6.0 WATER AND HYDROLOGY (INCLUDING WATER FRAMEWORK DIRECTIVE ASSESSMENT)

6.1 INTRODUCTION

This chapter of the EIAR provides an evaluation of the current environmental conditions and the potential impacts of the proposed development on the hydrology of the site and its surrounding area. The effects on land, soils, geology, and hydrogeology are discussed in Chapter 5 (Lands, Soils, Geology, and Hydrogeology). Additionally, this chapter assesses the existing hydrological conditions and the likely impacts of the proposed development on the local hydrology.

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6.2 STUDY METHODOLOGY

This assessment was conducted based on the available baseline data, potential effects, and other available relevant information. The evaluation followed the methodology outlined in the relevant guidance documents listed below:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports.

The following sources of information were consulted:

- Eastern River Basin District (ERBD) Management Plan - Liffey Water Management Unit and Programme of Measures – ERBD.
- 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)).
- Requirement for the Protection of Fisheries Habitat During Construction and Development Works at River Sites (Eastern Regional Fisheries Board (ERFB)).
- Dublin City Council (2005) Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council.
- Greater Dublin Regional Code of Practice for Drainage Works: Version 6.0 (Wicklow County Council, South Dublin County Council (SDCC), Meath County Council, Kildare County Council, Fingal County Council, Dun Laoghaire- Rathdown County Council & Dublin City Council).
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (CIRIA 532, 2001).

The quality, magnitude and duration of potential effects are defined in accordance with the criteria provided in the EPA Guidelines (Section 3, Table 3.4).

This EIAR Chapter is informed by the Site-Specific Flood Risk Assessment (CS Consulting Engineers, 2024) and Engineering Services Report (CS Consulting Engineers, 2024) as well as Chapter 2 of this EIA Report.

6.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

6.3.1 Topography

The topography of the proposed development site is generally flat with the elevation of the site ranging from 2.97mOD (Ordnance Datum) to 3.01 mOD.

6.3.2 Site Area Description

The site primarily consists of the former City Arts Centre Building and the surrounding hard standing area, bordered by City Quay to the north, Moss Street to the west, and Gloucester Street South to the south. To the east, the site is adjacent to the City Quay Covid testing centre and City Quay National School.

The former City Quay Arts site is one of Dublin City's most notable brownfield locations, offering an exceptional opportunity for high-density development in the heart of the city. Situated at the junction of City Quay and Moss Street, the site spans 0.22 hectares and is bordered by Gloucester Street South to the south. The entire site is covered in hard standing. For many years, the site has been vacant, with the abandoned City Arts Centre building occupying the northwest corner. Since the mid-1990s, the site has primarily been used for surface car parking, with a small storage shed located along the western boundary.

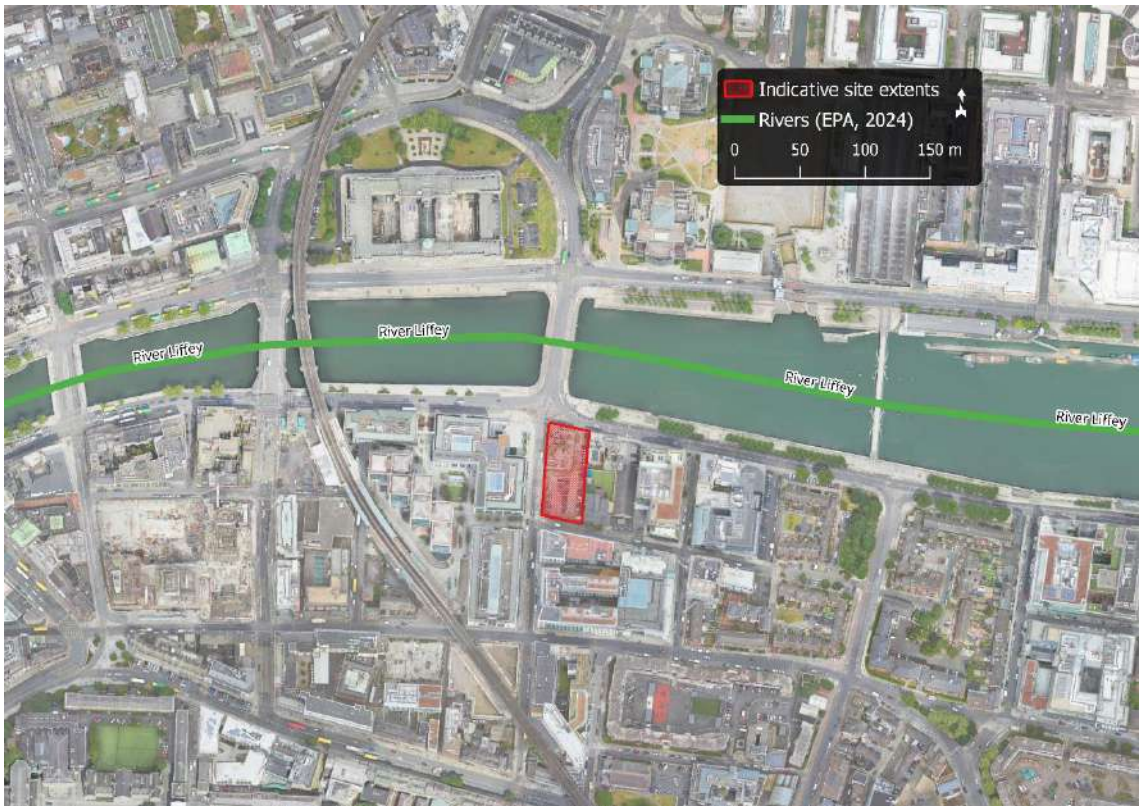
The site is strategically positioned to contribute to a growing cluster of developments around the Customs House. It has the potential to be integrated into the South Quays' architectural massing, alongside the recently approved Tara Street Tower and College Square developments, enhancing the symmetrical setting of the Customs House along the North Quays. The proposed development site is designated as 'Zone 25: City Centre' in the Dublin City Council Development Plan 2022-2028. The hydrological context of the surrounding environment is detailed in the following sections.

6.3.3 Hydrology

The proposed development is situated within Hydrometric Area No. 09, which covers the Liffey and Dublin Bay area of the Irish River Network. Specifically, the site lies within the Dodder Sub-Catchment (Dodder_SC_010), part of the larger River Liffey catchment. The River Liffey originates between Kippure and Tonduff in the Wicklow Mountains, flowing approximately 129 km through Counties Wicklow, Kildare, and Dublin before emptying into the Irish Sea at Dublin Bay. The River Liffey catchment spans an area of about 1,369 km².

The closest waterbody to the site is the River Liffey (IE_EA_090_0400, 09_2111), located roughly 0.02 km to the north of the proposed development. The river then discharges into Dublin Bay Natura Site, approximately 1.54 km east of the development site. There is a possibility that a section of the now-disused 'Gallows Stream' could cross the proposed development area. Historical records suggest that the stream originated near Leeson Lane off Leeson Street and flowed near Government Buildings (Oram, 2004; Sweeney, 2017). However, site investigations did not detect the stream's presence. The River Liffey and Liffey Estuary Upper are classified as 'Moderate' and 'Good' in terms of water quality, respectively.

Figure 6.1. Hydrological Environment (approximate boundaries denoted with red below)



6.3.4 Water Quality

The proposed development is situated within Hydrometric Area No. 09, which covers the Liffey and Dublin Bay area of the Irish River Network. Specifically, the site lies within the Dodder Sub-Catchment (Dodder_SC_010), part of the larger River Liffey catchment as shown in **Error! Reference source not found.** 6.1 above.

The development is situated within the Eastern River Basin District (ERBD), as defined by the EU Water Framework Directive (2000/60/EC), which establishes a framework for community action in the field of water policy, commonly referred to as the Water Framework Directive (WFD).

The Liffey Estuary Upper is classified as 'Moderate' due to its designation as 'Potentially Eutrophic'. However, the water quality improves downstream, beyond the Talbot Memorial Bridge, where it is classified as 'Intermediate.' These waterbodies are considered transitional.

Surface Water Quality

Q Values are used by the Environmental Protection Agency (EPA) to indicate the biological water quality of a water body, based on changes in the macroinvertebrate communities in riffle areas due to organic pollution. A Q1 value represents a seriously polluted water body, while a Q5 value indicates unpolluted water of high quality.

The River Liffey is classified as 'Poor' at the nearest river station to the site, located at LIFFEY - 0.2 km downstream of Chapelizod Bridge (Lynch's Lane) (RS09L012360), approximately 6.05 km upstream (west). This is an operational station, and its current status is 'Poor' with a Q-value of 3, as recorded in 2022. The descriptions of each of the Q Ratings are shown in Table 6.1.

Table 6.1. EPA Biological Q Ratings

Quality Class	Quality Ratings	Condition	Pollution Status
Class A	Q5, Q4-5, Q4	Satisfactory	Unpolluted
Class B	Q3-4	Unsatisfactory	Slightly Polluted
Class C	Q3, Q2-3	Unsatisfactory	Moderately Polluted
Class D	Q2, Q1-2, Q1	Unsatisfactory	Seriously Polluted

6.3.5 Water Supply

CS Consulting Engineers have prepared an Engineering Services Report (ESR), which has been submitted as part of the planning application documentation. Along with the planning drawings, the report outlines the existing and proposed water supply, drainage, and wastewater plans for the site.

A pre-connection inquiry has been submitted to Uisce Éireann (UE), and it is anticipated that a connection agreement will be established to provide potable water to the proposed development. Records from Uisce Éireann indicate that two connections (250mm Ductile Iron pipes) currently serve the site, linking it to the IW network at Moss Street. Additionally, the existing Water Supply Network records show another 250mm DI watermain on City Quay and a 5" Cast Iron water main along Gloucester Street.

6.3.6 Foul Infrastructure

According to the available Uisce Éireann maps, the existing wastewater network in the streets surrounding the proposed development site is a combined system, handling both stormwater and foul water discharges.

6.3.7 Surface Water Drainage

As mentioned earlier, based on the available Uisce Éireann maps, the existing wastewater network in the streets surrounding the proposed site is a combined system, carrying both stormwater and foul water discharges.

Additionally, aerial images and survey data indicate that the current surface water drainage flows freely into the combined public sewer system without any restrictions.

6.3.8 Flooding

The existing road levels around the site range from 2.950m to 3.150m OD on Moss Street. To aid in flood protection, the entrances to the ground floor of the proposed building will be approximately 0.8m higher than the surrounding ground level. The development will include a double-level basement, with the lowest finished floor level set at approximately -4.0m OD, which is 8.0m below the highest ground floor level. The main vehicular access to the site will be via Gloucester Street, with a car lift providing access to the basement parking (details are provided in the architects' plans).

A Flood Risk Assessment (FRA) has been conducted by CS Consulting Engineers and is included in Appendix 6.1. A summary of the flood risk for the site is provided below.

The Flood Risk Assessment for the City Quay development site has been carried out in relation to the proposed multi-storey commercial development.

The eastern portion of the subject site is located within Flood Zone A and B, and the remainder within Flood Zone C.

The development of a commercial complex is classified as a less vulnerable development under the Flood Risk Management Guidelines.

The proposed development follows a precautionary approach to setting finished floor levels, as outlined in Section 5.16 of the Flood Risk Management (FRM) Guidelines. It is designed to be resilient to breach, overtopping, and climate change scenarios. The commercial development will be situated above the 0.5% Annual Exceedance Probability (AEP) coastal flood level, with allowances for climate change and freeboard, set at 3.92mOD.

The development will not alter flood extent, depth, risk, or flood routes in surrounding areas.

Although the development will rely on the existing South Campshire Flood Protection Scheme for additional protection, it incorporates its own measures to meet the required design standards outlined in the FRM Guidelines.

A justification test has been conducted for the proposed development, confirming its appropriateness and demonstrating that it aligns with the requirements of *The Planning System and Flood Risk Management, Guidelines for Planning Authorities* (2009), as well as local zoning objectives, while respecting the local streetscape and urban fabric.

6.3.9 Rating of Site Importance of the Hydrology Features

Based on the TII methodology, the hydrological features at this site are rated as Medium Importance for the following reasons:

- The site has no direct connectivity to a major receiving waterbody.
- There are no surface water sources in the surrounding area that are designated for potable water, amenity, or fisheries purposes.
- The status of the receiving water is classified as Moderate.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed building consists of 14 floors above the ground floor and includes 2 basement levels. The lower basement level accommodates 11 car parking spaces, including 2 disabled accessible spaces and 3 motorbike spaces.

