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Project Title:	Residential Development at Stocking Lane, Ballyboden, Dublin 16.
Report Title:	Engineering Services Report
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Contents:

1.0 Introduction

Lohan & Donnelly have been commissioned to prepare an Engineering Services Report (ESR) to support a planning application for the proposed residential development located at Stocking Lane, Ballyboden, Dublin 16. The report is to be read in conjunction with all the accompanying documentation, calculations & engineering drawings.

The purpose of this report is to capture and address the following network system required to service the development:

- Foul Water Network
- Surface Water Network
- Water main

The following documents were used in the creation of this report:

- Greater Dublin Regional Code of Practice V6.0
- Strategic Flood Risk Assessment (SFRA) for South Dublin Development Plan 2022-2028
- The Planning System and Flood Risk Management Guidelines for Planning Authorities
- Irish Water - Code of Practice for Water Infrastructure
- Irish Water - Code of Practice for Wastewater Infrastructure
- Sustainable Drainage Explanatory Design & Evaluation Guide 2022
- Ciria – The SuDS Manual 2015

2.0 Project Overview

2.1 Site Location

The proposed site is located at Stocking Lane, Ballyboden, Dublin 16 as shown in Figure 1.1 below. The site is bounded to the west by the R115; residential properties to the North; Springvale housing estate to the east and by Prospect housing estate to the south. An existing 600mm diameter reservoir overflow pipe traverses the site, gravitating toward Springvale housing estate to the north. The Owendoher river runs east of the site along Edmondstown road at the rear of Springvale housing estate. The Ballyboden Reservoir is located approximately 50m west of the site.

Figure 1: Site Location.
(Source: Google Earth 2020)

2.2 Description of Existing Site

The existing site comprises of an area of approximately 2.56 hectares. The site is located on a sloping site with the southern end being the highest level ranging from approximately 98mOD down to 92mOD at the north east corner. An existing 600mm diameter reservoir overflow pipe traverses the site, dividing the site in two, gravitating toward the Springvale Housing Estate and on to the Owendoher River in the East.

2.4 Proposed Redevelopment of Site

Rycroft SLR LTD intend to apply to South Dublin County Council for permission for development of a Large Scale Residential Development (LRD) on a site of 2.56ha at Stocking Lane, Rathfarnham, Dublin 14. The development will consist of 119 no. residential units ranging from 2 – 4 storeys in height, all boundary treatment and landscaping works, site services connections and all site development works.
The proposed development includes:

a) Demolition of the existing 'St. Winnows' detached house c. 177.9sqm.
b) Construction of 119 no. residential units (33 no. 1-bedroom units, 50 no. 2-bedroom units, 28 no. 3-bedroom units and 8 no. 4-bedroom units) in the form of the following unit types:
    - 32 no. House Type A1 - 2 Bed Mid Terrace units,
    - 6 no. House Type A2 - 3 Bed Mid Terrace units
    - 13 no. House Type B - 3 Bed End of Terrace
    - 9 no. House Type C - 3 Bed End of Terrace
    - 8 no. House Type D - 4 Bed Semi Detached
    - 4 no. 1 Bed Maisonette
    - 4 no. 1 Bed Duplex
    - 4 no. 2 Bed Duplex
    - 25 no. 1 Bed Apartment
    - 14 no. 2 Bed Apartment

Each residential unit has associated private open space in the form of a garden/balcony/terrace.

c) Open Space is proposed in the form of (i) 4 no. public open space (approx. 3,968sqm) and (ii) residential communal open spaces (approx.411sqm) including a playground.
d) The development shall be served via a new vehicular access point from Stocking Lane.
e) Shared pedestrian and cycle access at the eastern boundary of the site to neighbouring Springvale estate, raised pedestrian crossing to the south west of the site across Stocking Lane and shared pedestrian and cycle lane connection to proposed granted development to the north along Stocking Lane.
f) A total of 126 no. car parking spaces, to include 2 no. accessible parking space, 1 no. Driveyou Space, and 6 no. EV charging spaces for all apartment and Duplex/ Maisonette parking spaces.
g) A total of 249 no. bicycle parking spaces, in the form of 54 no. long stay bicycle parking spaces within the apartment block, 92no. spaces in the form of secure bicycle lockups adjacent to the entrance of mid-terraced houses and duplex units, 68no spaces for houses and maisonettes in the form of direct access to rear gardens, 23 no. short stay visitor bicycle parking spaces at surface level for the apartment block, 8 no. bicycle parking spaces for the duplex units and 4 no. visitor bicycle spaces for the maisonettes.
h) 2 no. ESB Kiosks.
i) Bin store area for the apartment block is proposed at ground floor level adjacent to the apartment block.
j) Retention of green infrastructure zone along the southern boundary of the site.
k) All associated site and infrastructural works include provision for water services; foul and surface water drainage and connections; internal roads, attenuation proposal; permeable paving; all landscaping works; green roofs; roof plant room and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.

3.0 Surface Water

3.1 Existing Surface Water Drainage Infrastructure

Review of Irish Water drainage record map shows multiple existing surface water manholes located near the proposed site. To the northwest there is an existing surface water manhole and 225mm diameter surface water sewer that originates to the west and turns north to run along Scholarstown Wood Lane serving the neighbouring estate. To the southwest there is an existing surface water manhole and 225mm diameter surface water sewer that originates at the top of Prospect Heath Road and runs south away from the subject site.

An existing 600mm diameter reservoir overflow pipe traverses the site, originating to the west of the site and gravitating east toward the Springvale Housing Estate where it connects into an existing surface water manhole and into an existing 225mm diameter surface water sewer. This sewer runs along the eastern boundary of the site and down into the Springvale housing cul-de-sac where it serves the existing houses.

3.2 Proposed Surface Water Drainage Infrastructure

The surface water drainage infrastructure for the proposed development has been designed and is to be constructed in accordance to the "Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Technical Document – Volume 2, New Developments, 2005", "Greater Dublin Regional Code of Practice Works", "South Dublin Count Council Development Plan 2022-2028" and the Building Regulation requirements.

The GDSDS guidelines and the SDCC SuDS Guidance Document require the following four main criteria to be provided by the developments surface water design:

- Criterion 1: River quality protection – satisfied by providing interception storage and treatment of run-off within the SuDS measures incorporated within the design. Section 3.3 of this report outlines the details of SuDS measures proposed. Section 3.5 outlines the interception storage provided on site.
- Criterion 2: River regime protection – satisfied by limiting run-off to the greenfield peak run-off rate. This is achieved by attenuating run-off through the use of SuDS and flow control devices prior to discharge to the existing surface water drainage system. Section 3.4 of this report outlines the permissible discharge rate for the proposed site.
- Criterion 3: Level of service (flooding) for the site – satisfied by no flooding on site except where specifically planned flooding is approved, no internal property flooding and no flooding of adjacent urban areas with overland flooding managed within the development.
- Criterion 4: River flood protection – long-term floodwater accommodated on site through attenuation within the proposed SuDS features.

3.3 Sustainable Urban Drainage Systems (SuDS)

It is proposed to use a sustainable urban drainage system approach to surface water management throughout the site. The objective is to provide an effective system to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater, contributing to amenity, aesthetics and biodiversity enhancement and allow for the maximum collection of rainwater for re-use where possible. In addition, 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, where possible, by the proposed.

3.3.1 Proposed SuDS

An infiltration test was carried out on the proposed site, showing poor infiltration. This results in more required onsite storage, given that infiltration cannot be considered. A number of SuDS features are proposed for this site including a small attenuation tank which is regarded as a last resort in this instance. Of all the onsite storage proposed, the attenuation tank provides approximately 19% of the required storage. The SuDS features proposed which have been designed in accordance with CIRIA documents C753, C697 and C609 as follows:

Tree Pits: Tree pits are constructed to attenuate Surface Water runoff by exploiting the natural void within the tree soil rooting zone and is contained within an underground tree pit. The stored water can be used by the tree resulting in a further reduction of surface water runoff. Each tree pit will be provided with drain down pipes which will convey flows downstream.

Permeable Paving: Pervious surfacing that can treat rainwater at source and allow infiltration through to an underlying porous subbase. Water can be stored within voids of the subbase layer before being released slowly to the drainage collection system through natural flow. A partial infiltration system will be incorporated as the existing ground is not capable of absorbing all the water through the infiltration. This system includes a permeable geotextile as the subbase as well as an outlet to the surface water system. The system will provide storage for small rainfall events and result in infiltration, evaporation and absorption in small quantities, thereby reducing runoff from these areas in small rainfall event, 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. It is proposed to use permeable paving only within areas that will remain under management of the maintenance company as per opinion permeable paving areas will not be taken in charge by SDCC.

Bioretention Raingarden Areas: These areas use soil, plants and microbes to treat stormwater before it is infiltrated or discharged. Bioretention areas are shallow depressions filled with sandy soil, topped with a thick layer of mulch and planted with dense vegetation. Stormwater runoff flows into the bioretention area, percolates through the soil (which acts as a filter) and eventually drains into the groundwater; some of the water is also absorbed by the plants. Bioretention areas are usually designed to allow ponded water and with an overflow outlet to prevent flooding during larger storm events. As soils on the proposed site have low permeability a perforated underdrain is incorporated that routes to a storm drain system.

Detention Basin: Surface storage basins that provide flow control through attenuation of stormwater run-off and facilitate some settling of particulate pollutants. A detention basin is normally dry and can function as a recreational facility. For the proposed development, the detention basin will serve as a grassed open space area.

Green-Blue Roof: A blue roof incorporates a sustainable drainage system SuDS, which retains water following a downpour and manages how the water is dispersed to prevent the damaging run off. Commonly a green roof is installed above the blue roof. The Green roof layer is designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows. It also provides good removal capability of atmospherically deposited urban pollutants.

Total SuDS Coverage: The total area of the site occupied by SuDS features, including grassed areas is 13295m^2. This area of proposed SuDS features makes up approximately 60% of the total area of the site. Figure 2 below shows the areas of the site occupied by SuDS measures highlighted blue. The white areas represent the hardstanding areas of the site which consist of the roofs of houses, roads and paths that are to be taken in charge by SDCC.

Figure2: Area of Site Covered by SuDS Measures

3.3.2 SuDS Considered

Table 1 outlines the SuDS measures considered with explanations/rationale for selecting or not selecting additional natural SuDS measures.

SuDS measures	**Measures to be used on this site**	**Rationale for selecting / not selecting measure**	**Area of feature (m^2)**	**Attenuation volume of feature (m^3)**
Swales	No	In order for stormwater to flow into a swale it would need to be located on the northern side of the site as the level of the site falls in this direction. This area is mainly taken up by proposed houses and private gardens with areas of open space either side. Existing trees and other proposed Suds measures are located within these areas of open space leaving insufficient space to provide swales.	N/A	N/A
Integrated constructed Tree Pits	Yes	Tree pits are proposed under new trees within the proposed site where possible.	803.5	311.17
Green/Blue Roofs	Yes	The apartment block has a green-blue roof, proposed as extensive green-blue roofs.	685	68.50
Filter Drain	No	Similar reason for not selecting a swale. Filter drains would need to be located at the lower levels within the site in order for runoff to flow into the drain It is preferred to provide above ground stormwater management where possible through the use of bioretention raingardens and a detention basin. With these features in place, it leaves insufficient space in suitable areas for filter drains.	N/A	N/A
Permeable Paving	Yes	Permeable paving is proposed for private driveways and parking spaces within the areas of the proposed development that will not be taken in charge by SDCC. All other paths and roads within the development cannot utilise permeable surfaces as they are to be taken in charge by SDCC which will not accept permeable paving to be taken in charge.	689.65 (Parking Areas) 2019 (Private Driveways)	134.94 (Parking Areas) 220.92 (Private Driveways)

Green wall	No	The proposed apartment block incorporates a green-blue roof system that caters for run-off at roof revel. Green wall deemed not appropriate for the remaining domestic dwellings.	N/A	N/A
Filter strips	No	Filter strips deemed not suitable due to poor infiltration on site. Other SuDS measures preferred.	N/A	N/A
Bio-retention systems/ Raingardens	Yes	Bioretention raingardens proposed throughout the lower levels of the site to manage and treat run-off at source and promote biodiversity development.	711.89	235.75
Detention Basin	Yes	It is proposed to provide a detention basin to the northeast corner of the development to attenuate surface runoff during heavy storm events. Planned flooding can occur within the basin during extreme rainfall. When dry, the area will serve as amenity space.	290	77.90
Retention Basin	No	Insufficient space within the proposed site. A detention basin was the preferred option as it is usually dry and can be used by residents and public as open space.	N/A	N/A
Ponds	No	Insufficient open space within the proposed site to provide ponds.	N/A	N/A
Wetlands	No	Insufficient open space within the proposed site to provide ponds.	N/A	N/A

Table 1: SuDS Measures Considered.

