HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT

for

PROPOSED MIXED USE DEVELOPMENT AT JAMESTOWN INDUSTRIAL ESTATE, JAMESTOWN ROAD, FINGLAS.

Technical Report Prepared For

Jamestown Village Ltd

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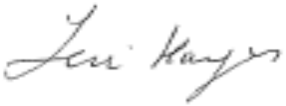
Signature		
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1.0 INTRODUCTION

1.1 Site Location & Hydrological Setting

AWN have been requested by Jamestown Village Ltd. to carry out a Hydrological and Hydrogeological Qualitative Risk Assessment for a proposed redevelopment of a vacant former factory site located at Jamestown Industrial estate, Jamestown Road, Finglas, Dublin 11.

The proposal comprises the redevelopment of a vacant former factory site (c. 1.76 ha) Finglas Business Centre, Jamestown Road, Finglas, Dublin 11 and construction of a mixed-use development across 5 no. Blocks (A-E) providing 321 no. Build to Rent apartments 110 no. 1-bed and 211 no. 2-bed units (each with balcony or terrace) and c. 4,497 sqm gfa. of commercial uses.

Figure 1.1 Aerial satellite view (site boundary in red)

The development will consist of:

1. Demolition of existing ESB substation and boundary treatments.
2. Block A (6 storeys) comprises a c. 195 sqm café, bike and bin storage, ESB substation, meter room and switch room at ground floor level with 79 apartments (28 no. 1-bed and 51 no. 2-bed units) at ground to fifth floor level.
3. Block B (6 storeys) comprises 47 apartments (23 no. 1-bed and 24 no. 2-bed units) with bike storage and meter room at ground floor level.
4. Block C (6 storeys) comprises a c. 290 sqm crèche, bin and bike storage, ESB substation, meter rooms and switch room at ground floor and 90 no. apartments (34 no. 1-bed and 56 no. 2-bed units) at ground to fifth floor level.
5. Block D (6 storeys) comprises a c. 450 sqm public gymnasium, ESB substation, switch room, meter room, bin and bike storage at ground floor alongside residential amenity space (c. 841.6 sqm) at ground floor including gym, study area, library/ quiet room, lounge, games area, kids play room, shared kitchen

and cinema room with 105 apartments (25 no. 1-bed and 80 no. 2-bed units) at first to fifth floor level and external roof terrace (c. 469 sqm).

6. Block E (5 storeys) comprises c. 125 sqm of retail, c. 262 sqm of flexible office space, ESB substation, switch room, WCs, reception and bin store at ground floor with c. 2,176 sqm of flexible office space at first to fourth floor level, with c. 686.8 sqm basement below providing 56 no. bicycle parking spaces, plant, storage and shower facilities associated with the office building.
7. Provision of external communal open space in a landscaped garden courtyard extending to c. 1,891 sqm with children's play area, open air stairs and lift providing access to basement parking and c. 168 sqm of communal open space at residents' allotments at the southern elevation of Block A, with c. 2,017 sqm of public open space provided, bicycle parking areas provided throughout the surface level of the site.
8. Shared vehicular and bicycle access is taken from a new secondary access road branching west from Jamestown Road at the northeast corner of the site (extending to the western boundary), with 17 surface car parking spaces (including 8 no. visitor [3 accessible], 4 no. crèche, 5 no. Go Car [1 accessible] spaces) in the northern part of site, with ramp access to a basement level (c. 6,386 sqm) providing 175 car parking spaces (163 no. residential [5 no. accessible], 5 no. Go Car, 7 no. office [1 accessible]) and 12 motorbike parking spaces, with a total of 907 no. bicycle parking spaces (171 at ground floor and 736 at basement).
9. A total of c. 1,049.2 sqm of residential support facilities in the form of laundry, management suite, reception, WCs, bin and bike storage.
10. All circulation and ancillary uses, associated infrastructure and enabling works associated with the development, green/blue roofs, telecommunications equipment (radio antennas and microwave link dishes at Block D roof level) landscaping, pedestrian access, set down area at southern perimeter, boundary treatments and ESB substation at northern perimeter.