Further details of the Proposed Development can be found in Chapter 2 (Description of the Proposed Development). The key characteristics of the proposed development in relation to the hydrological environment are outlined below.

6.4.1 Water Supply

The water supply for the site has been designed in accordance with Irish Water Code of Practice and standard construction details. A pre-connection enquiry form has been issued to Uisce Éireann.

It is expected that the existing surrounding watermain network will provide sufficient water supply to meet the needs of the proposed development, including fire flow requirements. This will be confirmed after Irish Water completes its assessment.

Water conservation measures will be implemented throughout the development, addressing both potable and non-potable water demands.

The estimated post-development water demand for the proposed development is 6.586 l/sec, as outlined in the Engineering Services Report submitted with this planning application.

6.4.2 Foul Sewage

The foul drainage system has been designed in compliance with industry standards, the Building Regulations, and the guidelines outlined in Technical Guidance Document H. It will be installed in full accordance with Uisce Éireann's requirements for taking the system in charge.

Uisce Éireann's maps indicate that the existing wastewater network in the surrounding streets of the proposed development site is a combined system, handling both stormwater and foul discharge.

Based on the Engineering Services Report submitted with this planning application, the foul discharge from the proposed development is calculated to be 4.742 l/s (with a peak flow of 4.5 times the Dry Weather Flow).

6.4.3 Surface Water Drainage

6.4.3.1 Construction

The main civil engineering activities during the construction of the proposed development that could potentially affect the water and hydrological environment are summarised as follows:

- Excavations required for the foundations of the proposed buildings and the installation of associated services.
- Excavations for the two basement levels.
- Potential discharge of collected rainwater during excavation and groundworks, depending on the season during which the development occurs.
- Storage of cement, concrete materials, temporary oils, and fuels on-site, which may result in small, localised accidental releases of contaminants, such as hydrocarbons, from construction traffic and vehicles operating on-site.
- Localised excavation (cuts) and infill (build-up) to achieve the designed elevation changes across the proposed development site.

6.4.3.2 Operation

The proposed surface water drainage design has been developed in accordance with The Greater Dublin Regional Code of Practice for Drainage Works, The Greater Dublin Strategic Drainage Study (GDSDS), Volume 2, British Standard BS EN 752:2008 (Drains and Sewer Systems Outside Buildings), and Part H of the Building Regulations (Building Drainage).

Surface water runoff from the proposed development will be attenuated on-site before being discharged into the combined public sewers located on Moss Street. Although the site is brownfield, the development will reduce stormwater discharge to a maximum of 2l/s, as specified in the Greater Dublin Regional Code of Practice for Drainage Works. A flow control device will be used to limit discharge into the existing public combined sewer.

In line with the Dublin City Development Plan 2022-2028, Objective SIO3 requires all new developments to provide separate foul and surface water drainage systems and to incorporate sustainable urban drainage systems (SuDS). The proposed design integrates SuDS and features such as Green Blue Roofs, as outlined in Appendix 11 of the DCC Development Plan 2022-2028, and considers the control of paving and grassed areas. Surface water from the development will be managed on-site, attenuated, and then discharged to the existing Irish Water combined sewer at a controlled maximum flow rate of 2l/s.

The SuDS Systems for the proposed development at 1-6 City Quay includes the following:

- Green/ Blue Roofs - It is proposed to provide Green Blue roof at the setback on level 11 and at main roof level, which shall retain and attenuate rainfall at source prior to out falling to the public network. It is proposed to provide blue roof below the landscaping at the terraces on levels 6, 9 and 12 as well as below the area of PV panels at Roof level. The Green /Blue roof shall have a total storage volume of 113 m^3.

- Green Roofs - It is proposed to provide 576m^2 of biodiverse green roof at level 11 and roof level. In addition to this it is also proposed to provide soft landscaping area on terrace.

- Attenuation - Based on the adopted run off rate the total attenuation storage volume required is 121m^3, with 18m^3 provided in the attenuation storage system located at the basement level and 103m^3 provided within the combined blue roof buildup at terrace and roof levels noted above. The attenuation tank is designed to attenuate a 1:100 year+ 20% climate change storm event.

Refer to Engineering Services Report and Engineering Drawings prepared by CS Consulting submitted with this planning application for further details on the surface water management plan and drainage details.

6.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The potential impacts on the surface water environment during both the construction and operational phases of the proposed development are outlined in the following sub-sections below:

6.5.1 Construction Phase

The main civil engineering works for the proposed development will involve excavating material for the foundations and the delivery of imported materials such as engineering fill, crushed stone, concrete, reinforcement, and other construction supplies. Additionally, construction activities will include on-site storage of cement, concrete materials, oils, and fuels.

Increased Run-off and Sediment Loading

Surface water runoff during the construction phase, resulting from site preparation, levelling, landscaping, and excavations, may contain elevated silt levels or become contaminated by construction activities. Runoff with high silt content can damage surface water systems and receiving watercourses. Silt-laden water may arise from excavations, exposed ground, stockpiles, and access roads.

During construction, there is potential for increased runoff due to the introduction of impermeable surfaces and soil compaction. This will reduce the infiltration capacity of the site and increase the volume and rate of surface runoff. The resulting impact could include an increase in surface water runoff and sediment loading, which might affect local drainage systems. Site testing and previous use of the land have shown elevated levels of metals such as lead and zinc, as well as trace amounts of asbestos. Further environmental testing will be conducted before subsoil disposal, and hazardous materials will be removed at the outset of the project. There is no risk to the surrounding hydrological environment as these materials will be safely disposed of at a licensed facility by a licensed contractor.

A potential direct pathway exists from the excavation area to the surface water drainage system through overland flow. Mitigation measures, as outlined in Section 6.7, will be implemented to prevent any risk to the site's drainage system.

Uncontrolled Discharges, Fuel and Other Accidental Spills

During the construction phase, there is a potential risk of accidental pollution incidents from the following sources:

- Spillage or leakage of fuels and oils stored on-site.
- Spillage or leakage of fuels and oils from construction machinery or site vehicles.
- Spillage of oil or fuel during the refuelling of machinery on-site.
- The use of concrete and cement materials.

Machinery activities on-site during the construction phase may result in the contamination of runoff into surface water. Potential impacts could arise from accidental spills of fuels, oils, paints, and similar substances, which may affect surface water if allowed to flow into drainage systems and/or receiving watercourses. Concreting operations near surface water drainage points during construction also pose a risk of discharges into watercourses. Concrete, particularly its cement component, is highly alkaline, and any spillage into a local watercourse could harm water quality, as well as local fauna and flora. The mitigation measures outlined in Section 6.7 will be implemented to minimise and address any potential impacts.

Wastewater

Welfare facilities for contractors will be provided on-site during the construction works. Portable sanitary facilities will be made available, with waste collected and disposed of in an appropriate manner. No adverse impacts on wastewater are anticipated during the construction phase.

Summary of Construction Phase Impacts

A summary of the construction phase impacts for the proposed development, both with and without mitigation, in accordance with EPA (2022) EIA guidelines, is presented in the following sections.

Without the implementation of mitigation measures (design), the magnitude of the impact during the construction phase is expected to be short-term in duration, with a moderate adverse impact rating on the hydrological environment in the immediate vicinity of the development site.

However, with the adoption of design and mitigation measures (outlined in Section 6.7), the impact during the construction phase is expected to remain short-term in duration, with an imperceptible impact rating.

6.5.2 Operational Phase

The impact of the proposed development during its operational phase is summarised below:

Surface Water Runoff

Without proper control measures, an increase in hardstanding areas would lead to a higher rate of surface water runoff. Dublin City Council (DCC) mandates all new developments to incorporate Sustainable Drainage Systems (SuDS) to manage surface water on-site. This requirement is in line with the Greater Dublin Strategic Drainage Strategy, and the proposed development incorporates SuDS in its drainage design to manage surface water effectively.

Uncontrolled Discharges, Fuel and Other Accidental Spills

There is a potential for localised leaks and spillages from vehicles along access roads and parking areas. Any accidental release of oil, petrol, or diesel could lead to contamination if not properly mitigated and if it enters the water environment.

While there is no direct pathway to surface water from this site, there is an indirect pathway through the drainage system. The mitigation measures outlined in Section 6.7 will prevent potential impacts on both on-site and off-site watercourses.

Foul Water

As previously mentioned, the proposed development will result in an increase in foul water discharge.

Water Supply

The proposed development will lead to an increased demand for water from the Dublin City Council water supply system, as outlined in previous sections.

Summary of the Operational Phase Impacts

A summary of the operational phase impacts for the proposed development, with and without mitigation, following EPA (2022) EIA guidelines is provided below.

Without mitigation and design measures, the magnitude of the impact during the operational phase is temporary in duration, with a not significant impact rating on the hydrological environment in the immediate vicinity of the proposed development site.

However, with the implementation of design and mitigation measures (as described in Section 6.7), the impact during the operational phase will be long-term in duration, with an imperceptible impact rating.

6.6 DO NOTHING SCENARIO

If the proposed development does not proceed, runoff from the site will continue to directly flow into the existing drainage system.

It is important to note that the proposed redevelopment is expected to have a positive impact on the receiving waters. The drainage design for the site will comply with the Greater Dublin Strategic Drainage Study (GDSDS) Guidelines, which will result in attenuated runoff from the site and enhanced water quality management.

6.7 REMEDIAL AND MITIGATION MEASURES

The proposed development design has carefully considered the potential impacts and risks to the water environment. To minimise or avoid negative effects, mitigation measures have been developed, focusing on best practice construction techniques and compliance with relevant regulations.

The following mitigation measures aim to address impacts during both the construction and operational phases of the project. Due to the interconnected nature of Chapter 6 (Hydrology) and Chapter 5 (Land, Soils, Geology, and Hydrogeology), the mitigation measures discussed will be applicable to both sections.

6.7.1 Construction Phase

A project-specific Outline Construction and Environmental Management Plan (CEMP) has been developed by CS Consulting and is included as part of this planning application. Before construction begins, the CEMP will be updated and managed by the contractors throughout both the construction and operational phases. The CEMP will address all potentially polluting activities and include an emergency response procedure. All site personnel will receive training on how to implement these procedures effectively.

Soil Handling, Removal, and Compaction

Soil sampling (three samples) conducted on-site revealed that the soil is hazardous due to elevated levels of lead and zinc. Additional soil sampling and testing will be required if any soil needs to be removed from the site. Any soil removed will be disposed of by a licensed contractor at a licensed facility.

Temporary storage of soil will be carefully managed to prevent any adverse impact on the surrounding environment, with materials being stored away from surface water drains. The movement of materials will be minimised to reduce soil degradation and dust generation.

Basement Assessment – Mitigation Measures

The design includes the following mitigation measures to protect water quality during the construction and operation of the basement:

1. Groundwater and Rainwater Management During Excavation:

- Any minor ingress of groundwater and collected rainfall during excavation will be pumped out.
- The water will be discharged via the existing stormwater sewer network, with the use of silt traps and an oil interceptor, if necessary. This ensures that no silt or contaminated water is discharged into the sewer.

2. Site Investigation and Water Bearing Gravels:

- Site investigation has not identified significant water-bearing gravels within the basement footprint. If such gravels are encountered, the design will facilitate water discharge around the basement structure to prevent flooding.

3. Spill Control and Material Storage:

- All oils, solvents, and paints used during construction will be stored within temporary bunded areas. These bunds will have a volume capacity of 110% of the largest tank/container to prevent spillage into the surrounding environment.

4. Concrete Management:

- Ready-mixed concrete will be delivered to the site by truck, and a risk assessment will be carried out for wet concreting operations to ensure no discharge of alkaline wastewater or contaminated stormwater to the underlying subsoil.

- Concrete washing and washout of concrete vehicles will take place off-site at an appropriate facility.

5. Outline Construction and Environmental Management Plan (OCEMP):

- An OCEMP, prepared by CS Consulting Engineers, will guide the management of water and other environmental impacts during construction. A detailed CEMP will be produced by the appointed contractor before the start of construction and will include management of any collected water.

6. Ground Movement and Monitoring:

- Ground movements will be closely monitored, particularly in areas where movements are critical. Instruments such as inclinometers will be installed in the basement wall to monitor ground behaviour and ensure predicted values align with actual movements.

- Monitoring will include weekly readings of surveying points set up before the start of works. Vibration monitors will be installed to protect adjacent structures, and contingency measures will be put in place if movements exceed predetermined levels.

