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Engineering Service Report

Project

Proposed Residential Development at Anglesea
Terrace, Old Station Road, Cork

Client

Land Development Agency on behalf of Cork City
Council



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ENGINEERING SERVICE REPORT

PROPOSED RESIDENTIAL DEVELOPMENT AT ANGLESEA TERRACE, OLD STATION ROAD, CORK

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Land Development Agency on behalf of Cork City Council to prepare an Engineering Services Report (ESR) for a proposed residential development at Anglesea Terrace, Old Station Road, Cork.

1.1 Report Overview

This report details the following aspects of the proposed development:

- Foul Drainage Infrastructure
- Potable Water Infrastructure
- Surface Water Management Plan

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

- Cork City Development Plan 2022-2028
- Building Regulations 2010 (Part H)
- Greater Dublin Regional Code of Practice for Drainage Works (Version 6)
- Greater Dublin Strategic Drainage Study (GDSDS) 2005
- Uisce Éireann Code of Practice for Water Infrastructure (2020)
- Uisce Éireann Code of Practice for Wastewater Infrastructure (2020)
- Uisce Éireann Drainage and Supply Records

The Engineering Services Report is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting, and with the various additional information submitted by the other members of the design team, as part of the planning submission.

2.0 SITE LOCATION

The proposed development site is located along Old Station Road to the North, the South link Road bounds the site to the east and Anglesea Terrace is located to the south. The site is located in the administrative jurisdiction of Cork City Council.

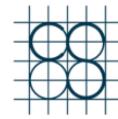


Figure 1 – Location of proposed development lands
(sources: EPA, OSi, NTA, OSM Contributors, Google)

The location of the subject lands is shown in **Figure 1**. The extents and environs are shown in more detail in **Figure 2**.

The development site is bound to the east by South Link Road, to the north by Old Station Road, to the west by an existing building and to the south by Anglesea Terrace.

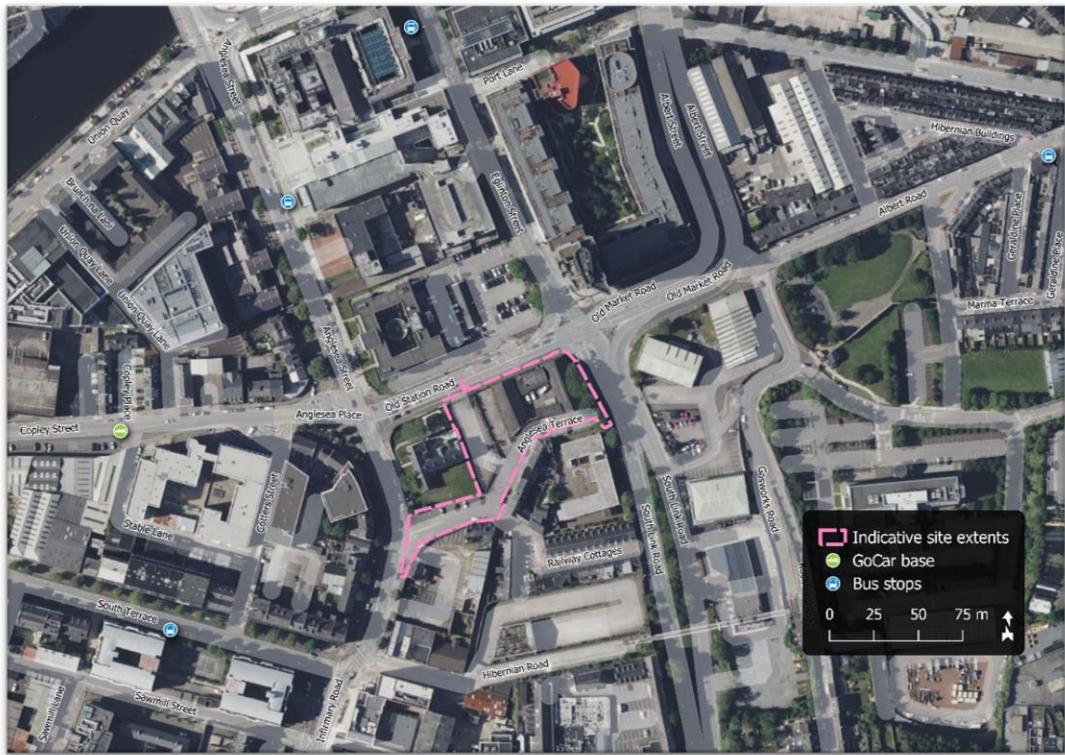


Figure 2 – Subject lands extents and environs
(sources: NTA, OSM Contributors, Microsoft)

2.1 Existing Site Condition

The proposed development site comprises of existing buildings and hard standing area. There are existing surface level car parking spaces within the development site.

2.2 Description of Proposed Development

The development proposes the demolition of existing structures and construction of 147 no. residential units and 3 mixed-use units located at Anglesea Terrace, Old Station Road, Cork. Please refer to the description of development in the Architects Design Statement for further details.

3.0 FOUL DRAINAGE

3.1 Existing Foul Drainage infrastructure

Uisce Éireann Drainage records indicate an existing 300mm diameter combined sewer along Anglesea Terrace to the south of the proposed development site, an existing 300mm unknown sewer along Old Station Road to the north of the development site, and an existing 450mm unknown sewer along South Link Road to the east of the development site.

No other public foul or combined sewers were indicated in the vicinity of the development site. Refer to **Appendix A** for Uisce Éireann Records.

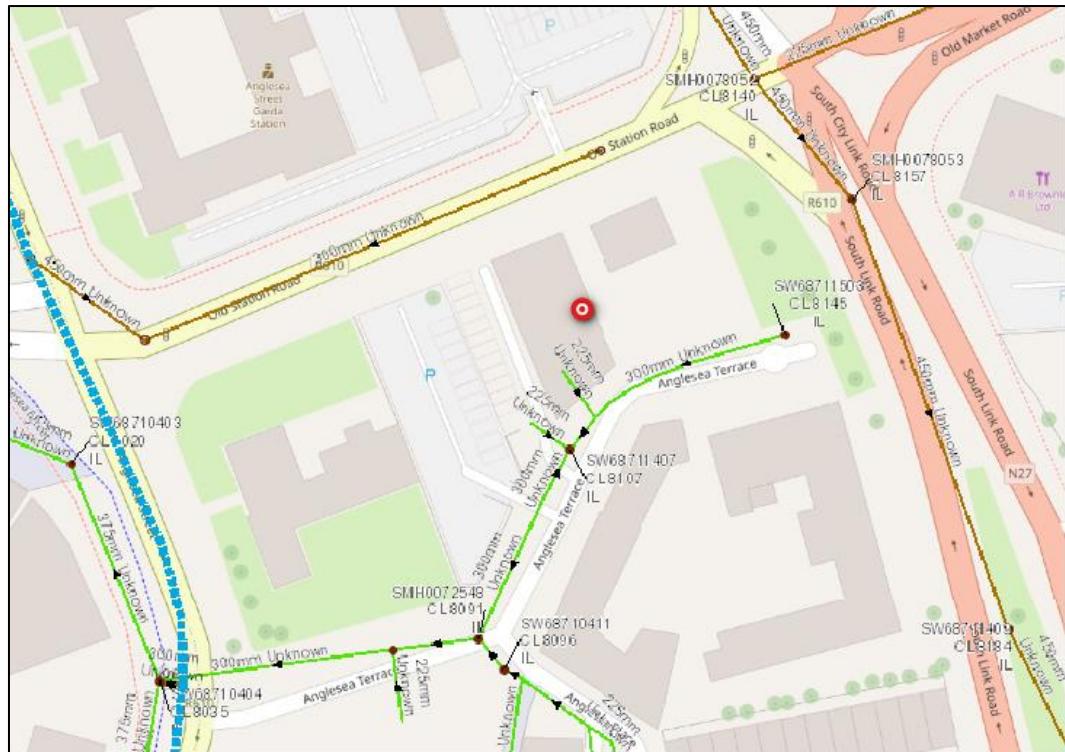


Figure 3 – Existing UE Services in the vicinity of the site
(map data & imagery: Google, QGIS, Uisce Éireann)

3.2 Foul Effluent Generation

3.2.1 Residential units foul effluent generation

The proposed development comprises of 147no. apartment units.