3.4 Permissible Site Discharge

Criterion 2 – River Regime Protection within the SDCC SUDS Explanatory Design and Evaluation Guide states that a discharge rate equal to 1-year greenfield site peak runoff rate or 2l/s/ha may be adopted, whichever is greater.

To calculate a runoff based on 2l/s/ha the site area of 2.52ha is used, giving a runoff rate of 5.04l/s

GDSDS Section 6.6.1 states that there are numerous techniques used to estimate greenfield run-off rates. The proposed method used for determining peak flow rates for small greenfield catchments is *IH Report 124, Flood estimation for small catchments*. This method is used for all catchment sized by applying it to a 50ha site and linearly interpolating the result for smaller areas.

$Q_{BARrural}$ is estimated from the equation:

$$Q_{BARrural} = 0.00108AREA^{0.89}\ SAAR^{1.17}\ SOIL^{2.17}$$

Where: $Q_{BARrural}$ is the mean annual flood flow from a rural catchment in m^3/s.

AREA is the area of the site in km^2.

SAAR is the standard average annual rainfall (for the period 1941 to 1970 in mm).

SOIL is the soil index, which is a composite index determined from soil survey maps that accompany the Flood Studies Report.

Using data received from Met Eireann for Irish Grid co-ordinates E 313000, N 226000 (site coordinates are: E 313397, N 226559), the SAAR is determined as 913mm.

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

Site Area = 0.0256 km^2

SAAR = 913mm

SOIL Value = 0.3 (soil type 2 from Table 6.7 – GDSDS)

Permissible site discharge $Q_{BARrural}$ = 6.29 l/s

As per SDCC SuDS guidance document the greater value of 6.29 l/s is adopted for design.

Refer to Appendix F for the permissible site discharge calculations.

3.5 Surface Water Attenuation

It is proposed that the site will be divided into two different catchments each with an independent attenuation system sized based on the contributing effective run-off area. A hydrobrake will be provided for each network to control discharge and utilise storage within the system. See Figure 3 below for the two catchments.

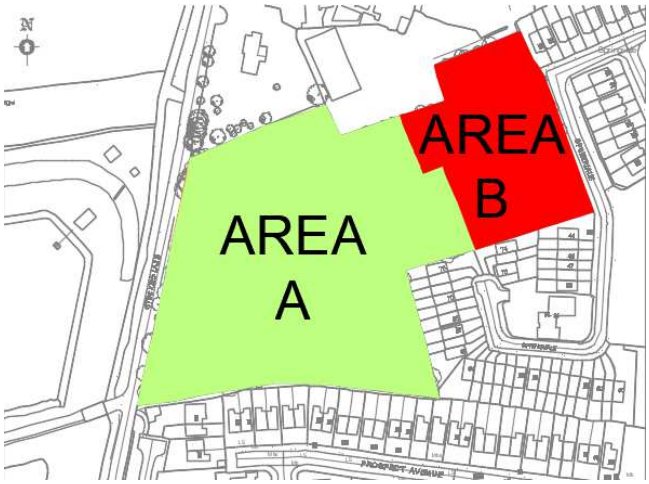


Figure 3: Site split into two catchments

Surface water attenuation for the site will be provided through a number of SuDS attenuation systems including tree pits, a detention basin, bioretention raingardens and underground proprietary modular arch systems. In accordance with SDCC policy and the GDSDS, every effort has been made to deal with run-off at source and to incorporate SuDS measures above ground throughout the site where possible, however due to site constraints involving the depth of surface water drainage network, the site topography and layout, and the volume of water to be attenuated, managing surface water runoff at source and providing above ground storage of the total required volume is not possible at all locations.

GDSDS requires flood waters for a 100-year return period, with a 20% allowance for climate change to be managed on site. Therefore, all surface water attenuation calculations have been carried out for this return period.

The two catchments and associated attenuation methods are described in detail below:

Catchment Area A:

Catchment A is located to the left hand side of the site and consists of approximately 18161m^2. Surface water runoff from hardstanding roof areas of the proposed houses drains to the proposed permeable paving for each driveway of the house dealing with surface water run-off at source. The discharge from each driveway system is limited to 0.2l/s through the use of a flow control device. Due to low infiltration on site this will slowly release into the proposed surface water drainage system.

Surface water run-off from the roads located to the south of the site being the highest point of the development will be collected by gullies along the road and flow into the proposed permeable car parking areas where it can be stored during heavy rainfall events.

Surface water from the remaining areas within this catchment drains to the bioretention gardens and tree pits located on the lower level of the site. Surface water can be used by the trees and

proposed plants within these areas. During periods of heavy rainfall, when the trees and proposed plants have reached capacity, excess surface water will flow from these SuDS systems into the main surface water drainage system to the proposed below ground arch attenuation system. The discharge from the tank will be restricted to 4.29l/s. The system will outfall into the existing surface water manhole along Stocking Lane.

The required attenuation volume within Catchment A has been calculated based off the type of surfaces and their corresponding impermeability factors.

Catchment Area A			
Surface Type:	**Area (m^2)**	**Surface Type**	**Run-off Coefficient**
Permeable driveways	1424	Permeable	0.6
Green-Blue roof	685	Permeable	0.8
Tree pits	595	Permeable	0.15
Bio retention raingardens	668.29	Permeable	0.15
Lined permeable paved carpark areas	483.45	Permeable	0.6
Permeable paving	179.98	Permeable	0.6
Roads & Paths	3782.25	Hardstanding	0.8
Hardstanding roof	2859	Hardstanding	0.8

Table 2: Catchment Area A – Surface Types and run-off coefficient

Table 3 below outlines the required attenuation volume within Catchment Area A and the provided volume through each proposed SuDS measure.

Catchment Area A			
Attenuation Volume Required (m^3)	**Attenuation Provision**	**Area (m^2)**	**Attenuation Volume Provided (m^3)**
692.58m^3	Permeable driveways	1424	149.52
	Green-Blue roof	685	68.50
	Tree pits	595	231.73
	Bio retention raingardens	668.29	216.13
	Lined permeable paving carpark areas	483.45	87.02
	Proprietary modular arch attenuation system	144	173
		Total:	925.90

Table 3: Catchment Area A – Attenuation Volumes

Catchment B:

Catchment B is located to the right-hand side of the site and consists of approximately 6846m^2. Surface water runoff from hardstanding roof areas of the proposed houses drains to the proposed permeable paving for each driveway of the house dealing with surface water run-off at source. The discharge from each driveway system is limited to 0.2l/s through the use of a flow control device. Due to low infiltration on site this will slowly release into the proposed surface water drainage system.

Surface water runoff from the hardstanding road and pathways will flow to the adjacent permeable paving (Paving Area 4) and the proposed bioretention raingarden. The tree pits and detention basins will provide attenuation to the surrounding green areas and pathway. For heavy rainfall events where the proposed surface water drainage system is at capacity, the detention basins will be allowed to flood. This is done through the use of a grated manhole lid allowing excess water from the drainage system to fill the basin.

Catchment Area B			
Surface Type:	**Area (m^2)**	**Surface Type**	**Run-off Coefficient**
Permeable driveways	595	Permeable	0.6
Tree pits	208.50	Permeable	0.15
Bio retention raingardens	43.60	Permeable	0.15
Lined permeable paved carpark areas	206.20	Permeable	0.6
Detention basin	290	Permeable	0.15
Roads & Paths	1575	Hardstanding	0.8
Hardstanding roof	1501	Hardstanding	0.8

Table 4: Catchment Area B – Surface Types and run-off coefficient

Catchment Area B			
Attenuation Volume Required (m^3)	**Attenuation Provision**	**Area (m^2)**	**Attenuation Volume Provided (m^3)**
291.47m^3	Permeable driveways	595	71.40
	Tree pits	208.50	79.44
	Bio retention raingardens	43.60	19.62
	Permeable paving carpark areas	206.20	49.50
	Detention basin	290	77.90
		Total:	297.86

Table 5: Catchment Area B – Attenuation Volumes

3.6 Interception Storage Volume

Interception storage refers to precipitation which will be stored and intercepted by certain alleviation measures, preventing the rainwater from leaving the site as run-off. The GDSDS states that no run-off to pass directly to the receiving watercourse for rainfall depths of 5mm and up to 10mm if possible. Interception should therefore be provided at source where possible.

The volume of interception required is based on assuming 80% run-off from impermeable areas. The total impermeable area for the development amounts to 9717m^2. To successfully intercept 10mm of rainwater leaving the development the interception volume has to equate to 97.17m^3. The interception volume attributable to each SuDS feature consists of the volume of water that infiltrates to the ground, evaporates into the atmosphere and transpires through plants and vegetation. Additionally, there will some losses of water due to absorption and wetting of stone and soil media.

Not all SuDS features will be able to achieve infiltration, evaporation, transpiration and losses due to absorption/wetting. The limits for each SuDS feature type will be taken into account when calculating interception volumes at detailed design. The interception storage attributable to the losses in stone and soil media, such as the stone media will not be included in the calculations. The total required interception storage for the proposed site is 97.17m^3. Interception calculations have been developed for the SuDS features below:

Green-Blue Roof: The area of green-blue roofs provided for the development amounts to 685m^2. The green-blue roof system will have 100mm deep attenuation cells with 95% void space, which equals to a total rain water interception volume of:

$$685 \times 0.1 \times 0.95 = 65.075\text{m}^3$$

Tree Pits: Interception storage will be provided in each tree pit by ensuring that the pipe linked to the proposed surface water drainage system is located 50mm above the bottom of the sub-base drainage layer. This will allow 0.392m^3 of water to be stored permanently in each tree pit for the tree roots to use. The volume of interception storage provided by the tree pits is equivalent to:

$$2.8 \times 2.8 \times 0.05 \times 99 = 38.81\text{m}^3$$

Total Storage: The total interception storage provided for the entire development amounts to 103.885m^3, more than both the minimum 5mm storage requirement and the recommended 10mm storage capacity, as denoted within the GDSDS code of practice document.

3.7 SuDS Management

The proposed SuDS features for the development will require proper maintenance:

- Permeable Surfacing: 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.

- Bioretention Raingardens: Use soil, plants and microbes to treat stormwater before it is infiltrated or discharged. Bioretention areas are typically shallow depressions filled with sandy soil, topped with a thick layer of mulch, and planted with dense vegetation.

- Tree pits: Regular maintenance involves removing litter, surface debris and weeds Remove sediment and debris build up form around inlets. Quarterly check operation of underdrains by inspection of flows after rain. Annually inspect plants for disease.

- Hydrobrake Manhole: Normally little maintenance is required, however, after installation, hydro brakes should be inspected to ensure the hydro brake orifice is not blocked on a monthly basis for three months and thereafter at six monthly intervals and hosed down if required. Remove rubbish or debris from hydro brake if present. Hydro-Brake Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

- Green-blue roof: Maintenance plans for blue roofs depend on the type of roof with which it is combined. Blue roof systems include sophisticated drainage systems that should be regularly checked for blockages. Inspection of the green roof for bare patches and replacement of plants will be required on a regular basis

3.8 Flow Route Analysis

3.8.1 Existing Flow Route Analysis

The natural hydrology, and the way that a development affects how rainfall behaves on a site, are assessed initially by flow route analysis. The first step in flow route analysis is to consider how a site behaves naturally before development. The topographical survey for the site provides the basic template for determining existing and future flows. Figure 4 below shows the existing levels and flow of surface water on site prior to development. The highest point of the site is along the southern boundary. The natural flow of surface water is from there towards the lowest point of the site, located at the northeast corner.