7. Water Inflow Risk:

- Based on groundwater monitoring of the adjacent site, it is considered that the risk of inflow during construction is low. Installation of piles prior to excavation is expected to mitigate groundwater inflow risks.

8. Impact on Water Levels and Aquifers:

- The basement excavation is not expected to affect the water levels in the overburden or the underlying aquifer. The bedrock water table will not be impacted by the excavation works.

- Temporary dewatering of the perched water table during excavation will have a minor, local impact, and no long-term effect is anticipated.

9. Waterproofing of Basement:

- The basement will be fully waterproofed to prevent groundwater ingress into the finished structure.

10. Management of Collected Rainwater and Groundwater:

- Any collected rainwater and groundwater seepage during the basement excavation will be pumped to the existing sewers after appropriate treatment, with approval from the regulatory authority.

These measures ensure that the basement construction will not adversely impact the surrounding water environment, and all potential risks are mitigated through careful planning, monitoring, and adherence to best practices.

<u>Fuel and Chemical Handling Mitigation Measures</u>

To minimise the impact on the underlying subsurface strata and surrounding environment from material spillages, the following mitigation measures will be employed during the construction phase of the development:

1. Storage of Oils, Solvents, and Paints:

- Oils, solvents, paints, and other chemicals will be stored in **temporary bunded areas**.
- Oil and fuel storage tanks will be placed in **designated bunded areas**, with the bunds designed to contain 110% of the volume of the largest tank/container plus an allowance of 30 mm for rainwater ingress.
- Drainage from the bunded areas will be diverted for **safe collection and disposal**, ensuring that no spillage contaminates surrounding soil or water systems.

2. Refuelling and Maintenance of Vehicles:

- **Refuelling of construction vehicles and equipment** will take place in a **designated refuelling area** on-site (or, where possible, off-site) located away from surface water drains or gullies.
- In the event that a machine needs to be refuelled outside of the designated area, fuel will be transported using **mobile double-skinned fuel tanks** to minimise the risk of leakage or spillage.
- An adequate supply of **spill kits** and **hydrocarbon adsorbent packs** will be maintained in the designated refuelling area. All personnel involved in refuelling operations will be **fully trained** in the use of these equipment and emergency procedures.
- The project will adhere to guidelines such as **"Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001)** to ensure best practices are followed.

3. Concrete Management:

- **Ready-mixed concrete** will be delivered to the site by truck, and a **suitable risk assessment** for wet concreting will be completed prior to commencement. The risk assessment will include measures to prevent the discharge of **alkaline wastewater** or **contaminated stormwater** into the underlying subsoil.
- The concrete pouring will occur within a **designated area** on-site, and a **geosynthetic material** will be used to prevent **concrete runoff** into the soil or groundwater.
- Wash down and washout of concrete trucks will take place **off-site** at an appropriate facility, reducing the risk of contamination from concrete residues.

4. Chemical Storage and Handling:

- **Drummed fuels** or other chemicals used during construction will be stored in a **dedicated, internally bunded chemical storage cabinet**. These cabinets will be clearly **labelled** to facilitate appropriate remedial action in case of a spill.
- The storage area will be managed to ensure that any potential spills can be contained and dealt with promptly, following best practices for hazardous material management.

By adhering to these robust mitigation measures, the project aims to prevent contamination of soil, groundwater, and surface water during the construction phase, ensuring compliance with environmental regulations and minimising any potential negative impacts.

6.7.2 Operational Phase

During the operational phase of the development, there will be no need for bulk fuel storage, reducing the risk of fuel spills. There will also be no discharge of water to the ground, as surface water will be managed through the drainage system. Additionally, the development will not extract groundwater, ensuring no impact on local water supplies. An Environmental Management Plan (EMP) will be implemented during operation to oversee environmental protection. The plan will include measures to prevent environmental harm and emergency response procedures in case of incidents, ensuring quick and effective action if needed.

Surface Water Drainage

The proposed development will significantly enhance the local drainage system by providing full attenuation for the increased hardstanding area, in line with the requirements of the Greater Dublin Strategic Drainage Study. Several measures will be implemented to reduce the risk of spills affecting the water environment, including the design of the car park and on-site speed restrictions.

A flood risk assessment was carried out in accordance with the OPW's "The Planning System and Flood Risk Management Guidelines for Planning Authorities" (November 2009). For further details, please refer to Section 6.3.7,

Flooding, above. The full Flood Risk Assessment for the proposed development can be found in Appendix 6.1 at the end of this report.

Foul Water

The proposed development will operate within the requirements of the connection agreement with Uisce Éireann.

Water Supply

Flow monitoring will be installed at the point where the public and private water mains meet, serving the purposes of billing and leakage detection. The specific details of the required meter and its enclosure will be discussed and agreed upon with the water authority prior to the start of construction.

6.8 RESIDUAL IMPACT OF THE PROPOSED DEVELOPMENT

6.8.1 Construction Phase

During construction, after applying the mitigation measures outlined in Section 6.6.1, the impact on water quality is expected to be short-term and imperceptible, with a neutral effect on water quality. This means any measurable impacts will have no significant consequences. This conclusion is based on assessments showing that there will be no significant increase in runoff from the site, and the quality of any runoff will be effectively mitigated if necessary.

6.8.2 Operational Phase

The operational phase of the proposed development has been carefully assessed for its potential effects on the hydrological environment. It is concluded that the development will not negatively impact any surface water bodies during operation, nor will it increase flood risk. With the implementation of mitigation measures as outlined in Section 6.6.2, no adverse effects are anticipated. Therefore, the operational phase is expected to have a long-term, imperceptible effect with a neutral impact on water quality, meaning any measurable changes will not have significant consequences.

6.9 MONITORING OR REINSTATEMENT

6.9.1 Construction Phase

During the construction phase, the site drainage systems will be monitored to ensure that construction activities do not negatively impact surface water. This monitoring will help confirm that all implemented mitigation measures are effective in protecting the hydrological environment.

6.9.2 Operational Phase

Maintenance of the stormwater and foul sewer systems for the entire landholding will adhere to the standards and requirements specified by the relevant utility providers. This ensures the systems function effectively and remain in compliance with all applicable regulations.

6.10 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

The cumulative impact of the proposed development, in conjunction with other related, permitted, concurrent, and future developments, has been carefully considered. A detailed discussion on these developments and their potential interactions with the proposed development is provided in Chapter 2 (Description of the Proposed Development). This analysis ensures that any combined effects on the environment, infrastructure, and local area are thoroughly evaluated and addressed.

6.10.1 Construction Phase

In relation to the potential cumulative impact on hydrology during the construction phases, the construction works that could have potential cumulative impacts include excavation activities, soil handling and removal, and the potential for increased surface water runoff from multiple construction sites. Additional factors include the use of machinery and temporary storage of construction materials such as fuels, oils, and concrete, which carry a risk of

accidental spills or contamination. These activities, if occurring concurrently with other nearby developments, could collectively increase the likelihood of impacts on local drainage systems and water quality.

Mitigation measures and careful coordination with other projects will minimise these risks and ensure no significant cumulative impact on hydrology, these include:

- Contractors for the proposed development will be required to adhere to the Construction and Environmental Management Plan (CEMP), which incorporates the mitigation measures outlined in this Environmental Impact Assessment (EIA) report. Similarly, other developments will also need to implement water protection measures to meet legislative standards for receiving water quality, as set out in the European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019). As a result, the potential for cumulative changes to the natural hydrological regime is minimal. The cumulative impact is considered to be neutral and imperceptible.

- Surface water run-off during the construction phase has the potential to carry increased levels of silt or become polluted due to construction activities. Such run-off can damage surface water systems and receiving watercourses by reducing water quality, clogging drainage systems, and negatively affecting aquatic habitats.

- Accidental spillages or leakages from construction traffic and materials could potentially contaminate local water sources if not properly managed. However, the absence of notable surface water features on-site and the lack of direct hydrological pathways to off-site surface water bodies reduce the risk of significant contamination. Compliance with project-specific Construction Environmental Management Plans (CEMPs) will further mitigate this risk, ensuring proper handling, storage, and response measures are in place.

- There is a potential for contamination of watercourses during the construction phase, primarily due to sediment runoff and fuel leakages. However, mitigation measures will be implemented to manage these risks during both construction and operation. All developments must comply with relevant legislation, such as the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009), which require effective management of runoff and fuel leakages to protect the receiving water environment. These measures will ensure that the development does not negatively impact water quality.

The residual cumulative impact on water and hydrology during the construction phase is expected to be short-term, with an imperceptible effect and a neutral impact on water quality. This is contingent on the implementation of appropriate mitigation measures to manage water quality runoff, ensuring compliance with legislative requirements for each development. These measures will effectively minimise any potential impact on the water environment during construction.

6.10.2 Operational Phase

Potential cumulative impacts in the operational phase include:

- The expansion of hard-standing areas will decrease the local groundwater recharge and, if not controlled to match the greenfield runoff rate, could increase surface water runoff;

- There is an increased risk of accidental fuel spills during storage or delivery, unless proper mitigation measures, such as bunded tanks, are in place;

- There is an increased risk of accidental hydrocarbon discharges from car parking areas and roads, unless these are diverted into the surface water system equipped with a petrol interceptor; and

- Any additional foul discharges should be properly treated, if necessary, and/or redirected to the foul sewer system instead of being discharged directly to the ground.

Mitigation measures similar to those outlined in Section 6.7 will need to be applied to safeguard water quality.

An increase in wastewater loading and water supply demand is a common impact for all developments. Each development will need approval from Uisce Éireann to confirm the availability of capacity in the water and wastewater infrastructure. The surface water and foul drainage systems, as well as the water supply infrastructure for the proposed development, have been designed to accommodate the anticipated future substation development.

The development will lead to an increase in hardstanding, which will reduce local groundwater recharge and increase the runoff rate. However, each approved development must comply with the Greater Dublin Strategic Drainage Strategy (GDSDS) and the requirements set by the Local Authority and Uisce Éireann. This includes implementing appropriate on-site attenuation measures to maintain greenfield runoff rates and ensure that there is no increase in off-site flooding due to the development.

The residual cumulative impact on water and hydrology during the operational phase is expected to be long-term with an imperceptible effect and a neutral impact on quality, provided that appropriate mitigation measures are implemented to manage water quality runoff in accordance with legislative requirements for each development.

6.11 DIFFICULTIES ENCOUNTERED IN COMPILING

No particular difficulties were encountered in the preparation of this EIAR chapter.

6.12 REFERENCES

- **Construction Industry Research and Information Association, 2011**. *Environmental good practice on site;* Construction Industry Research and Information Association publication C692 (3rd Edition - an update of C650 (2005); (I. Audus, P. Charles and S. Evans), 2011.

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- **Environmental Protection Agency, 2003**. EPA *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;* Environmental Protection Agency.

- **Environmental Protection Agency, 2022**. *Guidelines on the information to be contained in Environmental Impact Assessment Reports;* Environmental Protection Agency.

APPENDIX 6.1

SITE SPECIFIC FLOOD RISK ASSESSMENT

Document Title

Site Specific Flood Risk Assessment

Project

Proposed Office Development at 1-6 City Quay

Client

Ventaway Ltd

Job No. V101

19 November 2024

CS CONSULTING

Civil, Structural & Traffic Engineering

CS CONSULTING
Civil, Structural & Traffic Engineering

SITE SPECIFIC FLOOD RISK ASSESSMENT

PROPOSED OFFICE DEVELOPMENT AT 1-6 CITY QUAY

DOCUMENT STATUS					
File Location: V_JOBS\Job-V101\B_DOCUMENTS\1.0 Planning\SSFRA					
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SITE SPECIFIC FLOOD RISK ASSESSMENT

PROPOSED OFFICE DEVELOPMENT AT 1-6 CITY QUAY

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APPENDIX A: Dublin City Council Flood Risk Maps

APPENDIX B: OPW Past Flood Event Local Area Summary Report

APPENDIX C: CFRAMS Flood Risk Mapping

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1.0 INTORDUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Ventaway Ltd. to prepare a Site-Specific Flood Risk Assessment (SSFRA) for a proposed office development at 1-6 City Quay, Dublin 2.