The Uisce Éireann Code of Practice for Wastewater Infrastructure specifies an average foul effluent flow rate of 165 litres per person per day for domestic dwellings (150 litres per person per day, plus a 10% allowance for external infiltration) and an average occupancy of 2.7 persons per residential unit. The development's applicable design population is therefore 397 people, and the foul effluent to be generated by the proposed residential units may be calculated as:

- 165 l/person/day.
- Dry Weather Flow (DWF)

$$165 \text{ l/person/day} \times 397 \text{ people} = 65,505 \text{ l/day} = 0.758 \text{ l/sec.}$$

- Peak Flow (6 times DWF)

$$6 \times 0.758 \text{ l/sec} = 4.54 \text{ l/sec.}$$

3.2.2 Café/restaurant unit foul effluent generation

The proposed development also includes 3no. mixed use units, comprising 1no. café/restaurant and 2no. retail/office units.

The *Uisce Éireann Code of Practice for Wastewater Infrastructure* specifies an effluent flow rate of 28 litres per person per day for Restaurants – pre-prepared catering (25 litres per person per day, plus a 10% allowance for external infiltration). It is assumed that a maximum of 25no. people shall be using the café/restaurant on a daily basis. Therefore, the foul effluent generated by the proposed café/restaurant units may be calculated as;

- 28 l/person/day.
- Dry Weather Flow (DWF)

$$28 \text{ l/person/day} \times 25 \text{ people} = 700 \text{ l/day} = 0.008 \text{ l/sec.}$$

- Peak Flow (6 times DWF)

$$6 \times 0.008 \text{ l/sec} = 0.048 \text{ l/sec.}$$

3.2.3 Retail/office units foul effluent generation

The *Uisce Éireann Code of Practice for Wastewater Infrastructure* specifies an effluent flow rate of 55 litres per person per day for Office without canteen (50 litres per person per day, plus a 10% allowance for external infiltration). It is assumed that a maximum of 25no. people shall be using the retail/office units on a daily basis. Therefore, the foul effluent generated by the proposed retail/office units may be calculated as;

- 55 l/person/day.
- Dry Weather Flow (DWF)

$$55 \text{ l/person/day} \times 25 \text{ people} = 1,375 \text{ l/day} = 0.0159 \text{ l/sec.}$$

- Peak Flow (6 times DWF)

$$6 \times 0.0159 \text{ l/sec} = 0.0954 \text{ l/sec.}$$

3.2.4 Total foul effluent generated by the proposed development

- Dry Weather Flow (DWF)

$$= 0.758 \text{ l/sec} + 0.008 \text{ l/sec} + 0.0159 \text{ l/sec} = 0.7819 \text{ l/sec.}$$

- Peak Flow (6 times DWF)

$$= 4.54 \text{ l/sec} + 0.048 \text{ l/sec} + 0.0954 \text{ l/sec} = 4.6834 \text{ l/sec.}$$

3.3 **Proposed Foul outfall location**

All foul generated by the proposed development shall be collected in separate foul pipes and discharged into the 300mm diameter combined sewer along Anglesea Terrace to the south via gravity. Refer to CS Consulting drawing no. **H105-CSC-XX-XX-DR-C-0003_Proposed Drainage Layout** for further details.

In addition, a small basement is proposed within the development which comprises of sprinkler tanks, wet riser tanks, water and break tank room, and a pump room. The foul run-off from the basement shall be pumped via a rising main to the standoff manhole at the surface level and ultimately discharge into the existing combined sewer via gravity. Refer to CS Consulting drawing no. **H105-CSC-XX-XX-DR-C-0004_Proposed Basement Foul Drainage** for further details.

3.4 **Uisce Éireann Liaison**

A Pre-Connection Enquiry (PCE) was submitted to Uisce Éireann for the proposed development. As a response to the PCE, a Confirmation of Feasibility (CoF) was issued by the Uisce Éireann and was noted that wastewater connection is feasible without infrastructure upgrades. See **Appendix B** to this report for a copy of Confirmation of Feasibility (CoF).

3.5 **Design Standards**

- The Greater Dublin Regional Code of Practice Drainage Works,
- The Greater Dublin Strategic Drainage Study,
- Uisce Éireann Code of Practice for Wastewater Infrastructure.
- Part H of the Building Regulations.



4.0 WATER SUPPLY

4.1 Existing Water Supply Infrastructure

Uisce Éireann Drainage records indicate an existing 300mm diameter ductile iron watermain along Old Station Road to the north of the development site and an existing 100mm diameter cast iron watermain along Anglesea Terrace to the south of the development site. Refer to **Appendix A** for Uisce Éireann Records.

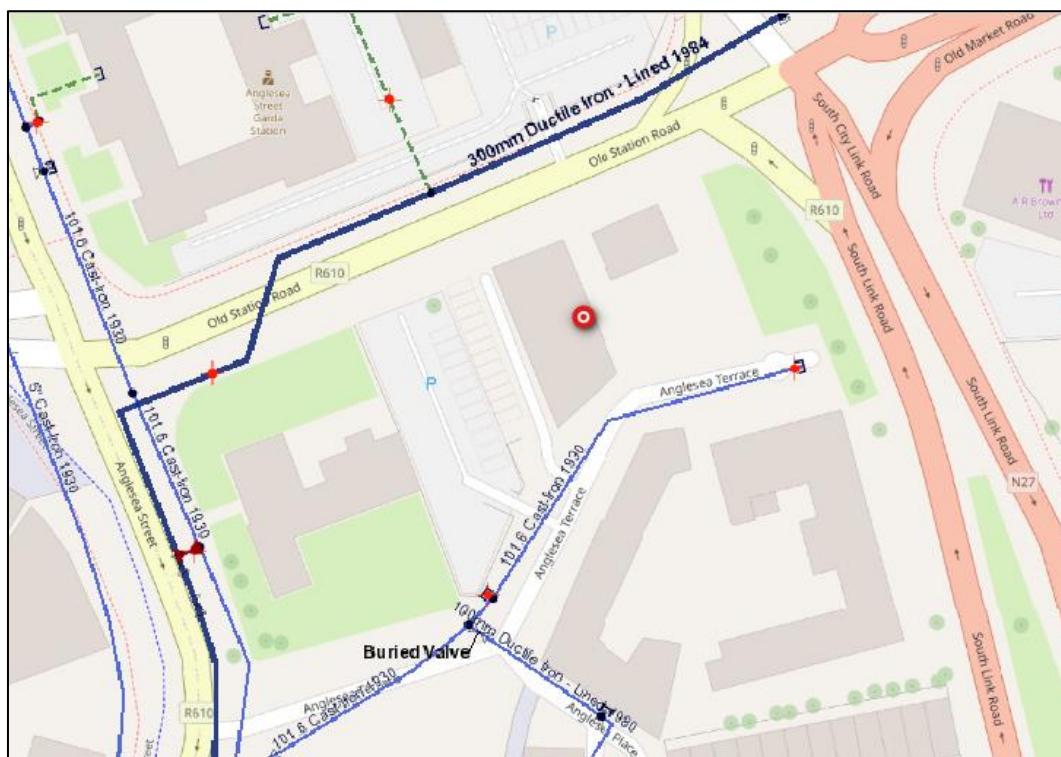


Figure 4 – Existing UE Services in the vicinity of the site
(map data & imagery: Google, QGIS, Uisce Éireann)

4.2 Water Demand Calculations

4.2.1 Residential units water demand

The proposed development comprises of 147no. apartment units.

The Uisce Éireann Code of Practice for Water Infrastructure specifies an average potable water demand of 150 litres per person per day for domestic dwellings, and an average occupancy of 2.7 persons per residential unit. The development's applicable design population is therefore 397 people, and the average potable water demand of the proposed development may be calculated as:

- 150 l/person/day.

- Average water demand

$$150 \text{ l/day} \times 397 \text{ people} = 59,550 \text{ l/person/day} = 0.689 \text{ l/sec}$$

- Average day/peak week demand

$$0.689 \times 1.25 = 0.8612 \text{ l/s}$$

- Peak water demand (5 times average water demand)

$$5 \times 0.8612 \text{ l/sec} = 4.3062 \text{ l/sec.}$$

4.2.2 Café/restaurant water demand

The proposed development also includes 3no. mixed use units, comprising 1no. café/restaurant and 2no. retail/office spaces.

