HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT for PROPOSED RESIDENTIAL DEVELOPMENT SITE at BREWERY ROAD, STILLORGAN, CO. DUBLIN

Technical Report Prepared For

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1.0 INTRODUCTION

1.1 Site Location & Hydrological Setting

It is proposed to construct 287 No. residential units with the associated tenant amenities over a basement carpark, together with the construction of a new Crèche. The site, comprising approx. 1.8ha, is located at Brewery Road, Stillorgan, Co. Dublin (refer site location in Figure 1.1 below).

The existing site is located in the suburbs of Stillorgan, Co.Dublin. It is bounded to the north by Brewery Road beyond which lies predominantly residential properties, to the east by Stillorgan Road/ N11 route, to the southwest by the Leopardstown Tennis Club/ parkland and to the southeast by a number of existing residential developments (refer design drawings under separate cover).

The site is also currently occupied by The Grange Marketing Suite, The Lodge (an existing 2-storey house south of the main entrance), Oaktree Business Centre and the now redundant site set up for the neighbouring development (WM, 2019). The site cover is currently 50% hardstanding, with topography range of approx. +66.0mOD (north-west) to +74mOD (south-east).

The proposed development is approximately 2.5km from Dublin Bay (i.e. Blackrock to Dalkey coastline), see Figure 1.1 below.

Figure 1.1 Site Location in relation to regional drainage (hydrological setting)

The EPA (2019) on-line database indicates two watercourses within the general area of the subject site, as shown in Figure 1.1 above, and discussed further in Section 1.3 below. The nearest watercourse is the Brewery Stream (also referred to as the Carysfort Maretimo Stream by the EPA) located <20m from the site and culverted at this point. It is understood this surface water feature traverses the north western boundary of the subject site and is a modified urban watercourse. The Brewery Stream flows in a north-easterly direction towards Blackrock, where it discharges into Dublin Bay. There is also a network of surface water sewers along Brewery Road into which the site currently drains (WM, 2019).

1.2 Objective of Report

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

In particular, this review considers the likely impact of construction run-off and domestic sewage from the proposed development on water quality and overall water body status within Dublin Bay SAC/ SPA/ pNHA which is located ~2.5Km farther to the east of the proposed development (see Figure 1.1). The assessment relies on information regarding construction and design provided by Waterman Moylan Engineering Consultants (WM, 2019) for the site as outlined in their '*Engineering Assessment Report: Proposed Residential Development Site at Brewery Road, Stillorgan, Co. Dublin*, (Report ref: 18-093r.002, dated August 2019.

This report is prepared by *Teri Hayes* (BSc MSc PGeol EurGeol) and *Pat Groves* (BSc MSc HD Env Eng). Teri is a Senior Hydrogeologist/ Director with over 25 years' 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). Teri's specialist area of expertise is water resource management, eco-hydrogeology, hydrological assessment and environmental impact assessment.

Pat is a Senior Hydrogeological Consultant with over 17 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, groundwater modelling, hydrogeology and geology in EIAR. He is involved in project managing IPPC groundwater monitoring sites, contaminated land assessments.

1.3 Description of Drainage

There is no direct discharge to an open stream/ river proposed as part of this development. (Presently, discharge from the site has been assessed as discharging directly to public stormwater and to public foul sewer (via initial private foul drainage), for surface water run-off and foul wastewater, respectively).

The nearest surface water receptors lie to the west and north of the proposed development site (refer Figure 1.1 above). These are identified as the Brewery Stream (EPA code: 09B13) located to the immediate west of the site, and Priory Stream (EPA code: 09P05) located >1Km to the north of the site. The Stillorgan reservoir is fully lined and is situated >400m to the south-west of the site off Brewery Road. There is no direct open-water linkage between the proposed development and these three water bodies.

The proposed development will involve the construction of all associated infrastructure to service the development including a network of foul water and surface water drains, as well as a water main. The design will incorporate separate storm and foul sewer lines, with foul only to Ringsend Waste Water Treatment Plant (WWTP).

With regard to stormwater drainage, the existing site drains surface water, unrestricted, to an existing 1,500mm dia. public surface water sewer which runs along Brewery Road. It is proposed that the development will attenuate and treat the surface water on site before discharging it, at a restricted rate, via two outfalls, to the existing surface water public sewer on Brewery Road.