There are no waterbodies within the Site of the Proposed Development. The closest surface water feature to the Proposed Development is the Bachelors Stream located 0.7km south west of the Proposed Development, which flows in a southwards direction for 2.5km before joining the River Tolka which ultimately discharges to the Tolka Estuary and Dublin Bay.

The surrounding environment can be described as a mix of both commercial setting and residential.

Figure 1.2 Site Location in relation to local drainage.

The nearest surface water body is the abovementioned Bachelors Stream. Surface waters in this catchment draining to the Bachelors Stream and River Tolka, prior to eventual outflow into Dublin Bay ca.6km to the south-east of the Site.

A review of the EPA (2020) on-line database indicates there are no groundwater or surface water dependent protected areas in the vicinity of the Proposed Development site. The nearest protected area is the South Dublin Bay and river Tolka Estuary SPA which is c. 5.9 km South-east of the site.

1.2 Objective of Report

The scope of this desktop review is to assess the potential for any likely significant impacts on receiving waters within 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 (construction run-off and domestic sewage) from the Proposed Development on water quality and overall water body status within the South Dublin Bay and River Tolka Estuary. The assessment relies on information regarding design provided by Barrett Mahony (BMCE). as follows:

- Flood Risk Assessment. Proposed Mixed use Development at Jamestown Road, Finglas, Dublin 11. (Lohan and Donnelly Consulting Engineers [L&DCE], Sept 2021).
- Construction and Environmental Management Plan. Proposed mixed use development at Jamestown Road, Finglas, Dublin 11. (Byrne Environmental Consulting [BEC] Ltd, Sept 2021).

- Drainage Infrastructure report. Proposed Mixed use Development at Jamestown Road, Finglas, Dublin 11. (Lohan and Donnelly Consulting Engineers, sept 2021)

This report was prepared by *Liam Bruen (BSc),* and *Teri Hayes (BSc MSc PGeol EurGeol)*. Liam is an environmental consultant working in the Environmental management sector. Liam holds a Bachelor of Science from Technological University Dublin in Environmental Management and is a member of the ESAI. 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). Her specialist area of expertise is water resource management eco-hydrogeology, hydrological assessment and environmental impact assessment.

1.3 Description of Drainage

The nearest surface water receptor is Dublin Bay Coastal Water Body (WFD Code: IE_EA_090_0000), which is located c. 6.5km to the southeast of the proposed development site. The nearest rivers to the site lie to the southwest and northeast of the proposed development site (refer Figure 1.1 above). These are identified as follows:

- The Bachelors Stream (River Waterbody Code: IE_EA_09T0111000) which is located c. 700m southwest from the site. The stream flows towards the southeast where it joins the Tolka River (River Waterbody Code: IE_EA_09T011100) c. 2.1km south of the proposed development.
- The Ballymun river (River Waterbody Code: IE_EA_09S0103000 is located 2.2km northeast from the Site of the Proposed Development. This watercourse flows north for 0.7km before joining the Santry River (River Waterbody Code: IE_EA_09S010300), located 2.1km north-east of the Site.

The surface water from the site drains via the existing storm water sewer located along Jamestown Road to the Bachelors Stream which in turn flows south-east for approximately 2.1km before entering the River Tolka just before it passes through Glasnevin Cemetery. The Tolka outflows into the Tolka Estuary ca.7.5km to the east of this point at East Wall.

The existing site is a brownfield site and is circa 1.79 hectares. The site is mostly hardstanding and there are no SuDS measures currently in place. The run-off from the site currently flows with no restrictions which during a storm event could contribute to an overflow in the public system and cause flooding in the area.

The Proposed Development will be served by a new surface water drainage system for the new development to collect runoff from the roof, paved areas and any additional runoff from landscaped areas which does not percolate to ground. It is proposed that all surface water entering the system will be attenuated on site before being discharged.

