HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT

for

RESIDENTIAL DEVELOPMENT SITE AT FORMER ABB SITE, BELGARD ROAD, TALLAGHT, DUBLIN 24

Technical Report Prepared For

Landmarque Property Group

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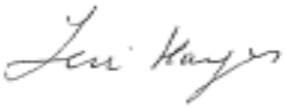
Signature		
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1.0 INTRODUCTION

1.1 Background

AWN have been requested by Landmarque Property Group to carry out a Hydrological and Hydrogeological Qualitative Risk Assessment for a residential located on the site of the ABB Building on Belgard Road, Tallaght, Dublin 24.

The site of c.0.898 ha is located at the former ABB Site, Belgard Road, Tallaght, Dublin 24, D24 KD78. The site is bound by Belgard Road (R113) to the east, Belgard Square North to the North and Belgard Square East to the west and Clarity House to the south.

The proposed development will consist of:

1. Demolition of all existing structures on site (with a combined gross floor area of c. 3625 sqm).

2. The construction of a mixed-use residential development set out in 3 No. blocks including a podium over a basement, ranging in height from 2 to 13 storeys, comprising:

    - 334 no. residential units of which 122 No. will be Build to Rent (BTR) residential units, with associated amenities and facilities across the development,
    - 4 No. commercial units and 4 no. commercial units associated with the 4 no. live-work units (530 sqm combined),
    - Childcare facility (144 sq.m.),
    - 660 No. bicycle parking spaces including 170 visitor spaces; 117 car parking spaces (including 5 disabled spaces) are provided at podium/ground floor level.
    - The overall development has a Gross Floor Area of 29,784 sq.m.
    - Two (2) podium residential courtyards and three (3) public accessible pocket parks, two (2) to the North & one (1) to the South.
    - Linear Park (as a provision of the Tallaght Town Centre LAP) providing safe public pedestrian and cycling access between Belgard Rd and Belgard Square East

3. Of the total 334 residential units proposed, unit types comprise:

    - Block A (Build-to-Rent)
        - 93 no. 1 bed units
        - 1 no. 2 bed 3 person units
        - 28 no. 2 bed 4 person units including 2 no. duplex units

    - Blocks B & C
        - 2 no. live-work studio units
        - 100 no. 1-bed units
        - 12 no. 2-bed 3 person units
        - 86 no. 2-bed 4 person units including 3 no. duplex units
        - 1 no. 2-bed 4 person live-work unit
        - 11 no. 3-bed units

4. All associated works, plant, services, utilities, PV panels and site hoarding during construction.

1.2 Hydrological Setting

According to the EPA river network (EPA maps, https://gis.epa.ie/EPAMaps/ accessed on 22-04-2022), the nearest surface water receptors are the Tymon River and the Jobstown Stream, which are located c. 210 m to the northeast and c. 700 m to the south of the site respectively (Refer to figure 1.1 below).

A review of historical maps of this zone was conducted (Geohive web maps; OPW, accessed on 22-04-2022), which does not show any additional historical rivers in the vicinity of the proposed development site.

