REPORT

Hydrological and Hydrogeological Qualitative Risk Assessment

Proposed Residential Development: Confey LRD (Leixlip), Co. Kildare.

CLIENT	DOCUMENT REFERENCE	DATE
Leixlip And Newbridge SPV Limited	267501.0283WR01	22 July 2026

AWN Consulting Ltd, The Tecpro Building, IDA Business & Technology Park, Clonshaugh, Dublin 17, D17 XD90

DOCUMENT CONTROL SHEET

Document Control Sheet	
Our Reference	267501.0283WR01
Original Issue Date	22 July 2026
Client:	Leixlip And Newbridge SPV Limited
Client Address:	First Floor, Block One, Quayside Business Park Mill Street Dundalk, Dundalk, Co. Louth

Revision	Revision Date	Description
A	22 July 2026	Issued to the Client

Details	Written by	Approved by
Signature		
Name	Luke Maguire	Marcelo Allende
Title	Environmental Consultant	Principal Hydrological Consultant
Date	22 July 2026	

Disclaimer
This report considers the specific instructions and requirements of our client. It is not intended for third-party use or reliance, and no responsibility is accepted for any third party. The provisions in this report apply solely to this project and should not be assumed applicable to other developments without review and modification.

ENVIRONMENT I.S. EN ISO 14001:2015 NSAI Certified
HEALTH & SAFETY I.S. ISO 45001:2018 NSAI Certified
QUALITY I.S. EN ISO 9001:2015 NSAI Certified

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Background

AWN have been requested by Leixlip And Newbridge SPV Limited to carry out a Hydrological and Hydrogeological Qualitative Risk Assessment for a large residential development (LRD) located at lands in the Townlands of Confey, Co. Kildare. The development site is a greenfield site located at Confey townlands which is situated approximately 1.3 km northeast of the Leixlip town centre. The subject development is partially bounded to the south by the Royal Canal and the Royal Canal Greenway, to the east by agricultural lands, to the north by the L1015 Confey Road, and to the west by Confey GAA Club (see Figure 1-1 below).

The proposed development is for no.125 residential units delivering 81 no. houses made up of semi-detached and terrace units (consisting of 56no. 3 beds and 25no. 4 beds), 22no. duplex apartments within 11 blocks (consisting of 11no. 2 beds and 11no. 3 beds) and 22no. apartments within one block (consisting of 5no. 1 bed and 17no. 2 beds) ranging in heights up to 5 storeys. Provision of car, cycle and motorbike parking will be provided throughout the development. Vehicular, pedestrian, and cyclist access will be provided from the north of the site via R149, with additional pedestrian and cyclist access provided from the south via the Royal Canal Greenway. The development will also provide landscaping, public and communal open spaces and all associated site development works, to facilitate the project. These include boundary treatments, plant and waste management areas, and other service provisions, including ESB works.' The associated site and infrastructural works, provision of utilities and associated civil works, foul and surface water drainage and public lighting, along with all ancillary works.

The scope of this desktop review is to assess the potential for any likely significant impacts on receiving waters and protected areas during construction and operational phases.

The potential impacts on the receiving water environment considered are:

- The management of surface water run-off and accidental leaks during construction phase.
- Connection to the local stormwater/surface drainage network during operation. Due to the residential nature of the proposed development, it has been assumed that there will be no bulk oil storage during the operational phase. The development does not require any groundwater abstraction or any long term or significant dewatering.

Figure 1-1 Site Location (Google Earth Satellite, 2026)

1.2 Objective of the Report

The scope of this desktop review is to assess the potential for any likely significant impacts on receiving waters and protected areas during construction or post development once operational/occupied, in the absence of taking account of any measures intended to avoid or reduce harmful effects of the proposed project (i.e. standard control 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 River Liffey (& upstream/upgradient tributaries) and Dublin Bay (where the relevant European Sites are located), including Natura 2000 Sites within these waterbodies and bathing water locations. The assessment relies on information regarding construction and design provided by DOBA Consulting Engineers and the site-specific ground conditions and subsurface environment, as follows:

- Character Area R5, Confey Lands, Leixlip- Site-Specific Flood Risk Assessment (SSFRA) Report – Corrigan Hodnett Consulting (September, 2025)
- Character Area R5, Confey Lands, Leixlip- Infrastructure Design Report (IDR) – Corrigan Hodnett Consulting (July, 2025)
- Ground Investigation Report- Confey, Leixlip. Ground Investigations Ireland Ltd (GII), July 2025.
- Consultation with design architects and engineers.
- Various design site plans and drawings, as submitted with this planning application.

This report was prepared by Luke Maguire Environmental Consultant and Geoscientist (BSc) at AWN Consulting and Marcelo Allende (BSc, BEng) Principal Hydrological Consultant at AWN Consulting.

Luke Maguire; is an Environmental Consultant at AWN with over 5 years of experience in Environmental Consulting and water resources. Luke holds a B.Sc. in Geoscience from Trinity College University of Dublin and has worked on a range of developments including pharmaceutical plants, medical device facilities, ICT facilities and energy projects. Luke has experience in contaminated soil sampling and analysis, basement impact assessments, bulk excavations and largescale dewatering processes. Additionally, Luke has gained experience in Environmental Impact Assessment (EIAR), Due Diligence Reporting, Hydrological and Hydrogeological Risk Assessment, Flood Risk Assessment and WFD Assessment Reporting and has worked in multiple Environmental monitoring disciplines such as Chemical Wastewater (Intel), Ground Gas, Surface Water, and Groundwater Monitoring at numerous sites across Dublin.

Marcelo Allende is a Principal Environmental Consultant (Hydrologist) with AWN Consulting with over 20 years of experience in water resources technical studies, conceptual and numerical hydrological/hydrogeological modelling and environmental consultancy. Marcelo holds a degree in Water Resource Civil Engineering (BEng, Hons) from the University of Chile and a Bachelor of Science in Engineering (BSc, Hons). He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, surface and groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site specific flood risk assessments (Stage 1,2 and 3), Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (IAH, Irish Group) and a member of Engineers Ireland (MIEI).

1.3 Hydrological Setting

The topography is relatively level/flat in elevation and characterized by minor localised undulations, whereby the elevation of land ranges from c. +57.0m AOD (Above Ordnance Datum) to +56.0m AOD across the site.

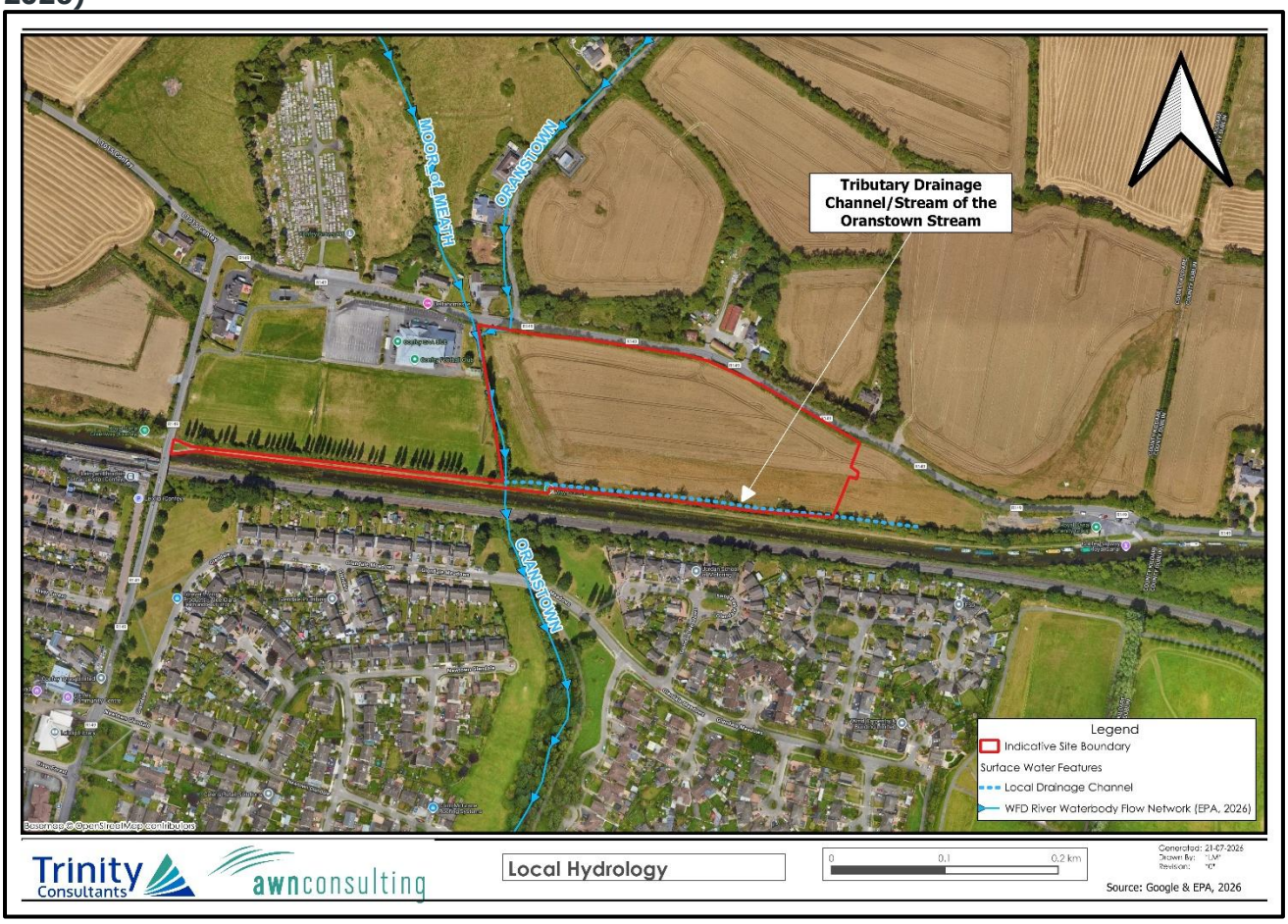
The site is characterized predominantly as greenfield grassland and hedgerow, therefore at present all drainage is via overland flow runoff (or subsurface baseflow) to the 3 no. open channels (described/detailed below) which flow within the site boundary, coupled with drainage to ground whereby surface water and rainfall runoff, is generally percolated to ground through the site via infiltration to grass and soil under the influence of gravity.

