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LANDS AT ELMFIELD
9TH LOCK ROAD, CLONDALKIN
THORNMEADOW DEVELOPMENTS

SURFACE WATER MANAGEMENT PLAN

Prepared by GK, Consulting Engineers

Date: AUGUST 2026

DOCUMENT REVIEW SHEET
DOCUMENT NO: GK-25126
(v1.1) 08.2026

Project Client: Thornmeadow Developments

Project Title: Lands at Elmfield, 9th Lock Road

Project Number: 25126

Document Title: Surface Water Management Plan

Document File Ref.: 25126-01

Rev.	Date	Issued to	Prepared by	Checked by	Approved by	Comments
01	08.2026		SOC	LG	LG	

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Project Preparation and Contact Person

08.2026

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Liam Gleeson – lgeeson@gkce.ie Date

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1. INTRODUCTION

GK Consulting Engineers have undertaken an assessment of proposed foul, surface water drainage & water supply infrastructure, associated with a proposed large residential development (LRD) at Elmfield. This report is prepared as part of an LRD Stage 3 application.

Image 1.1: Proposed site

Thornmeadow Developments Limited intend to apply for permission for a Large-Scale Residential Development on lands at the Securispeed Logistics site, Elmfield, Ninth Lock Road, Clondalkin, Dublin 22.

The proposed development will consist of the demolition of the existing warehouses and structures on site and the construction of a mixed-use residential-led development comprising a total of 408 no. residential units (403 apartments consisting of 24 no. studio units, 230 no. 1 bed units and 149 no. 2 bed units, and 5 no. 3 bed 2 storey houses) and 1 no. childcare facility. The residential units will comprise a mixture of apartments and own-door houses and range in height from 2-9 storeys. The proposed development will also comprise all associated car parking (210 no. spaces), cycle parking, refuse and storage areas, plant, landscaping, open space, boundary treatment, public lighting, ESB substations, and site and infrastructural works necessary to facilitate the proposed development.

There are existing industrial warehouse's & concrete hard standing on the site, which will be demolished to facilitate the new development.

1.1 LIGISLATION AND GUIDANCE

The key legislation with respect to surface water management is as follows:

- Water Framework Directive (WFD) 2000/60/EC;
- European Communities (Water Policy) Regulations 2003-2005 (S.I. 722 of 2003);
- EC Environmental Objectives (Surface Waters) Regulations (S.I. 272 of 2009);
- Local Government (Water Pollution) Acts 1977 – 1990; Groundwater Directive (2006/118/EC);
- EC Environmental Objectives (Groundwater) Regulations 2009 (S.I. 9 of 2010 and SI 366 2016);
- The Planning System and FRM Guidelines (OPW, 2009); Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016);
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (CIRIA Technical guidance C532, 2001); Control of water pollution from linear construction projects: Technical Guide (CIRIA C648, 2006);
- Control of water pollution from linear construction projects: Site Guide (CIRIA C649, 2006);

2. EXISTING SITE

2.1 TOPOGRAPHY

The existing site as previously mentioned currently is the site for the Securespeed Logistics site. The site is the location of an industrial estate with warehouse units, used for logistics & distribution.. There is also an existing concrete hardstanding.

The site covers a total area of approximately 2.32Ha.

Access to the site if from 9th Lock Rd on the western boundary. Boundaries to the West and the east are to housing & apartment developments. There are adjoining industrial and retail sites to the south and the north.

Based on the topo survey, the site is relatively flat with a slight fall from 54.00 at the existing entrance to 53.55 along the central area. The north east corner is also roughly 53.50 with the south east corner being a high point of 54.44 where the existing green area is. In general the site falls from North to South.

2.2 EXISTING DRAINAGE

Referring to South Dublin County Council utility maps (Appendix A), the existing site is serviced as follows:

Foul Sewer
The site is currently served by a 225mm diameter foul sewer flowing north off the site connecting to a 750mm diameter foul sewer on the New Nangor Rd.

Surface water
The existing building runoff from roof & hardstanding areas is collected by downpipes & gullies. The surface water from the site currently discharges to a 450mm diameter SW sewer. Flowing north off the site.

Watermain
There is an existing 200mm water main that runs along the 9th lock rd. it is proposed to connect directly to this main.

2.3 Flood Risk

A site-specific detailed flood risk modelling has been carried out by McCloy Consulting. The site falls into flood zone B, according to SDCC development plan SFRA mapping. The components considered in the identification and assessment of flood risk are:

- Tidal - flooding from high sea levels
- Fluvial - flooding from water courses
- Pluvial - flooding from rainfall / surface water
- Groundwater - flooding from springs/ raised groundwater
- Human/mechanical error - flooding due to human or mechanical error

Reference shall be made to McCloy Consulting assessment report.

2.4 Site Investigation

As covered in the detailed Site Investigation report. The site generally is made up of

- Paved surface: 200mm of concrete surfacing.
- Topsoil: encountered with a thickness range of 100 - 400mm thickness across the site.
- Made Ground (sub-base): sandy gravelly clay/silt fill extending to a depth of 0.70-1.10m
- Glacial Till: stiff to very still gravely clay
- Bedrock: Limestone rockhead was encountered at 2.50m

Trial pits were carried out in order to assess the sites permeability. Tests failed and it was deduced that the site has no infiltration capacity.

3. SURFACE WATER STATEGY

This SuDS Design Statement outlines the proposed approach for the management of rainfall runoff within the development to ensure no increase in flood risk to any development within the site or elsewhere with delivery of wider water quality, amenity and biodiversity benefits.

The approach to the SuDS Design is per the guidance from the CIRIA SuDS Manual, as outlined in the Surface water management plan, which is summarised as follows:

- Identify suitable mechanism of discharge for site drainage.
- Allocate a management train and appropriate number of sub catchments to provide the collection, treatment, storage, conveyance of runoff across the site.
- Identify suitable SuDS components which are in keeping with the proposed landscape character.

It is noted that the design presented and summarised in this report is outline / planning stage and surface water drainage at the site will be subject to detailed design post-planning.

3.1 SOURCE CONTROL

3.1.1 GREEN ROOF

It is proposed to introduce green roofing as a source control device. The proposed green roofing includes 4 blocks of approximately 2000m2 each of extensive lightweight green roof. The total roof area of the blocks is approximately 6500m^2, which means that the extensive green roof covers approximately 25% of the total site. South Dublin City Council's Green and Blue Roof Guide notes that new developments should provide a minimum green roof coverage of 70% for extensive or 50% for intensive green roofs. The proposed development provides approximately 90% green/blue roof coverage. As set out below, the green roofs will be set above blue roofing to provide additional rainwater storage.

The substrate and the plant layers in a green roof absorb large amounts of rainwater and release it back into the atmosphere by transpiration and evaporation. They also filter water as it passes through the layers, so the run-off, when it is produced, has fewer pollutants. Rainfall not retained by green roofs is detained, effectively increasing the time to peak and slowing peak flows.

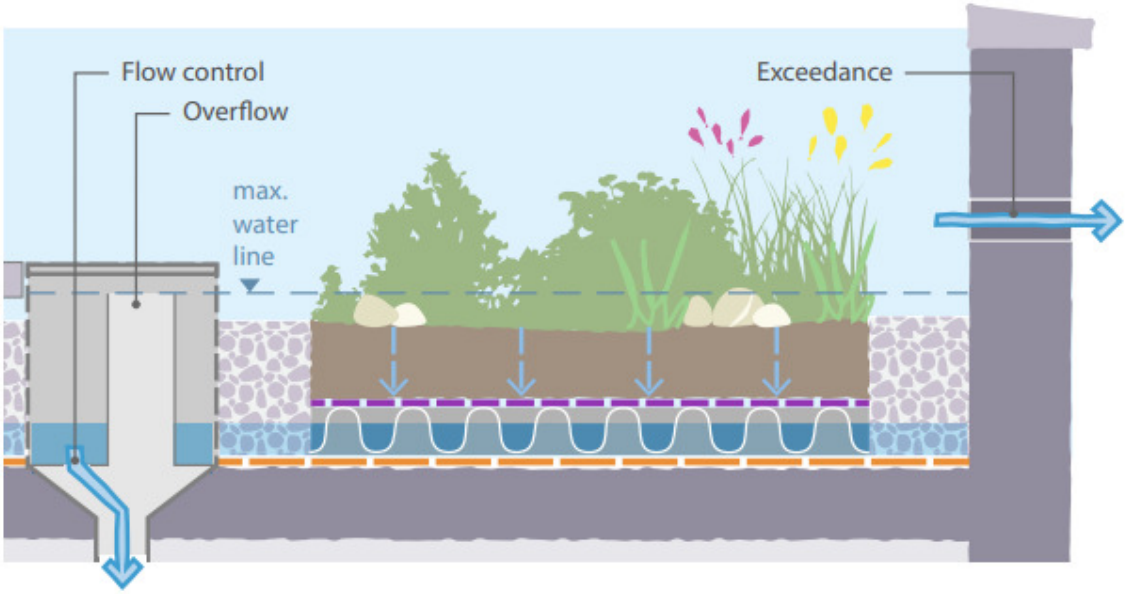
A green roof can reduce annual percentage runoff by between 40% and 80% through this retention and evapotranspiration, with the impact dependent on a range of factors including the depth of substrate, the saturation of substrate at the onset of a rain event, the angle of the roof, the range of vegetation growing, intensity of rainfall and the time of year.

3.1.2 BLUE ROOF

Blue roofs hold rainwater runoff on roofs and release that rainfall slowly through a flow control device. While blue roofs do not have to be vegetated, it is proposed to introduce this blue roofing beneath the areas of green roofing covering the flat roof areas. Dublin City Council's Green and Blue Roof Guide notes that green blue roofs that provide attenuation of rainfall on the roof is the approach preferred by SDCC.

Blue roof comprises a combined drainage and attenuation void within the roof structure and a roof outlet system designed to release the attenuated water at a controlled

discharge rate via a restrictor chamber. It is proposed to restrict runoff from each of the roofs using Bauder flow restrictor outlets or a similar approved flow control device. An overflow will be provided for rainfall events that exceed the storage capacity of the roof, and an exceedance outfall will be provided to prevent flooding should the primary outfall block. A typical arrangement, extracted from SDCC's Green and Blue Roof Guide, is shown in the Figure below



Blue roof decks are relatively low maintenance. Specific attention should be given to the blue roof elements such as the outlets. It is proposed to use Bauder blue roof and flow restrictor outlets or a similar approved system from another manufacturer. The Bauder system uses a sealed graded outlet, as shown in the below figure, which shows a typical flow restrictor outlet under construction. This reduces the risk of the outlet becoming blocked. Nonetheless, the outlets should be checked a minimum of twice annually

3.1.3 PERMEABLE PAVING

Concrete block permeable paving is proposed in all proposed parking and private parking areas. Water will be collected via a network of perforated pipes directing water to the surface water network. Permeable paving will serve multiple purposes, controlling storm wate rat the source to reduce run off as well as improving water quality by trapping suspended solids and filtering pollutants.

Further to the parking the Homezone roads will also be permeable paving.

3.2 SITE CONTROL

3.2.2 TREE PITS

Due to the large amount of tree planting throughout the proposed site, tree pits along the road system have been proposed to collect surface water runoff form the road system.

The proposed tree pits will provide attenuation, optimise the retention time and provide a water quality improvement, especially for the first flush from the road system. The tree pits along the road system will comprise of a 225mm perforated pipe which will collect and direct the surface water runoff into the below ground surface water system.

3.2.2 RAIN GARDENS

Several Bioretention areas below rain gardens are proposed through the site. Rain gardens are depressions with attractive planting which can act as infiltration points for surface water. The proposed planting will comprise suitable native vegetation that can accommodate occasional inundations. Referral shall be made the landscaping layout and report for further details.

3.3 REGIONAL CONTROL

3.3.1 DETENTION BASIN

Detention basins are proposed as end point attenuation systems throughout the site. Surface water collected throughout the site will flow through the detention basin as the final SUDS control measure. Any surface water over and above the greenfield runoff rates for the site will be attenuated within the basin.

The maximum water level of the detention basin will be minimum 150mm below any FFL throughout the development. A dry swale above the detention basin will also provide an extra level of storage for any surcharge.

3.3.2 FLOW CONTROL

Flows will be controlled by a Hydrobrake or similar approved flow control device, limited to the greenfield equivalent runoff rate (Refer to SW report in appendix), with excess flows being attenuated in the Detention basin as mentioned above before out falling to the existing SW network out fall to the north of the site

3.3.3 PETROL INTERCEPTOR

A Petrol interceptor is to be installed before the surface water outfall. Petrol Interceptors will remove hydrocarbons from surface flows, protecting the natural watercourse.

3.3.4 CLIMATE CHANGE

Requirements for climate change allowances are as per OPW 'General Map User Guidance Notes' found through floodinfo.ie4. A 20% uplift in extreme rainfall depths (Mid-Range Future Scenario (MRFS)) has been adopted for the purposes of undertaking hydraulic calculations to validate the outline design proposal.

4. TREATMENT AND ATTENUATION STORAGE

The flow rates in Table 3-2 indicate the restricted post-development runoff rates for the site to which the surface water drainage has been designed. The rates are based on those outlined in the Engineering services report and reflect the requirements of South Dublin CC. Further details are listed in the Surface Water Management Report (SWMP)

In addition, the surface water drainage has been designed in accordance with the criteria established by GDSDS5 Stormwater Management Policy as follows:

- Criterion 1: Interception storage is provided through of vegetated and soil based SuDS which will generate losses in runoff for the majority of runoff events. The losses generated will achieve this criterion.

- Criterion 2: River regime protection, GDSDS, the required attenuation volume is calculated assuming 100% runoff from paved areas, and has been calculated for the 1-year, 30-year and 100-year return periods, identifying the critical storm for each refer to the calculations included in the Appendix. The required attenuation storage is to be provided in the blue roofs and in a detention basin. Table 3-2 identifies the flow rate acceptable, which is demonstrated by the hydraulic calculations provided in the Appendix. The table also demonstrated the site discharge that will occur during various storm events.

- Criterion 3: A site-specific detailed flood risk modelling has been carried out by McCloy Consulting. The site falls into flood zone B, according to SDCC development plan SFRA mapping. Finished floor levels and site levels have been set in accordance with the parameters as specified in the report.

- Criterion 4: River flood protection. Of the three methods described in the GDSDS Criteria 4.3 was selected. All runoff shall be limited to Qbar. The proposed development includes a flow control device and the SuDs structures throughout out have ample storage for a 1:100-year storm with 20% climate change accounted for.

The flow rates in Table 3-2 provide guidance on the extent to which flows will be controlled from any proposed development within the site and are calculated using IH124 methodologies based on catchment specific characteristics; Soil WRAP Class 2 and SAAR of 911 mm.

Table 3-2 Attenuation Flow Rates

Return period	Greenfield Rate (l/s)	Site Discharge Rate (l/s) (Drained Area: 2.2 ha)
100% AEP (1 in 1 year)	7.5	6.4
3.33% AEP (1 in 30 Year + CC)	14.8	6.7
1% AEP (1 in 100 year) + CC	17.6	6.9

4.1.1 STORAGE OF RUNOFF AND DISCHARGE LOCATION

Runoff is attenuated throughout the site as it passes through or is stored in SuDS components which have been chosen to collect, convey and store water based on site and hydraulic requirements.

In line with GDSDS requirements, attenuation storage will be sized for the 1% AEP (with 20% allowance for climate change) critical rainfall event while limiting the 1-year and 100-year events to the rates shown above. Refer to Causeway Flow report in Appendix.

Table 3-3 Attenuation Flow Rates

Return period	Site Flow Volume* (m^3)
1% AEP (1 in 100 year) + CC	1371.5 m^3

* Attenuated to rates shown in Table 3-2

Final discharge for the site will flow into the existing 450mm surface water sewer exiting to the north of the site.

4.1.2 DESIGNING FOR EXCEEDANCE

Site levels and landscaping have been designed to route excedance flows away from buildings. Overland flow routes are defined using road corridors. Detail design will set final levels from individual SuDS components to ensure that flows are controlled and routed across the site in a predictable manner.

5. WATER QUALITY

5.1 WATER QUALITY REQUIREMENTS

Proposals for the site will comprise an industrial/commercial development. Treatment provision is summarised as follows:

- Roof only runoff – removal of solids. All roofed areas will pass through at least one stage of treatment as per the proposed SuDS design drawing included in the Appendix .

- Roads used for vehicular movement. The SuDS design developed makes provision for collection of runoff through a range of techniques namely; SuDS permeable paving, bioretention channels and detention basins/swales. Where proposed site levels allow, SuDS components are connected in series. Flows pass into a (site control) basin prior to final discharge.

Analysis of the effectiveness of chosen SuDS components to achieve water quality criteria follows the 'simple index approach' described in the CIRIA C753 SuDS Manual chapter 29.

5.2 SIMPLE INDEX APPROACH

The simple index approach assigns a risk index to areas of development dependent on their land use to represent the level of pollution that is typically generated and therefore must be 'treated' within SuDS components to meet water quality standards.