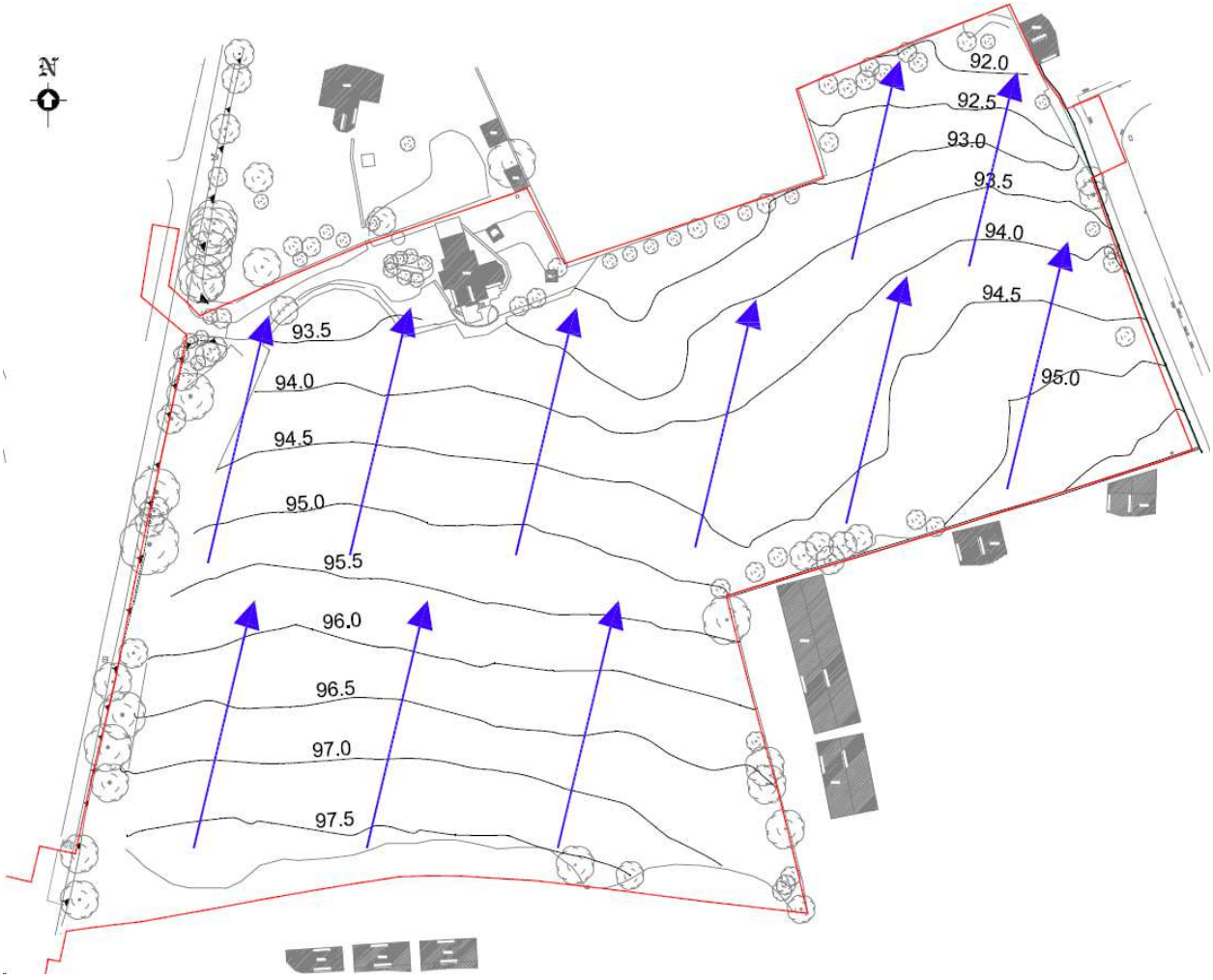


Figure 4: Existing Flow Route Analysis

3.8.2 Modified Flow Route Analysis

The surface water drainage for the proposed site has been designed to mimic the natural flows where possible. Figure 5 shows the modified flow route of surface water into the proposed SuDS features. The proposed flow route follows the existing natural flows where possible with hardstanding areas located where there is a natural flow. Modification of the flow route is necessary around the northwest and northeast corners to enable discharge of the surface water to the existing sewers. The smaller arrows breaking off the main flow line show surface water collected by the main drainage line passing through the proposed SuDS measures.

Figure 5: Modified Flow Route Analysis

4.0 Foul Water Drainage

4.1 Existing Foul Water Drainage Infrastructure

Review of Irish Water drainage record map shows an existing 225mm diameter foul sewer located in close vicinity to the proposed development along Springvale Road. The sewer originates in the existing housing cul-de-sac to the southeast of the proposed site and runs along the east side of the site. Irish Water drainage record map enclosed in Appendix A of this document.

4.2 Proposed Foul Water Drainage Infrastructure

The foul water drainage infrastructure for the proposed development has been designed and is to be constructed in accordance with Irish Water's "Code of Practice for Wastewater Infrastructure (Document IW-CDS-5030-03)", "Wastewater Infrastructure Standard Details (Document IW-CDS-5030-01)" and the Building Regulation requirements.

To service the development, a 150 and 225mm diameter foul water pipe will be provided, commencing from the north-west of the site, extending to the last foul water manhole of the site 'FWMH01'. The foul water will then flow towards the existing foul manhole 'EX.FWMH01' located to the east of the site on Springvale Road, discharging all the foul water generated from the proposed development.

Foul water flow rates for the proposed development have been generated in accordance with "Code of Practice for Wastewater Infrastructure (Document IW-CDS-5030-03)" Section 3.6, Appendix C, and Section 2.2.5 of Appendix B. For full foul water drainage infrastructure scheme for the proposed development refer to drawing "2385-LDE-ZZ-ZZ-DR-SC-1C01". For full flow rate calculations refer to wastewater calculation sheet in Appendix C of this document.

Pre-connection enquiry form (Reference No. CDS23003375) was submitted on the 8th of May 2023 to the new connections department within Irish Water to determine whether a wastewater connection for the proposed development is feasible and could be established. Confirmation of feasibility from Irish Water has been received on the 2rd of August 2023 stating that a foul water connection for the proposed development is feasible without infrastructure upgrade. Confirmation of feasibility letter from Irish Water enclosed in Appendix B within this document.

5.0 Watermain

5.1 Existing Watermain

Irish Water drainage record map shows an existing 300mm diameter Ductile Iron water main located outside the site boundary on the footpath, that runs parallel to the western boundary of the site. Irish Water drainage record map enclosed in Appendix A of this document. The drainage record map also indicates an existing 100mm uPVC watermain that originates within the Springvale housing estate to the southeast of the site. For watermain details refer to drawing "2385-LDE-ZZ-ZZ-DR-SC-1C02".

5.2 Proposed Watermain

The water main infrastructure for the proposed development has been designed and is to be constructed in accordance to Irish Water's "Code of Practice for Water Infrastructure (Document IW-CDS-5020-01)", "Water Infrastructure Standard Details (Document IW-CDS-5020-03)" and the Building Regulation requirements.

To service the development, it is proposed to provide a 150mm MDPE (medium density polyethylene) type PE-80 watermain. The water main will exit the proposed development to the west and connect to the existing 6" Cast Iron water main. Prior to exiting the site, a boundary box and telemetry kiosk will be installed to measure the water usage for the development.

Pre-connection enquiry form (Reference No. CDS23003375) was submitted on the 8th of May 2023 to the new connections department within Irish Water to determine whether a water connection for the proposed development is feasible and could be established. Confirmation of feasibility from Irish Water has been received on the 2rd of August 2023 stating that a water connection for the proposed development is feasible subject to upgrade works. The confirmation of feasibility letter, with regards to the feasibility of a wastewater connection states the following:

"In order to accommodate the proposed connection, approximately 90m of a new 150mm ID pipe main is to be laid to connect the site developments to the existing 6" Cast Iron main downstream of the existing PRV and inlet Flowmeter."

In order to comply with the condition above and achieve a feasible water main connection for the development the client has agreed to upgrade the existing water main and provide a 150mm ID main to connect the proposed development to the new upgraded main. Confirmation of feasibility letter from Irish Water enclosed in Appendix B within this document.

6.0 SDCC Development Plan 2022-2028

The South Dublin County Council (SDCC) Development Plan 2022-2028 sets out a vision to make south Dublin county a place that communities are proud of, that business can thrive in and that will help to live greener and healthier lives. There are a number of policies and objectives contained within the plan that all contribute towards this vision.

6.1 SDCC Chapter 4 – Green Infrastructure

Policy G14 of the SDCC Development Plan specifies the objectives for the provision of SuDS. The policy states that developments *"Require the provision of Sustainable Drainage Systems (SuDS) in the County and maximise the amenity and biodiversity value of these systems."*

GI14 Objective 1: To limit surface water run-off from new developments through the use of Sustainable Urban Drainage Systems (SuDS) using surface water and nature-based solutions and ensure that SuDS is integrated into all new development in the County and designed in accordance with South Dublin County Council's Sustainable Drainage Systems (SuDS) Explanatory, Design and Evaluation Guide

- The proposed surface water design for the development incorporates various SuDS features that are in line with SDCC Sustainable Drainage Systems (SuDS) Explanatory Design and Evaluation Guide 2022. The use of SuDs will help limit surface water run-off from the propose development. The run-off from the site has been limited to $Q_{BARrural}$ for the 100-year rainfall event with a 20% allowance for climate change.

GI4 Objective 2: To incorporate a SuDS management train during the design stage whereby surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment.

- The proposed surface water management plan as mentioned in Section 3 of this report is to split the site into two catchments, catchment A and catchment B so that surface water can be managed at source wherever possible. Surface water within each catchment flows to local SuDS features such as tree pits, permeable paving and bioretention raingardens before ultimately discharging to a detention basin or proprietary attenuation tank.

GI4 Objective 3: To require multifunctional open space provision within new developments to include provision for ecology and sustainable water management.

- The proposed SuDS measures require part of the site to be used as bioretention areas and a basin. These areas are also intended to function as play areas and places of interest in accordance with GI4 Objective 3. These SuDS features will act to improve ecology and promote sustainable water management by attracting wildlife and serving as a habitat while also accommodating flood waters on site during flood events.

GI4 Objective 4: To require that all SuDS measures are completed to a taking in charge standard.

- All proposed Suds measures have been designed to meet SDCC taking in charge standard where applicable.

GI4 Objective 5: To promote SuDS features as part of the greening of urban and rural streets to restrict or delay runoff from streets entering the storm drainage network.

- Proposed SuDS features for the development include tree pits, permeable paving, bioretention raingardens and a detention basin. These measures will restrict and delay the flow of surface water runoff entering the existing surface water drainage network.

GI4 Objective 6: To maintain and enhance existing surface water drainage systems in the County and promote and facilitate the development of Sustainable Urban Drainage Systems (SUDS), including integrated constructed wetlands, at a local, district and County level, to control surface water outfall and protect water quality.

- The surface water strategy for the proposed development has been designed considering the existing surface water drainage systems. The proposed surface water design incorporates a number of SuDS features that will improve surface water run-off quality within the site. Runoff rate from the site will be restricted to greenfield run-off rates as per GDSDS.

6.2 SDCC Chapter 11 – Infrastructure and Environmental Services

Policy IE2 of the SDCC Development Plan specifies the objectives for Water Supply and Wastewater. The Policy sets out to *"ensure that water supply and wastewater infrastructure is sufficient to meet the growing needs of the population and to support growth in jobs over the lifetime of the Development Plan facilitating environmental protection and sustainable growth."*

IE2 Objective 1: To work in conjunction with Irish Water to protect existing water and drainage infrastructure and to promote the ongoing upgrade and expansion of water supply and wastewater services to meet the future need of the County and Region.

