the same levels and the impact of these loadings should maintain the same level of effects on marine biodiversity". Therefore, it can be concluded that significant effects on the current status of the European sites within Dublin Bay from the current operation of Ringsend WWTP are unlikely. This conclusion is not dependent upon any future works to be undertaken at Ringsend.

Even without treatment at the Ringsend WWTP, the peak effluent discharge, calculated for the proposed development as 17.97 l/s (which would equate to 0.1617% of the current licensed discharge at Ringsend WWTP [peak hydraulic capacity]), would not have a measurable impact on the overall water quality within Dublin Bay coastal waterbody and therefore would not have an impact on the current Water Body Status (as defined within the Water Framework Directive). This assessment is supported by hydrodynamic and chemical modelling within Dublin Bay which has shown that there is significant dilution for contaminants of concern (DIN and MRP) available quite close to the outfall for the treatment plant (Ringsend WWTP 2012 EIS, Ringsend WWTP 2018 EIAR; refer to Section 12.4.22, ABP-301798-18 Inspector's report). The most recent water quality assessment of Dublin Bay WFD coastal waterbody undertaken by the EPA (Water Quality in 2022: An Indicators Report, 2023) also shows that Dublin Bay on the whole, currently has an '*Unpolluted*' water quality status (refer to www.catchments.ie).

It should be noted that the Ringsend WWTP upgrade has experienced capacity issues during rainfall events and therefore overflows can occur following periods of heavy rainfall. These overflows occur as a result of the impact on treatment capacity during heavy rainfall events due to surges primarily caused by the historical combined drainage system in Dublin. As the proposed development will not contribute any additional stormwater drainage to the WWTP over the natural greenfield rate, the development will therefore have no measurable impact on the water quality in any overflow situation.

The assessment has also considered the effect of cumulative events, such as release of sediment laden water combined with a hydrocarbon leak on site (1,000 litres as a worst-case scenario during the construction phase). As there is adequate assimilation and dilution between the site and the Natura 2000 sites located in Dublin Bay (c. 10.7 km from the site), it is concluded that no perceptible impact on water quality would occur at the Natura 2000 sites as a result of the construction or operation of this proposed development. It can also be concluded that the cumulative or in-combination effects of effluent arising from the proposed development with that of other permitted proposed developments, or with development planned pursuant to

statutory plans in the greater Dublin, Meath and Kildare areas, which will be discharged into Ringsend WWTP will not be significant having regard to the size of the calculated discharge from the proposed development and having regard to the following:

- Recent water quality assessment for Dublin Bay shows that they currently continue to meet the criteria for 'Unpolluted' water quality status.
- The Ringsend WWTP upgrade which is currently being constructed will result in improved water quality by 2025 to ensure compliance with Water Framework Directive requirements.
- All new developments are required to comply with SuDS which ensures management of run-off rate within the catchment of Ringsend WWTP.
- The natural characteristics of Dublin Bay result in enriched water rapidly mixing and degrading such that the plume has no appreciable effect on water quality at Natura 2000 sites.

As the proposed development will have no additional stormwater run-off during a stormwater event over and above the current level, surface water run-off from the development in the operational phase will therefore have no impact on the current water quality in any overflow situation at Irish Waters Ringsend WWTP at Dublin Bay. In addition, the proposed SuDs features comprising blue/green roofs, permeable paving, swales, bio-retention tree pits, bio-retention rain gardens, detention basins, petrol/hydrocarbon interceptors and flow control devices will result in a reduction in storm water discharge and an increase in water quality exiting the site.

Finally, in a worst-case scenario of an unmitigated leak and not considering the operation of the SuDS and interceptor already included in the design, no perceptible risk to any Natura 2000 Sites is anticipated given the distance from source to Dublin Bay protected areas (c. 10.7 km linear distance). Potential contaminant loading will be attenuated, diluted and dispersed near source area.

Table 3.1 below presents a summary of the risk assessment undertaken.

