HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT

for

A PROPOSED DEVELOPMENT LOCATED AT GOWAN HOUSE, CARRIGLEA BUSINESS PARK, NAAS ROAD, DUBLIN 12, D12 RCC4

Technical Report Prepared For

Malclose Limited

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TABLE OF CONTENTS

Figures

Tables

1.0 INTRODUCTION

1.1 Background

AWN have been requested by Malclose Limited to carry out a Hydrological and Hydrogeological Qualitative Risk Assessment for a development at Gowan Motors, Gowan House, Carriglea Business Park, Naas Road, Dublin 12.

Malclose Limited intend to apply to Dublin City Council for a 7-year permission for a large-scale residential development principally comprising student accommodation at this 0.962 Ha site at Gowan House, Carriglea Business Park, Naas Road, Dublin 12, D12 RCC4.

Works to upgrade of the access road to the west of the site on an area measuring c. 0.081 Ha are also proposed comprising new surfacing to the carriageway, the provision of inbound and outbound bicycle lanes from the development entrance to the Naas Road, the provision of a controlled pedestrian crossing on the access road at the Naas Road junction, and the provision of a further uncontrolled pedestrian and bicycle crossing linking the subject site with the approved Concorde SHD development (ABP Ref: TA29S.312218) to the west.

On the Naas Road, works are proposed on an area measuring c. 0.086 Ha comprising the realignment and widening of the existing pedestrian footpath along the westbound carriageway of the Naas Road and the provision of linkages from the realigned footpath to the development site, and the provision of new controlled pedestrian crossings across the eastbound and westbound carriages of the Naas Road and the provision of a new uncontrolled crossing of the Luas tracks.

The development site area and roadworks areas will provide a total application site area of c. 1.13 Ha.

The proposed development will principally consist of: the demolition of the existing two-storey office/warehouse building and outbuilding (5,172 sq m); and the construction of a development in two blocks (Block 1 (eastern block) is part 2 No. storeys to part 15 No. storeys over lower ground floor and basement levels with roof plant over and Block 2 (western block) is part 9 No. storeys to part 11 No. storeys over basement with roof plant over) principally comprising 941 No. Student Accommodation bedspaces (871 No. standards rooms, 47 No. accessible studio rooms and 23 No. studios) with associated facilities, which will be utilised for short-term lets during student holiday periods. The 871No. standard rooms are provided in 123 No. clusters ranging in size from 3 No. bedspaces to 8 No. bedspaces, and all clusters are served by a communal living/kitchen/dining room.

The development also provides: ancillary internal and external communal student amenity spaces and support facilities; cultural and community floor space (1,422 sq m internal and 131 sq m external) principally comprising a digital hub and co-working space with ancillary cafe; a retail unit (250 sq m); public open space; the daylighting of the culverted River Camac through the site; an elevated walkway above the River Camac at ground floor level; a pedestrian bridge link at first floor level between Blocks 1 and 2; vehicular access at the south-western corner; the provision of 7 No. car-parking spaces, 2 No. motorcycle parking spaces and 2 No. set down areas; bicycle stores at ground and lower ground floor levels; visitor cycle parking spaces; bin stores; substations; hard and soft landscaping; green and blue roofs; new telecommunications infrastructure at roof level of Block 1 including antennas and microwave link dishes, 18 No. antennas and 6 No. transmission dishes, together with all associated equipment; boundary treatments; plant; lift overruns; and all associated works above and below ground.

The gross floor area of the development is c. 33,140 sq m comprising c. 30,386 sq m above lower ground and basement level.

The surrounding area comprises industrial lands which include light industrial buildings, large warehouse-type units and offices (particularly onto Naas Road). In addition, the Carriglea residential development is located adjacent to the south and is nearing completion. The Gowan Motors facility consists of a single, large 2-storey building with at grade car parking facilities. There are also two minor, ancillary structures located within the southwest and southeast corners of the site: an outbuilding which is being demolished and a substation that is being retained.