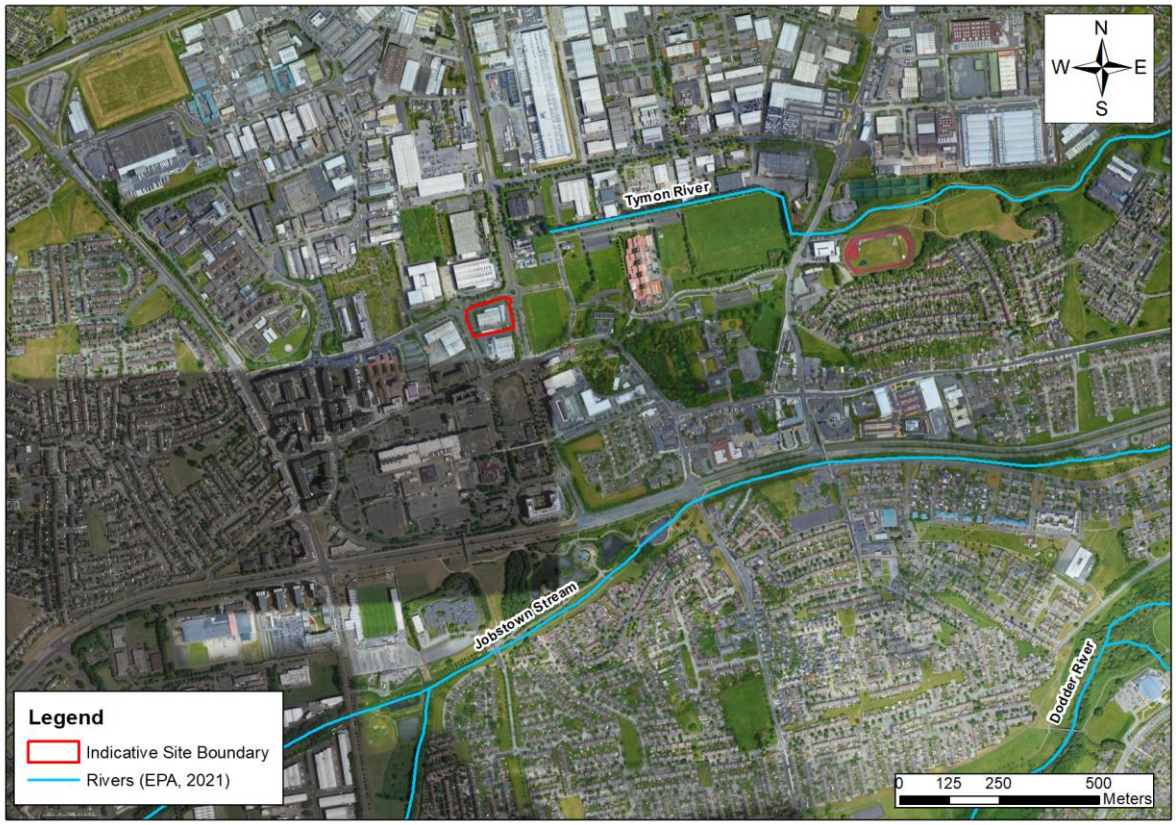

Figure 1.1 Site Location in relation to local drainage

The EPA (2022) on-line database indicates there is no NPWS protected area in the vicinity of the proposed development site. The nearest protected areas are the Glenasmole Valley SAC and the Wicklow Mountains SAC/SPA which are c. 3.6 and 5.8 km to the south of the site, respectively. The South Dublin Bay SPA/SAC/pNHA is c. 11km to the east of the site. There are no direct hydrological pathways between the site and these sites.

The topography of the site is flat with only localised falls for drainage purposes. Following receipt of the drainage records there is an existing 225mm stormwater line running along the eastern boundary of the development site on Belgard Road. There is also a stormwater line running along the northern and western boundaries of the site, the diameter of which is unknown.

It is proposed to discharge attenuated flows from the site to the existing drainage above mentioned on Belgard Road. This sewer possibly discharges into the Dodder River.

1.3 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 Tymon River, Jobstown Stream and ultimately Dublin Bay. The assessment relies on information regarding design provided by Landmarque Property Group as follows:

- Engineering Services Report. Former ABB Site. Belgard Road, Tallaght, Dublin 24 (CS Consulting, 2022);
- Flood Risk Assessment. Former ABB Site. Belgard Road, Tallaght, Dublin 24 (CS Consulting, 2022);
- Ecological Impact Assessment for a proposed SHD planning application for a residential development at the former ABB Site on Belgard Road, Tallaght, Dublin 24 (Altemar, 2022);
- Natura Impact Assessment for a proposed SHD planning application for a residential development at the former ABB Site on Belgard Road, Tallaght, Dublin 24 (Altemar, 2022);

This report was prepared by Marcelo Allende (BEng), and Teri Hayes (BSc MSc PGeol EurGeol). Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is an Environmental Consultant with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI). 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.