The current EPA (2026) watercourse mapping indicates two surface waterbodies / watercourses traversing the proposed development site, namely the Oranstown/Silleachain Stream which aligns the western boundary and the Moor_of_Meath Stream which traverses the northwestern corner of the site before merging with and discharging to the Oranstown/Silleachain Stream. However, an open channel (tributary to the Silleachain/Oranstown Stream) exists within site boundary along the southern boundary which is not depicted by the EPA waterbody mapping database. This tributary drains the southern portion of the lands and also conveys flow to the Oranstown Stream which flows south and discharges to the River Liffey at Castle Park, Leixlip (refer to **Error! Reference source not found.** below).

Historical mapping dated from 1829 to the early 1900s were examined for any indications of other hydrological features or watercourses in the immediate vicinity of the site. These historical mapping records show that the flow pathway of the Oranstown Stream, Moor of Meath Stream, and River Liffey in the vicinity of the site has remains largely unchanged since 1829.

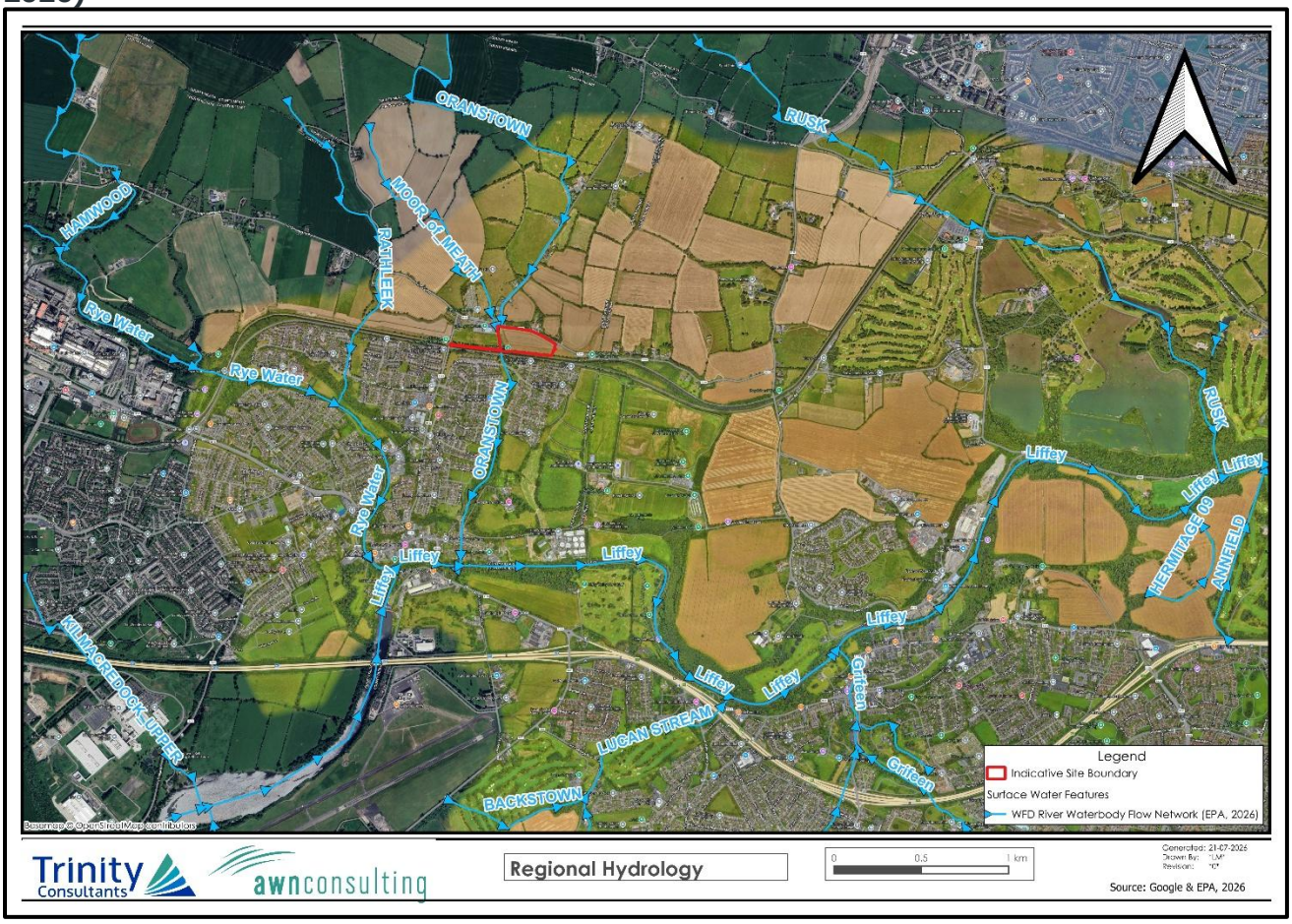
Figure 1-2 below presents the local hydrological environment as per the latest EPA mapping.

Figure 1-2 Local Hydrological Environment in the context of the Site Location and (EPA, 2026)



According to EPA watercourse mapping database, the Oranstown Stream (Silleachain Stream) and Moor_of_Meath Stream both originate on lands to the north of the site, the sources of which are located c. 2.2km and 1.2km north of the site, respectively. Both of these streams generally flow in an alternating southerly-southeasterly direction prior to traversing the western portion of the development where it flows along the western boundary of the site. These two watercourses are culverted beneath the R149 and merge at a confluence point located along the western boundary of the site. In turn, the Oranstown Stream continues to flow in a southerly direction before discharging to the River Liffey (WFD Name: LIFFEY_160, EU Code: IE_EA_09L012040) c. 1.4km south of the site (linear distance). From here, the River Liffey flows in an alternating east to southeasterly direction to its transition to the Liffey Estuary Upper (EU Code: IE_EA_090_0400) and Liffey Estuary Lower (UE Code: IE_EA_090_0300), prior to ultimately discharging to Dublin Bay coastal waterbody (European Code: IE_EA_090_0000) and the Northwestern Irish Sea SPA further east. Figure 1-3 below presents the regional hydrological environment as per the latest EPA mapping.

Figure 1-3 Regional Hydrological Environment in the context of the Site Location (EPA, 2026)



The NPWS (2026) on-line database have been reviewed to determine the location of areas of conservation within proximity to the proposed development site. According to the NPWS (2026) on-line database there are no Special Protected Areas (SPA) established under the EU Birds Directive (79/409/EEC) or Special Areas of Conservation (SAC) established under the Habitats Directive on or within the boundary of the proposed development site or its immediate vicinity. The lands in which the development is located have no formal designations. The development site is not located within or directly adjacent to any Natura 2000 site. No bodies of standing water or habitats which could be described as wetlands exist onsite. Furthermore, there are no Natural Heritage Areas (NHA), or proposed Natural Heritage Areas (pNHA) established under the Wildlife Acts, 1976 and 2000 (as amended). The lands in which the development is located have no formal designations (Refer to Figure 1-3 below).

The European site Natura 2000 and proposed National Heritage Areas in closest proximity and hydrologically connected to the Proposed Development site is as follows:

- The Rye Water Valley / Carton SAC/pNHA (European Site Code: IE0001398), located c. 880m southwest (linear distance) of the proposed development site.

The Proposed Development site has no hydrological pathway/connection with the Rye Water Valley / Carton SAC due to this natura 2000 site being located hydrologically upgradient and upstream of the site.

A hydrogeological connection may also exist to The Rye Water Valley / Carton SAC through the underlying "*Locally Important Aquifer*" (LI), due to the flow path distances (1km) typical within the Dublin GWB exceeding of separation (880m) from the proposed development sit, albeit via a moderate pathway

distance and an underground flow path involving a significant dilution factor (and mixing) within the aquifer / groundwater body (Dublin GWB).