Table 3-4 Risk Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Roofs	Very Low	0.2	0.2	0.05
Frequented apartment block	High	0.8	0.8	0.9

Table 3-5 Mitigation Indices

SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Tree pits	0.8	0.8	0.8
Detention Basin/Swale	0.5	0.6	0.6
Permeable Paving	0.7	0.6	0.7
TOTAL	***>0.95***	***>0.95***	***>0.95***

As per the simple index approach, each SuDS component is assigned a 'mitigation index' relative to the three primary sources of pollution listed above; TSS, metals and hydrocarbons. Mitigation indices are added together and water quality criteria are met if the mitigation index is greater than the risk index.

Secondary / further stages in the treatment train are assigned treatment indices 50% of stated value identified by SuDS Manual (as per advice provided by SuDS Manual).

As demonstrated in Table 3-5, the total of the mitigation indices is greater than the risk indices for both types of development on site so water quality requirements are deemed to have been met. It is noted that Detention basin and swales act together and have been included as one.

6. FLOW ROUTE ANALYSIS

6.1 EXISTING FLOW ROUTE ANALYSIS

The natural hydrology and existing characteristics have been assessed through flow route analysis to determine how the site behaves naturally before development and are illustrated in Figure 3-1. The overland flow is currently collected by an existing SW network and outfall at the Western Entrance to the site. The natural topography of the site has a gentle fall from north to south. Currently overland flow on the site is collected by the existing SW network below the hardstanding and outfalls via the existing SW main to the north of the site.

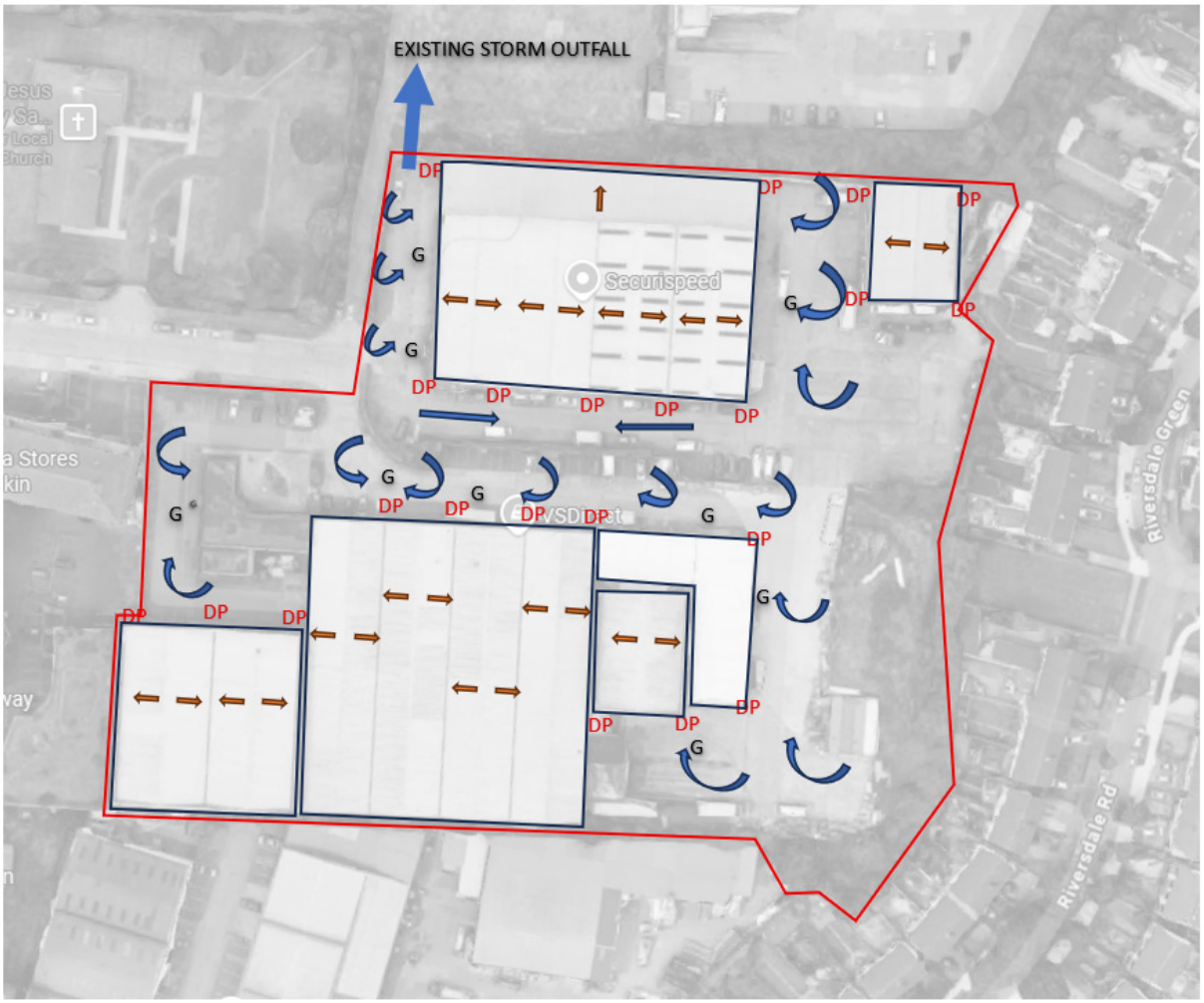


Figure 3-1 Existing overland Flow Route

6.2 MODIFIED FLOW ROUTE ANALYSIS

The modified flow route analysis is the basis for low flow conveyance, overflow arrangements and exceedance routes when design criteria are exceeded. The modified flow routes have been assessed, based on proposed site layout drawing included in Appendix A, and inform the overall design by predicting the flow of runoff through the site as shown in Figure 3-2.

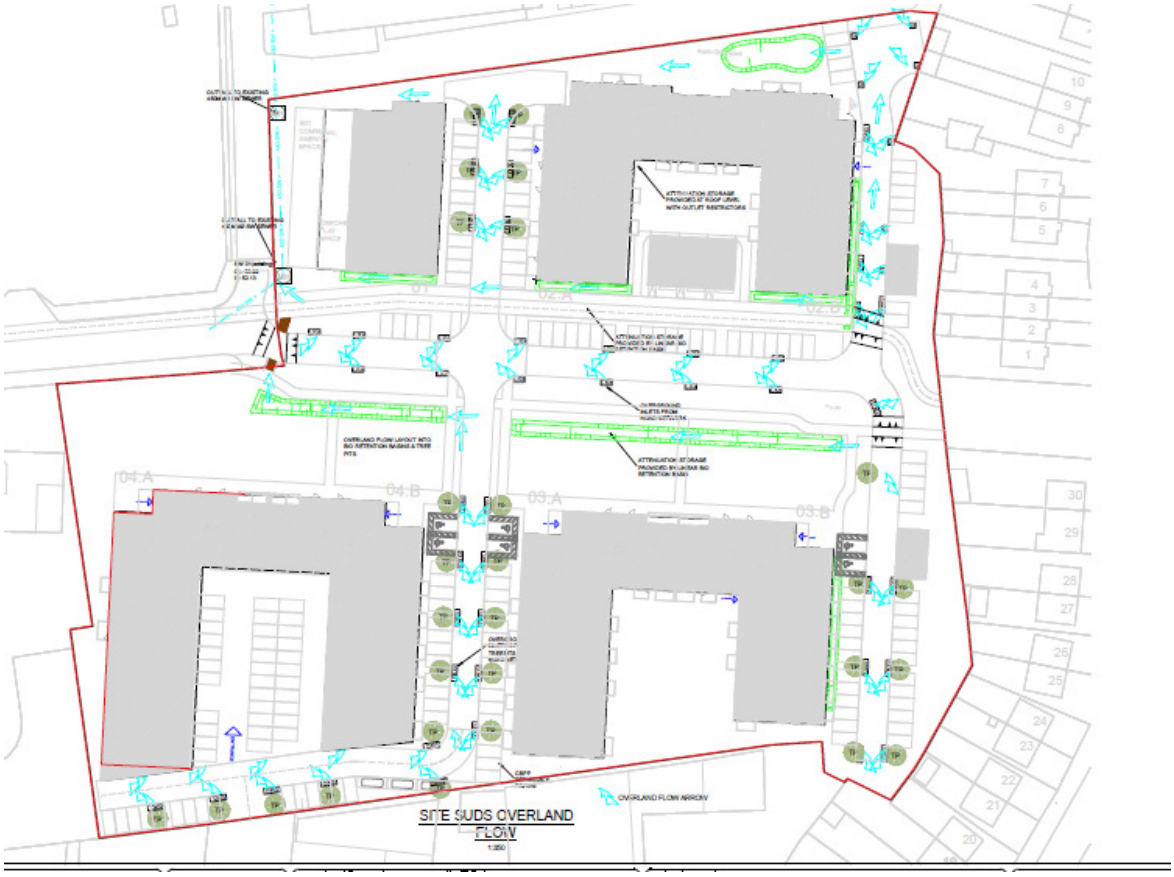


Figure 3-2 Modified Flow Route Analysis

7. MAINTANENCE AND MANAGEMENT

The proposed maintenance plan for the SuDS components on site is outlined in Table 4-1 along with the party who is anticipated to be responsible for maintenance of each type of component.

Table 7-1 Management and Maintenance Plan of SuDS Features

SuDS Component	Maintenance Responsibility	Maintenance Schedule	Required action	Typical frequency
Permeable Paving	Estate management company	Regular maintenance	Brushing (standard cosmetic sweep over whole surface)	Once a year after leaf fall or reduced frequency as required
		Occasional maintenance	Removal of weeds or management using glyphosate or other suitable week killer.	As required – once a year on less frequently used pavements
		Remedial actions	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
			Remediate any landscaping which has been raised to within 50 mm of the level of the paving	As required
			Rehabilitation of surface and upper sub-structure by remedial sweeping	Every 10 to 15 years or as required (if 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	Every 3 months, 48h after large storms in first six months
			Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually

			Monitor inspection chambers	Annually

SuDS Component	Maintenance Responsibility	Maintenance Schedule	Required action	Typical frequency
Bioretention Systems (Detention Basins/Rain Gardens/Tree Pits)	Estate management company	Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in 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 and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
			Replace any plants, to maintain planting density	As required

SuDS Component	Maintenance Responsibility	Maintenance Schedule	Required action	Typical frequency
			Tidy all dead growth before start of growing season	Annually
			Remove sediments from inlets and outlets	Annually (or as required)
			Manage plants (where specific planting regime is adopted).	Annually
		Occasional Maintenance	Reseed areas of poor vegetation growth	As required
			Prune and trim any trees and remove cuttings	Every 2 years, or as required.
			Remove sediment from inlets, outlets and main basin when required	Every 5 years, or as required (likely to be minimal requirements as upstream source control is provided)
		Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
			Realignment of rip-rap	As required
			Repair/rehabilitation of inlets and outlets	As required
			Relevel uneven surfaces and reinstate design levels	As required
Open ditch	Estate management company	Regular maintenance	Remove litter and debris	Monthly, or as required
			Cut grass – to retain grass height within specified design range	Monthly (during growing season) or as required
			Manage other vegetation and remove nuisance plants	Monthly at start, then as required.
			Inspect inlets, outlets for blockages, and clear if required	Monthly

			Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly

SuDS Component	Maintenance Responsibility	Maintenance Schedule	Required action	Typical frequency
			Inspect inlets and bed for silt accumulations, establish site removal frequencies	Half yearly
		Occasional maintenance	Reseed areas of poor vegetation growth. Alter plant types to better suit conditions if required	As required/if bare soil is exposed over 10% of swale treatment area
		Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
			Re-level uneven surfaces and reinstate design levels	As required
			Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required

8. CONSTRUCTION MAINTANENCE AND MANAGEMENT

8.1 OVERVIEW

A number of measures will be implemented during the construction phase in order to manage surface water in and around the construction works to mitigate impacts to the surface waters as a result of construction activity. The contractor will be required to produce a Surface Water Management Plan (SWMP) that will form part of an overall construction environment management plan. The key risks to surface water associated with the Proposed Project are:

- Impacts associated with increases in suspended solids being released into waterbodies;
- Impacts associated with pollution of waterbodies by other substances;
- Site preparation and clearance works (cut / fill operations);
- Temporary access roads construction;

The contractor shall develop a Sediment Control Plan (SCP), in advance of any construction activities commencing for the Proposed Project; The appointed contractor will inspect and monitor the water quality of surface waters in the vicinity of any works, paying particular attention to suspended solids and turbidity levels. This monitoring will form part of the Construction and Environmental Management Plan (CEMP) for the works. All discharges to surface waters will be suitably treated prior to discharge to the existing attenuation tank via existing surface water network outside the site boundary to the north of the site.

8.2 SITE MANAGEMENT

The Main Contractor shall be responsible for overall site management for the duration of the proposed works. Discussed below are a number of areas which the Main Contractor will be required to address within their Construction Surface Water Management for the duration the works period.

8.3 STORAGE OF MATERIALS ON SITE

There is scope for some storage of materials around the site. Any fuels or chemicals on site will be stored within double sealed tanks within bunds using standard practice procedures. A dedicated plant refuelling point will be set up on site. All fuels and chemicals required to be stored on site will be clearly marked.

8.4 GROUNDWATER AND SURFACE WATER CONTROL

The Contractor shall be required to prepare and implement a site wide Surface Water collection and disposal plan that fully details with all measures for groundwater and surface water control for agreement with the local authority prior to discharge of same from site. The extent of surface water will be minimal given the extent of the works.

Surface Water will be collected via a perforated drain constructed within the engineering fill (commencing at the location of the site offices, oil compound and staff parking) which are to be located at the entrance to the site and a temporary linear drain which will flow by gravity into a Silt Trap manhole. Water is to discharge from the Filtration bed to a proposed headwall where it will discharge into the River Nanny

Under no circumstances will water washings which have been contaminated with cement be allowed to enter the drainage system. Any water that might have accumulated behind the temporary barrier while cement is setting will be pumped to a separate container and disposed of separately.

If ground water is encountered during excavations, it shall be pumped from the excavation into a settling or stilling pond which will be used to attenuate and discharged into a temporary surface water manhole which then flows by gravity into a temporary storm water silt trap manhole discharging into the proposed permanent filtration bed. In this way it will be ensured that only silt-free run-off will enter the environment and existing surface water networks. The purpose of the settling or stilling pond is to intercept runoff laden with sediment and to reduce the amount of sediment leaving the disturbed area and by reducing runoff velocity.

Silt fences will be installed as an additional measure where required. The silt fence shall follow the technical guidance document "Control of Water Pollution from Linear Construction Projects" published by CIRIA. The silt fences where required shall be inspected regularly to ensure that water is continuing to flow through the fabric and not blocked by silt building up.

Figure 4 - Detail of Silt Trap Fence

8.5 MANAGEMENT OF ENVIRONMENTAL INCIDENTS

An emergency-operating plan shall be established to deal with incidents or accidents during construction that may give rise to pollution within any watercourse. This shall include means of containment in the event of accidental spillage of hydrocarbons or other pollutants. Throughout all stages of the construction phase of the Plot Residential and Creche Development the contract shall ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types.

All hazardous materials on site shall be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project as appropriate. Safe handling of all potentially hazardous materials shall be emphasised to all construction personnel employed during this phase of the project and an emergency response plan shall be in place, in case of accidental spillage. Raw or uncured waste concrete shall be disposed of by removal from the site. Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and the contaminated soil removed from the site and properly disposed of, and there shall be no discharge to the existing surface water or foul water networks on site.

8.6 FOUL DRAINAGE AND GREY WATER DISPOSAL

The site currently has access to an existing public Wastewater system network on or adjacent to the proposed development site. The Contractor will be responsible for provide onsite welfare facilities including a waste management plan to collect wastewater / grey water on site and disposal off site by a licensed waste collection contractor for delivery to a wastewater treatment plant for treatment.

Under no circumstance is any wastewater/greywater/grease/oils to be allowed to enter the existing ground or temporary storm water network.

8.8 WHEEL WASH FACILITY

There will be small volumes of traffic generated by aspects of the construction works, particularly during the excavations and groundworks phase, it shall be a requirement that the Contractor shall ensure, where appropriate:

- A wheel wash facility shall be provided at the egress point from the site.
- All vehicles shall be required to pass through the wheel wash facility before exiting the site to the public & private road networks. The wheel wash must be kept in place and used throughout the critical dirt generating activities of the construction works.
- A temporary linear drain will be located downstream of the wheel wash facility to ensure no water used in the cleaning process exits the site and is instead diverted into the proposed filtration bed.
- Water supplies shall be recycled for use in the wheel wash. All surface waters shall be drained through appropriate pipe networks and filter material prior to discharge from the site.

8.9 SITE DRAINAGE

As construction advances there may be a small requirement to collect and treat surface water within the site. If this is required, this will be completed using perimeter swales at low points around the construction areas, and if required water will be pumped from the swales into sediment bags prior to overland discharge allowing water to percolate naturally to ground. Daily monitoring and inspections of site drainage during construction will be carried out. A log will be maintained of daily inspections and status of drainage features. The log will be available on site for inspection.

Where concrete is delivered to site only chute cleaning will be permitted with the minimal volume of water possible. No washing of any plant used in concrete transport will be allowed on site. All foundation bases are to be free of any standing water prior to concrete pours with provision of plastic (or similar) covering material to be on standby in the event of sudden rainfall. Planned concrete pours are to be coordinated with weather forecasting.