1.4 Description of Drainage

The residential development consists of c. 0.898 ha and is located at former ABB Site, on Belgard Road (refer to Figure 1.1 above). The site currently contains a light industrial/office building which is occupied by ABB Limited. It also contains a storage yard with the remaining portion of the site used for carparking

The development is bound by the primary route of Belgard Road and the secondary routes of Belgard Square North & East with active frontage opening onto this route. The physical boundary to the south has a wall separating the site from an adjacent property along which the LAP seeks to introduce a Tertiary route.

The nearest surface water receptor is the Tymon River (WFD code: IE_EA_09P030800; EPA segment code 09_1029) which, according to the EPA maps, begins its course c. 200m to the northeast of the proposed development site (refer Figure 1.1 above). This river crosses the Tymon Park and becomes the Poddle River downstream c. 2.3Km northeast of the site. The Poddle River

eventually discharges into the River Liffey in Dublin Centre c. 9Km to the northeast of the site.

The Jobstown Stream (WFD code: IE_EA_09D010620; EPA segment code 09_369) is located c. 700 m south of the site. This stream is a tributary of the Dodder River to which joins it at the Dodder Valley Park c. 2Km to the southeast of the proposed development site (refer Figure 1.1 above). The Dodder River ultimately discharges into the River Liffey at Ringsend c. 11 Km to the northeast of the site.

The topography of the site is mostly flat. An existing 225mm stormwater line running along the eastern boundary of the development site on Belgard Road. There is also a stormwater line running along the northern and western boundaries of the site, the diameter of which is unknown. The public surface water network on Belgard Road will provide a suitable surface water discharge point for the proposed development through a new manhole to be constructed over the existing sewer.

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) and the requirements of SDCC Drainage Division which state that all new developments are to incorporate the principles of Sustainable Urban Drainage Systems (SuDS).

The designed SuDS measures comprise (i) permeable paving to all new parking spaces and (ii) an attenuation tank with flow control device (Hydrobrake or equivalent), sized to contain 1-in-100 year storm event and increased by 20% for predicted climate change to limit the surface water discharge from the site during extreme rainfall events.

The restricted flow from the development site shall then discharge to the existing 225mm stormwater network along the eastern boundary. The last public manhole and network to the existing boundary sewer is to be constructed in accordance with the Local Authority's requirements.

With regard to foul water, there is an existing 225mm diameter gravity foul sewer traversing the Belgard Square Road, flowing down the Belgard Square East Road. The proposed development will be served by a new drainage system with separate sewers and manholes for both foul and storm water within the sites boundary. All foul effluent generated from the proposed development will be collected in 150mm diameter pipe, provision for a pumping station should be made subject to a survey of the existing levels to ensure a new connection to the existing 225mm diameter foul sewer running adjacent to the Belgard Square East Road can be made. The drainage network for the development shall be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

This foul sewer eventually discharges to the Ringsend Waste Water Treatment Plant (WWTP) where it is treated and ultimately discharges to Dublin Bay. This WWTP operates under the EPA licence D0034-01.

According to the Flood Risk Assessment carried out by CS Consulting (2022), the site is located within Flood Zone C (i.e., where the probability of flooding from rivers is less than 0.1% or 1 in 1000 years – probability of fluvial flooding is low risk). SuDS measures incorporated in the design will significantly reduce the volume of storm water leaving the site during extreme storms which in turn shall have the effect of reducing the pressure on the existing public drainage system.

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 Dodder River sub-catchment (WFD name: Dodder_SC_010, Id 09_16) (EPA, 2022). The Tymon River begins its course approx. 200m northeast of the subject development site. From here this river flows for approx. 2.3Km before discharging into the Poddle River, which in turn eventually outfalls into the Liffey Estuary transitional waterbody which in turn discharges into Dublin Bay coastal waterbody c. 11Km east of the site, which includes Special Area of Conservation (SAC)/ proposed Natural Heritage Area (pNHA).

The Jobstown Stream is located c. 700m south of the subject site and joins the Dodder River c. 2Km to the southeast of the proposed development site. From here the Dodder flows for approx. 11Km before discharging into the Liffey Estuary transitional waterbody at Ringsend.

