McCloy Consulting

SuDS Design Statement

Stocking Lane, Dublin

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CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Terms of Reference

This drainage design statement was commissioned by South Dublin County Council to support a planning application for a site located at Stocking Lane, Rathfarnham, Dublin 16.

The objective of this report is to inform South Dublin County Council of the intended approach for the site drainage, attenuation, flow control and discharge locations and demonstrate compliance with the requirements of South Dublin County Council Development Plan.

1.2 Statement of Authority

McCloy Consulting is an independent environmental and water engineering consultancy specialising in drainage and SuDS design, surface water management plans and flood risk assessment. The practice has extensive experience in design and implementation of surface water management across Ireland and UK.

1.3 Approach to the Assessment

This report details the SuDS design associated with the proposed development at Stocking Lane, Rathfarnham, Dublin 16. The site is currently greenfield, and the proposals are for the development of ~133no. dwelling units consisting of a mix of social affordable units.

For the purposes of this study, the following resources have been referred to:

- South Dublin County Council Development Plan (2022 – 2028)
- South Dublin County Council: Sustainable Drainage Explanatory Design and Evaluation Guide 2022
- CIRIA C753: The SuDS Manual

2 DESIGN FOR PLANNING APPLICATION

2.1 SuDS Policy and Objectives

The key aspects driving the design are as detailed in Sustainable Drainage Systems of South Dublin County Council's Local Development Plans.

Policy GI4: Require the provision of Sustainable Urban Drainage Systems (SUDS) in the County and maximise the amenity and biodiversity value of these systems.

The requirements apply to all developments reviewed by South Dublin County Council as part of the planning process.

The objectives that support the policy are summarised as follows:

Policy GI4: Sustainable Drainage Systems Objectives	Objective Summary
Objective 1	To limit surface water from new developments through SuDS / nature-based solutions.
Objective 2	To incorporate a SuDS management train which manages surface water in small catchments.
Objective 3	Open space provision to include for ecology / sustainable water management.
Objective 4	SuDS measures are completed to 'taking in charge' standard.
Objective 5	Promotion of SuDS in greening of urban areas to restrict / delay run-off entering drainage networks.
Objective 6	Maintain and enhance existing drainage in the County; promote SuDS to control surface water outfall and protect water quality.

2.2 Site details

Specific design details relating to the site itself are as follows:

- The site covers an area of 0.6ha, and is located at ING coordinates; 312887E, 226026N.
- Existing land cover is greenfield, bordered by treelines/hedgerows. Bordering the site to the southeast is Stocking Lane, to the north is Stocking Ave, and to the southwest is a residential property.
- The site has a fall from southeast to northwest. Ground levels range from ~132m above Ordnance Datum (AOD) at the southeastern corner to ~118mAOD at the northwestern corner. The site's length is ~200m, resulting in an average gradient of 1:14.

2.3 Surface Water Management Approach

The development runoff will be collected and stored using green roofs, permeable paving (and associated voided storage within the subbase of the pavement), shallow subbase replacement attenuation system (permavoid), basin and rain gardens. Flow controls will be used throughout the site to incrementally limit flow rates and utilise the storage within the various SuDS features, with final discharge limited to equivalent greenfield runoff rates. Flows are proposed to discharge to the existing storm sewer which runs along the adjacent road to the north boundary of the site.

The proposed SuDS layout is included in Appendix C.

Hydraulic calculations are included in Appendix B.

2.4 Quantity - Hydraulic Design

2.4.1 Design parameters

The following was adopted in the analysis of the proposed SuDS elements at the site:

- 100-year return period (1% AEP) event plus climate change allowance of 20%.
- Assumption that all roof areas produce 95% runoff, paved areas are 90% runoff and green roofs are 85% runoff.

Soil conditions

- Geological Survey Ireland (GSI) online mapping data indicates the site is underlain by bedrock geology of Butter Mountain Formation – Slate schist, quartzite, coticule. Groundwater Recharge data indicates a recharge of 200mm/year and Groundwater Subsoil Permeability is indicated as 'moderate'.
- SIS National Soil Survey data relating to the soils on the site identifies no soil type present at the location of the site, with 'bedrock at or close to surface'.
- GSI online borehole records have been searched, and the closest is identified ~5km to the northwest of the site. This is considered too remote to provide a suitable assessment of soils/ geology at the site.

Based upon analysis of available information on soil conditions, infiltration potential is anticipated to be low and Soil WRAP Class of 4 has been selected accordingly.

A detailed site investigation including infiltration tests will be carried out in advance of the detailed design (including SuDS design) and design parameters will be adjusted to suit where infiltration is established as being viable at the site.

2.4.2 Allowable discharge rate

The greenfield runoff rate or Qbar has been calculated as 4.0l/s based upon soil WRAP Class of 4.

2.4.3 Flow route analysis

At concept stage a flow route analysis was undertaken to understand the flow patterns across the site in the existing and proposed scenarios. Flow route analysis is presented in Appendix C.

2.4.4 Designing for exceedance

In the event of any exceedance flood events, site levels will be designed to divert overland flows away from and around buildings, to lower lying parts of the site to the north. Exceedance flow routes are shown in the flow route analysis presented in Appendix C.

2.4.5 Attenuation storage design

Attenuation provision for the site as follows:

- The site has 2070m^2 proposed development (impermeable area including permeable pavement).
- Effective storage proposed for the site is 172m^3.
- This equates to 0.083m^3 of storage per m2 of development.

2.5 Quality - Pollution Control

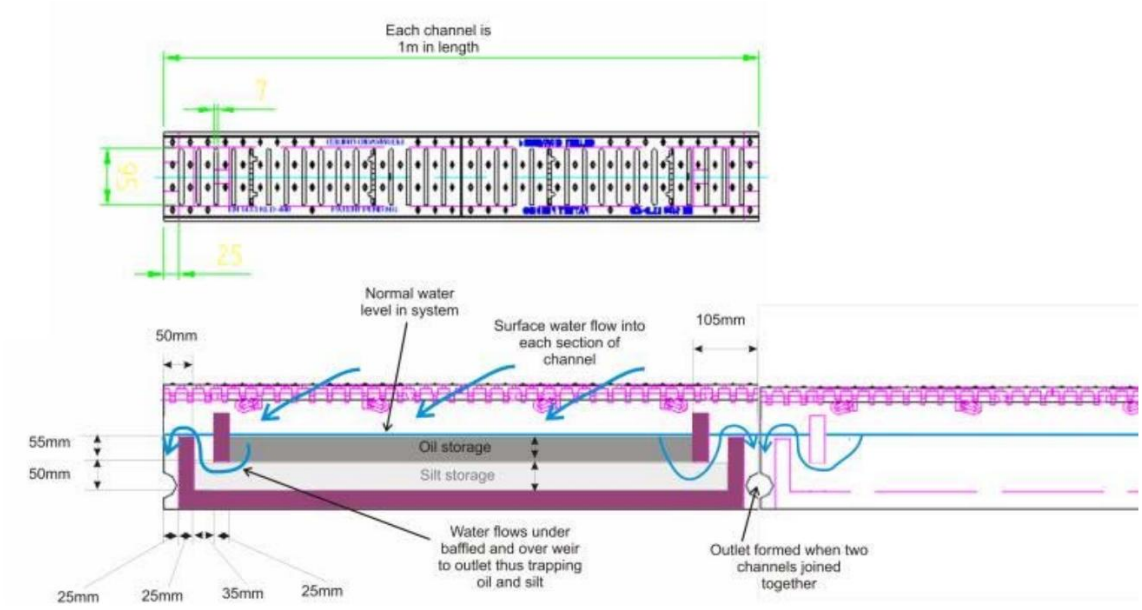
The proposed development consists of roofing and residential car parking / traffic, and is assessed as low pollution hazard per CIRIA C753 SuDS Manual, Table 26.2. The SuDS manual indicates source hazard indices per Table 2-1.

The larger carpark area is anticipated to receive the most traffic and therefore will be the most polluted. The treatment train for the larger carpark will be permeable pavement and either rain garden or basin. Per CIRIA C753, Table 26.3, the mitigation indices of a permeable paving would exceed the respective pollution hazard indices shown below.

Table 2-1 Pollution Control Hazard and Treatment Indices

Pollutant	Source Hazard Index (Risk score)	Permeable pavement/ surface (Mitigation score)	Total Mitigation Index >=0 deemed compliant	Compliant?
TSS	0.5	0.7	-0.2	Yes
Metals	0.4	0.6	-0.2	Yes
Hydrocarbons	0.4	0.7	-0.3	Yes

Surface runoff from the western carpark (small with 4 carpark spaces) will discharge through permachannels which provide treatment with removal of silt and oil as per diagram below.



An independent research paper on the efficacy of permachannel is contained within the following link.

Stormwater quality performance of a macro-pervious pavement car park installation equipped with channel drain based oil and silt retention devices - ScienceDirect

https://www.sciencedirect.com/science/article/pii/S0043135413006039

The treatment performance of the channel is considered to meet site requirements proportionate to the level of pollution likely to be experienced within the small carpark / surface runoff area.

All other roof and paved areas are prosed to discharge via swales and attenuation basins and will be provided with a sufficient treatment. The proposed SuDS features are considered suitable for the nature of the development in terms of pollution risk mitigation.

2.6 Amenity and Biodiversity

SuDS have been integrated into the scheme design with the following approach adopted;

- Rain gardens been integrated within amenity space.
- Rain planters are proposed for the frontage of houses.
- Permeable pavement provides collection, treatment of storage of rainfall runoff whilst also providing trafficable function for access and parking.
- Within the main amenity space, swales and planted basin are proposed.
- Green roofs proposed on two of the proposed buildings.

SuDS features such as the proposed raingarden, basin, planters and swale offer opportunities for planting of native species supporting delivery of the All-Ireland Pollinator Plan[1].

2.7 Maintenance Requirements

The developer is to ensure that maintenance of the drainage system is provided for as part of the overall management plan for the site.

Maintenance plans for drainage features are detailed on the following table.

Table 2-2 Drainage System Maintenance Requirements

Flow Controls, Inspection Chambers and Sediment Traps		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly
	Remove debris and sediment from chambers.	Monthly for first six months, then quarterly or after significant storm.
Remedial actions	Repair/rehabilitate where required.	As required
Monitoring	Check all structures to ensure all is in good condition and operating as designed.	Annually
	(Flow controls) check for evidence of blockage.	Monthly or after significant storm.
	(Flow controls) check for damage to components.	Annually or after significant storm.

[1] All-Ireland Pollinator Plan » All-Ireland Pollinator Plan

Permeable Paving		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing (standard cosmetic sweep over whole surface).	Once per year, after autumn leaf fall, or reduced frequency as required, based on site- specific observations of clogging or manufacturers recommendation- pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying.	As required once per year on less frequently used pavements.
Remedial Action	Remediation of any landscaping which, through vegetation maintenance, causes soil to spill from the rain planter to the permeable pavement.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging).
Monitoring	Initial inspection.	Monthly for three months after installation.
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action.	Three- monthly, 48hours after large storms for first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequency.	Annually

	Monitor inspection chambers.	Annually

Raingarden, Swales and Attenuation Basins		
Maintenance Schedule	Required Action	Typical Frequency
Regular inspections	Inspect filtration surfaces for silting / ponding. Record dewatering time and assess standing water levels in any underdrain to determine if maintenance is necessary.	Quarterly
	Check operation of underdrains by inspection of flows after rain.	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary.	Quarterly
	Inspect inlets and outlets for blockage.	Quarterly
Regular Maintenance	Remove litter, surface debris and weeds.	Quarterly
	Replace any plants to maintain density.	As required
Occasional Maintenance	Infill any holes / scour in filter medium. Improve erosion protection if required.	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch.	As required
Remedial actions	Remove and replace filter medium and vegetation above.	As required but likely to be >20 years.

Inlets, Chambers, Channels and Sediment Traps		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly
	Remove debris and sediment from chambers	Monthly for first six months, then quarterly or after significant storm
Remedial actions	Repair/rehabilitate where required	As required
Monitoring	Check all structures to ensure all is in good condition and operating as designed.	Annually

	(Flow controls and permachannel) check for evidence of blockage	Monthly or after significant storm.
	(Flow controls and permachannel) check for damage to components	Annually or after significant storm.