The Royal Canal pNHA (Site Code: 002103) bounds the site to the south. This watercourse is a fully lined (contained) feature therefore negating any hydrological or hydrogeological connectivity or pathway/linkage between the proposed development site and this waterbody.

Other relevant European site Natura 2000 and proposed National Heritage Areas located within Dublin Bay include the following:

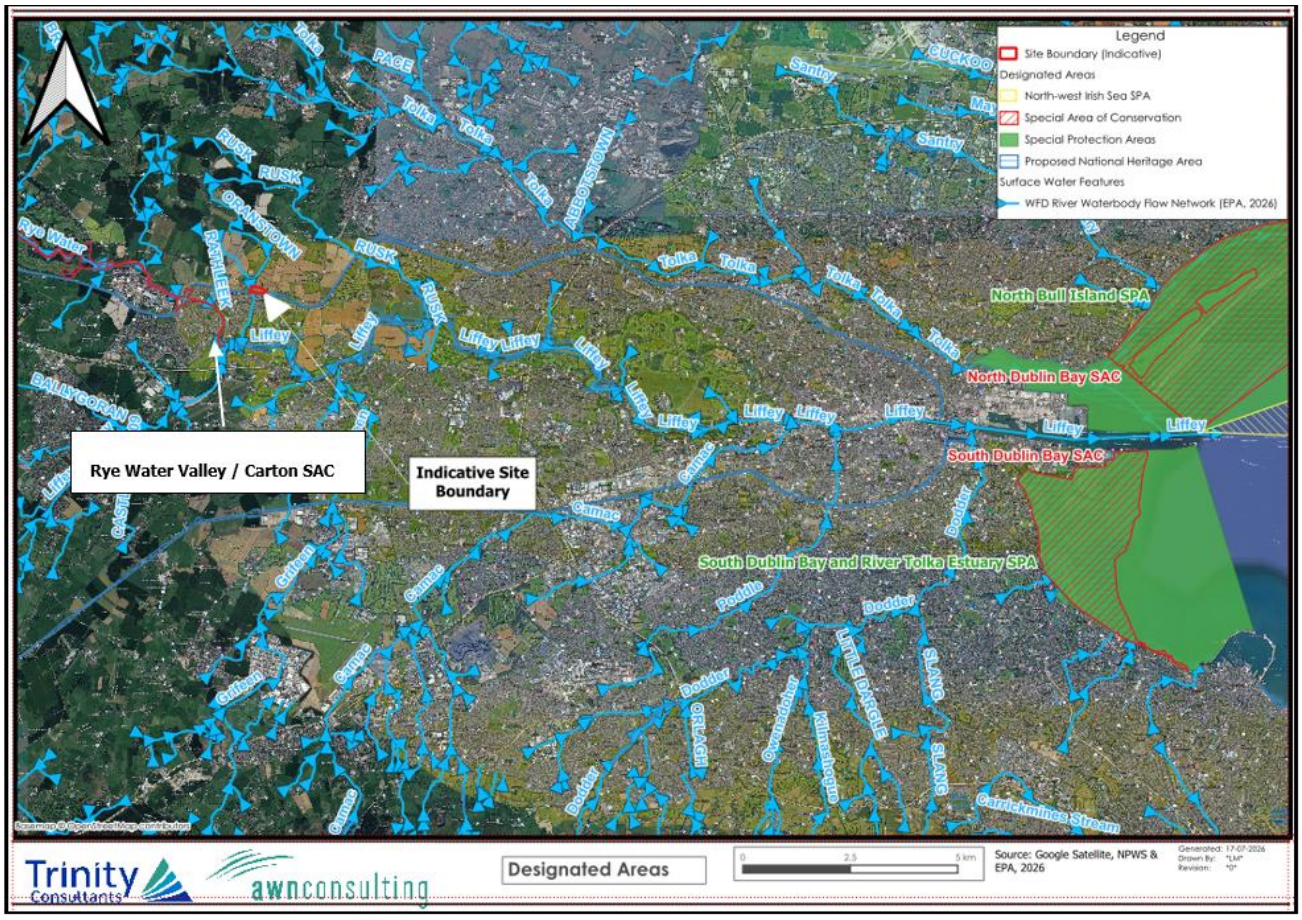
- North Dublin Bay Special area of Conservation (SAC) (Site Code 000206) – c. 19.8 km east of the Site.
- South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) (Site Code 004024) – c. 18.9 km east of the Site.
- North Bull Island SPA (Site Code 004024) – c. 21.6 km east of the Site.
- South Dublin Bay SAC (Site Code 000210) – c. 21.1 km southeast of the Site
- North-West Irish Sea SPA (Site Code: 004236) c. 22.8 km to the southeast of the site at the point of closest proximity.

The site has an indirect hydrological pathway to the designated sites located within Dublin Bay via the Oranstown Stream (Silleachain Stream), River Liffey and Liffey Estuary, however based on the significant distance to these receptors, coupled with the large dilution factor and contribution from other watercourses downgradient along the hydrological pathway, there is no likelihood of an accidental release of hydrocarbons or silt from the proposed development resulting in any change in surface water quality contributing to these habitats. The connection is an extremely lengthy hydrological pathway allowing significant time for settlement and dilution (mixing) downstream in the catchment (pathway). As such, based on the significant distance to these designated receptors in Dublin Bay, coupled with the large dilution factor and mixing along the hydrological pathway, there is no potential/likelihood of an accidental release of hydrocarbons or silt from the proposed development resulting in any change in surface water quality contributing to these habitats.

Currently, the site has a no potential for a hydrogeological (groundwater) connection to downstream / downgradient designated site located within Dublin Bay (listed above), due to the distance of separation (minimum 18.5km east) exceeding the distance of local underground flow paths within the Dublin GWB aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the overburden, which is characteristic of cohesive glacial clays, and moderate vulnerability (5-10m+ overburden thickness) negates the potential of vertical and lateral migration offsite thereby further reducing/decreasing the potential for a hydrogeological linkage pathway to the sensitive receptors.

Refer to Figure 1-4 below which presents / illustrates the location of the Rye Water Valley / Carton SAC and Dublin Bay Natura 2000 Sites and the hydrological connectivity in the context of the Proposed Development site.

Figure 1-4 Designated Natura 2000 Conservation / Protection Sites and hydrological linkage / pathway in the context of the development site location (EPA, 2026)



1.4 Existing and Proposed Water Infrastructure

1.4.1 Existing Surface Water Drainage

The site is characterised as greenfield grassland and hedgerow, therefore at present all drainage is primarily via runoff/overland flow and baseflow to the Oranstown Stream and one unnamed open channel / drainage ditch which traverse the site (aligning the western and southern boundary), coupled with drainage to ground whereby surface water and rainfall runoff, is generally percolated to ground through the site via infiltration to grass and soil under the influence of gravity.

1.4.2 Proposed Surface Water Drainage

1.4.2.1 Construction Phase

The CEMP and this EIAR contains and is informed by best practice measures and protocols to be implemented during the construction phase of the proposed development to avoid / minimise environmental impact.

Surface water discharge points during the construction phase are to be agreed with Kildare County Council's Environment Section prior to commencing works on site.

There is no likely discharge from the site (without settlement and treatment) as surface water runoff from and surface water collected in excavations and from designated vehicle areas will pass through a series

of temporary silt traps. Surface water runoff will outfall into the on-site streams along the western (Silleachain/Oranstown Stream) and southern (tributary of Oranstown Stream) boundaries of the site.

Pre-construction site clearance and construction work have the potential to indirectly impact on Silleachain Stream and existing drainage ditches, causing deterioration of water quality flowing into the designated sites located downstream of the proposed project.

According to the OCEMP prepared by Wave Dynamics Acoustics Monitoring Environmental (2026), a 20m buffer will be maintained between all construction works and existing waterbodies in order to avoid and / or minimise adverse effects from pollution and runoff and to ensure the project will not have adverse effects on the integrity of any designated sites located downstream of the proposed project.

The 20m distance exclusion zone or buffer from the watercourse must be maintained for the duration of all construction works.

- No material shall be stored in the exclusion zone.
- There shall be no cement, concrete, grout, fuels/ oil/ hydrocarbons stored in the exclusion zone. Pollution prevention measures detailed below will be incorporated during the construction phase to prevent any possibility of sediments and other pollutants entering any nearby watercourses or surface drainage systems.