Table 3.1 *Pollutant Linkage Assessment (without mitigation)*

Source	Pathways	Receptors Considered	Risk of Impact
Construction Impacts (Summary)			
Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle (1,000 litres worst case scenario). Discharge to ground of runoff water with High pH from cement process/ hydrocarbons from construction vehicles/run-off containing a high concentration of suspended solids.	Bedrock protected by >3 m low permeability overburden (sandy gravelly clay). Migration within weathered/ less competent bedrock is low (low permeability and porosity, local fracturing rather than large and connected fractures). Indirect pathway to Liffey Estuary Lower transitional waterbody and Dublin Bay coastal waterbody	Underlying Bedrock Aquifer (Poor Aquifer). Dodder_040 WFD Surface Waterbody (Bohernabreena, Friarstown Upper, Oldcourt 09, Ballycullen Stream & River Dodder pNHA). Dodder_050 WFD Surface Waterbody (c. 7.2 km downstream / linear distance: c. 5 km).	Low risk of migration through low permeability poorly productive bedrock, with little connectivity and poorly connected fracturing. No likely impact on the status of the aquifer/off site migration due to low potential loading, low permeability within overburden and discrete nature of fracturing reducing off site migration. No perceptible risk to water requirements for Dodder Valley pNHA or the Natura 2000 sites in Dublin Bay based on loading and high level of dilution in the surface water sewer / drainage

	through public foul sewer network. Indirect pathway through stormwater drainage network to Dublin Bay coastal waterbody. Indirect pathway through existing drainage ditches on site and the Bohernabreena, Friarstown Upper and Oldcourt 09 EPA river waterbodies which ultimately discharge to the River Dodder (pNHA) through the Ballycullen Stream and into Liffey Estuary Lower transitional waterbody / Dublin Bay coastal waterbody.	Liffey Estuary Lower Transitional Waterbody (c. 16 km downstream / linear distance: c. 11.8 km). South Dublin Bay SAC/pNHA (c. 21 km downstream / linear distance: c. 10.7 km). South Dublin Bay and River Tolka Estuary SPA (c. 21 km downstream / linear distance: c. 10.7 km).	network and on the distance of removal between the source and protected sites discussed.
Operational Impacts (Summary)			
Foul effluent discharge to sewer. Discharge to ground of hydrocarbons from carpark leak.	Indirect pathway to Dublin Bay coastal waterbody through public foul sewer network. Indirect pathway to Liffey Estuary Lower transitional waterbody and Dublin Bay coastal waterbody through public foul sewer network. Indirect pathway through existing drainage ditches on site and the Bohernabreena, Friarstown Upper and Oldcourt 09 EPA river waterbodies which ultimately discharge to the River Dodder (pNHA) through the Ballycullen Stream and into Liffey Estuary Lower transitional waterbody / Dublin Bay coastal waterbody.	Dodder_040 WFD Surface Waterbody (Bohernabreena, Friarstown Upper, Oldcourt 09, Ballycullen Stream & River Dodder pNHA). Dodder_050 WFD Surface Waterbody (c. 7.2 km downstream / linear distance: c. 5 km). Liffey Estuary Lower Transitional Waterbody (c. 16 km downstream / linear distance: c. 11.8 km). South Dublin Bay SAC/pNHA (c. 21 km downstream / linear distance: c. 10.7 km). South Dublin Bay and River Tolka Estuary SPA (c. 21 km downstream / linear distance: c.	No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge (17.97 l/s which would equate to 0.1617% of the licensed discharge at Ringsend WWTP); would not impact on the overall water quality within Dublin Bay and therefore would not have an impact on the current Water Body Status (as defined within the Water Framework Directive). No perceptible risk – taking into account the implementation of the design measures which includes SuDS features i.e. blue/green roofs, permeable paving, swales, bio-retention tree pits, bio-retention rain gardens, detention basins, petrol/hydrocarbon interceptors and flow control devices. Furthermore, the extent of loading of contaminant, distance between the source and the protected sites along with significant dilution in the surface water sewer and drainage network will ensure any released hydrocarbons are at background levels (i.e., with no likely impact above water quality objectives as

		10.7 km).	outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019).

4.0 CONCLUSIONS

A conceptual site model (CSM) has been prepared following a desk top review of the site and surrounding environs. Based on this CSM, plausible Source-Pathway-Receptor linkages have been assessed assuming an absence of any measures intended to avoid or reduce harmful effects of the proposed project (i.e., mitigation measures) in place at the proposed development site.

During the construction phase there is no direct source pathway linkage between the proposed development site and Dublin Bay coastal waterbody and the Natura sites located herein; South Dublin Bay Special Area of Conservation (SAC), North Dublin Bay Special Area of Conservation (SAC), South Dublin Bay and River Tolka Estuary Special Protection Area (SPA), North Bull Island Special Protection Area (SPA) and North-West Irish Sea Special Protection Area (SPA), located c. 18.7km downstream of the site (10.7km to the north-east - linear distance). There is an indirect source pathway linkage between the proposed development site and downgradient Natura sites through the existing on-site drainage ditches and streams (Bohernabreena, Friarstown_Upper, Oldcourt 09), which discharge to the River Dodder through the Ballycullen Stream. There will also be an indirect source pathway linkage through the foul water drainage network, which eventually discharges to Irish Water's Ringsend WWTP.