Appendix A

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Inverts
M5-60 (mm)	17.100	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Template	Freeform Carrier	Follow Ground	x
Shape	Circular	Velocity	Manning
Barrels	1	ks (mm) / n	
Auto Increment (mm)	75		

Available Diameters (mm)

150 | 225 | 300 | 375 | 450

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)
15.000	CRECHE	J9	17.623	0.012	52.650	52.200	0.450	39.2	150	5.20	43.4
11.000	04.A (Blue Green Roof)	SW06	33.822	0.012	52.850	52.280	0.570	59.3	150	5.47	42.5
8.000	04.B (Blue Green Roof)	SW06.1	35.922	0.012	52.850	52.306	0.544	66.0	150	5.52	42.4
14.000	02.A (Blue Green Roof)	J9	19.894	0.012	52.650	52.300	0.350	56.8	150	5.27	43.1
20.000	02.B (Blue Green Roof)	J6	9.743	0.012	52.750	52.600	0.150	65.0	150	5.14	43.5
24.000	SW08.1	J1	14.318	0.012	53.000	52.930	0.070	204.5	225	5.28	43.1

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)
15.000	1.492	26.4	1.0	1.200	1.350	0.000	1.0	20	0.722
11.000	1.212	21.4	1.0	1.200	1.720	0.000	1.0	22	0.617
8.000	1.149	20.3	1.0	1.200	1.444	0.000	1.0	23	0.595
14.000	1.238	21.9	1.0	1.200	1.250	0.000	1.0	22	0.631
20.000	1.158	20.5	1.0	1.200	1.150	0.000	1.0	23	0.600
24.000	0.855	34.0	0.0	1.075	1.145	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)
3.000	PP01	J3	5.765	0.012	52.850	52.670	0.180	32.0	150	5.06	43.8
2.000	PP02	J3	5.941	0.012	52.850	52.670	0.180	33.0	150	5.06	43.8
1.002	SW06.1.3	SW06.1.2	19.848	0.012	52.650	52.600	0.050	397.0	225	7.61	37.1
1.003	SW06.1.2	J4	14.473	0.012	52.600	52.550	0.050	289.5	225	7.94	36.4
29.001	SW05	23	4.358	0.012	52.663	52.613	0.050	87.2	150	5.20	43.4
16.000	MH new(03)	J9	12.519	0.012	52.300	52.200	0.100	125.2	225	5.19	43.4
1.005	SW06.1.1	SW06.1	38.436	0.012	52.500	52.400	0.100	384.4	225	9.40	33.7
4.000	PP03	J4	7.094	0.012	52.850	52.750	0.100	70.9	150	5.11	43.6
5.000	PP04	J4	6.043	0.012	52.850	52.750	0.100	60.4	150	5.08	43.7
7.000	PP06	SW06.1.1	8.909	0.012	52.750	52.500	0.250	35.6	150	5.09	43.7
6.000	PP05	SW06.1.1	9.127	0.012	52.750	52.500	0.250	36.5	150	5.10	43.7
10.000	SW07	SW06.1	6.496	0.012	52.350	52.306	0.044	147.6	225	5.11	43.6
1.006	SW06.1	20	7.737	0.012	52.306	52.254	0.052	148.8	225	9.53	33.5
9.000	22	SW06.1	6.946	0.012	52.500	52.306	0.194	35.8	150	5.07	43.7
22.002	SW03	26	9.615	0.012	52.275	52.210	0.065	147.9	225	5.40	42.7
24.001	J1	J1.1	15.959	0.012	52.930	52.870	0.060	266.0	225	5.63	42.0
24.002	J1.1	SW08	35.523	0.012	52.870	52.800	0.070	507.5	225	6.72	39.1
102	SW08	21	17.955	0.012	52.800	52.760	0.040	448.9	225	7.24	37.9
28.000	SW06.2	21	17.879	0.012	52.750	52.600	0.150	119.2	150	5.35	42.9

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)
3.000	1.650	29.2	1.4	1.200	1.280	0.009	0.0	23	0.854
2.000	1.625	28.7	3.6	1.200	1.280	0.023	0.0	35	1.102
1.002	0.614	24.4	8.3	1.225	1.275	0.062	0.0	90	0.554
1.003	0.719	28.6	10.7	1.275	1.325	0.081	0.0	95	0.667
29.001	1.000	17.7	1.7	1.287	1.337	0.011	0.0	31	0.631
16.000	1.093	43.5	0.0	1.175	1.275	0.000	0.0	0	0.000
1.005	0.624	24.8	16.4	1.275	1.275	0.135	0.0	134	0.668
4.000	1.108	19.6	1.6	1.200	1.200	0.010	0.0	29	0.668
5.000	1.201	21.2	2.1	1.200	1.200	0.013	0.0	32	0.766
7.000	1.564	27.6	1.2	1.200	1.350	0.008	0.0	22	0.797
6.000	1.545	27.3	1.2	1.200	1.350	0.008	0.0	22	0.787
10.000	1.007	40.0	3.4	1.200	1.369	0.022	0.0	44	0.614
1.006	1.003	39.9	22.3	1.369	1.421	0.176	1.0	121	1.033
9.000	1.560	27.6	0.0	1.450	1.444	0.000	0.0	0	0.000
22.002	1.006	40.0	4.3	1.200	1.340	0.028	0.0	50	0.656
24.001	0.750	29.8	4.0	1.145	1.205	0.026	0.0	56	0.523
24.002	0.543	21.6	7.2	1.205	1.275	0.051	0.0	89	0.488
102	0.577	23.0	9.8	1.275	1.315	0.072	0.0	103	0.556
28.000	0.855	15.1	2.0	1.300	1.550	0.013	0.0	37	0.591

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)
23.000	24	SW03	8.994	0.012	52.350	52.280	0.070	128.5	150	5.18	43.4
29.000	PP10	SW05	7.564	0.012	52.750	52.663	0.087	86.9	150	5.13	43.6
13.000	25	SW02	3.121	0.012	52.220	52.200	0.020	156.0	300	5.04	43.8
11.002	SW02	SW01 OUTFALL	7.076	0.012	52.200	52.130	0.070	101.1	300	6.20	40.5
17.000	PP12	J9	6.545	0.012	52.450	52.200	0.250	26.2	150	5.06	43.8
18.000	PP11	J9	5.733	0.012	52.450	52.200	0.250	22.9	150	5.05	43.8
21.000	J7	J6	9.471	0.012	52.570	52.500	0.070	135.3	225	5.15	43.5
20.001	J6	SW05.1	7.520	0.012	52.500	52.375	0.125	60.2	225	5.23	43.3
22.000	PARKING 3	SW03.1	14.875	0.012	52.475	52.350	0.125	119.0	225	5.22	43.3
1.000	SW06.1.4	J3	26.441	0.012	52.700	52.670	0.030	881.4	225	6.07	40.8
14.001	J9	SW04	22.888	0.012	52.200	52.050	0.150	152.6	225	5.65	42.0
100	SW06	SW02	26.461	0.012	52.280	52.200	0.080	330.8	225	6.12	40.7
101	19	SW06	4.330	0.012	52.300	52.280	0.020	216.5	150	5.11	43.6
1.001	J3	SW06.1.3	22.105	0.012	52.670	52.650	0.020	1105.2	225	7.07	38.3
1.004	J4	SW06.1.1	17.008	0.012	52.550	52.500	0.050	340.2	225	8.37	35.6
14.002	SW04	MH new(02)	45.598	0.012	52.050	51.880	0.170	268.2	225	6.76	39.1
11.003	SW01 OUTFALL	MH new(02)	27.879	0.012	52.130	51.880	0.250	111.5	450	6.45	39.8
20.002	SW05.1	SW05.2	27.253	0.012	52.375	52.300	0.075	363.4	225	5.94	41.2

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)
23.000	0.824	14.6	0.0	1.275	1.270	0.000	0.0	0	0.000
29.000	1.001	17.7	0.4	1.300	1.287	0.002	0.0	15	0.401
13.000	1.186	83.9	0.0	1.480	1.500	0.000	0.0	0	0.000
11.002	1.474	104.2	1.0	1.500	1.560	0.000	1.0	21	0.468
17.000	1.825	32.2	1.9	1.400	1.350	0.012	0.0	24	0.989
18.000	1.950	34.5	2.0	1.400	1.350	0.012	0.0	24	1.057
21.000	1.052	41.8	3.6	1.205	1.175	0.023	0.0	45	0.649
20.001	1.577	62.7	4.6	1.175	1.200	0.023	1.0	41	0.916
22.000	1.121	44.6	2.0	1.200	1.200	0.013	0.0	32	0.562
1.000	0.412	16.4	0.0	1.175	1.205	0.000	0.0	0	0.000
14.001	0.990	39.4	8.4	1.275	1.525	0.042	2.0	71	0.789
100	0.673	26.7	1.0	1.645	1.575	0.000	1.0	29	0.319
101	0.634	11.2	0.0	1.450	1.720	0.000	0.0	0	0.000
1.001	0.368	14.6	4.4	1.205	1.225	0.032	0.0	85	0.322
1.004	0.663	26.4	13.4	1.325	1.275	0.105	0.0	114	0.667
14.002	0.747	29.7	10.4	1.525	1.895	0.060	2.0	92	0.681
11.003	1.839	292.5	1.0	1.410	1.670	0.000	1.0	19	0.422
20.002	0.642	25.5	7.8	1.200	1.075	0.046	1.0	86	0.565

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)
20.003	SW05.2	J10	11.525	0.012	52.300	52.250	0.050	230.5	225	6.18	40.5
19.000	J11	SW04	38.935	0.012	52.250	52.050	0.200	194.7	225	5.74	41.7
22.001	SW03.1	SW03	2.246	0.012	52.350	52.275	0.075	30.0	225	5.24	43.2
27.000	03.B (Blue Green Roof)	21	28.348	0.012	52.850	52.524	0.326	87.0	150	5.47	42.5
25.000	03.A (Blue Green Roof)	21	49.936	0.012	52.850	52.277	0.573	87.1	150	5.83	41.5
26.000	PARKING 4	21	32.536	0.012	52.850	52.476	0.374	87.0	150	5.54	42.3
11.004	MH new(02)	Exit	3.536	0.012	51.880	51.870	0.010	353.6	450	6.81	38.9

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)
20.003	0.806	32.0	7.7	1.075	1.225	0.046	1.0	75	0.663
19.000	0.877	34.9	0.0	1.225	1.525	0.000	0.0	0	0.000
22.001	2.235	88.9	4.3	1.200	1.200	0.028	0.0	34	1.157
27.000	1.001	17.7	1.0	1.200	1.626	0.000	1.0	24	0.543
25.000	1.000	17.7	1.0	1.200	1.873	0.000	1.0	24	0.542
26.000	1.001	17.7	6.3	1.200	1.674	0.041	0.0	62	0.916
11.004	1.033	164.2	11.4	1.670	1.680	0.060	3.0	80	0.594

Node MH new(02) Online Orifice Control

Flap Valve	x	Invert Level (m)	51.880	Diameter (m)	0.054
Downstream Link	11.004	Design Depth (m)	1.500	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	7.5		

Node SW02 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	11.002	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0092-5000-2000-5000
Invert Level (m)	52.200	Min Outlet Diameter (m)	0.150
Design Depth (m)	2.000	Min Node Diameter (mm)	1200
Design Flow (l/s)	5.0		

Node SW04 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	14.002	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0092-5000-2000-5000
Invert Level (m)	52.050	Min Outlet Diameter (m)	0.150
Design Depth (m)	2.000	Min Node Diameter (mm)	1200
Design Flow (l/s)	5.0		

Node 22 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.40	Main Channel Length (m)	60.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.500	Main Channel Slope (1:X)	350.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.030

Inlets
21

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	120.0	120.0	1.500	120.0	178.2

Node 19 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.40	Main Channel Length (m)	30.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.300	Main Channel Slope (1:X)	350.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.030

Inlets
20

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	1.500	50.0	87.6

Node 25 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.40	Main Channel Length (m)	30.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.220	Main Channel Slope (1:X)	350.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.030

Inlets
26

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	2.000	50.0	100.1

Node 24 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.40	Main Channel Length (m)	60.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.350	Main Channel Slope (1:X)	350.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.030

Inlets
23

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	150.0	150.0	1.400	150.0	210.8

Node PP01 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.850	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.45	Length (m)	22.000		

Node PP02 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.850	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.45	Length (m)	35.000		

Node J11 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.40	Main Channel Length (m)	20.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.250	Main Channel Slope (1:X)	350.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.030

Inlets

J10

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	110.0	110.0	1.300	110.0	158.3

Node PP03 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.850	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	35.000		

Node PP04 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.850	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	35.000		

Node PP06 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.750	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	15.000		

Node PP05 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.750	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	15.000		

Node PP10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.750	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	10.000		

Node PP11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.450	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	30.000		

Node PP12 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.450	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.40	Length (m)	30.000		

Node PARKING 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.850	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	60.000	Inf Depth (m)	
Porosity	0.40	Length (m)	5.000		

Node PARKING 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.475	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.40	Length (m)	5.000		

Results for 1 year +20% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	PP01	3600	53.175	0.325	0.4	15.0209	0.0000	SURCHARGED
1440 minute winter	SW07	3600	53.175	0.825	0.3	1.1841	0.0000	SURCHARGED
1440 minute winter	PP02	3600	53.175	0.325	0.5	22.9117	0.0000	SURCHARGED
1440 minute winter	SW06.1.2	3600	53.175	0.575	0.7	0.7974	0.0000	SURCHARGED
1440 minute winter	J9	3600	53.145	0.945	2.2	0.2241	0.0000	SURCHARGED
1440 minute winter	SW06.1	3600	53.175	0.869	4.5	1.1986	0.0000	SURCHARGED
1440 minute winter	PP03	3600	53.175	0.325	0.5	20.3196	0.0000	SURCHARGED
1440 minute winter	PP06	3600	53.175	0.425	0.4	12.3371	0.0000	SURCHARGED
1440 minute winter	PP05	3600	53.175	0.425	0.4	12.3371	0.0000	SURCHARGED
1440 minute winter	SW06.1.3	3600	53.175	0.525	0.6	0.8109	0.0000	SURCHARGED
1440 minute winter	SW06.1.1	3600	53.175	0.675	1.1	0.8911	0.0000	SURCHARGED
1440 minute winter	J1.1	3600	53.176	0.306	0.6	0.1033	0.0000	SURCHARGED
1440 minute winter	SW08	3600	53.176	0.376	0.9	0.5312	0.0000	SURCHARGED
1440 minute winter	SW06.2	3600	53.176	0.426	0.2	0.5567	0.0000	SURCHARGED
1440 minute winter	19	3600	53.174	0.874	4.3	0.0000	0.0000	SURCHARGED
1440 minute winter	20	3600	53.174	0.920	4.4	0.0000	0.0000	OK
1440 minute winter	21	3600	53.176	0.899	3.6	0.1384	0.0000	OK
1440 minute winter	22	3600	53.176	0.676	3.2	0.0000	0.0000	SURCHARGED
1440 minute winter	23	3600	53.172	0.650	0.7	0.0000	0.0000	OK
1440 minute winter	24	3600	53.171	0.821	1.1	0.0000	0.0000	SURCHARGED
1440 minute winter	25	3600	53.171	0.951	1.6	0.0000	0.0000	SURCHARGED
1440 minute winter	26	3600	53.171	0.961	1.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP01	3.000	J3	1.2	0.300	0.042	0.0855	
15 minute summer	SW07	10.000	SW06.1	3.4	0.181	0.086	0.2584	
15 minute summer	PP02	2.000	J3	3.1	0.508	0.107	0.0881	
15 minute summer	SW06.1.2	1.003	J4	10.4	0.563	0.365	0.5756	
30 minute summer	J9	14.001	SW04	6.9	0.630	0.176	0.9103	
30 minute summer	SW06.1	1.006	20	30.4	0.765	0.763	0.3077	
30 minute summer	PP03	4.000	J4	1.3	0.623	0.065	0.1094	
15 minute summer	PP06	7.000	SW06.1.1	1.1	0.162	0.039	0.1568	
15 minute summer	PP05	6.000	SW06.1.1	1.1	0.160	0.040	0.1607	
30 minute summer	SW06.1.3	1.002	SW06.1.2	7.7	0.492	0.316	0.7894	
15 minute summer	SW06.1.1	1.005	SW06.1	17.2	0.692	0.694	1.5286	
15 minute summer	J1.1	24.002	SW08	9.1	0.484	0.422	0.7099	
15 minute summer	SW08	102	21	12.4	0.694	0.540	0.5674	
15 minute summer	SW06.2	28.000	21	2.4	0.448	0.156	0.3148	
15 minute summer	19	101	SW06	20.1	1.141	1.791	0.0762	
30 minute summer	20	Flow through Pond	19	25.7	0.249	0.035	12.2441	
15 minute summer	21	Flow through Pond	22	20.9	0.311	0.019	17.4273	
30 minute winter	22	9.000	SW06.1	11.4	0.779	0.415	0.1223	
60 minute summer	23	Flow through Pond	24	-4.1	0.061	-0.003	31.7926	
30 minute summer	24	23.000	SW03	-10.3	-0.666	-0.709	0.1583	
30 minute summer	25	13.000	SW02	-14.6	-0.254	-0.174	0.2198	
30 minute summer	26	Flow through Pond	25	-13.2	-0.085	-0.014	13.7988	