The River Camac is a culverted river lying from c. 7.5 to 10 metres below the ground floor level through the development site, and flows at an angle through the middle of the subject site from northwest to southeast. The proposed development includes for daylighting approximately 76 No. metres of the River Camac. The intention is that this would create 1,261 sq m (13% of the site area) of space allocated for the Riparian Zone.

To establish softer, more natural riverbanks that will aim to improve the quality of the River Camac and enhance biodiversity at the river level, a combination of grey and green bioengineering solutions are proposed such as vegetated rip-rap and willow staking, spiling and mattressing.

The Camac River flows culverted underground the subject site and the adjacent Carriglea lands (Phase 1 Planning Ref. 2203/18 and Phase 2 SHD TA29S.311606) before re-emerging immediately east of these lands where it drains north-eastwards through Landsdowne Valley.

The potential impacts on the receiving water environment considered withing this report are:

- The management of foul, surface water run-off and accidental oil leaks during construction phase.
- Connection to foul sewer and stormwater sewer during operation. Due to the residentiall nature of the proposed development it has been assumed that there will be no bulk oil storage during the operational phase.

1.2 Hydrological Setting

A culverted section of the Camac River runs diagonally through and beneath the site, flowing in a south-easterly direction (refer to Figure 1.1 below).

The Camac River in this area flows from the South Dublin County Council area at the Old Naas Road. There are four stretches where the river channel is open and natural but these are so short and far apart that the river is essentially a heavily modified water body and has been designated as such in the River Basin Management Plan (RBMP). The river passes through a number of industrial estates and then flows through Lansdowne Valley Park. The Robinhood Stream, the Gallblack River (including the Blackditch and Gallanstown streams) and the Walkinstown Stream all discharge to the Camac River. In addition, an extensive surface water drainage network discharges to the Camac River and a significant number of combined sewer overflows also discharge to the river and its tributaries. The area is heavily developed by a mixture of industrial and commercial development. Increasingly residential development is being built in this area. Some land owned by DCC and others near the river are required for flood storage. Developments are likely to be infill or brownfield sites. A significant portion of the river is culverted under the old and new Naas Roads as well as under Davitt Road and the Grand Canal.

It should be noted that the Naas Road Lands LAP (adopted January 2013, extended until January 2023 and expired in January 2023) identifies the de-culverting of the Camac River as an objective.

A review of the EPA (2023) on-line database indicates that the nearest designated land to the site is the Grand Canal pNHA (Site Code: 002104) at c.540m to the north of the subject site. As the canal is a contained feature (fully lined) there is no potential for a source pathway linkage.

The nearest Natura 2000 Sites with potential hydrological link are South Dublin Bay Special Area of Conservation (SAC)/ proposed Natural Heritage Area (pNHA) and South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) sites which are c. 8.1 km to the east of the site. There will be an indirect discharge to the Dublin Bay waterbody from the Proposed Development site through the stormwater and foul water site drainage as described in Section 1.4 below.

There is no direct hydrological connection between the proposed development and these sites.