The *Uisce Éireann Code of Practice for Water Infrastructure* does not specify potable water consumption rates for non-domestic uses. On the principle that the development's water consumption shall not exceed its foul effluent generation, the foul generation rates used in sub-section 3.2 have therefore also been employed for calculating average potable water demand (omitting the 10% increase corresponding to foul drainage infiltration). It is assumed that a maximum of 25no. people shall be using the café/restaurant on a daily basis. Therefore, the water demand by the café/restaurant may be calculated as:

- 25 l/person/day.
- Average Water Demand

$$25 \text{ l/person/day} \times 25 \text{ people} = 625 \text{ l/day} = 0.007 \text{ l/sec.}$$

- Average day/peak week demand

$$0.007 \times 1.25 = 0.00875 \text{ l/s}$$

- Peak water demand (5 times average water demand)

$$5 \times 0.00875 \text{ l/sec} = 0.04375 \text{ l/sec.}$$

4.2.3 Retail/office water demand

As mentioned above, the foul generation rates used in Sub-Section 3.2 have therefore also been employed for calculating average potable water demand (omitting the 10%

increase corresponding to foul drainage infiltration. It is assumed that a maximum of 25no. people shall be using the retail/office units on a daily basis. Therefore, the water demand by the retail/office may be calculated as:

- 50 l/person/day.
- Average Water Demand

$$50 \text{ l/person/day} \times 25 \text{ people} = 1,250 \text{ l/day} = 0.0145 \text{ l/sec.}$$

- Average day/peak week demand

$$0.0145 \times 1.25 = 0.0181 \text{ l/s}$$

- Peak water demand (5 times average water demand)

$$5 \times 0.0181 \text{ l/sec} = 0.0905 \text{ l/sec.}$$

4.2.4 Total potable water demand of the proposed development

- Average Water Demand

$$0.689 \text{ l/sec} + 0.007 \text{ l/sec} + 0.0145 \text{ l/sec} = 0.7105 \text{ l/sec.}$$

- Average day/peak week demand

$$0.8612 \text{ l/sec} + 0.00875 \text{ l/s} + 0.0181 \text{ l/s} = 0.88805 \text{ l/sec.}$$

- Peak water demand (5 times average water demand)

$$4.3062 \text{ l/sec} + 0.04375 \text{ l/sec} + 0.0905 \text{ l/sec} = 4.4405 \text{ l/sec.}$$

4.3 **Proposed Watermain Connection point**

It is proposed to connect into the existing 100mm cast iron watermain running along Anglesea Terrace via a 100mm connection from the proposed development. Refer to CS Consulting drawing no. **H105-CSC-XX-XX-DR-C-0005** for further details.

A Pre-Connection Enquiry (PCE) was submitted to Uisce Éireann for the proposed development. As a response to the PCE, a Confirmation of Feasibility (CoF) was issued by Uisce Éireann which states a water connection is feasible subject to upgrades:

'In order to accommodate the proposed connection, approximately 110m of local water network upgrades will be required to provide additional network capacity. Uisce Éireann does

not currently have any plans to undertake these works, therefore the applicant will be required to fund these local network upgrades. The fee for these works will be calculated at a connection application stage.'

It is proposed to upgrade the existing watermain to provide additional network capacity. A formal connection application shall be submitted to Uisce Éireann subject to planning. See **Appendix B** to this report for a copy of Confirmation of Feasibility (CoF).

4.4 Design Standards

- Uisce Éireann Code of Practice for Water Infrastructure.
- Building Regulations

5.0 SURFACE WATER MANAGEMENT PLAN

5.1 Existing Surface Water Drainage Infrastructure

Uisce Éireann Drainage records indicate an existing culverted storm water sewer running along Anglesea Place approx. 80m to the west of the development site. Uisce Éireann Drainage records also indicate an existing 300mm diameter combined sewer along Anglesea Terrace to the south of the proposed development site, an existing 300mm unknown sewer along Old Station Road to the north of the development site, and an existing 450mm unknown sewer along South Link Road to the east of the development site.

However, Cork City Council Drainage Records indicate a 450mm diameter storm sewer running along Old Station Road to the north of the development site and an existing 1050mm diameter storm culvert running along Anglesea Street approx. 100m west of the development site.

Refer to **Appendix A** for IW records and Cork City Council Drainage records.

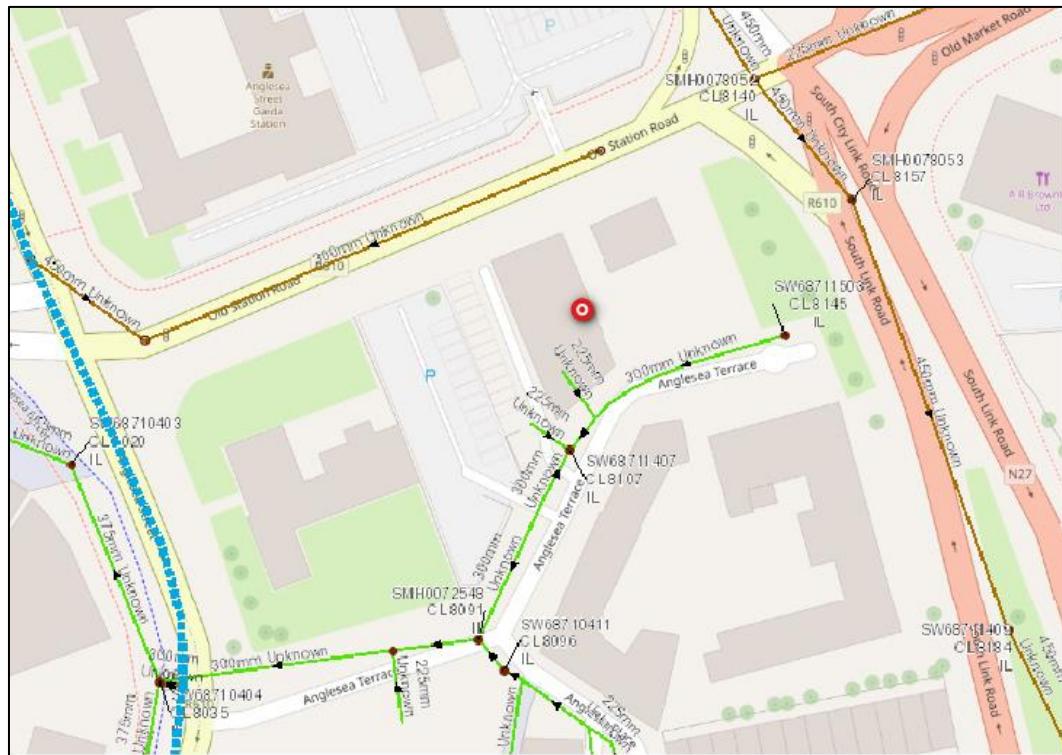
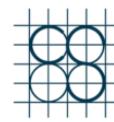


Figure 5 – Existing UE Services in the vicinity of the site
(map data & imagery: Google, QGIS)