The design of the surface water drainage network has taken cognisance of the objectives and guidance contained in the Greater Dublin Strategic Drainage Study (GDSDS). The rate of run-off will be attenuated by a reinforced concrete attenuation tank and a flow control device (Hydrobrake or similar) for a flow limited to a runoff

rate of 3.42 l/s. The design has been based on the site critical duration storm for the 1 in 100-year return period in attenuation storage volume calculations and an increase in rainfall event depth by 20% to take account of climate change.

A series of SuDS elements are incorporated in the design, which will comprise treatment via the use of a blue and green roofs incorporating and permeable paving. This will result in improvement in the rate of and quality of stormwater discharging from the site compared to current.

Foul water will be drained separately by gravity. It is proposed to discharge the foul effluent generated by the Proposed Development to manhole F01. From F01 foul water is to flow via a 225mm diameter pipe to the existing sewer on Jamestown Road. This foul sewer will eventually discharge to the Ringsend Waste Water Treatment Plant (WWTP) where it is treated and ultimately discharges to Dublin Bay. The WWTP operates under the EPA licence D0034-01.

According to the Flood Risk Assessment carried out by L&DCE (2021), there is little or no risk of flooding affecting the site from tidal, fluvial or groundwater sources. The development may be susceptible to pluvial flooding. The Proposed Drainage system designed for a 1:100 year storm event with a 20% allowance for climate change, along with additional SuDS measures, should mitigate any risk highlighted by OPW pluvial flood maps. The site lies within a Flood Zone C (i.e., where the probability of flooding from rivers is less than 0.1% or 1 in 1000).

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 Tolka River sub-catchment (WFD name: Dodder_ Tolka_SC_020, id 09_4) (EPA, 2020) which is managed by the Dublin County Council (DCC).

The nearest surface water stream is the Bachelors Stream (River Waterbody Code: IE_EA_09T0111000) which is located c. 700m southwest from the site. The stream flows towards the southeast where it joins the Tolka River (River Waterbody Code: IE_EA_09T011100) c. 2.1km south of the proposed development.

The subject site is currently drained by the public surface water network via an existing surface water sewer located on Jamestown Road to the East of the site which currently discharges into the Bachelors Stream.

The Environmental Protection Agency (EPA, 2020) on-line mapping presents the available water quality status information for water bodies in Ireland.

The River Tolka (Section: Tolka_050) has a WFD status (2019) of ‘poor’. Dublin Bay has a WFD status of ‘Good’. The River Tolka 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 ecological status (which comprises biological and chemical status) of

transitional and coastal water bodies during 2013-2018 for the Tolka Estuary and Dublin Bay is classed as 'moderate' and 'Good' respectively.

The most recent surface water quality data for the Liffey Estuary Upper and Dublin Bay (2019-2020) 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.

2.2 Aquifer Description and Superficial Deposits

Mapping from the Geological Society of Ireland (GSI, 2020) indicates the bedrock underlying the site is part of the Lucan Formation (code CDLUCN) and made up of dark limestone and shale (Calp). The lithological description comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. The beds are predominantly fine-grained distal turbidites in the north Dublin Basin. The formation is intermittently exposed on the coast between Rush and Drumanagh Head. The formation ranges from 300m to 800m in thickness.

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 (2020) National Bedrock Aquifer Map, the GSI classifies the bedrock aquifer beneath the subject site as a '*Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*'. The proposed development is within the '*Dublin*' groundwater body and is classified as '*Poorly productive bedrock'*. The most recent WFD groundwater status for this water body (2013-2018) is '*Good*' with a current WFD risk score of '*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 (2020) guidance presently classifies the bedrock aquifer vulnerability in the region of the subject site as '*Low*' which indicates a general overburden depth potential of >10m. This shows that the aquifer is well protected by low permeability glacial clays. The aquifer vulnerability class in the region of the site is presented as Figure 2.1 below.

