

**HYDROLOGICAL & HYDROGEOLOGICAL  
QUALITATIVE RISK ASSESSMENT**

**for  
PROPOSED DEVELOPMENT  
at  
BLAKES  
STILLORGAN,  
CO. DUBLIN**

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Technical Report Prepared For

**Cairn Homes Properties Ltd.  
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Dublin 2.**

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Our Reference

CLD/21/12054WR01

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Date of Issue

28 March 2022

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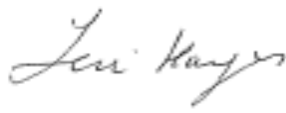
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**Document History**

Document Reference		Original Issue Date	
TH/21/12052WR01		28 March 2022	
Revision Level	Revision Date	Description	Sections Affected

**Record of Approval**

Details	Written by	Approved by
Signature		
Name	Colm Driver	Teri Hayes
Title	Senior Environmental Scientist	Director
Date	28 March 2022	28 March 2022

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## 1.0 INTRODUCTION

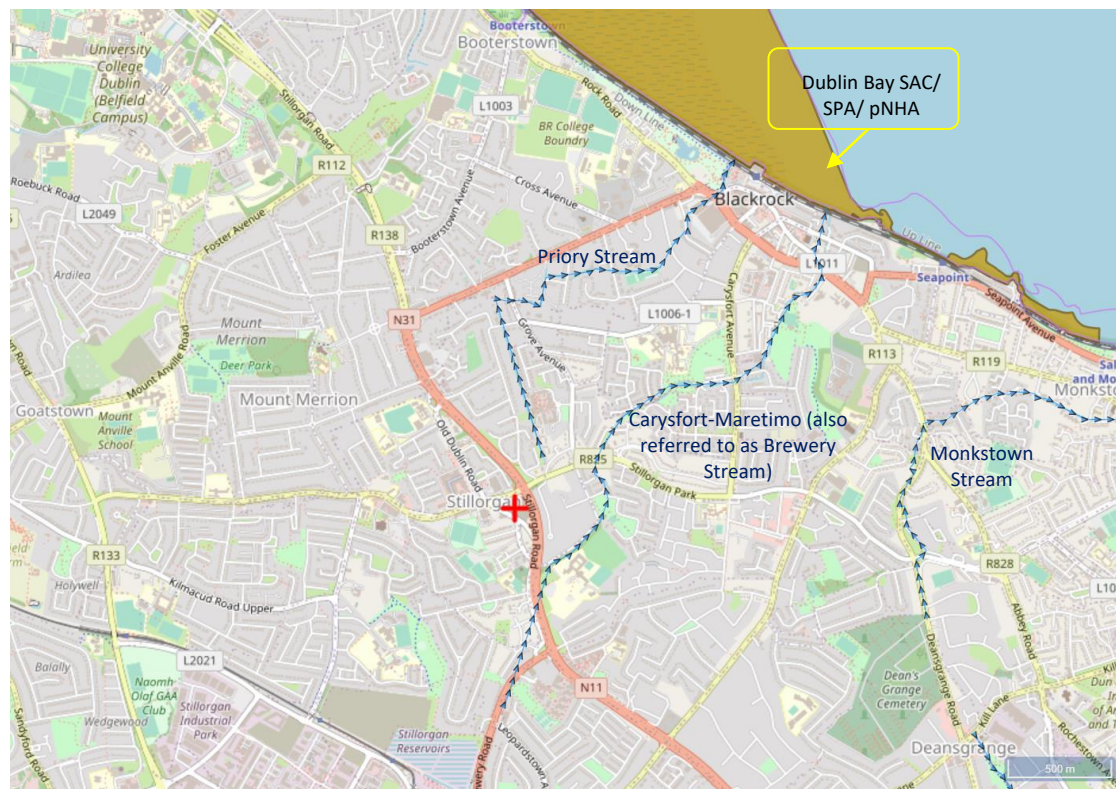
### 1.1 Site Location & Setting

Cairn Homes Properties Ltd intends to apply for a mixed-use scheme of “Built to Rent” BTR apartments, retail/commercial, childcare and residents’ facilities laid out in 6 no. blocks ranging in height from 3-9 storeys (over basement) comprising of apartment units.

The development will consist of the construction of a mixed use scheme of 377 no. “Built to Rent” BTR apartments, Community Sports Hall (933 sq. m), along with 5 no. restaurant/café (c. 841.2 sq.m), creche (c. 215 sq. m), office hub (195.3 sq. m) and ancillary residents’ support facilities/services (1,016 sq. m) laid out in 6 no. blocks ranging in height from 3-9 storeys (over basement) comprising 21 no. studio apartments, 189 no. 1 bedroom apartments, 159 no. 2 bedroom apartments & 8 no. 3 bedroom apartments, and public realm upgrades on a site of c. 1.41 hectares.

The proposed development site (Figure 1.1 below) is located on a brownfield development between the Hill Lwr. Kilmacud Road and the Stillorgan Road (N11), Stillorgan, Co. Dublin. The northern half of the site is above 48.7mOD and the southern half is subject to a rapid drop in elevation down to 46.8mOD.

The surrounding environment can be described as predominantly a mix of both retail/commercial setting with residential properties to the south.



Source: [www.epa.ie](http://www.epa.ie)

**Figure 1.1** Site Location (red cross) in relation to local drainage

## 1.2 Objective of Report

The scope of this desk top review is to confirm any hydrological pathway to Natura 2000 sites and determine the risks to water quality based on the construction and operation of the proposed development.

In particular, this review considers the possible impact of construction run-off and domestic sewage from the proposed development on water quality and overall water body status within Dublin Bay habitats SAC/ SPA/ pNHA which is located to the north-east of the proposed development (see Figure 1.1). The assessment relies on information regarding construction and design provided by Waterman Moylan Consulting Engineers Engineering Assessment Report 2022 and JBA Stillorgan Flood Risk Assessment report (March 2022).

