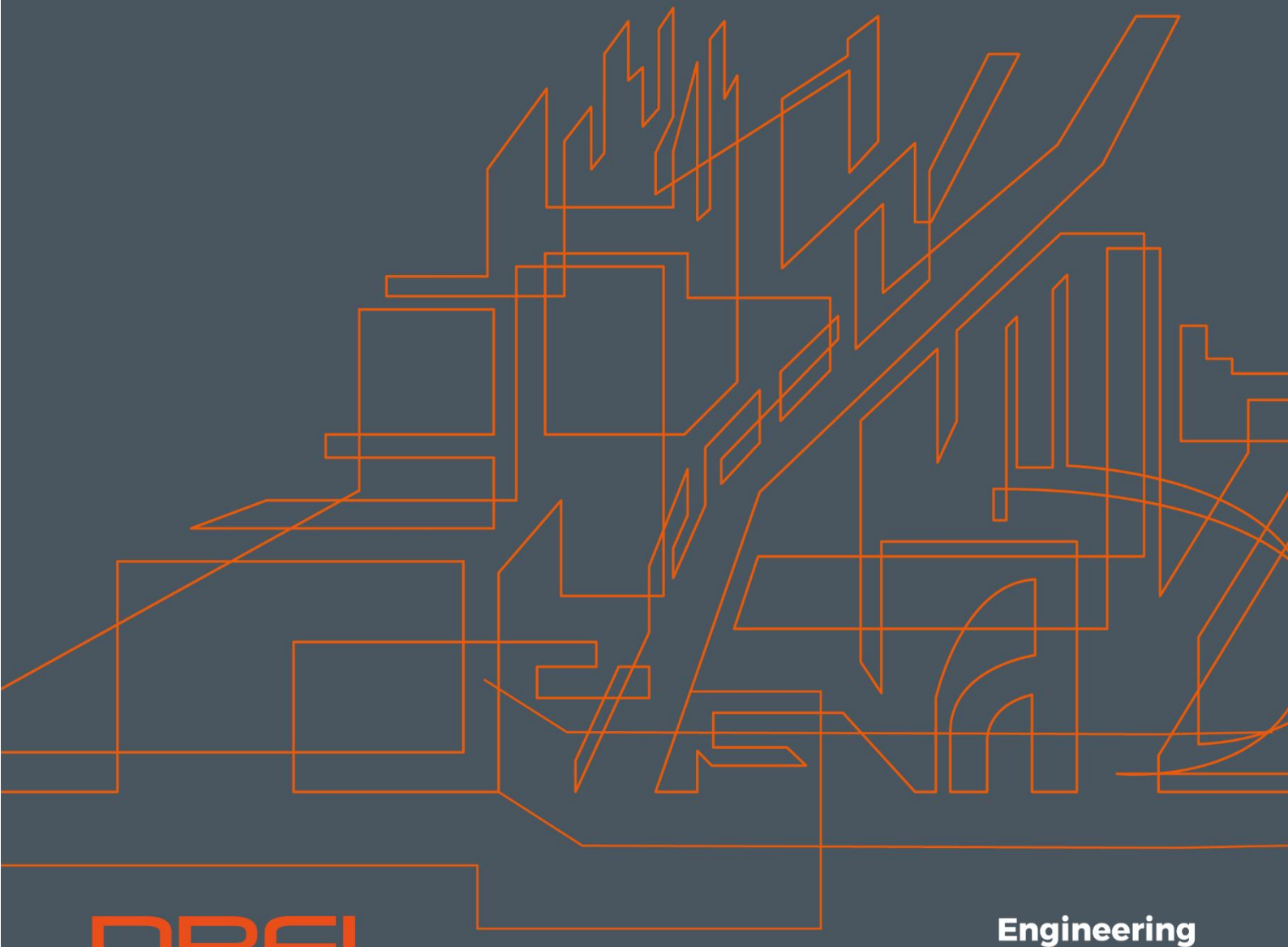
The Former Ford Distribution Site

Infrastructure Design Report

240002-X-X-X-XXX-RP-DBFL-CE-0001

November 2024



DBFL CONSULTING ENGINEERS

Engineering Sustainable Futures

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Status	Rev.	Date	Description	Prepared	Reviewed	Approved
P1	0	June 2024	Draft Issue	LR	GK	NJF
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P3	0	Nov 2024	Issued for Planning	MLC	NJF	NJF

Contents

Figures

Tables

1 INTRODUCTION

1.1 Background

DBFL have been instructed to prepare an Infrastructure Design Report (IDR) to accompany a planning application for the proposed residential development at Centre Park Road in the South Docklands of Cork City. This IDR was prepared to comply with current planning legislation and forms part of proposed planning application for a new large scale residential development (LRD) proposal for pre-planning application stage.

1.2 Location & Topography

The existing brownfield site is approximately 0.84 Ha in size and is located along South Docks area of Cork City, approx. 2km east of the City Centre. The site is bounded by Centre Park Road to the northwest and marsh land to the east. The lands to the southwest are to be developed with residential apartments as per planning reference: ABP-309059-20. The application site, known as the Former Ford Distribution Site, was used in more recent years for hosting music and cultural events, refer Figure 1-1 below for the site location.

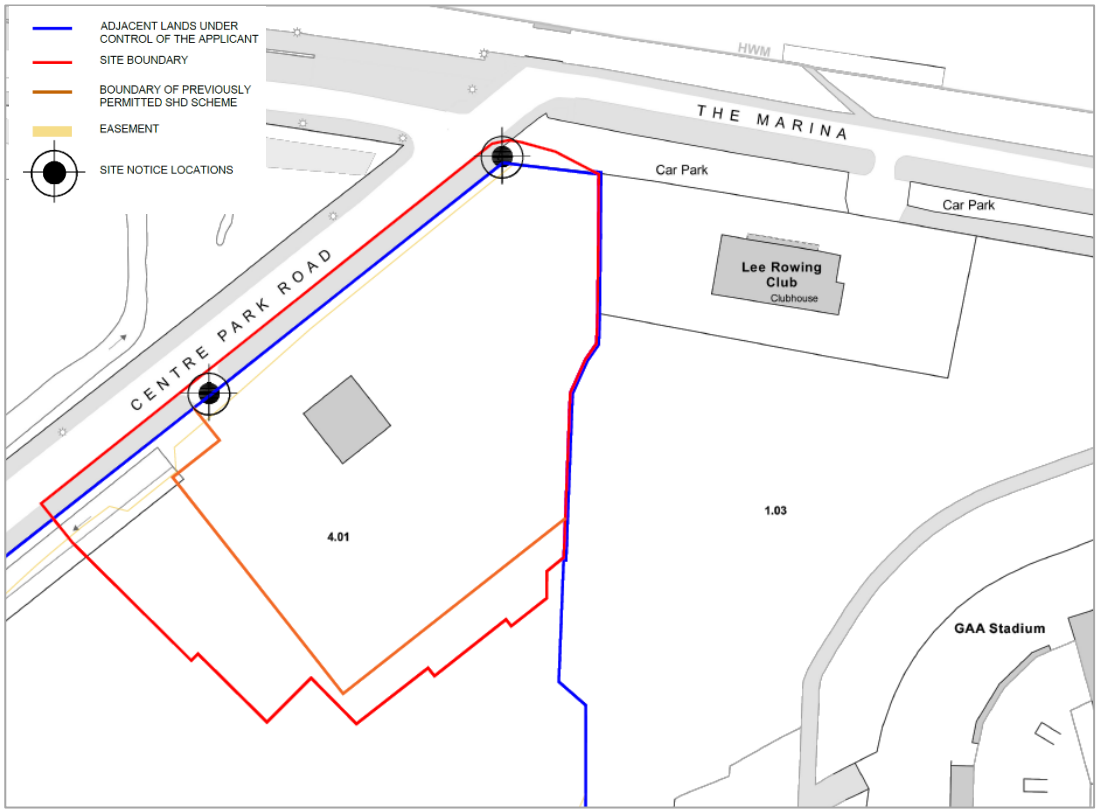


Figure 1-1: Site Location Plan (Source: JFA Architects)

The site slopes from southwest to the northeast with levels ranging from 1.8m to the southwest rising to 3.9m at the northeast. The site boundaries are generally formed by fencing and scrub vegetation. The east of the site is formed by marshlands located south of the Lee Rowing Club. Structures on the site are limited to an entrance canopy and adjoining industrial shed. Centre Park Road is characterised by mature trees on both sides. There is an existing open drainage channel which runs along the northwestern and southeastern boundary of the subject site.

The site lies on the strategic transport corridor intended to facilitate a rapid transit system as identified in the Cork Metropolitan Area Transport Strategy.

1.3 Proposed Development

Permission for the construction of 176 no. 1 and 2 bed apartment units in 2 no. block, 1 no. creche, 1 no. gym, a retail/café space and all associated ancillary development works.

2 SITE ACCESS AND ROAD LAYOUT

2.1 Existing Access

The proposed development site has a single entry-point for vehicles and pedestrians at the north-west of the site in Centre Park Road.