Silt remediation and sediment treatment measures will be incorporated. Contaminated runoff must not be pumped or flow into the water environment without appropriate treatment (e.g., settlement ponds, settlement tanks) that allow water to remain undisturbed for a period. Plant washing must occur in a designated hardstanding area at least 20 metres from any watercourse or drain. Silt controls will be in place to prevent entry into watercourses or drains. Geotextile silt fencing will be installed at the toe of slopes before soil stripping begins (Wave Dynamics Acoustics Monitoring Environmental, 2026)

1.4.2.2 Operational Phase

The design and management of surface water for the proposed development will comply with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS). The design of the surface water network and SuDS measures within the application site shall include a 30% climate change factor and an allowance for a 10% factor applied to account for Urban Creep in accordance with the Kildare Co. Council Water Services requirements. These SuDS measures by design ensure the stormwater leaving the site is to be attenuated and treated within the new development site boundary to ensure suitable quality, before discharging to the existing local drainage network which subsequently outfalls to the Oranstown Stream (Silleachain Stream). SuDS are drainage systems that are environmentally beneficial, causing minimal or no long-term detrimental damage.

It is proposed to separate the surface water and wastewater drainage networks, which will serve the proposed development, and provide independent connections to the local surface water drainage network and wastewater public sewer networks respectively.

There are no diversions or alterations to existing surface water networks proposed as part of the current development design.

The naturally formed catchments formed by the existing Oranstown Stream (Silleachain Stream) to the west will act and serve as suitable points for the discharge of surface water from the proposed development.

The Confey Masterplan details that the surface water outfall from the site is at a single point to the Silleachain Stream at the northwest corner of the site. However, on detailed analysis of the site particularly with regard to the fact that the site is relatively flat it is apparent that a single outfall at this location to serve the entire site is not possible. As part of the design process, it has been determined that it is

necessary to separate the site into five separate surface water drainage catchments and outfall each catchment individually to the watercourse to the south. A specific QBAR value has been calculated for each catchment and each network designed and modelled on that basis.

Figure 1-5 Surface Water Drainage Catchments for the Proposed Development (Corrigan Hodnett Consulting, 2026)

As mentioned above, surface water runoff from the development will be attenuated to greenfield runoff rates (Qbar) in accordance with the Greater Dublin Strategic Drainage Study (GDSDS).

It should be noted that there are no underground attenuation tanks proposed as part of the scheme. The scheme prioritises nature based solutions maximising infiltration to ground SuDS devices throughout the development resulting in groundwater recharge, reduced discharge volumes and improved treatment benefits.

SuDS features such as bioswales, tree pits, bioswales, water butts, green roofs, infiltration trenches, interception storage beneath swales (swale detention) and the inclusions of permeable paving, will provide a surface water treatment train and promote source control throughout the development while also providing attenuation storage at source. Roof rainwater from the front of the houses will discharge directly into the permeable paved driveway OGCR sub-base. It will then overflow into the main drainage carrier pipe discharging to the common 15mm volumetric interception storage. The green roof area will discharge into the infiltration trench/swale and from there into the 15mm volumetric interception storage. Surface water discharge will also pass via a petrol / oil and silt interceptors prior to discharge (sized in accordance with permitted discharge from the site). So as not to disrupt the natural regime of the existing surface watercourse and flow rate/quantity from the development, flow restriction is achieved by means of a vortex flow control device (Hydrobrake) installed at the outfall of the surface water catchment within the development and associated underground attenuation systems.

Refer to the Infrastructure Design Report (Corrigan Hodnett Consulting Engineers, 2026) for further details in relation to the proposed surface water drainage network.

1.4.3 Foul / Wastewater Drainage

1.4.3.1 Existing Foul / Wastewater Drainage

The site has no existing foul loading and no existing foul / wastewater connections to the public sewer or nearby Leixlip Wastewater Treatment Plant as it is predominantly greenfield.

There are two Uisce Éireann wastewater assets currently traversing the site as follows:

- There is a 450mm diameter wastewater rising main to the south and west of the site running parallel to the site boundaries within the area zoned 'Open Space and Amenity'.
- There is a 750mm diameter wastewater sewer running parallel and to the south/west of the rising main

1.4.3.2 Proposed Foul / Wastewater Drainage

Strict separation of surface water and wastewater will be implemented within the development. 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 Uisce Eireann (formerly Irish Water) licencing requirements.

Uisce Eireann, through the Pre-Connection Enquiry (PCE) process (reference CDS26003112"dated 29th May 2026) have confirmed that there is capacity on the site for the developments wastewater The Applicant has submitted an updated PCE for the proposed development and are in possession of a Confirmation of Feasibility (CoF) which states that a connection to the existing infrastructure is 'Feasible' without Infrastructure Upgrade by Uisce Eireann'.

The proposed wastewater network will collect effluent from the new development via a main Wastewater drainage network which is located within the road network around the proposed development where it will finally discharge by gravity to the existing 750mm diameter wastewater sewer to the south of the site.

Wastewater from the Confey lands drains to the public foul sewer network and is ultimately routed to the Ringsend Wastewater Treatment Plant via the 9C Sewer catchment. Locally, an existing major Uisce Éireann foul sewer runs through the southern side of the Confey lands. This trunk main starts as a 400 mm diameter pipe and increases to 750 mm diameter to accommodate local wastewater flows.

The regional network forms part of the broader Lower Liffey Valley Regional Sewerage Scheme. It connects to major wastewater infrastructure passing through Leixlip, including network flows from neighbouring Maynooth via the Maynooth Wastewater Transfer Pipeline Project.

Rather than being treated and discharged locally at the former Leixlip Wastewater Treatment Plant site, the significant municipal wastewater load is conveyed through an approximately 8 km regional underground transfer pipeline. This pipeline routes foul flows out of Kildare and connects to the 9C Sewer catchment near Blanchardstown. The 9C trunk sewer network then conveys the consolidated flows to the Ringsend Wastewater Treatment Plant in Dublin, where they undergo treatment prior to discharge to Dublin Bay.

The foul discharge from the site will join the public sewer and will be treated at the Ringsend Wastewater Treatment Plant (WWTP EPA Licence: D0034-02) prior to subsequent discharge to the Dublin Bay. This WWTP is required to operate under and in compliance with the associated EPA licence and meet environmental legislative requirements as set out in its licence. There is no 'direct' pathway for foul sewage to any receiving water body (as identified above). There will also be indirect hydrological connection to Dublin Bay via/through the foul water discharge which will be treated off site at Ringsend WWTP. Given the discharge post treatment, coupled with the significant dilution / mixing and the contribution from

multiple watercourses merging downstream in the hydrological catchment, there is no potential for water quality exceeding SI threshold concentrations to be exceeded at the Dublin Bay coastal waterbody (and corresponding SPA/SAC Natura 2000 designated conservation/protection areas).

A full, detailed foul water management strategy for the proposed development is included in the Infrastructure Design Report by Corrigan Hodnett Consulting Engineers (2026), submitted under separate cover included as part of the planning application.

1.4.4 Flood Risk

A Site-Specific Flood Risk Assessment (SSFRA) was carried out by Corrigan Hodnett Consulting Engineers in July 2025 for the proposed development.

The SSFRA concludes that the proposed development complies with the requirements of the Justification Test for development management and that the Flood Risk Assessment and strategic development recommendations were undertaken in accordance with 'The Planning System and Flood Risk Management' guidelines and agrees with the core principles contained within.

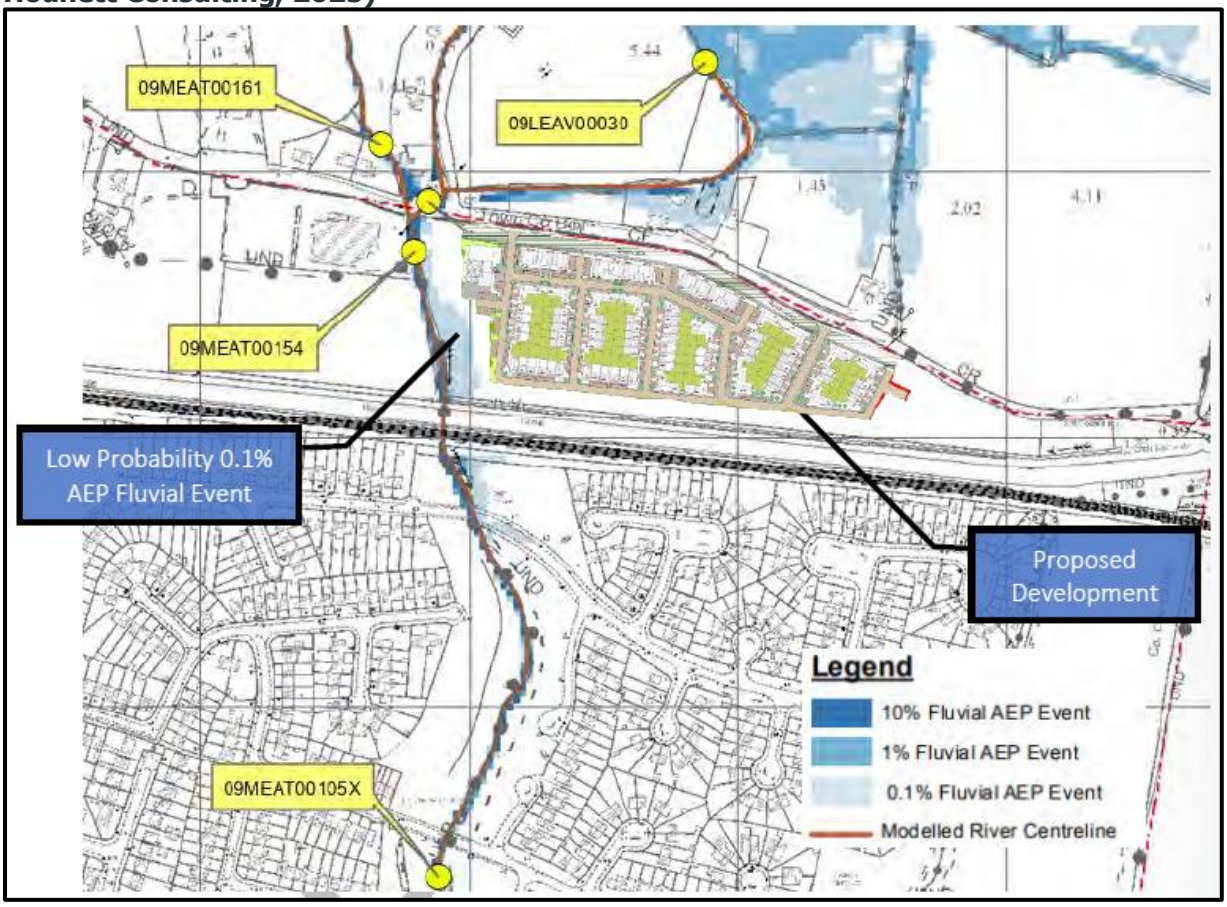
On review of the OPW www.floodmaps.ie website there are no recorded flood events within the site. The closest recorded event is on the opposite side of the R149 Confey Road to the north of the site.

