

80192-MAHON-SOCIAL HOUSING DEVELOPMENT

PLANNING SERVICES DESIGN REPORT



August 2024

CLUID HOUSING

MAHON SOCIAL HOUSING DEVELOPMENT

PLANNING SERVICES DESIGN REPORT

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B					
C					
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1 INTRODUCTION

Nicholas O'Dwyer were commissioned by the Applicant, Cluid Housing, to prepare an Engineering Services Report for the proposed residential development at Mahon Housing development in Mahon, Co. Cork. The development comprises 2 main housing blocks, a two-storey housing block to the east and a four-storey apartment block to the west.

The development will house 22 new residential units and will comprise one, two and three-bedroom units with a maximum occupancy of 78 persons. The development will also include an access road, parking and a bin store.

1.1 Site Location

The site is located in the centre of Mahon town in Co. Cork, east of Cork City. The site is bordered by Skehard Road to the North, Ballinure Road to the West, St. Michaels Cemetery to the South and a greenfield site to the East. Figure 1 below depicts the site location. The site is accessed via Ballinure Avenue. The site is within 700m of Lough Mahon to the east.

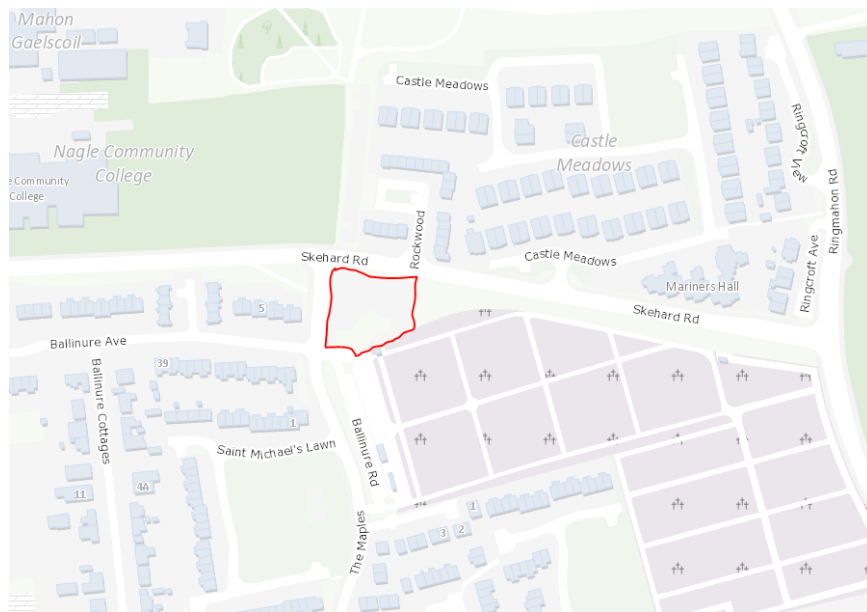


Figure 1.1: Site Location

The historic 25" map, **Figure 1.2**, shows no historical ground features, quarries, wells, water courses and springs at the site to be concerned of. The site is located on the historical border between Ballinure House and Mahon Cottage.



Figure 1.2: Historic 25" Map

1.2 Site Topography

The site is irregular in shape and at its largest dimension measures approximately 53m to the North and West, and approximately 32m to the East. A topographical & GPR survey was carried out by Geodata in July 2022 and is attached in Appendix A. From the survey, it is evident that the site slopes from the West to East boundary with recorded ground levels of approximately 10.86mOD and 9.50mOD respectively.

From satellite photos taken in 2013, **Figure 1.3**, it is evident that the site had been previously developed. However, the structure has since been demolished in 2017/2018 as can be seen in **Figure 1.4**.

The site is slightly overgrown and comprises some concrete surfacing and hardstanding which will have to be removed and disposed of off-site. Some existing services were noted around the footprint of the previous building structure during a site visit in February 2022. Some service i.e. 60mmØ water pipe 1.5mbgl was detected in the GPR survey. It is recommended that additional investigations be carried out on-site by the appointed contractor before construction activities commence on these services to determine whether they are live or redundant and if they contain any asbestos material.



Figure 1.3: 2013 Satellite Image of Site



Figure 1.4: Recent Satellite Image & Site Photos (Feb. 2022)

The associated site and infrastructural works include watermains, foul and surface water drainage, parking facilities, permeable paving, bin store, landscaping, boundary walls and fences.

The objective of this report is to provide information on the calculations, estimates and assumptions used to design the foul sewers, surface water sewers, surface water attenuation and Sustainable Drainage Systems (SuDS), and watermains for the proposed development.

2 WATER SUPPLY

2.1 Scope Overview

To provide an adequate water distribution supply for water consumption by the proposed housing development.

2.2 Design Standards and Design Guidelines

- Uisce Éireann – Code of Practice for Water Infrastructure

2.3 Existing Services

Existing watermain records were obtained from Cork City Council Environment Directorate (an agent of Uisce Éireann). The existing watermain records are included in Appendix A. The public watermain is located on Shekard Road and Ballinure Road as depicted in **Figure 2.1**. The existing watermain comprises 200mm and 300mm Ø ductile iron pipes. A public fire hydrant is located approximately 150m East of the site along the watermain on Skehard Road. A 100mmØ connection to the site is evident in records, however, this was not detected in a GPR survey carried out. However, a 60mmØ water pipe 1.5mbgl was detected in the GPR survey.

It is recommended that further investigation be carried out on-site by the appointed contractor before construction activities commence. Any live pipework needs to be decommissioned and removed. Any redundant pipework needs to be removed from the site.



Figure 2.1: CCC Watermain Records

2.4 Proposed Design

The proposed development of 22 new residential units will be fed from the existing water supply main located on Ballinure Road via a new 100mm diam. watermain.

The estimated peak hour water demand from the development will be 0.85 l/s with the average daily demand being 0.14l/s. Total water demand is based on a total population of 78 persons and having a rate of 150l/pop/day over a 24-hour period. Calculations in support of this design are included in Appendix B.

The proposed watermain, connections and hydrants will all be installed in accordance with the Irish Water specification for developments. The ring main will be a minimum of 100mm diameter. Spurs and connections from the ring main will be 25mm diameter.

It is proposed to install one off-line fire hydrant on the new proposed main to service the Southern elevations of the development, while an existing hydrant on Shekard Road serves the northern and western elevations. Note that this is subject to review by Uisce Éireann, fire officer and fire consultant. Given the height and scale of the building, the fire officer may require assurance of a reliable water supply and pressure; this may be satisfied by carrying out a flow-pressure test on an existing hydrant on the public main and may require additional testing when the new main is constructed. If the water pressure is not found to be sufficient, then water storage for firefighting may be required for the site.

For layout and details of the proposed water services please refer to the following drawings.

80192-NOD-01-XX-DR-C-08501	Water Supply Plan layout
80192-NOD-01-XX-DR-C-08510	Water Supply Standard Details Sheet 1
80192-NOD-01-XX-DR-C-08511	Water Supply Standard Details Sheet 2

3 FOUL SEWER DRAINAGE

3.1 Scope Overview

To provide a collection system to receive, manage and dispose of foul sewer discharge associated with the proposed development.

3.2 Design Standards and Design Guidelines

- Uisce Éireann – Code of Practice for Wastewater Infrastructure

3.3 Existing Services

Existing drainage records were obtained from Cork City Council (CCC) Environment Directorate (an agent of Uisce Éireann). The drainage records are included in Appendix A. Local foul sewers are located on Shekard Road and below the road shoulder in Ballinure Road as depicted in **Figure 3.1**.

A GRP survey carried out in 2020 confirmed these as 225mm diam. sewers. It also confirms a 225mm diam. spur entering the site from the west off Ballinure Road and is noted as being blocked. It is recommended that additional investigations be carried out on-site by the appointed contractor before construction activities commence. Any live pipework and manholes need to be decommissioned and removed from the site. Any redundant pipework needs to be removed from the site.

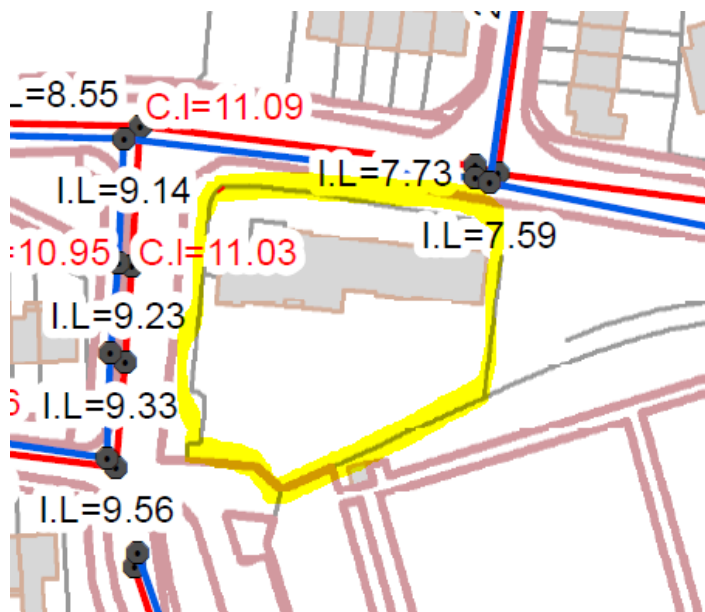


Figure 3.1: CCC Drainage Records - Blue-Storm; Red-Foul; Yellow-Site

3.4 Proposed Design

Foul sewage within the site will be drained via individual inspection chambers at each dwelling to a proposed 150mm diameter foul sewer which will pass between housing blocks and exit across the norther boundary to discharge into a proposed new manhole on the existing foul sewer located on Shekard Road.