- A confirmation of feasibility letter has been received from Irish Water confirming that the existing drainage network can accommodate the foul water flows and water demand required from the proposed development. The foul water and watermain network have been designed to adhere to the Irish Water Code of Practice.

IE2 Objective 3: To promote and support the implementation of the Greater Dublin Strategic Drainage Study, Dublin Region Local Authorities (2005) GDSDS.

- The proposed surface water strategy has been designed in accordance with the guidelines set out by the GDSDS.

IE2 Objective 5: To prohibit the connection of surface water outflows to the foul drainage network where separation systems are available.

- The proposed surface water drainage network is completely separate to the proposed foul water network throughout the development.

IE2 Objective 9: To ensure that all new developments in areas served by a public foul sewerage network connect to the public sewerage system.

- The proposed foul water network is designed in accordance to the Irish Water Code of Practice and will connect to the public foul sewerage network that is under the responsibility of Irish Water. A Confirmation of Feasibility letter received from Irish

Water is within Appendix B of this report. The letter states that the connection to the existing network is viable.

IE2 Objective 10: To require all development proposals to provide a separate foul and surface water drainage system – where practicable.

- The proposed surface water drainage network is completely separate to the proposed foul water network throughout the development.

Policy IE3 sets out to "*manage surface water and protect and enhance ground and surface water quality to meet the requirements of the EU water framework directive."*

IE3 Objective 2: To maintain and enhance existing surface water drainage systems in the County and to require Sustainable Drainage Systems (SuDS) in new development in accordance with objectives set out in section 4.2.2 of this Plan including, where feasible, integrated constructed wetlands, at a local, district and County level, to control surface water outfall and protect water quality.

- The surface water drainage strategy outlined in this report, the SSFRA and the relevant drawings, proposed the extensive use of SuDS throughout the development to control surface water outfall and protect water quality.

Policy IE4 sets out to *"ensure the continued incorporation of Flood Risk Management into the spatial planning of the County, to meet the requirements of the EU Floods Directive and the EU Water Framework Directive and to promote a climate resilient County."*

IE4 Objective 1: To require site specific flood risk assessments to be undertaken for all new developments within the County in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) and the requirements of DECLG Circular P12 / 2014 and the EU Floods Directive and Chapter 12: *Implementation and Monitoring* and the policies and objectives of this chapter.

- A site specific flood risk assessment for the proposed development has been prepared in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) and the requirements of DECLG Circular P12 / 2014 and the EU Floods Directive and Chapter 12: *Implementation and Monitoring* and the policies and objectives of this chapter.

7.0 Comments from LRD Report

7.1 Conclusion and Recommendations from LRD Report

The recommendations from the final report in relation to drainage and SuDS are as follows:

SuDS Strategy to include:

a) SUDs Design details

Response: Section 3.3 and 3.5 within this report outline the proposed SuDS measures and surface water strategy for the site. Refer to drawings No. 4C05 and 4C06 for SuDS details.

b) Revised report showing surface water attenuation calculations for proposed development.

Response: Refer to Appendix D for revised surface water attenuation calculations for proposed development.

c) Revised calculation reports showing increased surface water attenuation provided and show calculations for same. Examine if additional surface water attenuation can be provided in green areas and by means of SuDS (Sustainable Drainage Systems).

Response: Additional surface water attenuation has been provided through the use of SuDS in green areas within the site. The proposed SuDS strategy now incorporates multiple bioretention raingardens throughout the site, tree pits and detention basins. Attenuation provided through each of the different SuDS measures is shown in the calculations within Appendix D of this report.

d) If underground tanks present, why these cannot be excluded from the design.

Response: Every effort has been made to provide surface water attenuation for the site through natural, green SuDS measures. Refer to Section 3.3 of this report for detail of the proposed SuDS measures. The site has been split into two catchment areas as mentioned in Section 3.5. Surface water attenuation is provided entirely through SuDS features for catchment Area B. For the larger catchment, Area A, the proposed SuDS measures provide 75% of the total required surface water attenuation. The proposed underground tank provides the remaining attenuation required within this area. The tank is proposed as a last resort due to no infiltration available on the site as identified in the GI Report. This reduces the amount of water that can be retained permanently on site. Should SDCC change their stance on not taking permeable paving into charge, the roads and footpaths could be a permeable surface and further attenuate storm water at source. This would eliminate the requirements of the attenuation tank. The overall required attenuation for the site is 985.05m^3, the underground tank only provides 18%. A revised plan of the SuDS measures has been submitted. Refer to drawings 1C04, 4C05 & 4C06 for plan and cross-sectional view of the proposed SuDS measures.

e) SuDS Layout, identify the different types of SuDS features.

Response: Section 3.3 and 3.5 of this report identifies the different types of SuDS features proposed for the site. Refer to drawing No. 1C04 for SuDS layout plan with details of areas and storage volumes for each SuDS measure. Refer to drawings No. 4C06 and 4C07 for details and cross sectional views of proposed SuDS features.

i) Maximise use of permeable surfaces and stormwater attenuation through SuDS.

Response: Permeable surfaces are proposed for all paving areas and car parking spaces that will remain under management of the maintenance company. Permeable surfaces are not proposed for the areas of the site to be taken in charge, as per the LRD opinion report, permeable paving areas will not be taken in charge by SDCC. The proposed SuDS features provide 82% of the total required surface water attenuation on site.

f) Underground attenuation to be considered as a last resort only.

Response: The attenuation tank is proposed as a last resort to provide the remaining attenuation volume required for the site that cannot be achieved through SuDS measures due to site constraints.

g) Demonstrate adherence to SDCC SuDS guidance.

Response: The surface water management for the proposed development has been designed based on the SDCC Sustainable Drainage Explanatory Design & Evaluation Guide 2022. Surface water run-off is managed through the use of SuDS that mimic the drainage processes found in nature where possible and an underground tank is only proposed as a last resort to achieve the remaining attenuation volume required in line with the SuDS guidance document. SuDS measures have been designed in accordance with Appendix 1 – SDCC Indicative Details for Taking in Charge. Refer to drawing No. 4C06 and 4C07 for SuDS details.

h) Drawing showing cross sectional views of all SuDS features.

Response: Refer to drawing No. 4C06 and 4C07 for cross sectional views of all proposed SuDS features.

i) SuDS Management

Response: Refer to Section 3.7 for the management requirements of all proposed SuDS features.

7.2 Water Services Report from LRD Opinion

Item 1.1: Underground tanks are not accepted for surface water attenuation because they are not a natural SuDS (Sustainable Drainage Systems) as required by SDCC (South Dublin County Council). Attenuation should be carried out by natural type green infrastructure such as swales tree pits with check dams closer to the source of surface water occurring instead of pipe networks or underground tanks.

Submit a revised drawing in plan and cross-sectional view showing additional SuDS such as:

- *Green / Blue Roofs*
- *Swales*
- *Green areas*
- *Permeable Paving*
- *Grasscrete*
- *Pond/s*
- *Other such SuDS*

Examine where pipes and underground attenuation systems can be replaced with SuDS type features. Submit a revised drawing

Response: Prior to any SuDS design on this site, a soil infiltration test was requested in order to inform the surface water design strategy for the site. Soil Infiltration report "Ground Investigation Report August 2023" by Ground Investigations Ireland is enclosed within this application. As per the conclusions within this report, the soil infiltration test failed. This means that the site has little to no natural infiltration due to the type of clay subsoils within the site. Therefore, the capacity of all SuDS measures is impacted and is generally a larger volume than would otherwise be due to this failed infiltration test. Every effort has been made to incorporate natural SuDS within the site where possible. The SuDS measures proposed include, tree pits, detention basin, bioretention rain gardens, a green-blue roof and permeable paving. Collectively these measures provide 82% of the total surface water attenuation required for the proposed site. Given that this site has been proven to have no natural infiltration we consider that the site justifiably falls into the last resort category for providing an attenuation tank and as such an attenuation tank has been proposed for the remaining 18% of the required volume. Refer to drawings No. 1C04 and 1C05 for plan and cross-sectional views of the proposed SuDS measures.

As per Figure 2 within Section 3.3.1 of this report, the proposed SuDS measures and grassed areas for this site occupy 60% of the surface area of the site. This is a significant proportion of the site in terms of surface area. We not that SDCC do not take permeable paving into charge for roads and footpaths. However, should SDCC change their stance on this point, the roads and footpaths occupy circa 23% of the site in terms of surface area and could be of a permeable finish which would remove the need for the attenuation tank in its entirety. This would result in a total SuDS coverage for the site of 83% in terms of surface area.

Item 1.2: The discharge rate of 7 litres/second is very high. Water service estimate a discharge rate 3.25 litres/ second for proposed development.

Response: Criterion 2 – River Regime Protection within the SDCC SUDS Explanatory Design and Evaluation Guide states that a discharge rate equal to 1-year greenfield site peak runoff rate or 2l/s/ha may be adopted, whichever is greater. A revised Qbar calculation has been carried out for both the 2l/s/ha and a greenfield runoff rate. To calculate a runoff based on 2l/s/ha the site area of 2.52ha is used, giving a runoff rate of 5.04l/s. A greenfield runoff rate of 6.29l/s was calculated based on the method outlined in Section 6.6.1 of the GDSDS. The greater value of

6.29l/s is adopted. Refer to Appendix E for full Q-bar calculations. These calculations have been submitted to Brian Harkin within SDCC for review prior to submission.

Item 1.3: The detention basin north of site appears to have surface water attenuation storage tanks or crates underground which would not be accepted by water services because it is not a SuDS system. Submit a drawing in plan and cross section showing design details of tree pits and detention basin that comply with SDCC SuDS Guide.

Response: There are individual tree pits proposed beneath the detention basin north of the site. Refer to drawing No. 2385-LDE-ZZ-ZZ-DR-SC-1C04 for a plan of the detention basin and drawing No. 2385-LDE-ZZ-ZZ-DR-SC-4C05 for a cross section showing design details of the proposed tree pits and detention basin.

Item 1.4: Submit a revised report showing details of different surface types and areas of same in m^2. For example, what is the area of roofs, green roofs, roads, permeable paving green areas and their respective runoff coefficients. Submit a report showing revised surface water attenuation calculations for proposed development.

Section 3.5 within this report outlines the details of the different surface types and areas of same in m^2 with the corresponding runoff coefficients used for attenuation calculations. Revised attenuation calculations included in Appendix D within this report.

Item 1.5: There is an existing 600mm surface water pipe traversing site. This pipe needs to be located on site by excavating a number of slit trenches prior to designing the location of houses and development. A minimum setback distance of 6m each side of surface water pipe from the outside diameter of pipe is required for a wayleave.