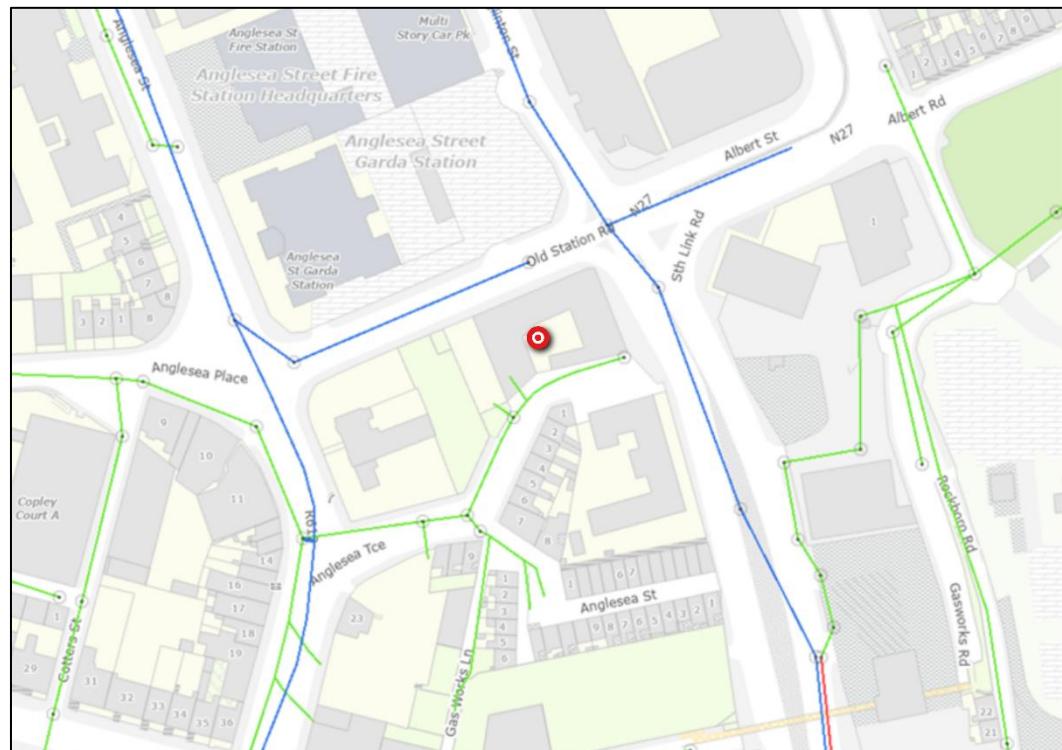


Figure 6 – Existing CCC Records in the vicinity of the site
(map data & imagery: Google, QGIS, CCC)



5.2 Proposed Surface Water Drainage Design

5.2.1 Allowable run-off rate and Surface Water Design

The development is required to retain stormwater volumes predicted to be experienced during extreme rainfall events. This is defined as the volume of storm water generated during a 1-in-100-year storm event, increased by 20% for the predicted effects of climate change. In addition to this, based on the information received from CCC's Drainage Department regarding the current capacity and constraints of the existing drainage network, CS were informed that the design of the attenuation tanks is to cater for the possibility of tidal lock in duration of 6-hours. This additional storage provision is included within the design.

In accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the proposed development is to restrict the stormwater run-off to greenfield run-off rates or 2.0l/s/ha whichever is greater.

QBar was calculated as follows;

$$QBAR = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}.$$

Where:

- AREA = site area in km², equal to a 50-ha catchment if the site is less than 50 hectares
- SAAR = standard average annual rainfall equal to 733 mm (as per Met Éireann data).
- SOIL = soil index, with associated SPR (Standard Percentage Runoff) coefficients as shown in **Table 1**:

Table 1 – SPR Values for each Soil Type

SOIL TYPE	SOIL TYPE 1	SOIL TYPE 2	SOIL TYPE 3	SOIL TYPE 4	SOIL TYPE 5
SPR	0.1	0.3	0.37	0.47	0.53

Based on the WRAP classification analysis shown in **Figure 7** below, and considering the following:

- Boreholes undertaken as part of the Site Investigations showed CLAY layers at an average depth of 1.4m for all logged locations, which indicates a Depth to impermeable horizon of greater than 80cm.
- The site slopes from the northeastern boundary to the southwestern boundary, which allows a Slope Class categorisation between 2° and 8°.
- Independent of the Water Regime Class and Permeability Class, the Soil Type shall be situated between values of 1 and 3. Conservatively, a value of 3 was considered, which equates to an SPR soil index value of 0.37



Figure 7 – WRAP Classification analysis based on site characteristics

Water regime class	Depth to impermeable horizon(cm)	Slope Classes								
		< 2°			2-8°			> 8°		
		Permeability class (above impermeable horizon)								
		Rapid	Medium	Slow	Rapid	Medium	Slow	Rapid	Medium	Slow
1	> 80				1	2	1	2	3	
	80-40	1			2			3		4
	< 40		-		-			-	-	-
2	> 80	2			3			-		
	80-40					4				
	< 40	3								
3	> 80									
	80-40				5			-		
	< 40									

These parameters allow the Q-Bar greenfield runoff rate to be calculated. The calculated Q-Bar rate was determined to be 3.03 l/s/ha.

Section 6.3.3.1 of the Greater Dublin Strategic Drainage Study (GDSDS) however notes the following regarding small site, 'To limit discharge to greenfield runoff rates usually requires a pipe or other form of throttle. These throttle sizes theoretically need to be quite small to achieve the required maximum rate of flow, especially for small developments. For operational purposes, it is recommended that the maximum throttle size for a pipe should be 150mm diameter and any other orifice unit other than a pipe should be minimum of 200mm diameter. This means that flows much below 10 l/s are rarely achievable. Thus small site, by default, are often allowed a more generous discharge limit than larger developments.'

Given the provision of tidal lock storage, limitations of the site, and its size, it is proposed to restrict the run-off from the subject site to 1 l/sec.

5.2.2 Proposed Surface Water Drainage Layout and Connection Points

The topography of the development site generally falls from the northeastern boundary to the southwestern boundary.

CS Consulting liaised with Tony Donovan (Senior Engineer) in Cork City Council to discuss the surface water strategy. CS Consulting tabled 2no. surface water options to Tony, and both the options were agreed in principle. Subject to further site investigation one of

these options will be adopted and designed further during the detailed design state. A brief of both these options are given below. However, it is worth noting that the preferred option by the applicant and the wider design team is Option 1.

Option 1

All storm water from the proposed development shall be collected in 2no. attenuation tanks located along the northern and southwestern boundary of the development site. The majority of the storm water volume shall be stored in the tank located along the northern boundary. The southwestern tank shall only cater for the western pathway and has only been proposed due to the site level constraints.

The storm water from the southwestern boundary shall be pumped via a rising main into the main attenuation tank located along the northern boundary of the development site. The storm water from the main attenuation tank along the northern boundary shall be then discharged into an existing 450mm storm sewer along Old Station Road via gravity. Refer to CS Consulting drawing no. **H105-CSC-XX-XX-DR-C-0003** for further details.

However, it is worth noting that the GPR results carried out along Old Station Road shows that the cover levels of this existing storm line are shallow, therefore, the proposed storm pipe exiting the development shall be encased in concrete.

Option 2

All storm water from the proposed development shall be collected in 2no. attenuation tanks located along the southern and southwestern boundary of the development site. The majority of the storm water volume shall be stored in the tank located along the southern boundary. The southwestern tank shall only cater for the western pathway and has only been proposed due to the site level constraints.

The storm water from the southwestern boundary shall be pumped via a rising main into the main attenuation tank located along the southern boundary of the development site. The storm water from the main attenuation tank along the southern boundary shall be pumped again via a rising main to the proposed standoff manhole located along the north-eastern boundary of the development site to ultimately discharge into the existing storm water manhole along the north-eastern boundary of the site via gravity.

For clarity it was initially proposed to connect onto the existing 300mm diameter combined sewer along Anglesea Terrace, however below comments received as part of Confirmation of Feasibility (CoF) received by Uisce Éireann noted the following regarding the stormwater outfall;

'Please note that discharge of storm water to the Uisce Éireann network as part of this Development will not be permitted. The Applicant should investigate suitable Sustainable Urban Drainage Systems (SuDS) measures within the Development to manage storm runoff on-site or alternatively discharge runoff into an existing storm water network on either South Link Road or Anglesea Street that does not discharge to an Uisce Éireann combined/foul sewer. Please refer to Section 1.5 of the Uisce Éireann Wastewater Code of Practice for further details.' Please refer to **Appendix B** for a copy of CoF. It is therefore not proposed to outfall into the existing combined sewer along Anglesea Terrace.

The proposed new stormwater drainage infrastructure will be designed and will be constructed in accordance with:

- i) The Greater Dublin Strategic Drainage Study (GDSDS), Volume 2
- ii) The Greater Dublin Regional Code of Practice for Drainage Works
- iii) British Standard BS EN 752:2008 (Drains and Sewer Systems Outside Buildings)
- iv) Part H of the Building Regulations (Building Drainage).