In preparing this report, CS Consulting has made reference to the following:

- Dublin City Development Plan 2022–2028
  (including Strategic Flood Risk Assessment)
- Greater Dublin Strategic Drainage Study (GDSDS) 2005
- The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009 (Flood Risk Management Guidelines)
- Greater Dublin Regional Code of Practice for Drainage Works (Version 6)
- Irish Water Drainage and Supply Records
- Office of Public Works Flood Maps
- Geological Survey of Ireland Maps

The SSFRA is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with all other relevant documentation submitted by other members of the project design team.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The site of the proposed development is located on the South Quays of the River Liffey in Dublin city centre, approx. 450m to the east of O'Connell Bridge, with frontages onto City Quay, Moss Street, and Gloucester Street South. The development site has an area of approx. 0.22ha and is located in the administrative jurisdiction of Dublin City Council.

The development site encompasses the existing registered addresses of 1-4 City Quay (D02 KT32), 5 City Quay (D02 PC03) and 23-25 Moss Street (D02 F854)..

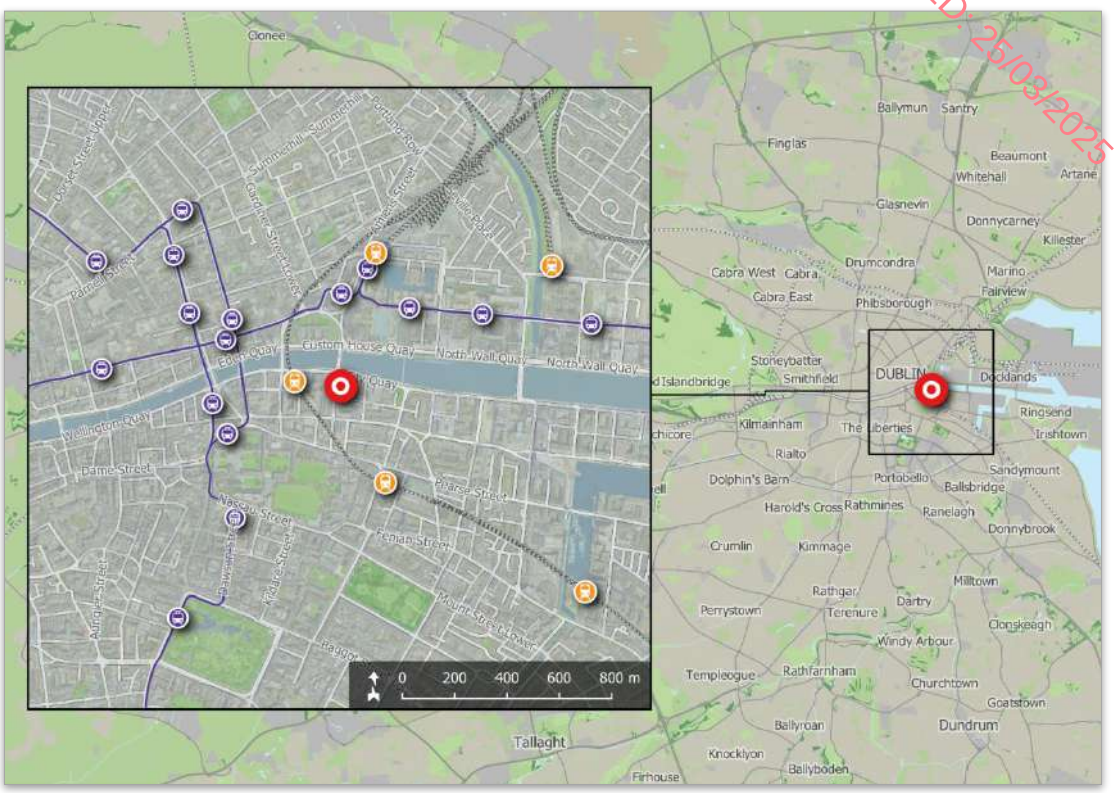

Figure 1 – Location of proposed development site
(Image source: EPA, OSi, OSM Contributors, Google)

The location of the proposed development site is shown in **Figure 1** above; the extents and context of the development site are shown in more detail in **Figure 2.**

The development site is bounded to the north, west, and south by the aforementioned streets of City Quay, Moss Street, and Gloucester Street South. To the east, the site is bounded by HSE premises at 7/8 City Quay (D02 Y663) and by the grounds of the City Quay National School on Gloucester Street South (D02 H277).

Figure 2 – Site extents and environs
(map data and imagery: NTA, OSM Contributors, Google)

2.2 Existing Site Condition

The subject development site is brownfield. Several derelict structures are present in the northern part of the site; the remainder comprises hardstanding that is currently in use as a commercial car park, accessed from City Quay.

2.3 Description of Proposed Development

The proposed development comprises demolition of the existing buildings and structures and construction of a building up to 14 storeys in height over a double basement including arts and cultural spaces and ancillary uses; associated car and bicycle parking; all ancillary and associated works to facilitate the development. An Environmental Impact Assessment Report and Natura Impact Statement have been prepared in respect of the proposed development and have been submitted with the planning application.

3.0 LEVEL OF SERVICE AND FLOOD RISK ZONING

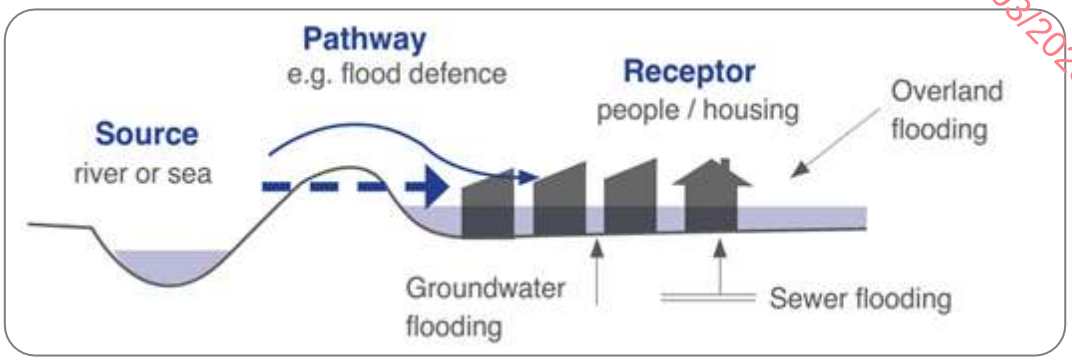

Figure 3 – Source-pathway-receptor model
(The Planning System and Flood Risk Management Guidelines)

There is an existing inherent risk of any flood event occurring during any given year. Typically, this likelihood of occurrence was traditionally expressed as a 1-in-100 chance of a 100-year storm event happening in any given year. A less ambiguous expression of probability is the Annual Exceedance Probability (AEP), which may be defined as the probability of a flood event being exceeded in any given year. Therefore a 1-in-100-year event has a 1% AEP; similarly, a 100% AEP can be expressed as a 1-in-1-year event.

The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Flood Risk Management Guidelines), published in 2009, set out the best practice standards for flood risk assessment in Ireland. These are summarised in **Table 1** below (Table 8.1 from Flood Risk Management Guidelines document).

Development Category	**Flooding Source**		
	Drainage	River	Tidal/ Coastal
Residential	1% AEP	0.1% AEP	0.1% AEP
Commercial	1% AEP	1% AEP	0.5% AEP
Water-compatible (docks, marinas)	-	>1% AEP	>0.5% AEP

Table 1: Summary of Level of Service: Flooding Source

Under these guidelines, a proposed development site has first to be assessed to determine the flood zone category it falls under. The flooding guidelines define three distinct areas of combined flood risk: Zones A, B, and C. These are described below.

- **Zone A** – High Probability of Flooding. Where the average probability of flooding from rivers and sea is highest (greater than 1% AEP for fluvial flooding or 0.5% AEP for tidal flooding).
- **Zone B** – Moderate Probability of Flooding. Where the average probability of flooding from rivers and sea is moderate (between 0.1% AEP and 1% AEP for fluvial flooding, and between 0.1% AEP and 0.5% AEP for tidal flooding).
- **Zone C** – Low Probability of Flooding. All areas outside Zones A and B. Where the probability of flooding from rivers and sea is lowest (less than 0.1% AEP for both fluvial and coastal flooding).

Figure 4 – Extract of DCC 2022-2028 SFRA Composite Flood Risk Mapping
(background imagery source: Dublin City Council)

A review of flood risk mapping contained within the *Dublin City Development Plan 2022–2028* Strategic Flood Risk Assessment, an extract of which is shown in **Figure 4**, shows that the eastern

portion of the subject site to be located in **Flood Zone A** and **B**, with the remainder within **Flood Zone C**. The relevant flood risk map is provided in full within **Appendix A**.

It is a requirement of Dublin City Council, the *Greater Dublin Strategic Drainage Study* (DCC 2005), and the Flood Risk Management Guidelines that the predicted effects of climate change be incorporated into any proposed design. **Table 2** below indicates the predicted climate change variations.

Design Category	Predicted Impact of Climate Change
Drainage	20% Increase in rainfall
Fluvial (river flows)	20% Increase in flood flow
Tidal / Coastal	Minimum Finished Floor Level 4.0 – 4.15m AOD

Table 2: Predicted climate change variations

The Flood Risk Management Guidelines provide an 'appropriateness' matrix for various developments and their potential risk factors. This matrix, reproduced in **Table 3** below, indicates whether a proposed development requires further analysis in the form of a justification test. The Flood Risk Management Guidelines classify commercial offices as 'less vulnerable development'.

Development Category	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development	***Justification Test Required***	***Justification Test Required***	Appropriate
Less Vulnerable Development	***Justification Test Required***	Appropriate	Appropriate
Water-compatible Development	Appropriate	Appropriate	Appropriate

Table 3: Flood Zone vs. Justification Test Matrix

As previously noted, a portion of the subject site is located within **Flood Zones A and B**. As such, a justification test is carried out. Please refer to **Section 7.0** for the justification test on the subject site.

4.0 PAST FLOODING EVENTS

A review of the Office of Public Works flood maps database (at www.floodinfo.ie) does not indicate any recorded historical instances of flooding on or near the development site, from any source. See **Figure 5** below and the OPW Past Flood Event Local Area Summary Report included as **Appendix B**.

Figure 5 – OPW Mapping of Past Flood Events
(background imagery source: www.floodinfo.ie)

5.0 SPECIFIC FLOOD RISKS

5.1 Fluvial Flooding

Recent modelling of the surrounding area as part of the *Liffey Catchment Flood Risk Assessment and Management Study* (CFRAMS) project indicates that the subject site is outside of the area at risk from a 0.1% AEP fluvial flooding event. The relevant CFRAMS fluvial flood extent map (as published at www.floodinfo.ie) is included within **Appendix C** to this report; an extract is shown in **Figure 6**.

The risk of fluvial flooding impacting upon the subject development is therefore negligible, even during a 1-in-1000-year flooding event, and no mitigation measures are required.

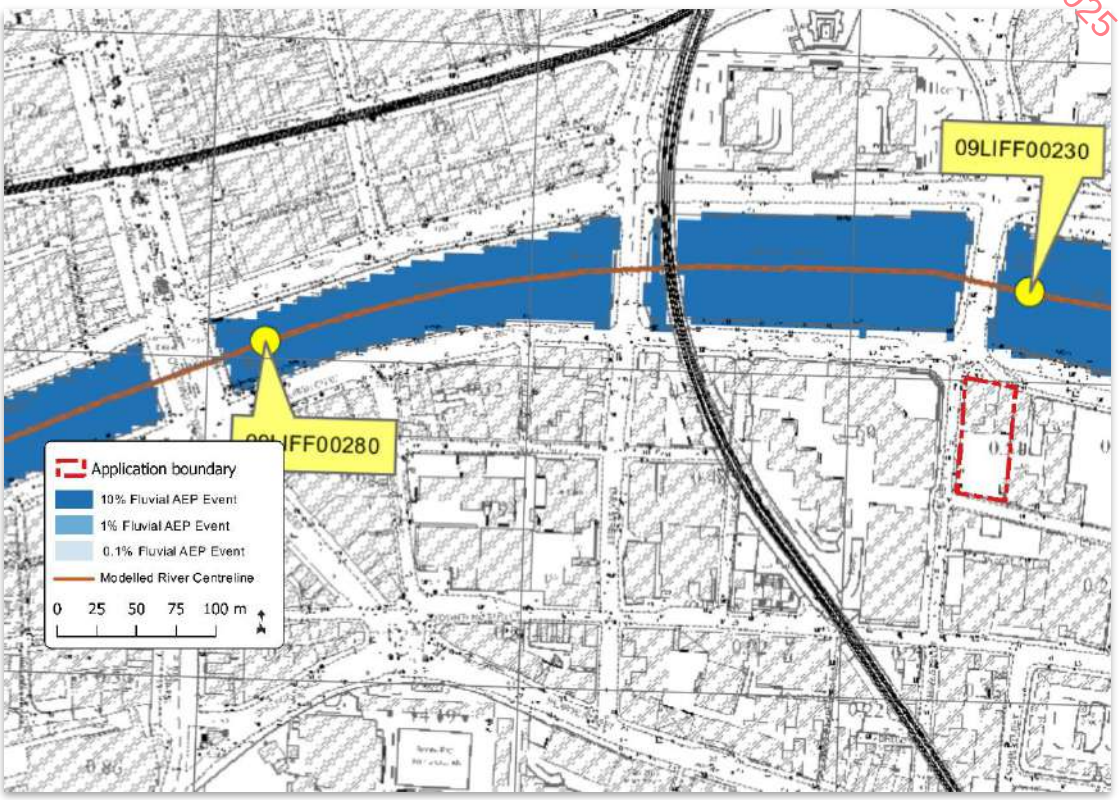

Figure 6 – CFRAMS Mapping of Fluvial Flood Risk Extents
(background imagery source: Office of Public Works)

5.2 Tidal Flooding

Recent modelling of the surrounding area as part of the Liffey Catchment Flood Risk Assessment and Management Study (CFRAMS) project indicates that the subject site is located within Flood Zone A and Flood Zone B. The relevant CFRAMS tidal flood extent map (as published at www.floodinfo.ie) is included within **Appendix C** to this report; an extract is shown in **Figure 7**.