The EPA (2022) on-line mapping presents the available water quality status information for water bodies in Ireland. The Tymon River (Poddle_010 WFD surface waterbody) has a '*Poor'* Water Framework Directive (WFD) status (2013-2018) and a WFD risk score of 'At risk of not achieving good status'. The '*Poor'* status assigned to the Tymon River is based on expert judgment (not actively monitored) by the EPA. The Jobstown Stream (Dodder_040 WFD surface waterbody) has a '*Poor'* WFD status and is also 'At Risk of not achieving good status'. This poor status is related to its biological status (invertebrate); all chemical conditions have been classified as 'good'. The most recent quality data (2019) for the Dodder River also indicate that it is 'Unpolluted' in the vicinity of the site (Old Bawn Bridge)

The Podder and Dodder sub-catchments discharge into the Liffey Estuary Upper and Lower, respectively. Both waterbodies have a WFD status (2013-2018) of 'Good'; the Dublin Bay Coastal waterbody has a WFD status of 'Good'. The Liffey Estuary Upper and Lower waterbodies have 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 surface water quality data for the Liffey Estuary and Dublin Bay (EPA, 2022) 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 maps, http://www.gsi.ie accessed on 22-04-2022) 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 (2022) 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 'Under Review'.

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 5-10m. This shows that the aquifer is naturally protected by low permeability glacial clays. The aquifer vulnerability class in the region of the site is presented as Insert 2.1 below.

Figure 2.1 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 residential area comprises TILL derived from quartzites (TLs).

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.

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) Hydrocarbons or any hazardous chemicals will be stored in specific bunded areas. Refuelling of plant and machinery will also be carried out in bunded areas to minimise risk of any potential being discharged from the site. As a worst-case scenario, a rupture of a 1,000 litre tank to ground is considered. 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. Run-off could contain a high concentration of suspended solids during earthworks. This could be considered an intermittent short-term event, i.e. on the assumption that mitigation measures to be incorporated in the Construction Environmental Management Plan (CEMP) do not work.

(v) A basement is not proposed as part of the development therefore no significant dewatering is required.

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 these areas; run-off may contain a worst-case scenario of 70 litres for example.

(iii) The stormwater drainage system follows SuDS measures, which are composed of an interception storage system (permeable paving) and an attenuation storage tank. The storage system will discharge following the characteristics of a greenfield run-off into the existing public surface water sewer located on Belgard Road. No additional treatment measures were considered due to the expected loading and provision of the mentioned interception system.

(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. It is noted that an application for a new upgrade to this facility is currently in planning.

3.2 Assessment of Pathways

The following pathways have been considered within this assessment:

The potential for offsite migration due to any construction discharges even without mitigation 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 ‘Moderate’ 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 no direct hydrological linkage for construction or operation run-off or any small hydrocarbon leaks from the site to the Tymon River, Jobstown Stream or Dublin Bay. However, an indirect pathway exists through the public stormwater sewer which ultimately discharges into the Dodder, 2Km to the southeast of the proposed development 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 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 aquifer;
(ii) Tymon River, Jobstown Stream and Dodder River; and
(iii) Liffey Estuary Upper/Lower and Dublin Bay.

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 during construction phase and post development. The overburden thickness and low permeability nature of till and a lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges to ground at the site. As such there is no potential for a change in the groundwater body status or significant source pathway linkage through the aquifer to any Natura site.

Should any silt-laden stormwater from construction or hydrocarbon-contaminated water from a construction vehicle leak manage to enter the public stormwater sewer, the suspended solids will naturally settle within the drainage pipes and hydrocarbons will dilute to 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 any open water based on the distance to waterways. Similarly, during operation, should any leak of hydrocarbon occur from a vehicle, the volume of contaminant release is low and combined with the significant attenuation within in the public stormwater sewers, hydrocarbons will dilute to background levels with no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009 and S.I. No. 77 of 2019. It can also be concluded that the in-combination effects of surface water arising from the proposed development taken together with that of other similar developments will not be significant given the potential loading of contaminant and the expected attenuation above mentioned.

The construction period will be less than 2 years. Even without mitigation the development has the potential to only have a *temporary* impact on the water quality as a result of an accidental discharge of suspended solids/ hydrocarbons during construction where not adequately mitigated. As such there is ***no potential for any change/impact on current water body status***.