The OPW Eastern CFRAM Study fluvial flood extent mapping confirms that none of the proposed buildings are within the identified fluvial extents flooding for the low probability 0.1% AEP Fluvial event i.e., the proposed site is situated largely within Zone C (i.e., where the probability of flooding from rivers is less than 0.1% or 1 in 1000) and in the limited area of Flood Zone B there are no changes proposed to the ground levels in this area (refer to Figure 1-6 below). The GSI mapping confirms that there are no visible alluvial deposits within the site which is indicative of the fact that all historical flows would have been within a confined channel width with little or no out of channel flooding for the extents of the watercourse within the site.

The internal drainage for the scheme has been designed such that there is no risk of internal flooding to the properties in the event of a system failure. In the event of a total system failure within the development, surface water from the development will primarily flow towards the west and northwest of the site towards the Silleachain Stream mirroring the existing overland flow routes.

Inspection of the topographic survey commissioned for the site confirms that the site is not at risk of flooding from overland pluvial flows. The proposed scheme includes extensive SuDS measures which will reduce surface water discharge and overland flow routes created within the development will ensure there is only limited risk of flooding as a result of a surface water network failure.

Figure 1-6 Extract from OPW Eastern CFRAMS Fluvial Extents Mapping, dated 2017 (Corrigan Hodnett Consulting, 2025)



2. ASSESSMENT OF BASELINE WATER QUALITY, RIVER FLOW AND WATER BODY STATUS

2.1 Hydrological Catchment Description

The Proposed Development site is located within the former Eastern River Basin District (ERBD) (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD).

The Proposed Development site as defined by the EPA nomenclature (EPA, 2026) is situated in Hydrometric Area No. 09 of the Irish River Network and lies within the Liffey and Dublin Bay Catchment (Catchment ID: 09). The approximate western portion of the proposed development site is located within the Liffey_SC_080 and the eastern portion is located within the Liffey_SC_100.

The Oranstown Streams and Moor_of_Meath Stream both belong to the LIFFEY_160 WFD river waterbody and its current WFD status is 'Poor' (2019-2024) while its WFD Risk Score is currently listed as under 'Review' (WFD 3rd Cycle). This rating and the main pressures identified on the LIFFEY_160 are attributed to poor ecological and biological status or potential assessed through modelling technique (i.e., there is no monitoring data available; Catchments.ie, 2026). According to the Liffey_SC_090 (Code: 09_15) Subcatchment Assessment report (WFD 2nd Cycle, December 2018) and the main pressures associated with the LIFFEY_160 include agriculture sources with pasture/farmyard related pressures. The 'Cycle 3 HA 09 Liffey and Dublin Bay Catchment Report (May 2024)' states that the LIFFEY_160 river waterbody is under 'review' for ecological and chemical conditions.

A review of the Environmental Protection Agency's (EPA) online mapping and Environmental Sensitivity Mapping online maps that includes the Register of Protected Areas (RPA) under the Water Framework Directive (WFD) has shown that there are no Recreational Waters , Bathing Waterbodies, or Surface Water Drinking RPA, located in the vicinity of the site or downstream/downgradient in the Confey / Rathleek Stream, River Rye Water, River Liffey and Liffey Estuary (Upper & Lower).

However, a portion of the River Liffey (LIFFEY_150) is listed as a river drinking water abstraction area and is classified as an Article 7 Abstraction for Drinking Water (EU_PA_Code: IEPA1_EA_09L011900). This classification of drinking water river lines has been delineated in accordance with the European Communities (Drinking Water) (No. 2) Regulations 2007 (SI No. 278/2007). This regulatory framework aims to ensure the protection of water resources utilised for human consumption, thus safeguarding public health and the environment. However, this area is located hydrologically upgradient/upstream of the proposed development site.

The nearest bathing waterbody is Sandymount Strand (BWID: IEEABWC090_0000_0300) located c. 18.9 km southeast of the site at the boundary/margins of the Dublin Bay coastal waterbody and the Irish Sea, and has a hydrological connection to the site through the River Rye Water, River Liffey and Liffey Estuary, abeit via an extremely legthy distance of separation and a significant dilution factor. The current bathing water quality classification for this site is 'Sufficient Water Quality' (2025). 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

2.2.1 Regional Bedrock Geology

Inspection of the available GSI mapping (GSI, 2026) shows bedrock geology underlying the proposed development site belongs to the Lucan Formation (Rock Unit code: LU), which is described as Carboniferous (Late Chadian to Asbian) dark limestones and shale ('calp'). This geological formation comprises dark grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. It is also characterised by its compact nature and discrete fracturing.

No bedrock outcrops are depicted within the proposed development site boundary or immediate vicinity by the GSI Bedrock Geology mapping database.

According to the GSI (2026), the regional area is not geologically variable. In terms of the geological structural relationship of the area, the GSI (100K) structural geology database does not display structural features (faults/faulting & unconformities) traversing the proposed development site or within the wider region / vicinity of the proposed development site.

According to the GSI Karst database there is no evidence of karstification (bedrock prone to dissolution leading to underground drainage systems such as caves and large crevices) in this area. This would not be expected in this type of Limestone. Given the lack of karstification in this region, there is no known/documented underground traced flow paths.

According to the ground investigations and geotechnical analysis carried out by GII (October- November 2024), the Bedrock or 'rockhead' was not encountered or proven with trial pits terminating at depths ranging from 1.4mBGL (metres below ground level) to 3.1mBGL and percussion boreholes terminating between depths ranging from 1.7mBGL to 1.9mBGL.

A review of the GSI (2026) online data base confirmed that no geological heritage site has been identified at the development site or in its immediate vicinity. Louisa Bridge Cold Spring (Site Code: KE016) and Louisa Bridge Warm Spring (Site Code: KE017) are the closest audited sites to the proposed development, which both share the same location/boundary, located approximately 1km to the southeast of the site at the point of closest proximity (linear distance). These coinciding features of geological heritage are described as a cold spring associated with a warm spring formerly used as a spa and is characterised by a generally low flow rate, with long periods during the summer when there is no flow. Given that hydrogeological flow path lengths in the Dublin GWB are not considered to be on a regional scale, and are typically less than 1km in length, the proposed development will have no interaction or hydrogeological connectivity with this location due to the separation distance exceeding the flow path distances and thus low potential for a source-pathway-receptor linkage. Additionally, the Louisa Bridge Cold / Warm Spring site is located hydrologically upgradient / upstream of the proposed development site, consequently there is no potential for hydrological connectivity or a source-pathway-receptor linkage.

2.2.2 Soil & Subsoil

The GSI/Teagasc (2026) mapping currently denotes the soil type underlying the entire proposed development site as BminPD- Poorly drained mineral soils derived from mainly basic parent materials

The majority of the site exists currently as portions of greenfield grassland fields / plots characterised by a previous (historic) agricultural function, which consisted of arable agricultural activities. Historical Ordnance Survey maps were examined. The assessment of site history (OSI, 2026) confirms that the proposed site has been greenfield with an inferred agricultural function since the earliest mapping available (1829-1842) up to the present day. No evidence was noted to indicate quarrying etc. have been undertaken on the subject site.

The GSI (2026) quaternary sediments (subsoils) mapping database indicates that the proposed site location is entirely underlain by 'Tills derived from Limestone' (Code: TLs), This till is made up of glacial CLAYs which form a cohesive, low permeability subsoil. Infiltration tests carried out by GII Ltd in 2024 soil is predominantly a boulder clay till with minimal infiltration characteristics as was demonstrated by the BRE Digest 365 soakaway testing.