2.2 Proposed Vehicular Access

The proposed development will be served via a shared vehicular, pedestrian and cyclist access off the Centre Park Road, located at the site's western boundary. In response to concerns raised in the Section 32b meeting with Cork City Council on the number of accesses off of Centre Park Road, the proposed access will be via the proposed 'Street C' of the adjacent development (planning reference: ABP-309059-20) to reduce the number of accesses onto Centre Park Road. This two-way access point will form a priority-controlled junction with the Centre Park Road and will serve as the sole vehicular entrance to the proposed residential development.

2.3 Proposed Pedestrian and Cyclist Access

Pedestrians and cyclists can access the subject site via the proposed footpath running along the northwestern boundary of the development, adjacent to Centre Park Road as well as the shared vehicular and pedestrian access via Street C of the adjacent development (planning reference: ABP-309059-20) to. The plan includes pedestrian and cyclist connections to the north and south of the site, which are designed to integrate with upcoming Marina Promenade and adjacent development, respectively. Pedestrian and cyclist permeability through the site is provided throughout.

The scheme proposals for the subject site will ensure pedestrians are given priority within the internal site layout to ensure desire lines within the site are accommodated, providing a good level of service, ensuring the risk of pedestrian conflict with vehicles is minimised and providing attractive convenient connections to external key walking desire lines.

2.4 Proposed Parking

The parking area within the development will consist of 56 no. car parking spaces which equates a ratio of 0.32 per residential unit. The total parking provision on site aligns with Cork City Development Plan (2022-2028) plans for the City Docklands area which aims to *"prioritise walking, cycling and public transport over other modes"*.

The Cork City Development Plan stipulates that an allocation of at least 1 bicycle parking space per residential unit (in City Centre /Inner Urban Areas locations) be provided. This equates to a minimum of 210 bicycle parking spaces for the proposed development.

A total of 427 bicycle parking spaces will be provided as part of the development. It is assumed that the cycle parking spaces will be sufficient to cater for the cycle parking demand associated with the residential elements of the scheme. All residential cycle parking spaces will be provided below street level.

3 FLOOD RISK

Refer to DBFL Site Specific Flood Risk Assessment report 240002-X-X-X-XXX-RP-DBFL-CE-0002.

4 EXISTING SERVICES AND UTILITIES

4.1 General

A comprehensive topographical survey was carried out for the subject site, existing drainage, and utility records in the vicinity of the site were obtained from Cork City Council and Irish Water and all utilities within the site were surveyed in detail. A summary of the existing services is provided below, and the Irish Water records can be found in Appendix A.

4.2 Surface Water Drainage

Within the site, there is currently no surface water network. Externally, Centre Park Road is drained via road gulleys into the existing open channel network which drains the South Docklands area, ultimately discharging to the Atlantic Pond and then into the River Lee.

4.3 Foul Sewer Drainage

A review of the Uisce Eireann records show that there is no existing foul network adjacent to the site boundary. The nearest connection point would be a foul sewer running along Marquee Road to the southwest as per Figure 4-1.

4.4 Water Supply

The site is well served by the adjacent watermain network. Uisce Eireann records show the presence of both a 400mm and a 100mm ductile iron watermain located along Centre Park Road and the Marina. Additionally, two 200mm connections from the adjacent development are proposed to serve the site. It is proposed to serve the site via a connection to the 200mm watermain connection from the adjacent development.

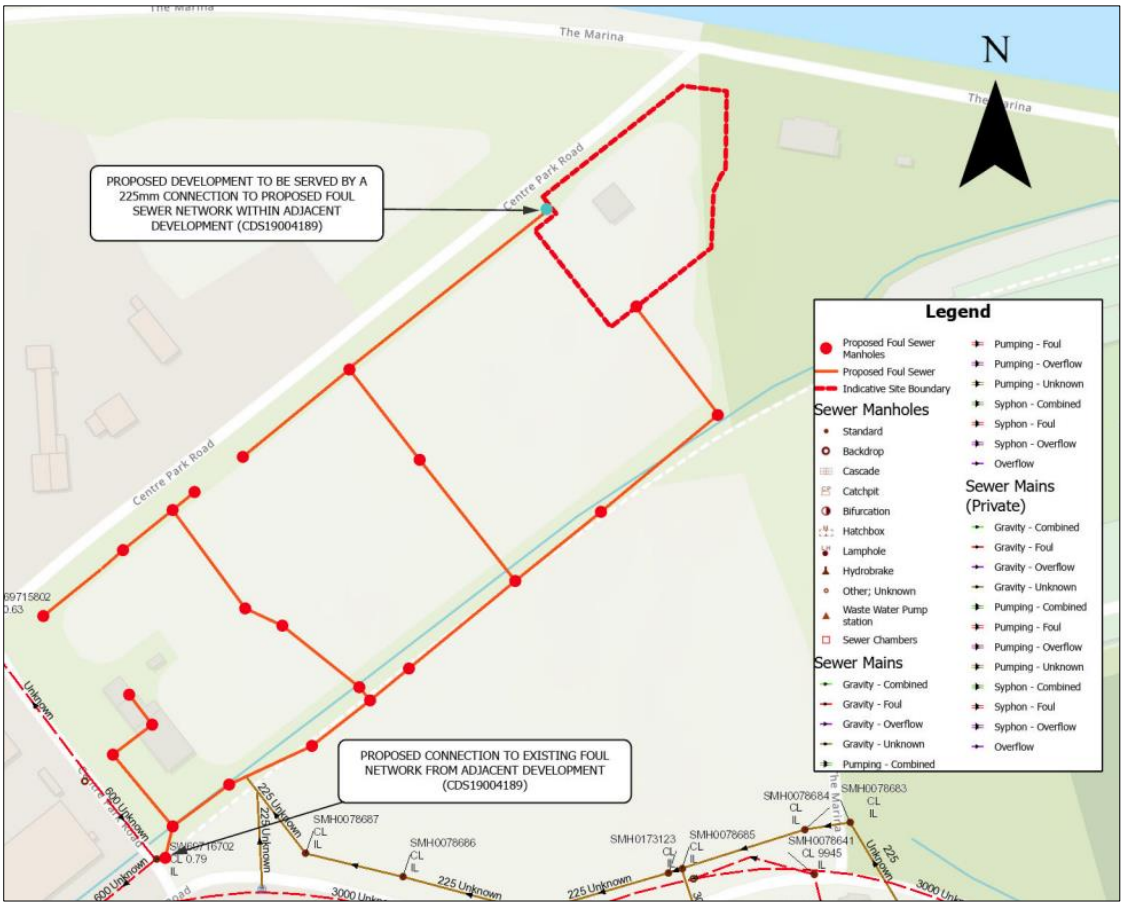


Figure 4-1: Existing foul network records

5 PROPOSED SURFACE WATER DRAINAGE

5.1 Surface Water Policy

The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Cork City Development Plan Objectives 2022-2028. The guidelines require the following 4 main criteria to be provided by the design:

- Criterion 1: Sustainable Urban Drainage Systems (SUDS) – for any new residential development it is required to incorporate SUDS by providing interception storage and treatment within the green roof, bio-retention/filter drains and green courtyard and garden.
- Criterion 2: Discharging – to require that onsite petrol/interceptors and silt traps shall be installed to all significant road projects where surface water otherwise discharges to watercourse, to prevent hydrocarbon pollution of the water.
- Criterion 3: Storm Water– satisfied by the development's surface water drainage design, planned flood routing, run-off contained within site and that flood management ensures that measures are implemented to protect property and infrastructure.
- Criterion 4: Water quality– to support Irish water in its implementation of water quality for ground, surface, coastal and estuarine. To support mitigation and protection measures for all protected areas and associated source protection plan in line with the Water framework Directives.

5.2 Surface Water Strategy

To meet the requirements of the surface water policy above, the surface water strategy has been described in this section to give a clearer indication of how the design of the development has progressed to the submitted design. The surface water strategy for the proposed development area will incorporate SuDS features to reduce run-off and provide biodiversity benefits. Storm water from the contributing catchment will be attenuated and discharged into the adjacent development (planning reference: ABP-309059-20) which has accounted for the inclusion of runoff from the subject site. Discharge rates from the adjacent development accounting for the overall surface water strategy are in accordance with the South Docklands Drainage Strategy with storm-water storage facilities and SuDS elements incorporated to reduce run-off volumes and rates where possible.

The surface water network will be attenuated at one attenuation location using 'Stormtech' type systems to provide the attenuation storage volume required for a 100-year plus 20% climate change storm event. All surface water discharges will be controlled using a vortex flow control (Hydrobrake or equivalent).

The surface water strategy is aligned to the requirements of the Cork City Council South Docklands Levels Strategy. As there are no open channels to discharge to within the vicinity of the site boundary, it is proposed that the surface water generated on site will be discharged to the proposed surface water network within the adjacent development site (Ref. ABP-309059).

The adjacent scheme (Ref. ABP-309059) is under the same land owner/developer as the subject site and that this planning application is part of the wider site in regard to infrastructure. Therefore, design and coordinate between the two proposed surface water networks is possible. The SHD surface water drainage strategy has been designed to accommodate the surface water discharge generated by the proposed development. Discharge from the subject site into the adjacent SHD drainage network will be restricted to 5l/s via a flow control (see section 5.4 for details).