2.8 Summary / Demonstration of Compliance

The proposed development is resilient to surface water flooding. Site drainage design shall ensure the site is drained and flood resilient. Drainage design shall be as per the requirements of South Dublin County Council Policy GI4 – Sustainable Drainage Systems.

Table 2-3 Demonstration of Compliance with South Dublin County Council Planning Policy

Policy GI4: SuDS Objectives	Description of Objective	Demonstration of compliance
Objective 1	To limit surface water from new developments through SuDS / nature-based solutions.	The proposals involve the use of a new raingarden, swales, attenuation basins and permeable paved areas.
Objective 2	To incorporate a SuDS management train which manages surface water in small catchments.	The SuDS features have been applied to individual sections of roof and/or paved areas and have been contained at or close to source.
Objective 3	Open space provision to include for ecology / sustainable water management.	The raingarden shall undergo appropriate planting and ongoing maintenance to ensure contribution to ecology and biodiversity.
Objective 4	SuDS measures are completed to taking in charge standard.	Any areas which may be taken in charge will be designed to a taken in charge standard.
Objective 5	Promotion of SuDS in greening of urban areas to restrict / delay run-off entering drainage networks.	The proposals involve the introduction of green roofs, raingarden, swales and attenuation basins, which will provide biodiversity benefit. Discharge has been restricted to greenfield runoff rates.
Objective 6	Maintain and enhance existing drainage in the County; promote SuDS to control surface water outfall and protect water quality.	Water quality pollution risk for the drained area is low (roofing; residential traffic / car parking); however above ground features and permeable paving offer removal of pollutants. Proposal includes flow control devices to reduce run-off rates from the development area.

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Appendix A

Architect's Proposals

Appendix B

Hydraulic Calculations

Appendix C

Proposed SuDS Layout Plan

Appendix D

Utility Records / GPR Survey

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	5.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	20	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	18.300	Minimum Backdrop Height (m)	1.000
Ratio-R	0.300	Preferred Cover Depth (m)	0.000
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Public SW MH19			118.980	1200	-36.001	98.571	2.670
MH01			120.200	600	-35.157	93.942	2.550
MH01b Att Basin 2 Outlet		5.00	120.000	600	-39.468	91.428	0.500
Att Basin 2 Inlet			121.000		-40.072	89.815	1.484
MH02			121.000	600	-19.676	96.621	1.964
Carpark W01 In	0.009	5.00	121.500		-11.109	94.192	1.100
MH03			122.000		-5.681	97.306	1.500
Att Basin 1 HW		5.00	122.000		-4.175	96.703	1.000
Swale North Out			123.500		17.181	98.830	2.460
MH04 Swale North In			124.600	600	50.927	103.633	0.600
Carpark N01 Out	0.004	5.00	124.600		53.366	102.711	0.550
Carpark N01 In			124.600		56.091	100.171	0.539
Carpark N02 Out	0.005	5.00	125.100		56.735	99.385	0.600
Carpark N02 In			125.100		58.681	97.101	0.589
Carpark N03 Out	0.005	5.00	125.600		59.274	96.315	0.600
Carpark N03 In			125.600		61.017	94.012	0.589
Carpark N04 Out	0.005	5.00	126.100		61.584	93.257	0.600
Carpark N04 In			126.100		63.329	90.943	0.589
Cascade Out			123.500		-1.566	86.315	2.460
Swale South Out			124.300		-0.640	81.584	0.300
Swale South In			125.650		38.665	82.509	0.300
Raingarden Out		5.00	126.250		44.843	82.663	0.450
Raingarden In			126.250		54.902	82.579	0.500
Carpark S01 Out	0.005	5.00	126.500		58.142	84.574	0.500
Carpark S01 In			126.500		63.877	86.675	0.489
Carpark S02 Out	0.004	5.00	126.900		64.722	86.011	0.600
Carpark S02 In			126.900		66.365	83.413	0.589
Carpark S03 Out	0.004	5.00	127.300		66.839	82.806	0.600
Carpark S03 In			127.300		68.453	80.198	0.589
Carpark S04 Out	0.005	5.00	127.700		68.990	79.452	0.600
Carpark S04 In			127.700		71.903	77.334	0.589
Carpark S05 Out	0.006	5.00	128.100		72.470	76.542	0.600
Carpark S05 In			128.100		76.949	75.950	0.589
Carpark S06 Out	0.005	5.00	128.500		77.707	75.296	0.600
Carpark S06 In			128.500		82.370	74.917	0.589
Carpark S07 Out	0.005	5.00	128.900		83.129	74.237	0.600
Carpark S07 In			128.900		87.909	74.025	0.589
Carpark S08 Out	0.005	5.00	129.300		88.705	73.256	0.600
Carpark S08 In			129.300		93.471	72.922	0.589

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Carpark S09 Out	0.005	5.00	129.700		94.308	72.225	0.600
Carpark S09 In			129.700		99.009	71.960	0.589
Carpark S10 Out	0.005	5.00	130.100		99.854	71.259	0.600
Carpark S10 In			130.100		104.642	70.904	0.589
Carpark S11 Out	0.005	5.00	130.500		105.398	70.256	0.600
Carpark S11 In			130.500		110.110	69.965	0.589
Carpark S12 Out	0.004	5.00	130.900		111.075	69.300	0.600
Carpark S12 In			130.900		115.585	68.839	0.589
Carpark S13 Out	0.002	5.00	131.200		116.422	68.289	0.600
Carpark S13 In			131.200		119.051	66.985	0.589
MH05			125.000	600	59.767	103.637	0.950
MH06			126.000	600	82.956	104.676	1.050
MH07			127.800	600	114.919	103.635	1.050
Roof Central	0.050	5.00	129.000		114.926	96.938	1.000
MH08			129.000	600	144.672	101.406	1.000
MH09			129.300	600	154.406	97.353	1.000
Roof NE	0.007	5.00	129.800		155.684	94.581	1.000
MH10			130.000	600	162.346	92.640	1.000
Roof SE Out	0.012	5.00	131.000		158.737	85.733	1.500
Carpark W01 Out	0.019	5.00	121.000		-15.842	93.607	0.600
Footpath 90m2	0.009	5.00	129.000		146.847	102.071	0.500
Roof W1 Out	0.002	5.00	123.000		-30.763	91.176	1.500
Roof W1 In			123.000		-30.307	89.543	1.500
Roof W2 Out	0.002	5.00	123.000		-30.043	88.294	1.150
Roof W2 In			123.000		-29.658	87.117	1.150
Roof W3 Out	0.002	5.00	123.000		-29.230	85.691	0.800
Roof W3 In			123.000		-28.905	84.571	0.800
Roof W4 Out	0.002	5.00	123.000		-28.595	83.530	0.450
Roof W4 In			123.000		-28.264	82.540	0.450
Roof SE In			131.000		156.135	74.894	1.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/h
.100 Outfall	MH01	Public SW MH19	4.430	0.600	117.650	116.310	1.340	3.3	150	5.00	50.
.001	MH01b Att Basin 2 Outlet	MH01	5.730	0.600	119.500	117.700	1.800	3.2	100	5.00	50.
.000	MH02	MH01	19.780	0.600	119.036	118.839	0.197	100.4	150	5.00	50.
.000	MH03	MH02	9.070	0.600	120.500	119.036	1.464	6.2	150	5.00	50.

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.100 Outfall	5.583	98.7	4.1	2.400	2.520	0.019	0.0	21	2.764
1.001	4.367	34.3	0.0	0.400	2.400	0.000	0.0	0	0.000
1.000	1.003	17.7	4.1	1.814	1.211	0.019	0.0	49	0.816
2.000	4.075	72.0	0.0	1.350	1.814	0.000	0.0	0	0.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.001	Carpark S01 Out	Raingarden In	3.805	0.600	126.000	125.750	0.250	15.2	100	5.00	50.0
4.000	MH05	MH04 Swale North In	7.420	0.600	124.050	124.000	0.050	148.4	225	5.00	50.0
4.001	Carpark N01 Out	MH04 Swale North In	2.607	0.600	124.050	124.000	0.050	52.1	100	5.00	50.0
5.000	MH06	MH05	21.720	0.600	124.950	124.050	0.900	24.1	150	5.00	50.0
6.000	MH07	MH06	29.280	0.600	126.750	124.950	1.800	16.3	150	5.00	50.0
7.001	Roof Central	MH07	6.697	0.600	128.000	126.800	1.200	5.6	100	5.00	50.0
7.000	MH08	MH07	27.460	0.600	128.000	126.800	1.200	22.9	100	5.00	50.0
8.000	MH09	MH08	9.740	0.600	128.300	128.000	0.300	32.5	100	5.00	50.0
9.001	Roof NE	MH09	3.052	0.600	128.800	128.300	0.500	6.1	100	5.00	50.0
9.000	MH10	MH09	8.410	0.600	129.000	128.300	0.700	12.0	100	5.00	50.0
10.000	Roof SE Out	MH10	7.100	0.600	129.500	129.000	0.500	14.2	100	5.00	50.0
4.004	Carpark N04 Out	Carpark N03 In	1.000	0.600	125.500	125.300	0.200	5.0	50	5.00	50.0
4.003	Carpark N03 Out	Carpark N02 In	1.000	0.600	125.000	124.800	0.200	5.0	50	5.00	50.0
4.002	Carpark N02 Out	Carpark N01 In	1.000	0.600	124.500	124.300	0.200	5.0	50	5.00	50.0
3.013	Carpark S13 Out	Carpark S12 In	1.000	0.600	130.600	130.500	0.100	10.0	50	5.00	50.0
3.012	Carpark S12 Out	Carpark S11 In	1.000	0.600	130.300	130.200	0.100	10.0	50	5.00	50.0
3.011	Carpark S11 Out	Carpark S10 In	1.000	0.600	129.900	129.800	0.100	10.0	50	5.00	50.0
3.010	Carpark S10 Out	Carpark S09 In	1.000	0.600	129.500	129.400	0.100	10.0	50	5.00	50.0
3.009	Carpark S09 Out	Carpark S08 In	1.000	0.600	129.100	129.000	0.100	10.0	50	5.00	50.0
3.008	Carpark S08 Out	Carpark S07 In	1.000	0.600	128.700	128.600	0.100	10.0	50	5.00	50.0
3.007	Carpark S07 Out	Carpark S06 In	1.000	0.600	128.300	128.200	0.100	10.0	50	5.00	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.001	1.990	15.6	1.1	0.400	0.400	0.005	0.0	18	1.127
4.000	1.071	42.6	16.9	0.725	0.375	0.078	0.0	99	1.012
4.001	1.069	8.4	0.9	0.450	0.500	0.004	0.0	21	0.683
5.000	2.058	36.4	16.9	0.900	0.800	0.078	0.0	72	2.020
6.000	2.510	44.3	16.9	0.900	0.900	0.078	0.0	64	2.343
7.001	3.295	25.9	10.8	0.900	0.900	0.050	0.0	45	3.144
7.000	1.620	12.7	6.1	0.900	0.900	0.028	0.0	49	1.604
8.000	1.358	10.7	4.1	0.900	0.900	0.019	0.0	43	1.275
9.001	3.150	24.7	1.5	0.900	0.900	0.007	0.0	17	1.737
9.000	2.241	17.6	2.6	0.900	0.900	0.012	0.0	26	1.612
10.000	2.061	16.2	2.6	1.400	0.900	0.012	0.0	27	1.507
4.004	2.191	4.3	1.1	0.550	0.250	0.005	0.0	17	1.799
4.003	2.191	4.3	1.1	0.550	0.250	0.005	0.0	17	1.799
4.002	2.191	4.3	1.1	0.550	0.250	0.005	0.0	17	1.799
3.013	1.546	3.0	0.4	0.550	0.350	0.002	0.0	13	1.090
3.012	1.546	3.0	0.9	0.550	0.250	0.004	0.0	18	1.331
3.011	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415
3.010	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415
3.009	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415
3.008	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415
3.007	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.006	Carpark S06 Out	Carpark S05 In	1.000	0.600	127.900	127.800	0.100	10.0	50	5.00	50.0
3.005	Carpark S05 Out	Carpark S04 In	1.000	0.600	127.500	127.400	0.100	10.0	50	5.00	50.0
3.004	Carpark S04 Out	Carpark S03 In	1.000	0.600	127.100	127.000	0.100	10.0	50	5.00	50.0
3.003	Carpark S03 Out	Carpark S02 In	1.000	0.600	126.700	126.600	0.100	10.0	50	5.00	50.0
3.002	Carpark S02 Out	Carpark S01 In	1.000	0.600	126.300	126.200	0.100	10.0	50	5.00	50.0
Swale South	Swale South In	Swale South Out	39.320	0.030	125.350	124.000	1.350	29.1	300	5.00	50.0
Swale North	MH04 Swale North In	Swale North Out	34.086	0.030	124.000	123.200	0.800	42.6	300	5.00	50.0
3.000	Raingarden Out	Swale South In	6.180	0.600	125.800	125.350	0.450	13.7	100	5.00	50.0
Cascade	Swale South Out	Cascade Out	4.821	0.030	124.000	123.200	0.800	6.0	300	5.00	50.0
Att Basin 1 Out	Att Basin 1 HW	MH03	1.622	0.600	121.000	120.500	0.500	3.2	150	5.00	50.0
2.001	Carpark W01 Out	MH02	4.877	0.600	120.400	119.086	1.314	3.7	100	5.00	50.0
8.001	Footpath 90m2	MH08	2.274	0.600	128.500	128.000	0.500	4.5	100	5.00	50.0
1.005	Roof W4 Out	Roof W3 In	1.000	0.600	122.550	122.220	0.330	3.0	50	5.00	50.0
1.004	Roof W3 Out	Roof W2 In	1.000	0.600	122.200	121.870	0.330	3.0	50	5.00	50.0
1.003	Roof W2 Out	Roof W1 In	1.000	0.600	121.850	121.520	0.330	3.0	50	5.00	50.0
1.002	Roof W1 Out	Att Basin 2 Inlet	9.408	0.600	121.500	120.000	1.500	6.3	100	5.00	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.006	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415
3.005	1.546	3.0	1.3	0.550	0.250	0.006	0.0	23	1.490
3.004	1.546	3.0	1.1	0.550	0.250	0.005	0.0	21	1.415
3.003	1.546	3.0	0.9	0.550	0.250	0.004	0.0	18	1.331
3.002	1.546	3.0	0.9	0.550	0.250	0.004	0.0	18	1.331
Swale South	2.089	1190.9	0.0	0.000	0.000	0.000	0.0	0	0.000
Swale North	1.727	984.6	17.8	0.300	0.000	0.082	0.0	33	0.494
3.000	2.096	16.5	0.0	0.350	0.200	0.000	0.0	0	0.000
Cascade	4.593	2618.0	0.0	0.000	0.000	0.000	0.0	0	0.000
Att Basin 1 Out	5.636	99.6	0.0	0.850	1.350	0.000	0.0	0	0.000
2.001	4.043	31.8	4.1	0.500	1.814	0.019	0.0	25	2.809
8.001	3.651	28.7	2.0	0.400	0.900	0.009	0.0	18	2.072
1.005	2.819	5.5	0.4	0.400	0.730	0.002	0.0	10	1.678
1.004	2.819	5.5	0.4	0.750	1.080	0.002	0.0	10	1.678
1.003	2.819	5.5	0.4	1.100	1.430	0.002	0.0	10	1.678
1.002	3.107	24.4	0.4	1.400	0.900	0.002	0.0	9	1.139

