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Site Address

**35 Wilson Road
Huyton
Knowsley
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Document Title

Drainage Condition Report



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Project Title 35 Wilson Road, Huyton, Knowsley, L36 6AE
Project No 3125-BCL-00-XX-RP-C-0001
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Revision History

Issue	Date	Status	Prepared By	Signature
P01	04.06.26	First Issue	Lee Meadowcroft BSc(Hons) PgDip MScCHE CEng MStructE MICE IHBC	

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1.0 Introduction

- 1.1 In June 2024 a planning application was submitted to Knowsley Council (KC) for a variation of condition 3 attached to outline planning permission 22/00284/out (demolition of existing buildings and outline application for the erection of a logistics warehouse (use class b8) - approval sought for access (appearance, layout, landscaping and scale reserved for future approval) to allow for an amendment to the parameters plan in order to change the maximum ridge height of the building at the front section of the site to comprise a gradual maximum ridge height between 17.5m and 21.6m in accordance with the site section on the parameters plan at 35 Wilson Road, Huyton, Knowsley, L36 6AE.
- 1.2 Planning approval was granted via Appeal in November 2025 via application number 24/3164M – 24/00427/FUL. Following this approval, in 2024 a Variation of Conditions 17 & 18 was submitted with Planning Approval granted in April 2026 encompassing a number of planning conditions, including two conditions relating to the drainage of the development.
- 1.3 This report has been prepared to support the discharge of these drainage related planning conditions. The condition numbers are 17 & 18.

2.0 Drainage Strategy

2.1 Existing Drainage

2.1.1 United Utilities

The UU sewer records confirm existing 600mm diameter combined sewer running along the northern boundary before increasing in size as it enters Wilson Road and becoming a 825mm diameter sewer.

To the western boundary within Wilson Road is an existing 225mm diameter surface water sewer which meets a 750mm diameter sewer at the south-west corner of the site. The United Utilities records does not show an outfall which likely means this is either undocumented or has never been surveyed. UU have confirmed this sewer carries a 3m easement to both sides of the sewer.

A 1200mm diameter surface water sewer is located within the site extents to the northern boundary. The sewer drains the industrial estate and highway from the northeast and crosses the site in an east to west directions before discharging via an existing headwall into Longwood Mill Brook.

2.1.2 Private Drainage

A number of manholes are indicated on the topographical survey, which would indicate the presence of an existing private drainage system on site. No CCTV/GPR survey has been completed but it is expected that the runoff passes to the UU surface water sewer or direct to the watercourse.

2.2 Existing Runoff

2.2.1 The current site encompasses a significant amount of hard paved areas with unrestricted discharge. However, to satisfy local policy the post development runoff will be restricted to Greenfield rates. Figure 1 below defines the existing Greenfield runoff rates based on the site area of 4.40ha.

Existing Site Area (ha)	1yr Greenfield Rate	Qbar Greenfield Rate	30yr Greenfield Rate	100yr Greenfield Rate
4.40	23.10 l/s	26.5 l/s	45.1 l/s	55.20 l/s

Figure 1 Existing Greenfield Runoff Rates

2.3 Geology

2.3.1 The British Geological Society (BGS) online mapping indicates that the site geology comprises of superficial Devensian Till (diamicton) across the entire development area. These superficial deposits predominantly overlie solid deposits of Pennine Lower Coal Measures Formation in the west of site. The bedrock is identified by the British Geological Society as the Etruria Formation comprising of mudstone.

2.3.2 Based on these findings, infiltration as a means of draining the site is discounted.

2.4 Hydrological Assessment

- 2.4.1 A review of the topographical survey, OS Maps and Environment Agency maps would indicate Longwood Mill Brook flowing south beyond the eastern boundary.

2.5 SuDS Hierarchal Approach

- 2.5.1 Based on the existing drainage configuration, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Site investigation would indicate that the underlying clay strata is unsuitable for infiltration.
Connection to Watercourse	Yes	New connections to watercourse beyond eastern boundary at restricted Qbar discharge rates.
Connection to Surface Water Sewer	No	Higher options available.
Connection to a Combined Sewer	No	Higher options available.

Figure 2 SuDS Hierarchal Approach

2.6 Surface Water Drainage Strategy

- 2.6.1 The surface water drainage strategy is to collect the runoff from the roof of the new commercial building and connect with the runoff from the external areas. Three separate networks are proposed with separate outfall to the adjacent Longwood Mill Brook at a peak combined Qbar rate of 26.5l/s. Due to the restriction, attenuation will take the form of permeable surfacing, attenuation ponds, filter drains and geocellular tanks.
- 2.6.2 A detailed drainage GA drawing and calculations can be found in the Appendices. This has shown no flooding for the 30-year event. Some low-level flooding has been identified to the southern dock area for the extreme 100 year + 40% climate change event.

2.7 Foul Water Strategy

- 2.7.1 The foul water drainage strategy is to construct a new foul water drainage network to serve the offices and outfall to existing combined water sewer via an existing connection.
- 2.7.2 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2017 and Building Regulations Part H guidance.
- 2.7.3 The foul water drainage layout can be found on the drainage GA drawing in Appendix A.