This report is prepared by *Colm Driver (BSc MSc MIT)* and *Teri Hayes (BSc MSc PGeol EurGeol)*. Colm is an Environmental Consultant (Hydrogeologist) with AWN Consulting with over 5 years' experience in the field of environmental sciences including hydrogeology, soils, geology, geotechnical engineering, and impact assessment. His role at AWN includes responsibility for groundwater related projects including groundwater resource management and assessment, aquifer characterisation and source protection plans, contaminated land assessments, groundwater modelling, hydrogeology and geology in EIAR. His experience also includes the provision of hydrogeological conceptual site models (CSM) and ArcGIS mapping. Colm is a member of the International Association of Hydrogeologists (Irish Group), Irish Brownfield Network and Institute of Geologists Ireland.

Teri is a hydrogeologist with over 25 years of experience in water resource management and impact assessment. She has a Masters in Hydrogeology and is a former President of the Irish Group of the Association of Hydrogeologists (IAH) and has provided advisory services on water related environmental and planning issues to both public and private sector bodies. She is qualified as a *competent person* as recognised by the EPA in relation to contaminated land assessment (IGI Register of competent persons [www.igi.ie](http://www.igi.ie)). Her specialist area of expertise is water resource management eco-hydrogeology, hydrological assessment and environmental impact assessment.

## 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 environments.

### 2.1 Hydrological Catchment Description

Figure 1.1 above and Figure 2.1 below shows the site in relation to its hydrological environment.

The EPA (2022) on-line database indicates two watercourses (the Carysfort-Maretimo Stream (also referred to as Brewery Stream) and Priory Stream) within the general area of the subject site, as shown in Figure 2.1.

Both streams then flow into Dublin Bay coastal water which hosts the South Dublin Bay Special Area of Conservation (SAC), South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) and proposed National Heritage Area (pNHA) habitats. These are



further described in the Ecological Impact Assessment prepared by Altamar as part of this planning submission.



Source: [www.epa.ie](http://www.epa.ie)

**Figure 2.1** Site location in relation to regional drainage (hydrological setting – EPA, 2022).

The proposed development site lies within the Liffey River and Dublin Bay Catchment 09. The nearest surface water receptors lie to the south and north-east of the proposed development site. These are identified as the PRIORITY Stream (EPA code: 09P05) located approx. >200m to the north-northeast of the site, and Carysfort -Maretimo Stream (also referred to as Brewery Stream) (EPA code: 09B13) located approx. >250m to the south. The Stillorgan reservoir is fully lined and is situated >1km to the south of the site, off Brewery Road. The PRIORITY Stream is shown (EPA, 2022) as open watercourse at the Hawthorns, north of Stillorgan Park with the remainder of the watercourse shown as culverted flow northwards and north-eastwards towards Blackrock before final discharge to the southeast of Blackrock Park to Dublin Bay. In contrast, the Carysfort-Maretimo Stream (Brewery Stream) is shown (EPA, 2022) to start in Leopardstown and flow generally north-north-eastwards with intermittent open water course and culverted sections before finally discharging to Dublin Bay southeast of Idrone Terrace, Blackrock. The river is culverted for approximately 750 metres in the vicinity of the proposed development and can be a flood risk to the site during high rainfall events

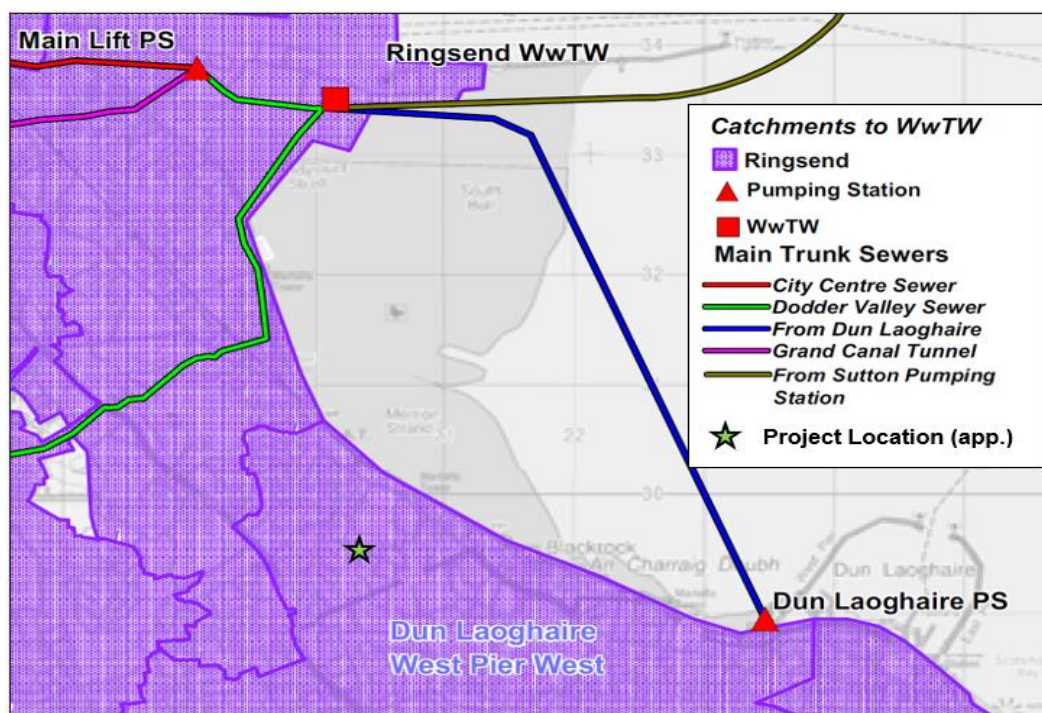
There is no open water hydraulic linkage between the proposed development and these water bodies. However, the PRIORITY stream is the receiving water for all drainage coming

from the site, via the manmade surface water drain which crosses the site and drains to the stream via a culvert under the N11.