Foul sewers have been designed and will be constructed in accordance with the Uisce Éireann's '*Standard Details for Wastewater Infrastructure*' and '*Code of Practice for Wastewater Infrastructure*'. In addition, foul sewers have been designed to Building Regulations and specifically in accordance with the principles and methods set out in EN 752:2008 and DOE '*Recommendations for Site Development Works*'. In addition, HR Wallingford '*Tables for the hydraulic design of pipes, sewers and channels*' and Water UK/WRC '*Sewers for Adoption – 6th Edition*' have been applied. Values for roughness of uPVC pipes were obtained from Wallingford "*Tables for the Hydraulic Design of Pipes, Sewers and Channels*".

Using Uisce Éireann parameters, the peak flow from the site is calculated as 0.9 l/s at 6 DWF averaged over a 24-hour period. The following minimum gradients were used:

No. of Houses	Minimum Pipe Gradient
1	100mm dia. @ 1:60 or self-cleansing gradient (private connection)
2-9	150mm dia. @ 1:60 or self-cleansing gradient
> 10	Min 150mm dia. or self-cleansing gradient

Sewers and drains shall be laid to comply with the requirements of the Building Regulations 1997 in accordance with the recommendations contained in the Technical Guidance Documents, Section H (revised 2005). Standard drainage details will be in accordance with the Greater Dublin Regional Code of Practice for Drainage Works and Uisce Éireann Standard Details for Wastewater infrastructure.

Total foul water discharge is based on a total population of 78 persons and having a rate of 150l/pop/day over a 24-hour period. The proposed maximum peak discharge from the site at 6 DWF will be 0.9 l/sec averaged over a 24-hour period.

For layout and details of the proposed Foul drainage please refer to the following drawings.

80192-NOD-01-XX-DR-C-08301	Foul Sewer Layout Plan
80192-NOD-01-XX-DR-C-08310	Foul Sewer Standard Details Sheet 1
80192-NOD-01-XX-DR-C-08311	Foul Sewer Standard Details Sheet 2
80192-NOD-01-XX-DR-C-08312	Foul Sewer Standard Details Sheet 3

4 SURFACE WATER DRAINAGE

4.1 Overview

The overall objective of the stormwater drainage is to provide well-drained operational areas to permit the safe movement of vehicles and efficient operation of the buildings under storm conditions. Terraces, hard stand areas, and roadways with concrete paving, and landscaped surfaces are all part of the proposed surface infrastructure.

The stormwater management for the proposed housing development will focus on the following:

- Prevent flooding of the proposed housing development due to possible flash floods coming from upstream catchments (external storm water system).
- Prevent flooding of the proposed site due to rainfall falling directly on the site (internal storm water system).
- To control and separate polluted and unpolluted water generated within the proposed housing development.

4.2 Design Standards and Design Guidelines

- Greater Dublin Strategic Drainage Study (GSDSDS)
- Greater Dublin Regional Code of Practice for Drainage Works, V6.0 2005
- CIRIA Sustainable Drainage Systems (SUDS) Manual 2015
- BS 8582:2013

4.3 Existing Services

Existing drainage records were obtained from Cork City Council (CCC) Environment Directorate (an agent of Uisce Éireann). The drainage records are included in Appendix A. Local storm sewers are located on Shekard Road and below the road shoulder in Ballinure Road as depicted in **Figure 3.1**.

A GRP survey carried out in 2020 confirmed these as 300mm diam. It also confirms 2 no. 225mm diam. spur entering the site from the west off Ballinure Road along with 100mm storm sewers and manholes within the existing site. It was recorded that the storm sewer is 0.5mbgl and appeared to be blocked. It is recommended that additional investigations be carried out on-site by the appointed contractor before construction activities commence. Any live pipework and manholes need to be decommissioned and removed from the site. Any redundant pipework needs to be removed from the site.

4.4 Proposed Design

It is proposed to discharge surface water to the existing surface water network on Shekard Road using a combination of sustainable methods and storage facilities in accordance with the Great Dublin Strategic Drainage Study Policy.

Calculations for the quantity of run off and volume of surface water to be disposed off-site is for the 1 in 100-year storm event. The total maximum storage capacity required for the site is 47m³ for a 1 in 100-year storm event with a 20% increase allowance for Climate change. Calculations in support of this design are included in Appendix D.

All stormwater pipelines will be attenuated for the purposes of sustainable drainage, and the proposed attenuation systems will be located south of the housing block before discharge. Attenuation of the surface water will be provided by mainly Stormtech underground storage systems and a mixed use of permeable paving.

Stormwater will then be discharged through a hydro-brake manhole into the public stormwater network to the Northern boundary of the site. The location of the hydrobrake is to be agreed with CCC/UE as it is anticipated to be located outside the site boundary due to space constraints.

Runoff from the untrafficked hardstanding areas will be directed to the attenuation systems. Road and parking runoff will pass through oil interceptors prior to attenuation. Parking spaces will be constructed with a permeable surface to reduce runoff entering the drainage pipelines.

For layout and details of the proposed Surface Water drainage please refer to the following drawings.

80192-NOD-01-XX-DR-C-08401	Surface Water Layout Plan
80192-NOD-01-XX-DR-C-08410	Surface Water Standard Details Sheet 1
80192-NOD-01-XX-DR-C-08411	Surface Water Standard Details Sheet 2
80192-NOD-01-XX-DR-C-08412	Surface Water Standard Details Sheet 3

4.5 Sustainable Drainage Systems (SuDS)

It is proposed to use a Sustainable Urban Drainage System (SuDS) approach to stormwater management which has been designed in accordance with the SUDS Manual and to suit the site constraints. SUDS incorporate a series of elements that have been developed to attenuate flows and mitigate pollution from runoff. The philosophy of SUDS

is to replicate as close as possible the natural drainage from a site before the development, so reducing the impact on the receiving watercourse. The strategy aims to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater, and contributing to amenity, aesthetics and biodiversity enhancement. Additionally, the SuDS features aim to replicate the natural characteristics of rainfall runoff for any site by providing control of run-off at source and this has been achieved by the current proposals.

4.5.1 Proposed SUDS elements

Permeable Paving for parking spaces

Porous surfacing (paving block or open graded material) which can treat rainwater at source and allow infiltration through to an underlying porous subbase where water can be stored within the voids before being slowly released to the drainage collection system through natural flow via the porous medium. These systems will allow some form of storage for small rainfall events and will result in interception, water evaporation and adsorption in small quantities, therefore there will be less runoff from these areas in small rainfall event thus mimicking the natural response for this catchment. As well as reducing the amount of runoff from the surface, permeable paving will slow down the rate of runoff from the pavement in extreme rainfall events contributing to attenuation flows. In addition, permeable paving will increase the quality of water which is intercepted by the system through filtration, biodegradation, pollutant adsorption and settlement and retention of solids, also the reduction in peak flows to the outfall will enhance settlement and biodegradation of pollutants

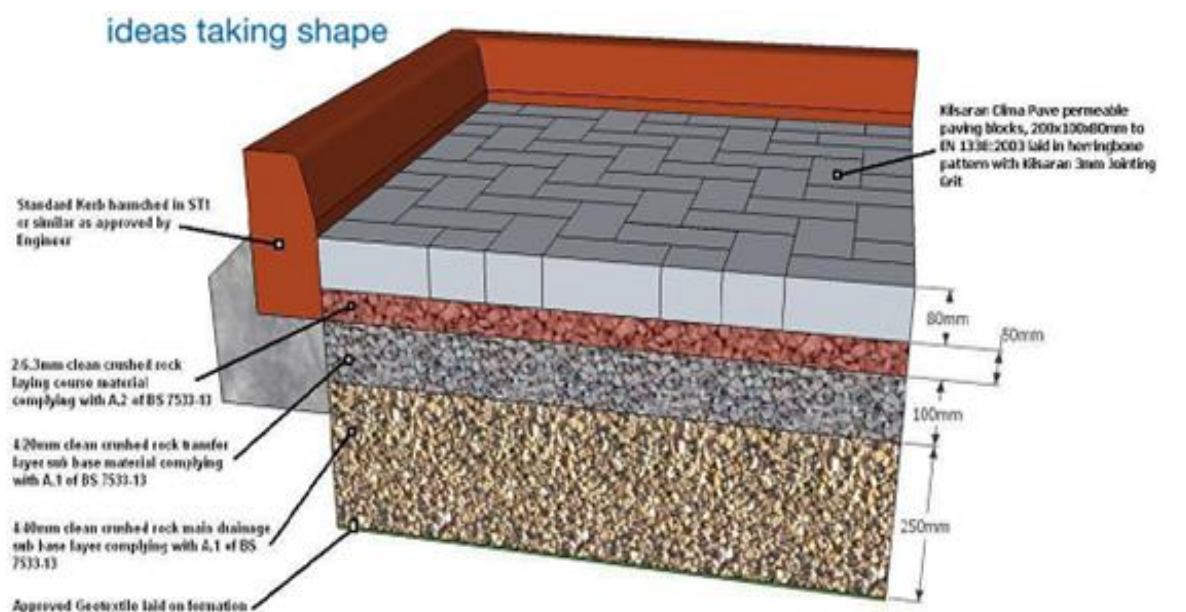


Figure 4-1: *Typical permeable paving detail*

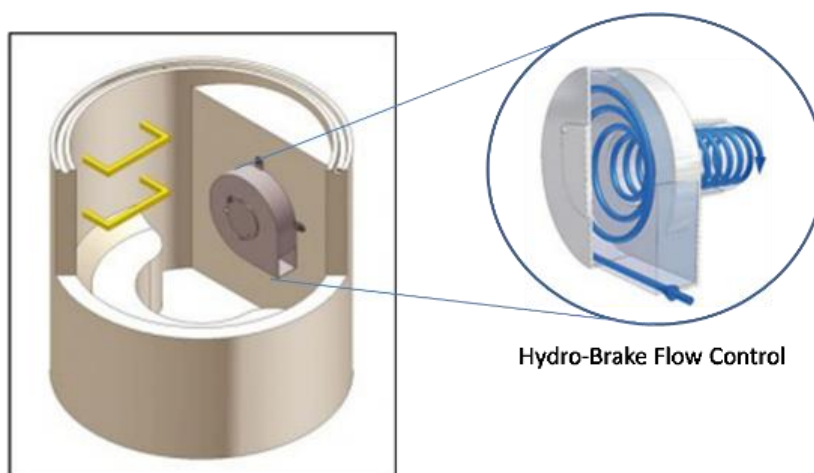
Stormtech Soak-away providing significant attenuation storage:



Figure 4-2: *Typical attenuation/soakaway structure*

By combining several SUDS elements, a treatment train is formed which initially infiltrates the development runoff, removing pollutants as it soaks through the permeable pavements and filter drain material. Treatment storage is the second step and is provided by filtration through stone layers, either beneath permeable paving or as part of a filter drain. An additional stage of filtration would be provided by the stone layer at the base of the Stormtech facility. All these methods allow for groundwater recharge.

An outfall manhole containing a flow restriction would be employed to limit the overall site runoff (see below).



Hydro-Brake Chamber

Figure 4-3: *Flow restricting Hydro-Brake Chamber*

4.5.2 Permissible Site Discharge

According to the GDSDS, the method used for determining peak flow rates for small greenfield catchments is the UK '*Institute of Hydrology Report 124, Flood Estimation for Small Catchments*'. This method calculates $Q_{BARrural}$ which is the mean annual flood flow from a rural catchment.

Where long-term storage can be provided or is not necessary, surface water can be discharged at a higher value than $Q_{BARrural}$, this discharge rate ($Q_{BARgrowth}$) is dependent on the design return period and the corresponding growth factor from the GDSDS Table 6.6. However, if long-term storage cannot be provided on-site the discharge rate from the site should be kept to $Q_{BARrural}$ or 2 l/s/ha. This is the case for this proposed development.

The IH124 method calculates $Q_{BARrural}$ which is the mean annual flood flow from a rural catchment. As the subject site area is less than 50 hectares, the calculated Q_{BAR} is to be linearly interpolated from the calculated value to produce a reduced allowable outflow based on the actual site area, as per GDSDS section 6.6.1.

$$Q_{BARrural} = 0.00108 \times (\text{Area})^{0.89} (\text{SAAR})^{1.17} (\text{SOIL})^{2.17}$$

where:-

$Q_{BARrural}$ = Mean Annual Flood (m^3/s)

Area = Catchment Area (km^2)

SAAR = Standard Average Annual Rainfall (mm)

SOIL = SOIL index from Flood Studies Report

Using data received from Met Eireann for Irish Grid co-ordinates E 317000, N 229000 (site co-ordinates are: E 172542, N 70974), the SAAR is determined as 1111mm.

The soil value can be determined from the Flood Studies Report - Winter Rainfall Acceptance Maps (WRAP). A more accurate approach is to use the '*The Classification of Soils from Winter Rainfall Acceptance Rate, Flood Studies Report Table 4.5*' to determine soil type and determine the soil value from Table 6.7 from the GDSDS. The latter method is adopted for this site.

Permissible site discharge for the site has been determined as follows:

Catchment Area = 0.25 Ha

SAAR = 1111mm

SOIL Value = 0.47 (for soil type 4 from Table 6.7 from the GDSDS)

The calculated permissible site discharge is 2.11 l/s.

See Appendix D for the Permissible Site Discharge calculations.

4.5.3 Surface Water Runoff Coefficients

As a large proportion of runoff is routed through SuDS features these will have an attenuating effect which reduce the rate of stormwater runoff for every rainfall event. Also, SuDS features will reduce the runoff volume through evaporation, transpiration, infiltration and depression storage of the water within each system. The following runoff coefficients have been applied as follows:

Roofs - Type 1 (Draining to traditional gullies) = 1.00

Roofs - Type 2 (Draining to SuDS features) = 0.75

Roads and Footpaths - Type 1 (Draining to traditional gullies) = 0.95

Roads and Footpaths - Type 2 (Draining to SuDS features) = 0.70

Permeable Paving = 0.70

Grassed Areas = 0.15

4.5.4 Surface Water Attenuation

GDSDS requires flood waters for a 100 year return period to be managed on-site, therefore this return period is adopted for attenuation calculations. Surface water attenuation for the site will be provided within the permeable paving within the car parking bays.

In order to ensure that the proposed design provides similar or improved benefits, the design proposal is for the inclusion of permeable paving within the car parking bays. The interception and treatment volumes of the above proposed designs are discussed in greater detail below.

The development drainage infrastructure system, including Sustainable Drainage System features (SuDS) with underground attenuation, will be designed such that the catchment will drain to the existing storm network on Skehard Road. Surface water runoff from this catchment will be restricted as noted above.

As per Table 6.2 of GDSDS Vol. 2, a climate change allowance of 10% will be applied to the surface water drainage design.

See Appendix D for surface water attenuation calculations.

4.5.5 Treatment Volume

The GDSDS requires that a “treatment volume” (V_t) be provided in order to prevent any pollutants or sediments discharging into river systems, additionally a ‘treatment train’ stormwater runoff management system is required. According to CIRIA document C697 the following treatment train approach is necessary:

Roofs – 1 Treatment Stage

Road Areas – 2 Treatment Stages

Paved Areas excluding Roads - 1 Treatment Stage

The treatment volume required is based on treatment 15mm of rainfall depth from 80% of the runoff from impermeable areas as defined in the GDSDS (Appendix E section E2.1.2).

All run-off areas will pass through the required number of treatment stages prior to discharging to the downstream outfall. Treatment methods include permeable paving, silt traps and petrol interceptors.

The total treatment volume required (as calculated) for the site is 20m³.

where:

Treatment Volume V_t (m³) = Impermeable Area (ha) x 15mm x 10
& 80% runoff from impermeable area is assumed.