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.100 Outfall	4.430	3.3	150	Circular	120.200	117.650	2.400	118.980	116.310	2.520
1.001	5.730	3.2	100	Circular	120.000	119.500	0.400	120.200	117.700	2.400
1.000	19.780	100.4	150	Circular	121.000	119.036	1.814	120.200	118.839	1.211
2.000	9.070	6.2	150	Circular	122.000	120.500	1.350	121.000	119.036	1.814
3.001	3.805	15.2	100	Circular	126.500	126.000	0.400	126.250	125.750	0.400
4.000	7.420	148.4	225	Circular	125.000	124.050	0.725	124.600	124.000	0.375
4.001	2.607	52.1	100	Circular	124.600	124.050	0.450	124.600	124.000	0.500
5.000	21.720	24.1	150	Circular	126.000	124.950	0.900	125.000	124.050	0.800
6.000	29.280	16.3	150	Circular	127.800	126.750	0.900	126.000	124.950	0.900
7.001	6.697	5.6	100	Circular	129.000	128.000	0.900	127.800	126.800	0.900
7.000	27.460	22.9	100	Circular	129.000	128.000	0.900	127.800	126.800	0.900
8.000	9.740	32.5	100	Circular	129.300	128.300	0.900	129.000	128.000	0.900
9.001	3.052	6.1	100	Circular	129.800	128.800	0.900	129.300	128.300	0.900
9.000	8.410	12.0	100	Circular	130.000	129.000	0.900	129.300	128.300	0.900
10.000	7.100	14.2	100	Circular	131.000	129.500	1.400	130.000	129.000	0.900
4.004	1.000	5.0	50	Circular	126.100	125.500	0.550	125.600	125.300	0.250
4.003	1.000	5.0	50	Circular	125.600	125.000	0.550	125.100	124.800	0.250
4.002	1.000	5.0	50	Circular	125.100	124.500	0.550	124.600	124.300	0.250
3.013	1.000	10.0	50	Circular	131.200	130.600	0.550	130.900	130.500	0.350
3.012	1.000	10.0	50	Circular	130.900	130.300	0.550	130.500	130.200	0.250
3.011	1.000	10.0	50	Circular	130.500	129.900	0.550	130.100	129.800	0.250

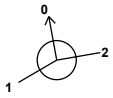
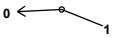
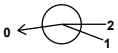
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.100 Outfall	MH01	600	Manhole	Adoptable	Public SW MH19	1200	Manhole	Adoptable
1.001	MH01b Att Basin 2 Outlet	600	Manhole	Adoptable	MH01	600	Manhole	Adoptable
1.000	MH02	600	Manhole	Adoptable	MH01	600	Manhole	Adoptable
2.000	MH03		Junction		MH02	600	Manhole	Adoptable
3.001	Carpark S01 Out		Junction		Raingarden In		Junction	
4.000	MH05	600	Manhole	Adoptable	MH04 Swale North In	600	Manhole	Adoptable
4.001	Carpark N01 Out		Junction		MH04 Swale North In	600	Manhole	Adoptable
5.000	MH06	600	Manhole	Adoptable	MH05	600	Manhole	Adoptable
6.000	MH07	600	Manhole	Adoptable	MH06	600	Manhole	Adoptable
7.001	Roof Central		Junction		MH07	600	Manhole	Adoptable
7.000	MH08	600	Manhole	Adoptable	MH07	600	Manhole	Adoptable
8.000	MH09	600	Manhole	Adoptable	MH08	600	Manhole	Adoptable
9.001	Roof NE		Junction		MH09	600	Manhole	Adoptable
9.000	MH10	600	Manhole	Adoptable	MH09	600	Manhole	Adoptable
10.000	Roof SE Out		Junction		MH10	600	Manhole	Adoptable
4.004	Carpark N04 Out		Junction		Carpark N03 In		Junction	
4.003	Carpark N03 Out		Junction		Carpark N02 In		Junction	
4.002	Carpark N02 Out		Junction		Carpark N01 In		Junction	
3.013	Carpark S13 Out		Junction		Carpark S12 In		Junction	
3.012	Carpark S12 Out		Junction		Carpark S11 In		Junction	
3.011	Carpark S11 Out		Junction		Carpark S10 In		Junction	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.010	1.000	10.0	50	Circular	130.100	129.500	0.550	129.700	129.400	0.250
3.009	1.000	10.0	50	Circular	129.700	129.100	0.550	129.300	129.000	0.250
3.008	1.000	10.0	50	Circular	129.300	128.700	0.550	128.900	128.600	0.250
3.007	1.000	10.0	50	Circular	128.900	128.300	0.550	128.500	128.200	0.250
3.006	1.000	10.0	50	Circular	128.500	127.900	0.550	128.100	127.800	0.250
3.005	1.000	10.0	50	Circular	128.100	127.500	0.550	127.700	127.400	0.250
3.004	1.000	10.0	50	Circular	127.700	127.100	0.550	127.300	127.000	0.250
3.003	1.000	10.0	50	Circular	127.300	126.700	0.550	126.900	126.600	0.250
3.002	1.000	10.0	50	Circular	126.900	126.300	0.550	126.500	126.200	0.250
Swale South	39.320	29.1	300	Swale	125.650	125.350	0.000	124.300	124.000	0.000
Swale North	34.086	42.6	300	Swale	124.600	124.000	0.300	123.500	123.200	0.000
3.000	6.180	13.7	100	Circular	126.250	125.800	0.350	125.650	125.350	0.200
Cascade	4.821	6.0	300	Swale	124.300	124.000	0.000	123.500	123.200	0.000
Att Basin 1 Out	1.622	3.2	150	Circular	122.000	121.000	0.850	122.000	120.500	1.350
2.001	4.877	3.7	100	Circular	121.000	120.400	0.500	121.000	119.086	1.814
8.001	2.274	4.5	100	Circular	129.000	128.500	0.400	129.000	128.000	0.900
1.005	1.000	3.0	50	Circular	123.000	122.550	0.400	123.000	122.220	0.730
1.004	1.000	3.0	50	Circular	123.000	122.200	0.750	123.000	121.870	1.080
1.003	1.000	3.0	50	Circular	123.000	121.850	1.100	123.000	121.520	1.430
1.002	9.408	6.3	100	Circular	123.000	121.500	1.400	121.000	120.000	0.900

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.010	Carpark S10 Out		Junction		Carpark S09 In		Junction	
3.009	Carpark S09 Out		Junction		Carpark S08 In		Junction	
3.008	Carpark S08 Out		Junction		Carpark S07 In		Junction	
3.007	Carpark S07 Out		Junction		Carpark S06 In		Junction	
3.006	Carpark S06 Out		Junction		Carpark S05 In		Junction	
3.005	Carpark S05 Out		Junction		Carpark S04 In		Junction	
3.004	Carpark S04 Out		Junction		Carpark S03 In		Junction	
3.003	Carpark S03 Out		Junction		Carpark S02 In		Junction	
3.002	Carpark S02 Out		Junction		Carpark S01 In		Junction	
Swale South	Swale South In		Junction		Swale South Out		Junction	
Swale North	MH04 Swale North In	600	Manhole	Adoptable	Swale North Out		Junction	
3.000	Raingarden Out		Junction		Swale South In		Junction	
Cascade	Swale South Out		Junction		Cascade Out		Junction	
Att Basin 1 Out	Att Basin 1 HW		Junction		MH03		Junction	
2.001	Carpark W01 Out		Junction		MH02	600	Manhole	Adoptable
8.001	Footpath 90m2		Junction		MH08	600	Manhole	Adoptable
1.005	Roof W4 Out		Junction		Roof W3 In		Junction	
1.004	Roof W3 Out		Junction		Roof W2 In		Junction	
1.003	Roof W2 Out		Junction		Roof W1 In		Junction	
1.002	Roof W1 Out		Junction		Att Basin 2 Inlet		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Public SW MH19	-36.001	98.571	118.980	2.670	1200	1	1.100 Outfall	116.310	150
									
MH01	-35.157	93.942	120.200	2.550	600	1	1.001	117.700	100
						2	1.000	118.839	150
									
						0	1.100 Outfall	117.650	150
MH01b Att Basin 2 Outlet	-39.468	91.428	120.000	0.500	600				
						0	1.001	119.500	100
Att Basin 2 Inlet	-40.072	89.815	121.000	1.484		1	1.002	120.000	100
MH02	-19.676	96.621	121.000	1.964	600	1	2.001	119.086	100
						2	2.000	119.036	150
									
						0	1.000	119.036	150
Carpark W01 In	-11.109	94.192	121.500	1.100					
MH03	-5.681	97.306	122.000	1.500		1	Att Basin 1 Out	120.500	150
									