3.0 Management & Maintenance Plan

- 3.1 The drainage network encompasses standard pipework, manholes and a flow control. As long as the gullies at the base of the rainwater pipes are kept clear of leaves and detritus by regular inspection by the property owners then this should negate it passing into the network.
- 3.2 All management and maintenance of the drainage will be with the property owners. This will involve general maintenance of the drainage network in accordance with best practice. All drainage will remain private and not be adopted by the local sewerage authority.
- 3.3 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints. The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.
- 3.4 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:
- Regular Maintenance – 'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'
 - Occasional Maintenance – 'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example.'
 - Remedial Maintenance – 'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'
- 3.5 Specific maintenance needs should be monitored and maintenance schedules adjusted to suit the location and condition of the drainage feature in question.
- Piped Networks, Inspection, Manhole and Catchpit Chambers
- 3.6 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.
- 3.7 Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.
-

- 3.8 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.
- 3.9 Access for maintenance is provided through access chambers and manholes.
- 3.10 Regular inspection and maintenance are important to identify areas which may have been obstructed /clogged and may not be drainage correctly thus exposing the site to a greater level of flood risk.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required, take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Figure 3 Operation and Maintenance Requirements of Piped Networks and Inspection Chambers

Permeable Paving

- 3.11 Permeable paving provides a surface suitable for vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying structural layers. The surface itself is impervious to water, but the blocks are laid to provide void space through the surface to the sub-base. The water is temporarily stored within this sub-base before controlled discharge downstream.

- 3.12 Permeable surfaces, together with their associated substructures, are an efficient means of managing surface water runoff close to its source – intercepting runoff, reducing the volume and frequency of runoff, and providing a treatment medium. Treatment processes that occur within the surface structure, sub-base and geotextile layers include filtration, absorption, biodegradation and sedimentation.
- 3.13 Permeable paving should be inspected regularly, preferably during and after heavy rainfall to check effective operation and identify areas of ponding. Permeable paving needs to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Evidence suggests that sweeping once per year should be sufficient to maintain an acceptable infiltration rate on most developments.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, or when required during autumn leaf fall
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48hours	Every 3 months, 48 hours after large storms.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Manage other weeds and vegetation and remove nuisance plants	Once a year, or when required
Remedial Actions	Repair erosion of any adjacent soft landscaping adjacent to the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks.	As required
	Rehabilitation of surface and upper sub-structure by remedial sweeping	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Figure 4: Operation and Maintenance Requirements for Permeable Paving

Geocellular Attenuation Tank

- 3.14 Geocellular tanks are modular storage systems made with plastic units. These units can be assembled to achieve the required volume and usually on multiple layers. Generally, the units have 95% of voids content and are used to create an efficient below ground structure to store surface water.
- 3.15 The geocellular units and geotextile are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.

- 3.16 Access for maintenance should be provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.
- 3.17 Regular inspection and maintenance are important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly.
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as required.	Annually.
	Remove sediments from pre-treatment structures and/or internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

Figure 5 – Operation & maintenance requirements for attenuation storage tanks - Based on CIRIA SuDS Manual 2015

Attenuation Pond

- 3.18 Ponds are small open depressions that allow the water to be attenuated.
- 3.19 Shallow access for maintenance of both the pond bed and headwalls should be provided from the top of bank.
- 3.20 Regular inspection and maintenance are important for the effective operation of the ponds as designed.

Maintenance schedule	Required action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly.
	For systems where rainfall infiltrates into the pond from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as required.	Annually.
	Remove sediments from pre-treatment structures and/or internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Check for sediment build-up and remove if necessary.	Every 5 years or as required.

Figure 6: Operation & maintenance requirements for attenuation ponds - Based on CIRIA SuDS Manual 2015

Flow Control Units

- 3.21 The flow control units are intended for flood control and flow restriction.
- 3.22 The flow control is specified as Hydro-brake and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.
- 3.23 Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

Figure 7: Operation and Maintenance Requirements for Flow Controls

4.0 Drainage Related Planning Condition and Responses

4.1 Planning Conditions

Conditions 17 & 18 are detailed below in *italics* with the Brennan Consult response beneath in Blue.

Condition 17

The development hereby permitted (excluding demolition) shall not be commenced until a scheme for the provision and implementation of a surface water regulation system to manage the risk of flooding from both overland flow and from the sewer network, has been submitted to and approved in writing by the Local Planning Authority. The agreed scheme shall be implemented prior to the first occupation of the development.

The surface water drainage scheme should be consistent with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards.

As discussed in the report, the proposed drainage layout including a flow control limiting the peak rate to 26.5l/s for the extreme 100 year + 40% Climate change event. The hydraulic design has indicated some exceedance flooding to the lower lying dock areas only for the extreme event.

The northern boundary will include a cut off open ditch to collect any residual water from the higher ground to the north.

The proposed drainage layout is designed in line with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015), with connection to the adjacent watercourse at restricted rates.

Condition 18

Management and Maintenance Plan for the sustainable drainage system relating to the lifetime of the development through an appropriate legally binding agreement shall be submitted to and approved in writing by the Local Planning Authority. This shall include:

- i. *The arrangements for adoption by an appropriate public body or statutory undertaker or details of provision for management and maintenance by a management company.*

All the proposed drainage will all remain private and maintained by an appointed management company.