APPENDIX A – EXISTING SERVICES RECORDS

Shehard Rd Cork. Water Network



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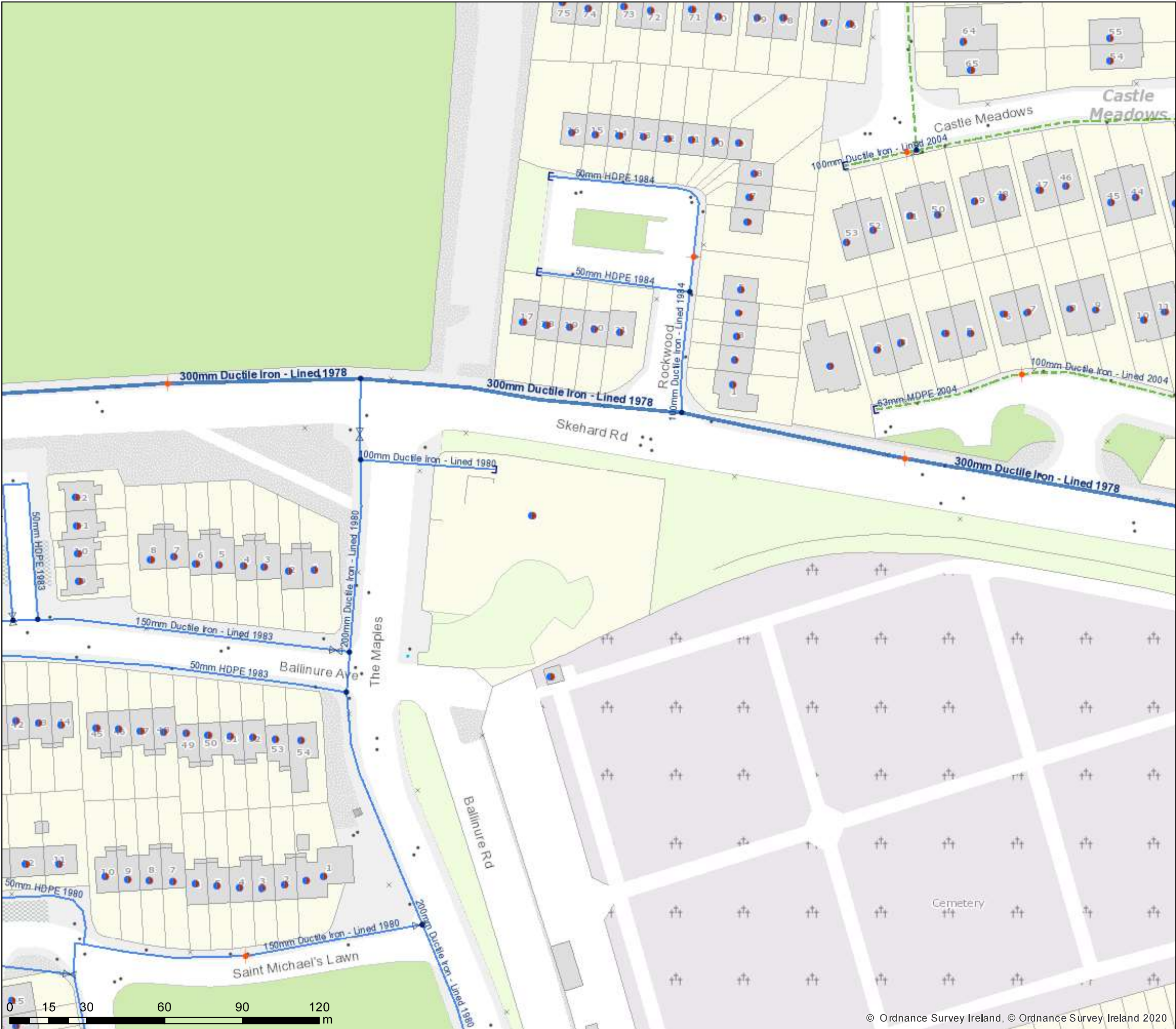
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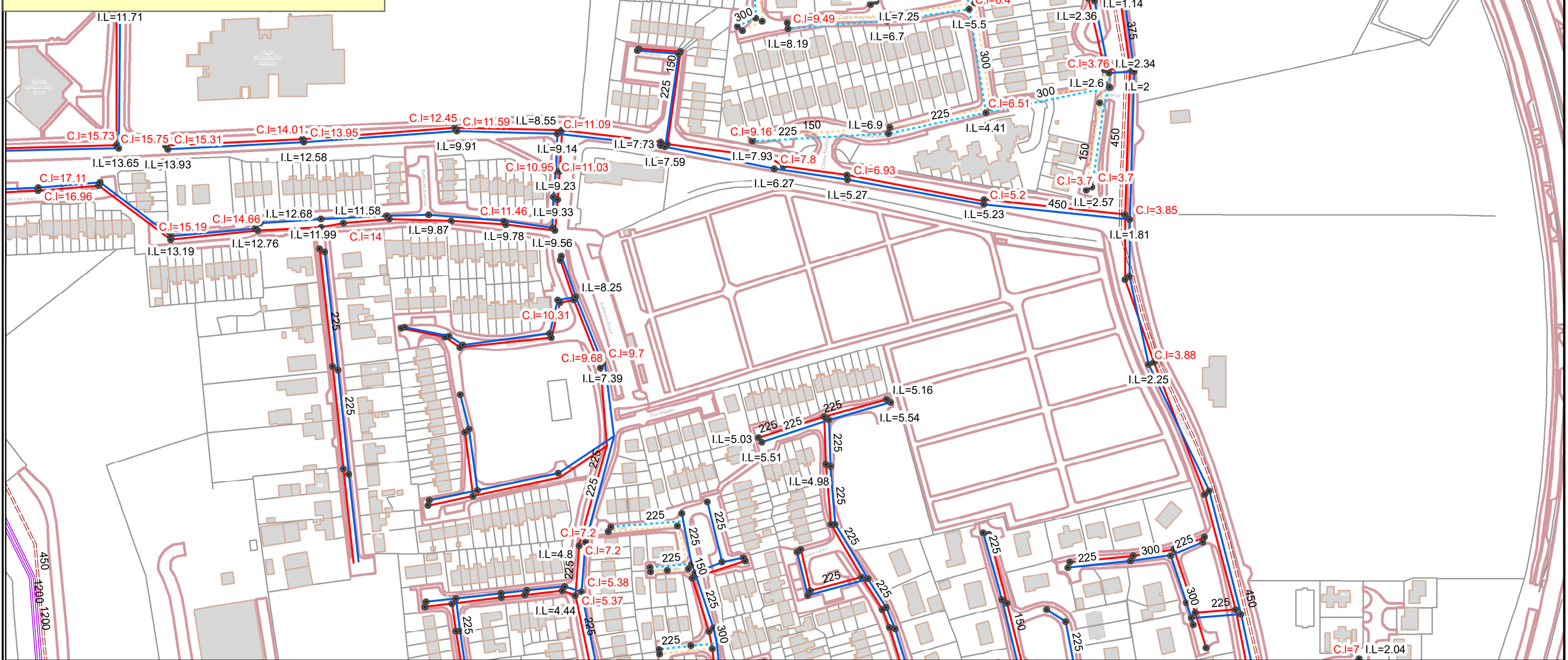
NOTE: DIAL BEFORE YOU DIG Phone: 1850 427 747 or e-mail dig@gasnetworks.ie - The actual position of the gas/electricity distribution and transmission network must be verified on site before any mechanical excavating takes place. If any mechanical excavation is proposed, hard copy maps must be requested from GNI re gas. All work in the vicinity of gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie."



Water Distribution Network - Water Treatment Plant - Water Pump Station - Storage Cell/Tower - Dosing Point - Meter Station - Abstraction Point - Telemetry Kiosk Reservoir - Potable - Raw Water Water Distribution Mains - Irish Water - Private Trunk Water Mains - Irish Water - Private Water Lateral Lines - Irish Water - Non IW - Water Casings Water Abandoned Lines - Boundary Meter - Bulk/Check Meter - Group Scheme - Source Meter - Waste Meter - Unknown Meter; Other Meter - Non-Return - PRV - PSV - Sluice Line Valve Open/Closed - Butterfly Line Valve Open/Closed - Sluice Boundary Valve Open/Closed - Butterfly Boundary Valve Open/Closed - Scour Valves - Single Air Control Valve - Double Air Control Valve - Water Stop Valves - Water Service Connections - Water Distribution Chambers - Water Network Junctions - Pressure Monitoring Point - Fire Hydrant - Fire Hydrant/Washout Water Fittings - Cap - Reducer - Tap - Other Fittings	Sewer Foul Combined Network - Waste Water Treatment Plant - Waste Water Pump station Sewer Mains Irish Water - Gravity - Combined - Gravity - Foul - Gravity - Unknown - Pumping - Combined - Pumping - Foul - Pumping - Unknown - Syphon - Combined - Syphon - Foul - Overflow Sewer Mains Private - Gravity - Combined - Gravity - Foul - Gravity - Unknown - Pumping - Combined - Pumping - Foul - Pumping - Unknown - Syphon - Combined - Syphon - Foul - Overflow Sewer Lateral Lines - Sewer Lateral Lines - Sewer Casings Sewer Manholes - Standard - Backdrop - Cascade - Catchpit - Bifurcation - Hatchbox - Lampole - Hydrobrake - Other; Unknown Discharge Type - Outfall - Overflow - Soakaway - Other; Unknown Cleanout Type - Rodding Eye - Flushing Structure - Other; Unknown Sewer Inlets - Catchpit - Gully - Standard - Other; Unknown Sewer Fittings - Vent/Col - Other; Unknown	Storm Water Network Surface Water Mains - Surface Gravity Mains - Surface Gravity Mains Private - Surface Water Pressurised Mains - Surface Water Pressurised Mains Private Inlet Type - Gully - Standard - Other; Unknown Storm Manholes - Standard - Backdrop - Cascade - Catchpit - Bifurcation - Hatchbox - Lampole - Hydrobrake - Other; Unknown Storm Clean Outs - Storm Clean Outs - Stormwater Chambers Discharge Type - Outfall - Overflow - Soakaway - Other; Unknown Gas Networks Ireland - Transmission High Pressure Gasline - Distribution Medium Pressure Gasline - Distribution Low Pressure Gasline ESB Networks ESB HV Lines - HV Underground - HV Overhead - HV Abandoned ESB MV/LV Lines - MV Overhead Three Phase - MV Overhead Single Phase - LV Overhead Three Phase - LV Overhead Single Phase - MV/LV Underground - Abandoned Non Service Categories - Proposed - Under Construction - Out of Service - Decommissioned Water Non Service Assets - Water Point Feature - Water Pipe - Water Structure Waste Non Service Assets - Waste Point Feature - Sewer - Waste Structure
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Drainage Records

- Legend**
- LOCAL STORM
 - PRIVATE STORM
 - Manhole
 - LOCAL FOUL
 - RISING MAIN
 - PRIVATE FOUL
 - PRESSURE PIPE
 - Manhole
 - OldCorkCityBoundaryIG



THE SEWERS SHOWN ON THIS MAP ARE FOR REFERENCE ONLY. THE LOCATION AND PROPERTIES OF ALL SEWERS, LEVELS, PIPESIZES, etc, MUST BE CONFIRMED ON SITE.