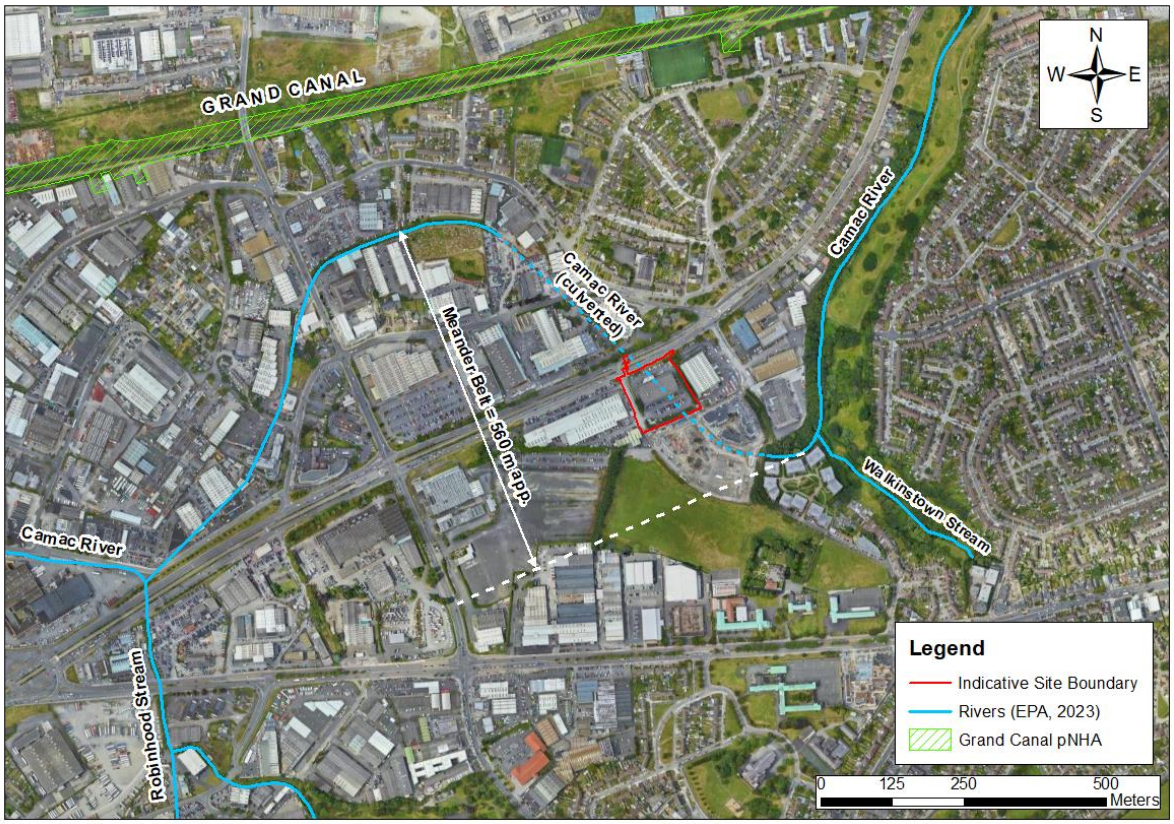

Figure 1.1 Location and Hydrological Environment

1.3 Objective of Report

The scope of this desktop review is to assess the potential for any likely significant impacts on receiving waters and protected ecological 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. design or 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 (where the relevant European Sites are located). The assessment relies on information regarding construction and design provided by the applicant as follows:

- Civil Engineering Infrastructure, Flood Risk and Transportation Report. Former Gowan House Site – Mixed Use Development. Barrett Mahony Consulting Engineers (BMCE) August 2023, which accompanies this planning application.
- Flood Risk Assessment Report. Development at Gowan House, Carriglea Business Park, Naas Road, Dublin 12. Barrett Mahony Consulting Engineers (BMCE) August 2023, which accompanies this planning application.

This report was prepared by Marcelo Allende (BSc, BEng), and Teri Hayes (BSc MSc PGeol EurGeol). Marcelo is a Water Resources Engineer with over 18 years of experience in environmental consultancy and water resources studies. Marcelo is a Senior Environmental Consultant (Hydrologist) 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 Existing Site and Proposed Drainage

Existing and Proposed Surface Water Drainage

The existing building on the site, along with the gullies serving the surface car park, connect to a local surface water system before discharging to the Camac culvert. There is an existing 450mm concrete public surface water sewer running along the northern boundary of the site within the Naas Road carriageway. A 225mm concrete public surface water sewer also runs along the northern boundary of the site within the Naas Road public footpath. Both stormwater pipes discharge to the culverted Camac River just north of the subject lands. To the north of the site, on the Naas Road, there are additional 4no. surface water sewers which discharge into the Camac River.