5.3 Sustainable Urban Drainage Systems (SUDS)

In accordance with the Cork City Development Plan 2022-2028 it is proposed to provide SUDS for managing surface water from the facility. The aim of the SUDS strategy for the site will be to:

- Attenuate surface water runoff;
- Reduce surface runoff;
- Reduce pollution impact; and
- Replicate the natural characteristics of rainfall runoff for the site.

An assessment of the potential SUDS that could be incorporated within the site was conducted using the SUDS Manual, CIRIA 753. The SUDS elements which were found applicable to the proposed scheme design and layout include the following:

1. Extensive green roofs, rain gardens, green podiums and permeable podium paving have been included in the scheme to provide interception, treatment and where possible, evapotranspiration. The interception and treatment benefits of rain garden systems are a major benefit within the treatment train and a vital part of the surface water management of the site. The location of rain gardens have been selected in more level areas of the site to ensure these are as effective as possible.

2. Attenuation storage will be an online filtration type (Stormtech or similar approved) system with an isolator row to encourage infiltration and treatment of run-off.
3. A planted roof area with low growing, low maintenance plants consisting of self-sustaining mosses, sedums, succulents, herbs or grasses over a drainage layer and waterproofing membrane will be provided. Extensive green roofs provide ecological, aesthetic and amenity benefits and intercept, treat and retain rainfall, reducing the volume of runoff and attenuation of peak flows. The extensive roof will only be accessed for maintenance.

Although the buildup within the SuDS elements will provide a level of storage there is no flow control provided on the SuDS elements and as such the storage volumes cannot be accurately determined especially in larger rainfall events. The SuDS elements are designed to temporarily store the everyday rainfall event but in larger rainfall events the runoff will overflow back into the main drainage network and be stored in proposed attenuation tank which has been designed for the 100 year storm event plus climate change as well as the tidal locked event. Therefore, the incorporation of the above SUDS elements will provide a sustainable way to slow down and disperse surface water from the site and provide treatment of run-off and subsequent improvement of discharge quality.

5.4 Attenuation

Attenuation volumes have been calculated based on a discharge rate of 5l/s which has been aligned with the adjacent development's surface water network (Ref. ABP-309059), where it is proposed to discharge the development runoff. During discussions with CCC at preplanning stage, concern was raised about the rate of discharge into the adjacent development's drainage network and whether tidal locking had been considered during the design of the site wide drainage network. The drainage design of the adjacent development (Ref. ABP-309059) has accounted for the area of the subject site when sizing their attenuation tanks. Consequently the drainage network and attenuation tanks of the adjacent development can cater for uncontrolled runoff from the subject site. However, to ensure the site has enough storage to be self-sufficient in an extreme rainfall event, it is proposed to store runoff on site and release it into the adjacent development at a rate of 5l/s, thus providing a betterment from what has been designed for. Further, the design of the adjacent developments surface water network (Ref. ABP-309059) accounts for a tidal locked event and adequate storage is provided within the SHD for a tidal lock scenario.

The impermeable areas contributing to the attenuation volume have had the following reduction factors applied:

- Impermeable roofs, roads, foot paths and shared surfaces; a 5% reduction of the surface area is applied to take account of run-off not collected and stored within the micro and macro texture of the surfacing. (Various sources recommend different reduction coefficients e.g. IS EN752 recommends Runoff Coefficient (C for the Rational Method) of 0.9 to 1.0 for impermeable areas and steeply sloping roofs. For flat roofs it recommends 0.5 to 1.0 depending on area.
- Roads and footpath areas draining to Bio-Swales, Filter Drains, Tree pits and Bio-Retention Areas; a reduction factor of 30% has been used for these areas. Firstly, rainfall will 'wet' the initial surface of the paving, allowing water to be stored in the micro and macrotexture of the surfacing and will be lost to evapotranspiration, giving a reduction in volume. As run-off drains to these SUDS elements and through the build-up, the aggregate/soil surface area will also 'wet' giving another reduction of volume due to evapotranspiration and natural storage within the SUDS feature. There will also be a reduction of velocity as the aggregate/filter material used in the SUDS feature slows the run-off at source, changing the input hydrograph which will ultimately reduce the peak inflow for attenuation calculations.
- Green areas; a conservative reduction factor of 70% has been applied. The deep soil build-up will primarily absorb a substantial amount of the initial run-off and once saturated will reduce the flow of run-off through the green medium.

Table 5-1: Summary of surface water runoff reduction factors

Description	Area (m^2)	Reduction Factor
Green roof	1527	25%
Hardstand Roof	655	5%
Roads and paths draining to suds	2245	30%
Soft landscaping	996	70%
Green/Permeable podium	1308	25%

The Stormtech systems were selected and designed to provide the required attenuation volume for the 100-year storm event using Microdrainage software (refer to Appendix B for summary of results). Calculations indicate that approximately 206m^3 of storage volume for the 100-year event +20% climate change is needed. Due to the high water table present on the subject site, the proposed stormtech system will be lined to ensure no ground water can enter the proposed attenuation storage thus ensuring no reduction in storage volume.

5.5 Design Standards

The following design parameters are applicable to the design:

- Time of entry: 8 minutes
- Pipe Friction (Ks): 0.6 mm
- Minimum Velocity: 1.0 m/s
- Standard Average Annual Rainfall: 1045mm
- M5-60: 18.8mm
- Ratio r (M5-60/M5-2D): 0.26
- Attenuation Tank Storm Return Event: 30 year no flooding on site.100 year check no internal property flooding. Flood routing plan. FFL freeboard above 100-year flood level. No flooding to adjacent areas.
- Climate Change 20% for rainfall intensities.

Surface water sewers have been designed in accordance with IS EN 752 and the recommendations of the Cork City Development Plan.

The minimum pipe diameter for public surface water sewers is 225mm. Private drains comprise of diameters from 100mm.

5.6 Climate Change

Surface water calculations for the development made use of rainfall values for the South Docklands area as provided by Met Eireann. Rainfall intensities were increased by a factor of 20% to take account of climate change, in accordance with the Cork City Council Development Plan 2022-2028.

5.7 Flooding Provision

During an exceedance storm event, i.e. in excess of the 1% AEP event, remaining additional storage volume within the surface water network will fill within the freeboard flood levels before wider flooding of the development. After the remaining freeboard storage is exceeded, overland flow paths are designed to direct runoff either to landscape features and onto the public Centre Park Road. No flow paths direct runoff to third party lands.

5.8 Surface Water Quality Impact

The majority of the proposed development does not present a high risk of run-off contamination as most of the site coverage will be green roof area, green area (podiums, open spaces and gardens) and pedestrian walkways.

The development will drain into a subsurface stormwater network and into the online Stormtech Attenuation System which will provide removal of pollutants due to the geotextiles and filter stone.

5.9 Interception

The GDSDS requires that no run-off should directly pass to the receiving watercourse for rainfall depths of 5mm up to 10mm, therefore interception should be provided at source where practicable. The volume of interception required is based on 5mm of rainfall depth from 80% of the runoff from impermeable areas as defined in the GDSDS (Appendix Section E2.1.1).

Each of the SuDS features provided will allow a volume of infiltration/evapotranspiration to cater for interception storage. This storage will be additional to the attenuation storage required and will allow long-term interception of run-off corresponding to the 5mm rainfall depth mentioned above.

The development's drainage design allows for collection of most of the site's run-off via SUDS features e.g. green roofs, green/permeable podium and bioretention providing interception at source.

A total of **26.9m^3** interception volume is required for the proposed development. The proposed SUDS features provide a total of **547.28m^3** interception volume with all hardstanding area being intercepted by at least one SUDS feature, thus providing adequate interception for the proposed development. All SUDS interception calculations are provided in Appendix D.

5.10 Treatment Volume

The GDSDS requires that a "treatment volume" (Vt) be provided in order to prevent any pollutants or sediments discharging into river systems, additionally a 'treatment train' surface water runoff management system is required. According to CIRIA document C753 the following treatment train approach is necessary:

- Roofs – 1 Treatment Stage
- Road Areas – 2 Treatment Stages
- Paved Areas excluding Roads - 1 Treatment Stage

Treatment is being provided by the various SuDS features included in the site, specifically the green roof, green/permeable podiums and rain garden. Finally all discharge will pass through a bypass separator before being discharged into the surface water network. All run-off areas will pass through the required number of treatment stages prior to discharging to the downstream outfall.

A total of **80.8m³** treatment volume is required for the proposed development. The proposed SUDS features provide a total of **213.51m³** treatment volume with all hardstanding area being intercepted by at least one SUDS feature, thus providing adequate treatment for the proposed development. All SUDS treatment calculations are provided in Appendix D.

5.11 SuDS and Drainage Network Maintenance

The SuDS features proposed above for the site will require the following maintenance:

Permeable Paving: Regular brushing and removal of leaves, removal of weeds as necessary. Stabilise and mow contributing and adjacent landscaped areas regularly. Repair any depressions, rutting, cracked or broken blocks considered detrimental to the structural performance or a hazard to users.

Bypass Separator: Systems should be inspected every 6 months (or in line with the manufacturer's instructions) to verify the appropriate level of maintenance. Floating debris and solids should be removed and the sump cleaned with a conventional sump vacuum cleaner. Filter media should be replaced and sediments, oils and grease should be removed where required.