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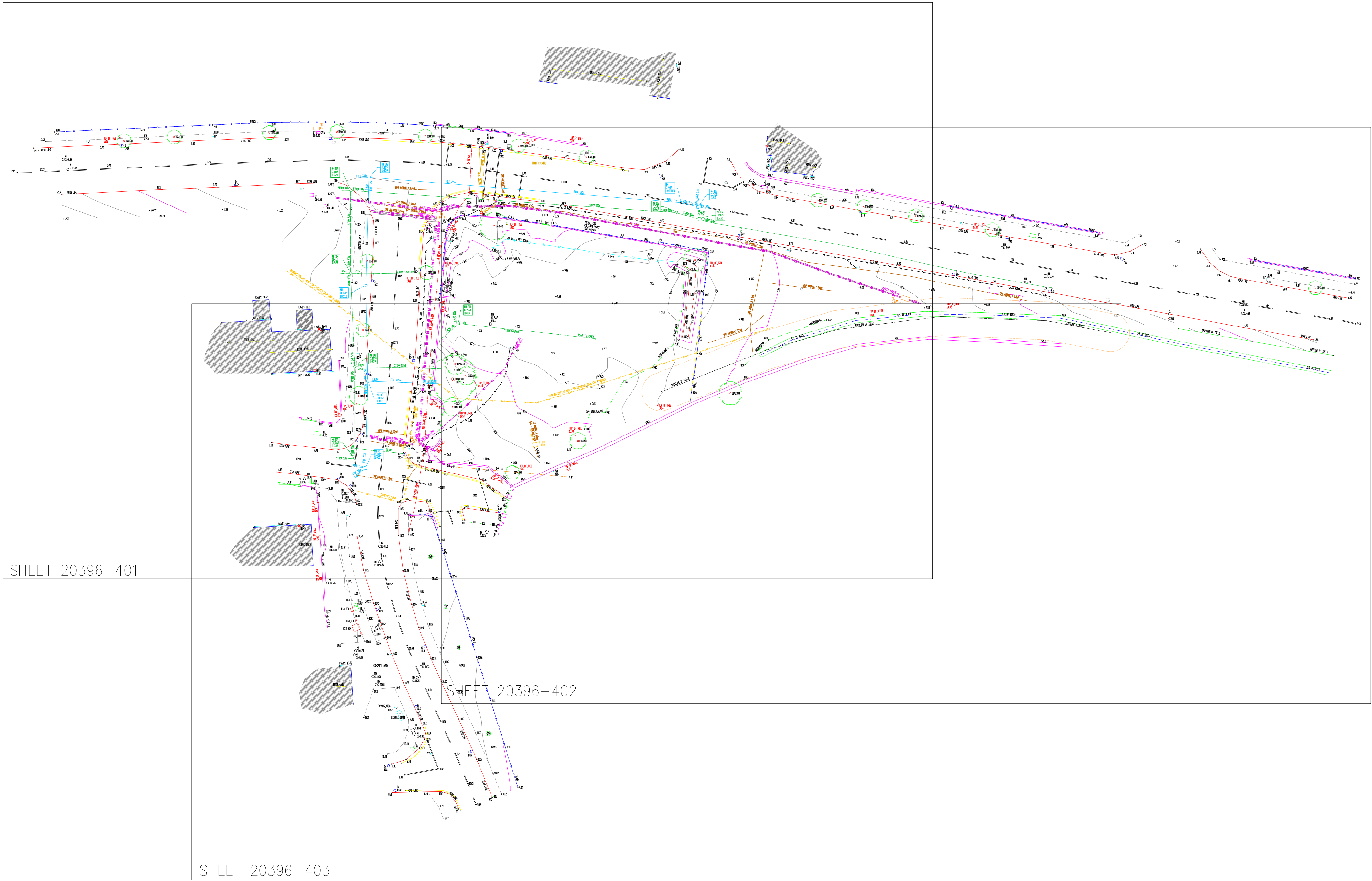


CORK CITY COUNCIL ENVIRONMENT DIRECTORATE
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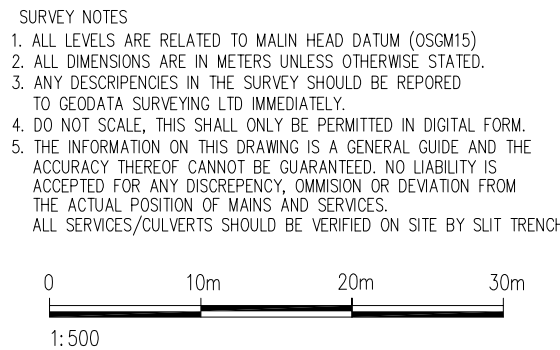
Drawn By: T.Quinn

Checked by:

Date: 04/11/2022



GPR Survey
Scale 1:500



SYMBOLS																							
	SPOT LEVEL		6" WATER METER		AIR VALVE		ARMSTRONG JUNCTION		GATE		OVERHEAD FIBER LINE		SDN		SOFFIT BEAM		RIDGE		FDR SERVER		UNIDENTIFIED COP SIGNAL		TRAFFIC
	CONTROL SURVEY STATION		WATER METER		FIRE HYDRANT		LAMP POST		SURFACE WATER LEVEL		OVERHEAD WATER LINE		TREE ACTUAL SPREAD		SOFFIT CEILING		SOFFIT LEVEL		STORM SEWER		ELECTRICAL CABLE		TRENCH
	MANHOLE COVER		SLUICE VALVE		TEL. INSP. CHAMBER		TELEDCOM POLE		BED LEVEL WATERCOURSE		TELEDCOM POLE		TREE TAG N.L.		HEAD TO HEEL		FINISH FLOOR LEVEL		COMBINED SEWER		PUBLIC LIGHTING		COMBINED SEWER
	UTILITY INSP. CHAMBER		STOP COCK		MND. PILLAR		ESP POLE		INVERT LEVEL		TOP TAG		BOLLARD		WINDOW BOARD TO FFL		PEG REF. NUMBER		ESB BOX		UNIDENTIFIED GPR		ESB BOX

APPENDIX B – WATER SUPPLY CALCULATIONS

PROJECT TITLE: Mahon-Corner of Skehar Rd & Ballinure

JOB REFERENCE:

80196

SUBJECT

Water Demand for Irish Water



DRAWING NO.

CALCULATIONS BY BV

CHECKED BY MD

DATE

07/03/2023

POST DEVELOPMENT DEMAND

Per-Capita Consumption¹ litres/person/dayAverage Occupancy Ratio² person/unit

Residential Unit Type	Unit
Average Occupancy(persons)	2.7
Number of Units	29
Average Occupancy ² (PE)	78.3

Average Residential Demand³ l/day

Commercial Unit Type	Shopping	Commercial	Pub/ Restaurant	Leisure/ Gym	Medical/ Care Home	Creche
Average Occupancy (per m2)	0	0	0	0	0	0
Area(m2)	0	0	0	0	0	0
Average Occupancy ² (PE)	0	0	0	0	0	0
Average Usage(litres per person/day)	25	100	60	50	350	60
Daily Usage(l)	0	0	0	0	0	0

Average Commercial Demand³ l/dayAverage Day/Week Demand Factor³Peak Demand Factor⁴

WATER DEMAND SUMMARY

	Residential	Commercial	Total
Average Daily Demand	0.14 l/s	0.00 l/s	0.14 l/s
Average Day/Peak Week Demand ⁵	0.17 l/s	0.00 l/s	0.17 l/s
Peak Hour Water Demand ⁶	0.850 l/s	0.000 l/s	0.850 l/s

Notes:

- Per-Capita Consumption 150l/person/day as per Irish Water Code of Practice - (3.7.2)
- Average Occupancy ratio of 2.7 persons per dwelling from Irish Water Code of Practice - (3.7.2)
- Average Day/Week Demand Factor is 1.25 as per Irish Water Code of Practice - (3.7.2)
- Peak Demand Factor is 5 as per Irish Water Code of Practice - (3.7.2)
- Average Occupancy(or PE-Population Equivalent) = No. of Residential Units X Average Occupancy Ratio
- Average Domestic Demand = Average Occupancy X Per-Capita Consumption
- Average Day/Peak Week Demand = Average Daily Domestic Demand X Average Day/Week Demand Factor
- Peak Hour Water Demand = Average Occupancy X Per-Capita Consumption X Average Day/Week Demand Factor X Peak Demand Factor

APPENDIX C – FOUL SEWER CALCULATIONS

PROJECT TITLE: Mahon-Corner of Skehar Rd & Ballinure

JOB REFERENCE:

80196

SUBJECT

Wastewater Load for Irish Water



DRAWING NO.

CALCULATIONS BY: BV

CHECKED BY:

MD

DATE

07/03/2023

POST DEVELOPMENT DEMAND

Wastewater flow per head¹ 150 litresUnit Consumption Allowance³ 10 %Average Occupancy Ratio² 2.7 person/unitDWF Peak Factor⁴ Res. 6 Com. 4.5

Residential Unit	Unit
Average Occupancy(persons)	2.7
Number of Units	29
Average Occupancy ² (PE)	78.3

Residential Dry Weather Flow(DWF) Volume⁵ 12,920 litres

Commercial Unit Type	Shopping	Commercial	Pub/ Restaurant	Leisure/ Gym	Medical/ Care Home	Creche
Average Occupancy (per m2)	0	0	0	0	0	0
Area(m2)	0	0	0	0	0	0
Average Occupancy ² (PE)	0	0	0	0	0	0
Average Usage(litres per person/day) ⁶	25	100	60	50	350	50
Daily Usage(l)	0	0	0	0	0	0

Commercial Dry Weather Flow(DWF) Volume⁷ 0 litres

WASTEWATER LOADING SUMMARY

	Residential	Commercial	Total
Average Daily Discharge	0.15 l/s	0.00 l/s	0.15 l/s
Peak Discharge ⁸	0.90 l/s	0.00 l/s	0.90 l/s

Notes:

1. Waste Water flow - 150 l/head as per Irish Water Code of Practice - (3.6)
2. Average Occupancy ratio of 2.7 persons per dwelling from Irish Water Code of Practice - (3.6)
3. 10% Unit Consumption Allowance as per Irish Water Code of Practice - (3.6.3)
4. DWF Peak Factor is 6 as per Irish Water Code of Practice - (3.6)
5. Dry Weather Flow = No. of Residential Units X Average Occupancy Ratio X Waste Water Flow X UCA³
6. Peak Discharge = Average Daily Discharge X DWF Peak Factor
7. The average concentrations of wastewater parameters taken from EPA "Wastewater Treatment Manuals, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels".
8. Assumed Maximum concentration is equal to the average concentration plus 2 times the standard deviation (for the 95%ile) taken from EPA "Wastewater Treatment Manuals, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels".