The development will be served by a new separate surface water gravity drainage system to collect runoff from the roof & paved areas. The proposed surface water network on site will connect to a new chamber to be constructed adjacent to the Camac culvert, on the west side of the site.

It is proposed to provide 1 no. buried attenuation tank within the site which will be located in the northwest corner of the site. This will be designed for the 1 in 100-year rainfall event plus 20% due to climate change. The discharge flow will also be attenuated through a proposed flow control device (hydro-brake or similar) with outflow from limited to a greenfield rate prior to outfall into the Camac River.

The design includes Sustainable Urban Drainage Systems (SuDS) which will be incorporated to reduce run-off volumes and improve run-off water quality. The SuDs features comprise green/ blue roofs, swales and permeable paving.

Refer to the Civil Engineering Infrastructure Report (BMCE, 2023) for further details. It should be noted that these SuDS measures have not been taken into account in the subsequent analysis.

Flood Risk Assessment

BMCE carried out a Flood Risk Assessment (FRA) Report which is included as part of this application. This FRA includes a numerical hydraulic model for the daylighting of the Camac River culvert. Based on this analysis, the proposed open section will be capable of carrying even a flow associated with an extreme storm event of 0.1% AEP (i.e., where the probability of flooding from rivers is 0.1% or 1 in 1000 years – probability of fluvial flooding is low risk), plus 20% due to climate change, without affecting the basement level. Therefore, no flood events will result in flooding of the Proposed Development, and the development will not affect flood storage volume or increase flood risk elsewhere.

Existing and Proposed Foul Water Drainage

There are two existing public combined foul water sewers located in the Carriglea Industrial Estate Road to the west of the proposed development site; a 1,350mm sewer and a 225mm diameter sewer. These sewers flow towards Drimnagh Castle to the south. The existing foul water from the development site flows to a chamber at the southwest corner of the site, where it then leaves the site to the west, presumably connecting to one of the existing sewers mentioned above. Refer to the Civil Engineering Infrastructure Report (BMCE, 2023) for further details.

The foul water from the proposed development eventually discharges to the Ringsend Waste Water Treatment Plant (WWTP) which in turn discharges into Liffey Estuary Lower and Dublin Bay waterbodies.

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

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

2.1 Hydrological Catchment Description

The proposed development site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and River Liffey sub-catchment (WFD name: Liffey_SC_090, Id 09_15) (EPA, 2023). The nearest river is the Camac River which flows underneath the subject site and discharges into to the River Liffey Estuary Upper WFD (European Code IE_EA_090_0300). The Liffey Transitional Water Body discharges into the Dublin Bay (c. 12.8 Km to the east of the site).

The Environmental Protection Agency (EPA, 2023) on-line mapping presents the available water quality status information for water bodies in Ireland. The Camac River in the development area belongs to the '*Camac_040*' WFD surface waterbody which has a '*Poor*' Status (WFD 2016-2021 status, EPA, 2023) and its WFD risk score is *'At Risk*' of not achieving good status. This '*Poor*' status is related to its biological (invertebrate) status or potential (refer to www.catchments.ie).

The Coastal Waterbody Dublin Bay has a WFD status (2016-2021) of '*Good*' and a WFD risk score of '*Not at risk*'. The ecological status (which comprises biological and chemical status) of transitional and coastal water bodies during 2016-2021 for Dublin Bay is classed as '*Good*'. The most recent surface water quality data for the Dublin

Bay on trophic status of estuarine and coastal waters indicate that they are '*Unpolluted*' (based on *Water Quality in 2022*, EPA, 2023)'. 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 (refer to www.catchments.ie).

As the proposed development will have no additional stormwater run-off, when compared with the existing situation, during a stormwater event, the development will, therefore, have no measurable impact on the water quality in any overflow situation at Ringsend WWTP apart from a minor contribution from foul sewage. As explained in Section 3.4 below, the maximum contribution of foul sewage (peak flow of 13 l/s) from the Proposed Development is 0.12% of the peak hydraulic capacity at Ringsend WWTP.