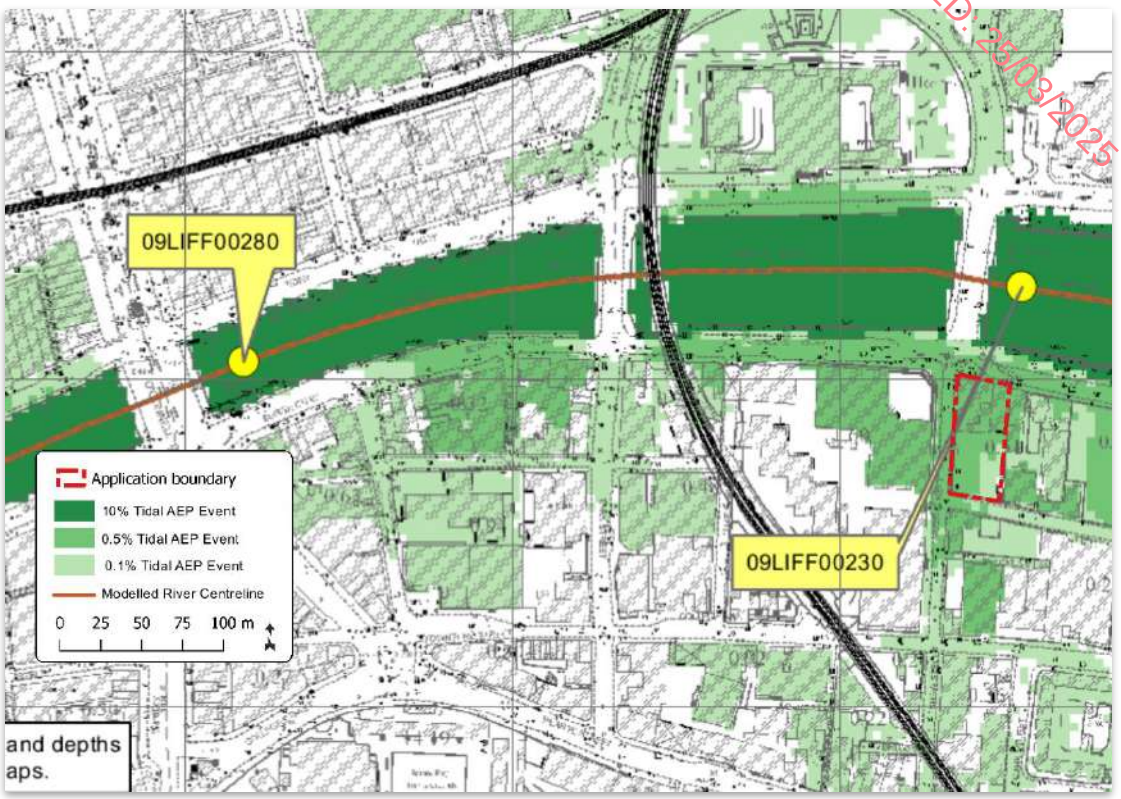

Figure 7 – CFRAMS Mapping of Tidal Flood Risk Extents
(background imagery source: Office of Public Works)

The 2017 CFRAMS Tidal Flood Extents Maps include node point 09LIFF00230 which is the closest note to the proposed development site. This node indicates the tidal flood level for the 0.5% AEP of 3.12m AOD. It is worth noting that the majority of the ground floor level of the proposed development will be set at 4.00m AOD, in order to set the floor level above the flood protection level of 3.92m AOD which takes into account climate change allowance off 500mm and a 300mm freeboard allowance (3.12m AOD + 0.30m+0.50m = 3.92m AOD).

Given that the proposed development is partially located within Flood Zone A justification test has been undertaken. For details of the justification test and proposed tidal flooding mitigation measures refer to section 7 of this report.

5.3 Pluvial Flooding

Pluvial flooding is flooding that has originated from overland flow resulting from high intensity rainfall. The *Dublin City Development Plan 2022-2028* Strategic Flood Risk Assessment includes a map of modelled pluvial flooding depths for a 3-hour duration rainfall event with 1% AEP. For

such a rainfall event, this model indicates that the existing site may experience pluvial flooding up to a depth of approximately 0.3m along the western boundary of the site. This map is included within **Appendix A** to this report; an extract of the map is shown in **Figure 8**.

However, the proposed development site will be fitted with an attenuation system of 121m3 and limiting storm water run-off to 2 l/s provided for the 1-in-100-year extreme storm event increased by 20% for the predicated effects of climate change. By reducing the run-off from the site into the local authority drainage system the potential risk of flooding from pluvial action is deemed to be within acceptable limits.

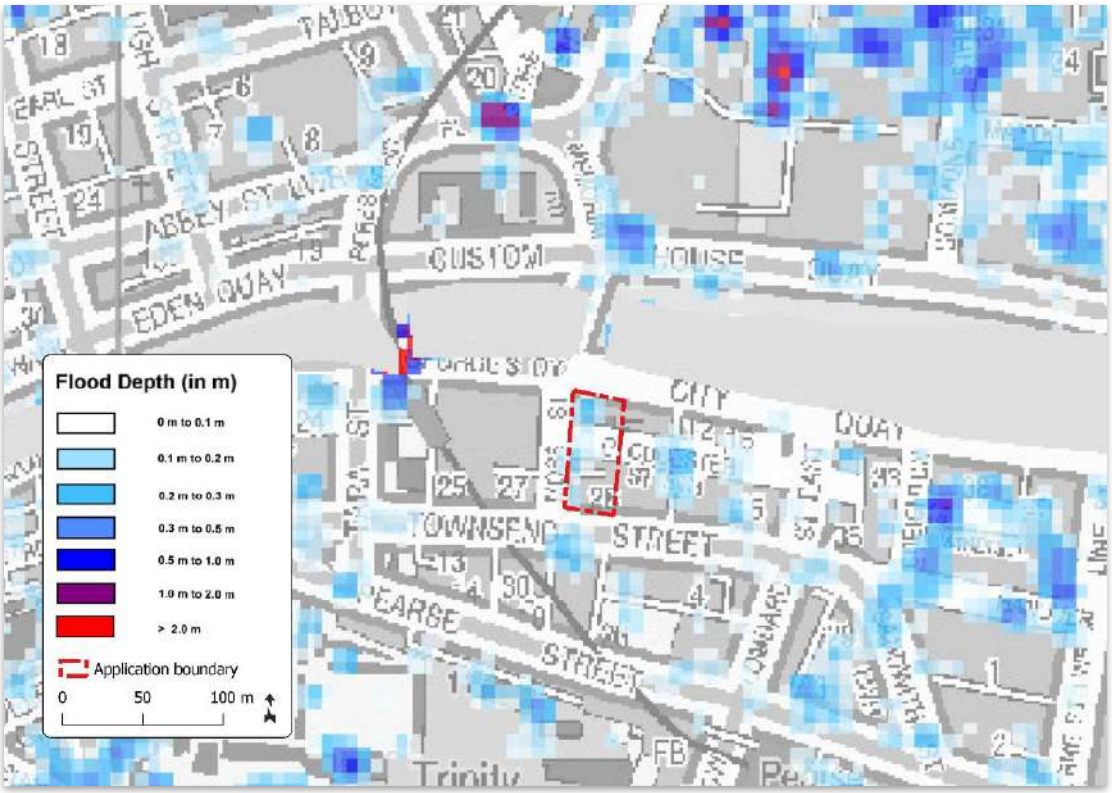

Figure 8 – Extract of DCC 2022-2023 SFRA Pluvial Flood Depth Mapping
(background imagery source: DCC)

5.4 Groundwater Flooding

A review of the Geological Survey of Ireland (GSI) interactive maps (available at www.gsi.ie) shows that the development site is underlain with dark limestone and shale ('calp') of the Lucan Formation. The site is shown as overlaying both a locally important gravel aquifer and a locally important bedrock aquifer that is "moderately productive only in local zones" and is in

an area of low groundwater vulnerability. See **Appendix F** for GSI mapping of the area encompassing the development site.

5.5 Infrastructure flooding

As part of Dublin City Council survey of the drainage network of Dublin, the Greater Dublin Strategic Drainage Study (GDSDS), a review of the drainage assets in Dublin was carried out. From the survey, hydraulic performance mapping was developed to give an indication of the current and predicted hydraulic performance of sewers up to 2031. The GDSDS was published in 2005 and alterations to the local drainage arrangements have taken place since its publication.

The GDSDS mapping covering the development site indicates that the existing combined sewer in Moss Street, to which it is proposed to discharge foul and storm water from development, is predicted to surcharge for 1 or 2 year return period events, as is the combined sewer in Gloucester St South to which it connects. The proposed development site will include an attenuation system which reduces the hydraulic pressure on the public network during extreme rainfall events. See **Appendix E** for the relevant GDSDS Hydraulic Performance Map, an extract of which is shown in **Figure 9.**

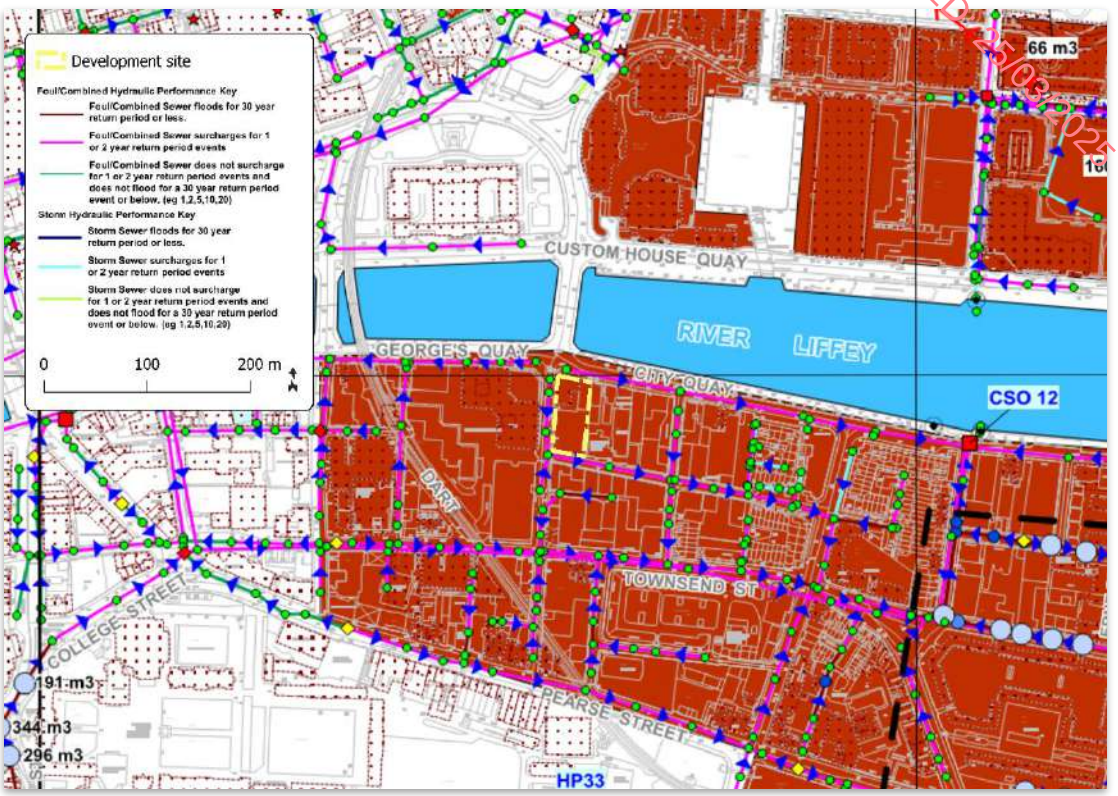

Figure 9 – Extract of 2031 GDSDS System Performance Assessment Map
(background imagery source: Dublin Drainage)

6.0 POTENTIAL FOR DEVELOPMENT TO CONTRIBUTE TO OFF-SITE FLOODING

The proposed development will include an attenuation system. The attenuation tank has been sized for a 1-in-100-year extreme storm event, increased by 20% for the predicted effects of climate change. The attenuation will release the storm water in a controlled manner after the peak storm duration has passed. An attenuation storage volume of 121m3 is required to ensure that stormwater runoff from the development does not exceed 2.0 l/s. The relevant calculations, as well as a more detailed description of the proposed attenuation system, are given in the accompanying Engineering Services Report.