5.2.3 Summary of Compliance with Criteria 1-4 of GDSDS

The GDSDS and the Regional Code of Practice for Drainage Works require that a development's stormwater drainage arrangements satisfy four main criteria:

- Criterion 1: River Water Quality Protection – satisfied by treatment of run-off within SuDS features, e.g., Green Roofs, permeable pavement etc.
- Criterion 2: River Regime Protection - satisfied by attenuating run-off from the site.
- Criterion 3: Level of Service (flooding) for the site – satisfied by providing adequate mitigation measures for the site for coastal and fluvial flood risks.
- Criterion 4: River Flood Protection – attenuation provided within the site.

In accordance with the requirements of Cork City Council, the proposed development shall incorporate Sustainable Drainage Systems (SuDS) features. These serve a dual purpose in managing stormwater runoff from the proposed development and providing interception and treatment of the storm water runoff.

5.2.4 Stormwater Attenuation Storage

Option 1

The attenuation tank for the Option 1 of the proposed development shall be designed to cater for a 1-in-100-year storm event plus 20% climate change factor. It is also worth noting

that the main attenuation tank along the northern boundary shall be made with a provision of tidal lock for 6-hour duration. For the proposed development the storm water discharge rate has been set to 1.0 l/s.

Based on the discharge flow of 1 l/sec and 6-hour tidal provision, overall attenuation volume of circa 130m³ (refer to **Appendix C** for attenuation calculations) shall be required to serve this development site. The initial design proposed to provide 2no. attenuation tanks which shall be located along the northern and south-western boundaries. The attenuation tank along the northern boundary shall have a volume of 125m³ and the attenuation tank along the south-western boundary shall have a volume of 5m³.

The storm water from the southwestern boundary shall be pumped via a rising main into the main attenuation tank located along the northern boundary of the development site. The storm water from the main attenuation tank along the northern boundary shall be then discharged into an existing 450mm storm sewer along Old Station Road via gravity.

Option 2

The attenuation tank for the Option 2 of the proposed development shall be designed to cater for a 1-in-100-year storm event plus 20% climate change factor. It is also worth noting that the main attenuation tank along the northern boundary shall be made with a provision of tidal lock for 6-hour duration. For the proposed development the storm water discharge rate has been set to 1.0 l/s.

Based on the discharge flow of 1 l/sec and 6-hour tidal provision, overall attenuation volume of circa 140m³ (refer to **Appendix C** for attenuation calculations) shall be required to serve this development site. The initial design proposed to provide 2no. attenuation tanks which shall be located along the northern and south-western boundaries. The attenuation tank along the northern boundary shall have a volume of 135m³ and the attenuation tank along the south-western boundary shall have a volume of 5m³.

The storm water from the southwestern boundary shall be pumped via a rising main into the main attenuation tank located along the southern boundary of the development site. The storm water from the main attenuation tank along the southern boundary shall be pumped again via a rising main to the proposed standoff manhole located along the north-eastern boundary of the development site to ultimately discharge into the existing storm water manhole along the north-eastern boundary of the site via gravity.

5.3 Proposed Sustainable Drainage Systems (SuDS) Design

The function of SuDS features is to permit stormwater quality to be improved before disposal and, where applicable, to allow stormwater to infiltrate into the ground on site rather than discharging to the public drainage system or to watercourses.

It is proposed to use a range of SuDS devices for the scheme:

- a) Green Roof: Green roofs will be provided on the proposed building's flat roof areas and terraces at levels 4 and 7. During typical low-intensity rainfall events, these will collect and retain most rainwater falling on the roof areas until it subsequently evaporates. This will reduce the volumes of rainwater discharging to the public sewer network, as well as mitigating peaks in run-off and reducing the potential for contaminants to be washed from the roof, decreasing the development's impact on the receiving environment. Green roofs also have secondary environmental benefits, providing a temperature control effect by absorbing less solar radiation and improving air quality by trapping airborne particulate matter. Green Roof systems (a Nature Based Solution SuDS device) shall be provided at levels 4, and 7.
- b) Permeable paving or porous asphalt – some of the external hardstanding areas could be considered for permeable paving such as western pathway and loading bay.

There are several benefits from the promotion of these SuDS elements within the development, below is a list of such benefits:

- Biodiversity and Ecology: Habitats are maintained, created & linked to support existing & new wildlife. This increases biodiversity & improves the quality of ecosystems in urban environments.
- Water Quality: SuDS filter sediment & contaminants from runoff which improves quality. They intercept rainfall & reduce the volume entering sewers & drains, reducing combined sewer overflow and the amount that needs treating.
- Flood Risk Management: SuDS mimic natural drainage patterns & reduce the volume of runoff reaching drains & watercourses. They provide areas to store water & slow the flow of water to reduce flood risk in urban areas.
- Climate Resilience: Vegetation and plants used can capture & store carbon and greenhouse gases to improve air quality. They can also regulate building temperatures and reduce air & water pollution.



5.4 SuDS Outline Management Plan

The following outline maintenance requirements for the elements of the proposed surface water drainage system:

Attenuation Storage Tank

The following table provides guidance on the type of operation and maintenance schedule that may be appropriate for an attenuation tank storage. The list of actions is not exhaustive, and some actions may not always be required.

Operation & Maintenance Requirements for Attenuation Storage Tanks		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays.	Annually, or as required
	Repair/rehabilitate inlets, outlet, overflows, and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required

Manholes and Drains

The following table provides guidance on the type of operation and maintenance schedule that may be appropriate for manholes and drains. The list of actions is not exhaustive, and some actions may not always be required.



Operation & Maintenance Requirements for Manholes and Drains		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	Remove sediment from gullies.	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets and outlet	As required
Monitoring	Inspect/check all inlets and outlets to ensure that they are in good condition and operating as designed.	Annually

Green Roof

The following table provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required. Actual requirements will depend on the planting, the desired aesthetic and visual effect and the biodiversity objectives for the system. Maintenance specifications and schedules should therefore be specified for any individual green roof.

Operation & Maintenance Requirements for Green/Blue Roofs		
Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms



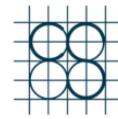
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e., year one), replace dead plants as required	Monthly (Usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required

Permeable Pavement

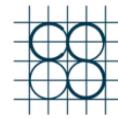
The following table provides guidance on the type of operation and maintenance schedule that may be appropriate for permeable pavements. The list of actions is not exhaustive, and some actions may not always be required.



Operation & Maintenance Requirements for Pervious Pavements		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a	As required



	hazard to users, and replace lost jointing material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