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

2.2 Aquifer Description & Superficial Deposits

Mapping from the Geological Society of Ireland (GSI, 2023 http://www.gsi.ie, accessed on 01-08-2023) 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 (2023) 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 (Ground Waterbody Code: IE_EA_G_008) and is classified under the WFD Status 2016-2021 (EPA, 2023) as having '*Good status'*. The WFD Risk Score system for this GWB is 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 (2023) guidance presently classifies the bedrock aquifer in the region of the subject site as having '*Moderate*' vulnerability which specifies a general overburden depth between 5-10 m, indicating that the aquifer is moderately protected by low permeability tills. The GSI aquifer vulnerability class in the region of the site is presented as Figure 2.1 below.

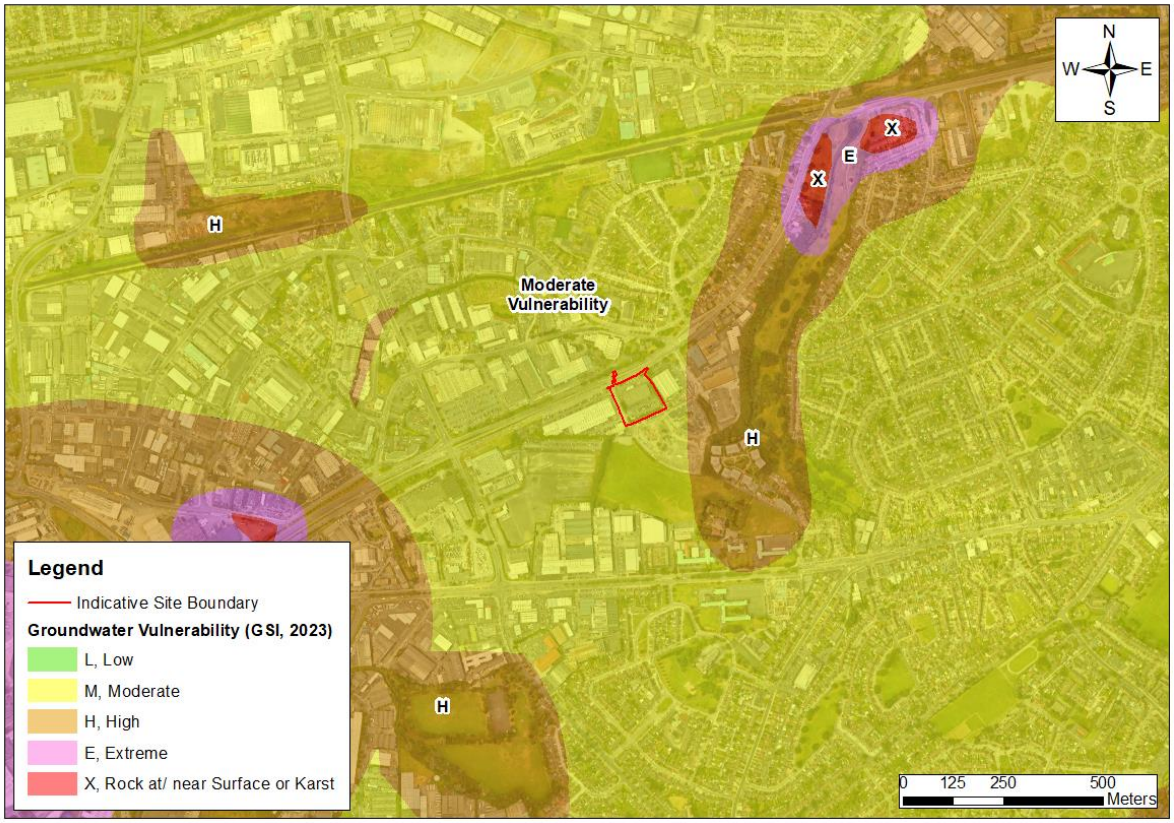

Figure 2.1 Aquifer Vulnerability (source: GSI, 2023)

The GSI/ Teagasc (2023) mapping database of the quaternary sediments in the area of the subject site indicates the principal subsoil type in the area comprises tills derived from limestones.