Both streams discharge to Dublin Bay, which is c. 1.70 km downgradient of the site. The Dublin Bay waterbody (EPA online site code: 00206) includes Special Area of Conservation (SAC), Special Protection Area (SPA), and proposed Natural Heritage Area (pNHA). The Environmental Protection Agency (EPA, 2022) on-line mapping presents the available water quality status information for water bodies in Ireland. Dublin Bay has a WFD status (2013 – 2018) of 'Good'. Dublin Bay waterbody has a WFD risk score of 'Not at risk'. The ecological status of transitional and coastal water bodies during 2013-2018 for Dublin Bay is classed as 'good' (taken from Map 4.1 EPA, 2019). The most recent surface water quality data for the Dublin Bay for the 2015–2017 assessment on trophic status of estuarine and coastal waters indicate that they are 'Unpolluted' (based on Map 10, EPA, 2018). 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.

Both watercourses, i.e., the Priory Stream and Carysfort-Maretimo (also referred as the Brewery Stream), are currently designated for water quality by the EPA presently. The status for the Carysfort-Maretimo is currently classed as 'Moderate' status. This river is not monitored, and this status is based on expert judgement by the EPA. The Priory Stream is considered a part of the overall Carysfort-Maretimo. Therefore, the status for the Priory Stream is also considered 'Moderate'.

The foul sewer eventually discharges to the West Pier pumping station which transfers wastewater to Ringsend Waste Water Treatment Plant (WWTP) where it is treated and ultimately discharges into South Dublin Bay (refer to Figure 2.2 below). The WWTP and pumping station operate under an EPA licence D0034-01.



**Figure 2.2** Indicative Foul Sewer from West Pier to Ringsend WWTP (Source: Greater Dublin Strategic Drainage Study, 2005)



In general, urban wastewater is pumped to Ringsend WWTP, with additional capacity in a holding tank. When the flow is 6-7 times the dry weather flow, there is an approved overflow to the long sea outflow pipe (which extends out into Dublin Bay) and when this capacity is exceeded there is allowed overflow through a short sea outfall at West Pier. The understanding behind this design is that during these conditions, the discharge is highly diluted by rainfall and this is a short-term event into a water body with significant dilution.

With regard to local bathing areas, Dublin Bay hosts a number of swimming locations protected by the bathing water directive 2006/7. Water quality data is collected for nearby Seapoint and Merrion Strand bathing area and is reported by the EPA on [www.beaches.ie](http://www.beaches.ie). The EPA bathing status is not based on single events, rather it is based on a review of data over 4 years (based on data collected during the bathing season only). Bathing classes are determined as Excellent (highest cleanest class), Good (Generally good water quality), Sufficient (The water quality meets the minimum standard) and Poor (The water quality has not met the minimum standard). A review of this data for the last four years, shows that despite these temporary overflows, the current EPA (2022) Bathing Water Quality report has classified nearby Seapoint Strand as 'Excellent' for the last four years 2017-2020 (no classification in 2020). The nearby Merrion Strand has been classified as 'Poor' for the period 2018-2021 (no classification in 2020). According to Dublin City Council, one of the main problems at Merrion Strand is the impact from two polluted streams which flow onto the beach. These are the Elm Park and Trimleston streams which flow through both Dun Laoghaire-Rathdown and Dublin City Council areas. These streams are polluted by a combination of misconnections, where domestic plumbing goes into the wrong pipe and goes directly into the stream; leaks, spills and overflows from wastewater collection systems; and run-off from roads.

As the proposed development will have no additional stormwater run-off from current during stormwater event, the development will, therefore, have no measurable impact on the water quality in any overflow situation at Ringsend WWTP apart from a minor contribution from foul sewage. As explained in Section 3.4 below, the maximum contribution of foul sewage (peak flow of 6.46 l/s) from the proposed development is 0.058% of the peak hydraulic capacity at Ringsend WWTP. The proposed stormwater and foul water networks are entirely independent systems and rainfall will have no impact on foul flows to the West Pier Pumping station.

It should be noted that the bathing status has no direct relevance to the water quality status of the Natura 2000 sites due to rapid mixing and dilution resulting in no measurable change in water quality within the overall water body.

## 2.2 Aquifer Description & Superficial Deposits

The Geological Survey of Ireland GSI (2022) classifies the bedrock beneath the site and the surrounding area as dominated by rocks from the Caledonian system. The site is located over rock Type 2p microcline porphyritic (Rock Unit new code: INDNLGRP) which is described as Granite with microcline phenocrysts. 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