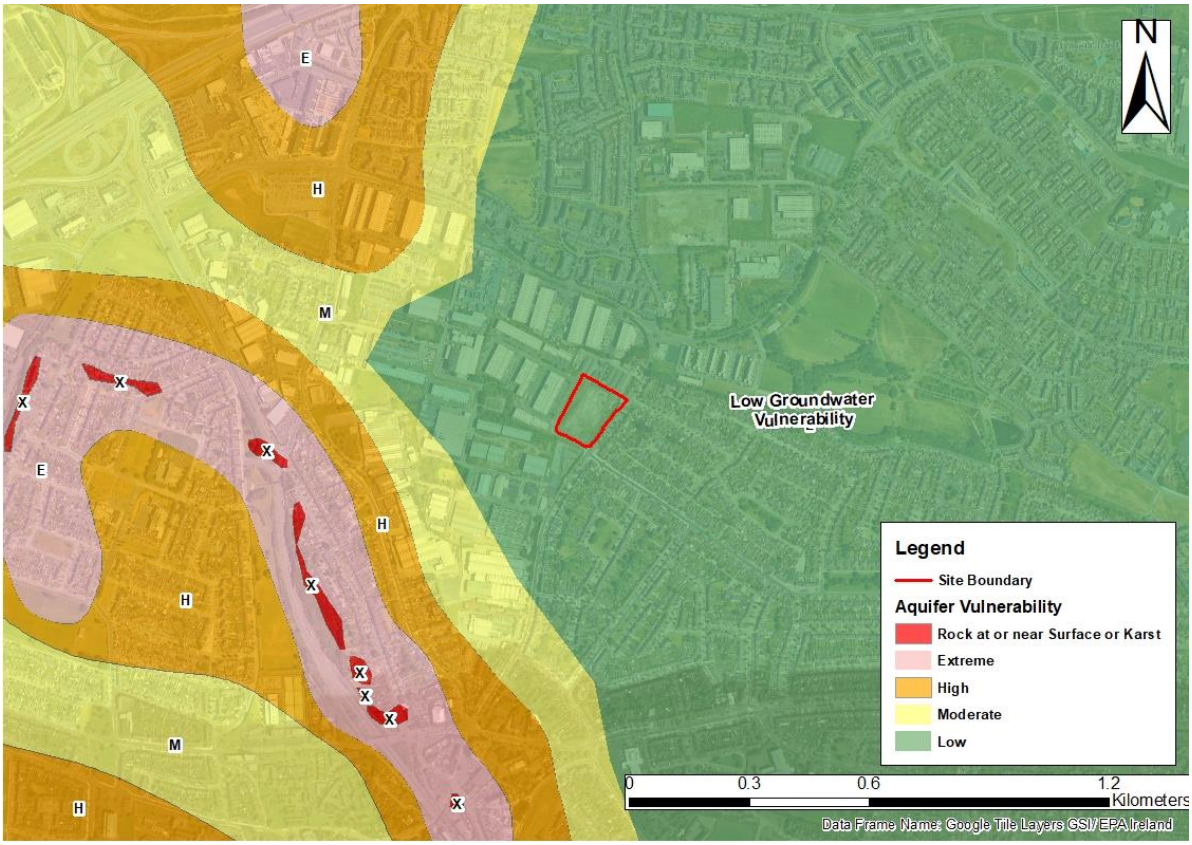

Figure 2.1 Aquifer Vulnerability

The GSI/ Teagasc (2020) mapping database of the quaternary sediments in the area of the subject site indicates the principal subsoil type in the area comprises Till derived from limestone.

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. The sources pathways and receptors are presented in the following sections with the overall impact presented in section 3.4. The impact is considered without consideration of mitigation measures.

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.

<u>Construction Phase</u>

The following sources are considered plausible 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. As a worst-case scenario, a rupture of a 1,000 litre tank directly to ground (without mitigation) is considered. 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. If concrete mixing is carried out on site, the mixing plant will be sited in a designated area with an impervious surface.

(iv) Construction requires soil excavation and removal and potentially groundwater collection. 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)

These could be considered intermittent short-term events, i.e. if adequate mitigation measures, which will be incorporated in the Construction and Environmental Management Plan (CEMP), fail.

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 car park/road areas. A worst-case scenario of 70 litres has been considered.