Green Roofs: Green roofs should be maintained as per the details of the proprietary product brochure or manual. This varies from product to product but generally involves the application of fertilisers in the spring months, removal of flowers at the end of summer and the application of slow-release fertilisers in autumn.

Catchpit Manhole: Catchpit manholes collect silt and debris from upstream SuDS features and gullies in the surface water system. Due to large volumes of silt and debris building up in catchpit manhole sumps, it is essential for them to be cleaned regularly. Inadequate maintenance of the catchpit manholes can lead to reduced performance of storage and treatment systems and can cause blockages leading to flooding of the surface water system. It is recommended that suction equipment is used by skilled personnel when cleaning to ensure effective and safe removal of silt and debris from catchpit manholes.

Bioretention Areas: Bioretention areas should be regularly maintained to ensure optimum operation. Planting should be trimmed as necessary, and the surface regularly cleared of organic matter. Underdrains should be inspected regularly and cleared if necessary.

'Stormtech' attenuation: The Stormtech attenuation system should be maintained as per the details of the proprietary product brochure or manual. This generally involves clearing with jet vac equipment to remove sediment build-up within the system.

6 PROPOSED FOUL DRAINAGE

6.1 Proposed Foul Layout

The proposed developments wastewater will be discharged to the Uisce Eireann 225 mm diameter foul sewer on Marquee Road via the proposed foul water network within the adjacent Fords SHD development.

All matters relating to wastewater will be agreed with Uisce Eireann. A confirmation of feasibility was received from Irish Water confirming feasibility without need for any upgrade works.

6.2 Design Calculations

All new main foul sewers are designed to discharge by gravity. Minimum gradients and pipe diameters for gravity collector and main sewers are designed in accordance with the Building Regulations and Irish Water's Code of Practice for wastewater infrastructure and Standard Details for wastewater infrastructure.

The sewer network is designed in accordance with the principles and methods set out in Irish Water's Code of Practice for Wastewater Infrastructure, IS EN 752 (2008), IS EN12056: Part 2 and Building Regulations Part H.

Foul sewer design criteria are as follows:

Pipe Roughness Coefficient	1.5 mm
Minimum Velocity	0.75 m/s (self-cleansing)
Maximum Velocity	3.0 m/s

Estimated peak foul loading generated by the proposed development is provided in Table 6-1.

Table 6-1: Estimated Foul Loading for Development

RESIDENTIAL - PREDICTED DEVELOPMENT FOUL FLOWS						
Use Type	**No.**	**Loading (G) (l/p/day)**	**Occupancy Rate (p/unit)**	**Occupancy (p/unit)**	**Daily Loading (l/day)**	**Daily Loading (l/s)**
Residential	176	150	2.7	489	71280	0.83
NON-RESIDENTIAL - PREDICTED DEVELOPMENT FOUL FLOWS						
Use Type	**Area (m^2)**	**Loading (G) (l/p/day)**	**Occupancy Rate (m^2/p)**	**Occupancy (p/m^2)**	**Daily Loading (l/day)**	**Daily Loading (l/s)**
Retail/Café/ Amenity	531	90	20	27	2390	0.03
Creche	181	50	10	18	905	0.03
					Daily Loading	**0.86**
					Growth factor	1.00
					Infiltration @ 20% (as CoP Appendix B - 2.2.4)	0.10
					Dry Weather Flow (l/s)	**0.96**
					Residential Peak Factor (as CoP App B 2.2.5)	6.0
					Design Foul Flow (l/s)	**5.78**
Flow rates extracted from IW CoP for Wastewater Infrastructure - Appendix B & C						

Overall design flows from the development are calculated using IW CoP for Wastewater Infrastructure Appendix C, as outlined below.

Dry Weather Flow = PG + I + E

Design Foul Flow = $[Pf_{Dom} \times PG] + [Pf_{Dom, Ind} \times P_E G_E] + I + [Pf_{Trade} \times E]$ (Eqn1)

Design Flow = Eqn 1 + $[SW + SW_E]$

The type of proposed use is mixed-use comprising residential and commercial; therefore, no industrial flow has been assumed.

For commercial premises a working day is assumed to be over 12 hours when flows will be contributing to the public sewer network.

Growth rates are not assumed as the proposed application is for a fixed quantum of development (G = 1).

Total Dry Weather Flow = **0.96 l/s**

Total Foul Flow = **5.78l/s**

7 WATER SUPPLY AND DISTRIBUTION

7.1 Proposed Watermain and Supply

It is proposed to supply the site via a 150mm connection to a spur provided as part of the adjacent development ABP-309059-20. Irish Water have previously confirmed the feasibility of a connection to the 400mm diameter ductile iron watermain along Centre Park to the south-east of the site, however upgrade works will be required to make the connection. Although the proposed connection is no longer proposed to be directly to the existing 400mm watermain and to the watermain from the adjacent development, the feed to the new watermain in the adjacent development will still be to the 400mm watermain. An amendment to the pre-connection enquiry will be submitted to Uisce Eireann.

7.2 Watermain Standards and Details

The water main layout and details including valves, hydrants, metering etc. will be in accordance with Irish Water's Code of Practice and Standard Details for water infrastructure.

7.3 Hydrants

Hydrants shall comply with the requirements of BS 750:2012 and shall be installed in accordance with Irish Water's Code of Practice and Standard Details.

7.4 Design Calculations

The water demand is designed in accordance with the principles and methods set out in Irish Water's Code of Practice for Water Infrastructure Connections and Developer Services Design & Construction Requirements for Self-Lay Developments December 2017:

Overall water demand is calculated using IW CoP for Water Infrastructure section 3.7.2, as outlined below:

Per-capita consumption	150l/person/day
Average day/week demand factor	1.25
Peak demand factor	5

Average daily domestic demand = Total occupancy * Per-capita consumption

Average day/peak week demand = Average daily domestic demand * Average day/week demand factor

Peak hour water demand = Average day/peak week demand * Peak demand factor

Estimated water demand for the proposed development is provided in Table 7-1.

Table 7-1: Estimated Water Demand for Development

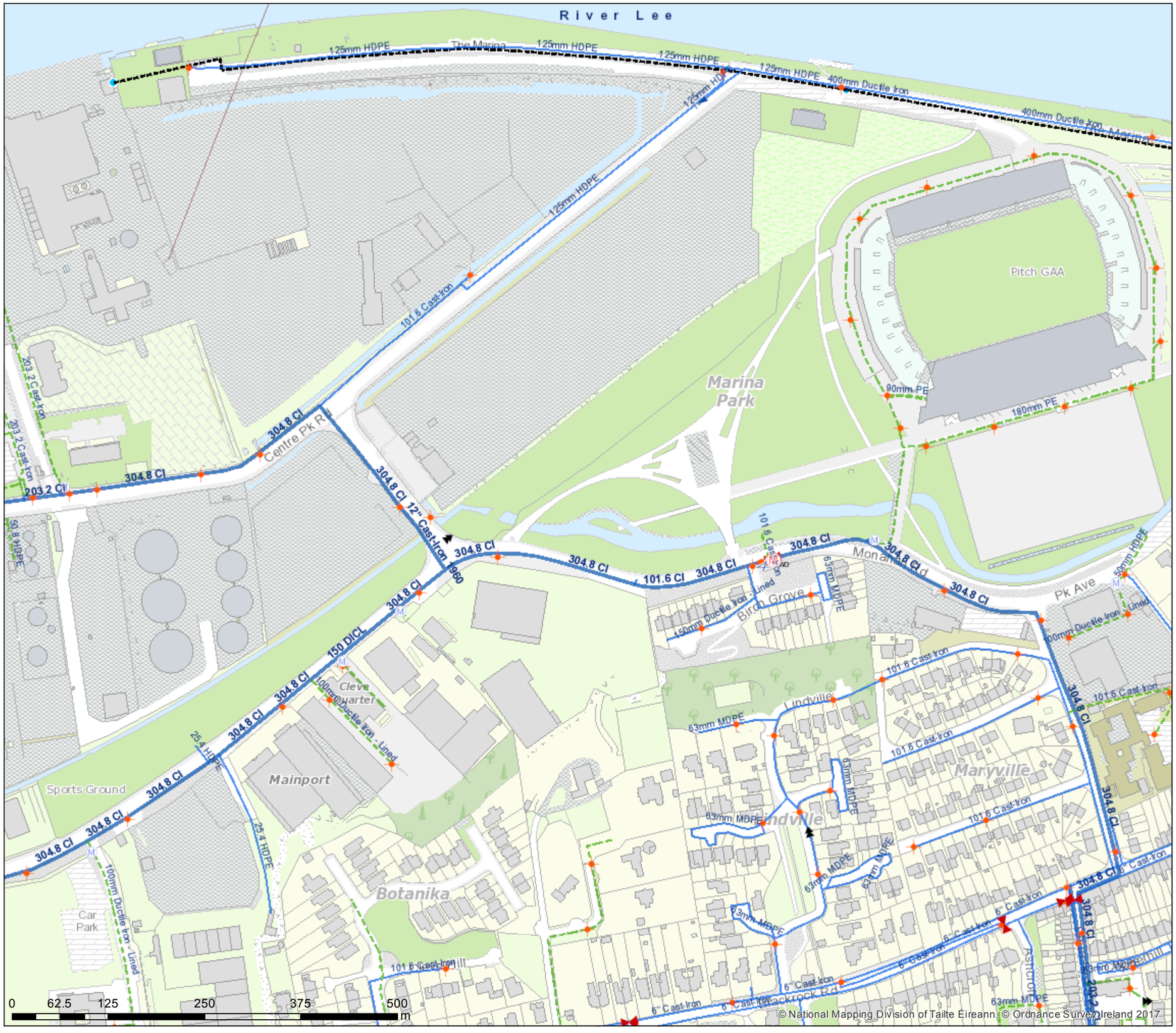
PREDICTED DEVELOPMENT WATER DEMAND						
RESIDENTIAL - WATER DEMAND						
Unit Type	**No.**	**Occupancy Rate (person/unit)**	**Occupancy**	**Per Capita Consumption (l/person/day)**	**Average daily domestic demand (l/day)**	**Average daily domestic demand (l/s)**
Residential	176	150	2.7	489	71280	0.83
NON-RESIDENTIAL - WATER DEMAND						
Unit Type	**Area (m^2)**	**Occupancy Rate (m^2/p)**	**Occupancy**	**Per Capita Consumption (l/person/day)**	**Average daily domestic demand (l/day)**	**Average daily domestic demand (l/s)**
Retail/Café/Amenity	531	90	20	27	2390	0.03
Creche	181	50	10	18	905	0.03
					Total Average Daily Demand l/s	**0.86**
					Average Day/Week Domestic Demand	1.25
					Average Day/Peak Week Demand l/s	**1.08**
					Peak Demand Factor	5.0
					Peak Hour Water Demand l/s	**5.39**
***Flow rates calculated using IW CoP for Water Infrastructure**						