Stormwater from the site will be collected and will drain to an underground 396m^3 volume attenuation storage tank within the basement carpark, and a 175m^3 volume attenuation tank for the western section of the site, prior to exiting via 2 no. separate hydro-brakes at a design limited total outflow rate for the proposed development of 6.36 l/s into the proposed surface water drainage network, located on Brewery Road as discussed (WM, 2019). Surface water run-off and discharges from the proposed

development will therefore enter the downstream receiving environment via the existing surface water drainage network (SC, 2019), i.e. the discharge point is to the culverted Brewery Stream. This surface water feature is shown to flow towards Dublin Bay, i.e. South Dublin Bay SAC/ SPA/ pNHA, located >2.5Km to the north-northeast, Site code: 000210 (EPA, 2019).

The site is already served by a private foul sewer within the site which serves the existing Grange development to the south of the proposed development. The proposed development can drain all foul water drainage on site to the existing on-site private drainage system, which eventually drains to the public foul sewer, or directly to the public foul sewer in Brewery Road by gravity (WM, 2019). Furthermore, following communication of the foul water discharge proposal (based on Building Regulations 2010/ Technical Guidance Documents) for the site with Irish Water, it is understood that a connection to the foul water sewer is feasible without any upgrade and in accordance with Irish Water requirements. This indicates the existing network has sufficient capacity to drain the proposed Grange development. In summary, the proposed foul water outfall from the development is via a 225mm diameter pipe laid at a minimum gradient of 1:200, giving a minimum capacity of 32 l/s. Therefore, the proposed outfall has adequate capacity to cater for the calculated flows from the development. The foul sewer eventually discharges to Ringsend (WWTP).

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 River Liffey and Dublin Bay Catchment 09 and Dodder-SC-010 WFD sub-catchment 09-16. The Brewery Stream is shown (EPA, 2019) 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. In contrast, the Priory Stream is shown (EPA, 2019) as open watercourse at the Hawthorns, north of Stillorgan Park (refer Figure 1.1) 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.

The Dublin Bay (Site Code: 00210) waterbody includes Special Area of Conservation (SAC), Special Protection Area (SPA), and proposed Natural Heritage Area (pNHA). The Environmental Protection Agency (EPA, 2019) on-line mapping presents the available water quality status information for water bodies in Ireland. Dublin Bay has a WFD status of '*Good*'. The Liffey Estuary Lower waterbody has a WFD risk score of '*At risk of not achieving good status*' while the Dublin Bay waterbody has a WFD risk score of '*Not at risk'*. The most recent surface water quality data for the Liffey Estuary Lower and Dublin Bay (2010-2012) indicate that they are '*Unpolluted*'. 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, in the context of the proposed development, i.e. the Brewery Stream and Priory Stream, are not designated by the EPA presently. The current EPA (2019) Bathing Water Quality report has classified nearby Merrion Strand as 'Poor' for the last four years 2015-2018.

2.2 Aquifer Description & Superficial Deposits

The Geological Survey of Ireland GSI (2019) classifies the bedrock beneath the overall site and the surrounding area as dominated by rocks from the Caledonian system. The northern part of the site is located over rock Type 2p microcline porphyritic (Rock Unit new code: INDNLGRP) which is described as Granite with microcline phenocrysts. The southern part of the site is located over rock Type 2e equigranular (Rock Unit new code: IDNLGRE) which is described as pale grey fine to coarse-grained Granite.

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 (2019) National Bedrock Aquifer Map, the GSI classifies the bedrock aquifer beneath the subject site as a *Poor Aquifer (PI), i.e. Bedrock which is Generally Unproductive except for Local Zones*. The proposed development lies within the Kilcullen Groundwater Body (GWB, IE_EA_G_003), classified as poorly productive bedrock.

The proposed development area groundwater body is 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, 2019) 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 (2019) guidance presently classifies the bedrock aquifer vulnerability in the region of the subject site as '*Extreme E-X*' which indicates a general thin overburden depth potential of <3m or rock '*at or near surface or karst'*, indicating limited [if any] protection of the underlying aquifer by low permeability glacial clays. The aquifer vulnerability class in the region of the site is presented as Figure 2.1 below.

Figure 2.1 Aquifer Vulnerability (site location indicated, cross)

The GSI/ Teagasc (2019) 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 TGr i.e. Till derived from Granites). According to the GSI (2019) geotechnical database, nearby sites with available [limited] geotechnical records for similar sediments indicate depth to bedrock between 1.60 – 1.80m mbgl (metres below ground level - approximately 370-700m east and southeast of the site). Locally, however, historical boreholes for the subject site indicate that depth to bedrock ranges from 0.65m (western part of the site) to 2.65m (near the eastern boundary), with sequences of Made Ground/ gravelly Clay overburden overlying weak to medium-strong occasionally strong coarse-grained Granite with weathered/ non-intact rock recorded near the upper level, in terms of discontinuities. Below the weathered zone the rock quality of the Granite increases with depth with some degree of fracturing ranging from closely to widely spaced. (GII, 2018).