- ii. *Arrangements for inspection and ongoing maintenance of all elements of the sustainable drainage system to secure the operation of the surface water drainage scheme throughout its lifetime.*

Refer to Section 3 for full details of the management and maintenance strategy.

- iii. *Details for planned maintenance and a mechanism for remedial and urgent repair works.*

Refer to Section 3 for full details of the management and maintenance strategy.

- iv. *Means of access for inspection and maintenance purposes.*

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Refer to Section 3 for full details of the management and maintenance strategy.

- v. *The plan shall be implemented in accordance with the timeframes contained within it.*

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Appendix A – Brennan Consult Drawings

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Appendix B – Hydraulic Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

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

Filter Link Type

Template	Filter Drain	Base Inf Coefficient (m/hr)	0.00000
Trench Width (mm)	1000	Side Inf Coefficient (m/hr)	0.00000
Underdrain height above base (m)	0.000	Safety Factor	2.0
Auto Increment (mm)	75	Porosity	0.30
Follow Ground	x		

Available Diameters (mm)

150

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	✓
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
SW13	0.663	5.00	26.700	1800	2.150	24.550
SW14	0.663	5.00	26.700	1800	2.350	24.350
TANK 1		5.00	26.600	100	2.200	24.400
SW15	0.312	5.00	26.550	1800	2.230	24.320
SW16			26.600	1800	2.390	24.210
OUTFALL			26.500	1200	2.400	24.100

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)
1.000	SW13	SW14	43.000	0.600	24.550	24.350	0.200	215.0	750	5.38	101.1
1.001	SW14	SW16	29.000	0.600	24.350	24.210	0.140	207.1	750	5.63	99.2
2.000	TANK 1	SW15	19.000	0.600	24.400	24.320	0.080	237.5	750	5.17	102.7
2.001	SW15	SW16	25.000	0.600	24.320	24.210	0.110	227.3	750	5.40	100.9
1.009	SW16	OUTFALL	9.000	0.600	24.210	24.100	0.110	81.8	225	5.73	69.0

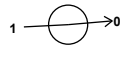
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.904	841.3	242.2	1.400	1.600	0.663	0.0	274	1.658
1.001	1.940	857.2	475.2	1.600	1.640	1.326	0.0	400	1.988
2.000	1.811	800.2	0.0	1.450	1.480	0.000	0.0	0	0.000
2.001	1.852	818.1	113.8	1.480	1.640	0.312	0.0	187	1.323
1.009	1.446	57.5	408.5	2.165	2.175	1.638	0.0	225	1.473

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	43.000	215.0	750	Filter	26.700	24.550	1.400	26.700	24.350	1.600
1.001	29.000	207.1	750	Circular	26.700	24.350	1.600	26.600	24.210	1.640
2.000	19.000	237.5	750	Circular	26.600	24.400	1.450	26.550	24.320	1.480
2.001	25.000	227.3	750	Circular	26.550	24.320	1.480	26.600	24.210	1.640
1.009	9.000	81.8	225	Circular	26.600	24.210	2.165	26.500	24.100	2.175

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW13	1800	Manhole	Adoptable	SW14	1800	Manhole	Adoptable
1.001	SW14	1800	Manhole	Adoptable	SW16	1800	Manhole	Adoptable
2.000	TANK 1	100	Manhole	Adoptable	SW15	1800	Manhole	Adoptable
2.001	SW15	1800	Manhole	Adoptable	SW16	1800	Manhole	Adoptable
1.009	SW16	1800	Manhole	Adoptable	OUTFALL	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW13	145.674	-0.905	26.700	2.150	1800				
						0	1.000	24.550	750
SW14	148.259	20.520	26.700	2.350	1800		1	1.000	24.350
						0	1.001	24.350	750
TANK 1	116.744	38.712	26.600	2.200	100				
						0	2.000	24.400	750
SW15	128.582	39.318	26.550	2.230	1800		1	2.000	24.320
						0	2.001	24.320	750

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW16	155.224	41.593	26.600	2.390	1800	1	2.001	24.210	750
						2	1.001	24.210	750
						0	1.009	24.210	225
OUTFALL	180.356	35.875	26.500	2.400	1200	1	1.009	24.100	225

SuDS Carriers

Link	US Node	DS Node	Link Type	Base Inf Coef (m/hr)	Sides Inf Coef (m/hr)	Safety Factor	Time to Half Empty (mins)
1.000	SW13	SW14	Filter	0.00000	0.00000	2.0	4

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	35	0	0
100	40	0	0

Node SW16 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	24.210	Product Number	CTL-SHE-0153-1440-2250-1440
Design Depth (m)	2.250	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	14.4	Min Node Diameter (mm)	1800

Node SW14 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	25.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	3
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	35.0	35.0	0.800	250.0	252.2

Node TANK 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	24.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	945.0	945.0	1.200	945.0	1075.8	1.201	0.0	1075.8