Results for 1 year +20% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	PP12	3600	53.145	0.695	0.8	34.3394	0.0000	SURCHARGED
1440 minute winter	PP11	3600	53.145	0.695	0.8	34.3449	0.0000	SURCHARGED
1440 minute winter	SW05.1	3600	53.145	0.770	3.0	1.1163	0.0000	SURCHARGED
1440 minute winter	PP10	3600	53.171	0.421	0.3	8.2379	0.0000	SURCHARGED
1440 minute winter	J1	3600	53.176	0.246	0.3	0.0948	0.0000	SURCHARGED
1440 minute winter	SW06.1.4	3600	53.175	0.475	0.1	0.5367	0.0000	SURCHARGED
1440 minute winter	SW02	3600	53.171	0.971	5.1	1.7161	0.0000	SURCHARGED
1440 minute winter	PP04	3600	53.175	0.325	0.5	20.3343	0.0000	SURCHARGED
1440 minute winter	SW05	3600	53.171	0.508	0.3	0.6357	0.0000	SURCHARGED
1440 minute winter	PARKING 4	3600	53.176	0.326	1.1	38.6740	0.0000	SURCHARGED
1440 minute winter	SW01 OUTFALL	3600	53.040	0.910	3.5	1.3023	0.0000	SURCHARGED
1440 minute winter	J7	3600	53.145	0.575	0.3	0.8366	0.0000	SURCHARGED
1440 minute winter	CRECHE	3600	53.146	0.496	1.0	0.5612	0.0000	SURCHARGED
1440 minute winter	04.A (Blue Green Roof)	3600	53.174	0.324	1.0	0.3668	0.0000	SURCHARGED
1440 minute winter	04.B (Blue Green Roof)	3600	53.176	0.326	1.0	0.3688	0.0000	SURCHARGED
1440 minute winter	03.A (Blue Green Roof)	3600	53.178	0.328	1.0	0.3706	0.0000	SURCHARGED
1440 minute winter	03.B (Blue Green Roof)	3600	53.177	0.327	1.0	0.3696	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute summer	PP12	17.000	J9	-2.1	-0.150	-0.066	0.1152	
180 minute summer	PP11	18.000	J9	-2.1	-0.146	-0.061	0.1009	
15 minute summer	SW05.1	20.002	SW05.2	9.3	0.611	0.366	1.0839	
480 minute summer	PP10	29.000	SW05	-0.7	0.150	-0.037	0.1332	
15 minute summer	J1	24.001	J1.1	4.8	0.375	0.161	0.2092	
15 minute summer	SW06.1.4	1.000	J3	-1.1	-0.158	-0.065	1.0516	
30 minute summer	SW02	11.002	SW01 OUTFALL	4.3	0.724	0.042	0.4983	
30 minute summer	PP04	5.000	J4	1.7	0.719	0.080	0.0932	
15 minute summer	SW05	29.001	23	1.7	0.625	0.098	0.0767	
120 minute summer	PARKING 4	26.000	21	2.0	0.159	0.112	0.5590	
15 minute summer	SW01 OUTFALL	11.003	MH new(02)	4.0	0.150	0.014	4.4172	
15 minute summer	J7	21.000	J6	4.3	0.711	0.102	0.3767	
960 minute summer	CRECHE	15.000	J9	1.0	0.456	0.038	0.3102	
30 minute winter	04.A (Blue Green Roof)	11.000	SW06	1.0	0.799	0.048	0.5213	
30 minute winter	04.B (Blue Green Roof)	8.000	SW06.1	1.1	0.771	0.052	0.5570	
480 minute winter	03.A (Blue Green Roof)	25.000	21	1.0	0.085	0.057	0.8791	
240 minute winter	03.B (Blue Green Roof)	27.000	21	1.0	0.539	0.057	0.4991	

Results for 1 year +20% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	02.B (Blue Green Roof)	3600	53.146	0.396	1.0	0.4477	0.0000	SURCHARGED
1440 minute winter	02.A (Blue Green Roof)	3600	53.146	0.496	1.0	0.5613	0.0000	SURCHARGED
1440 minute winter	PARKING 3	3600	53.171	0.696	0.7	23.9423	0.0000	SURCHARGED
1440 minute winter	J6	3600	53.145	0.645	2.2	0.0000	0.0000	SURCHARGED
1440 minute winter	SW04	3600	53.145	1.095	3.0	1.4607	0.0000	SURCHARGED
1440 minute winter	SW03.1	3600	53.171	0.821	0.7	1.1053	0.0000	SURCHARGED
1440 minute winter	SW03	3600	53.171	0.896	1.3	1.0136	0.0000	SURCHARGED
1440 minute winter	SW06	3600	53.173	0.893	5.2	1.0099	0.0000	SURCHARGED
1440 minute winter	SW08.1	3600	53.176	0.176	0.0	0.1987	0.0000	OK
1440 minute winter	J3	3600	53.175	0.505	0.5	0.0000	0.0000	SURCHARGED
1440 minute winter	J4	3600	53.175	0.625	0.9	0.0000	0.0000	SURCHARGED
1440 minute winter	MH new(02)	3600	53.040	1.160	6.4	1.6600	0.0000	SURCHARGED
1440 minute winter	MH new(03)	3600	53.146	0.846	0.3	0.9565	0.0000	SURCHARGED
1440 minute winter	SW05.2	3600	53.145	0.845	1.5	0.9560	0.0000	SURCHARGED
1440 minute winter	J10	3600	53.145	0.895	2.5	0.0000	0.0000	OK
1440 minute winter	J11	3600	53.145	0.895	4.5	0.0000	0.0000	SURCHARGED
1440 minute winter	Exit	3600	51.923	0.053	6.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	02.B (Blue Green Roof)	20.000	J6	1.0	0.596	0.049	0.1715	
30 minute winter	02.A (Blue Green Roof)	14.000	J9	1.0	0.626	0.046	0.3502	
60 minute summer	PARKING 3	22.000	SW03.1	-6.6	-0.276	-0.148	0.5916	
480 minute summer	J6	20.001	SW05.1	6.1	0.407	0.097	0.2991	
15 minute summer	SW04	14.002	MH new(02)	4.0	0.476	0.135	1.8135	
60 minute summer	SW03.1	22.001	SW03	-6.2	0.487	-0.070	0.0893	
60 minute summer	SW03	22.002	26	-12.1	0.315	-0.303	0.3824	
15 minute summer	SW06	100	SW02	19.5	0.629	0.730	1.0524	
360 minute summer	SW08.1	24.000	J1	0.0	-0.005	-0.001	0.1589	
15 minute summer	J3	1.001	SW06.1.3	4.3	0.320	0.291	0.8791	
30 minute summer	J4	1.004	SW06.1.1	13.3	0.561	0.504	0.6764	
1440 minute winter	MH new(02)	11.004	Exit	6.4	0.540	0.039	0.0419	1249.6
15 minute summer	MH new(03)	16.000	J9	-1.3	-0.072	-0.030	0.4979	
15 minute summer	SW05.2	20.003	J10	9.3	0.686	0.291	0.4584	
360 minute summer	J10	Flow through Pond	J11	19.7	0.047	0.006	32.4995	
30 minute summer	J11	19.000	SW04	-4.7	-0.161	-0.136	1.5485	

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	PP01	3600	53.240	0.390	0.7	18.2686	0.0000	SURCHARGED
1440 minute summer	SW07	3600	53.240	0.890	0.6	1.2780	0.0000	SURCHARGED
1440 minute summer	PP02	3600	53.240	0.390	1.1	28.0864	0.0000	SURCHARGED
1440 minute summer	SW06.1.2	3600	53.240	0.640	0.9	0.8885	0.0000	SURCHARGED
1440 minute summer	J9	3600	53.194	0.994	2.5	0.2356	0.0000	SURCHARGED
1440 minute summer	SW06.1	3600	53.240	0.934	4.9	1.2889	0.0000	SURCHARGED
1440 minute summer	PP03	3600	53.240	0.390	1.0	24.9095	0.0000	SURCHARGED
1440 minute summer	PP06	3600	53.240	0.490	0.5	14.3076	0.0000	SURCHARGED
1440 minute summer	PP05	3600	53.240	0.490	0.5	14.3076	0.0000	SURCHARGED
1440 minute summer	SW06.1.3	3600	53.240	0.590	1.0	0.9123	0.0000	SURCHARGED
1440 minute summer	SW06.1.1	3600	53.240	0.740	1.6	0.9775	0.0000	SURCHARGED
1440 minute summer	J1.1	3600	53.241	0.371	1.3	0.1253	0.0000	SURCHARGED
1440 minute summer	SW08	3600	53.241	0.441	1.7	0.6238	0.0000	SURCHARGED
1440 minute summer	SW06.2	3600	53.241	0.491	0.3	0.6422	0.0000	SURCHARGED
1440 minute summer	19	3600	53.240	0.940	4.6	0.0000	0.0000	SURCHARGED
1440 minute summer	20	3600	53.240	0.986	4.8	0.0000	0.0000	OK
1440 minute summer	21	3600	53.241	0.964	4.2	0.1485	0.0000	OK
1440 minute summer	22	3600	53.241	0.741	3.3	0.0000	0.0000	SURCHARGED
1440 minute summer	23	3600	53.237	0.715	0.8	0.0000	0.0000	OK
1440 minute summer	24	3600	53.236	0.886	1.3	0.0000	0.0000	SURCHARGED
1440 minute summer	25	3600	53.236	1.016	2.0	0.0000	0.0000	SURCHARGED
1440 minute summer	26	3600	53.236	1.026	1.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP01	3.000	J3	1.9	0.336	0.064	0.0895	
15 minute summer	SW07	10.000	SW06.1	6.0	0.215	0.151	0.2584	
15 minute summer	PP02	2.000	J3	4.6	0.538	0.160	0.0923	
15 minute summer	SW06.1.2	1.003	J4	15.1	0.598	0.528	0.5756	
30 minute summer	J9	14.001	SW04	9.1	0.630	0.231	0.9103	
15 minute summer	SW06.1	1.006	20	36.9	0.929	0.926	0.3077	
30 minute summer	PP03	4.000	J4	1.9	0.700	0.096	0.1159	
60 minute summer	PP06	7.000	SW06.1.1	-2.0	0.160	-0.071	0.1568	
60 minute summer	PP05	6.000	SW06.1.1	-2.0	-0.160	-0.072	0.1607	
30 minute summer	SW06.1.3	1.002	SW06.1.2	11.5	0.500	0.473	0.7894	
15 minute summer	SW06.1.1	1.005	SW06.1	23.4	0.726	0.944	1.5286	
15 minute summer	J1.1	24.002	SW08	13.4	0.530	0.622	0.9178	
15 minute summer	SW08	102	21	18.8	0.788	0.820	0.6005	
15 minute summer	SW06.2	28.000	21	3.5	0.457	0.233	0.3148	
15 minute summer	19	101	SW06	22.9	1.303	2.046	0.0762	
15 minute summer	20	Flow through Pond	19	29.5	0.296	0.041	12.2758	
15 minute summer	21	Flow through Pond	22	32.0	0.346	0.029	17.9087	
15 minute summer	22	9.000	SW06.1	12.5	0.712	0.455	0.1223	
30 minute summer	23	Flow through Pond	24	-5.8	0.111	-0.004	31.9390	
30 minute summer	24	23.000	SW03	-12.2	-0.758	-0.838	0.1583	
30 minute summer	25	13.000	SW02	-18.4	-0.282	-0.219	0.2198	
30 minute summer	26	Flow through Pond	25	-16.7	-0.091	-0.018	14.0828	

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	PP12	3600	53.194	0.744	1.2	34.3468	0.0000	SURCHARGED
1440 minute summer	PP11	3600	53.194	0.744	1.2	34.3528	0.0000	SURCHARGED
1440 minute summer	SW05.1	3600	53.194	0.819	4.7	1.1864	0.0000	SURCHARGED
1440 minute summer	PP10	3600	53.236	0.486	0.4	9.5435	0.0000	SURCHARGED
1440 minute summer	J1	3600	53.241	0.311	0.7	0.1200	0.0000	SURCHARGED
1440 minute summer	SW06.1.4	3600	53.240	0.540	0.1	0.6105	0.0000	SURCHARGED
1440 minute summer	SW02	3600	53.236	1.036	5.4	1.8313	0.0000	SURCHARGED
1440 minute summer	PP04	3600	53.240	0.390	1.0	24.9270	0.0000	SURCHARGED
1440 minute summer	SW05	3600	53.236	0.573	0.4	0.7173	0.0000	SURCHARGED
1440 minute summer	PARKING 4	3600	53.241	0.391	1.8	46.5699	0.0000	SURCHARGED
1440 minute summer	SW01 OUTFALL	3600	53.088	0.958	3.5	1.3711	0.0000	SURCHARGED
1440 minute summer	J7	3600	53.194	0.624	0.6	0.9072	0.0000	SURCHARGED
1440 minute summer	CRECHE	3600	53.195	0.545	1.0	0.6160	0.0000	SURCHARGED
1440 minute summer	04.A (Blue Green Roof)	3600	53.240	0.390	1.0	0.4406	0.0000	SURCHARGED
1440 minute summer	04.B (Blue Green Roof)	3600	53.241	0.391	1.0	0.4428	0.0000	SURCHARGED
1440 minute summer	03.A (Blue Green Roof)	3600	53.243	0.393	1.0	0.4447	0.0000	SURCHARGED
1440 minute summer	03.B (Blue Green Roof)	3600	53.242	0.392	1.0	0.4437	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	PP12	17.000	J9	-3.2	-0.229	-0.099	0.1152	
120 minute summer	PP11	18.000	J9	-3.2	-0.227	-0.092	0.1009	
15 minute summer	SW05.1	20.002	SW05.2	13.5	0.683	0.531	1.0839	
240 minute summer	PP10	29.000	SW05	-1.5	0.174	-0.084	0.1332	
15 minute summer	J1	24.001	J1.1	7.0	0.415	0.234	0.2900	
60 minute summer	SW06.1.4	1.000	J3	-2.4	-0.122	-0.149	1.0516	
15 minute winter	SW02	11.002	SW01 OUTFALL	4.1	0.729	0.040	0.4983	
15 minute summer	PP04	5.000	J4	2.5	0.806	0.119	0.0939	
15 minute summer	SW05	29.001	23	2.6	0.703	0.150	0.0767	
60 minute summer	PARKING 4	26.000	21	3.4	0.257	0.191	0.5620	
15 minute summer	SW01 OUTFALL	11.003	MH new(02)	4.1	0.163	0.014	4.4172	
15 minute summer	J7	21.000	J6	6.4	0.820	0.154	0.3767	
720 minute winter	CRECHE	15.000	J9	1.0	0.456	0.038	0.3102	
30 minute winter	04.A (Blue Green Roof)	11.000	SW06	1.0	0.799	0.048	0.5525	
60 minute winter	04.B (Blue Green Roof)	8.000	SW06.1	1.1	0.771	0.052	0.6212	
180 minute winter	03.A (Blue Green Roof)	25.000	21	1.0	0.140	0.057	0.8791	
360 minute summer	03.B (Blue Green Roof)	27.000	21	1.0	0.539	0.057	0.4991	

Results for 5 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	02.B (Blue Green Roof)	3600	53.194	0.444	1.0	0.5025	0.0000	SURCHARGED
1440 minute summer	02.A (Blue Green Roof)	3600	53.195	0.545	1.0	0.6161	0.0000	SURCHARGED
1440 minute summer	PARKING 3	3600	53.236	0.761	0.7	23.9537	0.0000	SURCHARGED
1440 minute summer	J6	3600	53.194	0.694	1.6	0.0000	0.0000	SURCHARGED
1440 minute summer	SW04	3600	53.193	1.143	3.2	1.5253	0.0000	SURCHARGED
1440 minute summer	SW03.1	3600	53.236	0.886	0.7	1.1929	0.0000	SURCHARGED
1440 minute summer	SW03	3600	53.236	0.961	1.6	1.0872	0.0000	SURCHARGED
1440 minute summer	SW06	3600	53.238	0.958	5.5	1.0837	0.0000	SURCHARGED
1440 minute summer	SW08.1	3600	53.241	0.241	0.0	0.2724	0.0000	SURCHARGED
1440 minute summer	J3	3600	53.240	0.570	1.0	0.0000	0.0000	SURCHARGED
1440 minute summer	J4	3600	53.240	0.690	1.4	0.0000	0.0000	SURCHARGED
1440 minute summer	MH new(02)	3600	53.088	1.208	6.5	1.7287	0.0000	SURCHARGED
1440 minute summer	MH new(03)	3600	53.194	0.894	0.3	1.0109	0.0000	SURCHARGED
1440 minute summer	SW05.2	3600	53.194	0.894	3.2	1.0107	0.0000	SURCHARGED
1440 minute summer	J10	3600	53.194	0.944	4.7	0.0000	0.0000	OK
1440 minute summer	J11	3600	53.194	0.944	3.6	0.0000	0.0000	SURCHARGED
1440 minute summer	Exit	3600	51.924	0.054	6.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	02.B (Blue Green Roof)	20.000	J6	1.0	0.596	0.049	0.1715	
30 minute summer	02.A (Blue Green Roof)	14.000	J9	1.0	0.626	0.046	0.3502	
60 minute summer	PARKING 3	22.000	SW03.1	-8.1	-0.303	-0.181	0.5916	
15 minute summer	J6	20.001	SW05.1	7.4	0.732	0.118	0.2991	
15 minute summer	SW04	14.002	MH new(02)	4.1	0.500	0.138	1.8135	
60 minute summer	SW03.1	22.001	SW03	7.7	0.518	0.087	0.0893	
30 minute summer	SW03	22.002	26	-15.0	-0.377	-0.375	0.3824	
30 minute summer	SW06	100	SW02	22.8	0.573	0.851	1.0524	
15 minute summer	SW08.1	24.000	J1	-0.2	-0.036	-0.005	0.0920	
15 minute summer	J3	1.001	SW06.1.3	6.5	0.331	0.447	0.8791	
15 minute summer	J4	1.004	SW06.1.1	19.0	0.606	0.721	0.6764	
1440 minute summer	MH new(02)	11.004	Exit	6.5	0.543	0.040	0.0426	1286.8
30 minute summer	MH new(03)	16.000	J9	-1.4	-0.130	-0.033	0.4979	
15 minute summer	SW05.2	20.003	J10	13.2	0.825	0.413	0.4584	
180 minute summer	J10	Flow through Pond	J11	17.1	0.066	0.005	32.2850	
30 minute summer	J11	19.000	SW04	-7.9	-0.213	-0.226	1.5485	