Ground investigations carried out by GII Ltd between October and December 2024 indicates that the subsoil material comprises predominantly soil identified/classified as glacial deposits (clay). The Natural Ground across the site is composed of alternating layers of firm to stiff, sandy gravelly CLAY with cobble content. No granular deposits / lenses (silt, sand, or gravel) were encountered at any intrusive investigation locations across the site. Bedrock or 'rockhead' was not encountered or proven with trial pits terminating at depths ranging from 1.4mBGL (metres below ground level) to 3.1mBGL and percussion boreholes terminating between depths ranging from 1.7mBGL to 1.9mBGL.

Seven (7No.) samples (TP01-TP07) were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as hazardous or nonhazardous. None of the tested tested samples displayed exceedances in concentrations above the inert classification threshold according to the Waste Acceptance Criteria, thereby all classifying as inert (non-reactive) soils. Asbestos was not detected in any of the samples tested. All samples are classified as inert (non-reactive) in line with the use of the site for agriculture, there was no evidence of contamination noted during site investigation. Soil samples were collected throughout the trial pitting / borehole exercise that were within the proposed developments red boundary line.

2.2.3 Aquifer Classification, Description & Inferred Flow Direction

The bedrock aquifers underlying the entire site and wider region according to the GSI (www.gsi.ie/mapping) National Bedrock Aquifer Map is classified as "Locally Important Aquifer" (LI). The potential for local vertical or horizontal migration within this type of aquifer is low depending on the area but may not have extensive regional connectivity. As such the aquifer is not a significant pathway for off-site migration. The GSI aquifer mapping database does not indicate/identify any gravel aquifers underlying the site.

The site is underlain by the Dublin GWB (EU Code: IE_EA_G_008). The general groundwater flow direction in this aquifer is towards the coast and also towards the overlying rivers. This aquifer is not expected to maintain regional groundwater flow paths.

The flow paths and key characteristics within the Dublin GWB are described as follows (GSI, 2026):

- 'The general groundwater flow direction in this aquifer is towards the coast and also towards the River Liffey and Dublin City. This aquifer is not expected to maintain regional groundwater flow paths. Groundwater circulation from recharge to discharge points will more commonly take place over a distance of less than a kilometre. The majority of groundwater flow will be a rapid flow in to upper weathered zone but flow in conduits is commonly recorded at depths of 30 to 50 m b.g.l. The aquifer is not considered to have any primary porosity and flow will be through fractures, some of which will have been enlarged by karstification and dolomitisation. The fissured nature and the moderate permeability of the bedrock close to the surface imply that water will move at high velocities.'
- 'The aquifers within the GWB are generally unconfined, but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the effective thickness of this aquifer is likely to be about 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deepwater strikes are commonly found in more isolated faults/ fractures at depths of 30 – 50 m.b.g.l. Flow path lengths are not considered to be on a regional scale, and are typically less than 1km in length. Groundwater discharges to the numerous streams and rivers crossing the aquifer, and to the springs and seeps towards the coast.'

The flow direction in the clay overburden generally follows no fixed pattern or trend. Flows of this nature are typical of low permeability clay strata with intermittent fill areas, where often the water level measures represent pore water seepages into the overburden monitoring well (opposed to bedrock wells) or perched groundwater conditions (not bedrock aquifer water). The clay is not considered to be a contamination pathway based on the discontinuous perched/pore water table meaning there is no continuous connectivity of shallow groundwater.

These aquifer types are 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 to short distances.

The inferred regional groundwater flow would most likely be to the east-southeast towards the River Liffey (main hydrological feature of the area), Dublin Bay and Irish Sea. The local groundwater flow direction likely follows the local topography towards the Rye Water River and River Liffey (contributing to their baseflow) located approximately 900m southwest and 1.2km south of the proposed development site, respectively. Additionally, groundwater is also likely to be in continuity with the Oranstown Stream, River Liffey and Liffey Estuary (Upper & Lower), which represents the most significant hydrological features in the region of the site.

There are no recorded groundwater resource protection zones in the immediate area of the proposed site, i.e., zones surrounding a groundwater abstraction area. In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity. Additionally, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas in the vicinity of the Proposed Development site. There are no recorded source protection areas / Zones (SPZs, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution) or recorded groundwater resource protection zones. The nearest Group Water Scheme Preliminary Source Protection area is Kiltale (Unique ID: IE_GSI_ZOC_222), located c. 18.9km north-west of the Proposed Development site (linear distance at the point of closest proximity). The subject development site is outside the zone of contribution for this supply.

In addition, groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution, are not identified by the GSI under / beneath the site or in the immediate adjacent lands / vicinity. The Public Water Supply / Public Supply Source Protection Area / Zone (SPZ) / drinking water protection area in closest proximity to the Proposed Development site is the Dunboyne PWS Ballyogarty (Source Protection Area Unique ID: IE_GSI_SPA_202), which is located c. 5.1km north of the Proposed Development site (linear distance at the point of closest proximity). The subject development site is outside the zone of contribution for this supply.

Neither of these areas share a hydrological or hydrogeological connection to the site and are located upgradient of the site within separate Sub-Catchments..

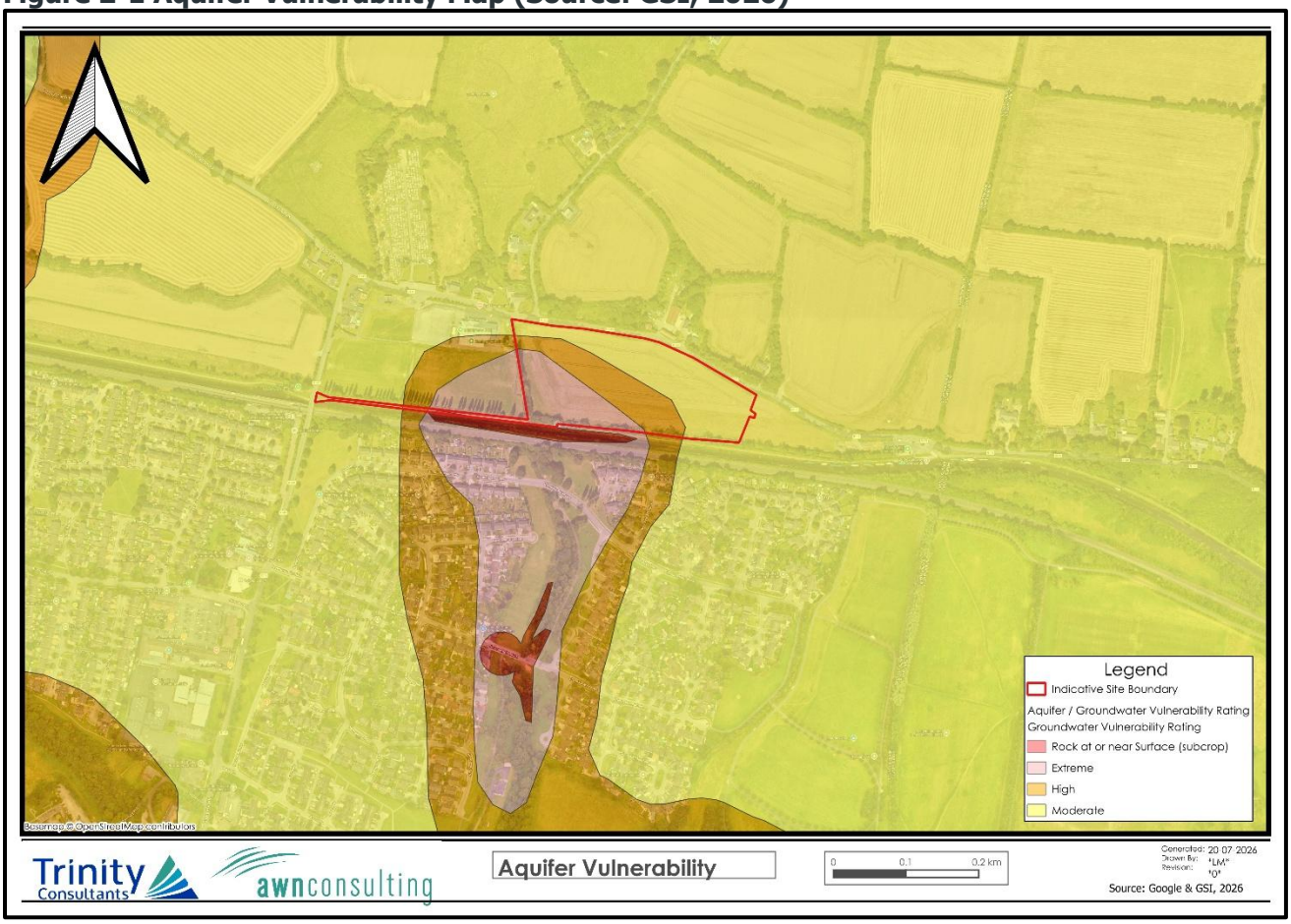
2.2.4 Aquifer Vulnerability

Groundwater vulnerability is an indication of how easily the aquifer can become contaminated by human activity. It is dependent on the thickness and permeability of the overlying soils and depth to the water table. For example, a bedrock aquifer with minimal thickness of overburden or with a thin layer of permeable overburden will be more vulnerable to contamination than a bedrock aquifer which has a thick layer of low permeability overburden. Extreme groundwater vulnerability is also associated with karst landforms as these are a direct pathway for water and contaminants to enter the aquifer from the surface.