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.

<u>Construction Phase</u>

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

(i) Hydrocarbons or any hazardous chemicals will be stored in specific bunded areas. Refuelling of plant and machinery will also be carried out in bunded areas to minimise risk of any potential being discharged from the site. As a worst-case

scenario, a rupture of a 1,000-litre tank to ground is considered in this analysis which disregards the effect of bunding. This would be a single short-term event.

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

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

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

(v) During the excavations for foundations and basements, no significant dewatering is expected given the low permeability overburden underlying the site.

Operational Phase

The following sources are considered plausible post construction:

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

(ii) Leakage of petrol/ diesel fuel may occur from individual cars in parking areas; run-off may contain a worst-case scenario of 70 litres for example.

(iii) The stormwater drainage system will follow SuDS measures that comprises green and blue roofs, permeable paving, petrol interceptors, bio-retention systems and an attenuation system. This system has been designed in order to discharge following the characteristics of a greenfield run-off into the Camac River. As such the potential for silt laden runoff is low. It should be noted that the worst-case scenario (70 litres) under consideration here disregards the effect of SuDS and petrol interceptors.

(iv) The proposed 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 commercial 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 (D0034-01) and meet environmental legislative requirements as set out in such licence. It is noted that a planning permission for a new upgrade to this facility was received in 2019 and is currently in the process of construction/ implementation.

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 2021)

shows it is currently operating for a PE peak loading of 2.23million while originally designed for 1.64million. However, the current maximum hydraulic load (864,774 m^3/day) is less than the peak hydraulic capacity as constructed (959,040 m^3/day) i.e., prior to any upgrade works.

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

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 with impact assessment presented in Section 3.4:

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 '*Moderate*' vulnerability present at the site resulting in a moderate natural aquifer protection from any localised diesel/ fuel oil spills during either construction or operational phases. The site is underlain by [generally low permeable] Limestone which the GSI classifies as a *Locally Important Aquifer.* This aquifer is 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 and operation run-off or any small hydrocarbon leaks from the site to the identified Natura 2000 sites in South Dublin Bay. There is an indirect connection as storm water discharges directly into the Camac River which ultimately discharges into the Liffey catchment and South Dublin Bay.

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

3.3 Assessment of Receptors

The receptors considered in this assessment include the following:

(i) Underlying limestone bedrock aquifer;
(ii) South Dublin Bay and River Tolka Estuary SPA (site code: 4024), and the South Dublin Bay SAC (site code: 0210).

Other Natura 2000 Sites within Dublin Bay that may be hydrologically connected to the proposed development site, but are located further away (North Dublin Bay SAC [site code: 0206], the North Bull Island SPA [site code: 4006], North-West Irish Sea SPA [site code: 4236], Rockabill to Dalkey Island SAC [site code: 3000] and Lambay Islands SAC [site code: 0204] and SPA [site code: 4069]) were excluded from the assessment due to their distance from the subject site, the potential loading of

contaminant from the site (risk scenarios presented in Section 3.1) and significant dilution through its pathway.

3.4 Assessment of Source Pathway Receptor Linkages

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

Construction Phase

The potential for impact on the aquifer is low based on the absence of any bulk chemical storage on site. The overburden thickness, 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 2000 site.