8 Engagement with Cork City Council

As part of the preplanning requirements a Section 32B preplanning submission was presented to Cork City Council to address any major concerns and/or requirements prior to the submission of the final LRD planning application. Cork City Council provided an opinion on the civil engineering items presented to them at the Section 32B stage. The CCC opinions have been incorporated into the design changes and the report information presented with this planning application. Further, a response to each relevant civil engineering opinion item has been provided and summarised in Appendix E.

Appendix A : Irish Water Records

Centre Park Rd Water Network



UISCE ÉIREANN : IRISH WATER

Print Date: 14/09/2023

Printed by:CCC

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 Casings

Sewer Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Discharge Type
- Outfall
- Overflow
- Soakaway
- Standard Outlet
- 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
- Lamphole
- Hydrobrake
- Other; Unknown
- Storm Culverts
- 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 MVLV Lines
- MV Overhead Three Phase
- MV Overhead Single Phase
- LV Overhead Three Phase
- LV Overhead Single Phase
- MVLV 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

Appendix B : Attenuation Calculations

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 368 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.907	0.507	0.0	5.0	5.0	77.1	O K
30 min Summer	1.052	0.652	0.0	5.0	5.0	105.1	O K
60 min Summer	1.189	0.789	0.0	5.0	5.0	132.5	O K
120 min Summer	1.310	0.910	0.0	5.0	5.0	157.2	O K
180 min Summer	1.362	0.962	0.0	5.0	5.0	168.2	O K
240 min Summer	1.387	0.987	0.0	5.0	5.0	173.4	O K
360 min Summer	1.398	0.998	0.0	5.0	5.0	175.7	O K
480 min Summer	1.396	0.996	0.0	5.0	5.0	175.3	O K
600 min Summer	1.390	0.990	0.0	5.0	5.0	174.1	O K
720 min Summer	1.383	0.983	0.0	5.0	5.0	172.5	O K
960 min Summer	1.364	0.964	0.0	5.0	5.0	168.6	O K
1440 min Summer	1.315	0.915	0.0	5.0	5.0	158.3	O K
2160 min Summer	1.221	0.821	0.0	5.0	5.0	139.0	O K
2880 min Summer	1.099	0.699	0.0	5.0	5.0	114.4	O K
4320 min Summer	0.876	0.476	0.0	5.0	5.0	71.3	O K
5760 min Summer	0.723	0.323	0.0	5.0	5.0	42.9	O K
7200 min Summer	0.624	0.224	0.0	4.9	4.9	25.2	O K
8640 min Summer	0.551	0.151	0.0	4.7	4.7	15.2	O K
10080 min Summer	0.497	0.097	0.0	4.5	4.5	9.8	O K
15 min Winter	0.959	0.559	0.0	5.0	5.0	87.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	95.597	0.0	82.7	22
30 min Summer	66.116	0.0	114.5	36
60 min Summer	43.030	0.0	149.1	66
120 min Summer	27.287	0.0	189.1	124
180 min Summer	20.753	0.0	215.5	182
240 min Summer	17.049	0.0	236.3	242
360 min Summer	12.893	0.0	268.1	332
480 min Summer	10.563	0.0	292.6	392
600 min Summer	9.045	0.0	313.5	458
720 min Summer	7.967	0.0	331.2	524
960 min Summer	6.521	0.0	361.3	664
1440 min Summer	4.913	0.0	408.4	942
2160 min Summer	3.694	0.0	460.8	1364
2880 min Summer	3.015	0.0	501.3	1760
4320 min Summer	2.261	0.0	564.1	2464
5760 min Summer	1.843	0.0	613.0	3120
7200 min Summer	1.573	0.0	654.0	3816
8640 min Summer	1.382	0.0	689.5	4488
10080 min Summer	1.239	0.0	721.1	5144
15 min Winter	95.597	0.0	92.6	22

Summary of Results for 100 year Return Period (+20%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	1.123	0.723	0.0	5.0	5.0	119.2	O K
60 min Winter	1.278	0.878	0.0	5.0	5.0	150.6	O K
120 min Winter	1.418	1.018	0.0	5.0	5.0	180.1	O K
180 min Winter	1.516	1.116	0.0	5.0	5.0	194.3	O K
240 min Winter	1.594	1.194	0.0	5.0	5.0	201.6	O K
360 min Winter	1.644	1.244	0.0	5.0	5.0	206.3	O K
480 min Winter	1.630	1.230	0.0	5.0	5.0	205.0	O K
600 min Winter	1.611	1.211	0.0	5.0	5.0	203.2	O K
720 min Winter	1.585	1.185	0.0	5.0	5.0	200.7	O K
960 min Winter	1.514	1.114	0.0	5.0	5.0	194.1	O K
1440 min Winter	1.401	1.001	0.0	5.0	5.0	176.3	O K
2160 min Winter	1.246	0.846	0.0	5.0	5.0	144.0	O K
2880 min Winter	1.032	0.632	0.0	5.0	5.0	101.3	O K
4320 min Winter	0.719	0.319	0.0	5.0	5.0	42.2	O K
5760 min Winter	0.556	0.156	0.0	4.8	4.8	15.7	O K
7200 min Winter	0.466	0.066	0.0	4.2	4.2	6.7	O K
8640 min Winter	0.439	0.039	0.0	3.8	3.8	4.0	O K
10080 min Winter	0.427	0.027	0.0	3.4	3.4	2.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	66.116	0.0	128.2	36
60 min Winter	43.030	0.0	166.9	64
120 min Winter	27.287	0.0	211.9	122
180 min Winter	20.753	0.0	241.5	180
240 min Winter	17.049	0.0	264.6	236
360 min Winter	12.893	0.0	300.3	344
480 min Winter	10.563	0.0	327.9	440
600 min Winter	9.045	0.0	350.9	476
720 min Winter	7.967	0.0	371.1	554
960 min Winter	6.521	0.0	404.9	714
1440 min Winter	4.913	0.0	457.5	1026
2160 min Winter	3.694	0.0	516.2	1476
2880 min Winter	3.015	0.0	561.5	1852
4320 min Winter	2.261	0.0	631.8	2508
5760 min Winter	1.843	0.0	686.6	3064
7200 min Winter	1.573	0.0	732.4	3744
8640 min Winter	1.382	0.0	772.2	4400
10080 min Winter	1.239	0.0	807.7	5072

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	18.400	Shortest Storm (mins)	15
Ratio R	0.262	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+20

Time Area Diagram

Total Area (ha) 0.462

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.212	4	8	0.250

Model Details

Storage is Online Cover Level (m) 2.000

Cellular Storage Structure

Invert Level (m) 0.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.60
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	168.0	0.0	1.061	156.0	0.0
0.190	168.0	0.0	1.250	156.0	0.0
0.191	294.0	0.0	1.251	0.0	0.0
1.060	358.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0101-5000-1324-5000
Design Head (m)	1.324
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	101
Invert Level (m)	0.326
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.324	5.0
Flush-Flo™	0.396	5.0
Kick-Flo®	0.818	4.0
Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.8	3.000	7.3	7.000	10.9
0.200	4.6	1.400	5.1	3.500	7.9	7.500	11.3
0.300	4.9	1.600	5.5	4.000	8.4	8.000	11.7
0.400	5.0	1.800	5.8	4.500	8.9	8.500	12.0
0.500	4.9	2.000	6.1	5.000	9.3	9.000	12.3
0.600	4.8	2.200	6.3	5.500	9.8	9.500	12.7
0.800	4.1	2.400	6.6	6.000	10.2		
1.000	4.4	2.600	6.8	6.500	10.6		

Appendix C : Irish Water Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

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

Gabriel Karpavicius

14 South Mall
Cork
Co. Cork
T12 CT91

24 April 2024

Our Ref: CDS24001285 Pre-Connection Enquiry
Centre Park Road, Cork, Co. Cork

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 Housing Development of 230 unit(s) at Centre Park Road, Cork, Co. Cork **(the Development)**.