						0	2.000	120.500	150
Att Basin 1 HW	-4.175	96.703	122.000	1.000					
						0	Att Basin 1 Out	121.000	150
Swale North Out	17.181	98.830	123.500	2.460		1	Swale North	123.200	300
									
MH04 Swale North In	50.927	103.633	124.600	0.600	600	1	4.001	124.000	100
						2	4.000	124.000	225
									
						0	Swale North	124.000	300
Carpark N01 Out	53.366	102.711	124.600	0.550					
						0	4.001	124.050	100
Carpark N01 In	56.091	100.171	124.600	0.539		1	4.002	124.300	50
									
Carpark N02 Out	56.735	99.385	125.100	0.600					
						0	4.002	124.500	50

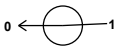
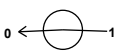
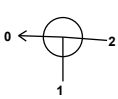
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Carpark N02 In	58.681	97.101	125.100	0.589		1	4.003	124.800	50
Carpark N03 Out	59.274	96.315	125.600	0.600		0	4.003	125.000	50
Carpark N03 In	61.017	94.012	125.600	0.589		1	4.004	125.300	50
Carpark N04 Out	61.584	93.257	126.100	0.600		0	4.004	125.500	50
Carpark N04 In	63.329	90.943	126.100	0.589					
Cascade Out	-1.566	86.315	123.500	2.460		1	Cascade	123.200	300
Swale South Out	-0.640	81.584	124.300	0.300		1	Swale South	124.000	300
						0	Cascade	124.000	300
Swale South In	38.665	82.509	125.650	0.300		1	3.000	125.350	100
						0	Swale South	125.350	300
Raingarden Out	44.843	82.663	126.250	0.450		0	3.000	125.800	100
Raingarden In	54.902	82.579	126.250	0.500		1	3.001	125.750	100
Carpark S01 Out	58.142	84.574	126.500	0.500		0	3.001	126.000	100
Carpark S01 In	63.877	86.675	126.500	0.489		1	3.002	126.200	50
Carpark S02 Out	64.722	86.011	126.900	0.600		0	3.002	126.300	50

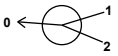
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Carpark S02 In	66.365	83.413	126.900	0.589		1	3.003	126.600	50
									
Carpark S03 Out	66.839	82.806	127.300	0.600					
						0	3.003	126.700	50
Carpark S03 In	68.453	80.198	127.300	0.589		1	3.004	127.000	50
									
Carpark S04 Out	68.990	79.452	127.700	0.600					
						0	3.004	127.100	50
Carpark S04 In	71.903	77.334	127.700	0.589		1	3.005	127.400	50
									
Carpark S05 Out	72.470	76.542	128.100	0.600					
						0	3.005	127.500	50
Carpark S05 In	76.949	75.950	128.100	0.589		1	3.006	127.800	50
									
Carpark S06 Out	77.707	75.296	128.500	0.600					
						0	3.006	127.900	50
Carpark S06 In	82.370	74.917	128.500	0.589		1	3.007	128.200	50
									
Carpark S07 Out	83.129	74.237	128.900	0.600					
						0	3.007	128.300	50
Carpark S07 In	87.909	74.025	128.900	0.589		1	3.008	128.600	50
									
Carpark S08 Out	88.705	73.256	129.300	0.600					
						0	3.008	128.700	50
Carpark S08 In	93.471	72.922	129.300	0.589		1	3.009	129.000	50
									

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Carpark S09 Out	94.308	72.225	129.700	0.600			0	3.009	129.100	50
Carpark S09 In	99.009	71.960	129.700	0.589		1 	3.010	129.400	50
Carpark S10 Out	99.854	71.259	130.100	0.600			0	3.010	129.500	50
Carpark S10 In	104.642	70.904	130.100	0.589		1 	3.011	129.800	50
Carpark S11 Out	105.398	70.256	130.500	0.600			0	3.011	129.900	50
Carpark S11 In	110.110	69.965	130.500	0.589		1 	3.012	130.200	50
Carpark S12 Out	111.075	69.300	130.900	0.600			0	3.012	130.300	50
Carpark S12 In	115.585	68.839	130.900	0.589		1 	3.013	130.500	50
Carpark S13 Out	116.422	68.289	131.200	0.600			0	3.013	130.600	50
Carpark S13 In	119.051	66.985	131.200	0.589						
MH05	59.767	103.637	125.000	0.950	600	1 	5.000	124.050	150
						0	4.000	124.050	225
MH06	82.956	104.676	126.000	1.050	600	1 	6.000	124.950	150
						0	5.000	124.950	150
MH07	114.919	103.635	127.800	1.050	600	1	7.001	126.800	100
						2 	7.000	126.800	100
						0	6.000	126.750	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Roof Central	114.926	96.938	129.000	1.000			0	7.001	128.000	100
MH08	144.672	101.406	129.000	1.000	600		1	8.001	128.000	100
							2	8.000	128.000	100
							0	7.000	128.000	100
MH09	154.406	97.353	129.300	1.000	600		1	9.001	128.300	100
							2	9.000	128.300	100
							0	8.000	128.300	100
Roof NE	155.684	94.581	129.800	1.000			0	9.001	128.800	100
MH10	162.346	92.640	130.000	1.000	600		1	10.000	129.000	100
							0	9.000	129.000	100
Roof SE Out	158.737	85.733	131.000	1.500			0	10.000	129.500	100
Carpark W01 Out	-15.842	93.607	121.000	0.600			0	2.001	120.400	100
Footpath 90m2	146.847	102.071	129.000	0.500			0	8.001	128.500	100
Roof W1 Out	-30.763	91.176	123.000	1.500			0	1.002	121.500	100
Roof W1 In	-30.307	89.543	123.000	1.500			1	1.003	121.520	50
										
Roof W2 Out	-30.043	88.294	123.000	1.150			0	1.003	121.850	50
Roof W2 In	-29.658	87.117	123.000	1.150			1	1.004	121.870	50
										
Roof W3 Out	-29.230	85.691	123.000	0.800			0	1.004	122.200	50

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Roof W3 In	-28.905	84.571	123.000	0.800		1	1.005	122.220	50
Roof W4 Out	-28.595	83.530	123.000	0.450		0	1.005	122.550	50
Roof W4 In	-28.264	82.540	123.000	0.450					
Roof SE In	156.135	74.894	131.000	1.500					

SuDS Carriers

Link	US Node	DS Node	Link Type	Base Inf Coef (m/hr)	Sides Inf Coef (m/hr)	Safety Factor	Time to Half Empty (mins)
Swale South	Swale South In	Swale South Out	Swale	0.00000	0.00000	2.0	
Swale North	MH04 Swale North In	Swale North Out	Swale	0.00000	0.00000	2.0	1
Cascade	Swale South Out	Cascade Out	Swale	0.00000	0.00000	2.0	

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
Rainfall Events	Singular	Additional Storage (m³/ha)	0.0
FSR Region	Scotland and Ireland	Starting Level (m)	
M5-60 (mm)	18.300	Check Discharge Rate(s)	✓
Ratio-R	0.300	2 year (l/s)	3.8
Summer CV	1.000	30 year (l/s)	7.8
Winter CV	1.000	100 year (l/s)	9.9
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year 360 minute (m³)	185

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	20	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 2 year	0.95
Greenfield Method	IH124	Growth Factor 30 year	1.95
Positively Drained Area (ha)	0.600	Growth Factor 100 year	2.48
SAAR (mm)	921	Betterment (%)	0
Soil Index	4	QBar	4.0
SPR	0.47	Q 2 year (l/s)	3.8
Region	11	Q 30 year (l/s)	7.8

Pre-development Discharge Rate

Q 100 year (l/s)	9.9

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.600	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.507
CWI	124.918	Runoff Volume (m^3)	185

Node MH01b Att Basin 2 Outlet Online Orifice Control

Flap Valve	x	Invert Level (m)	119.500	Diameter (m)	0.021
Downstream Link	1.001	Design Depth (m)	0.300	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.5		

Node Carpark W01 Out Online Orifice Control

Flap Valve	x	Invert Level (m)	120.400	Diameter (m)	0.021
Downstream Link	2.001	Design Depth (m)	0.300	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.5		

Node MH03 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	2.000	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0083-2800-0800-2800
Invert Level (m)	120.500	Min Outlet Diameter (m)	0.100
Design Depth (m)	0.800	Min Node Diameter (mm)	1200
Design Flow (l/s)	2.8		

Node Carpark N01 Out Online Orifice Control

Flap Valve	x	Invert Level (m)	124.050	Diameter (m)	0.038
Downstream Link	4.001	Design Depth (m)	0.450	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	2.0		

Node Roof W4 Out Online Orifice Control

Flap Valve	x	Invert Level (m)	122.550	Diameter (m)	0.010
Downstream Link	1.005	Design Depth (m)	0.200	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.1		

Node Roof W3 Out Online Orifice Control

Flap Valve	x	Invert Level (m)	122.200	Diameter (m)	0.014
Downstream Link	1.004	Design Depth (m)	0.200	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.2		

Node Roof W2 Out Online Orifice Control

Flap Valve	x	Invert Level (m)	121.850	Diameter (m)	0.018
Downstream Link	1.003	Design Depth (m)	0.200	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		

Node Roof W1 Out Online Orifice Control

Flap Valve	x	Invert Level (m)	121.500	Diameter (m)	0.020
Downstream Link	1.002	Design Depth (m)	0.200	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.4		

Node Roof SE Out Online Orifice Control

Flap Valve	x	Invert Level (m)	129.500	Diameter (m)	0.022
Downstream Link	10.000	Design Depth (m)	0.150	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.4		

Node Att Basin 1 HW Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	20.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	121.000	Main Channel Slope (1:X)	500.0
Safety Factor	2.0	Time to half empty (mins)	88	Main Channel n	0.030

Inlets

Swale North Out | Cascade Out

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	1.000	153.5	186.8

Node MH01b Att Basin 2 Outlet Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	8.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	119.500	Main Channel Slope (1:X)	500.0
Safety Factor	2.0	Time to half empty (mins)	0	Main Channel n	0.030

Inlets

Att Basin 2 Inlet

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	18.0	18.0	0.500	47.6	52.6

Node Raingarden Out Rain Garden Storage Structure

Filter Conductivity (m/hr)	250.00000	Porosity	0.95
Filter Depth (m)	0.300	Invert Level (m)	125.800
Base Inf Coefficient (m/hr)	0.00010	Time to half empty (mins)	0
Side Inf Coefficient (m/hr)	0.00000	Analyse flow through structure	x
Safety Factor	2.0		

Inlets

Raingarden In

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	90.0	0.450	90.0

Node Carpark W01 Out Tank Storage Structure

Invert Level (m)	120.400	Analyse flow through structure	x
Time to half empty (mins)	420		

Inlets

Carpark W01 In

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	60.0	0.300	60.0	0.301	0.0

Node Roof W1 Out Tank Storage Structure

Invert Level (m)	121.500	Analyse flow through structure	x
Time to half empty (mins)	270		

Inlets

Roof W1 In

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	21.5	0.033	21.5	0.034	0.0

Node Roof W2 Out Tank Storage Structure

Invert Level (m)	121.850	Analyse flow through structure	x
Time to half empty (mins)	225		

Inlets

Roof W2 In

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	21.5	0.033	21.5	0.034	0.0

Node Roof W3 Out Tank Storage Structure

Invert Level (m)	122.200	Analyse flow through structure	x
Time to half empty (mins)	240		

Inlets

Roof W3 In

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	21.5	0.033	21.5	0.034	0.0

Node Roof W4 Out Tank Storage Structure

Invert Level (m)	122.550	Analyse flow through structure	x
Time to half empty (mins)	210		

Inlets

Roof W4 In

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	21.5	0.033	21.5	0.034	0.0

Node Carpark N01 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	124.050
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	50
Underdrain Height above base (m)	0.000		

Inlets

Carpark N01 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	40.0	0.600	40.0	55.3

Node Carpark N02 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	124.500
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark N02 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	75.7

Node Carpark N03 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	125.000
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark N03 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	72.6

Node Carpark N04 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	125.500
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark N04 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	72.6

Node Carpark S01 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	126.000
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S01 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	72.3

Node Carpark S02 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	126.300
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	22
Underdrain Height above base (m)	0.000		