The GSI currently classifies the aquifer vulnerability within the eastern and central portion of the subject site as Moderate (M), which is indicative of 5-10m overburden thickness of low permeability (Tills) subsoil, while the western and southwestern portions of the development site are classified as High (H) to Extreme (E) vulnerability which is indicative of 3-5m and 0-3m overburden thickness of low permeability (Tills) subsoil, respectively. As previously mentioned, Bedrock or 'rockhead' was not encountered or proven with trial pits terminating at depths ranging from 1.4mBGL (metres below ground level) to 3.1mBGL and percussion boreholes terminating between depths ranging from 1.7mBGL to 1.9mBGL.

The aquifer vulnerability class in the region of the site is presented as **Error! Reference source not found.** below.

Figure 2-1 Aquifer Vulnerability Map (Source: GSI, 2026)



3. 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 (control/design measures) i.e. a worst-case scenario. Construction sources (short-term) and operational sources (long-term) are considered below.

Construction Phase

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 control measures which will be incorporated in the Construction Environmental Management Plan (CEMP) fail.

v. During the excavations for the development, no significant long-term dewatering is anticipated / expected.

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 comprises a SuDs design utilises swales, tree pits, bioswales, water butts, green roofs, infiltration trenches, interception storage beneath swales (swale detention), the inclusions of permeable paving,and oil/silt interceptors. The drainage system will provide a surface water treatment train and promote source control throughout the development

while also providing attenuation storage at source. The storage system will discharge following the characteristics of a greenfield run-off into the to the Oranstown Stream which eventually outfalls to the River Liffey to the south of the site. 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.

iv. SuDS features will provide a surface water treatment train and promote source control throughout the development while also providing attenuation storage at source.

v. 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 Uisce Éireann (Irish Water) licencing requirements. The foul discharge from the site will join the public sewer and will be treated at the Ringsend Wastewater Treatment Plant (WWTP EPA Licence: D0034-02) prior to subsequent discharge to the River Liffey which subsequently discharges to the Dublin Bay and Irish Sea. This WWTP is required to operate in compliance with and under the respective/corresponding EPA licence meet environmental legislative requirements as set out in such licence prior to discharge.

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 and all construction water is passed through treatment installed prior to discharge offsite

i. There would be a potential pathway to the underlying aquifer through the bedrock via vertical migration from any localised diesel/ fuel oil spills during either construction or operational phases. The site is underlain by a 'Locally Important Aquifer' (LI). However, these aquifer types are 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 to short distances.

ii. There is a hydrological linkage for construction / operation run-off or any small hydrocarbon leaks from the site to the onsite open channel drainage ditches which convey flow to the Oranstown Stream (Silleachain Stream) which subsequently discharge to the River Liffey/Dublin Bay, respectively (and the associated corresponding SAC/SPA/pNHA). However, as the surface water (stormwater) discharge is fully treated by the permitted SuDS and interceptors during construction and operation, there is no potential for water quality exceeding SI threshold concentrations to be exceeded at the Oranstown Stream (Silleachain Stream), River Liffey and Dublin Bay. In addition, a buffer zone of minimum 20 metres along the onsite open channel drainage ditches will be retained at all times, in accordance with Kildare County Council Development Plan 2023-2029 and IFI Guidance.

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 facility at Ringsend WWTP prior to discharge downgradient to the Dublin Bay post treatment. However, as the WWTP is required to operate in compliance with licence requirements there is no potential for water quality exceeding SI threshold concentrations to be exceeded at the Dublin Bay.

3.3 Assessment of Receptors

The receptors considered in this assessment include the following:

i. Underlying Locally Important bedrock aquifer (Dublin GWB).
ii. The Rye Water Valley / Carton SAC (European Site Code: IE0001398), located c. 1.2km southwest (linear distance) of the proposed substation development site.
iii. Other relevant European site Natura 2000 (SAC's/SPA's) located within Dublin Bay, located a minimum of 18.9km southeast of the site.

3.4 Assessment of Source-Pathway-Receptor Linkages

3.4.1 Hydrological Pathways

3.4.1.1 Rye Water Valley / Carton SAC

At present, the site has no hydrological connection with the Rye Water Valley / Carton SAC due the development site being located hydrologically downgradient / downstream of this Natura 2000 site.

The proposed development (operational design / drainage strategy) site has no hydrological pathway linkage or connection to the River Rye Water (Rye Water Valley / Carton SAC) as surface water (stormwater) is proposed to discharge to the Oranstown Stream and downstream River Liffey, with no proposed discharge to the Confey/Rathleek Stream and downstream Rye River.

3.4.1.2 Dublin Bay (and associate designated Natura 2000 sites)

At present, the site has hydrological connection with the Dublin Bay (and associated designated Natura 2000 sites) via drainage, runoff, overland flow or baseflow to the local surface water drainage network which comprises onsite open channel drainage ditches which convey flow to the Oranstown Stream to the west of the site, which subsequently discharges to the River Liffey prior to its ultimate outfall to Dublin Bay (c. 18.9km southeast of the site). However, the source pathway linkage is over a lengthy distance allowing for significant attenuation and large dilution factor and mixing (contribution of flow from multiple watercourses downstream) along the pathway and within the river catchment. It should be noted that there is no likelihood of an accidental release of hydrocarbons or silt from the proposed development resulting in any change in surface water quality contributing to these habitats.

The proposed development (operational design / drainage strategy) site has no direct hydrological pathway linkage or connection to any of the above listed designated areas of protection and conservation which are located downgradient of the proposed development site. The proposed development would have an indirect hydrological pathway / linkage to the Oranstown Stream and downstream River Liffey, which is hydrologically connected to the Dublin Bay and corresponding associated Natura 2000 conservation / protection areas via the proposed surface water (stormwater) drainage and the foul (wastewater) network which outfalls to the River Liffey (post treatment), albeit the source pathway linkage is over a lengthy distance (c. 18.9km minimum) allowing for significant attenuation and large dilution factor and mixing (contribution of flow from multiple watercourses downstream) along the pathway and within the river catchment. It should be noted that there is no likelihood of an accidental release of hydrocarbons or silt from the proposed development resulting in any change in surface water quality contributing to these habitats.

3.4.1.3 Royal Canal pNHA

The Royal Canal is a fully lined (contained) feature therefore negating any hydrological connectivity or pathway/linkage between the proposed development site and this watercourse.

3.4.1.4 Foul Effluent / Wastewater Drainage

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 Uisce Eireann Ringsend WWTP prior to discharge to the Dublin Bay post treatment. This WWTP is required to operate

under an EPA licence and meet environmental legislative requirements as set out in its licence prior to discharge to the to the Dublin Bay coastal waterbody.

Given this facility is required to operate in compliance with licence requirements there is no potential for water quality exceeding SI threshold concentrations to be exceeded at the Dublin Bay coastal waterbody (and associated natura 2000 sites).

3.4.2 Hydrogeological Pathway

3.4.2.1 Rye Water Valley / Carton SAC

Despite the Rye Water Valley / Carton SAC, being hydrologically upstream of the proposed development, given its local distance (880m southwest), the potential for a hydrogeological pathway has been assessed as part of a conservative approach.

A hydrogeological connection may exist to The Rye Water Valley / Carton SAC through the underlying "*Locally Important Aquifer*" (LI), due to the flow path distances (1km) typical within the Dublin GWB exceeding the distance of separation (c.880m) from the proposed development site, albeit via a moderate pathway distance and an underground flow path involving a significant dilution factor (and mixing) within the aquifer / groundwater body (Dublin GWB). The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the overburden, which is characteristic of cohesive glacial clays, thereby further negating the potential for a hydrogeological linkage pathway to the sensitive receptors.

During the operational phase, there is low potential for a hydrogeological connection to the Rye Water Valley / Carton SAC given the proposed surface water (stormwater) drainage system will include hardstand, intercepting and directing rainfall / runoff to attenuation prior to ultimate discharge to the Oranstown Stream to the east of the site, which has no hydrological connectivity with the aforementioned SAC.