Results for 30 year (first 5mm) Critical Storm Duration. Lowest mass balance: 97.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	PP01	9	52.868	0.018	1.3	0.1868	0.0000	OK
15 minute winter	SW07	13	52.471	0.121	3.1	0.1738	0.0000	OK
15 minute winter	PP02	9	52.878	0.028	3.3	0.4584	0.0000	OK
15 minute winter	SW06.1.2	9	52.681	0.081	7.7	0.1124	0.0000	OK
15 minute winter	J9	14	52.285	0.085	4.7	0.0201	0.0000	OK
15 minute winter	SW06.1	10	52.471	0.165	15.3	0.2275	0.0000	OK
15 minute summer	PP03	10	52.872	0.022	1.5	0.2413	0.0000	OK
15 minute winter	PP06	9	52.767	0.017	1.1	0.1530	0.0000	OK
15 minute winter	PP05	9	52.767	0.017	1.1	0.1540	0.0000	OK
15 minute winter	SW06.1.3	9	52.724	0.074	5.6	0.1140	0.0000	OK
15 minute winter	SW06.1.1	10	52.616	0.116	12.7	0.1534	0.0000	OK
15 minute winter	J1.1	8	52.957	0.087	7.1	0.0294	0.0000	OK
15 minute winter	SW08	9	52.898	0.098	9.5	0.1388	0.0000	OK
15 minute winter	SW06.2	8	52.785	0.035	1.9	0.0455	0.0000	OK
15 minute winter	19	15	52.443	0.143	14.9	0.0000	0.0000	OK
15 minute winter	20	14	52.466	0.212	15.4	0.0000	0.0000	OK
15 minute winter	21	11	52.733	0.456	13.0	0.0702	0.0000	OK
15 minute winter	22	14	52.550	0.050	9.0	0.0000	0.0000	OK
15 minute summer	23	12	52.534	0.012	1.3	0.0000	0.0000	OK
15 minute winter	24	25	52.414	0.064	4.0	0.0000	0.0000	OK
15 minute winter	25	19	52.416	0.196	8.9	0.0000	0.0000	OK
15 minute winter	26	20	52.416	0.206	5.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	PP01	3.000	J3	0.9	0.313	0.030	0.0256	
15 minute winter	SW07	10.000	SW06.1	2.4	0.372	0.060	0.1719	
15 minute winter	PP02	2.000	J3	2.2	0.530	0.076	0.0294	
15 minute winter	SW06.1.2	1.003	J4	7.6	0.530	0.266	0.2099	
15 minute winter	J9	14.001	SW04	4.7	0.345	0.118	0.6111	
15 minute winter	SW06.1	1.006	20	15.4	0.435	0.386	0.2706	
15 minute summer	PP03	4.000	J4	0.9	0.558	0.045	0.0111	
15 minute winter	PP06	7.000	SW06.1.1	0.8	0.201	0.028	0.0702	
15 minute winter	PP05	6.000	SW06.1.1	0.8	0.199	0.028	0.0719	
15 minute winter	SW06.1.3	1.002	SW06.1.2	5.4	0.450	0.222	0.2397	
15 minute winter	SW06.1.1	1.005	SW06.1	11.8	0.670	0.475	0.6774	
15 minute winter	J1.1	24.002	SW08	6.8	0.454	0.315	0.5461	
15 minute winter	SW08	102	21	9.1	0.632	0.395	0.2583	
15 minute winter	SW06.2	28.000	21	1.8	0.557	0.117	0.1623	
15 minute winter	19	101	SW06	13.6	0.975	1.216	0.0733	
15 minute winter	20	Flow through Pond	19	14.9	0.274	0.021	2.2251	
15 minute winter	21	Flow through Pond	22	9.0	0.231	0.008	2.3516	
15 minute winter	22	9.000	SW06.1	6.7	0.494	0.241	0.0791	
15 minute summer	23	Flow through Pond	24	0.7	0.078	0.001	2.0367	
15 minute winter	24	23.000	SW03	-3.6	-0.361	-0.248	0.1066	
15 minute winter	25	13.000	SW02	-8.6	-0.433	-0.102	0.1609	
15 minute winter	26	Flow through Pond	25	-5.6	0.142	-0.006	3.0577	

Results for 30 year (first 5mm) Critical Storm Duration. Lowest mass balance: 97.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	PP12	9	52.470	0.020	1.7	0.2078	0.0000	OK
15 minute winter	PP11	9	52.470	0.020	1.8	0.2125	0.0000	OK
15 minute winter	SW05.1	8	52.455	0.080	6.5	0.1154	0.0000	OK
15 minute summer	PP10	10	52.761	0.011	0.3	0.0594	0.0000	OK
15 minute winter	J1	7	52.983	0.053	3.8	0.0205	0.0000	OK
15 minute winter	SW06.1.4	11	52.741	0.041	0.7	0.0465	0.0000	OK
15 minute winter	SW02	19	52.416	0.216	13.3	0.3819	0.0000	OK
15 minute winter	PP04	10	52.874	0.024	1.9	0.3022	0.0000	OK
15 minute winter	SW05	8	52.691	0.028	1.3	0.0348	0.0000	OK
15 minute summer	PARKING 4	12	52.870	0.020	5.9	1.8287	0.0000	OK
15 minute winter	SW01 OUTFALL	55	52.228	0.098	3.7	0.1408	0.0000	OK
15 minute winter	J7	7	52.614	0.044	3.3	0.0633	0.0000	OK
15 minute summer	CRECHE	1	52.650	0.000	0.0	0.0000	0.0000	OK
15 minute summer	04.A (Blue Green Roof)	1	52.850	0.000	0.0	0.0000	0.0000	OK
15 minute summer	04.B (Blue Green Roof)	1	52.850	0.000	0.0	0.0000	0.0000	OK
15 minute summer	03.A (Blue Green Roof)	1	52.850	0.000	0.0	0.0000	0.0000	OK
15 minute summer	03.B (Blue Green Roof)	1	52.850	0.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	PP12	17.000	J9	1.2	0.382	0.038	0.0355	
15 minute winter	PP11	18.000	J9	1.3	0.415	0.039	0.0310	
15 minute winter	SW05.1	20.002	SW05.2	6.3	0.563	0.247	0.3094	
15 minute summer	PP10	29.000	SW05	0.2	0.244	0.010	0.0102	
15 minute winter	J1	24.001	J1.1	3.6	0.351	0.121	0.1689	
15 minute winter	SW06.1.4	1.000	J3	-0.7	-0.139	-0.044	0.1994	
30 minute winter	SW02	11.002	SW01 OUTFALL	3.7	0.709	0.036	0.0874	
15 minute winter	PP04	5.000	J4	1.2	0.648	0.056	0.0112	
15 minute winter	SW05	29.001	23	1.3	0.571	0.072	0.0097	
15 minute summer	PARKING 4	26.000	21	0.7	0.256	0.038	0.3092	
30 minute winter	SW01 OUTFALL	11.003	MH new(02)	4.3	0.161	0.015	2.1727	
15 minute winter	J7	21.000	J6	3.2	0.700	0.077	0.0437	
15 minute summer	CRECHE	15.000	J9	0.0	0.000	0.000	0.0862	
15 minute summer	04.A (Blue Green Roof)	11.000	SW06	0.0	0.000	0.000	0.2900	
15 minute summer	04.B (Blue Green Roof)	8.000	SW06.1	0.0	0.000	0.000	0.3162	
15 minute summer	03.A (Blue Green Roof)	25.000	21	0.0	0.000	0.000	0.4396	
15 minute summer	03.B (Blue Green Roof)	27.000	21	0.0	0.000	0.000	0.2495	

Results for 30 year (first 5mm) Critical Storm Duration. Lowest mass balance: 97.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	02.B (Blue Green Roof)	1	52.750	0.000	0.0	0.0000	0.0000	OK
15 minute summer	02.A (Blue Green Roof)	1	52.650	0.000	0.0	0.0000	0.0000	OK
15 minute winter	PARKING 3	11	52.492	0.017	1.8	0.4833	0.0000	OK
15 minute winter	J6	7	52.535	0.035	3.2	0.0000	0.0000	OK
15 minute winter	SW04	15	52.285	0.235	7.2	0.3133	0.0000	SURCHARGED
15 minute winter	SW03.1	20	52.415	0.065	2.4	0.0874	0.0000	OK
15 minute winter	SW03	20	52.415	0.140	3.7	0.1583	0.0000	OK
15 minute winter	SW06	19	52.421	0.141	13.6	0.1595	0.0000	OK
15 minute summer	SW08.1	1	53.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	J3	11	52.738	0.068	3.1	0.0000	0.0000	OK
15 minute winter	J4	9	52.646	0.096	9.6	0.0000	0.0000	OK
15 minute winter	MH new(02)	52	52.228	0.348	7.3	0.4987	0.0000	OK
15 minute summer	MH new(03)	1	52.300	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SW05.2	8	52.368	0.068	6.3	0.0772	0.0000	OK
15 minute winter	J10	9	52.331	0.081	6.1	0.0000	0.0000	OK
15 minute summer	J11	13	52.296	0.046	6.2	0.0000	0.0000	OK
15 minute winter	Exit	57	51.909	0.039	3.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	02.B (Blue Green Roof)	20.000	J6	0.0	0.000	0.000	0.0000	
15 minute summer	02.A (Blue Green Roof)	14.000	J9	0.0	0.000	0.000	0.0000	
15 minute winter	PARKING 3	22.000	SW03.1	0.5	0.403	0.011	0.0769	
15 minute winter	J6	20.001	SW05.1	3.2	0.408	0.051	0.0615	
15 minute winter	SW04	14.002	MH new(02)	3.7	0.523	0.126	1.6774	
15 minute winter	SW03.1	22.001	SW03	2.3	0.640	0.026	0.0398	
15 minute winter	SW03	22.002	26	-3.5	0.358	-0.088	0.3078	
15 minute winter	SW06	100	SW02	13.3	0.643	0.496	0.8652	
15 minute summer	SW08.1	24.000	J1	0.0	0.000	0.000	0.0501	
15 minute winter	J3	1.001	SW06.1.3	2.8	0.305	0.189	0.2292	
15 minute winter	J4	1.004	SW06.1.1	9.5	0.552	0.362	0.3117	
15 minute winter	MH new(02)	11.004	Exit	3.3	0.447	0.020	0.0266	20.5
15 minute summer	MH new(03)	16.000	J9	0.0	0.000	0.000	0.0812	
15 minute winter	SW05.2	20.003	J10	6.1	0.541	0.191	0.1312	
15 minute winter	J10	Flow through Pond	J11	6.9	0.142	0.002	1.3484	
15 minute summer	J11	19.000	SW04	3.1	0.127	0.090	0.8853	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	PP01	3600	53.330	0.480	0.7	22.7185	0.0000	SURCHARGED
1440 minute winter	SW07	3600	53.330	0.980	0.5	1.4067	0.0000	SURCHARGED
1440 minute winter	PP02	3600	53.330	0.480	1.0	35.1765	0.0000	SURCHARGED
1440 minute winter	SW06.1.2	3600	53.330	0.730	0.9	1.0127	0.0000	SURCHARGED
1440 minute winter	J9	3600	53.257	1.057	2.6	0.2505	0.0000	SURCHARGED
1440 minute winter	SW06.1	3600	53.330	1.024	4.9	1.4126	0.0000	SURCHARGED
1440 minute winter	PP03	3600	53.330	0.480	0.9	31.1989	0.0000	SURCHARGED
1440 minute winter	PP06	3600	53.330	0.580	0.5	17.0076	0.0000	SURCHARGED
1440 minute winter	PP05	3600	53.330	0.580	0.5	17.0076	0.0000	SURCHARGED
1440 minute winter	SW06.1.3	3600	53.330	0.680	1.0	1.0507	0.0000	SURCHARGED
1440 minute winter	SW06.1.1	3600	53.330	0.830	1.6	1.0959	0.0000	SURCHARGED
1440 minute winter	J1.1	3600	53.331	0.461	1.2	0.1558	0.0000	SURCHARGED
1440 minute winter	SW08	3600	53.331	0.531	1.6	0.7506	0.0000	SURCHARGED
1440 minute winter	SW06.2	3600	53.331	0.581	0.3	0.7597	0.0000	SURCHARGED
1440 minute winter	19	3600	53.329	1.029	4.7	0.0000	0.0000	SURCHARGED
1440 minute winter	20	3600	53.329	1.075	4.8	0.0000	0.0000	OK
1440 minute winter	21	3600	53.331	1.054	4.1	0.1623	0.0000	OK
1440 minute winter	22	3600	53.331	0.831	3.5	0.0000	0.0000	SURCHARGED
1440 minute winter	23	3600	53.326	0.805	0.8	0.0000	0.0000	OK
1440 minute winter	24	3600	53.326	0.976	1.3	0.0000	0.0000	SURCHARGED
1440 minute winter	25	3600	53.326	1.106	1.9	0.0000	0.0000	SURCHARGED
1440 minute winter	26	3600	53.326	1.116	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	PP01	3.000	J3	6.5	0.484	0.222	0.1015	
15 minute summer	SW07	10.000	SW06.1	7.3	0.272	0.183	0.2584	
60 minute summer	PP02	2.000	J3	7.9	0.575	0.276	0.1046	
15 minute summer	SW06.1.2	1.003	J4	18.1	0.622	0.634	0.5756	
15 minute summer	J9	14.001	SW04	14.3	0.622	0.364	0.9103	
15 minute summer	SW06.1	1.006	20	43.6	1.096	1.093	0.3077	
30 minute summer	PP03	4.000	J4	2.8	0.718	0.144	0.1239	
60 minute summer	PP06	7.000	SW06.1.1	-6.2	-0.424	-0.223	0.1568	
60 minute summer	PP05	6.000	SW06.1.1	-6.1	-0.422	-0.225	0.1607	
30 minute summer	SW06.1.3	1.002	SW06.1.2	13.1	0.500	0.535	0.7894	
15 minute summer	SW06.1.1	1.005	SW06.1	27.2	0.730	1.095	1.5286	
15 minute summer	J1.1	24.002	SW08	18.9	0.560	0.875	1.2047	
15 minute summer	SW08	102	21	26.5	0.878	1.152	0.6447	
15 minute summer	SW06.2	28.000	21	5.1	0.484	0.339	0.3148	
15 minute summer	19	101	SW06	24.7	1.401	2.200	0.0762	
15 minute summer	20	Flow through Pond	19	34.4	0.302	0.048	12.5791	
15 minute summer	21	Flow through Pond	22	41.4	0.371	0.038	18.6384	
15 minute summer	22	9.000	SW06.1	13.8	0.787	0.502	0.1223	
15 minute summer	23	Flow through Pond	24	-6.5	0.141	-0.004	32.0890	
30 minute summer	24	23.000	SW03	-13.3	-0.800	-0.911	0.1583	
30 minute summer	25	13.000	SW02	-20.5	-0.326	-0.245	0.2198	
30 minute summer	26	Flow through Pond	25	-18.7	-0.090	-0.020	14.5473	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	PP12	3600	53.257	0.807	1.1	34.3564	0.0000	SURCHARGED
1440 minute winter	PP11	3600	53.257	0.807	1.1	34.3629	0.0000	SURCHARGED
1440 minute winter	SW05.1	3600	53.257	0.882	2.4	1.2779	0.0000	SURCHARGED
1440 minute winter	PP10	3600	53.326	0.576	0.3	11.3327	0.0000	SURCHARGED
1440 minute winter	J1	3600	53.331	0.401	0.6	0.1547	0.0000	SURCHARGED
1440 minute winter	SW06.1.4	3600	53.330	0.630	0.1	0.7121	0.0000	SURCHARGED
1440 minute winter	SW02	3600	53.326	1.126	5.5	1.9891	0.0000	SURCHARGED
1440 minute winter	PP04	3600	53.330	0.480	0.9	31.2205	0.0000	SURCHARGED
1440 minute winter	SW05	3600	53.326	0.663	0.4	0.8290	0.0000	SURCHARGED
1440 minute winter	PARKING 4	3600	53.331	0.481	1.6	57.3886	0.0000	SURCHARGED
1440 minute winter	SW01 OUTFALL	3600	53.151	1.021	3.7	1.4607	0.0000	SURCHARGED
1440 minute winter	J7	3600	53.257	0.687	0.5	0.9989	0.0000	SURCHARGED
1440 minute winter	CRECHE	3600	53.258	0.608	1.0	0.6874	0.0000	SURCHARGED
1440 minute winter	04.A (Blue Green Roof)	3600	53.329	0.479	1.0	0.5418	0.0000	SURCHARGED
1440 minute winter	04.B (Blue Green Roof)	3600	53.331	0.481	1.0	0.5442	0.0000	SURCHARGED
1440 minute winter	03.A (Blue Green Roof)	3600	53.333	0.483	1.0	0.5461	0.0000	SURCHARGED
1440 minute winter	03.B (Blue Green Roof)	3600	53.332	0.482	1.0	0.5451	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	PP12	17.000	J9	-5.1	-0.329	-0.160	0.1152	
120 minute summer	PP11	18.000	J9	-5.1	-0.329	-0.148	0.1009	
15 minute summer	SW05.1	20.002	SW05.2	19.4	0.760	0.759	1.0839	
180 minute summer	PP10	29.000	SW05	-2.2	-0.205	-0.123	0.1332	
15 minute summer	J1	24.001	J1.1	9.9	0.438	0.331	0.4335	
15 minute summer	SW06.1.4	1.000	J3	-7.9	-0.223	-0.482	1.0516	
30 minute summer	SW02	11.002	SW01 OUTFALL	4.2	0.729	0.041	0.4983	
30 minute summer	PP04	5.000	J4	3.7	0.828	0.176	0.1055	
15 minute summer	SW05	29.001	23	3.9	0.782	0.221	0.0767	
30 minute summer	PARKING 4	26.000	21	5.2	0.376	0.295	0.5692	
15 minute winter	SW01 OUTFALL	11.003	MH new(02)	4.1	0.172	0.014	4.4172	
15 minute summer	J7	21.000	J6	9.4	0.929	0.225	0.3767	
960 minute winter	CRECHE	15.000	J9	1.0	0.456	0.038	0.3102	
60 minute winter	04.A (Blue Green Roof)	11.000	SW06	1.0	0.799	0.048	0.5954	
60 minute winter	04.B (Blue Green Roof)	8.000	SW06.1	1.1	0.771	0.052	0.6324	
30 minute summer	03.A (Blue Green Roof)	25.000	21	1.7	0.501	0.095	0.8761	
30 minute summer	03.B (Blue Green Roof)	27.000	21	1.5	0.539	0.084	0.4969	