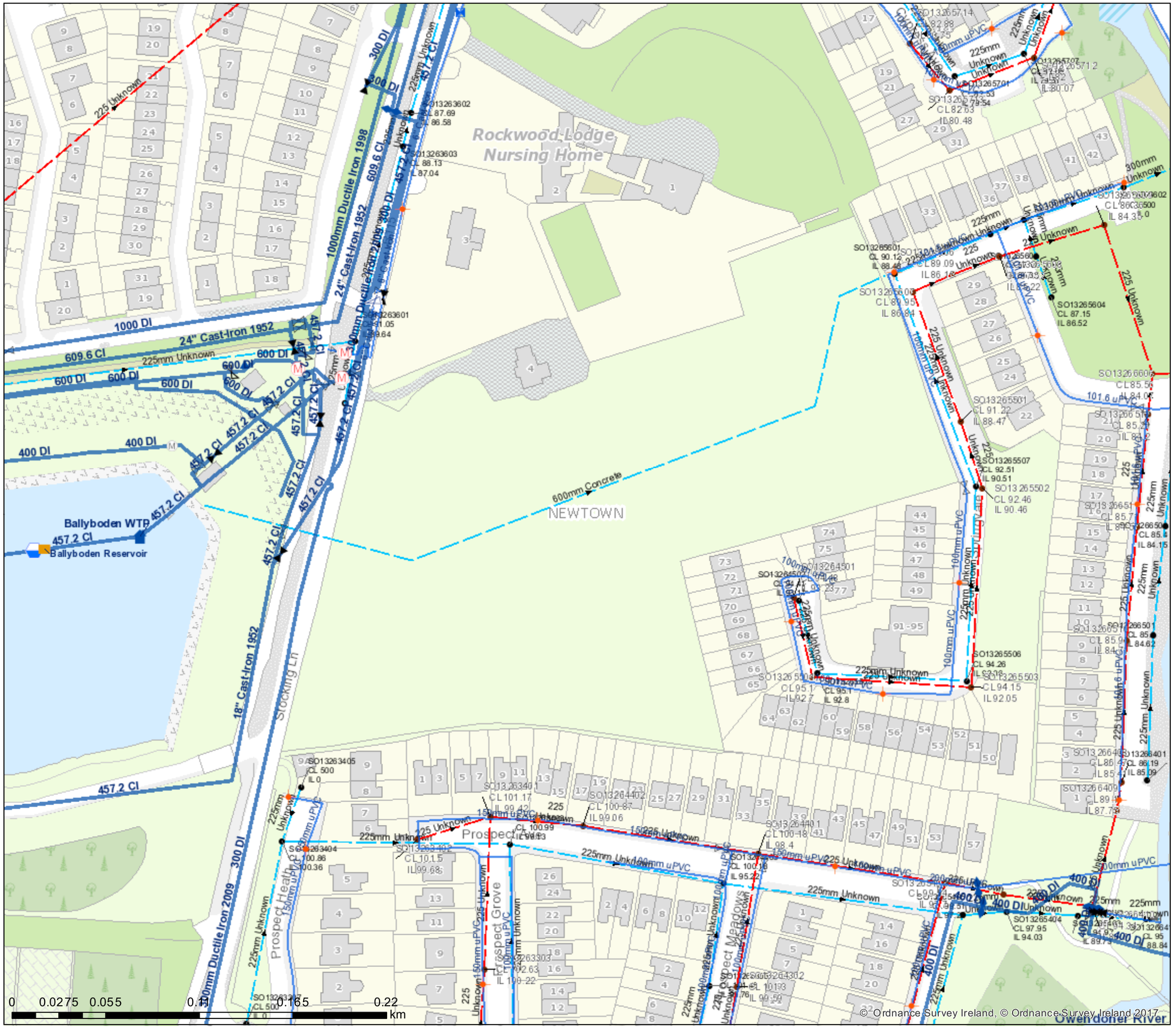
Response: The existing pipe traversing the site has been located by way of slit trenches and surveyed. Appendix 4 of the LRD Opinion states that a 5m setback either side of the pipe is required where Item 1.5 states that a minimum distance of 6m is required for a wayleave. The developer sought clarity directly from SDCC regarding the required setback distance. It was confirmed that for a pipe size of 600mm diameter that is less than 3m deep, a 3.5m wayleave is required. Refer to Appendix G for information provided by SDCC. The provided way leave is 5m either side of the outer diameter of the pipe.

Date: 19th December 2023

Sophie Higgins B.E., Structural Engineering
Engineer
For Lohan & Donnelly Civil & Structural Consulting Engineers

Appendix A – Irish Water Drainage Record Maps

Irish Water Web Map



UISCE ÉIREANN : IRISH WATER

Print Date: 12/04/2023

Printed by:Irish Water

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 – Confirmation of Feasibility (Irish Water)

CONFIRMATION OF FEASIBILITY

Uisce Éireann
Bosca OP448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

Sophie Higgins

Lohan & Donnelly Engineers
13 Gardiner Place
Mountjoy Square
Dublin 1
D01V0T8
Ireland

2 August 2023

Our Ref: CDS23003375 Pre-Connection Enquiry
Stocking Lane, Ballyboden, Rathfarnham, Dublin 16

Dear Applicant/Agent,

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

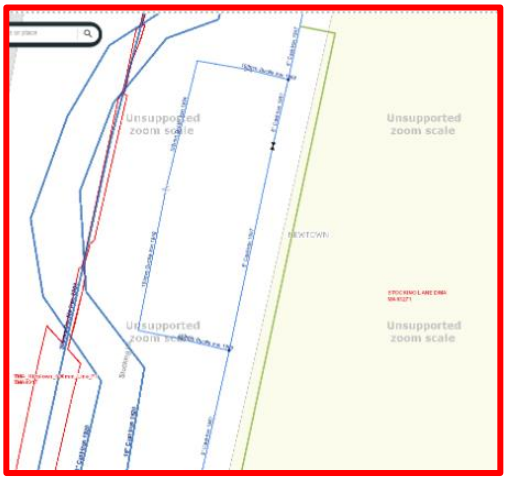
Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 121 unit(s) at Stocking Lane, Ballyboden, Rathfarnham, Dublin 16, (the **Development)**.

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

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

- In order to accommodate the proposed connection, approximately 90m of a new 150mm ID pipe main is to be laid to connect the site developments to the existing 6" Cast Iron main downstream of the existing PRV and inlet Flowmeter.

-



- Should you wish to progress with the connection, you have to fund the network extension works and it will be calculated in a connection offer fee.

- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water 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 Irish Water.

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/

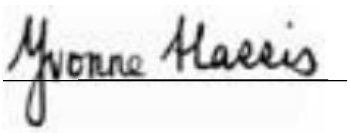
Where can you find more information?

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

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

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

Yours sincerely,



Yvonne Harris
Head of Customer Operations

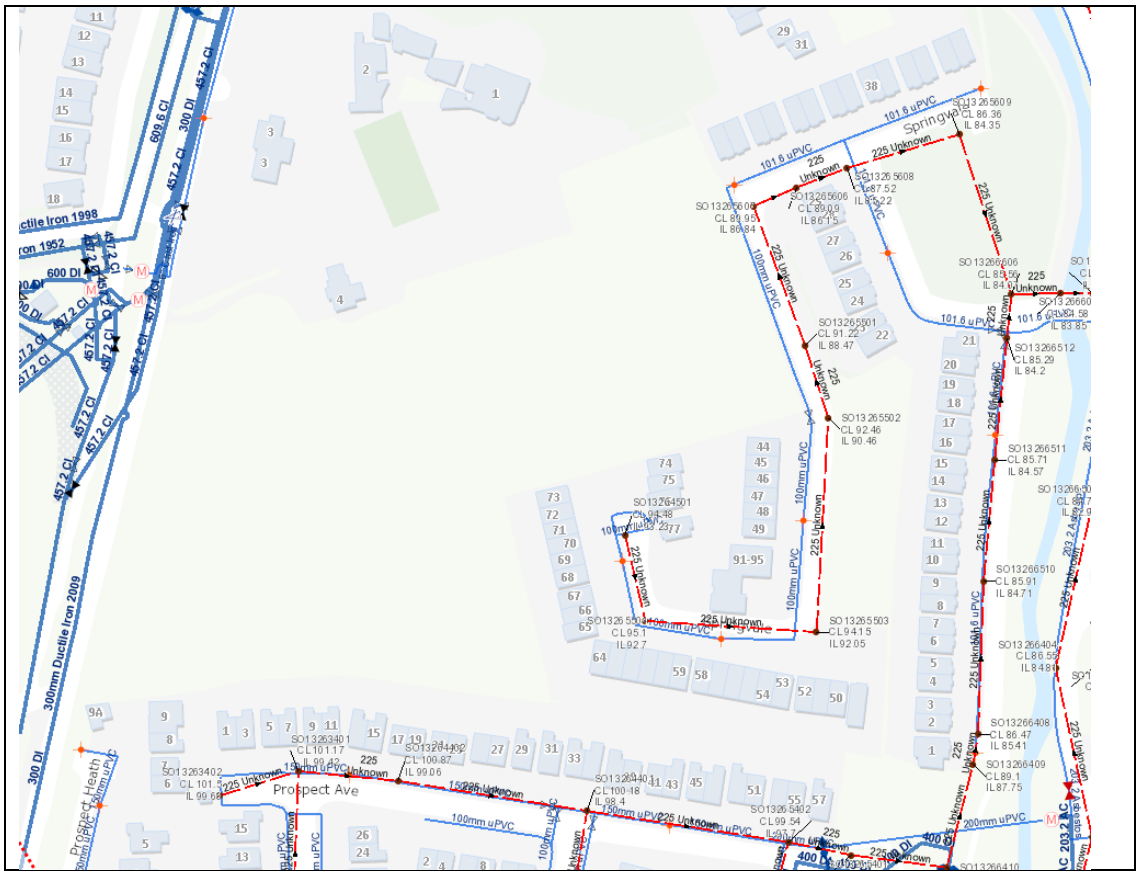
Section A - What is important to know?

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 Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
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?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *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 Irish Water's network(s)?	• Requests for maps showing Irish Water'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 Irish Water 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 Irish Water's Network(s)

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



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Note: The information provided on the included maps as to the position of Irish Water'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 Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water 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 Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water'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 C – Foul Water Calculations

LOHAN & DONNELLY
Consulting Engineers
13 Gardiner Place, Mountjoy Square, Dublin 1. T: 01 8787770
W: www.lohan-donnelly.com E: info@lohan-donnelly.com

Project	Residential Development at Stocking Lane, Ballyboden		
Element	Wastewater Demand		
By S.H	Date Nov. 2023	Proj. No. 2385	
Chk'd G.P	Date Nov. 2023	Sht. No. 1	of 1

Ref.	Calculations	Output

Usage Rates:

Standard Residential: 150 l/person/day

Max Occupancy:

Houses/apartments: 322 Persons

Wastewater Discharge = Usage Rate x Max Occupancy

Wastewater Discharge = [150 x 307] x 1.1 = 53130 l/day

Average Discharge = $\frac{53130}{60x60x24}$ = 0.61 l/s

Peak Discharge = Average Discharge x Peaking Factor

Peaking Factor = (6DWF)

Peak Discharge = 0.61 x 6 = 3.69 l/s

Note: 10% extra for infiltration allowance to be included as per sextion 3.6.3 and section 2.2.4 of Appendix B within Irish Water "Code of practice for wastewater infrastructure (IW-CDS_5030-03)" document

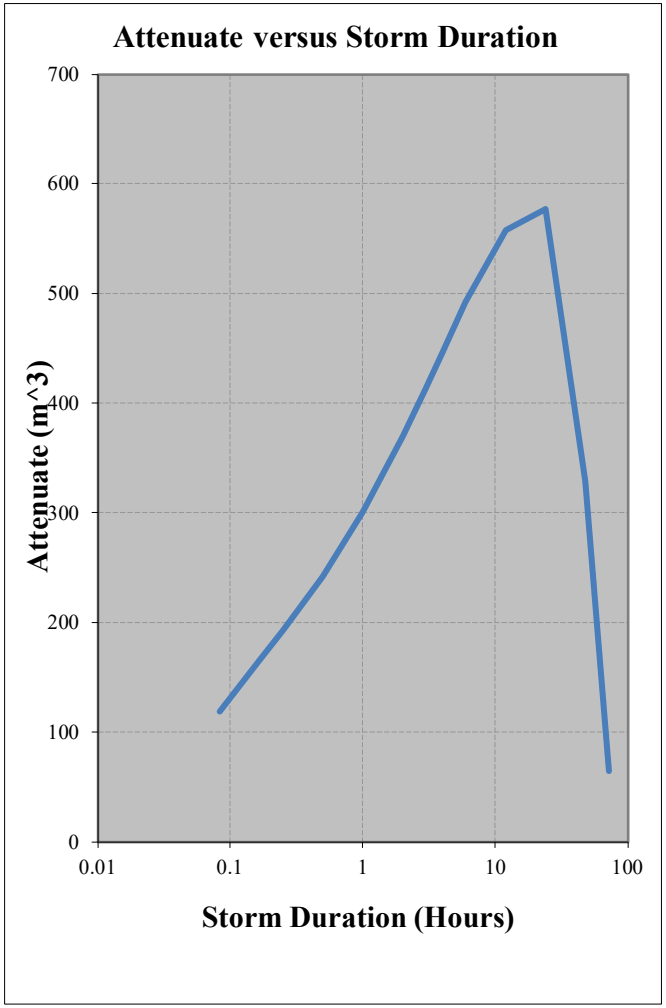
Appendix D – Attenuation Calculations

LOHAN & DONNELLY
Consulting Engineers
13 Gardiner Place, Mountjoy Square, Dublin 1. T: 01 8787770
W: www.lohan-donnelly.com E: info@lohan-donnelly.com