Inlets

Carpark S02 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	40.0	0.600	40.0	57.8

Node Carpark S03 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	126.700
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	12
Underdrain Height above base (m)	0.000		

Inlets

Carpark S03 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	40.0	0.600	40.0	57.8

Node Carpark S04 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	127.100
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	8
Underdrain Height above base (m)	0.000		

Inlets

Carpark S04 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	77.9

Node Carpark S05 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	127.500
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S05 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.0	60.0	0.600	60.0	86.5

Node Carpark S06 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	127.900
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S06 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	74.2

Node Carpark S07 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	128.300
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S07 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	74.0

Node Carpark S08 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	128.700
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S08 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	73.9

Node Carpark S09 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	129.100
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S09 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	74.0

Node Carpark S10 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	129.500
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S10 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	73.9

Node Carpark S11 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	129.900
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S11 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	0.600	50.0	74.3

Node Carpark S12 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	130.300
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S12 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	40.0	0.600	40.0	60.1

Node Carpark S13 Out Porous Paving Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00000
Underdrain Diameter (mm)	100	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	4.000	Invert Level (m)	130.600
Underdrain Slope (1:X)	350.0	Time to half empty (mins)	0
Underdrain Height above base (m)	0.000		

Inlets

Carpark S13 In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	20.0	20.0	0.600	20.0	33.0

Node Roof SE Out Tank Storage Structure

Invert Level (m)	129.500	Analyse flow through structure	x
Time to half empty (mins)	570		

Inlets

Roof SE In

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	120.0	0.058	120.0	0.059	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 41.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	Public SW MH19	304	116.330	0.020	3.7	0.0000	0.0000	OK
360 minute summer	MH01	304	117.671	0.021	3.7	0.0059	0.0000	OK
960 minute winter	MH01b Att Basin 2 Outlet	660	119.570	0.070	0.3	0.0199	0.0000	OK
960 minute winter	Att Basin 2 Inlet	660	119.570	0.054	0.3	0.0000	0.0000	OK
360 minute summer	MH02	312	119.082	0.046	3.5	0.0131	0.0000	OK
720 minute summer	Carpark W01 In	495	120.661	0.261	0.9	0.0000	0.0000	OK
360 minute summer	MH03	320	121.478	0.978	12.9	0.0000	0.0000	SURCHARGED
360 minute summer	Att Basin 1 HW	320	121.478	0.478	10.7	0.0000	0.0000	SURCHARGED
360 minute summer	Swale North Out	312	121.480	0.440	9.8	0.0000	0.0000	OK
15 minute summer	MH04 Swale North In	12	124.050	0.050	36.5	0.0142	0.0000	OK
60 minute summer	Carpark N01 Out	49	124.434	0.384	3.4	4.5850	0.0000	FLOOD RISK
60 minute summer	Carpark N01 In	48	124.444	0.383	4.6	0.0000	0.0000	OK
30 minute summer	Carpark N02 Out	22	124.573	0.073	5.5	1.0752	0.0000	SURCHARGED
30 minute summer	Carpark N02 In	22	124.586	0.074	4.3	0.0000	0.0000	OK
15 minute summer	Carpark N03 Out	12	125.041	0.041	4.5	0.5740	0.0000	OK
15 minute summer	Carpark N03 In	12	125.051	0.039	2.4	0.0000	0.0000	OK
15 minute summer	Carpark N04 Out	11	125.527	0.027	2.9	0.3108	0.0000	OK
15 minute summer	Carpark N04 In	12	125.527	0.015	0.1	0.0000	0.0000	OK
360 minute summer	Cascade Out	312	121.479	0.439	4.2	0.0000	0.0000	OK
360 minute summer	Swale South Out	264	124.008	0.008	4.2	0.0000	0.0000	OK
360 minute summer	Swale South In	264	125.363	0.013	4.2	0.0000	0.0000	OK
360 minute summer	Raingarden Out	264	125.839	0.039	8.8	3.8487	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Disch Vol (
minute summer	MH01	1.100 Outfall	Public SW MH19	3.7	2.608	0.037	0.0063	1
minute winter	MH01b Att Basin 2 Outlet	1.001	MH01	0.2	1.223	0.007	0.0011	
minute winter	Att Basin 2 Inlet	Flow through Pond	MH01b Att Basin 2 Outlet	0.3	0.007	0.000	1.2404	
minute summer	MH02	1.000	MH01	3.5	0.773	0.197	0.0894	
minute summer	MH03	2.000	MH02	3.0	1.048	0.042	0.0276	
minute summer	Att Basin 1 HW	Att Basin 1 Out	MH03	12.9	0.825	0.130	0.0286	
minute summer	Swale North Out	Flow through Pond	Att Basin 1 HW	6.2	0.080	0.000	33.8809	
inute summer	MH04 Swale North In	Swale North	Swale North Out	36.2	0.639	0.037	1.9342	
inute summer	Carpark N01 Out	4.001	MH04 Swale North In	1.8	1.176	0.212	0.0064	
inute summer	Carpark N01 In	Porous Paving	Carpark N01 Out	1.8	0.233	0.572		
inute summer	Carpark N02 Out	4.002	Carpark N01 In	4.6	2.490	1.067	0.0020	
inute summer	Carpark N02 In	Porous Paving	Carpark N02 Out	1.9	0.331	0.608		
inute summer	Carpark N03 Out	4.003	Carpark N02 In	4.4	2.488	1.012	0.0018	
inute summer	Carpark N03 In	Porous Paving	Carpark N03 Out	0.7	0.260	0.214		
inute summer	Carpark N04 Out	4.004	Carpark N03 In	2.4	2.250	0.557	0.0011	
inute summer	Carpark N04 In	Porous Paving	Carpark N04 Out	0.1	0.102	0.028		
minute summer	Cascade Out	Flow through Pond	Att Basin 1 HW	6.2	0.080	0.000	33.8809	
minute summer	Swale South Out	Cascade	Cascade Out	4.2	0.524	0.002	0.0382	
minute summer	Swale South In	Swale South	Swale South Out	4.2	0.382	0.003	0.4289	
minute summer	Raingarden Out	3.000	Swale South In	4.2	2.545	0.254	0.0107	
minute summer	Raingarden Out	Filtration		19.6				

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 41.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	Raingarden Out Filter Layer	140	125.800	0.300	7.4	25.6073	0.0000	OK
360 minute summer	Raingarden In	264	125.846	0.096	4.4	0.0000	0.0000	OK
30 minute summer	Carpark S01 Out	19	126.042	0.042	5.6	0.5933	0.0000	OK
30 minute summer	Carpark S01 In	19	126.054	0.042	3.7	0.0000	0.0000	OK
120 minute winter	Carpark S02 Out	122	126.463	0.163	4.3	1.9570	0.0000	SURCHARGED
120 minute winter	Carpark S02 In	122	126.480	0.168	4.2	0.0000	0.0000	OK
120 minute summer	Carpark S03 Out	122	126.859	0.159	4.3	1.9150	0.0000	SURCHARGED
120 minute summer	Carpark S03 In	122	126.876	0.165	4.2	0.0000	0.0000	OK
120 minute winter	Carpark S04 Out	114	127.254	0.154	4.2	2.3116	0.0000	SURCHARGED
120 minute winter	Carpark S04 In	114	127.270	0.159	4.1	0.0000	0.0000	OK
120 minute summer	Carpark S05 Out	108	127.646	0.146	4.2	2.6204	0.0000	SURCHARGED
120 minute summer	Carpark S05 In	108	127.661	0.150	4.0	0.0000	0.0000	OK
120 minute summer	Carpark S06 Out	98	128.036	0.136	4.1	2.0324	0.0000	SURCHARGED
120 minute summer	Carpark S06 In	98	128.051	0.139	3.9	0.0000	0.0000	OK
60 minute winter	Carpark S07 Out	59	128.428	0.128	4.0	1.9150	0.0000	SURCHARGED
60 minute winter	Carpark S07 In	59	128.443	0.131	3.8	0.0000	0.0000	OK
60 minute summer	Carpark S08 Out	53	128.819	0.119	4.1	1.7671	0.0000	SURCHARGED
60 minute summer	Carpark S08 In	53	128.833	0.121	3.7	0.0000	0.0000	OK
60 minute summer	Carpark S09 Out	46	129.206	0.106	4.1	1.5726	0.0000	SURCHARGED
60 minute summer	Carpark S09 In	46	129.219	0.107	3.5	0.0000	0.0000	OK
60 minute summer	Carpark S10 Out	42	129.590	0.090	4.1	1.3184	0.0000	SURCHARGED
30 minute summer	Carpark S10 In	27	129.601	0.090	3.2	0.0000	0.0000	OK
30 minute summer	Carpark S11 Out	22	129.968	0.068	4.1	0.9742	0.0000	SURCHARGED
30 minute summer	Carpark S11 In	22	129.977	0.065	2.7	0.0000	0.0000	OK
15 minute summer	Carpark S12 Out	12	130.337	0.037	2.9	0.3995	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	Raingarden Out Filter Layer	Infiltration		0.0				
30 minute summer	Carpark S01 Out	3.001	Raingarden In	5.6	1.470	0.358	0.0145	
30 minute summer	Carpark S01 In	Porous Paving	Carpark S01 Out	0.8	0.284	0.246		
120 minute winter	Carpark S02 Out	3.002	Carpark S01 In	4.3	2.188	1.410	0.0020	
120 minute winter	Carpark S02 In	Porous Paving	Carpark S02 Out	2.4	0.312	0.742		
120 minute summer	Carpark S03 Out	3.003	Carpark S02 In	4.2	2.171	1.399	0.0020	
120 minute summer	Carpark S03 In	Porous Paving	Carpark S03 Out	2.3	0.305	0.736		
120 minute winter	Carpark S04 Out	3.004	Carpark S03 In	4.2	2.146	1.383	0.0020	
120 minute winter	Carpark S04 In	Porous Paving	Carpark S04 Out	2.3	0.301	0.707		
120 minute summer	Carpark S05 Out	3.005	Carpark S04 In	4.1	2.104	1.356	0.0020	
120 minute summer	Carpark S05 In	Porous Paving	Carpark S05 Out	2.2	0.281	0.682		
120 minute summer	Carpark S06 Out	3.006	Carpark S05 In	4.0	2.049	1.320	0.0020	
120 minute summer	Carpark S06 In	Porous Paving	Carpark S06 Out	2.2	0.290	0.682		
60 minute winter	Carpark S07 Out	3.007	Carpark S06 In	3.9	2.007	1.293	0.0020	
60 minute winter	Carpark S07 In	Porous Paving	Carpark S07 Out	2.1	0.285	0.672		
60 minute summer	Carpark S08 Out	3.008	Carpark S07 In	3.8	1.952	1.258	0.0020	
60 minute summer	Carpark S08 In	Porous Paving	Carpark S08 Out	2.1	0.272	0.655		
60 minute summer	Carpark S09 Out	3.009	Carpark S08 In	3.7	1.879	1.211	0.0020	
60 minute summer	Carpark S09 In	Porous Paving	Carpark S09 Out	2.1	0.276	0.662		
60 minute summer	Carpark S10 Out	3.010	Carpark S09 In	3.5	1.780	1.147	0.0020	
30 minute summer	Carpark S10 In	Porous Paving	Carpark S10 Out	2.1	0.294	0.662		
30 minute summer	Carpark S11 Out	3.011	Carpark S10 In	3.2	1.759	1.066	0.0020	
30 minute summer	Carpark S11 In	Porous Paving	Carpark S11 Out	1.4	0.274	0.453		
15 minute summer	Carpark S12 Out	3.012	Carpark S11 In	2.7	1.747	0.897	0.0016	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 41.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Carpark S12 In	12	130.343	0.032	1.0	0.0000	0.0000	OK
15 minute summer	Carpark S13 Out	11	130.620	0.020	1.1	0.0851	0.0000	OK
15 minute summer	Carpark S13 In	12	130.620	0.009	0.0	0.0000	0.0000	OK
15 minute summer	MH05	11	124.216	0.166	35.6	0.0470	0.0000	OK
15 minute summer	MH06	11	125.078	0.128	35.8	0.0363	0.0000	OK
15 minute summer	MH07	11	126.852	0.102	35.8	0.0289	0.0000	OK
15 minute summer	Roof Central	11	128.419	0.419	28.7	0.0000	0.0000	SURCHARGED
15 minute summer	MH08	10	128.064	0.064	9.2	0.0181	0.0000	OK
15 minute summer	MH09	10	128.342	0.042	4.0	0.0120	0.0000	OK
15 minute summer	Roof NE	10	128.827	0.027	4.0	0.0000	0.0000	OK
1440 minute summer	MH10	900	129.008	0.008	0.2	0.0023	0.0000	OK
1440 minute summer	Roof SE Out	900	129.564	0.064	0.6	6.6839	0.0000	OK
720 minute summer	Carpark W01 Out	495	120.660	0.260	1.5	15.1423	0.0000	SURCHARGED
15 minute summer	Footpath 90m2	10	128.529	0.029	5.2	0.0000	0.0000	OK
960 minute winter	Roof W1 Out	615	121.663	0.163	0.3	0.6882	0.0000	SURCHARGED
960 minute winter	Roof W1 In	615	121.666	0.166	0.2	0.0000	0.0000	OK
960 minute winter	Roof W2 Out	615	121.991	0.141	0.3	0.6885	0.0000	SURCHARGED
960 minute winter	Roof W2 In	615	121.993	0.143	0.2	0.0000	0.0000	OK
960 minute winter	Roof W3 Out	615	122.362	0.162	0.2	0.6914	0.0000	SURCHARGED
960 minute winter	Roof W3 In	615	122.363	0.163	0.1	0.0000	0.0000	OK
960 minute winter	Roof W4 Out	615	122.705	0.155	0.1	0.6963	0.0000	FLOOD RISK
960 minute winter	Roof W4 In	615	122.704	0.154	0.0	0.0000	0.0000	OK
1440 minute summer	Roof SE In	900	129.564	0.064	0.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Carpark S12 In	Porous Paving	Carpark S12 Out	0.4	0.200	0.132		
15 minute summer	Carpark S13 Out	3.013	Carpark S12 In	1.0	1.395	0.338	0.0007	
15 minute summer	Carpark S13 In	Porous Paving	Carpark S13 Out	0.0	0.057	0.010		
15 minute summer	MH05	4.000	MH04 Swale North In	35.6	1.896	0.837	0.1406	
15 minute summer	MH06	5.000	MH05	35.6	2.036	0.980	0.3653	
15 minute summer	MH07	6.000	MH06	35.8	2.514	0.806	0.4217	
15 minute summer	Roof Central	7.001	MH07	26.8	3.531	1.037	0.0524	
15 minute summer	MH08	7.000	MH07	9.0	1.727	0.707	0.1430	
15 minute summer	MH09	8.000	MH08	4.0	0.938	0.372	0.0411	
15 minute summer	Roof NE	9.001	MH09	4.0	1.649	0.161	0.0074	
1440 minute summer	MH10	9.000	MH09	0.2	0.617	0.013	0.0042	
1440 minute summer	Roof SE Out	10.000	MH10	0.2	0.751	0.014	0.0022	
720 minute summer	Carpark W01 Out	2.001	MH02	0.5	1.446	0.014	0.0016	
15 minute summer	Footpath 90m2	8.001	MH08	5.2	1.476	0.181	0.0081	
960 minute winter	Roof W1 Out	1.002	Att Basin 2 Inlet	0.3	1.086	0.013	0.0028	
960 minute winter	Roof W2 Out	1.003	Roof W1 In	0.2	0.995	0.044	0.0011	
960 minute winter	Roof W3 Out	1.004	Roof W2 In	0.2	0.893	0.029	0.0010	
960 minute winter	Roof W4 Out	1.005	Roof W3 In	0.1	0.455	0.015	0.0010	