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	02.B (Blue Green Roof)	3600	53.257	0.507	1.0	0.5739	0.0000	SURCHARGED
1440 minute winter	02.A (Blue Green Roof)	3600	53.258	0.608	1.0	0.6875	0.0000	SURCHARGED
1440 minute winter	PARKING 3	3600	53.326	0.851	0.9	23.9694	0.0000	SURCHARGED
1440 minute winter	J6	3600	53.257	0.757	1.8	0.0000	0.0000	SURCHARGED
1440 minute winter	SW04	3600	53.257	1.207	3.6	1.6095	0.0000	SURCHARGED
1440 minute winter	SW03.1	3600	53.326	0.976	0.9	1.3133	0.0000	SURCHARGED
1440 minute winter	SW03	3600	53.326	1.051	1.6	1.1883	0.0000	SURCHARGED
1440 minute winter	SW06	3600	53.328	1.048	5.5	1.1849	0.0000	SURCHARGED
1440 minute winter	SW08.1	3600	53.331	0.331	0.0	0.3741	0.0000	SURCHARGED
1440 minute winter	J3	3600	53.330	0.660	1.0	0.0000	0.0000	SURCHARGED
1440 minute winter	J4	3600	53.330	0.780	1.4	0.0000	0.0000	SURCHARGED
1440 minute winter	MH new(02)	3600	53.151	1.271	6.7	1.8184	0.0000	SURCHARGED
1440 minute winter	MH new(03)	3600	53.257	0.957	0.1	1.0826	0.0000	SURCHARGED
1440 minute winter	SW05.2	3600	53.257	0.957	1.9	1.0821	0.0000	SURCHARGED
1440 minute winter	J10	3600	53.257	1.007	2.6	0.0000	0.0000	OK
1440 minute winter	J11	3600	53.257	1.007	7.4	0.0000	0.0000	SURCHARGED
1440 minute winter	Exit	3600	51.924	0.054	6.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	02.B (Blue Green Roof)	20.000	J6	1.0	0.596	0.050	0.1715	
960 minute summer	02.A (Blue Green Roof)	14.000	J9	1.0	0.626	0.046	0.3502	
30 minute winter	PARKING 3	22.000	SW03.1	-9.1	0.326	-0.205	0.5916	
120 minute summer	J6	20.001	SW05.1	11.6	0.595	0.185	0.2991	
30 minute summer	SW04	14.002	MH new(02)	4.2	0.489	0.140	1.8135	
30 minute summer	SW03.1	22.001	SW03	15.2	0.590	0.171	0.0893	
30 minute summer	SW03	22.002	26	-17.1	-0.430	-0.428	0.3824	
30 minute summer	SW06	100	SW02	25.0	0.630	0.936	1.0524	
15 minute summer	SW08.1	24.000	J1	1.0	0.118	0.031	0.1997	
15 minute summer	J3	1.001	SW06.1.3	8.8	0.223	0.603	0.8791	
15 minute summer	J4	1.004	SW06.1.1	23.3	0.598	0.883	0.6764	
1440 minute winter	MH new(02)	11.004	Exit	6.7	0.546	0.041	0.0435	1333.6
15 minute summer	MH new(03)	16.000	J9	-2.6	-0.180	-0.061	0.4979	
15 minute summer	SW05.2	20.003	J10	18.8	0.936	0.588	0.4584	
180 minute winter	J10	Flow through Pond	J11	25.4	0.069	0.008	34.4172	
15 minute summer	J11	19.000	SW04	-14.4	-0.367	-0.412	1.5485	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	PP01	3600	53.415	0.565	1.2	26.9574	0.0000	SURCHARGED
1440 minute summer	SW07	3600	53.415	1.065	0.9	1.5293	0.0000	SURCHARGED
1440 minute summer	PP02	3600	53.415	0.565	1.8	41.9244	0.0000	SURCHARGED
1440 minute summer	SW06.1.2	3600	53.415	0.815	0.8	1.1313	0.0000	SURCHARGED
1440 minute winter	J9	1080	53.373	1.173	3.0	0.2781	0.0000	SURCHARGED
1440 minute summer	SW06.1	3600	53.415	1.109	6.6	1.5304	0.0000	SURCHARGED
1440 minute summer	PP03	3600	53.415	0.565	1.6	37.1888	0.0000	SURCHARGED
1440 minute summer	PP06	3600	53.415	0.665	0.7	17.6443	0.0000	SURCHARGED
1440 minute summer	PP05	3600	53.415	0.665	0.7	17.6443	0.0000	SURCHARGED
1440 minute summer	SW06.1.3	3600	53.415	0.765	1.7	1.1829	0.0000	SURCHARGED
1440 minute summer	SW06.1.1	3600	53.415	0.915	2.7	1.2086	0.0000	SURCHARGED
1440 minute summer	J1.1	3600	53.417	0.547	2.1	0.1847	0.0000	SURCHARGED
1440 minute summer	SW08	3600	53.416	0.616	2.9	0.8715	0.0000	SURCHARGED
1440 minute summer	SW06.2	3600	53.416	0.666	0.6	0.8713	0.0000	SURCHARGED
1440 minute summer	19	3600	53.415	1.115	4.5	0.0000	0.0000	SURCHARGED
1440 minute summer	20	3600	53.415	1.161	4.7	0.0000	0.0000	OK
1440 minute summer	21	3600	53.416	1.139	6.0	0.1754	0.0000	OK
1440 minute summer	22	3600	53.416	0.916	4.5	0.0000	0.0000	SURCHARGED
1440 minute summer	23	3600	53.411	0.890	0.7	0.0000	0.0000	OK
1440 minute summer	24	3600	53.411	1.061	1.7	0.0000	0.0000	SURCHARGED
1440 minute summer	25	3600	53.411	1.191	1.9	0.0000	0.0000	SURCHARGED
1440 minute summer	26	3600	53.411	1.201	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP01	3.000	J3	9.4	0.643	0.321	0.0997	
30 minute summer	SW07	10.000	SW06.1	9.5	0.240	0.238	0.2584	
15 minute summer	PP02	2.000	J3	8.7	0.621	0.302	0.1027	
15 minute summer	SW06.1.2	1.003	J4	19.4	0.636	0.680	0.5756	
30 minute summer	J9	14.001	SW04	13.0	0.622	0.331	0.9103	
15 minute summer	SW06.1	1.006	20	48.7	1.225	1.222	0.3077	
30 minute winter	PP03	4.000	J4	4.1	0.698	0.207	0.1249	
60 minute summer	PP06	7.000	SW06.1.1	-7.9	-0.495	-0.286	0.1568	
60 minute summer	PP05	6.000	SW06.1.1	-7.9	-0.493	-0.289	0.1607	
30 minute summer	SW06.1.3	1.002	SW06.1.2	13.7	0.503	0.560	0.7894	
15 minute summer	SW06.1.1	1.005	SW06.1	28.0	0.732	1.127	1.5286	
15 minute summer	J1.1	24.002	SW08	23.3	0.585	1.077	1.4118	
15 minute summer	SW08	102	21	33.1	0.934	1.441	0.6773	
15 minute summer	SW06.2	28.000	21	6.3	0.503	0.418	0.3148	
30 minute summer	19	101	SW06	25.9	1.471	2.310	0.0762	
15 minute summer	20	Flow through Pond	19	37.5	0.310	0.052	12.8971	
15 minute summer	21	Flow through Pond	22	49.7	0.372	0.046	19.4035	
15 minute summer	22	9.000	SW06.1	15.5	0.879	0.561	0.1223	
30 minute summer	23	Flow through Pond	24	-8.1	0.115	-0.006	34.8055	
15 minute winter	24	23.000	SW03	-13.9	-0.888	-0.956	0.1583	
15 minute summer	25	13.000	SW02	-21.6	-0.382	-0.258	0.2198	
15 minute winter	26	Flow through Pond	25	-19.5	0.176	-0.021	14.4510	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	PP12	1080	53.373	0.923	1.2	34.3743	0.0000	SURCHARGED
1440 minute winter	PP11	1080	53.373	0.923	1.2	34.3817	0.0000	SURCHARGED
1440 minute winter	SW05.1	1080	53.373	0.998	2.3	1.4468	0.0000	SURCHARGED
1440 minute summer	PP10	3600	53.410	0.660	0.5	11.8315	0.0000	SURCHARGED
1440 minute summer	J1	3600	53.417	0.487	1.1	0.1878	0.0000	SURCHARGED
1440 minute summer	SW06.1.4	3600	53.415	0.715	0.1	0.8087	0.0000	SURCHARGED
1440 minute summer	SW02	3600	53.411	1.211	5.4	2.1394	0.0000	SURCHARGED
1440 minute summer	PP04	3600	53.415	0.565	1.6	37.2107	0.0000	SURCHARGED
1440 minute summer	SW05	3600	53.411	0.748	0.4	0.9352	0.0000	SURCHARGED
1440 minute summer	PARKING 4	3600	53.416	0.566	2.8	67.6876	0.0000	SURCHARGED
1440 minute summer	SW01 OUTFALL	1440	53.225	1.095	3.8	1.5669	0.0000	SURCHARGED
1440 minute winter	J7	1080	53.374	0.804	0.7	1.1683	0.0000	SURCHARGED
1440 minute winter	CRECHE	1080	53.374	0.724	1.0	0.8189	0.0000	SURCHARGED
1440 minute summer	04.A (Blue Green Roof)	3600	53.414	0.564	1.0	0.6382	0.0000	SURCHARGED
1440 minute summer	04.B (Blue Green Roof)	3600	53.417	0.566	1.0	0.6407	0.0000	SURCHARGED
1440 minute summer	03.A (Blue Green Roof)	3600	53.418	0.568	1.0	0.6426	0.0000	SURCHARGED
1440 minute summer	03.B (Blue Green Roof)	3600	53.417	0.567	1.0	0.6417	0.0000	SURCHARGED

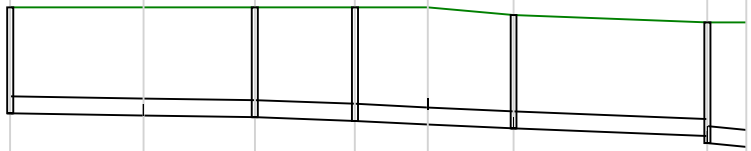
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	PP12	17.000	J9	-7.5	-0.480	-0.233	0.1152	
60 minute summer	PP11	18.000	J9	-7.6	-0.487	-0.221	0.1009	
15 minute summer	SW05.1	20.002	SW05.2	24.8	0.795	0.971	1.0839	
120 minute summer	PP10	29.000	SW05	-2.7	-0.225	-0.150	0.1332	
15 minute summer	J1	24.001	J1.1	12.9	0.427	0.431	0.5971	
30 minute winter	SW06.1.4	1.000	J3	-9.2	-0.275	-0.562	1.0516	
30 minute winter	SW02	11.002	SW01 OUTFALL	4.2	0.731	0.041	0.4983	
30 minute summer	PP04	5.000	J4	4.9	0.775	0.232	0.1064	
15 minute summer	SW05	29.001	23	5.1	0.840	0.288	0.0767	
30 minute summer	PARKING 4	26.000	21	5.9	0.415	0.335	0.5728	
15 minute winter	SW01 OUTFALL	11.003	MH new(02)	4.1	0.177	0.014	4.4172	
15 minute summer	J7	21.000	J6	12.3	1.009	0.294	0.3767	
720 minute summer	CRECHE	15.000	J9	1.0	0.456	0.038	0.3102	
60 minute winter	04.A (Blue Green Roof)	11.000	SW06	1.0	0.799	0.048	0.5954	
30 minute summer	04.B (Blue Green Roof)	8.000	SW06.1	1.1	0.771	0.054	0.6324	
30 minute summer	03.A (Blue Green Roof)	25.000	21	-2.5	0.501	-0.143	0.8791	
30 minute summer	03.B (Blue Green Roof)	27.000	21	-2.1	0.539	-0.117	0.4991	

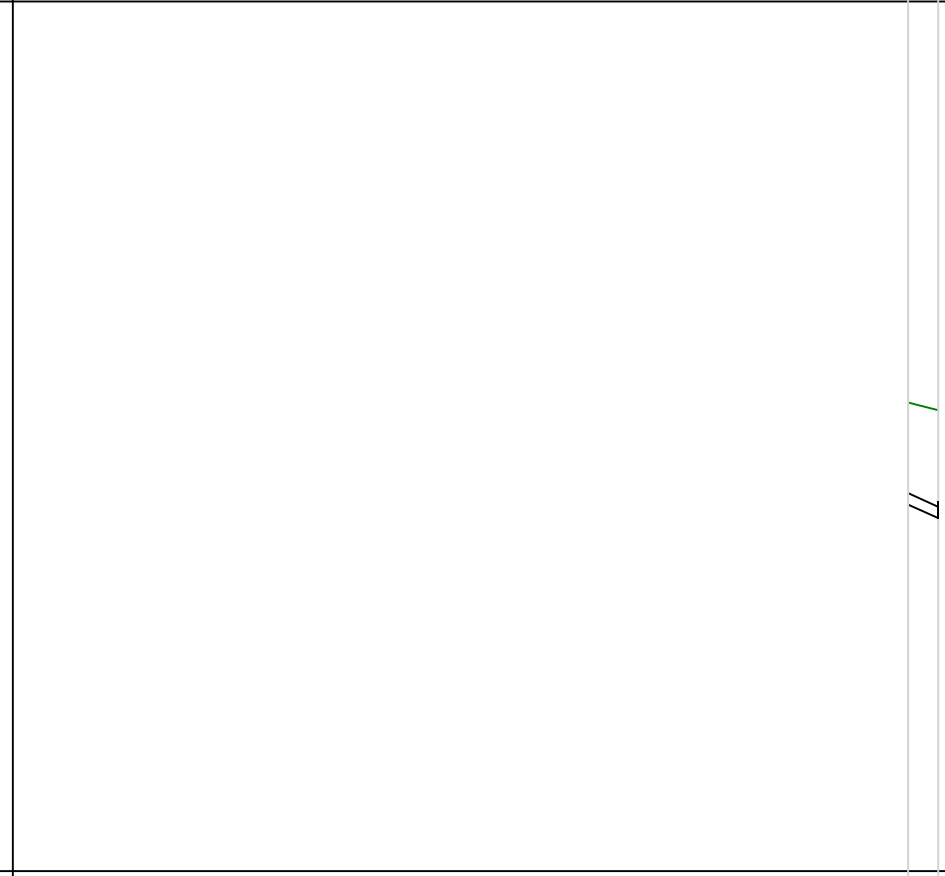
Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.38%