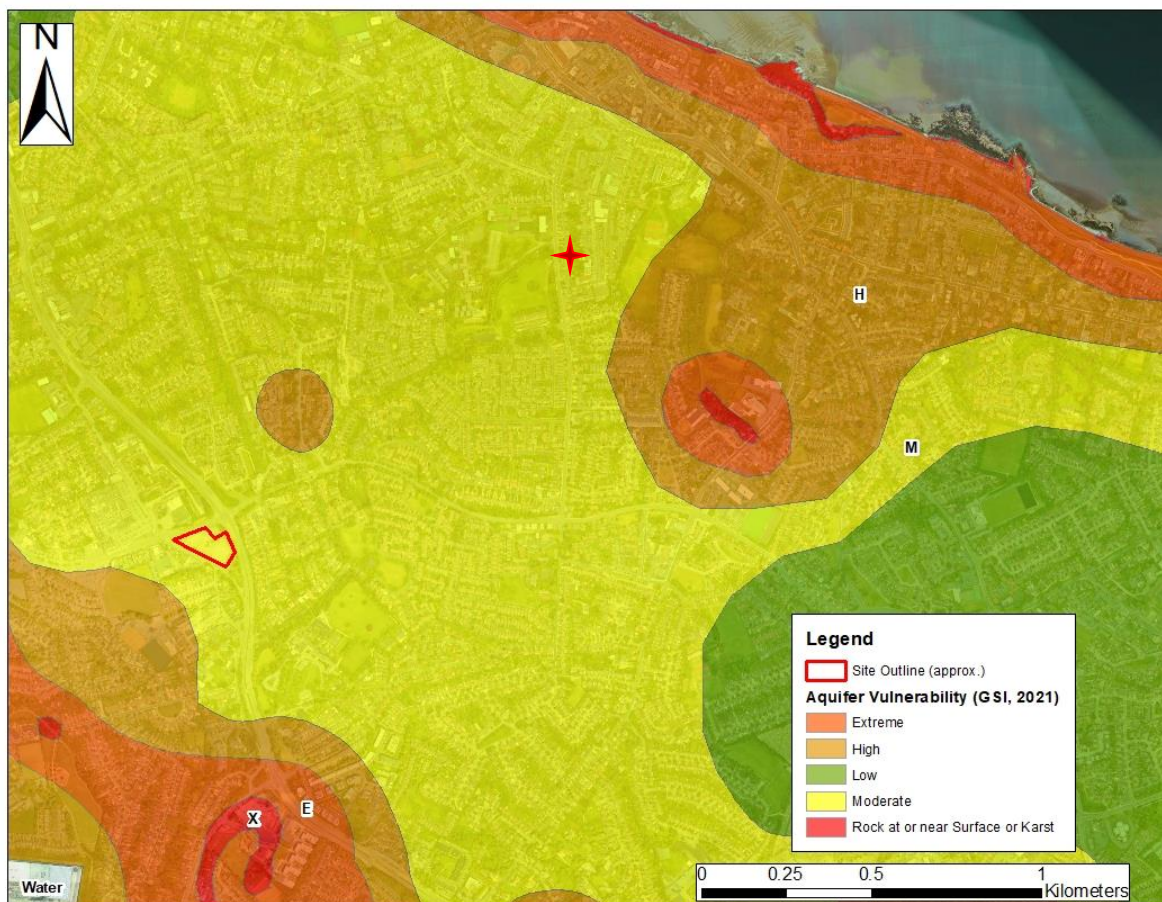


- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Rkd - Regionally Important Aquifer (karstified diffuse)

Presently, from the GSI (2022) National Bedrock Aquifer Map, the GSI classifies the bedrock aquifer beneath the subject site as a *Poor Aquifer (Pl)*, i.e. *Bedrock which is Generally Unproductive except for Local Zones*. The proposed development lies within the Kilcullen Groundwater Body (GWB), classified as poorly productive bedrock.

Presently, the groundwater body in the region of the site (Kilcullen GWB) is classified under the WFD Status 2010-2015 (EPA, 2022) as '*Expected to achieve good status*'. The WFD Risk Score system indicates the GWB as '*Not at risk*'.

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 (2022) guidance presently classifies the bedrock aquifer vulnerability in the region of the subject site as '*Moderate*' which indicates a general overburden depth potential of >5m, indicating a natural protection of the aquifer by low permeability glacial clays. The aquifer vulnerability class in the region of the site is presented as Figure 2.3 below.



Source: [www.gsi.ie](http://www.gsi.ie)

**Figure 2.3** Aquifer Vulnerability

The GSI/ Teagasc (2022) mapping database of the quaternary sediments in the area of the subject site indicates the principal subsoil type in the study area, underlying namely Made Ground which reflects the urbanised land use in the immediate area, comprises Limestone till Carboniferous (TLs, i.e. Till derived from limestones). According to the GSI (2022) geotechnical database, the nearest sites with available [limited] geotechnical records indicate depth to bedrock between 5.80 - 6.00 m bgl (metres below ground level). Locally, site investigation at the subject site indicates a variable depth to bedrock. Local Investigations indicate a depth to rock of 4m to 5m, with sequences of stiff Clay overburden overlying moderately weak to strong medium-grained Granite with moderate to highly weathered upper level, often recorded as non-intact in terms of discontinuities. Below the weathered zone lies generally strong to very strong medium-grained Granite with some degree of fracturing ranging from closely to widely spaced.

On the basis of the '*Moderate vulnerability*' classification the potential for any leakage of oil etc to ground to migrate horizontally or vertically is considered to be relatively low apart from where the natural clays have been removed and replaced with infill e.g., along drains etc. Site investigation has indicated contaminated soils in the vicinity of the former car dealership and petrol filling station. The contractor has planned removal of any contaminated soil to a licenced disposal site by a licenced waste contractor. As such the proposed development will reduce the potential for impact of any residual contamination to receiving waters. Mitigation measures are required during construction (removal of contaminated soils) to prevent any potential impact to the nearby Priory Stream.

### **2.3 Description of Current Site Drainage**

Currently the site is served by 2 No. existing foul sewers; an existing 600mm diameter foul sewer to the north in Lower Kilmacud Road and an existing 300mm diameter foul sewer to the east of the proposed development in the N11 Stillorgan Road. Foul water from the Blakes and Esmonde site discharge to the existing 600mm foul sewer on the Lower Kilmacud Road and to the existing 300mm sewer on the Old Stillorgan Road from the Esmonde Motors site.

It is proposed to divert the existing 300mm diameter foul which traverses the site in order to facilitate the subject development. All existing branch connections to these sewers carrying foul water flows will be retained. The private connections from the Former Blakes and Esmonde Motor site will be removed as part of the proposed works. The foul drainage from the subject site will generally connect to the diverted sewer, with some local connections provided to the 600 mm sewer at the northwest corner of the site serving the ground floor units of Blocks 3 - 5.

There is an existing 300mm diameter foul sewer which traverses the site from west to east. There are two 225mm diameter foul sewers connecting into this 300mm diameter on Old Stillorgan Road draining from the north and south. There is an existing 600mm diameter foul sewer on the Lower Kilmacud Road and a 300mm diameter foul sewer on the N11. This 600mm diameter sewer discharges north-eastwards to the Municipal Wastewater Treatment Plant at Ringsend via West Pier Pumping Station. Refer to Figure 2.4 below.