N

PUBLIC SW MANHOLE (IW REF: MH19) CL: 118.98 IL: 116.36

SWMH01 0.6m Ø PCC MANHOLE CL: 120.20 IL: 117.70

SWMH01b 0.6m Ø PCC MANHOLE FITTED WITH 20mm ORIFICE PLATE CL: 120.00 IL: 119.50

GABION ON OUTLET TO PROVIDE FILTER PRIOR TO FLOW CONTROL CHAMBER

SWMH02 0.6m Ø PCC MANHOLE CL: 121.00 IL: 119.50

SWMH02b 0.6m Ø PCC MANHOLE CL: 121.50 IL: 120.00

PERMACHANNEL

SWMH003 1.2m Ø PCC MANHOLE FITTED WITH VORTEX FLOW CONTROL TO LIMIT DISCHARGE TO 3.0l/s CL: 122.00 IL: 120.00

GABION ON OUTLET TO PROVIDE FILTER PRIOR TO FLOW CONTROL CHAMBER

PUBLIC SW MANHOLE (IW REF: MH20) CL: 121.91 IL: 119.73

SLOTTED PIPE WITHIN SUBBASE TO FACILITATE DRAINAGE

SWALE (NORTH) BOTTOM WIDTH 1000mm MAX DEPTH 300mm BANKS MAX 1 IN 3 SLOPE

SUBBASE DISCHARGE RESTRICTED WITH ORIFICE PLATE

SWMH04 0.6m Ø PCC MANHOLE CL: 124.60 IL: 124.00

SWMH05 0.6m Ø PCC MANHOLE CL: 125.00 IL: 124.10

PUBLIC SW MANHOLE (IW REF: MH21) CL: 124.62 IL: 122.38

SWMH06 0.6m Ø PCC MANHOLE CL: 126.00 IL: 125.00

SWMH11 0.6m Ø PCC MANHOLE CL: 127.20 IL: 126.60

PERMAVOID STORAGE 60m2 x 300mm (d) CL: 124.40

PLANTED BASIN TO PROVIDE ATTENUATION CL 120.00 IL 119.50

TOTAL ROOF AREA 115m2 GREEN ROOF 86m2 (75%) MONOPITCH, 15° (1:3.73)

BAFFLED SECTIONS WITH FLOW CONTROLS DUE TO GRADIENT. TOTAL STORAGE VOLUME CALCUATED 2.84m3.

IMPERMEABLE CAR PARK SURFACE 190m2

PLANTED BASIN TO PROVIDE ATTENUATION CL 120.00 IL 119.50

AREA OF BUSHES

Amenity - Communal 61 m²

PLANTED BASIN TO PROVIDE ATTENUATION CL: 122.00 TOP OF BANK (NORTH) 122.00 TOP OF BANK (SOUTH) 123.20 IL 121.00

WAYLEAVE AREA CONSTRUCTION RESTRICTED DUE TO BELOW GROUND UTILITIES / SERVICES

PERMEABLE PAVING 185m2

NORTHERN PP TO DRAIN VIA SWALE SOUTHERN PP TO DRAIN VIA RAINGARDEN

PERMEABLE PAVING 610m2

RAINGARDEN CL 126.25 IL 125.50

SWALE (SOUTH) BOTTOM WIDTH 1000mm MAX DEPTH 300mm BANKS MAX 1 IN 3 SLOPE

CASCADE TO ATTENUATION BASIN TOP LEVEL 124.00 BOTTOM LEVEL 123.20

CURRENT GRADIENT OF 1:8 IS TOO STEEP FOR PERMEABLE PAVING.

IMPERMEABLE SURFACE PROPOSED TO DRAIN VIA PERMACHANNELS WITH PERMAVOID FOR TREATMENT AND STORAGE.

RAINGARDEN DISCHARGE TO SWALE

RAINGARDEN TO FEATURE RETAINING WALL TO NW AND SW (EXAMPLE IMAGES BELOW).

RAINGARDEN SOIL DEPTH 450mm OVER 300mm LAYER OF PERMAVOID FOR STORAGE.

SUBBASE DISCHARGE TO RAINGARDEN

PROPOSED DRAINAGE LAYOUT

SCALE 1:200

NOTES

1. ALL DIMENSIONS IN METRES (UNLESS SHOWN OTHERWISE) AND ALL LEVELS IN METRES TO ORDNACE SURVEY BENCHMARK.
2. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.
3. THIS DRAWING IS NOT TO BE SCALED FROM.
4. THIS DRAWING SHALL BE REVIEWED IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS.
5. SEWER ALIGNMENTS BASED ON INFORMATION RECEIVED FROM SOUTH DUBLIN COUNTY COUNCIL.
6. THE CONTRACTOR IS TO CONFIRM ACCURACY OF EXISTING SURVEY, AND LINES AND LEVELS OF EXISTING SERVICES INDICATED ON THE CONTRACT DRAWINGS.
7. THE CONTRACTOR IS TO LIAISE WITH ALL STATUTORY UNDERTAKERS IN REGARD TO LOCATING ALL EXISTING SERVICES WITHIN AND ADJACENT TO THE SITE OF THE WORKS. NO EXCAVATION IS TO COMMENCE UNTIL ALL EXISTING SERVICES HAVE BEEN LOCATED, MARKED ON SITE AND PROTECTED TO THE SATISFACTION OF THE RELEVANT AUTHORITY.
8. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PERTAINING TO THE WORKS.

LEGEND

- PROPOSED SW SEWER
- PROPOSED SW MANHOLE
- PROPOSED VORTEX FLOW CONTROL MANHOLE
- EXISTING PUBLIC SW SEWER
- EXISTING PUBLIC SW MANHOLE
- PROPOSED ACO DRAIN / PERMACHANNEL
- PROPOSED SLOTTED PIPE
- PROPOSED SWALE
- PROPOSED ATTENUATION BASIN
- PROPOSED PERMEABLE PAVING
- INDICATIVE FLOW PATH THROUGH PERMEABLE PAVING SUBBASE
- PROPOSED PERMAVOID STORAGE
- PROPOSED GREEN ROOF
- PROPOSED RAINGARDEN
- WAYLEAVE AREA

ISSUE	DRN	APP	DATE	NOTES / DESCRIPTION
1.0	OFK	AMC	29.07.25	ISSUED AS DRAFT

STATUS: PLANNING

McCloy Consulting
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Mossley Mill, Lower Ground (West)
Carnmoney Road North
Newtownabbey
Co. Antrim, BT36 5QA

PROJECT: STOCKING LANE RATHFARNHAM, DUBLIN 16

CLIENT: SOUTH DUBLIN COUNTY COUNCIL

DRAWING TITLE: SURFACE WATER DRAINAGE LAYOUT PLAN (WEST)

SCALE	ORIGINAL SIZE
1:200	A1

DRAWN	CHECKED	DATE
OFK	AMC	29/07/2025

PROJECT No.	DRAWING No.	ISSUE NO.
M02138-11	DWG_101	1.0

N

SLOTTED PIPE WITHIN SUBBASE TO FACILITATE DRAINAGE

SUBBASE DISCHARGE RESTRICTED WITH ORIFICE PLATE

SWMH04
0.6m Ø PCC MANHOLE
CL: 124.60
IL: 124.00

SWMH05
0.6m Ø PCC MANHOLE
CL: 125.00
IL: 124.10

PUBLIC SW MANHOLE
(IW REF: MH21)
CL: 124.62
IL: 122.38

SWMH06
0.6m Ø PCC MANHOLE
CL: 126.00
IL: 125.00

SWMH07
0.6m Ø PCC MANHOLE
CL: 127.80
IL: 126.80

ACO DRAIN

SWMH08
0.6m Ø PCC MANHOLE
CL: 129.00
IL: 128.00

PUBLIC SW MANHOLE
(IW REF: MH22)
CL: 128.56
IL: 126.96

SWMH09
0.6m Ø PCC MANHOLE
CL: 129.30
IL: 128.30

SWMH10
0.6m Ø PCC MANHOLE
CL: 130.00
IL: 129.00

150Ø

100Ø

SWMH11
0.6m Ø PCC MANHOLE
CL: 127.20
IL: 126.60

PERMEABLE PAVING 185m2

NORTHERN PP TO DRAIN VIA SWALE
SOUTHERN PP TO DRAIN VIA RAINGARDEN

WAYLEAVE AREA – CONSTRUCTION RESTRICTED DUE TO BELOW GROUND UTILITIES / SERVICES

RAINGARDEN
CL 126.25
IL 125.50

ROOF AREA 504m2

PERMEABLE PAVING 610m2

ROOF AREA 70m2

TOTAL ROOF AREA 160m2
GREEN ROOF 120m2 (75%)
GRADIENT 1:80

TOTAL STORAGE VOLUME CALCULATED 6.95m3.
FLOW CONTROL PRIOR TO DISCHARGE.