(iii) The stormwater drainage system comprises green roofs, permeable paving, petrol interceptor, and a reinforced concrete attenuation storage tank. The storage system will discharge following the characteristics of a greenfield run-off into the existing public surface water sewer located at the northern boundary of the site. As such the potential for silt laden runoff is low. This assessment considers the off site impact without consideration of mitigation provided by SuDs measures included in the design.

(iv) The development will be fully serviced with separate foul and stormwater sewers which will have adequate capacity for the facility and discharge limits (as required by Irish Water licencing requirements). 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 Wastewater Treatment Plant (WWTP) prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence and meet environmental legislative requirements as set out its licence.

This plant operates under an EPA licence (D0034-01) and is currently in the process of being upgraded to a PE of 2.4million to meet the increased demand of the Dublin area. The most recent Annual Environmental Report (AER 2020) shows it is currently operating for a PE peak loading of 2.27million while originally designed for 1.64million. However, the current maximum hydraulic load (832,269 m3/day) is less than the Peak hydraulic capacity as constructed (959,040 m3/day) i.e. prior to any upgrade works. These upgrade works (described in section 3.4 below) have commenced and comprise a number of phases and are ongoing and expected to be fully completed by 2025.

3.2 Assessment of Pathways

The following pathways have been considered within this assessment:

The potential for offsite migration due to any construction discharges is low as there is no significant pathway in the aquifer or through land ditches or streams.

(i) Vertical migration to the underlying limestone is minimised due to the recorded '*Low*' vulnerability present at the site resulting in good aquifer protection from any localised diesel/ fuel oil spills during either construction or operational phases. The site is underlain by Calp limestone which is a 'Locally Important Limestone Aquifer' characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local.

(ii) There is an indirect hydrological linkage for construction/ operation run-off or any small hydrocarbon leaks from the site to South Dublin Bay and River Tolka Estuary SPA through the public stormwater sewer.

(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 discharge to Dublin Bay post treatment.

3.3 Assessment of Receptors

The receptors considered in this assessment include the following:

(i) Underlying limestone bedrock aquifer;
(ii) River Tolka
(iii) Tolka Estuary & Dublin Bay SAC/SPA/pNHA

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 potential for impact on the aquifer is low based on the low chemical storage on site. The overburden thickness, low permeability nature of till and a lack of fracture connectivity within the limestone bedrock aquifer 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 site.

There is no direct open-water pathway between the site and the Tolka Estuary/Dublin Bay. However, there is an indirect pathway through the stormwater drainage should any silt-laden stormwater from construction or hydrocarbon-contaminated water from a construction vehicle leak manage to enter the public stormwater sewer which discharges to the Bachelor's Stream. However, the distance to this receptor is 700m from the site. Even without any mitigation measures in place on the site, the suspended solids will naturally settle within the drainage pipes, attenuate and dilute to background levels in the event of a worst-case hydrocarbon leak of 1000L. There is a low potential (if unmitigated at the site) for hydrocarbon concentrations in excess of background levels (water quality objectives as outlined in S.I. No. 272 of 2009 and S.I. No. 77 of 2019 amendment) by the time the stormwater reaches the Batchelors stream. Further dilution and attenuation would occur within the stream prior to discharge to the Tolka River. As such, there is no likely exceedance of water quality objectives as outlined in S.I. No. 272 of 2009 and S.I. No. 77 of 2019 amendment within the Tolka Estuary or the Dublin Bay SAC/SPA/pNHA.

During operation, the potential for sediment runoff is low based on the SUDs design measures included in the project design. In addition, the potential for hydrocarbon discharge is quite minimal based on a very unlikely individual vehicle leak (70 litres) would be the only source for hydrocarbon release. The drainage design also incorporates a pollutant interceptor system and significant attenuation prior to discharge to the public sewer. However, even without these design features in place, there is no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009 and S.I. No. 77 of 2019) for a worst-case scenario within the Batchelors stream or downgradient Tolka Estuary or Dublin Bay(i.e even without taking account the proposed SuDS, interceptor and attenuation system).