APPENDIX D – SURFACE WATER CALCULATIONS

Calculation Sheet

Project No.: 80192	Rev.	Date	By
Project Title: Mahon Housing		7/23	BV

Item / Location:	Drawing Ref.:	Sheet	of
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Ref.	Calculations	Output																																													
	1 in 100 Year Storm Event A. Site Area and Permeability <table><thead><tr><th>Description</th><th>Plan Area</th><th>Impermeability Factor</th><th>Equivalent Impermeable Area</th><th></th></tr><tr><th></th><th>(m²)</th><th>Units</th><th>(m²)</th><th></th></tr></thead><tbody><tr><td>Road Surfaces</td><td>569</td><td>0.90</td><td>512</td><td></td></tr><tr><td>Roofs</td><td>731</td><td>1.00</td><td>731</td><td></td></tr><tr><td>Walkways</td><td>258</td><td>1.00</td><td>258</td><td></td></tr><tr><td>Grassed Area</td><td>980</td><td>0.15</td><td>147</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Total (m²)</td><td>2538</td><td>-</td><td>1648</td><td></td></tr><tr><td>Total (ha)</td><td>0.25</td><td>-</td><td>0.16</td><td></td></tr></tbody></table> Total Area of catchment = 2538 m² = 0.25 ha Equivalent Impermeable Site Area : = 1648 m² = 0.16 ha B. Permissible Site Run-off 1. QBAR = 0.00108 x (AREA)^{0.89} x (SAAR)^{1.17} x (SOIL)^{2.17} AREA = 2538 m² 3. SAAR = 1111 SOIL (Type S4) = 0.47 QBAR (50ha Site) = 414.4240 l/s QBAR/ha = 8.2885 l/s/ha QAllowable discharge from Site = 2.11 l/sec	Description	Plan Area	Impermeability Factor	Equivalent Impermeable Area			(m ²)	Units	(m ²)		Road Surfaces	569	0.90	512		Roofs	731	1.00	731		Walkways	258	1.00	258		Grassed Area	980	0.15	147							Total (m ²)	2538	-	1648		Total (ha)	0.25	-	0.16		
Description	Plan Area	Impermeability Factor	Equivalent Impermeable Area																																												
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Total (m ²)	2538	-	1648																																												
Total (ha)	0.25	-	0.16																																												

Calculation Sheet

Project No.: 80192	Rev.	Date	By
Project Title: Mahon Housing		7/23	BV

Item / Location:	Drawing Ref.:	Sheet	of
------------------	---------------	-------	----

Ref.	Calculations	Output
	Allowable discharge from Site =	2.11 l/sec
Growth 1:10	= 1.05 =	2.21 l/sec
1:30	= 1.65 =	3.47 l/sec
1:50	= 1.72 =	3.62 l/sec
1:100	= 1.95 =	4.11 l/sec
	C. Mahon Attenuation Size Calculation	
	Allowable discharge from Site =	4.11 l/sec
Return Period :	100 years	
Impermeable area of attenuation catchment	=	1648 m ²

Extreme Rainfall Event					Runoff	Runoff	Attenuation
Duration	Duration	Depth ⁴	+ 10% ⁵	Rate	Total	Excess	Volume
minutes	hrs	mm	mm	mm/hr	l/s	l/s	m ³
5	0.08	12.00	13.20	158.40	72.52	68.41	20.52
10	0.17	16.70	18.37	110.22	50.46	46.35	27.81
15	0.25	19.60	21.56	86.24	39.48	35.38	31.84
30	0.50	25.40	27.94	55.88	25.58	21.48	38.66
60	1.00	32.70	35.97	35.97	16.47	12.36	44.50
	2	42.30	46.53	23.27	10.65	6.55	47.13
	3	49.10	54.01	18.00	8.24	4.14	44.68
	4	54.60	60.06	15.02	6.87	2.77	39.87
	6	63.50	69.85	11.64	5.33	1.22	26.45
	9	73.70	81.07	9.01	4.12	0.02	0.60
	12	82.00	90.20	7.52	3.44	-0.66	0.00
	18	95.40	104.94	5.83	2.67	-1.44	0.00
	24	106.10	116.71	4.86	2.23	-1.88	0.00
	48	123.10	135.41	2.82	1.29	-2.81	0.00
	72	137.30	151.03	2.10	0.96	-3.14	0.00
	96	149.80	164.78	1.72	0.79	-3.32	0.00
	144	171.90	189.09	1.31	0.60	-3.50	0.00

Required Attenuation Volume for extreme 100 year Storm Event :

47 m³

Calculation Sheet

Project No.: 80192	Rev.	Date	By
Project Title: Mahon Housing		7/23	BV

Item / Location:	Drawing Ref.:	Sheet	of
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Ref.	Calculations	Output
	D. Attenuation Calculation	
	L =	11.5 m
	W =	2.75 m
	D =	1.5 m
	Volume =	47.4
	 Total Attenuation volume =	47.4 m³
	>	47 m ³

Calculation Sheet

Project No.: 80192	Rev.	Date	By
Project Title: Mahon Housing		7/23	BV

Item / Location:	Drawing Ref.:	Sheet	of
------------------	---------------	-------	----

Ref.	Calculations	Output
	E: Treatment Volume Total Area of catchment = 0.25 ha Equivalent Impermeable Site Area : = 0.16 m² Rainfall Depth = = 15 mm Treatment Volume (V_t) = 19.8 m³	
	References: - CIRIA C697 The SUDS Manual, Section 10 Greater Dublin Regional Code of Practice V6.0, Section 16.3 - Institute of Hydrology Report No. 124, Section 7.2, Eqn 7.1. CIRIA C697 The SUDS Manual, Table 4.2 states that the Institute of Hydrology Report No. 124 is to be used to determine QBAR. - MET Eireann Annual Average Rainfall Grid - MET Eireann Online Data - Rainfall Return Period Table - An allowance of 10% has been included for climate change as per Table 6.2 of GDSDS Vol. 2	

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 172542, Northing: 70974,

DURATION	Interval		Years													
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	3.2,	4.2,	4.7,	5.4,	5.8,	6.2,	7.3,	8.5,	9.3,	10.4,	11.3,	12.0,	13.0,	13.8,	14.5,	N/A ,
10 mins	4.4,	5.8,	6.5,	7.5,	8.1,	8.6,	10.2,	11.9,	13.0,	14.4,	15.7,	16.7,	18.2,	19.3,	20.2,	N/A ,
15 mins	5.2,	6.8,	7.6,	8.8,	9.6,	10.1,	12.0,	14.0,	15.3,	17.0,	18.5,	19.6,	21.4,	22.7,	23.8,	N/A ,
30 mins	7.0,	9.0,	10.1,	11.6,	12.6,	13.3,	15.7,	18.2,	19.8,	22.0,	23.9,	25.4,	27.5,	29.2,	30.5,	N/A ,
1 hours	9.3,	12.0,	13.3,	15.2,	16.5,	17.5,	20.5,	23.7,	25.7,	28.5,	30.9,	32.7,	35.5,	37.5,	39.2,	N/A ,
2 hours	12.4,	15.8,	17.6,	20.1,	21.7,	22.9,	26.7,	30.8,	33.4,	37.0,	40.0,	42.3,	45.7,	48.3,	50.4,	N/A ,
3 hours	14.7,	18.7,	20.7,	23.6,	25.4,	26.9,	31.3,	36.0,	39.0,	43.0,	46.5,	49.1,	53.0,	56.0,	58.4,	N/A ,
4 hours	16.5,	21.0,	23.2,	26.4,	28.5,	30.1,	35.0,	40.2,	43.5,	47.9,	51.7,	54.6,	58.9,	62.2,	64.8,	N/A ,
6 hours	19.6,	24.8,	27.4,	31.1,	33.5,	35.3,	40.9,	46.9,	50.7,	55.8,	60.2,	63.5,	68.4,	72.1,	75.1,	N/A ,
9 hours	23.2,	29.2,	32.2,	36.5,	39.3,	41.4,	47.9,	54.8,	59.1,	65.0,	70.0,	73.7,	79.4,	83.6,	87.1,	N/A ,
12 hours	26.1,	32.9,	36.2,	41.0,	44.0,	46.3,	53.5,	61.2,	65.9,	72.4,	77.9,	82.0,	88.2,	92.9,	96.7,	N/A ,
18 hours	31.0,	38.8,	42.7,	48.2,	51.7,	54.4,	62.7,	71.4,	76.9,	84.3,	90.6,	95.4,	102.4,	107.7,	112.1,	N/A ,
24 hours	34.9,	43.6,	47.9,	54.0,	58.0,	60.9,	70.1,	79.7,	85.8,	93.9,	100.9,	106.1,	113.9,	119.7,	124.4,	140.3,
2 days	44.3,	54.4,	59.3,	66.2,	70.6,	73.9,	84.1,	94.7,	101.3,	110.1,	117.5,	123.1,	131.4,	137.5,	142.5,	159.2,
3 days	52.1,	63.2,	68.6,	76.2,	81.0,	84.6,	95.6,	107.0,	114.1,	123.5,	131.4,	137.3,	146.0,	152.5,	157.8,	175.2,
4 days	59.0,	71.1,	76.9,	85.1,	90.2,	94.1,	105.8,	117.9,	125.4,	135.3,	143.6,	149.8,	159.0,	165.8,	171.3,	189.5,
6 days	71.3,	85.0,	91.6,	100.7,	106.5,	110.8,	123.8,	137.1,	145.3,	156.1,	165.2,	171.9,	181.8,	189.1,	195.0,	214.5,
8 days	82.4,	97.5,	104.7,	114.7,	121.0,	125.6,	139.7,	154.1,	162.9,	174.5,	184.2,	191.4,	201.9,	209.7,	216.0,	236.6,
10 days	92.7,	109.1,	116.9,	127.6,	134.3,	139.3,	154.4,	169.7,	179.0,	191.3,	201.6,	209.2,	220.3,	228.5,	235.1,	256.7,
12 days	102.4,	120.0,	128.3,	139.7,	146.9,	152.1,	168.1,	184.3,	194.1,	207.1,	217.8,	225.8,	237.4,	246.0,	252.9,	275.5,
16 days	120.7,	140.4,	149.6,	162.3,	170.2,	176.0,	193.6,	211.3,	222.1,	236.1,	247.8,	256.4,	269.0,	278.3,	285.7,	310.0,
20 days	137.9,	159.5,	169.6,	183.4,	191.9,	198.3,	217.2,	236.3,	247.9,	263.0,	275.5,	284.7,	298.1,	308.0,	315.9,	341.6,
25 days	158.4,	182.1,	193.1,	208.2,	217.5,	224.4,	245.0,	265.6,	278.1,	294.3,	307.7,	317.6,	332.0,	342.5,	350.9,	378.4,