Approval Settings

Node Size	✓	Maximum Full Bore Velocity (m/s)	3.000
Node Losses	✓	Proportional Velocity	✓
Link Size	✓	Return Period (years)	
Minimum Diameter (mm)	150	Minimum Proportional Velocity (m/s)	0.750
Link Length	✓	Maximum Proportional Velocity (m/s)	3.000
Maximum Length (m)	100.000	Surcharged Depth	✓
Coordinates	✓	Return Period (years)	
Accuracy (m)	1.000	Maximum Surcharged Depth (m)	0.100
Crossings	✓	Flooding	✓
Cover Depth	✓	Return Period (years)	30
Minimum Cover Depth (m)		Time to Half Empty	x
Maximum Cover Depth (m)	3.000	Discharge Rates	✓
Backdrops	✓	Discharge Volume	✓
Minimum Backdrop Height (m)		100 year 360 minute (m ³)	
Maximum Backdrop Height (m)	1.500	First Flush	✓
Full Bore Velocity	✓	Return Period (years)	30
Minimum Full Bore Velocity (m/s)		First Flush Depth (mm)	5

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	1 year 1440 minute winter	3.326	1.326
1 year 15 minute winter	76.857	30.991	30 year +35% CC 15 minute summer	362.754	102.647
1 year 30 minute summer	71.439	20.215	30 year +35% CC 15 minute winter	254.564	102.647
1 year 30 minute winter	50.133	20.215	30 year +35% CC 30 minute summer	236.154	66.823
1 year 60 minute summer	48.435	12.800	30 year +35% CC 30 minute winter	165.722	66.823
1 year 60 minute winter	32.179	12.800	30 year +35% CC 60 minute summer	157.395	41.595
1 year 120 minute summer	30.053	7.942	30 year +35% CC 60 minute winter	104.570	41.595
1 year 120 minute winter	19.966	7.942	30 year +35% CC 120 minute summer	95.091	25.130
1 year 180 minute summer	23.233	5.979	30 year +35% CC 120 minute winter	63.176	25.130
1 year 180 minute winter	15.102	5.979	30 year +35% CC 180 minute summer	71.952	18.516
1 year 240 minute summer	18.475	4.882	30 year +35% CC 180 minute winter	46.771	18.516
1 year 240 minute winter	12.274	4.882	30 year +35% CC 240 minute summer	56.165	14.843
1 year 360 minute summer	14.169	3.646	30 year +35% CC 240 minute winter	37.315	14.843
1 year 360 minute winter	9.210	3.646	30 year +35% CC 360 minute summer	42.149	10.846
1 year 480 minute summer	11.185	2.956	30 year +35% CC 360 minute winter	27.398	10.846
1 year 480 minute winter	7.431	2.956	30 year +35% CC 480 minute summer	32.837	8.678
1 year 600 minute summer	9.182	2.511	30 year +35% CC 480 minute winter	21.816	8.678
1 year 600 minute winter	6.274	2.511	30 year +35% CC 600 minute summer	26.670	7.295
1 year 720 minute summer	8.203	2.199	30 year +35% CC 600 minute winter	18.223	7.295
1 year 720 minute winter	5.513	2.199	30 year +35% CC 720 minute summer	23.611	6.328
1 year 960 minute summer	6.768	1.782	30 year +35% CC 720 minute winter	15.868	6.328
1 year 960 minute winter	4.483	1.782	30 year +35% CC 960 minute summer	19.190	5.053
1 year 1440 minute summer	4.949	1.326	30 year +35% CC 960 minute winter	12.712	5.053

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 1440 minute summer	13.717	3.676	100 year +40% CC 240 minute winter	50.477	20.078
30 year +35% CC 1440 minute winter	9.219	3.676	100 year +40% CC 360 minute summer	56.677	14.585
100 year +40% CC 15 minute summer	488.233	138.153	100 year +40% CC 360 minute winter	36.841	14.585
100 year +40% CC 15 minute winter	342.620	138.153	100 year +40% CC 480 minute summer	43.979	11.622
100 year +40% CC 30 minute summer	320.551	90.705	100 year +40% CC 480 minute winter	29.219	11.622
100 year +40% CC 30 minute winter	224.948	90.705	100 year +40% CC 600 minute summer	35.604	9.738
100 year +40% CC 60 minute summer	214.603	56.713	100 year +40% CC 600 minute winter	24.327	9.738
100 year +40% CC 60 minute winter	142.577	56.713	100 year +40% CC 720 minute summer	31.433	8.424
100 year +40% CC 120 minute summer	129.587	34.246	100 year +40% CC 720 minute winter	21.125	8.424
100 year +40% CC 120 minute winter	86.094	34.246	100 year +40% CC 960 minute summer	25.432	6.697
100 year +40% CC 180 minute summer	97.729	25.149	100 year +40% CC 960 minute winter	16.847	6.697
100 year +40% CC 180 minute winter	63.526	25.149	100 year +40% CC 1440 minute summer	18.055	4.839
100 year +40% CC 240 minute summer	75.977	20.078	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW13	12	25.219	0.669	118.3	5.8313	0.0000	OK
15 minute summer	SW14	12	25.255	0.905	202.7	12.1634	0.0000	SURCHARGED
120 minute winter	TANK 1	116	24.578	0.178	85.9	160.0647	0.0000	OK
15 minute summer	SW15	12	25.254	0.934	257.6	4.9922	0.0000	SURCHARGED
15 minute summer	SW16	12	25.257	1.047	240.4	2.6635	0.0000	SURCHARGED
30 minute summer	OUTFALL	21	24.176	0.076	14.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW13	1.000	SW14	128.1	0.756	0.152	18.3792	
15 minute summer	SW14	1.001	SW16	240.4	0.661	0.281	12.7635	
120 minute winter	TANK 1	2.000	SW15	-85.9	-1.125	-0.107	2.0333	
15 minute summer	SW15	2.001	SW16	-229.6	-0.578	-0.281	11.0030	
15 minute summer	SW16	1.009	OUTFALL	14.4	1.147	0.250	0.1127	105.9