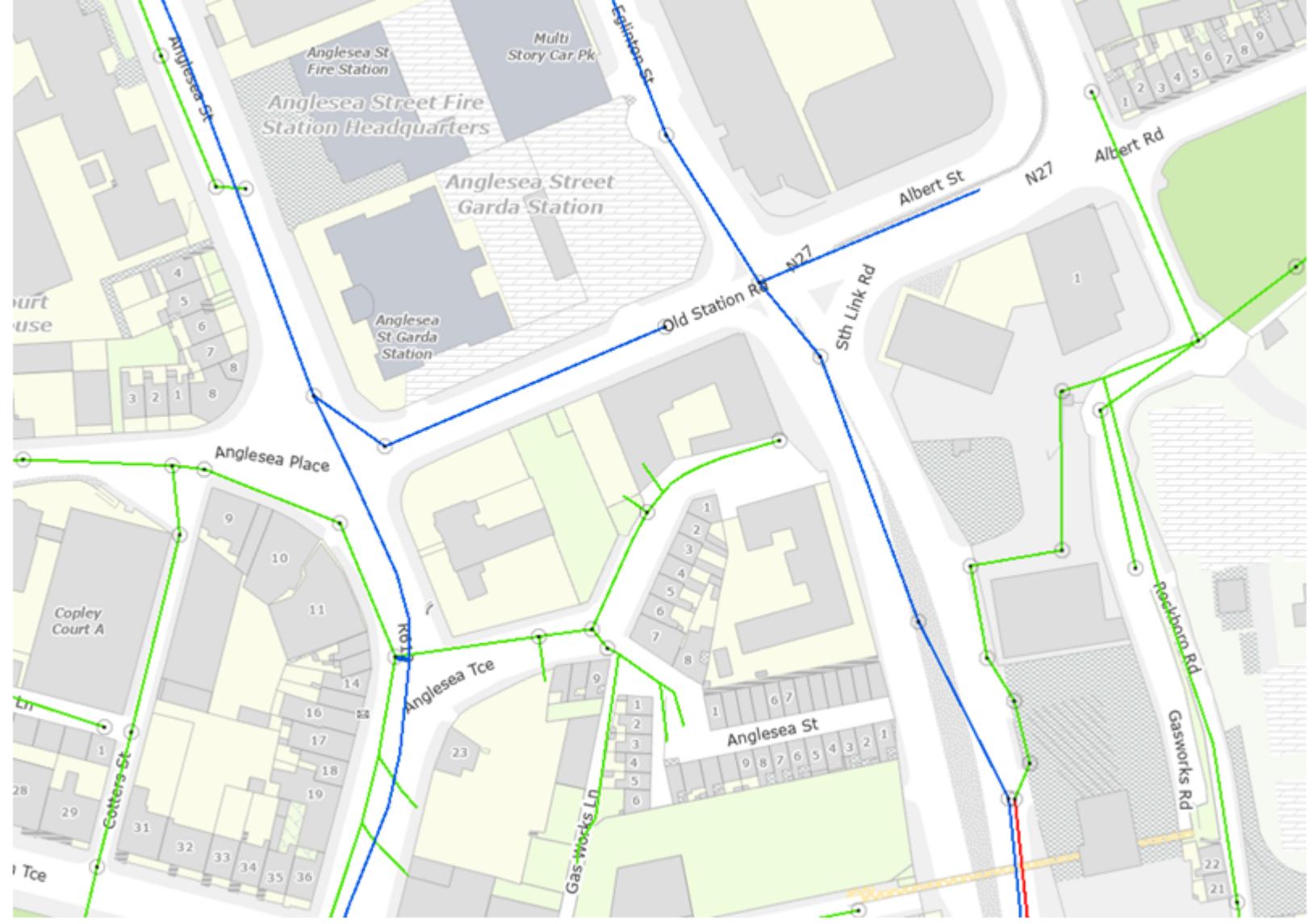


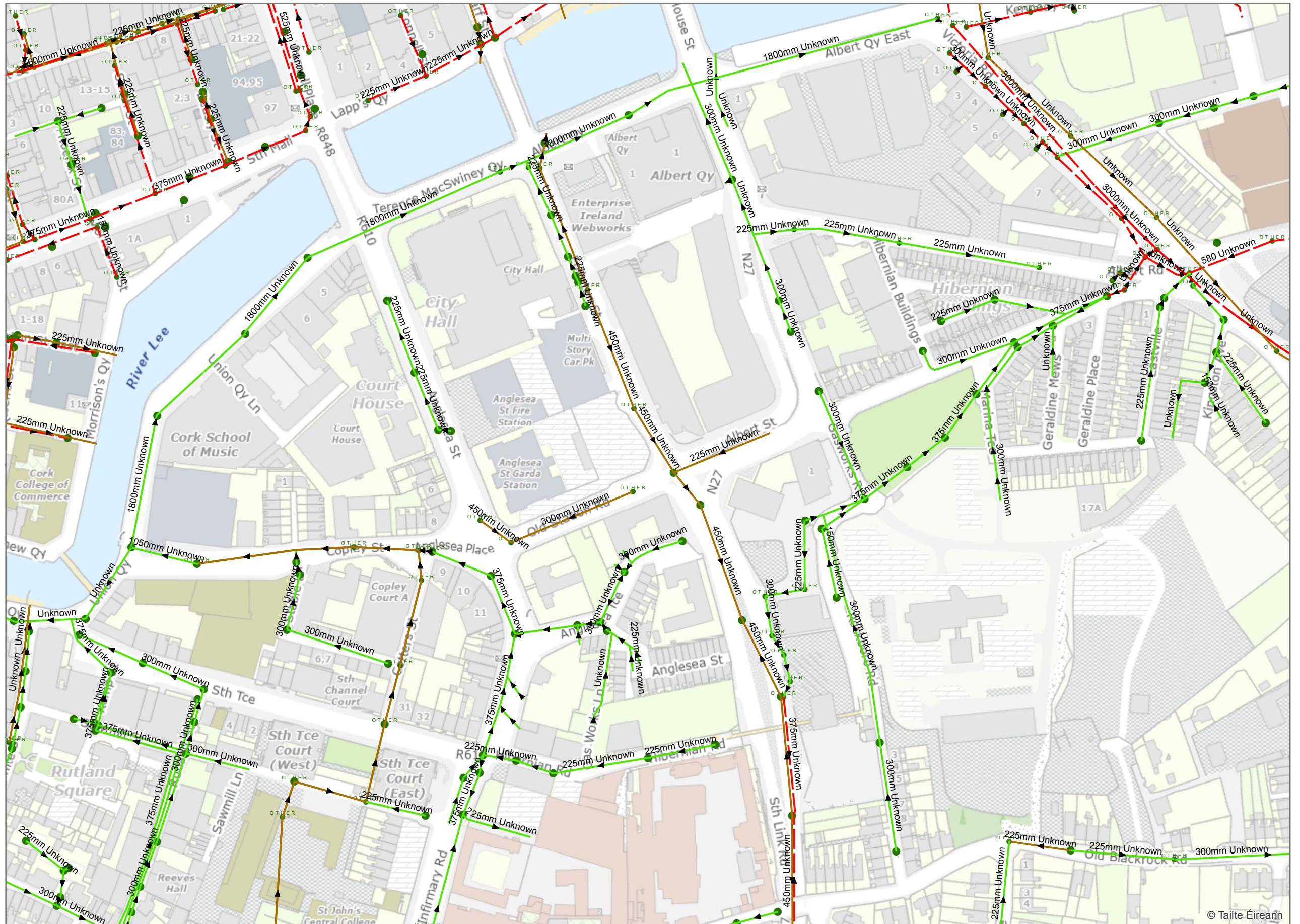
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APPENDIX A
UISCE ÉIREANN AND LOCAL AUTHORITY DRAINAGE RECORDS



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Sewer Network

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Legend	
Sewer Gravity Mains (Irish Water owned)	
Liquid	Green line
Foul	Red line
Unknown	Orange line
Sewer	
Manhole	Green dot
Standard	Green dot
OTHER	Green dot

0	20	40	80
m			
Coordinate System: TM65 Irish Grid Projection: Transverse Mercator			
Scale @ A3: 1:2,500			
Drawing No.: IW-AGG-2018-000			
Drawn By: NM			
Checked By: <Add Name>			
Approved By: <Add Name>			
Drawn Date 20/11/2024			
Checked Date: <dd/mm/yyyy>			
Approved Date: <dd/mm/yyyy>			





Legend

Sewer Manholes

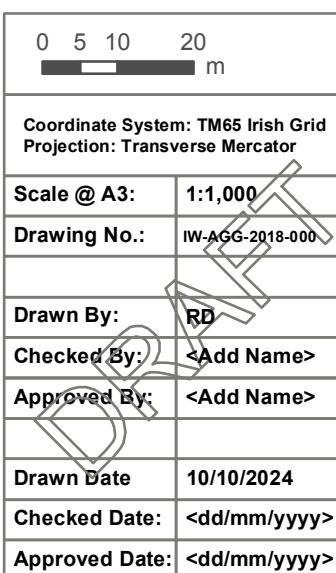
- Standard
- Other; Unknown

Sewer Discharge Points

OF Overflow

Sewer Mains (Irish Water)

- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown



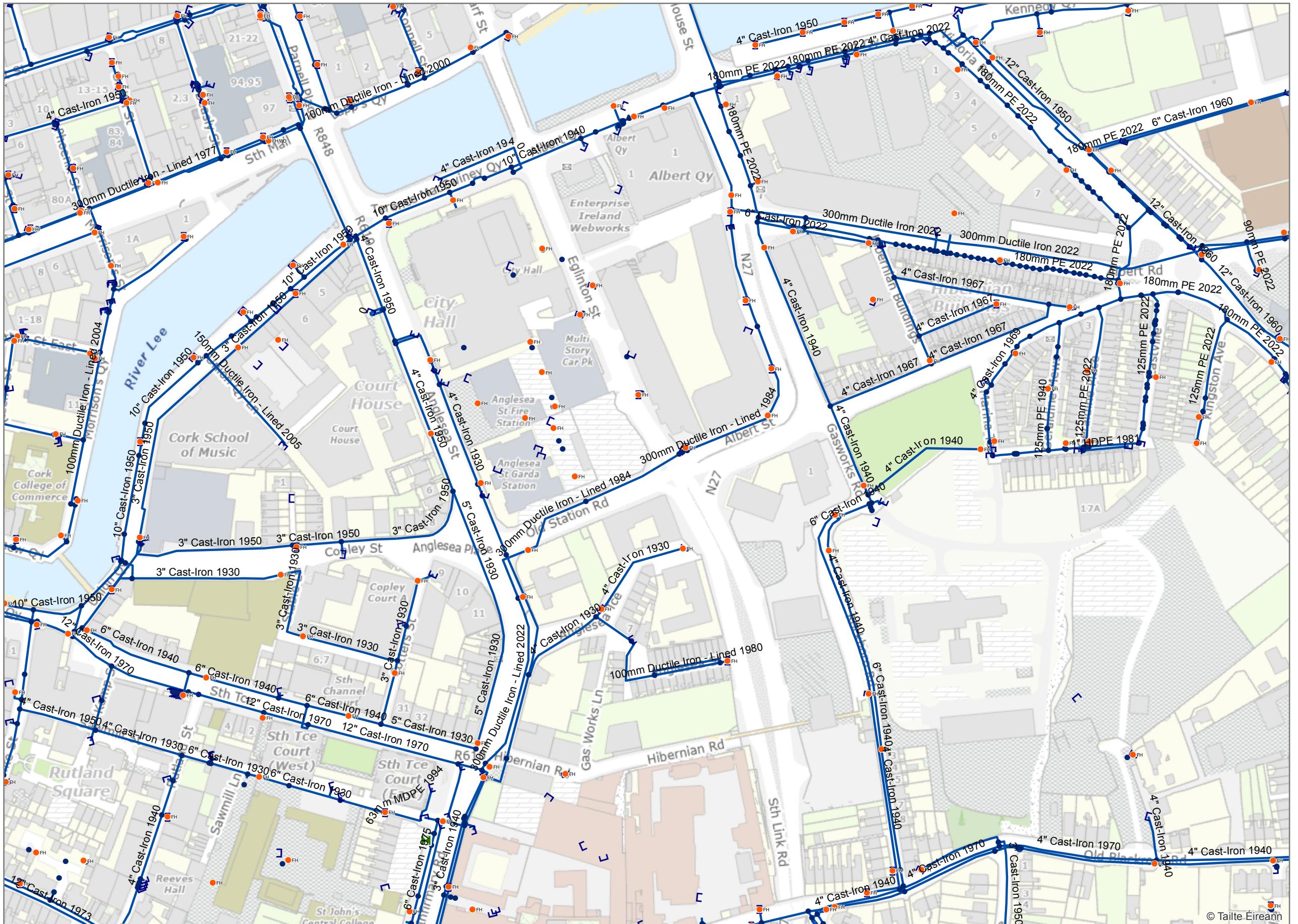
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Sewer Network Old Station Road



0	20	40	80
m			
Coordinate System: TM65 Irish Grid Projection: Transverse Mercator			
Scale @ A3: 1:2,500			
Drawing No.: IW-AGG-2018-000			
Drawn By: NM			
Checked By: <Add Name>			
Approved By: <Add Name>			
Drawn Date 20/11/2024			
Checked Date: <dd/mm/yyyy>			
Approved Date: <dd/mm/yyyy>			

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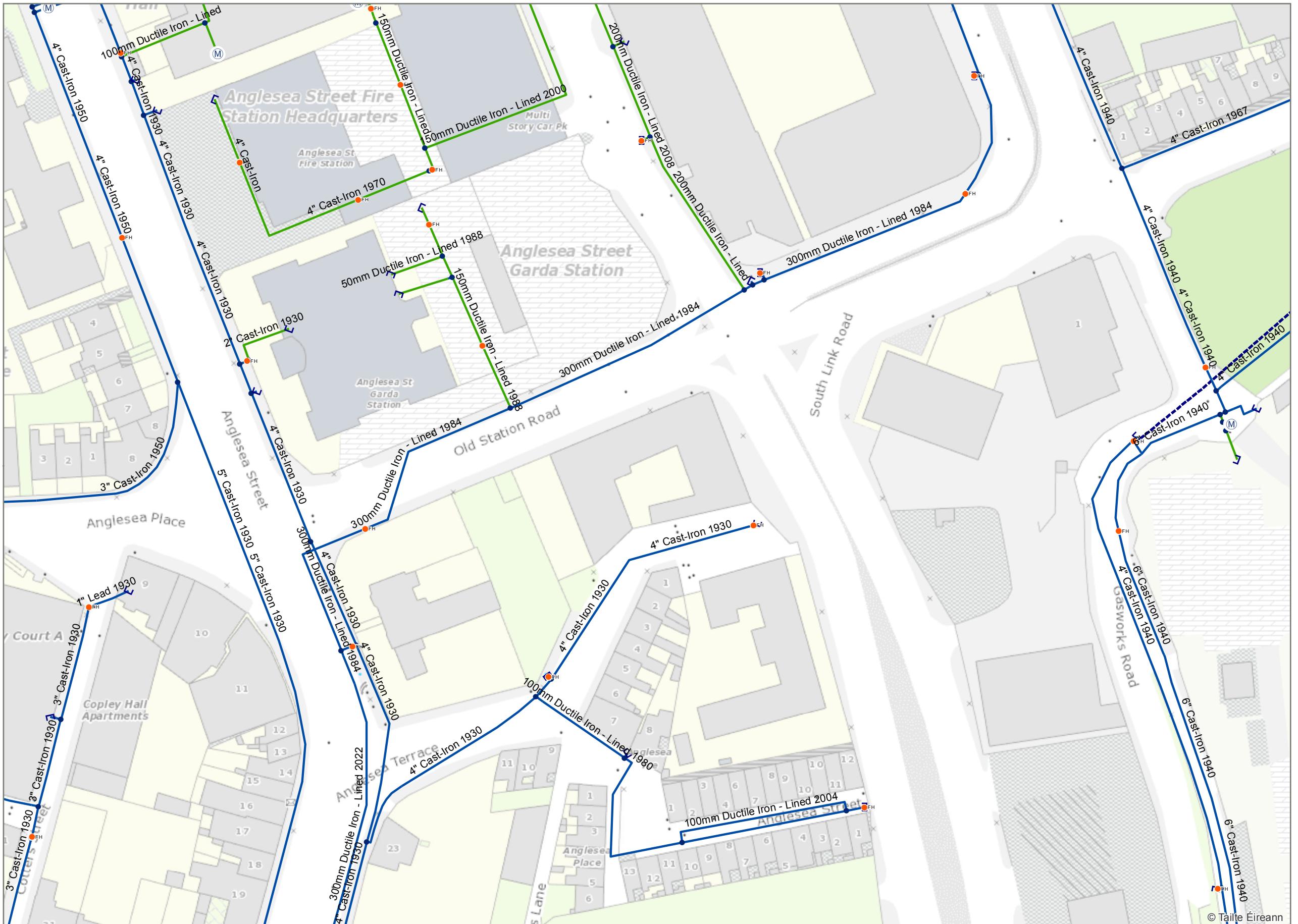
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Water Network





0	5	10	20
m			
Coordinate System: TM65 Irish Grid			Projection: Transverse Mercator
Scale @ A3: 1:1,000			
Drawing No.: IW-AGG-2018-000			
Drawn By: RD			
Checked By: <Add Name>			
Approved By: <Add Name>			
Drawn Date 10/10/2024			
Checked Date: <dd/mm/yyyy>			
Approved Date: <dd/mm/yyyy>			

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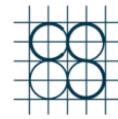
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Water Distribution Old Station Road





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APPENDIX B
UISCE ÉIREANN CONFIRMATION OF FEASIBILITY



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CONFIRMATION OF FEASIBILITY

Slaven Sose

19-22 Dame Street
Dublin 2
Co. Dublin
D02E267
Ireland

9 September 2025

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

Our Ref: CDS25005992 Pre-Connection Enquiry Anglesea Terrace Site, Anglesea Terrace, Cork City

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 153 unit(s) at Anglesea Terrace Site, Anglesea Terrace, Cork City, (the **Development**).