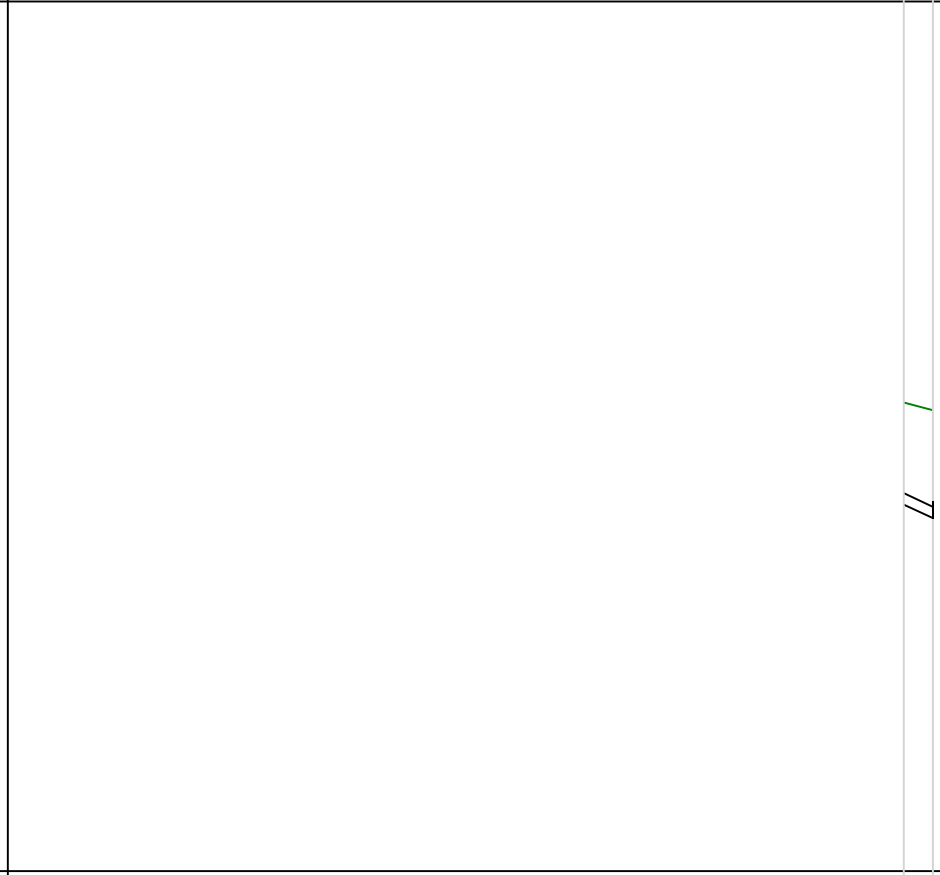
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	02.B (Blue Green Roof)	1080	53.374	0.624	1.0	0.7057	0.0000	SURCHARGED
1440 minute winter	02.A (Blue Green Roof)	1080	53.374	0.724	1.0	0.8190	0.0000	SURCHARGED
1440 minute summer	PARKING 3	3600	53.411	0.936	0.9	23.9843	0.0000	SURCHARGED
1440 minute winter	J6	1080	53.374	0.874	1.7	0.0000	0.0000	SURCHARGED
1440 minute winter	SW04	1080	53.373	1.323	3.9	1.7644	0.0000	SURCHARGED
1440 minute summer	SW03.1	3600	53.411	1.061	0.9	1.4278	0.0000	SURCHARGED
1440 minute summer	SW03	3600	53.411	1.136	1.6	1.2845	0.0000	FLOOD RISK
1440 minute summer	SW06	3600	53.413	1.133	5.4	1.2812	0.0000	SURCHARGED
1440 minute summer	SW08.1	3600	53.417	0.416	0.1	0.4711	0.0000	SURCHARGED
1440 minute summer	J3	3600	53.415	0.745	1.6	0.0000	0.0000	SURCHARGED
1440 minute summer	J4	3600	53.415	0.865	2.3	0.0000	0.0000	SURCHARGED
1440 minute summer	MH new(02)	1440	53.225	1.345	6.9	1.9246	0.0000	SURCHARGED
1440 minute winter	MH new(03)	1080	53.373	1.073	0.3	1.2139	0.0000	SURCHARGED
1440 minute winter	SW05.2	1080	53.373	1.073	2.3	1.2138	0.0000	FLOOD RISK
1440 minute winter	J10	1080	53.373	1.123	2.6	0.0000	0.0000	OK
1440 minute winter	J11	1080	53.373	1.123	5.4	0.0000	0.0000	SURCHARGED
1440 minute summer	Exit	1440	51.925	0.055	6.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	02.B (Blue Green Roof)	20.000	J6	1.0	0.596	0.050	0.1715	
720 minute summer	02.A (Blue Green Roof)	14.000	J9	1.0	0.626	0.046	0.3502	
30 minute winter	PARKING 3	22.000	SW03.1	-9.9	0.329	-0.223	0.5916	
15 minute summer	J6	20.001	SW05.1	13.2	0.732	0.211	0.2991	
30 minute winter	SW04	14.002	MH new(02)	4.3	0.501	0.146	1.8135	
30 minute summer	SW03.1	22.001	SW03	20.4	0.644	0.230	0.0893	
15 minute winter	SW03	22.002	26	-18.1	-0.455	-0.453	0.3824	
30 minute summer	SW06	100	SW02	26.2	0.658	0.979	1.0524	
15 minute summer	SW08.1	24.000	J1	2.4	-0.162	0.070	0.3975	
30 minute summer	J3	1.001	SW06.1.3	-8.8	-0.233	-0.602	0.8791	
15 minute summer	J4	1.004	SW06.1.1	25.5	0.640	0.966	0.6764	
1440 minute summer	MH new(02)	11.004	Exit	6.9	0.549	0.042	0.0445	1371.5
15 minute summer	MH new(03)	16.000	J9	-4.4	-0.155	-0.101	0.4979	
15 minute summer	SW05.2	20.003	J10	22.9	1.042	0.715	0.4584	
30 minute winter	J10	Flow through Pond	J11	26.4	0.118	0.008	31.8441	
15 minute summer	J11	19.000	SW04	-18.7	-0.477	-0.536	1.5485	

Causeway	GKCE	File: SW_Stage 3.pfd Network: Storm Network SEAN O'CONNOR 13/05/2026	Page 1 Lands at Elmfield Clondalkin Large Residential Development Thornmeadow Developments

Node Name		SW06.1.4	J3	SW06.1.3	SW06.1.2		SW06.1.1	SW06.1	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000									
Link Name		1.000	1.001	1.002	1.003	1.004	1.005	1.0(	
Section Type		225mm	225mm	225mm	225mm	225mm	225mm	225	
Slope (1:X)		881.4	1105.2	397.0	289.5	340.2	384.4	148	
Cover Level (m)		54.100	54.100	54.100	54.100	54.100	54.000	53.900	53.900
Invert Level (m)		52.700	52.670	52.670	52.650	52.650	52.600	52.600	52.550	52.550	52.500	52.500	52.400	52.396	52.394
Length (m)		26.441	22.105	19.848	14.473	17.008	38.436	7.7	

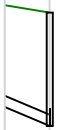
Node Name		PP03	12
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name		2.0	
Section Type		15	
Slope (1:X)		33	
Cover Level (m)		54.200	54.100
Invert Level (m)		52.630	
Length (m)		5.9	

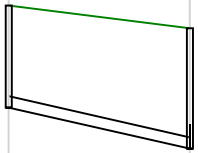
Node Name		PP01	1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name		3.0	
Section Type		15	
Slope (1:X)		32	
Cover Level (m)		54.200	54.100
Invert Level (m)		52.670	52.630
Length (m)		5.7	

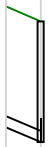
Node Name		PP03	3
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name		4.0	
Section Type		150	
Slope (1:X)		70.	
Cover Level (m)		54.200	54.100
Invert Level (m)		52.850	
Length (m)		7.0	

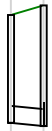
Node Name		PP04	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name		5.0	
Section Type		15	
Slope (1:X)		60	
Cover Level (m)		54.200	54.100
Invert Level (m)		52.850	
Length (m)		6.0	

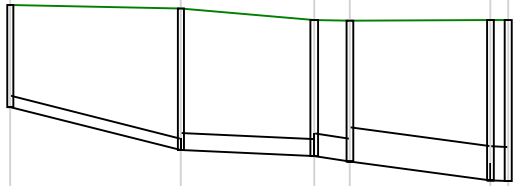
Node Name	PP05	SW06.1.1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000		
Link Name	6.00	
Section Type	150	
Slope (1:X)	36.5	
Cover Level (m)	54.100	54.000
Invert Level (m)	52.750	52.500
Length (m)	9.12	

Node Name	PP06	SW06.1.1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000		
Link Name	7.00	
Section Type	150	
Slope (1:X)	35.6	
Cover Level (m)	54.100	54.000
Invert Level (m)	52.750	52.500
Length (m)	8.90	

Node Name	04.B (Blue Green Roof)	SW06.1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000		
Link Name	8.000	
Section Type	150mm	
Slope (1:X)	66.0	
Cover Level (m)	54.200	53.900
Invert Level (m)	52.850	52.306
Length (m)	35.922	

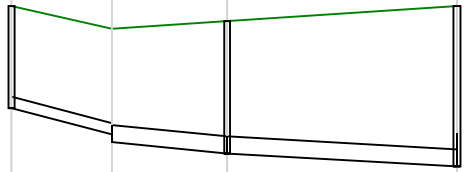
Node Name	22 SW06.1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000	
Link Name	9.0
Section Type	150
Slope (1:X)	35.
Cover Level (m)	54.100 53.900
Invert Level (m)	52.500
Length (m)	6.9

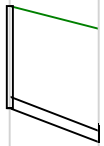
Node Name	SW07	SW06.1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000		
Link Name	10.	
Section Type	22	
Slope (1:X)	14	
Cover Level (m)	53.775	53.900
Invert Level (m)	52.300	
Length (m)	6.4	

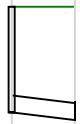
Node Name		04.A (Blue Green Roof)	SW06	SW02	SW01 OUTFALL (New(02)	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000						
Link Name		11.000	100	11.	11.003	1
Section Type		150mm	225mm	300	450mm	4
Slope (1:X)		59.3	330.8	101	111.5	3
Cover Level (m)		54.200	54.150	54.000	53.990	54.000 54.000
Invert Level (m)		52.850	52.280 52.280	52.200 52.190	52.130	51.880 51.870 51.880
Length (m)		33.822	26.461	7.0	27.879	3.

Node Name	19SW06
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000	
Link Name	10
Section Type	15
Slope (1:X)	21
Cover Level (m)	53.900 54.150
Invert Level (m)	52.280 52.380
Length (m)	4.

Node Name	2SW02
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000	
Link Name	1
Section Type	3
Slope (1:X)	1
Cover Level (m)	54.000
Invert Level (m)	52.200 52.220
Length (m)	3

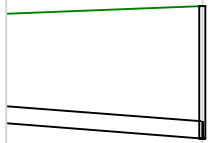
Node Name		02.A (Blue/Green Roof)	19	SW04	MH new(02)
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000					
Link Name		14.000	14.001	14.002	
Section Type		150mm	225mm	225mm	
Slope (1:X)		56.8	152.6	268.2	
Cover Level (m)		54.000	53.700	53.800	54.000
Invert Level (m)		52.650 / 52.300	52.200 / 52.050	52.050 / 51.880	
Length (m)		19.894	22.888	45.598	

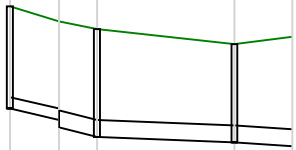
Node Name		CRECHE J9	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000			
Link Name		15.000	
Section Type		150mm	
Slope (1:X)		39.2	
Cover Level (m)		54.000	53.700
Invert Level (m)		52.650	52.200
Length (m)		17.623	

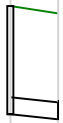
Node Name		MH new(03)	19
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000			
Link Name		16.00	
Section Type		225m	
Slope (1:X)		125.2	
Cover Level (m)		53.700	53.700
Invert Level (m)		52.300	52.200
Length (m)		12.51	

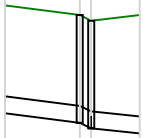
Node Name		PP19	12
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000			
Link Name		17.	
Section Type		15(	
Slope (1:X)		26.	
Cover Level (m)		54.000	53.700
Invert Level (m)		52.450	
Length (m)		6.5	

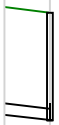
Node Name		PP19	1
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000			
Link Name		18	
Section Type		15	
Slope (1:X)		22	
Cover Level (m)		54.000	53.700
Invert Level (m)		52.490	52.190
Length (m)		5.7	

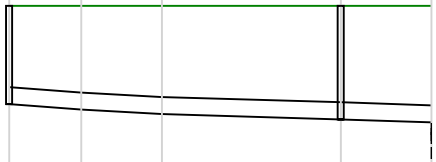
Node Name		J11	SW04
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000			
Link Name		19.000	
Section Type		225mm	
Slope (1:X)		194.7	
Cover Level (m)		53.700	53.800
Invert Level (m)		52.250	52.050
Length (m)		38.935	

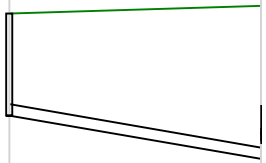
Node Name	02.BJ	JB	SW05.1	SW05.2	SW05.20
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000					
Link Name	20.0	20.(	20.002	20.00	
Section Type	150r	225	225mm	225m	
Slope (1:X)	65.0	60..	363.4	230.5	
Cover Level (m)	54.100	53.900	53.800	53.600	53.700
Invert Level (m)	52.750 52.600	52.500 52.375	52.375	52.300	52.300 52.250
Length (m)	9.747	7.5..	27.253	11.52	

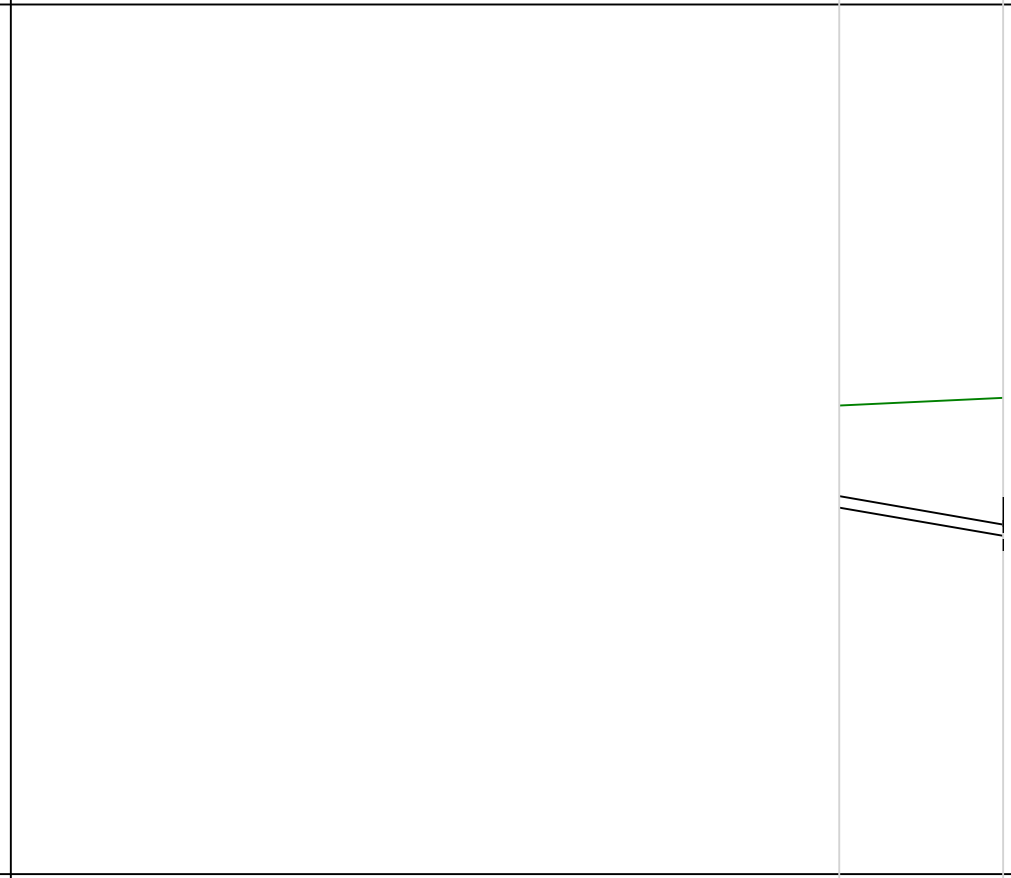
Node Name	J7	J6
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000		
Link Name	21.0	
Section Type	225r	
Slope (1:X)	135.	
Cover Level (m)	54.000	53.900
Invert Level (m)	52.570	52.500
Length (m)	9.47	

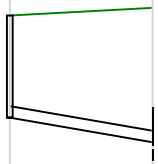
Node Name	PARKIN	SW0036		
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000				
Link Name	22.000	22.0		
Section Type	225mn	225r		
Slope (1:X)	119.0	147.		
Cover Level (m)	53.900	53.700	53.775	53.775
Invert Level (m)	52.475	52.350	52.350	52.210
Length (m)	14.875	29.61		

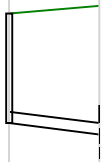
Node Name	24 SW03
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 47.000	
Link Name	23.0
Section Type	150
Slope (1:X)	128.
Cover Level (m)	53.775 53.700
Invert Level (m)	52.350 52.280
Length (m)	8.99

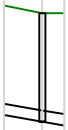
Node Name		SW08.11	J1.1	SW08 21
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000				
Link Name		24.000	24.001 24.002	102
Section Type		225mm	225mm 225mm	225mm
Slope (1:X)		204.5	266.0 507.5	448.9
Cover Level (m)		54.300	54.300 54.300	54.300 54.300
Invert Level (m)		53.000	52.930 52.930 52.870 52.870 52.800	52.800 52.760
Length (m)		14.318	15.959 35.523	17.955

Node Name		03.A (Blue Green Roof) 21	
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name		25.000	
Section Type		150mm	
Slope (1:X)		87.1	
Cover Level (m)		54.200	54.300
Invert Level (m)		52.850	52.277
Length (m)		49.936	

Node Name		PARKING 4	21
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name		26.000	
Section Type		150mm	
Slope (1:X)		87.0	
Cover Level (m)		54.200	54.300
Invert Level (m)		52.850	52.476
Length (m)		32.536	

Node Name	03.B (Blue Green Roof)	24
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000		
Link Name	27.000	
Section Type	150mm	
Slope (1:X)	87.0	
Cover Level (m)	54.200	54.300
Invert Level (m)	52.850	52.524
Length (m)	28.348	

Node Name	SW06.2	21
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000		
Link Name	28.000	
Section Type	150mm	
Slope (1:X)	119.2	
Cover Level (m)	54.200	54.300
Invert Level (m)	52.750	52.600
Length (m)	17.879	

Node Name	PP15	S29	S5
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 48.000			
Link Name	29.0	29	
Section Type	150	15	
Slope (1:X)	86.8	87	
Cover Level (m)	54.200	54.100	54.100
Invert Level (m)	52.750 52.600	52.613 52.463	
Length (m)	7.5	4.	