**Figure 2.4** Current Site Drainage (Source Irish Water – Waterman Moylan Report 2022a)

A flood assessment completed by JBA (March 2022) has shown the potential for flooding to occur on the site along this drain as a result of stormwater ponding and contribution from the Caryfort-Maritimo stream during high rainfall events.

A project-specific Flood Risk Assessment was carried out by JBA Consulting in March 2022. This recent FRA noted that *'the proposed buildings predominately site within Flood Zone C. As the development encroaches into Flood Zone A. Therefore, a Justification Test was required.'* Furthermore, it concluded that the Justification Test was applied and passed based on the following;

- The Stillorgan Local Area Plan 2018 (as a constituent of the Dun Laoghaire-Rathdown County Development Plan 2016-2022) has retained a 'district Centre' (DC) zoning on the proposed site. This denotes the intention " to protect, provide for and/or improve District Centre facilities". The zoning and designation of the overall site demonstrates that the development complies with Section 1 of the Justification Test.

- The Proposal has been subject to an appropriate flood risk assessment which shows:
  - The Development will not significantly increase flood risk elsewhere
  - The development (building FFL) is raised above the 1% AEP event including climate change and freeboard to minimise the risk to people and property as far as is possible. Wider site levels are managed so that any potential flooding is retained within the designed greenspace which can manage any flood flows through the site.
  - Residual risk is managed by the setting of appropriate finished floor levels, building placement and landscaping on site.
  - The development meets the standards of typical mixed use/residential development design. Therefore, in line with the Planning Guidelines the detailed FRA has applied and passed the Justification Test.

As a result, it is concluded that the site is in compliance with the core principles of the Planning System and Flood Risk Management Guidelines and has been subject to a commensurate assessment of risk.

The FRA concluded the following:

“JBA consulting has undertaken a detailed flood risk assessment for the proposed site in Stillorgan. The assessment has focused on verifying and improving detailed flood mapping and the impacts of the proposed new development would have on the site and surrounding area. The FRA has subsequently demonstrated that the design can appropriately manage flood risk without increasing risk to neighbouring properties and roadways.

A 1D-2D ESTRY-TUFLOW model of the site location and surface water network was created. Surface water flood risk is mitigated by natural attenuating landscaping, appropriate FFLs and the design of the surface water attenuation system with green roof Suds features. Safe access and egress from the property is maintained by a clear access route with raised levels at basement carpark entrances.

The FFLs of the development are above the 1% AEP climate change (MRFS) level plus a freeboard >1m. A substantial green space area is being maintained through the centre of the site in order to function as flood storage and retain any overland flows in high flood events which avoid inundating the culverts linking to the priory river downstream. The two attenuation tanks are designed to store a volume of a 1 in 100year storm event plus an allowance for climate change. Water level impacts were assessed pre-and post-construction. The results show no measurable increase in water levels following construction of the proposed development.

The FRA has been conducted in consonance of Dún Laoghaire-Rathdown County Council Strategic Flood Risk Assessment, and specifically sections 4.7, 4.7.1, 5.1 and 5.3.7 (Carysfort Maretimo).

In line with the Planning Guidelines the detailed FRA has applied and passed the Justification Test. As a result, it is concluded that the site is in compliance with the core principles of the Planning System and Flood Risk Management Guidelines and has been subject to a commensurate assessment of risk.”



### 3.0 REVIEW OF PROPOSED SITE DRAINAGE

#### *Proposed Stormwater Drainage*

There is an existing surface water sewer / culvert traversing the site in a north-east direction. This culvert, which forms part of the main Priory Stream catchment, discharges under the N11 to the Priory Stream. The size of the culvert varies through the site from a 1500mm wide x 800mm high stone arch culvert under the Old Stillorgan Road (The Hill) to a 1200mm wide x 1200mm high concrete culvert before turning into a 1200mm concrete pipe in the centre of the site and out to the N11.

There are two 225mm surface water sewers on the Lower Kilmacud Road to the north and a 225mm and 300mm on the N11 to the east. There is a 300mm surface water sewer traversing the Blakes and Esmonde site from the Lower Kilmacud Road connecting into the storm water culvert on the site. Refer to DLRCC record drawings in Appendix A. Surface water run-off from the Blakes and Esmonde site discharges through a series of drains and outfalls to the 1200mm storm culvert to the north-east of the site.

There is a 300mm surface water sewer traversing the Blakes and Esmonde site from the Lower Kilmacud Road connecting into the storm water culvert on the site.

It is proposed to divert the existing public surface water sewer traversing the site to a new location through the site. The development will attenuate the surface water on site before discharging it, at a restricted rate, to the proposed diverted surface water public sewer.

The drainage strategy for the development is to drain all of the building, podium levels and internal courtyards through various SUDS measures, into the onsite private surface water drainage system before out falling to the existing storm sewer at a restricted rate. Excess storm water will be stored in an attenuation tank, which will store storm water for the 1 in 100-year storm event including a 20% allowance for climate change. This is consistent with the drainage strategy approved under the *Planning Register Reference: (ABP-300520-17)* relating to the subject site.

A 300 mm diameter existing public surface water sewer traversing the site flows to the junction of Lower Kilmacud Road and the Stillorgan Road N11, to the north-east of the site. The existing 300mm dia. pipe flows discharges to a 1200mm large culvert which in turn flows north-east to an existing stream.

In accordance with the Dun-Laoghaire Rathdown County Council, Greater Dublin Strategic Drainage Study (GSDSDS) guidelines and CIRIA documents, surface water run-off should be managed as close to its source as possible, with the re-use of rainwater within the building prioritised. Sustainable Urban Drainage systems (SUDS) have been developed and are in use to alleviate the detrimental effects of traditional urban storm water drainage practice that typically consisted of piping run-off of rainfall from developments to the nearest receiving watercourse. Surface water drainage methods that take account of quantity, quality and amenity issues are collectively referred to as sustainable urban drainage systems; they are typically made up of one or more structures built to manage surface water run-off.