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

- **Water Connection** - Feasible Subject to Upgrade:

  In order to accommodate the proposed connection, approximately 150m of 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.

  This area forms part of the Cork Docklands Capital Investment Project, where proposals have been made to provide the infrastructure necessary to service this Development and the surrounding lands. It should be noted however that timeframes to deliver the water infrastructure in this area are not currently available, hence network upgrades stated above would be necessary to facilitate a connection in advance of the completion of these works.

- **Wastewater Connection** - Feasible without infrastructure upgrade by Uisce Éireann

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/

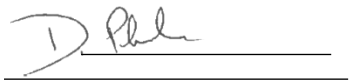
Where can you find more information?

- **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?

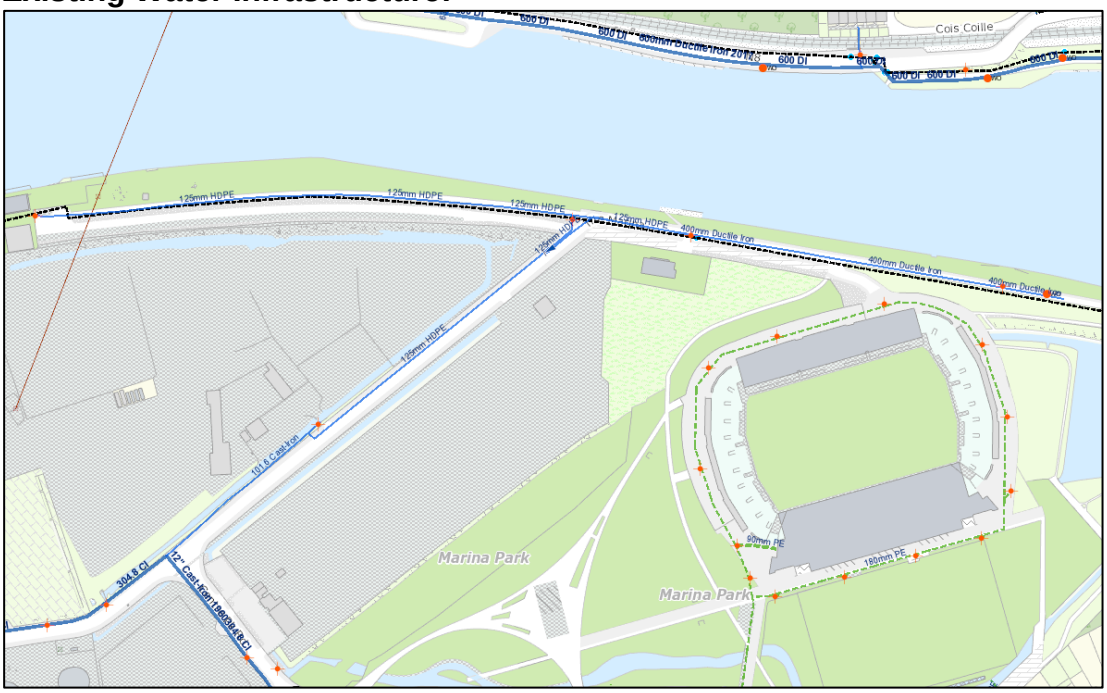
What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. *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
Fire flow Requirements	• 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	• 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)?	• 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)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• 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/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

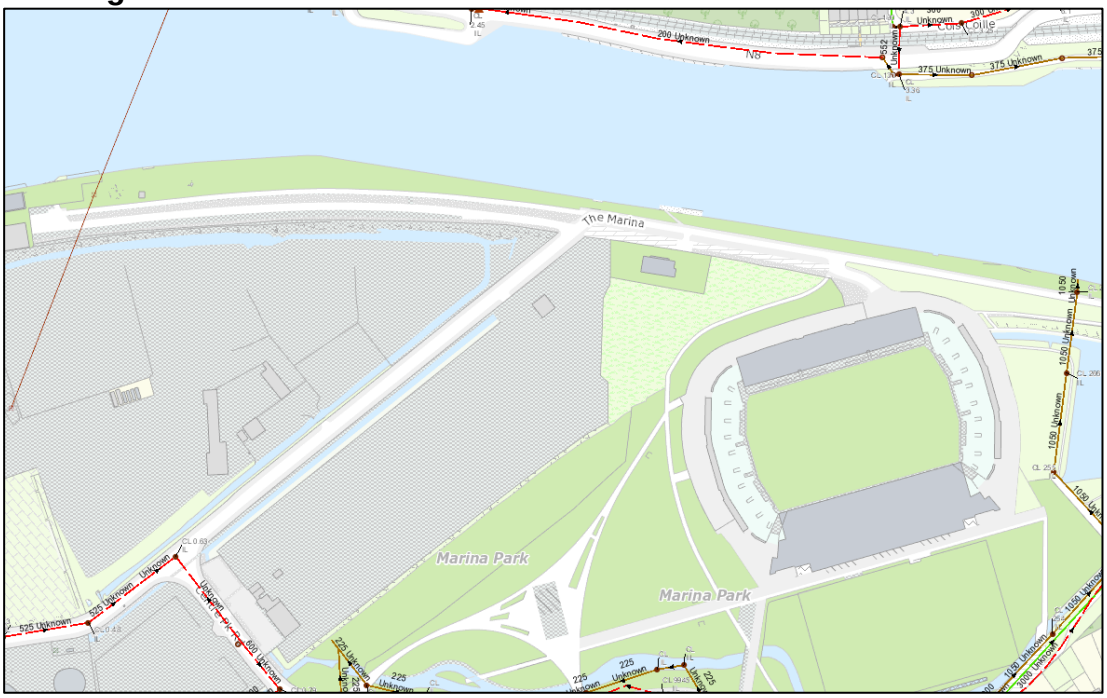
Section B – Details of Uisce Éireann's Network(s)

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:



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.

Appendix D : SUDS Treatment and Interception Volume Calculations

TITLE		**Job Reference**	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
GREEN ROOF DESIGN		1	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-91-Z00-DTM-DR-DBFL-CE-1310	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

				Total Applicable	
Green Roof Area (A)	1527.0	m^2		Roof Area	2182	m^2
[1]Filter Layer Depth (d)	0.200	m				
[1]Filter Layer Voids Ratio (η)	30.0	%		% Green Roof Area	70	%

TREATMENT VOLUME

[2]Treatment Volume (V_T)	91.6	m^3	Provided Treatment Volume

EVAPOTRANSPIRATION / INTERCEPTION VOLUME

[3]Evapotranspiration Rate per Day	3.00	mm/day	
Evapotranspiration Volume	4.6	m^3	Provided Interception Volume

Notes:

1 Filter Bed depth typically between 0.15 and 0.35m. This consists of the substrate and drainage layer.

2 Treatment Volume Vt (m^3) = Green Roof Area (m^2) x d x η

3 Assumed 2mm evaporation and 3mm transpiration.

TITLE		Job Reference	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
GREEN/PERMEABLE PODIUM DESIGN		2	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-91-Z00-DTM-DR-DBFL-CE-1310	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Green Podium Area (A)	1308.2	m^2
[1]Filter Layer Depth (d)	0.200	m
[1]Filter Layer Voids Ratio (η)	30.0	%

TREATMENT VOLUME

[2]Treatment Volume (V_T)	78.5	m^3	Provided Treatment Volume

EVAPOTRANSPIRATION / INTERCEPTION VOLUME

[3]Evapotranspiration Rate per Day	3.00	mm/day	
Evapotranspiration Volume	3.9	m^3	Provided Interception Volume

Notes:

1 Filter Bed depth typically between 0.15 and 0.35m. This consists of the substrate and drainage layer.

2 Treatment Volume Vt (m^3) = Green Roof Area (m^2) x d x η

3 Assumed 2mm evaporation and 3mm transpiration.

TITLE	Job Reference		
Fords LRD	240002		
SUBJECT	**Calc. Sheet No.**		
Rain Garden Area No.1	3		
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	795.5	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**5.31**	m^2
Provided Surface Area	**108.50**	m^2

TREATMENT VOLUME

[3]Treatment Volume (V_T)	9.5	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]Subgrade Infiltration Volume	68.435	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.326	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	2.170	m^3	
Total Infiltration/Interception Volume	70.930	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

$$\text{Area of Bioretention/Raingarden Filter Bed} = \frac{V_T \cdot L}{k(h+L)t}$$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE	Job Reference		
Fords LRD	240002		
SUBJECT	**Calc. Sheet No.**		
Rain Garden Area No.2	4		
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	741.5	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**4.95**	m^2
Provided Surface Area	**160.50**	m^2

TREATMENT VOLUME

[3]**Treatment Volume (V_T)**	8.9	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]**Subgrade Infiltration Volume**	89.397	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.482	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	3.210	m^3	
Total Infiltration/Interception Volume	93.089	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE		Job Reference	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
Rain Garden Area No.3		5	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	196.8	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**1.31**	m^2
Provided Surface Area	**59.80**	m^2