The existing site is currently largely occupied by hardstanding area, with no attenuated stormwater drainage arrangements. By restricting stormwater outflow as described, the proposed development shall therefore reduce the loading on the public drainage system locally during high intensity rainfall events and shall also reduce the risk of neighbouring sites flooding due to stormwater runoff from the subject site.

7.0 JUSTIFICATION TEST

Given the location of the development site, the only source of risk of flooding would be Tidal Flooding as shown in **Figure 7** of this report.

A justification test has been carried out below according to the *Section 5 Application of the Justification Test in development management of 'The Planning System and Flood Risk Assessment (Guidelines for Planning Authorities)'*.

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. *The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.*

   Response

   As mentioned in the Strategic Flood Risk Assessment (Area 3 - Liffey: O'Connell Bridge to Tom Clarke Bridge) of the DCC Development Plan 2022-2028, "High density Commercial and Residential development (some infill and some redevelopment) would be a natural extension of existing development. Development will be required within both Flood Zones A and B, so the Justification Test has been applied. Development will be permitted in Flood Zone C". The proposed development site is zoned as a high density commercial residential development zone.

   The development site comprises of existing surface car parking area and building with unattenuated discharge into the combined sewer system, where there was no flooding reported in the recent years.

2. *The proposal has been subject to an appropriate flood risk assessment that demonstrates:*
   - *i. The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;*
   - *ii. The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;*
   - *iii. The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as*

regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and

iv. *The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.*

Response 2.i

Currently the subject lands have an unattenuated discharge into the combined sewer system. It is proposed as a part of the proposed development that the surface water drainage strategy shall restrict the discharge rate which in turn will reduce the hydraulic pressure on the existing combined sewer network during rainfall events this will in turn help reduce the overall flood risk in and around the development site. The proposed development will be provided with Sustainable Drainage System (SuDS) measures including green roofs, and attenuation tank. As such, the proposed development will reduce risk of Pluvial flooding on the subject site and neighbouring lands.

Response 2.ii and 2.iii

It is proposed that the development shall be provided with attenuation tank, SuDS including green roof within the development. The nearest node point to the development site is 09LIFF00230 indicates the flood level for the 0.5% AEP is 3.12m AOD. It is worth noting that the majority of the ground floor level of the proposed development will be set at 4.00m AOD, in order to set the floor level above the flood protection level of 3.92m AOD which takes into account climate change allowance off 500mm and a 300mm freeboard allowance (3.12m AOD + 0.30m+0.50m = 3.92m AOD). In addition, the proposed development shall implement flood resistant and flood resilient construction techniques listed further below.

Uses located under the level of 4.00m AOD will include car parking, cycle parking, art/ cultural space, plant and storage area. These areas will be defended by most notably flood barriers raised up to 4.00m AOD and by and a combination of other flood resilience and flood resistance measures listed further below. It is also worth noting that Flood Warning and Flood Evacuation plan that will be prepared during the detail

design stage will include actions associated with these areas in a case tidal flood alerts issued by either Triton, Tidewatch or DCC Alerts.

The above will ensure that the flood risk to people, property, the economy, and the environment shall be mitigated as far as reasonably possible.

In relation to the flood resistance and flood resilience, compliance with the following Ciria documents will be ensured through the detail design of the proposed development:

- Code of practice for property flood resilience 2nd edition (C790A)
- Guidance on the code of practice for property flood resilience (C790B)
- Making your property more flood resilient (C790C)

During the detail design the below listed flood resilience and flood resistance measures will be implemented within the design:

- Non-return valves on the drains and pipes,
- Fitting automatic anti-flood airbricks,
- Demountable flood barriers,
- Covers for airbricks, and appliance vents,
- Utility meters to be positioned above the likely height of flood water,
- Ground level walls to be flood resistant construction,
- Avoid the use of fitted carpets and timber floors at ground level and level below.

Refer to **CSC drawing No. 16CQ-CSC-XX-GF-DR-C-0020** that illustrates the proposed locations of ground floor flood barriers.

In relation to the Flood Warning and Evacuation Plan it is worth noting that the plan does not remove the risk of flooding of the development however it does provide means those working in the development shall be made aware of the flood hazard and it will identify

any procedures that will enable the staff to avoid being directly exposed to the hazard in any future flood event that may affect the proposed development.

Flood Warning and Evacuation Plan will be prepared during the detail design stage of the proposed development and the Plan will include the following elements:

- Raise awareness of the flood hazard at the location specified by the plan,
- Define the flood warnings and estimated lead-in time available,
- Plan will be integrated with Triton, Tidewatch and DCC Alerts, tidal flood forecasting and warning systems operated by DCC,
- Detail how, when and by who the Plan is triggered,
- Define the responsibilities of those participating in the Plan,
- Outline the evacuation procedure and the safe evacuation route away from the development and in the event that evacuation is not an option, identify the place of safe refuge.
- Safe refuge area should be located above design flood event level and is to have access to clean water and medical equipment.
- Establish the procedure for implementing, monitoring and maintaining the Plan.

In relation to the evacuation, if required, this should be undertaken before a flood event occurs, not during the event. Evacuation during a flood event should only occur in exceptional circumstances where Flood Warning has not reached either the occupants or relevant management company responsible for triggering the Flood Warning and Evacuation Plan, and its deemed safe to do so by the Emergency Services.

Response 2.iv

In regard to the wider planning objectives that relate to urban design and streetscape elements the proposed development has been designed to respond to the established character of the city centre area in which it is situated and follows central government policy and Dublin City Council Development Plan. For details of the urban

design of the proposed development including the streetscape element refer to HJL Architects documents and drawings which accompany this planning application.

In conclusion, the proposed development is justified in accordance with *Dublin City Development Plan 2022-2028* with the justification points above.

8.0 CONCLUSIONS

The Site Specific Flood Risk Assessment has been carried out in accordance with the requirements of the national flood guidelines and Dublin City Council's Development Plan. Its conclusions are summarised as follows:

- The development site historically has no recorded flood events, as noted in the OPW's historical flood maps.
- Predicted flood hazard mapping for fluvial flood events shows that the proposed development site is under negligible risk of flooding from this source.
- Tidal flood mapping illustrates that the subject site is located within Flood Zone A and Flood Zone B. With the majority of the ground floor level of the proposed development being set at 4.00m AOD, in order to set the floor level above the flood protection level of 3.92m AOD which takes into account climate change allowance off 500mm and a 300mm freeboard allowance (3.12m AOD + 0.30m+0.50m = 3.92m AOD), and with the implementation of flood resistance and flood resilience mitigation measures it is deemed that the risk of tidal flooding has been adequately addressed given the subject site location and proposed use.
- Predicted flood hazard mapping for pluvial flood events show that the existing site is at moderate risk of flooding from these sources as at present the existing site has unattenuated discharge. However, the proposed development will allow for an appropriate surface water drainage system inclusive of a storm water attenuation sized to address a 1-in-100-year extreme storm event, increased by 20% for predicted climate change effects. This will significantly reduce the volume of storm water leaving the site during extreme storm events, which in turn will have the effect of reducing the loading on the existing public drainage system and reducing the risk of pluvial flooding on subject site and neighbouring sites.
- The development's basement shall be constructed to withstand groundwater ingress, mitigating the risk of flooding from this source.

The proposed development is deemed to be suitable for the site location, as historical and potential flood routes have been reviewed and the likelihood of the development being subject to flooding is low, given the implementation of the mitigation measures described.

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APPENDIX A

DUBLIN CITY COUNCIL FLOOD RISK MAPS

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Dublin City Development Plan 2022-2028

Composite Flood Map for Dublin City Council

Note: The Composite Flood Map, and all other map extracts, illustrate Flood Zone A, B and Defended Areas (in red), where defended areas indicates lands defended to the 1% AEP fluvial and /or the 0.5% AEP tidal flood events and should therefore be considered also to be Flood Zone A.

Flood Zone A

Flood Zone B

Flood Zone C

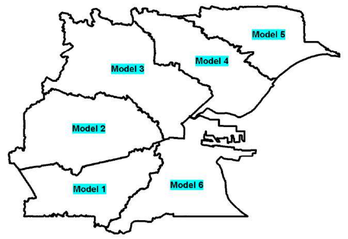
Defended

City Boundary

Refer To OPW Website – Floodinfo.ie

John O'Hara
Dublin City Planner

Flood Depth Map



Dublin City Model boundaries

Legend

Flood Depth (in m)

- 0 m to 0.1 m
- 0.1 m to 0.2 m
- 0.2 m to 0.3 m
- 0.3 m to 0.5 m
- 0.5 m to 1.0 m
- 1.0 m to 2.0 m
- > 2.0 m
- Model Boundary

Notes

LEGEND

Motorway and Junction Number
Bus Route, Route No. and Terminus
Thoroughfares Named and National Route Number
Thoroughfares Unnamed (see street index)
Public Buildings etc.
Built-up Areas
Parks, Ornamental Grounds, Golf Courses etc.
Water
Churches
Garda Síochána Stations
Railway Stations

A grid square on this map represents 1 square Kilometre.
SAMPLE REFERENCE MERRION SQUARE L 14

0 1km

1000 Metres 500 0

JACOBS

Client	Dublin City Baile Átha Cliath
Project	FloodResilienCity Project
Title	Type 1 Model - Flood Depth Map Dublin - 1% AEP Event - 3hr Duration
Drawing Status	DRAFT
Job No.	32102500
Figure No.	32102500/D/OV/FD/0010
Revision	0
Scale	
Date :	

Drawn	MM	Checker	MV	Reviewv	PS	Approved	CF

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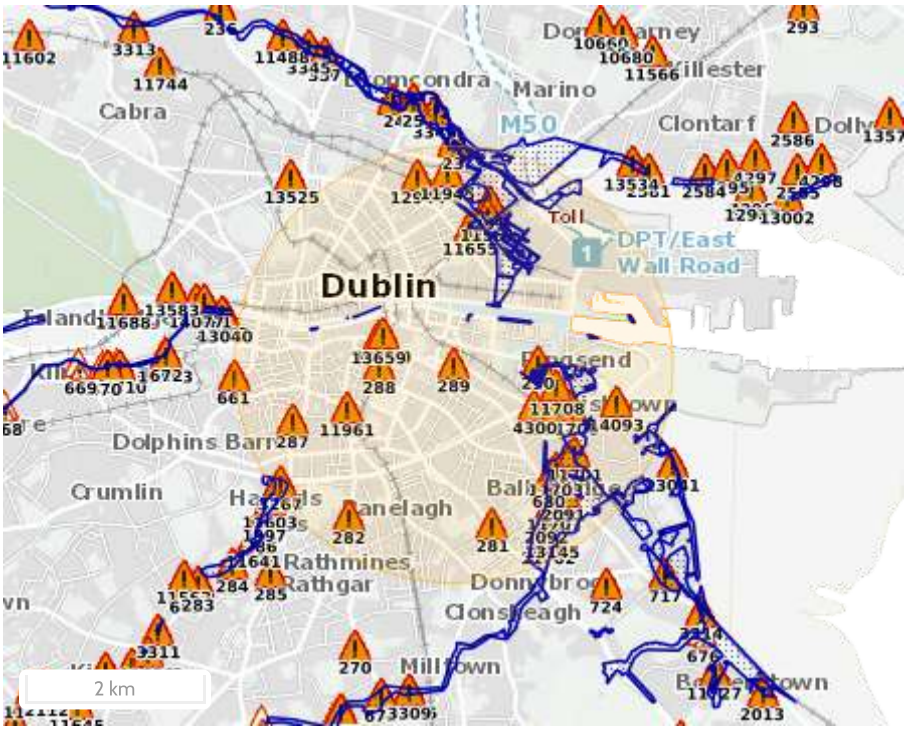
APPENDIX B