NOTES:

N/A Data not available

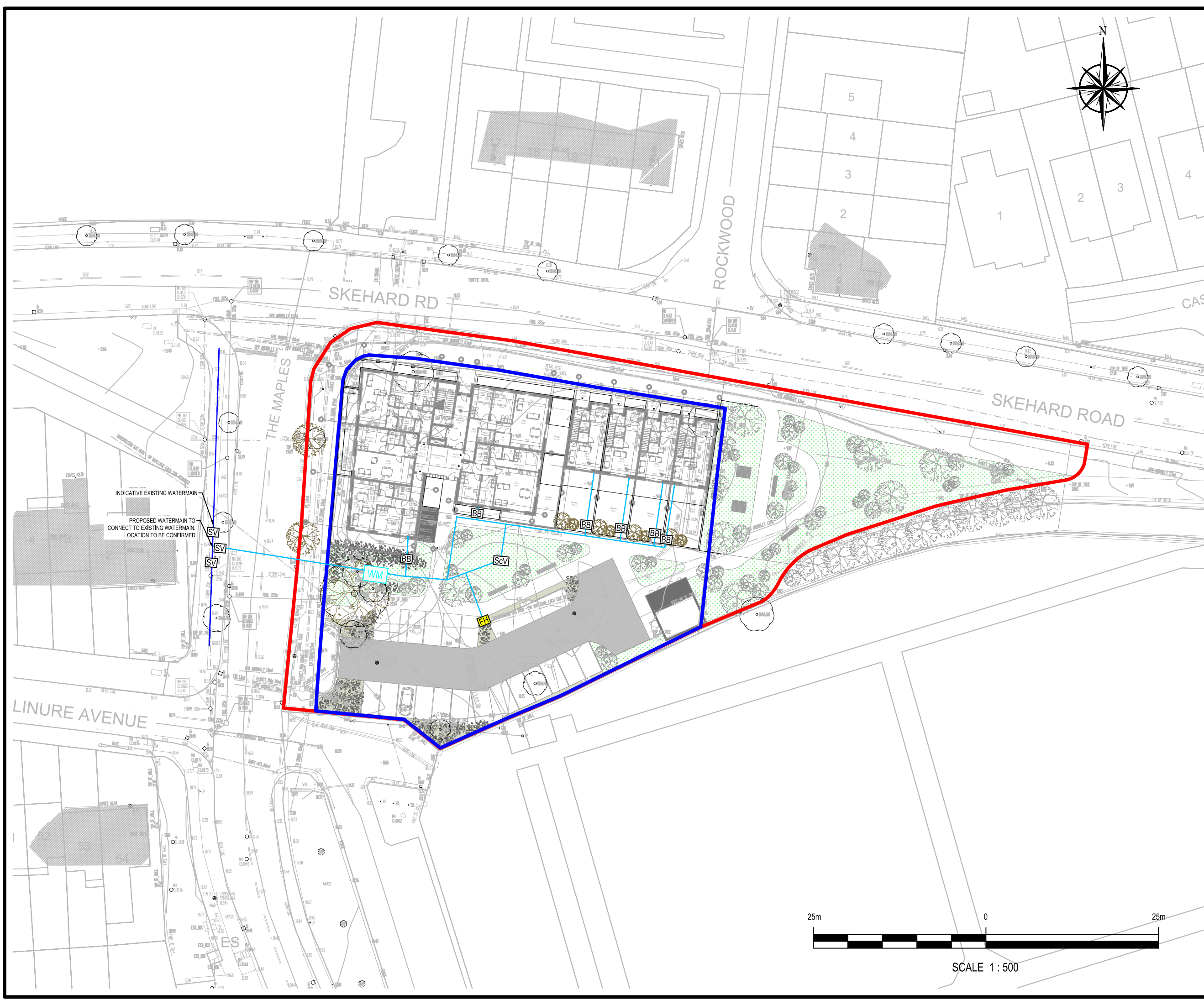
These values are derived from a Depth Duration Frequency (DDF) Model

For details refer to:

'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',

Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

APPENDIX E – LAYOUT DRAWINGS



NOTES

1. ALL MEASUREMENTS AND LEVELS ARE EXPRESSED IN METERS, UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE REFERENCED TO THE MALIN HEAD DATUM.
3. THE COORDINATE SYSTEM IS BASED ON THE IRISH TRANSVERSE MERCATOR
4. REFER TO ARCHITECTURAL LAYOUTS FOR CLIENT OWNERSHIP BOUNDARY AND BUILDING DIMENSIONS.

LEGEND

- SITE BOUNDARY
- OWNERSHIP BOUNDARY
- PROPOSED 100mm Ø WATER RING MAIN
- BB PROPOSED WATER CONNECTION PIPE TO UNITS WITH BOUNDARY BOX
- SG PROPOSED WATERMAIN SLUICE GATE
- FH PROPOSED FIRE HYDRANT
- WM PROPOSED WATER METER

P02	25.04.2025	ISSUED FOR INFORMATION	FW	JM	NS
P01	23.08.2024	ISSUED FOR INFORMATION	FW	NS	NS
REV	DATE	DESCRIPTION	D	C	A

PROJECT No.	STAGE
80192	PLANNING

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PROJECT

CLUID HOUSING MAHON

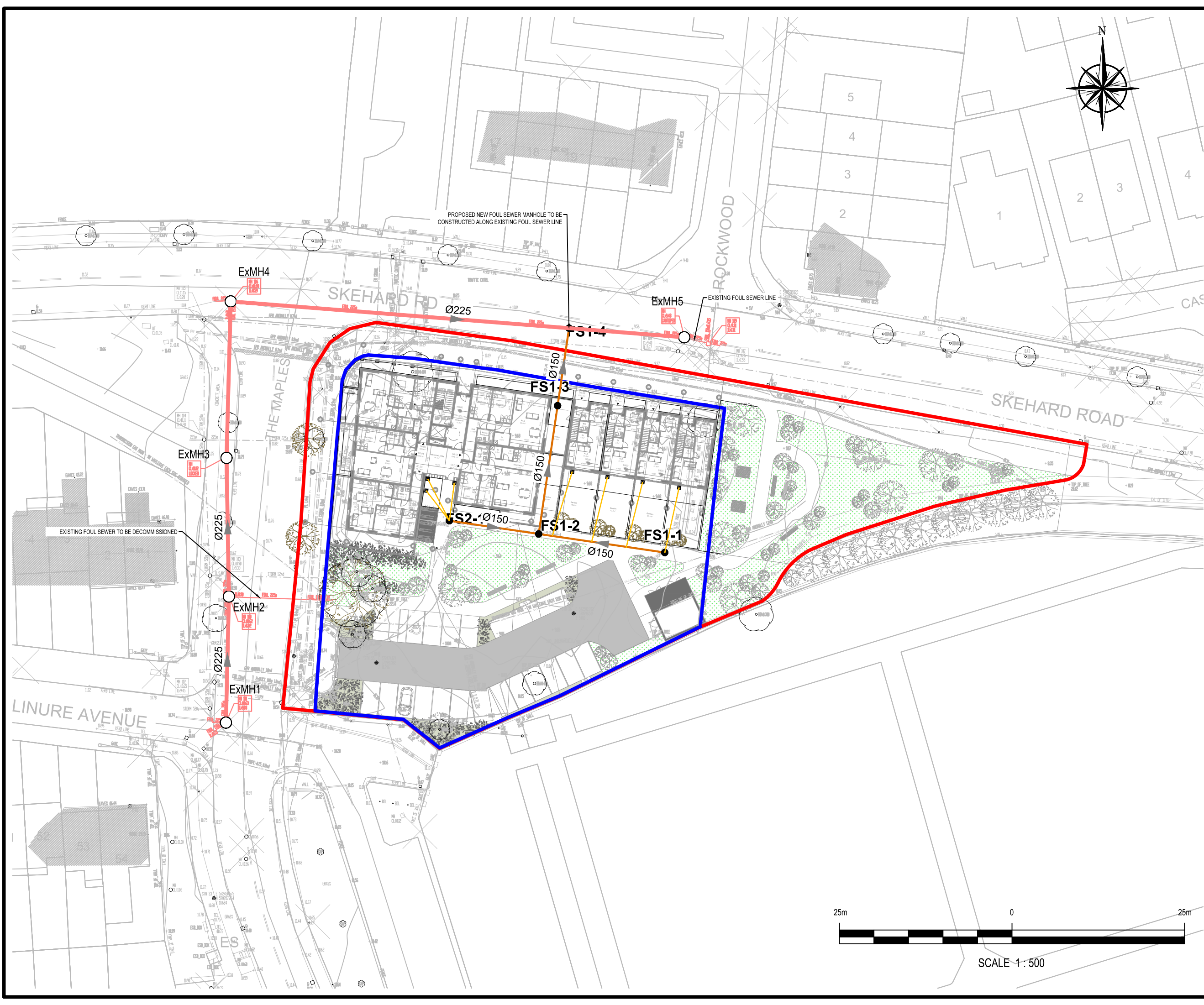
TITLE

WATER SUPPLY LAYOUT PLAN

SCALES @ A3	DRAWN	CHECKED	APPROVED
1:500	F. Wall	J. Muro	N. Skelton
	DATE	DATE	DATE
	23.08.2024	23.08.2024	23.08.2024