RAINGARDEN DISCHARGE TO SWALE

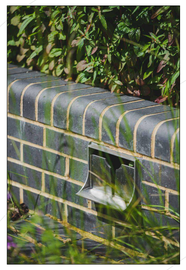
RAINGARDEN TO FEATURE RETAINING WALL TO NW AND SW (EXAMPLE IMAGES BELOW).

RAINGARDEN SOIL DEPTH 450mm OVER 300mm LAYER OF PERMAVOID FOR STORAGE.

SUBBASE DISCHARGE TO RAINGARDEN

BAFFLES FITTED WITHIN SUBBASE DUE TO GRADIENT.

50mm PIPES CONNECT SECTIONS AND CONVEY SURFACE WATER AT A RESTRICTED RATE.



PROPOSED DRAINAGE LAYOUT

SCALE 1:200

NOTES

1. ALL DIMENSIONS IN METRES (UNLESS SHOWN OTHERWISE) AND ALL LEVELS IN METRES TO ORDNACE SURVEY BENCHMARK.
2. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.
3. THIS DRAWING IS NOT TO BE SCALED FROM.
4. THIS DRAWING SHALL BE REVIEWED IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS.
5. SEWER ALIGNMENTS BASED ON INFORMATION RECEIVED FROM SOUTH DUBLIN COUNTY COUNCIL.
6. THE CONTRACTOR IS TO CONFIRM ACCURACY OF EXISTING SURVEY, AND LINES AND LEVELS OF EXISTING SERVICES INDICATED ON THE CONTRACT DRAWINGS.
7. THE CONTRACTOR IS TO LIAISE WITH ALL STATUTORY UNDERTAKERS IN REGARD TO LOCATING ALL EXISTING SERVICES WITHIN AND ADJACENT TO THE SITE OF THE WORKS. NO EXCAVATION IS TO COMMENCE UNTIL ALL EXISTING SERVICES HAVE BEEN LOCATED, MARKED ON SITE AND PROTECTED TO THE SATISFACTION OF THE RELEVANT AUTHORITY.
8. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PERTAINING TO THE WORKS.

LEGEND

- PROPOSED SW SEWER
- PROPOSED SW MANHOLE
- PROPOSED VORTEX FLOW CONTROL MANHOLE
- EXISTING PUBLIC SW SEWER
- EXISTING PUBLIC SW MANHOLE
- PROPOSED ACO DRAIN / PERMACHANNEL
- PROPOSED SLOTTED PIPE
- PROPOSED SWALE
- PROPOSED ATTENUATION BASIN
- PROPOSED PERMEABLE PAVING
- INDICATIVE FLOW PATH THROUGH PERMEABLE PAVING SUBBASE
- PROPOSED PERMAVOID STORAGE
- PROPOSED GREEN ROOF
- PROPOSED RAINGARDEN
- WAYLEAVE AREA

ISSUE	DRN	APP	DATE	NOTES / DESCRIPTION
1.0	OFK	AMC	29.07.25	ISSUED AS DRAFT

STATUS: PLANNING

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PROJECT: STOCKING LANE
RATHFARNHAM, DUBLIN 16

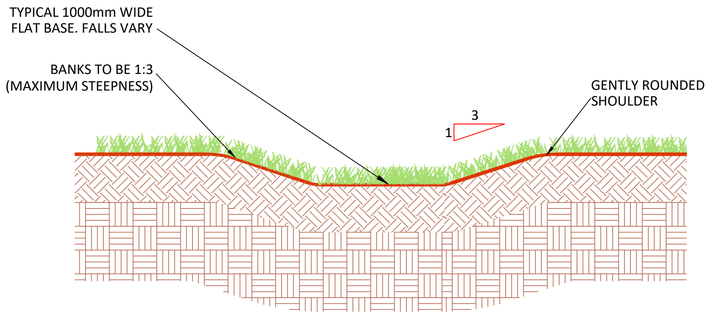
CLIENT: SOUTH DUBLIN COUNTY COUNCIL

DRAWING TITLE: SURFACE WATER DRAINAGE LAYOUT PLAN (EAST)

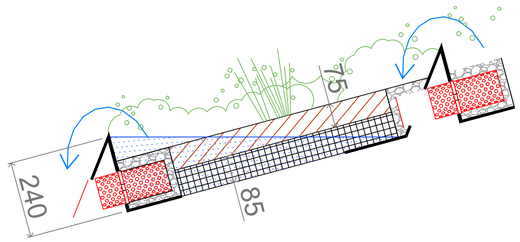
SCALE	ORIGINAL SIZE
1:200	A1

DRAWN	CHECKED	DATE
OFK	AMC	29/07/2025

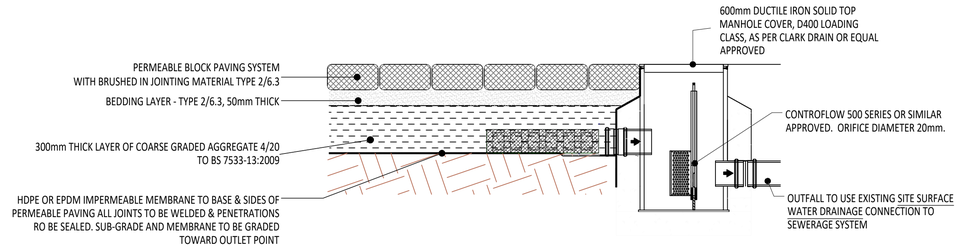
PROJECT No.	DRAWING No.	ISSUE NO.
M02138-11	DWG_102	1.0



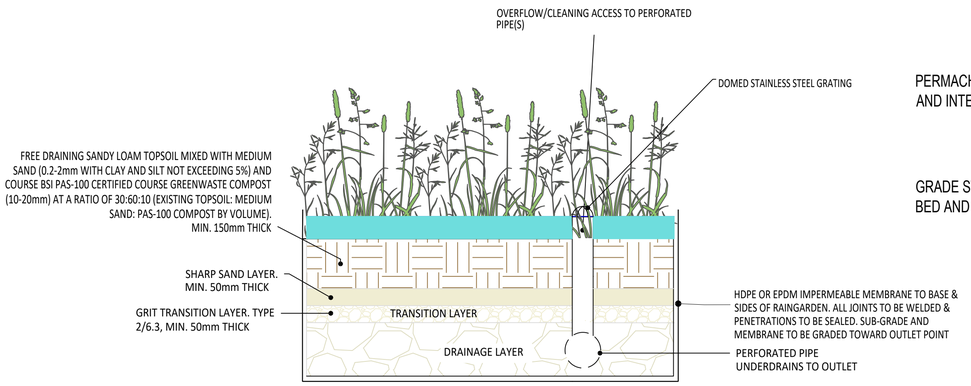
SWALE
SCALE: NTS



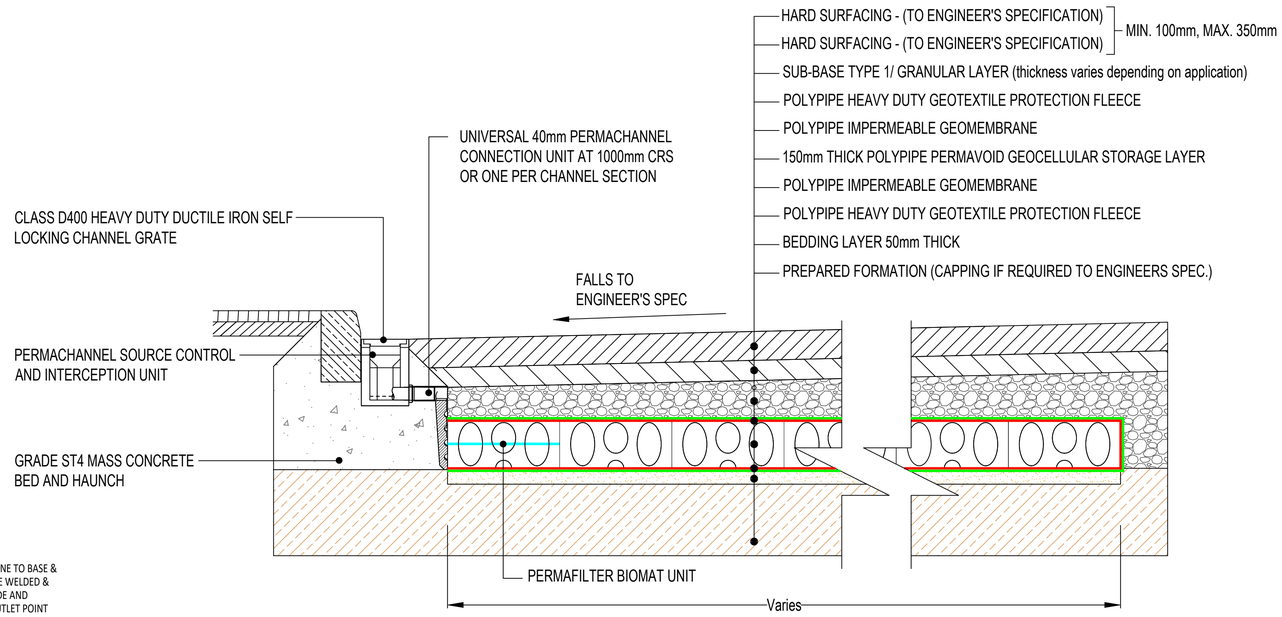
GREEN ROOF SECTION AT 15° (1:3.73) GRADIENT
SCALE: NTS



PERMEABLE PAVING AND OUTLET
SCALE: NTS



RAINGARDEN
SCALE: NTS



POLYPIPE PERMACHANNEL AND PERMAVOID ATTENUATION TANK
SCALE: NTS

NOTES

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ISSUE	DRN	APP	DATE	NOTES / DESCRIPTION
1.0	OFK	AMC	29.07.25	ISSUED AS DRAFT