Geotechnical investigation boreholes at the site have indicated rock at/ near the surface including locations where outcrop is recorded -the GSI classification of 'Extreme E-X vulnerability' is therefore accurate here. On the basis of this vulnerability classification the potential for any leakage of oil etc to ground to migrate horizontally or vertically is considered to be relatively moderate to high including where historically the natural clays have been removed and replaced with infill/ Made Ground e.g. along drains etc. As parts of the subject site have been previously developed some more permeable Made Ground material will therefore be present.

Recharge to ground (where feasible) is considered best practice in regards to SUDS designs (Greater Design Strategic Drainage Study -Dublin City Council, and Dun-Laoghaire Rathdown County Council) and CIRIA guidance documents is also the approach for the proposed development which will provide a mix of Green Roofs, Permeable Paving and Swales to ensure run-off is of high quality.

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) 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) Re-fuelling will generally be undertaken off site for most construction sites.
(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 during earthworks. This could be considered an intermittent short-term event, i.e. if adequate mitigation measures were not incorporated in the Construction Environmental Management Plan (CEMP).

It is noted that the proposed development site is currently surrounded by a mix of retail/ commercial/ leisure development, in addition to residential, which already has a stormwater network infrastructure in place. As such, this existing wider built infrastructure, together with parkland, provides additional attenuation for stormwater run-off prior to ultimate off-site discharge from the subject development site.

Operational Phase

The following sources are considered plausible post construction:

(i) The area is serviced by natural gas therefore it is unlikely that oil storage will be required. However, it is understood that a small life safety generator will be

placed within the basement but storage would not be significant and would be contained in an effectively bunded tank within skid. In any event, the risk of a short-term release of oil is already considered under the construction scenario above. No other fuel/ hazardous materials form part of the development plans.

(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. The risk of a short-term release of oil is already considered under the construction scenario above i.e. without mitigation. It is noted that mitigation will be provided by a proposed oil/ petrol interceptor at the site. 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.

(iii) 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 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 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 go to the public stormwater network (i.e. to the culverted Brewery Stream) which will discharge to Dublin Bay.

3.2 Assessment of Pathways

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

(i) The potential for vertical migration to the underlying Granite exists due to the recorded Extreme vulnerability present at the site, and thin sequences of Clay resulting in limited 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 (Pl), i.e. Bedrock which is Generally Unproductive except for Local Zones*.

Flow paths are generally limited to within the upper weathered zones as identified in the ground investigation completed in 2018.

(ii) There is no open water hydrological linkage with the Brewery Stream or Dublin Bay located farther down-gradient. However, an 'indirect pathway' does exist through the public stormwater sewer network (and culverted Brewery Stream) which ultimately discharges to Dublin Bay (>2.5km downgradient).

(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 ultimately discharges to the Irish Water WWTP at Ringsend 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] Granite bedrock aquifer;
(ii) Brewery Stream;
(iii) River Liffey Estuary Lower and Dublin Bay;
(iv) Merrion Strand Bathing Water Quality (for reference); and
(v) Natura 2000 sites.

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.

The proven [albeit limited] clayey overburden thickness/ strength and moreso a general lack of fracture connectivity associated with low permeable Granite beneath the subject site will help to minimise the rate of off-site migration for any indirect discharges to ground at the site.

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 any open watercourse (Dublin Bay SAC/SPA/pNHA is located >2.5Km away). Settlement is considered to occur within a distance of <0.5 km.

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]

300 litre [worst case scenario used] hydrocarbon leak fully discharging to the stormwater sewer during low flow conditions 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 Brewery Stream prior to dilution in the stream. This would be a short-term event. Due to dilution and attenuation the impact would not be measurable >1km from the site i.e. there would be no likely exceedance above statutory guidelines within Dublin Bay. However, 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 in the off-site stormwater drainage. 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 on the Brewery Stream.

Based on a value of 150 litres/person/day (l/p/day) for residential units and 50 l/p/day for the créche (applying EPA, 2010 *Code of Practice for Wastewater*) and a varying occupancy between residential/ crèche, set against calculated persons per unit (288 no. units) and floor area (refer Section 1.1 above), the dry weather wastewater discharge is calculated at 1.57 l/sec Dry Weather Flow (DWF). The Peak Foul DWF is calculated to be 9.41 l/sec.