During construction phase, there is no direct open-water pathway between the site and Natura 2000 sites within South Dublin Bay. However, there is an indirect pathway through potential discharges into the Camac River and eventually to South Dublin Bay. Should any silt-laden stormwater from construction or hydrocarbon-contaminated water from a construction vehicle leak/tank leak manage to enter into the surface water sewer, the suspended solids will naturally settle within the sewer; however, in the event of a worst case hydrocarbon leak of 1,000 litres this would be diluted to background levels (water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019) by the time the stormwater reaches the nearest Natura 2000 Sites (South Dublin Bay SAC/SPA, c. 8.1 km downgradient).

Operational Phase

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

It can be concluded that the in-combination effects of surface water arising from the proposed development taken together with that of other permitted developments will not be significant based on the in-combination low potential chemical and sediment expected loading. Therefore, based on the loading of any hazardous material considered in the worst-case scenarios mentioned in Section 3.1 above during construction and operation phases, there is subsequently no potential for impact on downgradient Natura 2000 habitats (those in South Dublin Bay, located c. 8.1 km from the site).

The peak wastewater discharge is calculated at 13 l/s. The sewage discharge will be

licensed by Irish Water, collected in public sewers and ultimately treated at Irish Water's WWTP at Ringsend prior to discharge to Dublin Bay. As outlined in section 3.1 (iv), upgrade works commenced in 2018 and are expected to be fully completed by 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 for a population equivalent of 2.1 million 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. After commissioning stages, the Capacity Upgrade facility began accepting flows for treatment in November 2021). This facility will enable current treatment levels to be maintained during the remainder of the upgrade of the existing secondary treatment tanks.

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

The application for the upgrade of the WWTP in 2012 and the revised upgrade in 2018 was supported by a detailed EIAR. As outlined in the EIAR, modelling of water quality in Dublin Bay has shown that the upgrades (which are now currently underway) will result in improved water quality within Dublin Bay. The 2018 EIAR predicts that the improvement in effluent quality achieved by the upgrade will compensate for the increase in flow through the plant. The ABP inspector's report summarises the positive findings of the modelling for the post WWTP upgrade scenario on Dublin Bay water quality in sections 12.3.5 and 12.3.12 of his report and the overall positive impact for human health and the environment in his conclusions in section 12.9.1.

In addition, the EIAR report acknowledges that under the do-nothing scenario "*the areas in the Tolka Estuary and North Bull Island channel will continue to be affected by the cumulative nutrient loads from the river Liffey and Tolka and the effluent from the Ringsend WWTP*", which could result in a deterioration of the biological status of Dublin Bay (Irish Water, 2018). Nevertheless, these negative impacts of nutrient over-enrichment are considered "unlikely" (Irish Water, 2018). This is because historical data suggests that pollution in Dublin Bay has had little or no effect on the composition and richness of the benthic macroinvertebrate fauna. Therefore, the do-nothing

scenario predicts that nutrient and suspended solid loads from the WWTP will "continue at the same levels and the impact of these loadings should maintain the same level of effects on marine biodiversity". Therefore, it can be concluded that significant effects on the current status of the European sites within Dublin Bay from the current operation of Ringsend WWTP are unlikely. This conclusion is not dependent upon any future works to be undertaken at Ringsend.

Even without treatment at the Ringsend WWTP, the peak effluent discharge, calculated for the proposed development as 13 l/s (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 2021: An Indicator Report, 2022) also shows that Dublin Bay on the whole, currently has an 'Unpolluted' water quality status (refer to www.catchments.ie).

With regard to bathing waters in Dublin Bay, as mentioned above the Proposed Development will have no impact on the water quality in any overflow situation apart from a minor contribution (0.12 % of the peak hydraulic capacity at Ringsend WWTP) from foul sewage.