Project:	Residential Development at Stocking Lane	Element:	Catchment Area A Total Attenuation
Job No:	2385	Page No:	1
Date:	Nov. 2023	Calc'd by:	SH
Checked by:	GP		

Hard Areas:	6611 m^2	Driveways:	1424 m^2	Permeable:	663 m^2	Raingardens	700 m^2	Equivalent Impermeable Area:	6733.2 m^2
I. Factor:	0.80	I. Factor:	0.60	I. Factor:	0.6	I. Factor:	0.15	Attenuated Flow Rate:	4.09 l/s
Tree Pits:	580	I. Factor:	0.15						

Storm Duration (Hours)	Rainfall (mm)	Total Surface Water (m^3)	Allowable Discharge (m^3)	Attenuate (m^3)
0.083	17.80	119.85	1.222092	118.63
0.166	24.90	167.66	2.444184	165.21
0.25	29.20	196.61	3.681	192.93
0.50	37.00	249.13	7.362	241.77
1.00	46.80	315.11	14.724	300.39
2.00	59.30	399.28	29.448	369.83
3.00	68.00	457.86	44.172	413.69
4.00	75.00	504.99	58.896	446.09
6.00	86.20	580.40	88.344	492.06
12.00	109.10	734.59	176.688	557.90
24.00	138.20	930.53	353.376	577.15
48.00	153.80	1035.57	706.752	328.81
72.00	167.00	1124.44	1060.128	64.32



Maximum Volume of Attenuate: 577.15 m^3 Climate Change = 1.2 Required Attenuation Volume = 692.58 m^3

Note: This spreadsheet calculates the Volume of Attenuate based on a Return Period of: 100 years.

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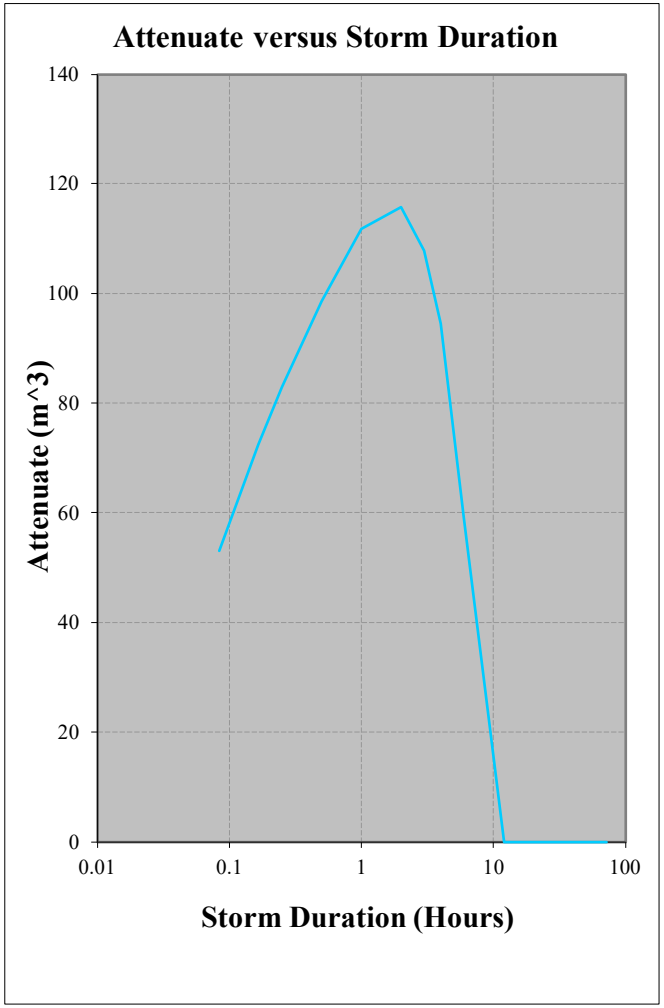
Project:	Residential Development at Stocking Lane	Element:	Catchment Area A - Roofs & Driveways	Job No:	2385
				Page No:	2
Date:	Nov. 2023	Calc'd by:	SH	Checked by:	GP

Roof Area: 2859 m^2 Paved Area: 1424 m^2 Other: 0 m^2 Equivalent Impermeable Area: 3141.6 m^2 Attenuated Flow Rate: 9.8 l/s
I. Factor: 0.80 I. Factor: 0.60 I. Factor: 1

Storm Duration (Hours)	Rainfall (mm)	Total Surface Water (m^3)	Allowable Discharge (m^3)	Attenuate (m^3)
0.083	17.80	55.92	2.92824	52.99
0.166	24.90	78.23	5.85648	72.37
0.25	29.20	91.73	8.82	82.91
0.50	37.00	116.24	17.64	98.60
1.00	46.80	147.03	35.28	111.75
2.00	59.30	186.30	70.56	115.74
3.00	68.00	213.63	105.84	107.79
4.00	75.00	235.62	141.12	94.50
6.00	86.20	270.81	211.68	59.13
12.00	109.10	342.75	423.36	0
24.00	138.20	434.17	846.72	0
48.00	153.80	483.18	1693.44	0
72.00	167.00	524.65	2540.16	0



Maximum Volume of Attenuate: 115.74 m^3 Climate Change = 1.2 Required Attenuation Volume = 138.88 m^3

Note: This spreadsheet calculates the Volume of Attenuate based on a Return Period of: 100 years.

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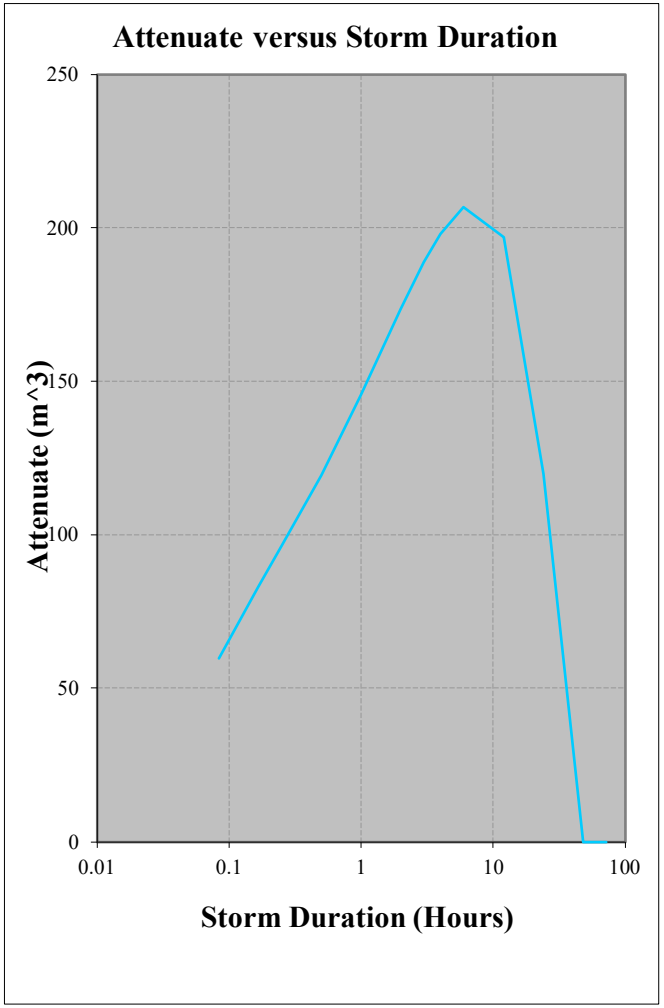
Project:	Residential Development at Stocking Lane	Element:	Catchment Area A - Roads and Paths	Job No:	2385
				Page No:	3
Date:	Nov. 2023	Calc'd by:	SH	Checked by:	GP

Hard Area: 3782 m^2 Permeable: 663 m^2
I. Factor: 0.80 I. Factor: 0.60

Equivalent Impermeable Area: 3423.6 m^2

Attenuated Flow Rate: 4.09 l/s

Storm Duration (Hours)	Rainfall (mm)	Total Surface Water (m^3)	Allowable Discharge (m^3)	Attenuate (m^3)
0.083	17.80	60.94	1.222092	59.72
0.166	24.90	85.25	2.444184	82.80
0.25	29.20	99.97	3.681	96.29
0.50	37.00	126.67	7.362	119.31
1.00	46.80	160.22	14.724	145.50
2.00	59.30	203.02	29.448	173.57
3.00	68.00	232.80	44.172	188.63
4.00	75.00	256.77	58.896	197.87
6.00	86.20	295.11	88.344	206.77
12.00	109.10	373.51	176.688	196.83
24.00	138.20	473.14	353.376	119.77
48.00	153.80	526.55	706.752	0
72.00	167.00	571.74	1060.128	0



Maximum Volume of Attenuate: 206.77 m^3 Climate Change = 1.2 Required Attenuation Volume = 248.12 m^3

Note: This spreadsheet calculates the Volume of Attenuate based on a Return Period of: 100 years.

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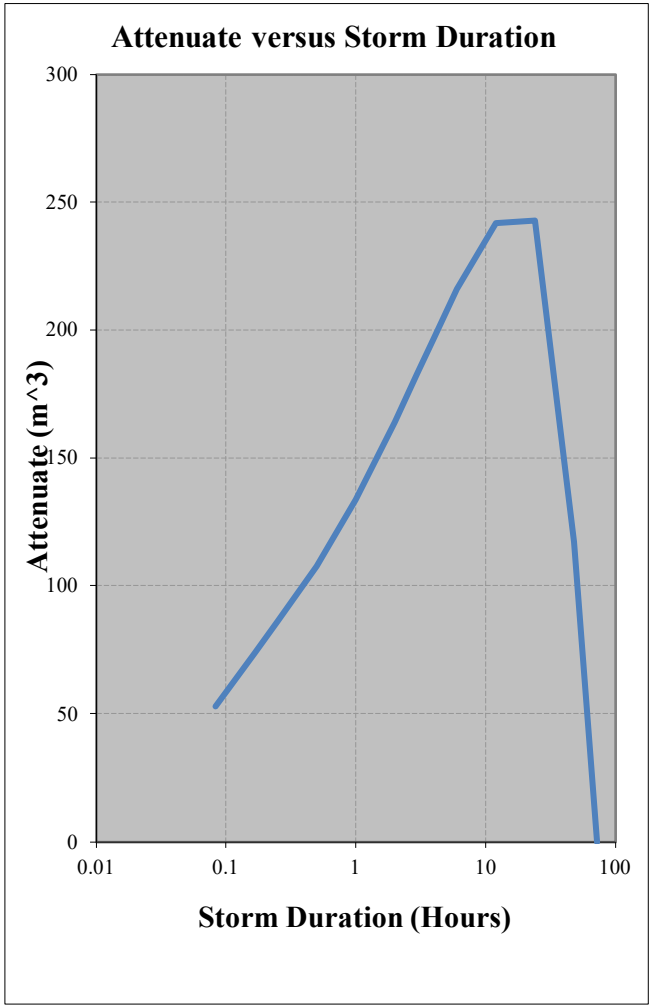
Project:	Residential Development at Stocking Lane	Element:	Catchment Area B Total Attenuation
Job No:	2385	Page No:	4
Date:	Nov. 2023	Calc'd by:	SH
Checked by:	GP		

Hard Area:	3064 m^2	Driveways	595 m^2	Raingardens:	43.6 m^2	D. Basin:	290 m^2	Equivalent Impermeable Area:	3007.9 m^2	Attenuated Flow Rate:	2 l/s
I. Factor:	0.80	I. Factor:	0.60	I. Factor:	0.15	I. Factor:	0.15				
Tree Pits:	180.3	I. Factor:	0.15	Paths:	205	I. Factor:	0.6				

Storm Duration (Hours)	Rainfall (mm)	Total Surface Water (m^3)	Allowable Discharge (m^3)	Attenuate (m^3)
0.083	17.80	53.54	0.5976	52.94
0.166	24.90	74.90	1.1952	73.70
0.25	29.20	87.83	1.8	86.03
0.50	37.00	111.29	3.6	107.69
1.00	46.80	140.77	7.2	133.57
2.00	59.30	178.37	14.4	163.97
3.00	68.00	204.54	21.6	182.94
4.00	75.00	225.59	28.8	196.79
6.00	86.20	259.28	43.2	216.08
12.00	109.10	328.16	86.4	241.76
24.00	138.20	415.69	172.8	242.89
48.00	153.80	462.61	345.6	117.01
72.00	167.00	502.32	518.4	0



Maximum Volume of Attenuate: 242.89 m^3 Climate Change = 1.2 Required Attenuation Volume = 291.47 m^3

Note: This spreadsheet calculates the Volume of Attenuate based on a Return Period of: 100 years.