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible Subject to upgrades

In order to accommodate the proposed connection, approximately 110m of local water network upgrades will be required to provide additional network capacity. Uisce Éireann does not currently have any plans to undertake these works, therefore the applicant will be required to fund these local network upgrades. The fee for these works will be calculated at a connection application stage.

The confirmation of feasibility to connect to the Uisce Éireann infrastructure does not extend to your fire flow requirements. Uisce Éireann cannot guarantee that the flow rates and residual pressures will meet the requirements of the Fire Authority.
- **Wastewater Connection** - Feasible without infrastructure upgrade by Uisce Éireann

Please note that discharge of storm water to the Uisce Éireann network as part of this Development will not be permitted. The Applicant should investigate suitable Sustainable Urban Drainage Systems (SUDS) measures within the Development to manage storm runoff on-site, or

Stiúrthóirí / Directors: Niall Gleeson (POF / CEO), Jerry Grant (Cathaoirleach / Chairperson), Gerard Britchfield, Liz Joyce, Michael Nolan, Patricia King, Eileen Maher, Cathy Mannion, Paul Reid, Michael Walsh.

Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin, Ireland D01NP86

Is cuideachta ghníomhaiochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Uisce Éireann is a designated activity company, limited by shares.

Cláraithe in Éirinn Uimh.: 530363 / Registered in Ireland No.: 530363.

alternatively discharge runoff into an existing storm water network on either South Link Road or Anglesea Street that does not discharge to an Uisce Éireann combined/foul sewer. Please refer to Section 1.5 of the Uisce Éireann Wastewater Code of Practice for further details.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

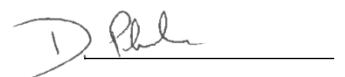
Where can you find more information?

- **Section A** - What is important to know?
- **Section B** - Details of Uisce Éireann's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Uisce Éireann's network(s). This is not a connection offer and capacity in Uisce Éireann's network(s) may only be secured by entering into a connection agreement with Uisce Éireann.

For any further information, visit www.water.ie/connections, email newconnections@water.ie or contact 1800 278 278.

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

Section A - What is important to know?

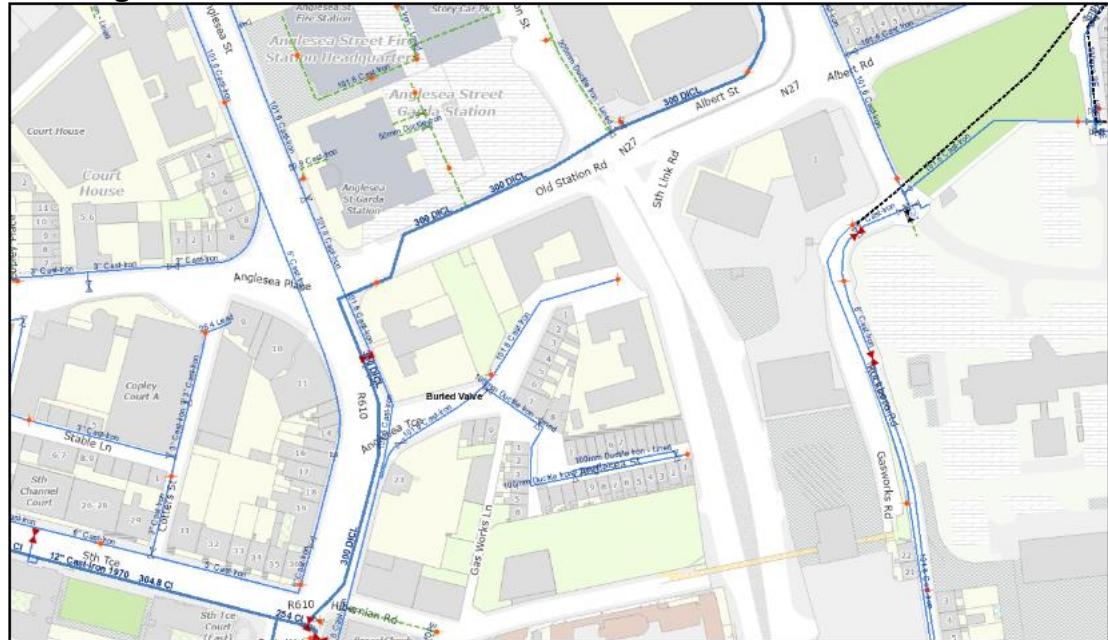
What is important to know?	Why is this important?
Do you need a contract to connect?	<ul style="list-style-type: none"> Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Uisce Éireann's network(s). Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application <u>and be granted and sign</u> a connection agreement with Uisce Éireann.
When should I submit a Connection Application?	<ul style="list-style-type: none"> A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	<ul style="list-style-type: none"> Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	<ul style="list-style-type: none"> All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. <p>*Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works</p>
Fire flow Requirements	<ul style="list-style-type: none"> The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. What to do? - Contact the relevant Local Fire Authority
Plan for disposal of storm water	<ul style="list-style-type: none"> The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. What to do? - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Uisce Éireann's network(s)?	<ul style="list-style-type: none"> Requests for maps showing Uisce Éireann's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	<ul style="list-style-type: none"> The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
Trade Effluent Licensing	<ul style="list-style-type: none"> Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ <p>**trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)</p>

Section B – Details of Uisce Éireann’s Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie

Existing Water Infrastructure:



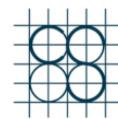
Existing Wastewater Infrastructure:



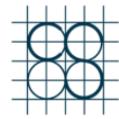
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Note: The information provided on the included maps as to the position of Uisce Éireann's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Uisce Éireann's underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.



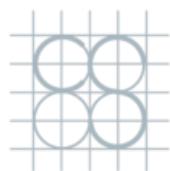
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APPENDIX C

STORM WATER CALCULATIONS



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Project: Anglesea Terrace, Cork
Project No.: H105
Calculation: Attenuation 100-year
Calcs By: JF
Checked By: SS
Date: 10/6/25



Site Location:	Cork	
Design Storm Return Period:	100 years	
Climate Change Factor:	20 %	
Soil Type:	3	
Total Site Area:	0.25 ha	
Hardstand Area:	0.20 ha@ 80% Impervious
Softstand Area:	0.05 ha@ 20% Impervious
Effective Impermeable Area:	0.17 ha	

Allowable Outflow	Calculate
IH124: QBAR = 0.00108 x AREA ^{0.89} x SAAR ^{1.17} x SOIL ^{2.17}	
AREA:	0.00 km ²
SAAR:	733 mm
SOIL:	0.37
QBAR/ha	3.03 l/s/ha
Allowable Outflow	1.0 l/s

Storage required =	100 m³	
---------------------------	--------------------------	--

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71iA) (l/s)	Proposed Runoff (m ³)	Contiguous Land Runoff (m ³)	Total Runoff (m ³)	Allowable Outflow (m ³)	Storage Required (m ³)
5	13.4	16.1	193.0	89	27	0	27	0	26
10	18.7	22.4	134.6	62	37	0	37	1	37
15	22.0	26.4	105.6	49	44	0	44	1	43
30	27.2	32.6	65.3	30	54	0	54	2	52
60	33.7	40.4	40.4	19	67	0	67	4	63
120	41.6	49.9	25.0	11	83	0	83	7	76
180	47.1	56.5	18.8	9	94	0	94	11	83
240	51.5	61.8	15.5	7	102	0	102	14	88
360	58.3	70.0	11.7	5	116	0	116	22	94
540	66.0	79.2	8.8	4	131	0	131	32	99
720	72.0	86.4	7.2	3	143	0	143	43	100
1080	81.6	97.9	5.4	3	162	0	162	65	98
1440	89.1	106.9	4.5	2	177	0	177	86	91
2880	100.0	120.0	2.5	1	199	0	199	173	26
4320	109.2	131.0	1.8	1	217	0	217	259	-42
5760	117.1	140.5	1.5	1	233	0	233	346	-113
8640	131.0	157.2	1.1	1	261	0	261	518	-258
11520	143.0	171.6	0.9	0	285	0	285	691	-407
14400	153.9	184.7	0.8	0	306	0	306	864	-558
17280	163.9	196.7	0.7	0	326	0	326	1037	-711
23040	182.0	218.4	0.6	0	362	0	362	1382	-1020



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