SUITABILITY CODE	SUITABILITY DESCRIPTION
S2	INFORMATION

DRAWING No.	REVISION
80192-NOD-01-XX-DR-C-08501	P02



NOTES

1. ALL MEASUREMENTS AND LEVELS ARE EXPRESSED IN METERS, UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE REFERENCED TO THE MAIN HEAD DATUM.
3. THE COORDINATE SYSTEM IS BASED ON THE IRISH TRANSVERSE MERCATOR.
4. REFER TO ARCHITECTURAL LAYOUTS FOR CLIENT OWNERSHIP BOUNDARY AND BUILDING DIMENSIONS.
5. FOUL SEWER MATERIAL TO BE uPVC AND IN ACCORDANCE TO IRISH WASTEWATER CODE OF PRACTICE.
6. COVER TO FOUL SEWER MAIN TO BE MINIMUM 1.2m UNDER ROADS AND 0.9m UNDER GRASSED AREAS AND FOOTPATHS TO BE 150mm CONCRETE.
7. ALL COVERS IN PUBLIC AREAS TO BE D400 COVER AND FRAME UNLESS OTHERWISE NOTED.
8. ALL MATERIALS PROPOSED FOR USE ON SITE TO BE APPROVED PRIOR TO ARRIVAL ON SITE.

LEGEND

- SITE BOUNDARY
- OWNERSHIP BOUNDARY
- PROPOSED FOUL SEWER CONNECTION FROM BUILDING
- PROPOSED 150mm/225mm Ø FOUL WATER CONNECTION
- PROPOSED FOUL SEWER ACCESS JUNCTION
- PROPOSED FOUL SEWER MANHOLE
- EXISTING FOUL SEWER MAIN (SECTION TO BE RE-ROUTED TO AVOID CLASH WITH PROPOSED HOUSING DEVELOPMENT)

P02	25.04.2025	ISSUED FOR INFORMATION	FW	JM	NS
P01	23.08.2024	ISSUED FOR INFORMATION	FW	NS	NS
REV	DATE	DESCRIPTION	D	C	A

PROJECT No.	STAGE
80192	PLANNING

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PROJECT

CLUID HOUSING MAHON

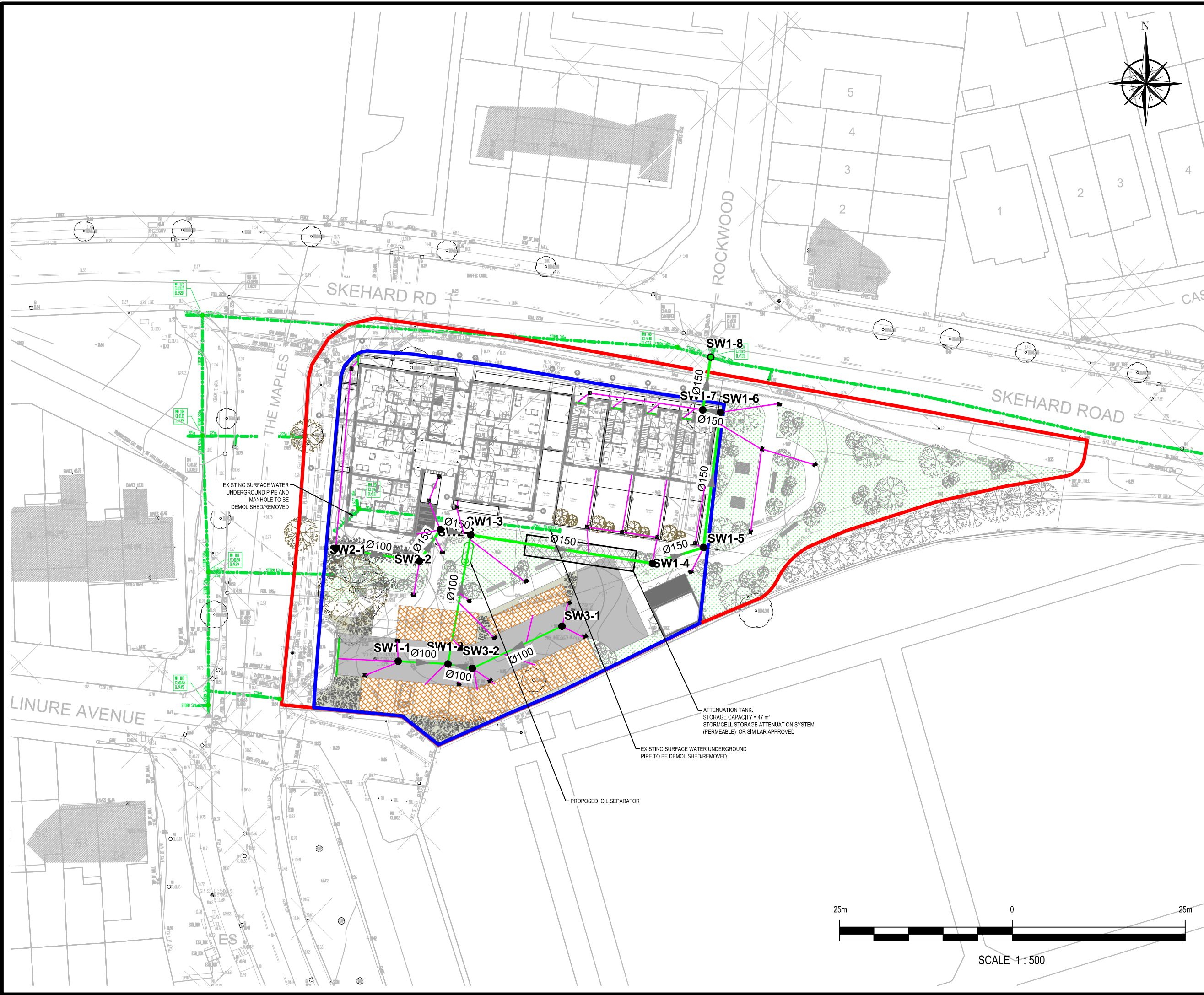
TITLE

FOUL SEWER
LAYOUT PLAN

SCALES @ A3	DRAWN	CHECKED	APPROVED
1:500	F. Wall	J. Muro	N. Skelton
	DATE	DATE	DATE
	23.08.2024	23.08.2024	23.08.2024

SUITABILITY CODE	SUITABILITY DESCRIPTION
S2	INFORMATION

DRAWING No.	REVISION
80192-NOD-01-XX-DR-C-08301	P02



NOTES

1. ALL MEASUREMENTS AND LEVELS ARE EXPRESSED IN METERS, UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE REFERENCED TO THE MALIN HEAD DATUM.
3. THE COORDINATE SYSTEM IS BASED ON THE IRISH TRANSVERSE MERCATOR.
4. REFER TO ARCHITECTURAL LAYOUTS FOR CLIENT OWNERSHIP BOUNDARY AND BUILDING DIMENSIONS.
5. ALL COVERS IN PUBLIC AREAS TO BE D400 COVER AND FRAME UNLESS OTHERWISE NOTED.
6. ALL MATERIALS PROPOSED FOR USE ON SITE TO BE APPROVED PRIOR TO ARRIVAL ON SITE.

LEGEND

- SITE BOUNDARY
- OWNERSHIP BOUNDARY
- PROPOSED 100mm Ø SURFACE WATER PIPE
- PERFORATED 100mm Ø PIPE WITHIN SuDS COMPONENT ONLY
- EXISTING SURFACE WATER DRAINAGE
- PROPOSED 150mm Ø OR LARGER SURFACE WATER PIPE
- PROPOSED CHANNEL DRAIN
- PROPOSED ACCESS JUNCTION
- PROPOSED SURFACE WATER BIG TEE
- PROPOSED SURFACE WATER ROAD GULLY
- PROPOSED SURFACE WATER MANHOLE

PO3	08.05.2025	SURFACE WATER LAYOUT UPDATED	FW	JM	NS
PO2	25.04.2025	ISSUED FOR INFORMATION	FW	JM	NS
PO1	23.08.2024	ISSUED FOR INFORMATION	FW	NS	NS
REV	DATE	DESCRIPTION	D	C	A

PROJECT No.	STAGE
80192	PLANNING

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PROJECT

CLUID HOUSING MAHON

TITLE

SURFACE WATER LAYOUT PLAN

SCALES @ A3	DRAWN	CHECKED	APPROVED
1:500	F. Wall	J. Muro	N. Skelton
DATE	DATE	DATE	DATE
23.08.2024	23.08.2024	23.08.2024	23.08.2024

SUITABILITY CODE	SUITABILITY DESCRIPTION
S2	INFORMATION

DRAWING No.	REVISION
80192-NOD-01-XX-DR-C-08401	P03