During the operational phase there is no direct source pathway linkage between the proposed development site and Dublin Bay coastal waterbody and the Natura sites located herein; South Dublin Bay Special Area of Conservation (SAC), North Dublin Bay Special Area of Conservation (SAC), South Dublin Bay and River Tolka Estuary Special Protection Area (SPA), North Bull Island Special Protection Area (SPA) and North-West Irish Sea Special Protection Area (SPA), located c. 18.7km downstream of the site (10.7km to the north-east - linear distance). There will be an indirect source pathway linkage through the stormwater drainage network, and following attenuation through the existing on-site drainage ditches, Bohernabreena, Friarstown Upper and Oldcourt 09 river waterbodies which discharge to the River Dodder through Ballycullen Stream. There will also be an indirect source pathway linkage through the foul water drainage network, which eventually discharges to Irish Water's Ringsend WWTP, which ultimately discharges to South Dublin Bay and the Natura 2000 sites located herein. However, the proposed development has a peak foul discharge that would equate to 0.1617% of the licensed discharge at Ringsend WWTP (peak hydraulic capacity), before the completion of the ongoing upgrade works which will result in treatment of sewage to a higher quality than current, thereby ensuring effluent discharge to Dublin Bay will comply with the Urban Wastewater Treatment Directive.

Even disregarding the operation of design measures including SuDS features i.e. blue/green roofs, permeable paving, swales, bio-retention tree pits, bio-retention rain gardens, detention basins, petrol/hydrocarbon interceptors and flow control devices, it is concluded there will be imperceptible impacts from the proposed development to the discussed water bodies due to emissions from the site stormwater drainage infrastructure to the wider drainage network. It should be noted that the proposed SuDS features will provide additional filtration from the site to the drainage network.

It is concluded that there are no pollutant linkages as a result of the construction or operation of the proposed development which could result in a water quality impact which could alter the habitat requirements of the Natura sites located within Dublin Bay or the other receptors included in this assessment.

Finally, and in line with good practice, appropriate and effective mitigation measures will be included in the construction design, management of construction programme and during the operational phase of the proposed development. With regard the construction phase, adequate mitigation measures will be incorporated in the Construction Environmental Management Plan (CEMP). These specific measures will provide further protection to the receiving soil and water environments. However, the protection of downstream European sites is in no way reliant on these measures and they have not been taken into account in this assessment.

5.0 REFERENCES

EPA, (2024). Environmental Protection Agency. Available on-line at: https://gis.epa.ie/EPAMaps/ [Accessed: 07-08-2024].

GSI, (2024). Geological Survey of Ireland; Available on-line at: http://www.gsi.ie [Accessed: 07-08-2024].

Geohive, (2024). Environmental Sensitivity Mapping. Available on-line at: Environmental Sensitivity Mapping (geohive.ie) [Accessed: 07-08-2024].

NPWS, (2024). National Parks & Wildlife Service. Available on-line at: http://webgis.npws.ie/npwsviewer/ [Accessed: 07-08-2024].

Irish Water (2024). Ringsend Wastewater Treatment Plant Annual Environmental Report 2022.

Irish Water (2018) Ringsend Wastewater treatment plant Upgrade Project Environmental Impact Assessment Report.

Inspector's Report – ABP-301798-18. 10-year permission for development of the Ringsend wastewater treatment plant upgrade project including a regional biosolids storage facility.

Board Order and Report of Inspector – ABP-301798-18. 10-year permission for development of the Ringsend wastewater treatment plant upgrade project including a regional biosolids storage facility.

Engineering Planning Report (DRAFT), Oldcourt LAP Lands, Firhouse, Dublin 24, January 2024.

Engineering Planning Report, Oldcourt LAP Lands, Firhouse, Dublin 24, September 2024.

Site Specific Flood Risk Assessment. Residential Development, Bohernabreena, Oldcourt, Ballycullen, Co. Dublin, July 2024.

Ground Investigations Report. Lands at Oldcourt, Ballycullen – Site Investigation, October 2015.