The peak wastewater discharge is calculated at an average wastewater discharge of 0.38 litres/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 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 permission (2019) and will be upgraded with increased treatment capacity over the next five years. The peak foul discharge calculated for the proposed development is well within the current capacity of the WWTP.

The 2019 planning permission facilitated upgrading works to meet nitrogen and phosphorus standards set out in the licence, which are temporarily exceeded currently. The design includes aerobic granular sludge which will result in treatment of sewage to a higher quality than current thereby ensuring effluent discharge to

Dublin Bay will comply with the Water Framework Directive, Urban Wastewater Treatment Directive and Bathing Water Directive. It is understood at this point in time that the upgrade to use of aerobic granular sludge and other phased upgrades (excluding the proposed Clonshaugh development) will result in the WWTP achieving a population equivalent of 2.4 million and are to be completed between by 2027 to 2028. 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 inspectors 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. Page 12 of the grant of permission (reference: ABP-301798-18) states the positive impact arising from the delivery of the project "…which would improve compliance with EU Directives and corresponding legislation and would be pivotal in supporting planning and economic growth in Dublin City and its region".

The project is being progressed in stages to ensure that the plant continues to treat the wastewater (1.98 million population equivalent) 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 2019 planning permission facilitated upgrading works to meet nitrogen and phosphorus standards set out in the licence, which are temporarily exceeded currently.

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 0.38 litres/sec (which would equate to 0.003% 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). The most recent water quality assessment of Dublin Bay WFD Waterbody undertaken by the EPA (four yearly monitoring of trends for indicator parameters) also shows that Dublin Bay on the whole, currently has an 'Unpolluted' water quality status (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 (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 Dublin Bay shows that Dublin Bay currently continues 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 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.

As the Proposed Development will have no additional stormwater run-off during a stormwater event over and above the current level, surface water run-off from the development in the operational phase will therefore have no impact on the water quality in any overflow situation apart from a minor contribution from foul sewage. 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.

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 5-10m 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	Overland flow/ indirect pathway through stormwater drainage to Dodder water course.	Dodder River	No perceptible risk – Distance from source to Dublin Coastal Natura sites (>11 km approx.) Low contaminant loading will be attenuated diluted and dispersed to below statutory water quality standards within c. 0.5 km of the site i.e.no potential impact to the Natura sites
Unmitigated run-off containing a high concentration of suspended solids	Indirect pathway to Dublin Bay through public sewer (distance source-receptor [SAC]: c.11km).	South Dublin Bay SAC/pNHA and South Dublin Bay and River Tolka SPA	
Operational Impacts			
Foul effluent discharge to sewer	Indirect pathway to Dublin Bay through public sewer	South Dublin Bay SAC/pNHA and South Dublin Bay and River Tolka SPA	No perceptible risk – Even without treatment at Ringsend WWTP, the average effluent discharge (0.38 litres/sec which would equate to 0.003% 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 car leak	Indirect pathway through stormwater drainage to Dodder water course and Dublin Bay (distance source-receptor [SAC]: c.11km).	Dodder River and South Dublin Bay	No perceptible risk – Distance from source to Dublin Bay protected area too great (>11 km), potential contaminant loading will be attenuated diluted and dispersed 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 direct source pathway linkage between the proposed development site and open water (i.e. Dodder/ Poddle Subcatchments or Dublin Bay). 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) and open water as defined. There is an indirect connection through the foul sewer which will eventually discharge to the Ringsend WWTP which ultimately discharges to Dublin Bay. The future development has a peak foul discharge that would equate to 0.003% of the licensed discharge at Ringsend WWTP (peak hydraulic capacity).

It is concluded that there are no pollutant linkages as a result of the construction or operation (without mitigation) 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, as outlined in the reports prepared by CS Consulting (Engineering Services Report, 2022), and in line with good practice, mitigation measures have been included during construction. During operation the potential for an impact to ground or storm water is negligible and there are 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 assessment of likely risk in this report is in no way reliant on the implementation of mitigation measures during the construction or operational phases of the proposed development.

5.0 REFERENCES

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