The sewage discharge will be licensed by Irish Water, collected in the public sewer and treated at Irish Water's WWTP at Ringsend prior to treated discharge to Dublin Bay. This WWTP is required to operate under an EPA licence (D0034-01) and to meet environmental legislative requirements. The plant has received planning (2019) and will be upgraded with increased treatment capacity over the next five years. The total dry weather discharge, calculated for the proposed development is well within the 'minimum' capacity of the proposed outfall, i.e. 32 l/sec to the Irish Water foul sewer line. In terms of outflow, the peak wastewater discharge is calculated at a wastewater discharge of 9.41 litres/sec (based on average dry weather flow of 1.57 litres/sec, as discussed above). The sewage discharge will be licensed by Irish Water, collected in the public sewer and treated at Irish Water's WWTP at Ringsend prior to treated discharge to Dublin Bay. This WWTP is required to operate under an EPA licence (D0034-01) and to meet environmental legislative requirements. The plant has received planning (2019) and will be upgraded with increased treatment capacity over the next five years. Even without treatment at the Ringsend WWTP, the peak effluent discharge, calculated for the proposed

development, would equate to 0.084% of the licensed discharge (peak hydraulic capacity) at Ringsend WWTP and 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). (*Note: As DWF, this would equate to approx. 0.034% of the DWF to the WWTP*). 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 (WWTP 2012 EIS, WWTP 2018 EIAR). Recent water quality assessment of Dublin Bay also shows that Dublin Bay on the whole, currently has an '*Unpolluted*' water quality status (EPA, 2019).

The assessment has also considered the *effect of cumulative events, such as* release of sediment-laden water combined with a hydrocarbon leak on site. As the potential hazard loading is low and there is adequate assimilation and dilution (distance >2.5 km) between the site and South Dublin Bay SAC/ SPA/ pNHA, South Dublin Bay and River Tolka SPA, it is concluded that no perceptible impact on water quality would occur. It can also be concluded that the cumulative or in-combination effects of effluent arising from the proposed development with that of other developments discharging to Ringsend WWTP will not be significant having regard to the size of the calculated discharge from the proposal.

The 'Poor' bathing water status (issued by the EPA) 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 Merrion Strand at Dublin Bay.

Source	Pathways	Receptors considered	Risk of Impact (without mitigation)
<u>Construction Impacts</u> Unmitigated leak from a construction vehicle. Discharge to ground of runoff water with High pH from cement process	Vertical with variable/ limited protection by overlying clayey subsoils (Extreme vulnerability)	Granite bedrock aquifer (Poor aquifer)	Moderate to high risk of localised impact to shallow weathered Granite due to variable thickness of protective clayey overburden. No likely impact on the status of the aquifer due to volume of leak indicated, some natural attenuation within overburden [albeit variable] and limited nature of bedrock fractures with depth reducing off site migration.
Unmitigated run-off containing a high concentration of suspended solids	Indirect pathway through stormwater drainage to Brewery Stream watercourse	Brewery Stream Dublin Bay (SAC/ SPA/ pNHA)	Moderate risk of a temporary impact without mitigation on Brewery Stream No likely impact due to low contaminant loading and distance (>2.5km) allowing attenuation and dilution near source area.
<u>Operational Impacts</u> Foul effluent discharge to sewer	Indirect pathway to Dublin Bay through public sewer, however main pathway is via Ringsend WWTP	Dublin Bay (SAC/ SPA/ pNHA)	No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge from the site would equate to 0.084% 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).
Discharge to ground of hydrocarbons from carpark leak	Indirect pathway through stormwater drainage to Brewery Stream water course	Brewery Stream Dublin Bay (SAC/ SPA/ pNHA)	Moderate risk of a temporary impact without mitigation on Brewery Stream No likely impact due to low contaminant loading and distance (>2.5 km) allowing attenuation and dilution near source area.

Table 3.1 Pollutant Linkage Assessment *(without mitigation)*

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.

There is no open water linkage between the proposed development site and Brewery Stream or Dublin Bay Natura 2000 site. It is concluded that there is also no resultant indirect source pathway linkage from the proposed development through public sewers which could result in any change to the current water regime (water quality or quantity) with Dublin Bay Natura 2000 sites

Finally, as outlined in the report prepared by WM (2019), and in line with good practice, mitigation measures have been included in the construction design, management of construction programme and during operation of the proposed development. 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.

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