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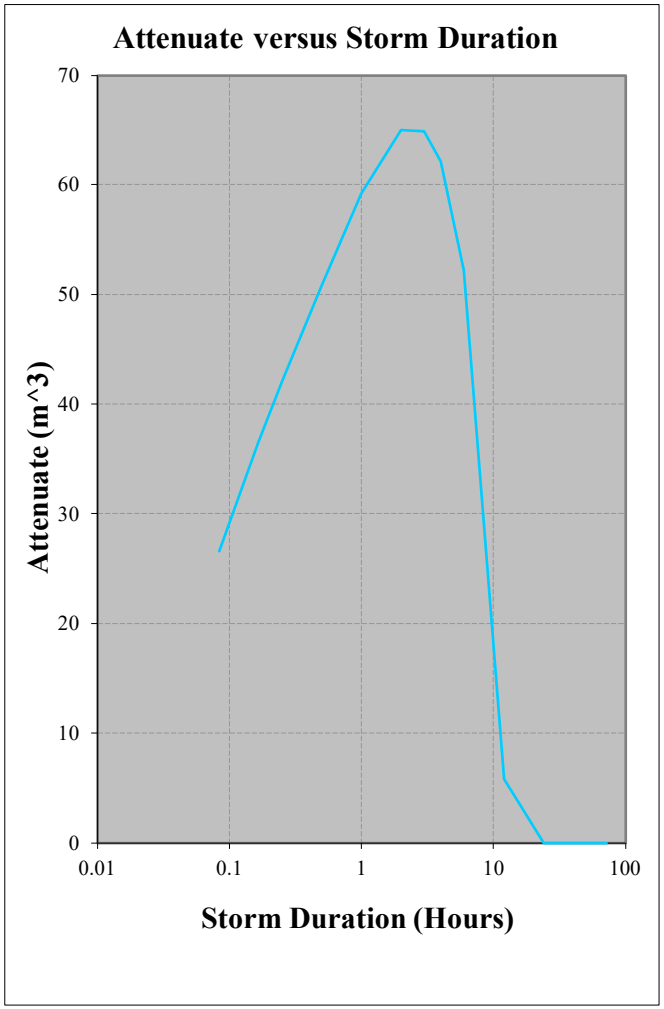
Project:	Residential Development at Stocking Lane	Element:	Catchment Area B - Roofs & Driveways	Job No:	2385
				Page No:	5
Date:	Nov. 2023	Calc'd by:	SH	Checked by:	GP

Roof Area: 1501 m^2 Permeable: 595 m^2
I. Factor: 0.80 I. Factor: 0.60

Equivalent Impermeable Area: 1557.8 m^2

Attenuated Flow Rate: 3.8 l/s

Storm Duration (Hours)	Rainfall (mm)	Total Surface Water (m^3)	Allowable Discharge (m^3)	Attenuate (m^3)
0.083	17.80	27.73	1.13544	26.59
0.166	24.90	38.79	2.27088	36.52
0.25	29.20	45.49	3.42	42.07
0.50	37.00	57.64	6.84	50.80
1.00	46.80	72.91	13.68	59.23
2.00	59.30	92.38	27.36	65.02
3.00	68.00	105.93	41.04	64.89
4.00	75.00	116.84	54.72	62.12
6.00	86.20	134.28	82.08	52.20
12.00	109.10	169.96	164.16	5.80
24.00	138.20	215.29	328.32	0
48.00	153.80	239.59	656.64	0
72.00	167.00	260.15	984.96	0



Maximum Volume of Attenuate: 65.02 m^3 Climate Change = 1.2 Required Attenuation Volume = 78.021 m^3

Note: This spreadsheet calculates the Volume of Attenuate based on a Return Period of: 100 years.

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Project:	Residential Development at Stocking Lane	Element:	Catchment Area B - Roads and Paths	Job No:	2385
				Page No:	6
Date:	Nov. 2023	Calc'd by:	SH	Checked by:	GP

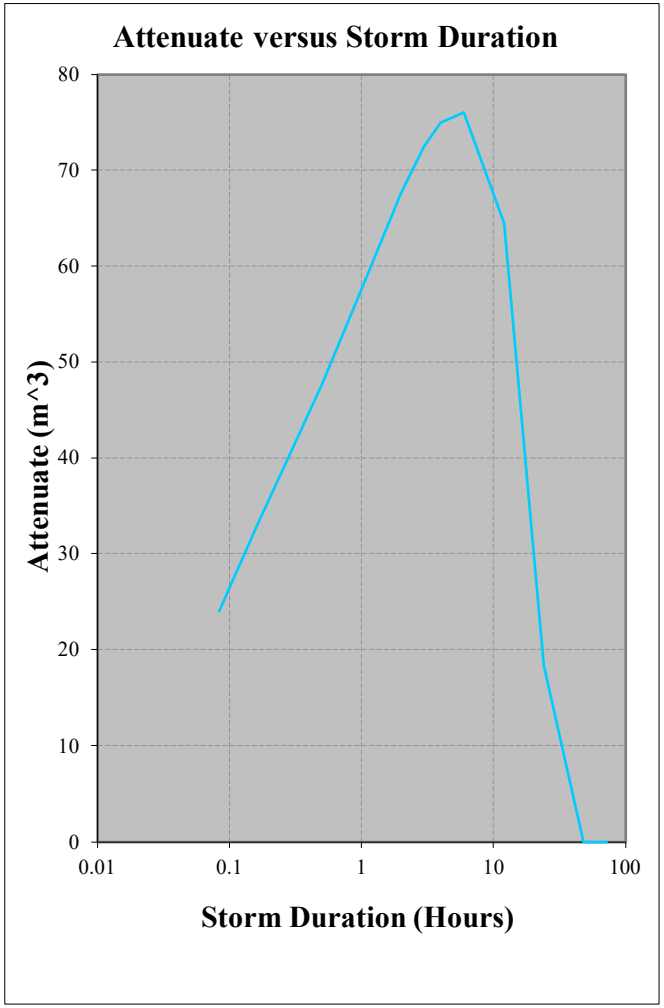
Roads: 1575 m^2 Paths: 205 m^2

I. Factor: 0.80 I. Factor: 0.60

Equivalent Impermeable Area: 1383 m^2

Attenuated Flow Rate: 2 l/s

Storm Duration (Hours)	Rainfall (mm)	Total Surface Water (m^3)	Allowable Discharge (m^3)	Attenuate (m^3)
0.083	17.80	24.62	0.5976	24.02
0.166	24.90	34.44	1.1952	33.24
0.25	29.20	40.38	1.8	38.58
0.50	37.00	51.17	3.6	47.57
1.00	46.80	64.72	7.2	57.52
2.00	59.30	82.01	14.4	67.61
3.00	68.00	94.04	21.6	72.44
4.00	75.00	103.73	28.8	74.93
6.00	86.20	119.21	43.2	76.01
12.00	109.10	150.89	86.4	64.49
24.00	138.20	191.13	172.8	18.33
48.00	153.80	212.71	345.6	0
72.00	167.00	230.96	518.4	0



Maximum Volume of Attenuate: 76.01 m^3 Climate Change = 1.2 Required Attenuation Volume = 91.218 m^3

Note: This spreadsheet calculates the Volume of Attenuate based on a Return Period of: 100 years.

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Project	Proposed Development at Stocking Lane		
Element	Bioretention Raingarden Attenuation Calculations		
By: S.H	Date: Nov. 2023	Proj. No.: 2385	
Chk'd: G.P	Date: Nov. 2023	Sht. No.: 7	of: 12

Ref.	Calculations	Output

Bioretention Raingarden 1:

Area of raingarden: 62.80 m^2

Above ground attenuation:

Allowable depth of water: 0.15 m

Attenuation volume: 9.4 m^3

Below ground attenuation:

Area of tree pits within raingarden: 23.52 m^2

Total remaining area of raingarden: 39.28 m^2

Filter layer depth: 0.75 m

Void ratio: 0.2

Attenuation provided: 5.89 m^3

Drainage layer depth: 0.5 m

Void ratio: 0.3

Attenuation provided: 5.89 m^3

Total attenuation provided: 21.20 m^3

Bioretention Raingarden 2:

Area of raingarden: 117.84 m^2

Above ground attenuation:

Allowable depth of water: 0.15 m

Attenuation volume: 18 m^3

Below ground attenuation:

Area of tree pits within raingarden: 54.88 m^2

Total remaining area of raingarden: 62.96 m^2

Filter layer depth: 0.75 m

Void ratio: 0.2

Attenuation provided: 9.44 m^3

Drainage layer depth: 0.5 m

Void ratio: 0.3

Attenuation provided: 9.44 m^3

Total attenuation provided: 36.56 m^3

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Project			
Proposed Development at Stocking Lane			
Element			
Bioretention Raingarden Attenuation Calculations			
By	Date	Proj. No.	
S.H	Nov. 2023	2385	
Chk' d	Date	Sht. No.	of
G.P	Nov. 2023	8	12

Ref.	Calculations	Output

Bioretention Raingarden 3:

Area of raingarden:	141.75 m^2
Above ground attenuation:	
Allowable depth of water:	0.15 m
Attenuation volume:	21 m^3
Below ground attenuation:	
Area of tree pits within raingarden:	78.4 m^2
Total remaining area of raingarden:	63.35 m^2
Filter layer depth:	0.75 m
Void ratio:	0.2
Attenuation provided:	9.50 m^3
Drainage layer depth:	0.5 m
Void ratio:	0.3
Attenuation provided:	9.50 m^3
Total attenuation provided:	**40.27 m^3**

Bioretention Raingarden 4:

Area of raingarden:	95.47 m^2
Above ground attenuation:	
Allowable depth of water:	0.15 m
Attenuation volume:	14 m^3
Below ground attenuation:	
Area of tree pits within raingarden:	39.2 m^2
Total remaining area of raingarden:	56.27 m^2
Filter layer depth:	0.75 m
Void ratio:	0.2
Attenuation provided:	8.44 m^3
Drainage layer depth:	0.5 m
Void ratio:	0.3
Attenuation provided:	8.44 m^3
Total attenuation provided:	**31.20 m^3**

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Project			
Proposed Development at Stocking Lane			
Element			
Bioretention Raingarden Attenuation Calculations			
By	Date	Proj. No.	
S.H	Nov. 2023	2385	
Chk' d	Date	Sht. No.	of
G.P	Nov. 2023	9	12

Ref.	Calculations	Output

Bioretention Raingarden 5:

Area of raingarden:	59.17 m^2
Above ground attenuation:	
Allowable depth of water:	0.15 m
Attenuation volume:	8.9 m^3
Below ground attenuation:	
Area of tree pits within raingarden:	15.68 m^2
Total remaining area of raingarden:	43.49 m^2
Filter layer depth:	0.75 m
Void ratio:	0.2
Attenuation provided:	6.52 m^3
Drainage layer depth:	0.5 m
Void ratio:	0.3
Attenuation provided:	6.52 m^3
Total attenuation provided:	**21.92 m^3**

Bioretention Raingarden 6:

Area of raingarden:	125.67 m^2
Above ground attenuation:	
Allowable depth of water:	0.15 m
Attenuation volume:	19 m^3
Below ground attenuation:	
Area of tree pits within raingarden:	31.36 m^2
Total remaining area of raingarden:	94.31 m^2
Filter layer depth:	0.75 m
Void ratio:	0.2
Attenuation provided:	14.15 m^3
Drainage layer depth:	0.5 m
Void ratio:	0.3
Attenuation provided:	14.15 m^3
Total attenuation provided:	**47.1 m^3**

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Project	Proposed Development at Stocking Lane		
Element	Bioretention Raingarden Attenuation Calculations		
By: S.H	Date: Nov. 2023	Proj. No.: 2385	
Chk'd: G.P	Date: Nov. 2023	Sht. No.: 10	of: 12

Ref.	Calculations	Output

Bioretention Raingarden 7:

Area of raingarden: 65.87 m^2

Above ground attenuation:

Allowable depth of water: 0.15 m

Attenuation volume: 9.9 m^3

Below ground attenuation:

Area of tree pits within raingarden: 39.20 m^2

Total remaining area of raingarden: 26.67 m^2

Filter layer depth: 0.75 m

Void ratio: 0.2

Attenuation provided: 4.00 m^3

Drainage layer depth: 0.5 m

Void ratio: 0.3

Attenuation provided: 4.00 m^3

Total attenuation provided: 17.88 m^3

Bioretention Raingarden 8:

Area of raingarden: 43.60 m^2

Above ground attenuation:

Allowable depth of water: 0.15 m

Attenuation volume: 6.5 m^3

Below ground attenuation:

Filter layer depth: 0.75 m

Void ratio: 0.2

Attenuation provided: 6.54 m^3

Drainage layer depth: 0.5 m

Void ratio: 0.3

Attenuation provided: 6.54 m^3

Total attenuation provided: 19.62 m^3

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Project: Proposed Development at Stocking Lane			
Element: Tree Pit Attenuation Calculations			
By: S.H	Date: Nov. 2023	Proj. No.: 2385	
Chk'd: G.P	Date: Nov. 2023	Sht. No.: 11	of: 12

Ref.	Calculations	Output

Tree Pits within green areas:

Tree Pit Parameters:

Length:	2.80	m
Width:	2.80	m
Area of tree pit:	7.84	m^2

Below ground attenuation:

Filter layer depth:	0.75	m
Void ratio:	0.2	
Attenuation provided:	1.18	m^3
Drainage layer depth:	0.8	m
Void ratio:	0.3	
Attenuation provided:	1.88	m^3

Total attenuation provided: 3.06 m^3 per tree pit

Street Tree Pits:

Tree Pit Parameters:

Length:	1.25	m
Width:	1.25	m
Area of tree pit:	1.56	m^2

Below ground attenuation:

Filter layer depth:	0.75	m
Void ratio:	0.2	
Attenuation provided:	0.23	m^3
Drainage layer depth:	0.8	m
Void ratio:	0.3	
Attenuation provided:	0.38	m^3

Total attenuation provided: 0.61 m^3 per tree pit

Catchment Area A:

No. of tree pits within grass area =	72	tree pits
Attenutation provided =	220.15	m^3
No. of street tree pits =	19	tree pits
Attenutation provided =	11.58	m^3
Total Attenuation =	231.73	m^3

Catchment Area B:

No. of tree pits within grass area =	25	tree pits
Attenutation provided =	76.44	m^3
No. of street tree pits =	8	tree pits
Attenutation provided =	3.00	m^3
Total Attenuation =	79.44	m^3

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Project			
Proposed Development at Stocking Lane			
Element			
Permeable Surface Attenuation Calculations			
By	Date	Proj. No.	
S.H	Nov. 2023	2385	
Chk' d	Date	Sht. No.	of
G.P	Nov. 2023	12	12

Ref.	Calculations	Output

Paving Area 1

Area of permeable paving:	110.95 m^2
Drainage layer depth:	0.60 m
Void ratio:	0.3
Total attenuation provided:	19.97 m^3

Paving Area 2

Area of permeable paving:	290 m^2
Drainage layer depth:	0.60 m
Void ratio:	0.3
Total attenuation provided:	52.20 m^3

Paving Area 3

Area of permeable paving:	82.50 m^2
Drainage layer depth:	0.60 m
Void ratio:	0.3
Total attenuation provided:	14.85 m^3

Total attenuation volume provided for Catchment Area A = 87.02 m^3

Paving Area 4

Area of permeable paving:	206.2 m^2
Drainage layer depth:	0.80 m
Void ratio:	0.3
Total attenuation provided:	49.49 m^3

Total attenuation volume provided for Catchment Area B = 49.49 m^3

Appendix E – Q-Bar Calculations

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W: www.lohan-donnelly.com E: info@lohan-donnelly.com

Project: Proposed Development at Stocking Lane			
Element: Q-Bar Calculation			
By: S.H	Date: Oct. 2023	Proj. No.: 2385	
Chk'd: G.P	Date: Oct. 2023	Sht. No.: 1	of: 1

Ref.	Calculations	Output

As per SDCC SuDS guidance document, Criterion 2 - River Regime Protection: Discharge rate equal to 1-year greenfield runoff rate or 2l/s/ha, whichever is greater

Calculation for 1-year greenfield run off rate:

$Q_{BARrural} = 0.00108AREA^{0.89} SAAR^{1.17} SOIL^{2.17}$

The site is greater than 1 hectare and less than 50 hectares, linear interpolation will therefore be used to determine the surface water discharge rate (Qbar).

Qbar for for 50 hectare site:

Area:	0.5	sq km
SAAR:	913	mm
Soil value:	0.30	
QBARrural	124.34	l/s

Qbar for for 2.56 hectare site (Proposed Development):

Area:	0.025	sq km
SAAR:	913	mm
Soil value:	0.30	
QBARrural:	6.29	l/s

Calculation for QBAR/ha (l/s/ha):

Site Area:	2.53	ha	
QBAR/ha:	2.0	l/s/ha	(Table 6.5 of GDSDS)
QBAR:	5.06	l/s	

Greater Value = QBARrural

Therefore the runoff rate for the proposed development = 6.29 l/s

Appendix F – Run-Off Calculations

LOHAN & DONNELLY
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W: www.lohan-donnelly.com E: info@lohan-donnelly.com

Project:	Residential Development at Stocking Lane, Ballyboden, Dublin	Job No:	2385
		Page No:	1
Date:	Nov. 2023	Calc'd by: S.H	Checked by: G.P

Remarks	From	To	Area (m^2)	Previous Area (m^2)	Total Area (m^2)	Length of Pipe (m)	Gradient	Size (mm)	Velocity (m/s)	Capacity (l/s)	Time of Entry (min)	Time of Flow (min)	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Total Run-Off (l/s)
Catchment Area A	SW01	SW02	294.3	0	294.3	30.25	1: 100	225	1.22	48.6	4	0.41	4.4	66.80	5.46
	SW02	SW03	179	294.3256	473.3	32.958	1: 60	225	1.58	62.8	4	0.76	4.8	64.50	8.48
	SW03	SW04	281.2	754.503	1036	18.569	1: 60	225	1.58	62.8	4	0.96	5.0	63.50	18.27
	SW05	SW06	130.3	0	130.3	35.195	1: 60	225	1.58	62.8	4	0.37	4.4	66.80	2.42
	SW06	SW07	163.8	130.3166	294.1	18.666	1: 60	225	1.58	62.8	4	0.57	4.6	65.50	5.35
	SW07	SW08	119.8	413.9323	533.7	13.211	1: 60	225	1.58	62.8	4	0.71	4.7	65.00	9.64
	SW09	SW11	213.4	0	213.4	42.459	1: 100	225	1.22	48.6	4	0.58	4.6	65.50	3.88
	SW10	SW11	214.7	0	214.7	52.971	1: 200	225	0.87	34.4	4	1.02	5.0	63.50	3.79
	SW11	SW08	235.9	428.0436	663.9	15.897	1: 200	225	0.87	34.4	4	1.91	5.9	59.20	10.92
	SW08	SW04	383.4	1197.688	1581	54.092	1: 200	225	0.87	34.4	4	2.95	6.9	55.00	24.16
	SW04	SW14	1036	2616.773	3652	8.846	1: 200	300	1.05	74.1	4	3.09	7.1	54.60	55.40
	SW12	SW13	197.6	0	197.6	43.21	1: 200	225	0.87	34.4	4	0.83	4.8	64.50	3.54
	SW13	SW14	245.7	443.2913	689	7.988	1: 200	225	0.87	34.4	4	0.99	5.0	63.50	12.15
	SW14	SW15	67.22	756.2113	823.4	10.95	1: 200	225	0.87	34.4	4	1.20	5.2	62.50	14.30
	SW15	Tank	256.3	1079.713	1336	1.727	1: 200	225	0.87	34.4	4	1.23	5.2	62.50	23.19
	Tank	SW16	0	1335.993	1336	30.249	1: 200	225	0.87	34.4	4	1.81	5.8	59.70	22.16
	SW16	SW17	0	1335.993	1336	21.255	1: 200	225	0.87	34.4	4	2.22	6.2	57.90	21.49

Note: This spreadsheet calculates the flow in pipes based on the Modified Rational Method and a Return Period of: 2 years.

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Project: Residential Development at Stocking Lane, Ballyboden, Dublin

Job No: 2385

Page No: 2

Date: Nov. 2023 Calc'd by: S.H Checked by: G.P

Remarks	From	To	Area (m^2)	Previous Area (m^2)	Total Area (m^2)	Length of Pipe (m)	Gradient	Size (mm)	Velocity (m/s)	Capacity (l/s)	Time of Entry (min)	Time of Flow (min)	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Total Run-Off (l/s)
Catchment Area B	SW18	SW20	294.3	0	294.3	44.938	1: 100	225	1.22	48.6	4	0.61	4.6	65.50	5.36
	SW19	SW20	389.5	0	389.5	43.753	1: 200	225	0.87	34.4	4	0.84	4.8	64.50	6.98
	SW20	SW21	213.6	389.5	603.1	18.996	1: 40	225	1.93	76.9	4	0.16	4.2	68.10	11.41
	SW21	SW22	107.1	603.137	710.3	24.056	1: 40	225	1.93	76.9	4	0.21	4.2	68.10	13.44
	SW22	SW23	153	710.2676	863.3	9.048	1: 20	225	2.74	108.8	4	0.06	4.1	68.60	16.45
	SW23	Ex. SW	77.19	863.3146	940.5	4.834	1: 100	225	1.22	48.6	4	0.07	4.1	68.60	17.92

Note: This spreadsheet calculates the flow in pipes based on the Modified Rational Method and a Return Period of: 2 years.

Appendix G – Correspondence with SDCC

From: Colin Bolger <cbolger@SDUBLINCOCO.ie>
Sent: Wednesday, August 16, 2023 8:38 AM
To: Dan Ryan <dan@goldenport.ie>
Subject: RE: Services map request

Dan,
It is an SDCC asset & will have a wayleave of 3.5m from outside face of pipe if it's less than 3m deep.

Pipe size 450mm - 749mm dia. less than 3m deep = 3.5m
3m - 4m deep = 4m
4m – 5m deep = 5m (from outside face of pipe)

Regards,
Colin

From: Dan Ryan <dan@goldenport.ie>
Sent: Wednesday, August 16, 2023 8:30 AM
To: Colin Bolger <cbolger@SDUBLINCOCO.ie>
Subject: RE: Services map request

Good morning Colin,

No problem, thanks anyway.
Given its an overflow and seems to connect in with the surface water line in Springvale, does it fall under SDCC or IW control ?.

Cheers

Dan

From: Colin Bolger <cbolger@SDUBLINCOCO.ie>
Sent: Wednesday, August 16, 2023 8:17 AM
To: Dan Ryan <dan@goldenport.ie>
Subject: RE: Services map request

Dan,
Unfortunately we do not have much details on this pipe.
What I can tell you is that it is a 600mm dia. overflow pipe from the Ballyboden Reservoir & discharges to the Owendoher River.
Depth is not known & will probably vary given to land contours in that area.
Regards,
Colin