There is an existing culvert which traverses and varies in sizes through the site from a 1500mm wide x 800mm high stone arch culvert under the Old Stillorgan Road (The Hill) to a 1200mm wide x 1200mm high concrete culvert before turning into a 1200mm concrete pipe in the centre of the site and out to the N11. It is proposed that the existing surface water culvert be upgraded to a 1500mm diameter pipe with part diversion to facilitate the

development. This is in line with the previously approved scheme. The proposed surface water run-off from the development will drain via gravity to this diverted stormwater. The surface water run-off will be restricted to 3.29 l/s greatly reducing the existing run-off rate from site. Excess storm water will be stored in a suitably sized attenuation tank, which will store storm water for the 1 in 100-year storm event including a 20% allowance for climate change. This will be achieved by using a Sustainable drainage network of Green Roofs, Infiltration Trenches, Water Butts, Rain gardens, Rainwater Harvester and Porous Surfacing, all discharging the treated water to an underground storage tank. Surface water run-off will be restricted by a flow restrictor. The storm water system has been designed to cater for the 1 in 100-year storm plus a 20% allowance for climate change in accordance with GSDS Guidelines.

The proposed surface water features and design is further discussed in the Engineering Assessment Report (Waterman, 2022a) attached to this planning application.

#### *Proposed Foul Drainage*

It is proposed to divert the existing 300mm diameter foul which traverses the site in order to facilitate the subject development. All existing branch connections to these sewers carrying foul water flows will be retained. The private connections from the Former Blakes and Esmonde Motor site will be removed as part of the proposed works. The foul drainage from the subject site will generally connect to the diverted sewer, with some local connections provided to the 600 mm sewer at the northwest corner of the site serving the ground floor units of Blocks 3 - 5. Please refer to Waterman Moylan drawing No's. 20-071-P119, 20-071-P123 to P125 for details of diversions and associated wayleaves.

As set out above it is proposed to discharge the subject site to the 300 mm sewer traversing the site by gravity in accordance with Irish Water requirements, with some local connections to the 600 mm sewer at the northwest corner of the site. The proposal to divert the existing sewer has been agreed in principle with Irish Water and will be subject to a diversion agreement at the appropriate stage, approved under the Planning Register Reference: (ABP-300520-17).

The drainage will generally drain by gravity via slung drainage to be strapped to the underside of the ground floor slab within a dedicated service zone within the areas with basement below and by gravity below ground to its outfall location in all other areas. The foul drainage in the basement of building 1 & 2 will be pumped to a standoff manhole before draining by gravity to the proposed diverted existing 300mm diameter foul sewer located between the 2 No. basement / building areas. The foul drainage in the basement of building 3-5 will be pumped to a standoff manhole before draining by gravity to the existing 600mm diameter foul sewer located northeast of the site in the Lower Kilmacud Road.

The basement foul pumping stations will take foul drainage from the basement level only. This will include water runoff/ snow melt from cars and drains in stores and plant rooms. This pump station will be a private pump station, within the building basement, that will be operated by the client.

As part of the proposals, run-off from the basement car parks will discharge through petrol interceptors before discharge via a pump chamber and rising main to the external foul gravity drainage systems. See Drawing 20-071-P123 Drainage for the proposed basement drainage layout drawing.

This is consistent with the drainage strategy approved under the *Planning Register Reference: (ABP-300520-17)*. (Waterman, 2022a).

The dry weather flow (DWF) for the proposed mixed-use development is 1.99 l/s while the peak foul flow is estimated at 6.46 l/s. (Waterman, 2022a)

The proposed foul water system features, and design is further discussed in the Engineering Assessment Report (Waterman, 2022a) attached to this planning application.

#### 4.0 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.

#### 4.1 Assessment of Plausible Sources

Potential sources during both the construction and operational phases are considered. For the purposes of assessing 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) i.e., a worst-case scenario*. Construction sources (short-term) and operational sources (long-term) are considered below.

##### Construction Phase

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

- (i) Accidental 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.
- (ii) 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 phases of work this is again considered as a single short-term event rather than an ongoing event.
- (iii) The construction requires soil excavation and removal and import. Unmitigated run-off could contain a high concentration of suspended solids during earthworks. The removal of contaminated soil to a licenced disposal site by a licenced waste contractor. As such the proposed development will reduce the potential for impact of any residual contamination to receiving waters. Mitigation measures are required during construction (removal of contaminated soils) to prevent any potential impact to the nearby Priory Stream.
- (iv) Removal of contaminated material from the proposed development site.

These impacts could be considered as intermittent short-term events.

##### Operational Phase

The following sources are considered plausible post construction:

- (i) No oil storage is required for the proposed development (The heating source on site is a central gas fired boiler district heating system, with supplementary Air Source Heat Pumps (ASHPs), Combined Heat and Power Units (CHPs) and PV). Therefore, the only plausible leak is petrol/ diesel fuel from individual cars in basement parking

areas, run-off may contain a worst-case scenario of 70 litres. The risk of a short-term release of oil is already considered under the construction scenario above i.e., without mitigation. Within the basement carpark area, any rainwater entering the sealed system as a result of snow melt or raindrops from cars will pass through a petrol interceptor providing treatment before discharging to the foul sewer. These mitigation measures have not been considered in this risk assessment.

- (ii) The development will be fully serviced with [separate] foul and storm sewers which will have adequate capacity for the facility as required by Irish Water licencing. Discharge from the site to the public foul sewer will be sewage and grey water. The foul discharge from the site will join the public sewer and will be treated at the Irish Water Ringsend WWTP prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence and must meet environmental legislative requirements as set out in such licence. It is noted that an application for a new upgrade to this facility (Irish Water, 2018) has recently received planning and is expected to be fully operational with greater treatment capacity within 5 years. All [attenuated] stormwater will discharge to the public stormwater network which will ultimately discharge to Dublin Bay.