BlueRoofDesign Software

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 01.A

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 600m2 x 0.018l/s/m2 = 10.8l/s.

(This would require 2no. additional DN70 outlets set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 2no. (dedicated) = 12.7l/s).

Roof Details:

BlueRoof	600 m²	x 100 %
Additional Catchment	0 m²	x 100 %
Effective Area	600 m²	

Storage Details:

Area	600 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	6.9
10 min	18.0	108.2	10.7
15 min	22.5	90.0	13.3
30 min	31.3	62.6	18.2
45 min	36.9	49.1	21.2
60 min	40.9	40.9	23.3
2 hours	51.9	26.0	28.4
6 hours	73.4	12.2	34.7
24 hours	111.0	4.6	36.8
48 hours	136.0	2.8	33.5

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.68 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	17.67 hrs
Hmax	65 mm
Required Volume	37 m³
Time to half empty	7.6 hrs
Roof Loading*	61.67 Kg/m²

The roof loading refers only to the weight of water on the roof.

Industry best practices recommend the provision of a minimum of two outlets per roof area. Where a single blue roof outlet Is specified a second overflow only outlet should be installed.

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product. Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissionsor otherwise arising therefrom.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. Please NOTE: the overflows are designed to ensure the roof cannot be overloaded in an exceedance event. The overflows will require a head of water to achieve the required discharge rate (typically 35mm). This additional height of water and load should be allowed for.

BlueRoofDesign Software

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 02.A (LVL 5)

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 625m2 x 0.018l/s/m2 = 11.25l/s.

(This would require 2no. additional DN70 outlet set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 2no. (dedicated) = 12.7l/s

Roof Details:

BlueRoof	625 m²	x 100 %
Additional Catchment	0 m²	x 100 %
Effective Area	625 m²	

Storage Details:

Area	625 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	7.2
10 min	18.0	108.2	11.1
15 min	22.5	90.0	13.8
30 min	31.3	62.6	19.0
45 min	36.9	49.1	22.2
60 min	40.9	40.9	24.4
2 hours	51.9	26.0	29.7
6 hours	73.4	12.2	36.5
24 hours	111.0	4.6	38.9
48 hours	136.0	2.8	35.8

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.68 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	18.5 hrs
Hmax	66 mm
Required Volume	39.1 m³
Time to half empty	7.9 hrs
Roof Loading*	62.56 Kg/m²

The roof loading refers only to the weight of water on the roof.

Industry best practices recommend the provision of a minimum of two outlets per roof area. Where a single blue roof outlet Is specified a second overflow only outlet should be installed.

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product. Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissionsor otherwise arising therefrom.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. Please NOTE: the overflows are designed to ensure the roof cannot be overloaded in an exceedance event. The overflows will require a head of water to achieve the required discharge rate (typically 35mm). This additional height of water and load should be allowed for.

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Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 02.A (LVL 2)

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 230m2 x 0.018l/s/m2 = 4.1l/s.

(This would require 1no. additional DN70 outlet set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 1no. (dedicated) = 7.3l/s).

Roof Details:

BlueRoof	230 m²	x 100 %
Additional Catchment	0 m²	x 100 %
Effective Area	230 m²	

Storage Details:

Area	230 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	2.6
10 min	18.0	108.2	4.0
15 min	22.5	90.0	5.0
30 min	31.3	62.6	6.7
45 min	36.9	49.1	7.6
60 min	40.9	40.9	8.2
2 hours	51.9	26.0	9.3
6 hours	73.4	12.2	10.1
24 hours	111.0	4.6	8.2
48 hours	136.0	2.8	5.9

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.58 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	6.08 hrs
Hmax	46 mm
Required Volume	10.1 m³
Time to half empty	2.4 hrs
Roof Loading*	43.91 Kg/m²

The roof loading refers only to the weight of water on the roof.

Industry best practices recommend the provision of a minimum of two outlets per roof area. Where a single blue roof outlet Is specified a second overflow only outlet should be installed.

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product. Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissionsor otherwise arising therefrom.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. Please NOTE: the overflows are designed to ensure the roof cannot be overloaded in an exceedance event. The overflows will require a head of water to achieve the required discharge rate (typically 35mm). This additional height of water and load should be allowed for.

BlueRoofDesign Software

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Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 02.B (LVL 4)

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 1113m2 x 0.018l/s/m2 = 20l/s.

(This would require 4no. additional DN70 outlets set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 4no. (dedicated) = 23.5l/s).

Roof Details:

BlueRoof	890 m²	x 100 %
Additional Catchment	223 m²	x 100 %
Effective Area	1113 m²	

Storage Details:

Area	890 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	12.9
10 min	18.0	108.2	19.9
15 min	22.5	90.0	24.8
30 min	31.3	62.6	34.2
45 min	36.9	49.1	40.0
60 min	40.9	40.9	44.2
2 hours	51.9	26.0	54.7
6 hours	73.4	12.2	71.0
24 hours	111.0	4.6	81.8
48 hours	136.0	2.8	81.1

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.81 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	24.72 hrs
Hmax	97 mm
Required Volume	81.8 m³
Time to half empty	14.1 hrs
Roof Loading*	91.91 Kg/m²

The roof loading refers only to the weight of water on the roof.

Industry best practices recommend the provision of a minimum of two outlets per roof area. Where a single blue roof outlet Is specified a second overflow only outlet should be installed.

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product. Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissionsor otherwise arising therefrom.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. Please NOTE: the overflows are designed to ensure the roof cannot be overloaded in an exceedance event. The overflows will require a head of water to achieve the required discharge rate (typically 35mm). This additional height of water and load should be allowed for.

BlueRoofDesign Software

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Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 03.A (LVL 5)

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 780m2 x 0.018l/s/m2 = 14l/s.

(This would require 3no. additional DN70 outlet set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 3no. (dedicated) = 18.1l/s).

Roof Details:

BlueRoof	780 m²	x 100 %
Additional Catchment	0 m²	x 100 %
Effective Area	780 m²	

Storage Details:

Area	780 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	9.0
10 min	18.0	108.2	13.9
15 min	22.5	90.0	17.3
30 min	31.3	62.6	23.9
45 min	36.9	49.1	27.9
60 min	40.9	40.9	30.7
2 hours	51.9	26.0	37.8
6 hours	73.4	12.2	47.7
24 hours	111.0	4.6	52.8
48 hours	136.0	2.8	50.4

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.71 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	24.17 hrs
Hmax	71 mm
Required Volume	52.8 m³
Time to half empty	10.4 hrs
Roof Loading*	67.69 Kg/m²

The roof loading refers only to the weight of water on the roof.

Industry best practices recommend the provision of a minimum of two outlets per roof area. Where a single blue roof outlet Is specified a second overflow only outlet should be installed.

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product. Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissionsor otherwise arising therefrom.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. Please NOTE: the overflows are designed to ensure the roof cannot be overloaded in an exceedance event. The overflows will require a head of water to achieve the required discharge rate (typically 35mm). This additional height of water and load should be allowed for.

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 03.B (LVL 4)

Emergency Overflow requirement (in accordacne with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 1113m2 x 0.018l/s/m2 = 20l/s.

(This would require 4no. additional DN70 outlets set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 4no. (dedicated) = 23.5l/s).

Roof Details:

BlueRoof	890 m²	x 100 %
Additional Catchment	223 m²	x 100 %
Effective Area	1113 m²	

Storage Details:

Area	890 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	12.9
10 min	18.0	108.2	19.9
15 min	22.5	90.0	24.8
30 min	31.3	62.6	34.2
45 min	36.9	49.1	40.0
60 min	40.9	40.9	44.2
2 hours	51.9	26.0	54.7
6 hours	73.4	12.2	71.0
24 hours	111.0	4.6	81.8
48 hours	136.0	2.8	81.1

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.81 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	24.72 hrs
Hmax	97 mm
Required Volume	81.8 m³
Time to half empty	14.1 hrs
Roof Loading*	91.91 Kg/m²

The roof loading refers only to the weight of water on the roof.

Industry best practices recommend the provision of a minimum of two outlets per roof area. Where a single blue roof outlet Is specified a second overflow only outlet should be installed.

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BlueRoofDesign Software

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 04.A (LVL 4)

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 1395m2 x 0.018l/s/m2 = 25.1l/s.

(This would require 4no. additional DN70 outlet set at Hmax.
Max capacity of overflows: 1.9l/s x 2no. (integrated) + 5.4l/s x 4no. (dedicated) = 25.4l/s).

Roof Details:

BlueRoof	1145 m²	x 100 %
Additional Catchment	250 m²	x 100 %
Effective Area	1395 m²	

Storage Details:

Area	1145 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	mm/h	Required storage(m³)
5 min	11.6	139.7	16.1
10 min	18.0	108.2	24.8
15 min	22.5	90.0	30.9
30 min	31.3	62.6	42.5
45 min	36.9	49.1	49.5
60 min	40.9	40.9	54.4
2 hours	51.9	26.0	66.4
6 hours	73.4	12.2	81.8
24 hours	111.0	4.6	87.5
48 hours	136.0	2.8	80.7

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	1.49 l/s
Outlet	2 No
Flow Per Outlet	0.74 l/s

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	18.92 hrs
Hmax	81 mm
Required Volume	87.9 m³
Time to half empty	8.2 hrs
Roof Loading*	76.77 Kg/m²

The roof loading refers only to the weight of water on the roof.

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BlueRoofDesign Software

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Date: 16/12/2025 Revision: A

Client:

Project: B256085_Elmfield LRD Development

Location: Dublin

Roof Location: 04.B (LVL 5)

Emergency Overflow requirement (in accordance with BSEN12056-3:2000, CAT 1 storm):

Total overflow discharge: 760m2 x 0.018l/s/m2 = 13.7l/s.

(This would require 3no. additional DN70 outlets set at Hmax.
Max capacity of overflows: 1.9l/s x 1no. (integrated) + 5.4l/s x 3no. (dedicated) = 18.1l/s).

Roof Details:

BlueRoof	760 m²	x 100 %
Additional Catchment	0 m²	x 100 %
Effective Area	760 m²	

Storage Details:

Area	760 m²
Depth	100 mm
Porosity	95 %
Slope	none

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	30 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	Intensity mm/h	Required storage(m³)
5 min	11.6	139.7	8.8
10 min	18.0	108.2	13.6
15 min	22.5	90.0	16.9
30 min	31.3	62.6	23.3
45 min	36.9	49.1	27.1
60 min	40.9	40.9	29.9
2 hours	51.9	26.0	36.7
6 hours	73.4	12.2	46.3
24 hours	111.0	4.6	51.0
48 hours	136.0	2.8	48.5

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	Twist Std. Position 1
Sump Depth	None
Discharge rate	0.7 l/s
Outlet	1 No

****Emergency overflows are required. See calculation in Red below****

Result:

Outcome	Pass
Critical Storm Duration	23.28 hrs
Hmax	71 mm
Required Volume	51 m³
Time to half empty	10.1 hrs
Roof Loading*	67.11 Kg/m²

The roof loading refers only to the weight of water on the roof.

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Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 307121, Northing: 231897,

	Interval		Years									
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,
5 mins	2.5,	3.6,	4.3,	5.2,	5.9,	6.4,	8.1,	10.0,	11.4,	13.2,	14.9,	16.3,	17.2,
10 mins	3.5,	5.1,	5.9,	7.3,	8.2,	8.9,	11.3,	14.0,	15.8,	18.5,	20.8,	22.7,	23.9,
15 mins	4.1,	6.0,	7.0,	8.5,	9.6,	10.5,	13.2,	16.5,	18.6,	21.7,	24.5,	26.7,	28.1,
30 mins	5.4,	7.8,	9.0,	11.0,	12.3,	13.4,	16.8,	20.7,	23.3,	27.0,	30.4,	33.0,	34.7,
1 hours	7.1,	10.1,	11.7,	14.2,	15.8,	17.1,	21.3,	26.1,	29.2,	33.7,	37.7,	40.7,	42.8,
2 hours	9.4,	13.2,	15.2,	18.2,	20.3,	21.8,	27.0,	32.8,	36.6,	41.9,	46.7,	50.4,	52.8,
3 hours	11.1,	15.4,	17.7,	21.1,	23.4,	25.2,	31.0,	37.5,	41.7,	47.7,	53.0,	57.0,	59.8,
4 hours	12.5,	17.2,	19.7,	23.5,	26.0,	27.9,	34.2,	41.2,	45.8,	52.2,	57.9,	62.3,	65.2,
6 hours	14.7,	20.1,	23.0,	27.2,	30.0,	32.2,	39.3,	47.1,	52.3,	59.4,	65.7,	70.5,	73.7,
9 hours	17.3,	23.5,	26.8,	31.5,	34.7,	37.2,	45.1,	53.9,	59.6,	67.5,	74.5,	79.8,	83.4,
12 hours	19.4,	26.2,	29.8,	35.0,	38.5,	41.2,	49.8,	59.3,	65.4,	74.0,	81.4,	87.2,	91.0,
18 hours	22.9,	30.6,	34.7,	40.6,	44.5,	47.6,	57.2,	67.8,	74.6,	84.1,	92.4,	98.7,	102.9,
24 hours	25.7,	34.2,	38.6,	45.1,	49.4,	52.7,	63.1,	74.6,	81.9,	92.1,	101.0,	107.8,	112.3,
2 days	32.0,	41.7,	46.6,	53.6,	58.3,	61.8,	72.9,	84.9,	92.5,	103.0,	112.0,	118.9,	123.4,
3 days	37.3,	47.9,	53.2,	60.8,	65.7,	69.5,	81.2,	93.8,	101.8,	112.6,	121.9,	129.0,	133.6,
4 days	42.1,	53.4,	59.0,	67.1,	72.3,	76.3,	88.6,	101.8,	110.0,	121.2,	130.8,	138.1,	142.8,
6 days	50.5,	63.2,	69.5,	78.4,	84.1,	88.4,	101.7,	115.8,	124.7,	136.6,	146.7,	154.3,	159.3,
8 days	58.2,	72.0,	78.8,	88.4,	94.5,	99.2,	113.4,	128.4,	137.7,	150.2,	160.8,	168.8,	174.0,
10 days	65.3,	80.2,	87.4,	97.7,	104.2,	109.1,	124.1,	139.9,	149.6,	162.7,	173.7,	182.0,	187.4,
12 days	72.0,	87.8,	95.6,	106.4,	113.2,	118.4,	134.2,	150.6,	160.8,	174.3,	185.8,	194.4,	200.0,
16 days	84.6,	102.2,	110.7,	122.6,	130.1,	135.7,	152.8,	170.5,	181.4,	195.9,	208.1,	217.1,	223.1,
20 days	96.6,	115.7,	124.9,	137.7,	145.7,	151.7,	170.0,	188.8,	200.4,	215.7,	228.5,	238.1,	244.3,
25 days	110.7,	131.6,	141.6,	155.4,	164.1,	170.6,	190.2,	210.3,	222.6,	238.8,	252.4,	262.4,	269.0,

NOTES:
These values are derived from a Depth Duration Frequency (DDF) Model update 2023
For details refer to:
'Mateus C., and Coonan, B. 2023. Estimation of point rainfall frequencies in Ireland. Technical Note No. 68. Met Eireann',
Available for download at:
http://hdl.handle.net/2262/102417