TREATMENT VOLUME

[3]**Treatment Volume (V_T)**	2.4	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]**Subgrade Infiltration Volume**	46.324	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.179	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	1.196	m^3	
Total Infiltration/Interception Volume	47.699	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE		Job Reference	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
Rain Garden Area No.4		6	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	125.5	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**0.84**	m^2
Provided Surface Area	**40.50**	m^2

TREATMENT VOLUME

[3]Treatment Volume (V_T)	1.5	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]Subgrade Infiltration Volume	36.240	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.122	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	0.810	m^3	
Total Infiltration/Interception Volume	37.172	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed =

$$\frac{V_T \cdot L}{k(h+L)t}$$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE		Job Reference	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
Rain Garden Area No.5		7	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	228.4	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**1.53**	m^2
Provided Surface Area	**61.20**	m^2

TREATMENT VOLUME

[3]Treatment Volume (V_T)	2.7	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]Subgrade Infiltration Volume	47.015	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.184	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	1.224	m^3	
Total Infiltration/Interception Volume	48.422	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE	Job Reference		
Fords LRD	240002		
SUBJECT	**Calc. Sheet No.**		
Rain Garden Area No.6	8		
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	239.8	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**1.60**	m^2
Provided Surface Area	**56.00**	m^2

TREATMENT VOLUME

[3]**Treatment Volume (V_T)**	2.9	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]**Subgrade Infiltration Volume**	44.424	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.168	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	1.120	m^3	
Total Infiltration/Interception Volume	45.712	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE		Job Reference	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
Rain Garden Area No.7		9	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	216.0	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**1.44**	m^2
Provided Surface Area	**47.50**	m^2

TREATMENT VOLUME

[3]**Treatment Volume (V_T)**	2.6	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]**Subgrade Infiltration Volume**	40.034	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.143	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	0.950	m^3	
Total Infiltration/Interception Volume	41.126	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE		Job Reference	
Fords LRD		240002	
SUBJECT		**Calc. Sheet No.**	
Rain Garden Area No.8		10	
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	158.4	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**1.06**	m^2
Provided Surface Area	**48.00**	m^2

TREATMENT VOLUME

[3]**Treatment Volume (V_T)**	1.9	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]**Subgrade Infiltration Volume**	40.298	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.144	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	0.960	m^3	
Total Infiltration/Interception Volume	41.402	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE	Job Reference		
Fords LRD	240002		
SUBJECT	**Calc. Sheet No.**		
Rain Garden Area No.9	11		
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	508.3	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**3.39**	m^2
Provided Surface Area	**110.00**	m^2

TREATMENT VOLUME

[3]Treatment Volume (V_T)	6.1	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]Subgrade Infiltration Volume	69.069	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.330	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	2.200	m^3	
Total Infiltration/Interception Volume	71.599	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed =

$$\frac{V_T \cdot L}{k(h+L)t}$$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE	Job Reference		
Fords LRD	240002		
SUBJECT	**Calc. Sheet No.**		
Rain Garden Area No.10	12		
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
240002-X-05-Z00-XXX-DR-DBFL-CE-1301	WM	NJF	01/11/2024

DBFL CONSULTING ENGINEERS

INPUT DATA

Effective Impermeable Area for Treatment (A)	406.4	m^2
Filter Bed Depth (L)	0.500	m
Coefficient of Permeability of Filter Medium (k)	0.000010	m/s
[2]Average Height of Water above Filter Bed (h)	0.020	m
Time Required for Percolation (t)	48.0	hr

AREA

Surface Area (A_f)	**2.71**	m^2
Provided Surface Area	**48.40**	m^2

TREATMENT VOLUME

[3]**Treatment Volume (V_T)**	4.9	m^3	Provided Treatment Volume

INFILTRATION / INTERCEPTION VOLUME

Subgrade Infiltration Rate per hour	36.000	mm/hr	Table 25.1 SuDS manual and SI
[5]Subgrade Infiltration Rate (f)	0.01000	mm/s	
[4]**Subgrade Infiltration Volume**	40.509	m^3	
Transpiration Rate per day	3.000	mm/day	
Transpiration	0.145	m^3	
Additional Storage Depth Below Outlet Invert	0.050	m	
Revoir Storage	0.968	m^3	
Total Infiltration/Interception Volume	41.622	m^3	Provided Interception Volume

Notes:

2 h = Half maximum height, where hmax <=2m

3 Treatment Volume Vt (m^3) = Impermeable Area (ha) x 15mm x 10 x 80% (GDSDS Section 6.3.1.2.1).

4 Volume calculated using 6 hour storm event.

5 Source ' The SuDS Manual Table 25.1'.

Area of Bioretention/Raingarden Filter Bed = $\frac{V_T \cdot L}{k(h+L)t}$

Table: 1

Material	Infiltration Rate (m/s)
Source: SUDS Manual Section 25-1	
Silty Loam	0.000002
Sand	0.000000028 - 0.000028
Loamy sand	0.0000000028 - 0.00000028
Sandy loam	0.000000014 - 0.00000014
Loam	0.00000000028 - 0.000000028
Silty Loam	0.00000000014 - 0.0000000014

TITLE	Job Reference		
Fords LRD	240002		
SUBJECT	**Calc. Sheet No.**		
Interception/Treatment Volume Summary	13		
DRAWING NUMBER	**Calculations by**	**Checked by**	**Date**
-	WM	NJF	01/11/2024

INPUT DATA

Treatment

Treatment Volume Required	80.8	m^3

Treatment Mechanism	**Treatment Volumes**	
Green Roof	91.6	m^3
Green Podium	78.5	m^3
Bioretention / Rain Gardens	43.4	m^3
Total Volumes Provided	213.51	m^3
Check Provided Volumes are greater than Required Volumes	PASS	

Interception

Interception Volume Required	26.9	m^3

Interception Mechanism	**Interception Volumes**	
Green Roof	4.6	m^3
Green Podium	3.9	
Bioretention / Rain Gardens	538.8	m^3
Total Volumes Provided	547.28	m^3
Check Provided Volumes are greater than Required Volumes	PASS	

Appendix E : Uisce Éireann Statement of Design Compliance

Appendix F : Response to 32B Opinion

DBFL CONSULTING ENGINEERS

Engineering Sustainable Futures

November 2024

RE: CCC Reference LRD 002-24 – Former Ford Distribution Site

Further to the above project, reference LRD 002-24, and response to Section 32B Opinion from the council, please find below our responses to the engineering items specifically. Our responses are numbered to correspond with the original Cork City Council numbering system in the Opinion.

6. Consideration of the proposals to address the following Strategic Transport related requirements (as set out in the Strategic Transport Planning Report attached in Appendix C):

a) The inclusion of a direct pedestrian access from Street C to Block A is welcome, however, the applicant is requested to further consider the issue of permeability and connectivity, particularly with regard to improvement of the public realm design interface to ensure a direct hard standing access is provided and the route is not blocked by street furniture.

Response: Permeability within the site, to Centre Park Road and to the adjacent SHD have been considered and prioritized by creating a large shared surface linking the proposed development with Street C of the adjacent development and the Centre Park Road. All direct pedestrian links onto the proposed cycle and pedestrian tracks are designed to ensure clear access without blockage from landscaping or street furniture.

c) To avoid the provision of a further street entrance along Centre Park Road the applicant is requested to further consider relocating the proposed vehicular entrance serving the undercroft car park to Street C with the proposed disabled parking bay removed completely (all parking should be provided within the undercroft car park). The removal of this entrance and associated roadspace will provide an opportunity to create an enhanced public space within the development lands and remove potential conflicts along Centre Park Road.

Response: The vehicular entrance has been amended to enter via street C of the adjoining SHD, thus removing the additional entrance off Centre Park Road, refer to DBFL drawing X-04-Z00-XXX-DR-DBFL-CE-1201 Roads Layout.

9. Consideration of the proposals to address the following Urban Roads & Street Design related requirements (as set out in the Urban Roads & Street Design Report attached in Appendix C):

b) The applicant is requested to submit confirmation of intervisibility of drivers egressing the car parking and a driver carrying out maneuvers to any parking bays/set-downs adjacent to the vehicular access/egress.

Registered Office
Ormond House
Upper Ormond Quay
Dublin 7, Ireland
D07 W704

+ 353 1 400 4000
www.dbfl.ie

Cork Office
14 South Mall
Cork, Ireland
T12 CT91

+ 353 21 202 4538

Galway Office
Odeon House
7 Eyre Square
Galway, Ireland
H91 YNC8

+353 91 335599

Waterford Office
Suite 8b The Atrium
Maritana Gate, Canada St
Waterford, Ireland
X91 W028

+ 353 51 309 500

DBFL Consulting Engineers Limited
trading as DBFL Consulting Engineers

VAT. No. IE6355828Q
Company No. 335828

Response: The vehicles egressing the car parking can see further than half way up the external disabled parking bay when approaching the exit to the undercroft parking area ensuring there is sufficient intervisibility between the anyone exiting the parking area and a driving carrying out a maneuver in the disabled bay.