#### 4.2 Assessment of Pathways

The following pathways have been considered within this assessment with impact assessment presented in Section 4.4:

- (i) Vertical migration to the underlying Granite is minimised somewhat due to the recorded moderate vulnerability present at the site resulting in additional aquifer protection from any localised diesel/ fuel oil spills during either construction or operational phases. The site is underlain by [generally low permeable] Granite which the GSI classifies as a *Poor Aquifer (PI)*, i.e., *Bedrock which is Generally Unproductive except for Local Zones*. Flow paths are generally limited to within the upper weathered zones identified. Site investigation has indicated contaminated soils in the vicinity of the former car dealership and petrol filling station. The contractor has planned removal of any contaminated soil to a licenced disposal site by a licenced waste contractor. As such the proposed development will reduce the potential for impact of any residual contamination to receiving waters.
- (ii) There is an 'indirect' hydrological linkage for construction or operational run-off for any small hydrocarbon leaks from the site to the Priory Stream due to the presence of the concrete stormwater drain which crosses the site and discharges to the Priory Stream 200 m downgradient. This stream ultimately discharges to Dublin Bay over 2 km downgradient of the site.
- (iii) There is no 'direct' pathway for foul sewage to any receiving water body (as identified above). There is however an 'indirect pathway' through the public sewer which is pumped from West Pier and ultimately discharges to the Irish Water WWTP at Ringsend prior to discharge to Dublin Bay post treatment.

#### 4.3 Assessment of Receptors

The receptors considered in this assessment include the following:

- (i) Underlying [poor] Granite bedrock aquifer;
- (ii) Priory Stream;
- (iii) River Liffey Estuary Lower and Dublin Bay;



- (iv) Merrion Strand Bathing Water Quality (for reference); and
- (v) Natura 2000 sites.

#### 4.4 Assessment of Source Pathway Receptor Linkages

Table 4.1 below summarises the plausible pollutant linkages (S-P-R) considered as part of the assessment and a review of the assessed risk to waterbodies is also summarised below.

The overburden thickness and permeability together with the underlying Poor aquifer will help to minimise the rate of any off-site migration for any indirect discharges to ground at the site.

Site investigation has indicated contaminated soils in the vicinity of the former car dealership and petrol filling station. The contractor has planned removal of any contaminated soil to a licenced disposal site by a licenced waste contractor. As such the proposed development will reduce the potential for impact of any residual contamination to receiving waters. Mitigation measures are required during construction (removal of contaminated soils) to prevent any potential impact to the nearby Priory Stream.

Should any silt-laden stormwater from construction manage to enter the public stormwater sewer i.e. without on-site mitigation, the suspended solids will naturally settle within the drainage pipes by the time the stormwater reaches the Priory stream. Standard mitigation e.g., use of a silt buster or similar to allow settlement of any silt laden stormwater during construction will be incorporated into the construction plan design to minimise any impacts on stormwater drains. In the event of a [theoretical] 1,000 litre [worst case scenario used] hydrocarbon leak fully discharging to the stormwater sewer without mitigation, there is potential for some impact above water quality objectives as outlined in S.I. No. 272 of 2009/ Surface Water Amendment Regs SI No. 386 of 2015 in the receiving Priory Stream prior to dilution in the stream. This would be a short-term event. Based on the distance to Dublin Bay, and allowing for attenuation, there is no likely impact above statutory concentrations for an accidental discharge event during construction. During operation, with the presence of an oil/ petrol interceptor within the sealed basement car park area of the proposed development, there is no likely impact above statutory thresholds on the Priory stream or Dublin Bay. Based on the possible loading of any hazardous material during construction and operation there is subsequently no potential for impact on Dublin Bay water quality status from an accidental discharge to stormwater which discharges to the Priory Stream.

Based on an average daily wastewater discharge is calculated as 1.99 l/s and peak flow discharge is 6.46 l/s (Source: Waterman 2022a).

The peak wastewater discharge for the proposed development site is calculated as 5.90 litres/sec which is less than 0.1% of the current licensed discharge at Ringsend WWTP. As outlined in section 3.1 (iv), upgrade works have commenced in 2018 and are expected to be fully completed by 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 by Q4 2023.

As the proposed development will have no additional stormwater run-off from current during stormwater event, the development will, therefore, have no measurable impact on the water quality in any overflow situation at Ringsend WWTP apart from a minor

contribution from foul sewage. As explained in Section 3.4 below, the maximum contribution of foul sewage (peak flow of 6.46 l/s) from the Proposed Development is 0.058% of the peak hydraulic capacity at Ringsend WWTP. The proposed stormwater and foul water networks are entirely independent systems and rainfall will have no impact on foul flows to the West Pier Pumping station.

The 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.

Irish Water recently completed work on an €80 million, 400,000 population equivalent upgrade to the Ringsend Wastewater Treatment Plant. These upgrades to the WWTP were scheduled to be completed in the first quarter of 2021 and were completed in Q4 2021. Ringsend is the largest wastewater treatment plant in Ireland and was built to treat the wastewater for the equivalent of 1.64 million people. Currently the plant services over 40% of the national population and is treating wastewater for the equivalent of 1.9 million people.

This newly completed upgrade will accommodate the current demand, support planned housing in the Dublin Region and will improve the quality of the treated wastewater discharged to the Liffey estuary.

This capacity upgrade is one part of an overall investment of €400 million by Irish Water in the Ringsend Wastewater Treatment Plant Upgrade Project. Subject to planning permission, the overall upgrade project will enable full treatment of wastewater for the equivalent of 2.4 million people, meeting all foreseeable development needs to at least 2025.

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.

Even without treatment at the Ringsend WWTP, the peak effluent discharge, calculated for the proposed development, would equate to 0.058% of the licensed discharge at Ringsend WWTP [peak hydraulic capacity], 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). 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 Waterbody undertaken by the EPA (Water Quality in 2020: An Indicator Report, 2021) also shows that Dublin Bay on the whole, currently has an 'Unpolluted' water quality status (refer to [www.catchments.ie](http://www.catchments.ie)).