3.4.2.2 Dublin Bay (and associate designated Natura 2000 sites)

Currently, the site has a no potential for a hydrogeological (groundwater) connection to downstream / downgradient designated site located within Dublin Bay (listed above), due to the distance of separation (minimum 18.9km east) vastly exceeding the distance of local underground flow paths typical of the Dublin GWB aquifers beneath the site. The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the overburden, which is characteristic of cohesive glacial clays, and moderate vulnerability (5-10m+ overburden thickness) negates the potential of vertical and lateral migration offsite thereby further reducing/decreasing the potential for a hydrogeological linkage pathway to the sensitive receptors. Such a hydrogeological linkage / connection does involve a significant dilution factor downgradient in the aquifer (Dublin GWB) and estuaries. The good natural aquifer protection of the overburden from any localised diesel/ fuel oil spills during either construction or operational phases thereby further negates the potential for a hydrogeological linkage pathway to the sensitive receptors. There are no groundwater dependent wetlands within the downstream zone of influence of the proposed development.

3.4.2.3 Royal Canal pNHA

The Royal Canal is a fully lined (contained) feature therefore negating any hydrogeological connectivity or pathway/linkage between the proposed development site and this waterbody

3.4.3 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 local glacial clay subsoil/overbudren and a lack of

fracture connectivity within the aquifer will minimise the rate of off-site migration for any indirect discharges to ground at the site. As such there is low 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 the Oranstown Stream (Silleachain Stream) or River Liffey. However, there is an indirect pathway through the local drainage network (onsite open channel drainage ditch and Oranstown Stream) post treatment e.g. silt/sediment remediation. This will provide silt settlement treatment for any remaining suspended silts. Should any silt-laden stormwater from construction or hydrocarbon-contaminated water from a construction vehicle leak/tank leak manage to enter into the local drainage network, the suspended solids will naturally settle within the proposed construction drainage network; 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 River Liffey and Natura 2000 Sites in Dublin Bay.

It should be noted that during construction phase, a buffer zone of minimum 20 metres along the onsite open channel drainage ditches will be retained at all times, in accordance with Kildare County Council Development Plan 2023-2029.

3.4.4 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, attenuation and oil/ petrol interceptors prior to discharge off-site (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 the hydrologically downgradient Natura 2000 habitats located within Dublin Bay (c. 18.9m minimum linear distance downgradient).

It should be noted that the peak effluent loading / discharge, calculated for the proposed development as 3.87 l/s would equate to c. 0.028% of the licensed discharge at Ringsend WWTP / Lower Liffey Valley Regional Sewerage Scheme [peak hydraulic capacity, as constructed]. It should be noted that Uisce Éireann has recently completed the upgrade project of the Ringsend Wastewater Treatment Plant (WWTP). The completed upgrade now provides treatment capacity for 2.4 million PE and an increased peak hydraulic capacity of 13.8 m3/s, which indicates that this WWTP has adequate capacity with the capacity not projected to be exceeded within the next three years (capacity not exceeded before 2027). As such, this flow and treatment at Ringsend WWTP would not have a measurable impact on the overall current water quality and Water Body Status within the Dublin Bay and therefore would not have an impact on the current Water Body Status (as defined within the Water Framework Directive).

As the Proposed Development will have no additional stormwater run-off (due to attenuation to greenfield Q-bar rates) 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 the River Liffey or 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 and interceptor already included in the design, no perceptible risk to any Natura 2000 Sites is anticipated given the distance and dilution from source to Dublin Bay designated conservation and protected areas. Potential contaminant loading will be attenuated, diluted and dispersed near source area.

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.

Table 3-1. Pollutant Linkage Assessment (without control measures)

Source	Pathways	Receptors Considered	Risk of Impact
Construction Impacts			
Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle (1,000 litres worst case scenario).	Pathway to the underlying 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.	Bedrock aquifer (Locally Important aquifer) and Rye Water / Carton SAC.	Low risk of migration through poorly connected fracturing within the limestone rock mass. No likely impact on the status of the aquifer/off site migration due to low potential loading, natural attenuation within cohesive low permeability Till overburden (moderate aquifer vulnerability) 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.	Pathway through stormwater drainage to Oranstown/ Stream (via overland flow runoff or baseflow directly to the Oranstown Stream along the sites western boundary or to its tributary open channel drainage stream aligning the southern boundary of the site), which connect to the River Liffey via the Oranstown Stream	Dublin Bay Natura 2000 sites via the Oranstown Stream, River Liffey and Liffey Estuary (Upper and Lower)	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 River Rye Water based on low potential loading and dilution / mixing in the surface water drainage network pathway along the distance of c. 500m between the source and receptor (Rye Water / Carton SAC).

Source	Pathways	Receptors Considered	Risk of Impact
Operational Impacts (Summary)			
Foul effluent discharge to sewer	Indirect pathway to Dublin Bay through public sewer	Dublin Bay (and associated SPA/SAC/pNHA)	No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge (3.87 l/s which would equate to c. 0.028% of the licensed discharge at Ringsend WWTP; would not impact on the overall water quality within Dublin Bay (corresponding host SPA/SAC/pNHA sites) 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 through stormwater drainage to LIFFEY_150 (Oranstown Stream & River Liffey) & Dublin Bay	Dublin Bay and associated corresponding SAC/SPA/pNHA conservation / protection areas	No perceptible risk – taking into account the extent of loading of contaminant, significant distance between the source and receptor is c. 20 km and significant dilution in the catchment 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).

4. 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.

At present, the site has no hydrological connection with the Rye Water Valley / Carton SAC given that this designated Natura 2000 site is located hydrologically upgradient/upstream of the site. However, a hydrogeological connection may also exist to this SAC through the underlying "*Locally Important Aquifer*" (LI), due to the flow path distances (1km) typical within the Dublin GWB exceeding the distance of separation (c.880m) from the proposed development sit, albeit via a moderate pathway distance and an underground flow path involving a significant dilution factor (and mixing) within the aquifer / groundwater body (Dublin GWB). The vertical migration to the underlying bedrock is minimised due to the low permeability nature of the overburden, which is characteristic of cohesive glacial clays, thereby further negating the potential for a hydrogeological linkage pathway to the sensitive receptors.

During the operational phase, there is low potential for a hydrogeological connection to the Rye Water Valley / Carton SAC given the proposed surface water (stormwater) drainage system will include hardstand, intercepting and directing rainfall / runoff to attenuation prior to ultimate discharge to the Oranstown Stream to the east of the site, which is not hydrologically connected to the aforementioned upstream/upgradient SAC

The operational proposed development would have an indirect hydrological pathway / linkage to the Oranstown Stream, River Liffey, Liffey Estuary (Upper & Lower), Dublin Bay and the corresponding associated Natura 2000 conservation / protection areas via the proposed surface water (stormwater) drainage and the foul (wastewater) network which outfalls to Oranstown Stream (then River Liffey) and River Liffey, respectively (post treatment onsite via the proposed drainage design/strategy and post treatment offsite at Ringsend Wastewater Treatment Plant WWTP / Lower Liffey Valley Regional Sewerage Scheme), albeit the source-pathway linkage is over a significant distance allowing for significant attenuation and large dilution factor and mixing (contribution from multiple watercourses downstream) within the drainage design, and downstream in the river / estuary catchment.

There is an indirect source pathway linkage between the Proposed Development site and any open waters or Natura 2000 sites (i.e., Dublin Bay SAC's/SPA's) through the foul public sewer which will discharge to the public foul sewer network and eventually outfall to the Ringsend WWTP and ultimately discharges to the Dublin Bay. It should be noted that the Ringsend WWTP has capacity for this proposed foul effluent following recent upgrade works which have increased capacity for foul effluent treatment of this facility.

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

It is concluded that there are 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 the Rye Water / Carton SAC or Dublin Bay (and corresponding SPA/SAC/pNHA).

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 regards to 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. REFERENCES

- EPA, (2026). Environmental Protection Agency. Available on-line at: https://gis.epa.ie/EPAMaps/ [Accessed: 16-07-2026].
- GSI (2026). Geological Survey of Ireland; Available on-line at: http://www.gsi.ie [Accessed: 16-07-2026].
- NPWS (2026). National Parks & Wildlife Service. Protected Site Register. Available on-line at: http://webgis.npws.ie/npwsviewer/ [Accessed: 16-07-2025].
- River Basin Management Plan for Ireland 2018-2021.
- River Basin Management Plan for Ireland 2022-2027.
- County Louth Development Plan 2021-2027.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)).
- Department of Housing, Planning & Local Government (2018). River Basin Management Plan for Ireland 2018 – 2021.
- Eastern Regional Fisheries Board (2006). Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites.
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie).
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001).
- Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).
- Character Area R5, Confey Lands, Leixlip- Site-Specific Flood Risk Assessment (SSFRA) Report – Corrigan Hodnett Consulting (September, 2025)
- Character Area R5, Confey Lands, Leixlip- Infrastructure Design Report (IDR) – Corrigan Hodnett Consulting (July, 2025)
- Ground Investigation Report- Confey, Leixlip. Ground Investigations Ireland Ltd (GII), July 2025.
- Uisce Eireann- Catchments.ie (2026). Annual Environmental Report 2024, Ringsend WWTP (D0034-02), Uisce Éireann, (Irish Water);
- Cycle 3 HA 09 Liffey and Dublin Bay Catchment Report (EPA/Catchments.ie, May 2024).