10. Consideration of the proposals to address the following Traffic Regulation & Safety related requirements (as set out in the Traffic Regulation & Safety Report attached in Appendix C):

a) The applicant is to clarify if permitted developments in the area (adjoining Ford site, Gouldings site etc) are taken into account in the traffic assessment as this is not outlined in the TTA.

Response: The permitted development in the vicinity of the subject site has been considered and included in the Traffic and Transportation Assessment report (240002-X-90-X-XXX-RP-DBFL-CE-0001). Section 5.3.1 of the TTA outlines a total of four separate 'Committed' development schemes near the subject site, ensuring that the impacts of these developments have been comprehensively accounted in the Traffic Assessment.

b) The applicant is requested to ensure that an assessment of the impact of construction traffic on the local network should be carried out taking into account the timelines for other permitted developments in the area that may have similar construction phase timings.

Response: The potential impact of construction traffic of proposed development on the local network has been assessed and demonstrated in Section 6.4 of the Traffic and Transportation Assessment report (TTA). The construction traffic associated with the permitted developments in the vicinity has also been accounted as part of the construction impact assessment.

c) The interaction of the permitted Street C entrance on the adjoining development and the proposed undercroft parking vehicular entrance in terms of how vehicles, pedestrians and cyclists interact is not shown. There is a concern in relation to introducing additional conflict points here from a road safety point of view. The preference would be for the side by side entrances to be combined to reduced confusion for road users and reduce conflict points. The applicant is requested that further consideration should be given to same.

Response: The vehicular entrance has been amended to enter via street C of the adjoining SHD, thus removing the additional entrance off Centre Park Road, refer to DBFL drawing X-04-Z00-XXX-DR-DBFL-CE-1201 Roads Layout.

d) The applicant is requested to further consider improving the access to the Block A cycle storage area, with particular consideration given to ensuring direct access from the Street C elevation is also provided.

Response: Cycle access to the proposed development has been amended to be via street C of the adjoining SHD development, thus providing access to the Block A cycle storage area.

e) A mobility management plan should be submitted as part of the planning application documentation.

Response: Please refer to DBFL report 240002-X-90-X-XXX-RP-DBFL-CE-0002 Mobility Management Plan.

f) An outline CTMP should be submitted as part of the planning application documentation.

Response: An outlined CTMP has been included in the CEMP included in this submission. Refer to reports 240002-X-X-X-XXX-RP-DBFL-CE-0003 Construction and Environmental Management Plan.

11. Consideration of the proposals to address the following Drainage related requirements (as set out in the Drainage Report attached in Appendix C):

a) A copy of the Statement of Design Acceptance from Uisce Eireann (following submittal of full and final designs to Uisce Éireann) and full design details and drawings to be included with the planning application.

Response: A SODA has been included in Appendix E of DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0001 Infrastructure Design Report.

b) The applicant is requested to provide further consideration of, and possible amendment to, the documents and/or design proposals in respect of the proposed surface water management arrangements of the development, with particular focus on the following:

- *The Site Services Layout drawing shows the proposed storm water drainage system discharging to the adjacent site. This connection point is labelled as "Existing surface water manhole to be provided as part of the adjacent Fords Development". It is understood that this manhole has not been constructed and is not existing. The applicant is requested to consider how this manhole is to be constructed as it currently lies within the red line boundary of this application and not the adjacent SHD site. The applicant is requested to clarify the red line boundaries between the sites (evidence of agreement with the adjacent site for the proposed storm water connection would be required).*
  Response: Due to the change in vehicle access to be via Street C, the red line boundary has extended to overlap with the SHD extents. A letter of agreement from the site owner of the adjacent SHD has been granted to agree to the connection of the surface water drainage to the drainage network within the adjacent SHD development.

- *As shown on the Site Services Layout drawing, it is proposed to discharge 5l/s to the drainage system of the adjacent site. No details or calculations for this discharge rate are included in the Infrastructure Design Report. The impact of discharging at 5l/s to the drainage system of the adjacent site has not been addressed or assessed in the Infrastructure Design Report. The applicant is requested to provide full details of same and to revise and update the report.*
  Response: Please refer to Section 5.4 of DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0001 Infrastructure Design Report for response.

- *No details or calculations have been provided for any SuDS or NBS feature other than the attenuation tank. Further consideration should be given to provide full designs and calculations for the drainage network, including each of the SuDS features, detailing their infiltration, storage or attenuation contribution to limiting site run-off (i.e. green roof / rain garden / bio retention area / permeable paving).*

  Response: Although the buildup within the SuDS elements will provide a level of storage there is no flow control provided on the SuDS elements and as such the storage volumes cannot be accurately determined especially in larger rainfall events. The SuDS elements are designed to temporarily store the everyday rainfall event but in larger rainfall events the runoff will overflow back into the main drainage network and be stored in proposed attenuation tank which has been designed for the 100 year storm event plus climate change as well as the tidal locked event. Therefore, the incorporation of the above SUDS elements will provide a sustainable way to slow down and disperse surface water from the site and provide treatment of run-off and subsequent improvement of discharge quality. Treatment volume and interception volume calculations have been provided for the proposed SuDS features, however, no storage is accounted for in the calculations. Please refer to Section 5.9 and 5.10 and Appendix D of DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0001 Infrastructure Design Report for further information.

- *The applicant is requested to clarify if, and how, the proposed storm water drainage system takes account of tide locking during storm events.*

  Response: It is proposed to discharge the subject site's surface water network into the adjacent development (Ref. ABP-309059). The surface water strategy of the adjacent development has both been designed to cater for the runoff area of the subject site and to account for a tidal lock event. Please refer to Section 5.4 of DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0001 Infrastructure Design Report for further information.

- *It is noted that the proposed attenuation tank is a geo-cellular system (i.e. StormTech). The applicant is requested to clarify that the proposed system is suitable for use in areas of groundwater and the storage capacity of the tank will not be reduced due to groundwater.*

Response: The proposed tank type was selected to provide another level of filtration but will be lined to protect against ingress of groundwater and potential contamination via infiltration. Please refer to Section 5.4 of DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0001 Infrastructure Design Report for further information.

- *The applicant is requested to clarify if it is intended for the development to be taken in charge, and, if so, details of the proposed areas to be taken in charge should be submitted. Please note that where a development is to be taken in charge, all attenuation tanks shall be concrete and permeable paving is not permitted.*

  Response: It is not proposed to have the proposed development taken in charge.

c) The applicant is requested to provide further consideration of, and possible amendment to, the documents and/or design proposals in respect of the proposed flood risk management arrangements of the development, with particular focus on the following:

- *As per Section 11.266 of the City Development Plan, applications for vulnerable development in flood risk zones, including within Flood Zones A and B in the City Centre and the Dockland areas and in areas at risk under the OPW's Mid-Range Future Scenario, shall provide details of structural and non structural risk management measures to include, but not be limited to specifications of the following:*

  - *Floor Levels*
  - *Internal Layout*
  - *Flood-Resistant Construction*
  - *Emergency Response Planning*

  The above items should be addressed and detailed in the Flood Risk Assessment.

  Response: Please refer DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0002 Site Specific Flood Risk Assessment for details.

- *Section 10.120 of the City Development Plan highlights that maintaining the aquitard function provided by the existing alluvium soil layer has been identified as a key requirement of the proposed redevelopment of the South Docks. Further consideration is required to detail how no new flow paths will be created and that an equivalent aquitard function is maintained post development. Also, the depth of the aquitard should be highlighted on the foul and surface water drainage long sections submitted as part of the Planning Application.*

Response: Refer to DBFL drawing 240002-X-05-X-XXX-DR-DBFL-CE-3301 Drainage Longitudinal Sections for details.

- *Chapter 5 of the Site Specific Flood Risk Assessment submitted is titled "Stage 3 Detailed Flood Risk Assessment & Management". This Site Specific Flood Risk Assessment does not meet the requirements of a Stage 3 Detailed Flood Risk Assessment as per the Flood Risk Management Guidelines. A Stage 3 assessment assesses flood risk issues in sufficient detail and provides a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.*

  Response: Please refer to section 5 of DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0002 Site Specific Flood Risk Assessment for details.

12. Consideration of the proposals to address the following Construction and Demolition related requirements (as set out in the Environment Report attached in Appendix C):

b) The applicant is requested to submit a Construction and Environmental Management plan with any planning application

Response: Please refer to DBFL report 240002-X-X-X-XXX-RP-DBFL-CE-0003 Construction and Environmental Management Plan.

ENVIRONMENT
ISO 14001:2015
NSAI Certified

HEALTH
& SAFETY
ISO 45001:2018
NSAI Certified

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

Engineering
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DBFL
CONSULTING ENGINEERS

Dublin Office

Ormond House
Upper Ormond Quay
Dublin 7, Ireland
D07 W704

+ 353 1 400 4000
info@dbfl.ie
www.dbfl.ie

Cork Office

14 South Mall
Cork, Ireland
T12 CT91

+ 353 21 202 4538
info@dbfl.ie
www.dbfl.ie

Galway Office

Odeon House
7 Eyre Square
Galway, Ireland
H91 YNC8

+ 353 91 33 55 99
info@dbfl.ie
www.dbfl.ie

Waterford Office

Suite 8b The Atrium
Maritana Gate, Canada St
Waterford, Ireland
X91 W028

+ 353 51 309 500
info@dbfl.ie
www.dbfl.ie