The assessment of the current proposal has also considered the effect of cumulative events, such as release of sediment laden water combined with a hydrocarbon leak on site. As there is adequate assimilation and dilution between the site and the Natura sites (South Dublin Bay), it is concluded that no perceptible impact on water quality would occur at the Natura 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 Irish Sea Dublin and Dublin Bay shows that they currently continue to meet the criteria for 'Unpolluted' water quality status (EPA, 2022).
- The Ringsend WWTP upgrade which is currently being constructed will result in improved water quality by Q4 2023 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 sites.

It should be noted that the bathing status has no direct relevance to the water quality status of the Natura sites due to rapid mixing and dilution resulting in no measurable change in water quality within the overall water body.

Finally, in a worst-case scenario not considering the operation of the SuDS and interceptor already included in the design, no perceptible risk to any Natura Sites 2000 is anticipated given the distance from source to Dublin Bay protected areas (c. 1.70 km). Potential contaminant loading will be attenuated diluted and dispersed near source area.

The 'Poor' bathing water status (issued by the EPA) for Merrion Strand will be unchanged by the proposed development at Stillorgan. The existing and proposed foul and storm sewers are 'separate' in compliance with the Building Regulations and Dublin City Councils 'Regional Code of Practice for Drainage works and Irish Waters Code of Practice for Wastewater Infrastructure'. As such, there is no potential for sewage-laden water from the proposed development to enter the local stormwater network ultimately discharging to the bathing area.

In addition, there is no long-term discharge planned which could have an impact on the

status of the water body. In the scenario of an accidental release (unmitigated leaks mentioned above) there is potential for a temporary impact only which would not be of a sufficient magnitude to effect a change in the current water body status.

Table 4.1 below presents a summary of the risk assessment undertaken.



Source	Pathways	Receptors considered	Risk of Impact
<p><u>Construction Impacts</u> Unmitigated leak from a construction vehicle.</p> <p>Discharge to ground of runoff water with high pH from cement process</p> <p>Unmitigated run-off containing a high concentration of suspended solids</p>	<p>Vertical migration inhibited by overlying stiff clayey soils (Moderate vulnerability)</p> <p>Indirect pathway through stormwater drainage to Priory Stream watercourse</p>	<p>Granite bedrock aquifer (Poor aquifer)</p> <p>Priory Stream</p>	<p>Low risk of localised impact to shallow weathered Granite due to thickness of protective clayey overburden. No likely impact on the status of the aquifer due to volume of leak indicated, natural attenuation within overburden and limited nature of bedrock fractures with depth reducing off site migration.</p> <p>Moderate risk of a temporary significant impact without mitigation due to chemical loading but no perceptible impact during operation as no bulk oil storage and basement car park areas drained through oil interceptors to the foul sewer. Any potential contaminant loading will be attenuated, diluted and dispersed near source area.</p>
<p><u>Operational Impacts</u> Foul effluent discharge to sewer</p> <p>Discharge to ground of hydrocarbons from carpark leak</p>	<p>Indirect pathway to Dublin Bay through public foul sewer, via Ringsend WWTP</p> <p>Indirect pathway through stormwater drainage to Priory Stream water course</p>	<p>Dublin Bay (SAC/ SPA/ pNHA)</p> <p>Priory Stream</p>	<p>No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge from the site would equate to 0.058% 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). As the proposed development will have no additional stormwater run-off from current during stormwater event, the development will, therefore, have no measurable impact on the water quality in any overflow situation at Ringsend WWTP apart from a minor contribution from foul sewage. The proposed stormwater and foul water networks are entirely independent systems and rainfall will have no impact on foul flows to the West Pier Pumping station.</p> <p>Low risk of a temporary impact without mitigation due to low chemical loading but no perceptible impact with an oil/ petrol interceptor and discharge to foul sewer proposed and potential contaminant loading will be attenuated diluted and dispersed near source area.</p>

**Table 4.1** Pollutant Linkage Assessment (*without mitigation*)

An assessment of plausible source pathway receptor linkages shows there is no resultant impact as a result of construction or operation of the proposed development, which could

result in any change to the current water regime (water quality or quantity) with Dublin Bay Natura 2000 sites.

## 5.0 CONCLUSIONS

A conceptual site model (CSM) has been prepared following a desktop 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 construction and operation phases there is no direct source pathway linkage between the proposed development site and open waters. There is no direct source pathway linkage between the Proposed Development site and any Natura 2000 sites (i.e. South Dublin Bay SAC/SPA/pNHA). There are indirect source pathway linkages from the proposed development through the stormwater drainage (via Priory Stream) which discharges into the Dublin Bay Natura Site and through the foul sewer which will eventually discharge to the Ringsend WWTP and ultimately discharges to South Dublin Bay SAC/SPA/pNHA. The future development has a peak foul discharge that would equate to 0.058% of the licensed discharge at Ringsend WWTP (peak hydraulic capacity).

Even disregarding the operation of design measures including an attenuation system and petrol interceptors on site, it is concluded that there will be imperceptible impacts from the proposed development to the water bodies due to emissions from the site stormwater drainage infrastructure to the wider drainage network. It should be noted the proposal also includes an attenuation system and petrol interceptors as part of best practice project design, and these features will provide additional filtration from the site to the drainage network.

It is concluded that there are potential pollutant linkages as a result of the construction of the proposed development which could result in a water quality impact which would be capable of having a significant effect on the Natura 2000 sites within Dublin Bay. However, there are no pollutant linkages as a result of the operation of the proposed development which could result in a water quality impact which would be capable of having a significant effect on the Natura 2000 sites within Dublin Bay.

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.

Mitigation measures during construction are required at this development to ensure the protection of the Priory Stream and downgradient Natura 2000 sites as such a Natura Impact Statement (NIS) is required. Mitigation measures set out in the NIS & CEMP will be implemented to ensure the protection of receiving watercourses and therefore, the downgradient Natura 2000 sites.

## 6.0 REFERENCES

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