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW13	11	26.407	1.857	391.9	16.1775	0.0000	FLOOD RISK
15 minute summer	SW14	11	26.355	2.005	759.4	79.1101	0.0000	SURCHARGED
360 minute winter	TANK 1	352	25.200	0.800	100.0	717.7646	0.0000	SURCHARGED
15 minute summer	SW15	10	26.099	1.779	1154.9	9.5074	0.0000	SURCHARGED
15 minute summer	SW16	10	26.196	1.986	1061.5	5.0535	0.0000	SURCHARGED
60 minute summer	OUTFALL	39	24.176	0.076	14.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW13	1.000	SW14	371.3	0.857	0.441	18.9252	
15 minute summer	SW14	1.001	SW16	1061.5	2.412	1.238	12.7635	
360 minute winter	TANK 1	2.000	SW15	-100.0	-0.570	-0.125	8.3623	
15 minute summer	SW15	2.001	SW16	-1063.6	-2.417	-1.300	11.0030	
15 minute summer	SW16	1.009	OUTFALL	14.4	1.148	0.250	0.1128	208.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW13	11	26.652	2.102	527.8	18.3168	0.0000	FLOOD RISK
15 minute summer	SW14	11	26.547	2.197	1045.7	118.2351	0.0000	FLOOD RISK
480 minute winter	TANK 1	472	25.724	1.324	110.0	1077.7600	0.0000	SURCHARGED
15 minute summer	SW15	9	26.231	1.911	1351.1	10.2111	0.0000	SURCHARGED
15 minute summer	SW16	10	26.314	2.104	1226.8	5.3539	0.0000	FLOOD RISK
30 minute winter	OUTFALL	9	24.176	0.076	14.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW13	1.000	SW14	518.0	1.177	0.616	18.9252	
15 minute summer	SW14	1.001	SW16	1226.8	2.788	1.431	12.7635	
480 minute winter	TANK 1	2.000	SW15	-110.0	-0.446	-0.138	8.3623	
15 minute summer	SW15	2.001	SW16	-1223.3	-2.780	-1.495	11.0030	
15 minute summer	SW16	1.009	OUTFALL	14.4	1.148	0.250	0.1128	215.0

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

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	Auto Increment (mm)	75
Shape	Circular	Follow Ground	✓
Barrels	1		

Available Diameters (mm)

100 | 150

Filter Link Type

Template	Filter Drain	Base Inf Coefficient (m/hr)	0.00000
Trench Width (mm)	1000	Side Inf Coefficient (m/hr)	0.00000
Underdrain height above base (m)	0.000	Safety Factor	2.0
Auto Increment (mm)	75	Porosity	0.30
Follow Ground	x		

Available Diameters (mm)

150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
SG01	0.078	8.00	26.550	300	1.050	25.500
SW01			26.800	600	1.420	25.380
SW02			26.800	600	1.485	25.315
SW03	0.022	5.00	26.650	600	1.375	25.275
SW04	0.063	5.00	26.650	600	1.670	24.980
SW05	0.075	5.00	26.650	600	1.890	24.760
SW06			26.650	900	2.070	24.580
SW07	0.120	5.00	26.650	1200	1.150	25.500
SW08	0.120	5.00	26.650	1200	1.430	25.220
SW09			26.550	1200	1.700	24.850

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
SW10	0.005	5.00	26.525	1200	1.725	24.800
SW11	0.009	5.00	26.650	1350	1.985	24.665
POND 1			26.600	100	2.125	24.475
SW12			26.600	1500	2.155	24.445
OUTFALL			26.500	1200	2.255	24.245

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)
1.000	SG01	SW01	20.000	0.600	25.500	25.380	0.120	166.7	225	8.33	82.7
1.001	SW01	SW02	11.000	0.600	25.380	25.315	0.065	169.2	225	8.51	81.8
1.002	SW02	SW03	7.000	0.600	25.315	25.275	0.040	175.0	225	8.63	81.3
1.003	SW03	SW04	38.000	0.600	25.275	25.055	0.220	172.7	225	9.27	78.3
1.004	SW04	SW05	57.000	0.600	24.980	24.760	0.220	259.1	300	10.25	74.3
1.005	SW05	SW06	49.000	0.600	24.760	24.580	0.180	272.2	300	11.11	71.1
1.006	SW06	POND 1	6.000	0.600	24.580	24.550	0.030	200.0	300	11.20	70.8
2.000	SW07	SW08	59.000	0.600	25.500	25.220	0.280	210.7	300	5.91	97.1
2.001	SW08	SW09	74.000	0.600	25.220	24.850	0.370	200.0	300	7.02	89.8
2.002	SW09	SW10	10.000	0.600	24.850	24.800	0.050	200.0	300	7.18	88.9
2.003	SW10	SW11	12.000	0.600	24.800	24.740	0.060	200.0	300	7.36	87.8
2.004	SW11	POND 1	11.000	0.600	24.665	24.610	0.055	200.0	375	7.50	87.0
1.007	POND 1	SW12	7.000	0.600	24.475	24.445	0.030	233.3	375	11.30	70.5
1.008	SW12	OUTFALL	17.000	0.600	24.445	24.245	0.200	85.0	150	11.56	69.6