OPW PAST FLOOD EVENT LOCAL AREA SUMMARY REPORT

Past Flood Event Local Area Summary Report

Report Produced: **5/9/2024 15:13**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

36 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Dublin City on 30/07/2019 (ID-13659) **Additional Information:** Reports (0) Press Archive (0)	30/07/2019	Approximate Point
2.	Poddle Limekiln Lane Sept 1931 (ID-3267) **Additional Information:** Reports (1) Press Archive (0)	02/09/1931	Approximate Point
3.	Report of flooding at Jones Road, Dublin 3 on 26th July 2013 (ID-11945) **Additional Information:** Reports (1) Press Archive (0)	25/07/2013	Approximate Point
4.	Flooding at Trinity College, Dublin 2, 26th July 2013 (ID-11960) **Additional Information:** Reports (1) Press Archive (0)	25/07/2013	Approximate Point
5.	Flooding on Wexford St, Dublin 2 on 26th July 2013 (ID-11961) **Additional Information:** Reports (1) Press Archive (0)	25/07/2013	Approximate Point
6.	Dodder Oct 1987 (ID-680) **Additional Information:** Reports (3) Press Archive (0)	20/10/1987	Approximate Point

	Name (Flood_ID)	Start Date	Event Location
7.	Poddle August 1986 (ID-32) Additional Information: Reports (9) Press Archive (1)	24/08/1986	Area
8.	Dodder August 1986 (ID-1) Additional Information: Reports (21) Press Archive (18)	25/08/1986	Area
9.	Poddle Limekiln Lane Aug 1905 (ID-1998) Additional Information: Reports (1) Press Archive (0)	24/08/1905	Approximate Point
10.	Dodder Ballsbridge Sept 1931 (ID-2091) Additional Information: Reports (8) Press Archive (7)	02/09/1931	Approximate Point
11.	Dodder Anglesea Road Dec 1958 (ID-2092) Additional Information: Reports (7) Press Archive (0)	18/12/1958	Approximate Point
12.	Bath Avenue June 1963 (ID-4300) Additional Information: Reports (4) Press Archive (0)	10/06/1963	Exact Point
13.	Dodder Donnybrook June 1963 (ID-281) Additional Information: Reports (4) Press Archive (3)	10/06/1963	Exact Point
14.	Rathmines Lower June 1963 (ID-282) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
15.	Clanbrassil Street June 1963 (ID-287) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
16.	Grafton Street June 1963 (ID-288) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
17.	Fenian Street June 1963 (ID-289) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
18.	Ringsend June 1963 (ID-290) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
19.	North Strand Road June 1963 (ID-291) Additional Information: Reports (4) Press Archive (2)	10/06/1963	Exact Point
20.	Flooding at Irishtown on 07/12/2021 (ID-14093) Additional Information: Reports (0) Press Archive (0)	07/12/2021	Approximate Point
21.	Flooding at Ballsbridge on 14/11/2014 (ID-13145) Additional Information: Reports (0) Press Archive (0)	14/11/2014	Approximate Point
22.	Tolka November 2002 (ID-5) Additional Information: Reports (143) Press Archive (13)	13/11/2002	Area
23.	Dublin City Tidal Feb 2002 (ID-456) Additional Information: Reports (45) Press Archive (27)	01/02/2002	Area
24.	Flooding at Bessborough Avenue, North Strand, Dublin 3 on 24th Oct 2011 (ID-11561) Additional Information: Reports (1) Press Archive (0)	23/10/2011	Exact Point
25.	Tolka December 1954 (ID-4) Additional Information: Reports (16) Press Archive (9)	08/12/1954	Area

	Name (Flood_ID)	Start Date	Event Location
26.	Flooding at Shamrock Place, Cottages and Terrace, Dublin 3 on 24th Oct 2011 (ID-11655) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
27.	Flooding at Bath Avenue, Sandymount, Dublin 4 on 24th Oct 2011 (ID-11706) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
28.	Flooding at Anglesea Road, Ballsbridge, Dublin 4 on 24th Oct 2011 (ID-11702) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
29.	Flooding at Herbert Cottages, Ballsbridge, Dublin 4 on 24th Oct 2011 (ID-11703) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
30.	Flooding at RDS, Ballsbridge, Dublin 4 on 24th Oct 2011 (ID-11707) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
31.	Flooding at Havelock Square, Sandymount, Dublin 4 on 24th Oct 2011 (ID-11725) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
32.	Flood report for Shamrock Cottages on the 24th October 2011 (ID-12684) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Approximate Point
33.	Dodder Anglesea Road Nov 1965 (ID-238) **Additional Information:** Reports (11) Press Archive (10)	17/11/1965	Approximate Point
34.	Flooding at Railway Cottages, Ballsbridge, Dublin 4 on 24th Oct 2011 (ID-11701) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
35.	Flooding at ESB Sportsco, Ringsend, Dublin 4 on 24th Oct 2011 (ID-11708) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
36.	Flooding at Dublin City on 25/07/2013 (ID-12944) **Additional Information:** Reports (0) Press Archive (0)	25/07/2013	Approximate Point

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APPENDIX C

CFRAMS FLOOD RISK MAPPING

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00371	2.55	160.64	2.63	213.22	2.77	280.83
09LIFF00333	2.52	165.79	2.58	217.56	2.68	284.77
09LIFF00328	2.51	166.49	2.57	218.17	2.66	285.34
09LIFF00280	2.46	172.70	2.47	224.47	2.49	291.84
09LIFF00230	2.44	180.89	2.44	232.15	2.44	299.59

315000 315200 315400 315600 315800 316000 316200 316400

235000 234800 234600 234400 234200 234000 233800

09LIFF00230

09LIFF00280

09LIFF00328

09LIFF00371

09LIFF00333

For river Poddle flood extents and depths Refer to Poddle HPW maps.

0 50 100 200 300 400 500 Metres

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
An Oifig um Oibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

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74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Liffey Fluvial Flood Extents

Map Type:	EXTENT	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.C.	Date : 9 May 2017
Checked By :	A.S.	Date : 9 May 2017
Approved By :	S.P.	Date : 9 May 2017

Drawing No. :
E09LIF_EXFCD_F1_03

Map Series : Page 3 of 8

Drawing Scale : 1:5,000 @ A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00371	2.73	N/A	3.16	N/A	3.38	N/A
09LIFF00328	2.71	131.89	3.14	135.63	3.37	137.96
09LIFF00280	2.68	N/A	3.12	N/A	3.35	N/A
09LIFF00230	2.67	N/A	3.12	N/A	3.35	N/A

09LIFF00280

09LIFF00230

09LIFF00371

09LIFF00328

For river Poddle flood extents and depths refer to Poddle HPW maps.

315000 315200 315400 315600 315800 316000 316200 316400

235000 234800 234600 234400 234200 234000 233800

0 50 100 200 300 400 500 Metres

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW

RPS

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Map:
Liffey Tidal Flood Extents

Map Type:	EXTENT		
Source:	TIDAL		
Map Area:	COASTAL		
Scenario:	CURRENT		
Drawn By :	C.C.	Date :	9 May 2017
Checked By :	A.S.	Date :	9 May 2017
Approved By :	S.P.	Date :	9 May 2017

Drawing No. :
E09LIF_EXCCD_F1_03

Map Series : Page 3 of 8

Drawing Scale : 1:5,000 @ A3

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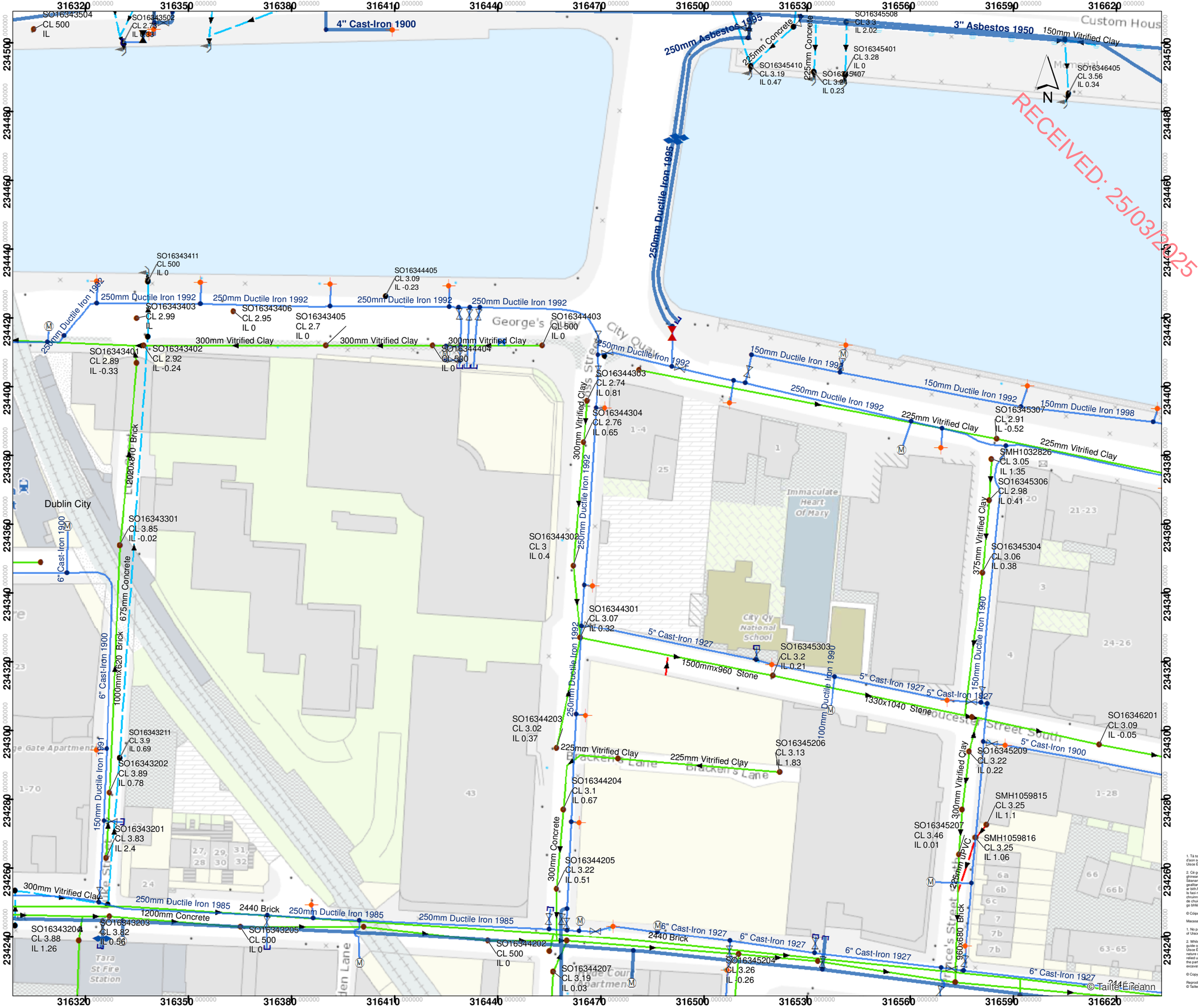
APPENDIX D

IRISH WATER DRAINAGE AND SUPPLY RECORDS



RECEIVED: 25/03/2025

Legend

Uisce Éireann Irish Water

- Unknown Meter ; Other Meter
- Sluice Valve Open
- Sluice Valve Closed
- Sluice Valve Closed
- Double Air Control Valve