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

The assessment has also considered the effect of cumulative events, such as release of sediment laden water combined with a hydrocarbon leak on site (1,000 litres as a worst-case scenario during the construction phase). As there is adequate assimilation and dilution between the site and the Natura 2000 sites (South Dublin Bay, which is c. 8.1 km from the site), it is concluded that no perceptible impact on water quality would occur at the Natura 2000 sites as a result of the construction or operation of this Proposed Development. It can also be concluded that the cumulative or in-combination effects of effluent arising from the Proposed Development with that of other permitted proposed developments, or with development planned pursuant to statutory plans in the greater Dublin, Meath and Kildare areas, which will be discharged into Ringsend WWTP will not be significant having regard to the size of the calculated discharge from the Proposed Development and having regard to the following:

- Recent water quality assessment for Dublin Bay shows that they currently continue to meet the criteria for 'Unpolluted' water quality status (EPA, data until July 2021).
- The Ringsend WWTP upgrade which is currently being constructed will result in improved water quality by Q4 2023 (for a population of 2.1 million) and 2025 (for a population of 2.4 million) to ensure compliance with Water Framework Directive requirements.

- All new developments are required to comply with SuDS which ensures management of run-off rate within the catchment of Ringsend WWTP.
- The natural characteristics of Dublin Bay result in enriched water rapidly mixing and degrading such that the plume has no appreciable effect on water quality at Natura 2000 sites.

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

It should also 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.

In addition, there is no long term discharge planned which could have an impact on the status of the water body. In the scenario of an accidental release (unmitigated leaks mentioned above) there is potential for a temporary impact only which would not be of a sufficient magnitude to effect a change in the current water body status.

Finally, in a worst-case scenario of an unmitigated leak and not considering the operation of the SuDS measures already included in the design, no perceptible risk to any Natura 2000 Sites is anticipated given the distance from source to South Dublin Bay protected areas (c. 8.1 km). Potential contaminant loading will be attenuated, diluted and dispersed near source area.

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

Source	Pathways	Receptors considered	Risk of Impact
Construction Impacts (Summary)			
Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle (1,000 litres worst case scenario).	Bedrock protected by 5-10m low permeability overburden. Migration within weathered/ less competent limestone is low (limestone has discrete local fracturing rather than large connected fractures).	Limestone bedrock aquifer (Locally Important Aquifer)	Low risk of migration through poorly connected fracturing within the limestone (Locally Important Aquifer) rock mass. No likely impact on the status of the aquifer/off site migration 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 to South Dublin Bay through public sewer (distance source-receptor: >8.1km)	South Dublin Bay SAC/SPA/pNHA	Potential for local temporary exceedances of statutory water quality standards at outfall. However, no perceptible risk to water requirements for the Natura 2000 sites in Dublin Bay based on loading and high level of dilution in the surface water sewer and on the distance of c. 8.1 km between the source and the estuary.
Operational Impacts (Summary)			
Foul effluent discharge to sewer	Indirect pathway to South Dublin Bay through public sewer (distance source-receptor: >8.1km).	South Dublin Bay SAC/SPA/pNHA	No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge (13 l/s which would equate to 0.12% 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 (70 litres worst case scenario)	Indirect pathway to South Dublin Bay through public sewer (distance source-receptor: >8.1km).	South Dublin Bay SAC/SPA/pNHA	No perceptible risk – taking into account the extent of loading of contaminant, distance between the source and Dublin Bay is c. 8.1 km and significant dilution in the surface water sewer, will ensure any released hydrocarbons are at background levels (i.e., with no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019).

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.

During construction and operation phases there is no direct source pathway linkage between the proposed development site and any Natura 2000 sites (i.e., South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA). There are indirect source pathway linkages from the proposed development through the Camac River and foul sewers which eventually discharges to the discharges to South Dublin Bay. The future development has a peak foul discharge that would equate to 0.12% of the licensed discharge at Ringsend WWTP (peak hydraulic capacity). The Proposed Development will not contribute any additional stormwater drainage to the WWTP over the natural greenfield rate.

Even disregarding the operation of design measures including SuDS on site, it is concluded that there will be imperceptible impacts from the proposed development to the water bodies due to emissions from the site stormwater drainage infrastructure to the wider drainage network.

It 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 2000 sites within South Dublin Bay.

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

5.0 REFERENCES

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