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.010	40.1	23.3	0.825	1.195	0.078	0.0	123	1.047
1.001	1.002	39.8	23.1	1.195	1.260	0.078	0.0	123	1.036
1.002	0.985	39.2	22.9	1.260	1.150	0.078	0.0	123	1.022
1.003	0.992	39.4	28.3	1.150	1.370	0.100	0.0	141	1.076
1.004	0.972	68.7	43.8	1.370	1.590	0.163	0.0	174	1.028
1.005	0.948	67.0	61.2	1.590	1.770	0.238	0.0	226	1.070
1.006	1.108	78.3	60.9	1.770	1.750	0.238	0.0	200	1.220
2.000	1.079	76.3	42.1	0.850	1.130	0.120	0.0	159	1.104
2.001	1.108	78.3	77.9	1.130	1.400	0.240	0.0	246	1.256
2.002	1.108	78.3	77.1	1.400	1.425	0.240	0.0	243	1.256
2.003	1.108	78.3	77.8	1.425	1.610	0.245	0.0	246	1.256
2.004	1.277	141.1	79.9	1.610	1.615	0.254	0.0	203	1.316
1.007	1.182	130.5	125.3	1.750	1.780	0.492	0.0	296	1.337
1.008	1.091	19.3	123.7	2.005	2.105	0.492	0.0	150	1.111

Pipeline Schedule

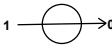
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	20.000	166.7	225	Circular	26.550	25.500	0.825	26.800	25.380	1.195
1.001	11.000	169.2	225	Filter	26.800	25.380	1.195	26.800	25.315	1.260
1.002	7.000	175.0	225	Circular	26.800	25.315	1.260	26.650	25.275	1.150
1.003	38.000	172.7	225	Filter	26.650	25.275	1.150	26.650	25.055	1.370
1.004	57.000	259.1	300	Filter	26.650	24.980	1.370	26.650	24.760	1.590
1.005	49.000	272.2	300	Filter	26.650	24.760	1.590	26.650	24.580	1.770
1.006	6.000	200.0	300	Filter	26.650	24.580	1.770	26.600	24.550	1.750
2.000	59.000	210.7	300	Filter	26.650	25.500	0.850	26.650	25.220	1.130
2.001	74.000	200.0	300	Filter	26.650	25.220	1.130	26.550	24.850	1.400
2.002	10.000	200.0	300	Circular	26.550	24.850	1.400	26.525	24.800	1.425
2.003	12.000	200.0	300	Circular	26.525	24.800	1.425	26.650	24.740	1.610
2.004	11.000	200.0	375	Circular	26.650	24.665	1.610	26.600	24.610	1.615
1.007	7.000	233.3	375	Circular	26.600	24.475	1.750	26.600	24.445	1.780
1.008	17.000	85.0	150	Circular	26.600	24.445	2.005	26.500	24.245	2.105

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SG01	300	Manhole	Adoptable	SW01	600	Manhole	Adoptable
1.001	SW01	600	Manhole	Adoptable	SW02	600	Manhole	Adoptable
1.002	SW02	600	Manhole	Adoptable	SW03	600	Manhole	Adoptable
1.003	SW03	600	Manhole	Adoptable	SW04	600	Manhole	Adoptable
1.004	SW04	600	Manhole	Adoptable	SW05	600	Manhole	Adoptable
1.005	SW05	600	Manhole	Adoptable	SW06	900	Manhole	Adoptable
1.006	SW06	900	Manhole	Adoptable	POND 1	100	Manhole	Adoptable
2.000	SW07	1200	Manhole	Adoptable	SW08	1200	Manhole	Adoptable
2.001	SW08	1200	Manhole	Adoptable	SW09	1200	Manhole	Adoptable
2.002	SW09	1200	Manhole	Adoptable	SW10	1200	Manhole	Adoptable
2.003	SW10	1200	Manhole	Adoptable	SW11	1350	Manhole	Adoptable
2.004	SW11	1350	Manhole	Adoptable	POND 1	100	Manhole	Adoptable
1.007	POND 1	100	Manhole	Adoptable	SW12	1500	Manhole	Adoptable
1.008	SW12	1500	Manhole	Adoptable	OUTFALL	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SG01	-11.634	55.898	26.550	1.050	300					
						0	1.000	25.500	225	
SW01	16.982	73.075	26.800	1.420	600		1	1.000	25.380	225
						0	1.001	25.380	225	
SW02	43.762	72.689	26.800	1.485	600		1	1.001	25.315	225
						0	1.002	25.315	225	
SW03	48.564	83.364	26.650	1.375	600		1	1.002	25.275	225
						0	1.003	25.275	225	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW04	75.044	88.417	26.650	1.670	600		1	1.003 25.055	225
							0	1.004 24.980	300
SW05	110.964	87.991	26.650	1.890	600		1	1.004 24.760	300
							0	1.005 24.760	300
SW06	142.419	86.929	26.650	2.070	900		1	1.005 24.580	300
							0	1.006 24.580	300
SW07	60.166	50.797	26.650	1.150	1200				
							0	2.000 25.500	300
SW08	106.713	51.647	26.650	1.430	1200		1	2.000 25.220	300
							0	2.001 25.220	300
SW09	135.889	52.072	26.550	1.700	1200		1	2.001 24.850	300
							0	2.002 24.850	300
SW10	137.318	61.637	26.525	1.725	1200		1	2.002 24.800	300
							0	2.003 24.800	300
SW11	138.922	72.631	26.650	1.985	1350		1	2.003 24.740	300
							0	2.004 24.665	375
POND 1	158.449	91.648	26.600	2.125	100		1	2.004 24.610	375
							2	1.006 24.550	300
							0	1.007 24.475	375
SW12	163.007	82.026	26.600	2.155	1500		1	1.007 24.445	375
							0	1.008 24.445	150
OUTFALL	187.507	59.929	26.500	2.255	1200		1	1.008 24.245	150