Water Hydrants

Hydrant Function

- Fire Hydrant
- Water Kiosk
- Cap
- Other Fittings

Water Distribution Mains

Owned By

- Irish Water
- Irish Water

Sewer Manholes

Manhole Type

- Standard
- Gravity - Combined
- Gravity - Foul

Storm Manholes

Manhole Type

- Standard

Storm Discharge Points

Discharge Type

- Outfall
- Surface Gravity Mains

Storm Inlets

Inlet Type

- Gully

Print Date: 16/08/2024

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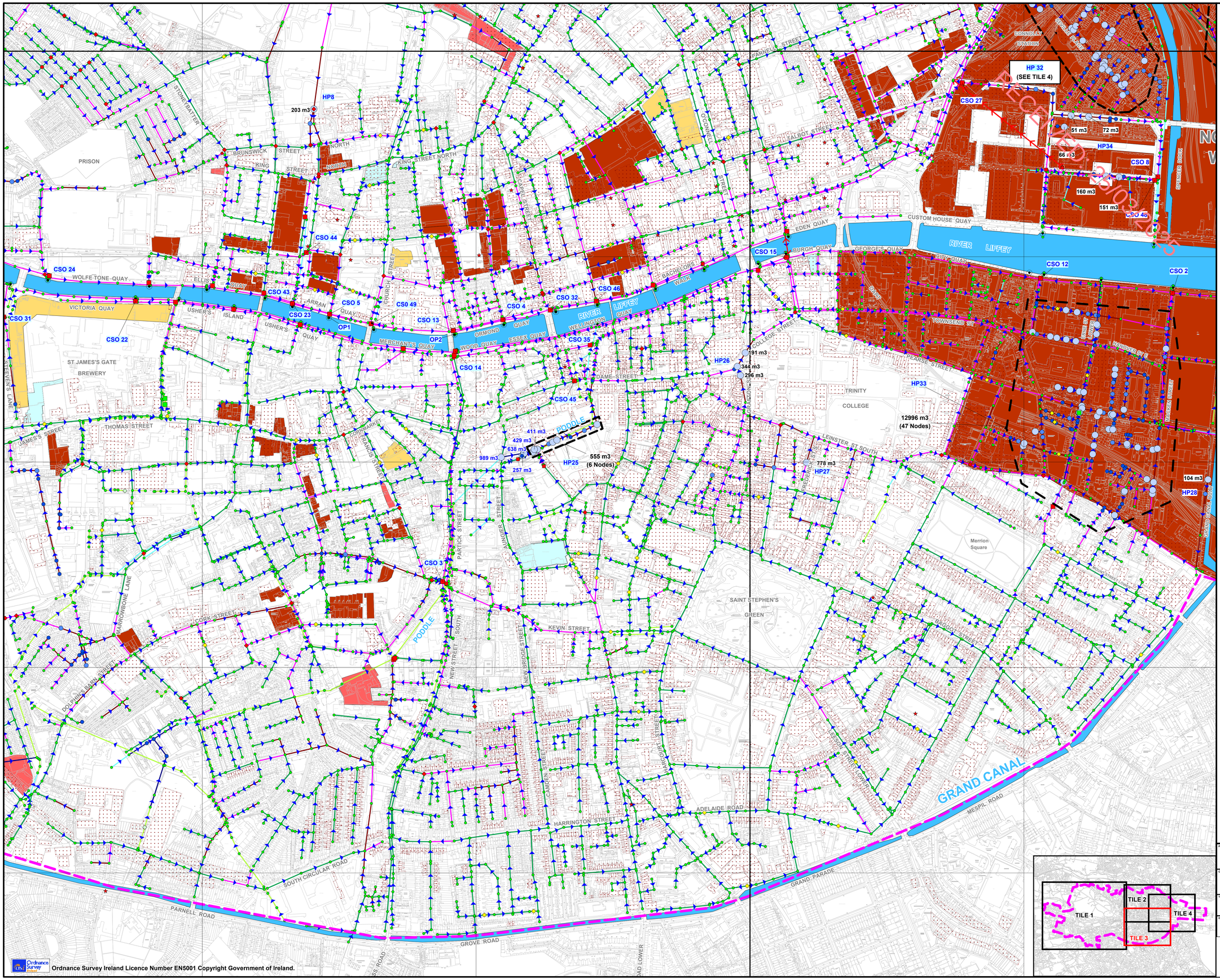
APPENDIX E

GDSDS 2031 PERFORMANCE MAP



Legend

- Wastewater Treatment Works
- County Council Boundaries
- Catchment Boundary
- Rising Main (Coloured as sewer)
- Sewer not included in hydraulic model
- Direction of Flow (on sewer line)
- River/Watercourse
- Culverted River/Watercourse
- 1:1000 OS Grid Line Boundaries
- 1:5000 OS Grid Line Boundaries
- Combined Sewer Overflow
- Foul/Combined Pumping Station
- Foul/Combined Bifurcation
- Foul/Combined Apex Manhole
- Foul/Combined Flow Management Chamber
- Storm Water Overflow to Foul/Combined
- Storm Water Bifurcation
- Storm Water Apex Manhole

Flooding Performance Key

- Flooding greater than 50m3 Volume for 5yr Return Period Event (Volume m3)
- Flooding between 25m3 and 50m3 Volume for 5yr Return Period Event
- Flooding less than 25m3 Volume for 5yr Return Period Event
- Modelled Manhole does not flood for 5 year Return Period Event
- 75m3 — 1:5 year Foul/Combined flood volume
- 75m3 — 1:5 year Storm flood volume
- Historically Reported Flooding Incidents caused by Hydraulic Overloading
- Outfall

Foul/Combined Hydraulic Performance Key

- Foul/Combined Sewer floods for 30 year return period or less.
- Foul/Combined Sewer surcharges for 1 or 2 year return period events
- Foul/Combined Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)

Storm Hydraulic Performance Key

- Storm Sewer floods for 30 year return period or less.
- Storm Sewer surcharges for 1 or 2 year return period events
- Storm Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)
- Area Covered by EDS/DCC Asset Survey

Important Hydraulic Considerations

- Location of Known Basements
- Zoned Residential Land
- Zoned Science/Technology Parks/Land
- Zoned Industrial Land
- Zoned Commercial Land
- Zoned Land for Mixed Development
- Recently Completed Developments

Catchment Deficiency Reference Key

- HP 1 — Hydraulic Deficiency Reference No (Foul/Combined) (Not included for EDS/DCC Asset Survey area).
- CSO 1 — CSO Deficiency Reference No. (Hydraulic or Environmental)
- OP 1 — Operational Deficiency Reference No.

Notes

1. Results are based on assessment of sewer system under 1, 2, 5, 10, 20, 30, 50 and 100 year return period rainfall events.
2. For colour coding, flooding takes priority over surcharging.
3. Levels referenced in meters to Ordnance Survey Datum, which is Mean Sea Level at Malin Head, Co. Donegal (1970 Adjustment).

Project: GREATER DUBLIN STRATEGIC DRAINAGE STUDY

Catchment: CITY CENTRE/DOCKLANDS CATCHMENT

Title: PHASE 3 - 2031 System Performance Assessment

Dig. No.: GDSDS/MAR3079/F001/P3-003_Tile3

Dublin Drainage
A Strategic Study for Greater Dublin

Drawn	JGA	Chk'd	MCB
Approved	MCB		
Scale	N.T.S.	REVISION	A
Date	7/5/04		

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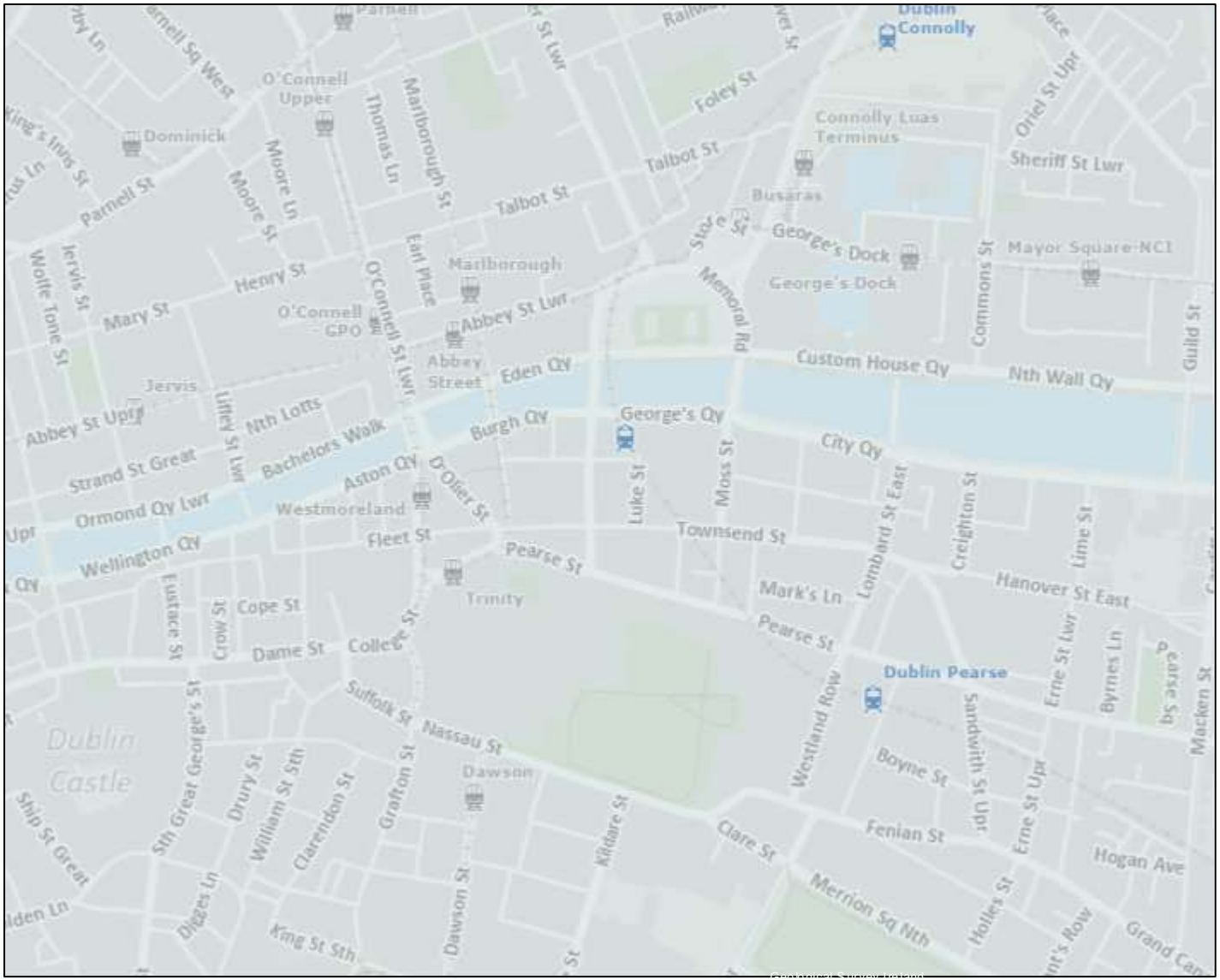
APPENDIX F

GSI GEOLOGY AND HYDROGEOLOGY MAPPING

GSI Bedrock



Scale: 1:10,000

Geological Survey Ireland

N W E S

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Map Centre Coordinates (ITM) 716,213 734,326

10/22/2024, 4:48:23 PM

Legend

IE_GSI_Structural_Sy...

- Dip of bedding or main foliation, old GSI data
- First foliation parallel to bedding
- Foliation trend, Thorr and Rosses Granites
- Horizontal Bedding
- Strike and dip of bedding, right way up
- Strike and dip of bedding, way up unknown
- Strike and dip of first foliation
- Strike and dip of overturned bedding
- Strike and dip of second foliation
- Strike and dip of third foliation
- Strike and plunge of first generation fold axis
- Strike and plunge of second generation fold axis
- Strike and plunge of third generation fold axis
- Strike of vertical bedding/foliation
- Strike of vertical first foliation
- Bedrock Outcrops

IE_GSI_Geological_Li...

- Anticlinal Axis
- Antiformal axis
- Aquifer Boundary
- Area
- Coal seam
- Dyke
- Fault
- Ghost Line
- Goniatite marine band (R1-R4)
- Lithological boundary offshore
- Metadolerite sheet, mainly sills
- Paleogene/ Tertiary Dyke
- Synclinal Axis
- Synformal axis
- Tectonic Slide, barbs on hanging-wall
- Thin stratigraphical unit, diagrammatic
- Thrust, barbs on hanging-wall side
- Tuff band
- Unconformity, dots on younger side
- X-Section

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