STATUS
PLANNING

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PROJECT
STOCKING LANE
RATHFARNHAM, DUBLIN 16

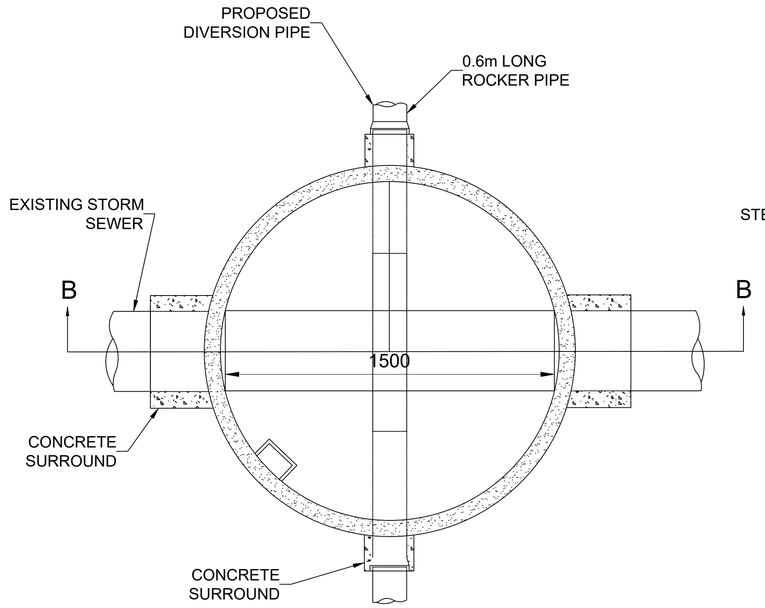
CLIENT
SOUTH DUBLIN
COUNTY COUNCIL

DRAWING TITLE
SuDS TYPICAL DETAILS
SHEET 1 OF 2

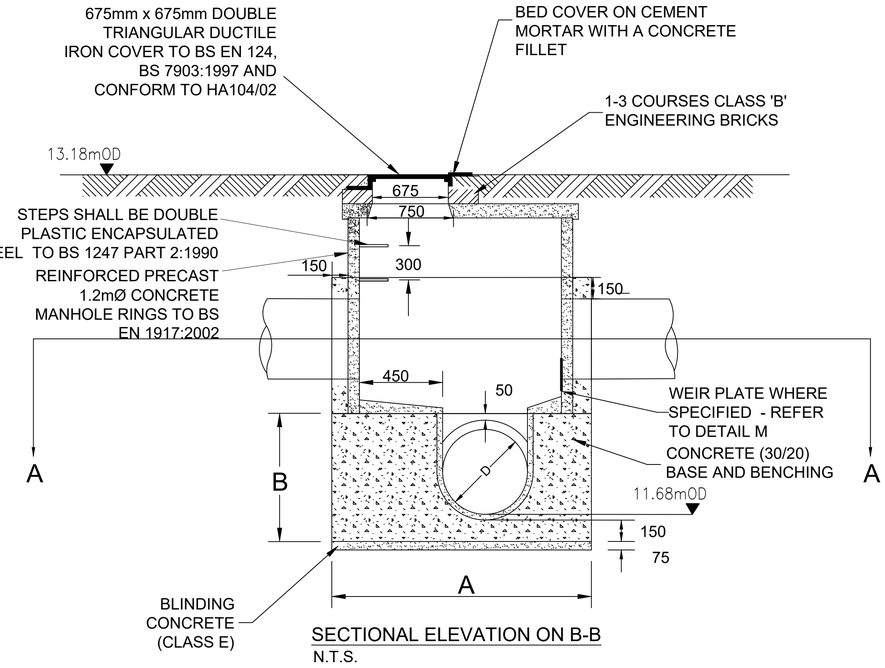
SCALE	ORIGINAL SIZE
1:200	A1

DRAWN	CHECKED	DATE
OFK	AMC	29/07/2025

PROJECT No.	DRAWING No.	ISSUE NO.
M02138-11	DWG_201	1.0

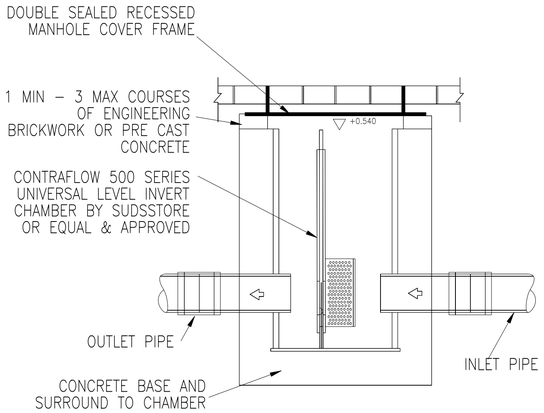


SECTIONAL PLAN ON A-A
N.T.S.

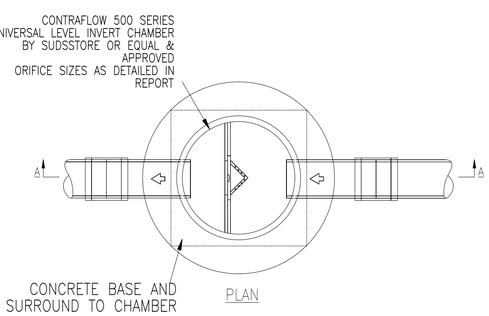


SECTIONAL ELEVATION ON B-B
N.T.S.

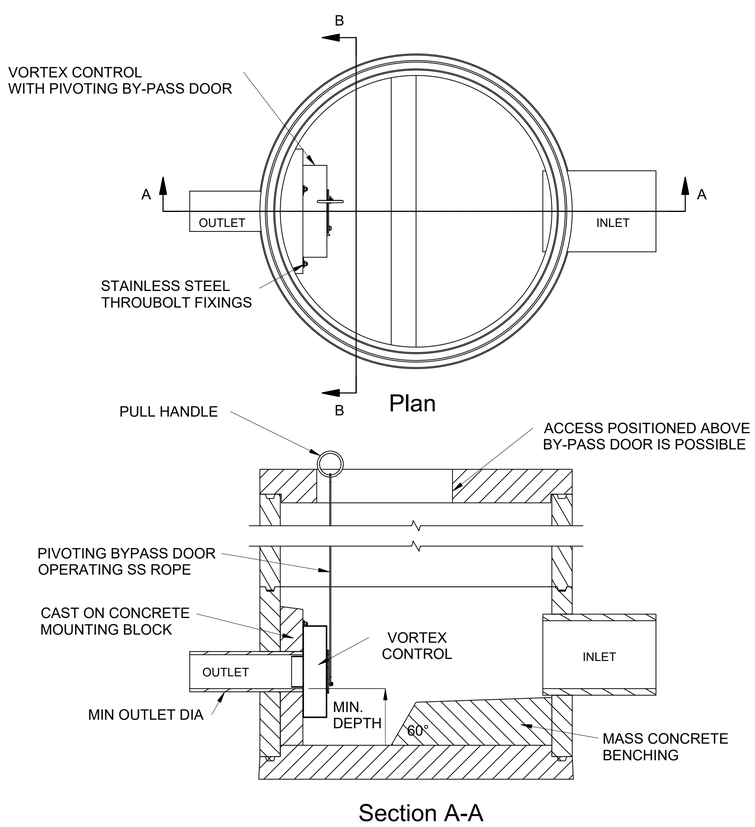
PRECAST CONCRETE CIRCULAR MANHOLE DEPTH LESS THAN 4.5m
SCALE: NTS



SECTION A-A



ORIFICE PLATE FLOW CONTROL CHAMBER
SCALE: NTS



VORTEX FLOW CONTROL CHAMBER
SCALE: NTS

NOTES

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PROJECT: STOCKING LANE
RATHFARNHAM, DUBLIN 16

CLIENT: SOUTH DUBLIN
COUNTY COUNCIL

DRAWING TITLE: SuDS TYPICAL DETAILS
SHEET 2 OF 2

SCALE	ORIGINAL SIZE
1:200	A1

DRAWN	CHECKED	DATE
OFK	AMC	29/07/2025

PROJECT No.	DRAWING No.	ISSUE NO.
M02138-11	DWG_202	1.0

N

EXCEEDANCE FLOWS FROM ATTENUATION BASIN AND CARPARK DIRECTED AWAY FROM BUILDINGS, TOWARDS NORTHERN BOUNDARY.

EXCEEDANCE FLOWS FROM NORTHERN PERMEABLE PAVING AREA DIRECTED AWAY FROM BUILDINGS TOWARDS NORTHERN BOUNDARY.

EXCEEDANCE FLOWS FROM SOUTHERN PERMEABLE PAVING AREA DIRECTED AWAY FROM BUILDINGS TOWARDS NORTHERN BOUNDARY.

EXCEEDANCE FLOWS DIRECTED AWAY FROM AND AROUND BUILDINGS.

FLOW

STOCKING AVENUE

FLOW ROUTE ANALYSIS

SCALE 1:200

LEGEND

FLOW — EXISTING SURFACE WATER FLOW ROUTES

EXCEEDANCE FLOW ROUTES

ISSUE	DRN	APP	DATE	NOTES / DESCRIPTION
1.0	OFK	AMC	29.07.25	ISSUED AS DRAFT

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PROJECT: STOCKING LANE RATHFARNHAM, DUBLIN 16

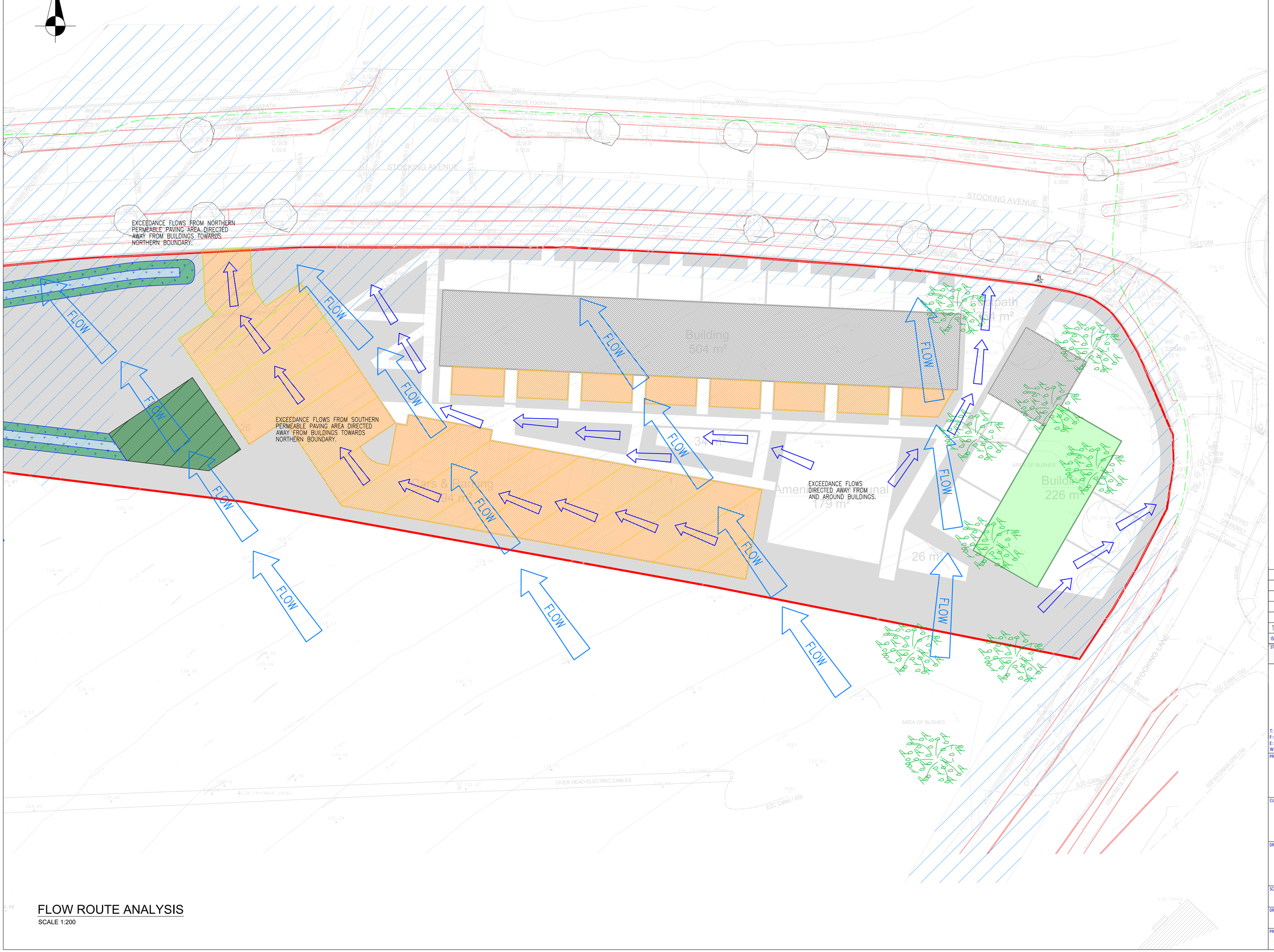
CLIENT: SOUTH DUBLIN COUNTY COUNCIL

DRAWING TITLE: FLOW ROUTE ANALYSIS (WEST)

SCALE	ORIGINAL SIZE
1:200	A1

DRAWN	CHECKED	DATE
OFK	AMC	29/07/2025

PROJECT No.	DRAWING No.	ISSUE NO.
M02138-11	DWG_SK01	1.0



FLOW ROUTE ANALYSIS

SCALE 1:200

LEGEND

FLOW — EXISTING SURFACE WATER FLOW ROUTES

EXCEEDANCE FLOW ROUTES

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PROJECT: STOCKING LANE RATHFARNHAM, DUBLIN 16

CLIENT: SOUTH DUBLIN COUNTY COUNCIL

DRAWING TITLE: FLOW ROUTE ANALYSIS (EAST)

SCALE	ORIGINAL SIZE
1:200	A1

DRAWN	CHECKED	DATE
OFK	AMC	29/07/2025

PROJECT No.	DRAWING No.	ISSUE NO.
M02138-11	DWG_SK02	1.0