SuDS Carriers

Link	US Node	DS Node	Link Type	Base Inf Coef (m/hr)	Sides Inf Coef (m/hr)	Safety Factor	Time to Half Empty (mins)
1.001	SW01	SW02	Filter	0.00000	0.00000	2.0	5
1.003	SW03	SW04	Filter	0.00000	0.00000	2.0	
1.004	SW04	SW05	Filter	0.00000	0.00000	2.0	
1.005	SW05	SW06	Filter	0.00000	0.00000	2.0	
1.006	SW06	POND 1	Filter	0.00000	0.00000	2.0	
2.000	SW07	SW08	Filter	0.00000	0.00000	2.0	5
2.001	SW08	SW09	Filter	0.00000	0.00000	2.0	

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	35	0	0
100	40	0	0

Node SW12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	24.445	Product Number	CTL-SHE-0062-2000-1400-2000
Design Depth (m)	1.400	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node POND 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	24.475
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	2.000	600.0	611.3

Node SW07 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.300	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	2	Depth (m)	0.250
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		

Node SW08 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.300	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.250
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	1.00	Length (m)	50.000		

Approval Settings

Node Size	✓	Maximum Full Bore Velocity (m/s)	3.000
Node Losses	✓	Proportional Velocity	✓
Link Size	✓	Return Period (years)	
Minimum Diameter (mm)	150	Minimum Proportional Velocity (m/s)	0.750
Link Length	✓	Maximum Proportional Velocity (m/s)	3.000
Maximum Length (m)	100.000	Surcharged Depth	✓
Coordinates	✓	Return Period (years)	
Accuracy (m)	1.000	Maximum Surcharged Depth (m)	0.100
Crossings	✓	Flooding	✓
Cover Depth	✓	Return Period (years)	30
Minimum Cover Depth (m)		Time to Half Empty	x
Maximum Cover Depth (m)	3.000	Discharge Rates	✓
Backdrops	✓	Discharge Volume	✓
Minimum Backdrop Height (m)		100 year 360 minute (m³)	
Maximum Backdrop Height (m)	1.500	First Flush	✓
Full Bore Velocity	✓	Return Period (years)	30
Minimum Full Bore Velocity (m/s)		First Flush Depth (mm)	5

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year +35% CC 15 minute winter	254.564	102.647
1 year 15 minute winter	76.857	30.991	30 year +35% CC 30 minute summer	236.154	66.823
1 year 30 minute summer	71.439	20.215	30 year +35% CC 30 minute winter	165.722	66.823
1 year 30 minute winter	50.133	20.215	30 year +35% CC 60 minute summer	157.395	41.595
1 year 60 minute summer	48.435	12.800	30 year +35% CC 60 minute winter	104.570	41.595
1 year 60 minute winter	32.179	12.800	30 year +35% CC 120 minute summer	95.091	25.130
1 year 120 minute summer	30.053	7.942	30 year +35% CC 120 minute winter	63.176	25.130
1 year 120 minute winter	19.966	7.942	30 year +35% CC 180 minute summer	71.952	18.516
1 year 180 minute summer	23.233	5.979	30 year +35% CC 180 minute winter	46.771	18.516
1 year 180 minute winter	15.102	5.979	30 year +35% CC 240 minute summer	56.165	14.843
1 year 240 minute summer	18.475	4.882	30 year +35% CC 240 minute winter	37.315	14.843
1 year 240 minute winter	12.274	4.882	30 year +35% CC 360 minute summer	42.149	10.846
1 year 360 minute summer	14.169	3.646	30 year +35% CC 360 minute winter	27.398	10.846
1 year 360 minute winter	9.210	3.646	30 year +35% CC 480 minute summer	32.837	8.678
1 year 480 minute summer	11.185	2.956	30 year +35% CC 480 minute winter	21.816	8.678
1 year 480 minute winter	7.431	2.956	30 year +35% CC 600 minute summer	26.670	7.295
1 year 600 minute summer	9.182	2.511	30 year +35% CC 600 minute winter	18.223	7.295
1 year 600 minute winter	6.274	2.511	30 year +35% CC 720 minute summer	23.611	6.328
1 year 720 minute summer	8.203	2.199	30 year +35% CC 720 minute winter	15.868	6.328
1 year 720 minute winter	5.513	2.199	30 year +35% CC 960 minute summer	19.190	5.053
1 year 960 minute summer	6.768	1.782	30 year +35% CC 960 minute winter	12.712	5.053
1 year 960 minute winter	4.483	1.782	30 year +35% CC 1440 minute summer	13.717	3.676
1 year 1440 minute summer	4.949	1.326	30 year +35% CC 1440 minute winter	9.219	3.676
1 year 1440 minute winter	3.326	1.326	100 year +40% CC 15 minute summer	488.233	138.153
30 year +35% CC 15 minute summer	362.754	102.647	100 year +40% CC 15 minute winter	342.620	138.153