It can be concluded that the in-combination effects of surface water arising from the Proposed Development taken together with that of other developments will not be significant based on the low potential chemical and sediment loading and distance to receptors. In addition, all developments are required to incorporate SUDs measures in accordance objectives and guidance contained in the Greater Dublin Strategic Drainage Study (GDSDS).

The peak wastewater discharge is calculated at an average wastewater discharge of 13.64 litres/sec foul and surface water combined). Irish Water (IW) will have to approve the connection to the sewage network. Sewage will be collected in the public sewer and treated at IW's WWTP at Ringsend prior to discharge to Dublin Bay. In providing a permission for discharge to sewer, IW will have considered the capacity of their infrastructure (current and future capacity) and environmental impact. This WWTP is required to operate under an EPA licence (D0034-01) and to meet environmental legislative requirements. The Ringsend WWTP received planning permission for upgrading works in 2012. Works commenced on this upgrade in February 2018 and are due to be completed in 2021. This upgrade will deliver a 25% increase in capacity.

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.

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.

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. These works are at an advanced stage with testing and commissioning stages expected to be completed in the second half of 2021.

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. Award of the second contract is due in Q3 2021 and the third and forth contracts are scheduled to commence in late 2021 and mid 2023 respectively.

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 as 13.64 litres/sec (which would equate to 0.12% of the licensed discharge at Ringsend WWTP [peak hydraulic capacity]), would not have a measurable 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).

Recent water quality assessment for Dublin Bay also shows that Dublin Bay on the whole, currently continues to meet the criteria for 'Unpolluted' water quality status (EPA, 2020).

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 there is adequate assimilation and dilution between the site and the Natura sites (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 proposed developments or planned development pursuant to statutory plans in the greater Dublin, Meath and Kildare areas discharging to 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, data until July 2021).
- 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.

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

Source	Pathways	Receptors considered	Risk of Impact
Construction Impacts			
Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle.	Bedrock protected by >10m low permeability overburden. Migration within weathered/ less competent limestone is low (Calp limestone has discrete local fracturing rather than large, connected fractures).	Limestone bedrock aquifer (locally important aquifer)	Low risk of localised impact to shallow weathered limestone due to protective overburden. No likely impact on the status of the aquifer due to low potential loading, natural attenuation within overburden and discrete nature of fracturing reducing off site migration.
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	Indirect pathway through stormwater drainage to Dublin Bay water course (distance source-receptor: c.5.9 Km)	River Tolka South Dublin Bay and River Tolka Estuary SPA North and South Dublin Bay SACs North Bull Island SAC	No perceptible risk – Distance from source to Dublin Bay and River Tolka Estuary Natura sites (5.9 km approx.) Potential contaminant loading is low and will be fully attenuated diluted and dispersed (without mitigation measures in place) prior to reaching any Natura site.
Operational Impacts			
Foul effluent discharge to sewer	Indirect pathway to Dublin Bay through public sewer	South Dublin Bay and River Tolka	No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge (13.64 litres/sec which would equate to 0.12% of the licensed discharge at Ringsend WWTP), would not impact on the overall water

		Estuary SPA North and South Dublin Bay SACs	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 car leak	Indirect pathway through stormwater drainage to Dublin Bay water course (distance source-receptor: 5.9 km)	North Bull Island SAC	No perceptible risk – Negligible loading of chemicals and distance from source to Dublin Bay and River Tolka Natura sites) allowing for full attenuation and dilution. without mitigation measures in place).

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 direct source pathway linkage between the Proposed Development site and open water (i.e. South Dublin Bay and River Tolka Estuary SPA etc.). There are indirect source pathway linkage from the Proposed Development through public combined sewers to Dublin Bay (Circa 5.9 km downgradient of the proposed site) which discharge to Ringsend WWTP which ultimately discharges following treatment into Dublin Bay.

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 within Dublin Bay.

Finally, in line with good practice, mitigation measures are included during construction to minimise the potential for any accidental releases off site. During operation, the potential for an impact to ground or storm water is negligible and there are design measures incorporated within the Proposed Development to manage stormwater run-off quality. 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.

5.0 REFERENCES

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