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 30 minute summer	320.551	90.705	100 year +40% CC 360 minute winter	36.841	14.585
100 year +40% CC 30 minute winter	224.948	90.705	100 year +40% CC 480 minute summer	43.979	11.622
100 year +40% CC 60 minute summer	214.603	56.713	100 year +40% CC 480 minute winter	29.219	11.622
100 year +40% CC 60 minute winter	142.577	56.713	100 year +40% CC 600 minute summer	35.604	9.738
100 year +40% CC 120 minute summer	129.587	34.246	100 year +40% CC 600 minute winter	24.327	9.738
100 year +40% CC 120 minute winter	86.094	34.246	100 year +40% CC 720 minute summer	31.433	8.424
100 year +40% CC 180 minute summer	97.729	25.149	100 year +40% CC 720 minute winter	21.125	8.424
100 year +40% CC 180 minute winter	63.526	25.149	100 year +40% CC 960 minute summer	25.432	6.697
100 year +40% CC 240 minute summer	75.977	20.078	100 year +40% CC 960 minute winter	16.847	6.697
100 year +40% CC 240 minute winter	50.477	20.078	100 year +40% CC 1440 minute summer	18.055	4.839
100 year +40% CC 360 minute summer	56.677	14.585	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SG01	12	25.580	0.080	10.3	0.1248	0.0000	OK
15 minute summer	SW01	12	25.464	0.084	10.3	0.0237	0.0000	OK
15 minute summer	SW02	12	25.403	0.088	10.3	0.1811	0.0000	OK
15 minute summer	SW03	12	25.368	0.093	13.8	0.0559	0.0000	OK
15 minute summer	SW04	11	25.099	0.119	24.0	0.1674	0.0000	OK
360 minute winter	SW05	352	24.984	0.224	6.0	1.7009	0.0000	OK
360 minute winter	SW06	352	24.984	0.404	6.0	3.9334	0.0000	SURCHARGED
15 minute summer	SW07	11	25.606	0.106	21.5	0.3408	0.0000	OK
15 minute summer	SW08	11	25.375	0.155	42.1	1.0122	0.0000	OK
15 minute summer	SW09	12	25.019	0.169	40.2	0.8431	0.0000	OK
360 minute winter	SW10	352	24.984	0.184	6.2	0.2188	0.0000	OK
360 minute winter	SW11	352	24.984	0.319	6.4	0.4856	0.0000	OK
360 minute winter	POND 1	352	24.984	0.509	10.8	61.7122	0.0000	SURCHARGED
360 minute winter	SW12	352	24.984	0.539	1.8	0.9525	0.0000	SURCHARGED
15 minute winter	OUTFALL	16	24.274	0.029	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SG01	1.000	SW01	10.3	0.790	0.257	0.2609	
15 minute summer	SW01	1.001	SW02	10.3	0.744	0.259	0.1530	
15 minute summer	SW02	1.002	SW03	10.3	0.725	0.264	0.1044	
15 minute summer	SW03	1.003	SW04	13.6	0.897	0.345	0.5755	
15 minute summer	SW04	1.004	SW05	23.3	0.755	0.340	1.7928	
360 minute winter	SW05	1.005	SW06	6.0	0.481	0.090	3.1080	
360 minute winter	SW06	1.006	POND 1	4.7	0.441	0.060	0.4225	
15 minute summer	SW07	2.000	SW08	20.9	0.737	0.274	1.7365	
15 minute summer	SW08	2.001	SW09	40.2	1.084	0.514	2.8326	
15 minute summer	SW09	2.002	SW10	38.4	0.964	0.490	0.3985	
360 minute winter	SW10	2.003	SW11	6.2	0.645	0.080	0.6401	
360 minute winter	SW11	2.004	POND 1	6.1	0.541	0.043	1.1557	
360 minute winter	POND 1	1.007	SW12	1.8	0.162	0.014	0.7721	
360 minute winter	SW12	1.008	OUTFALL	1.6	0.660	0.084	0.0418	49.1

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.25%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SG01	13	25.843	0.343	34.0	0.5336	0.0000	SURCHARGED
15 minute summer	SW01	13	25.743	0.363	33.0	0.1027	0.0000	SURCHARGED
30 minute summer	SW02	21	25.683	0.368	31.8	1.0788	0.0000	SURCHARGED
30 minute summer	SW03	21	25.643	0.368	41.9	0.2221	0.0000	SURCHARGED
960 minute winter	SW04	930	25.601	0.621	5.8	5.1523	0.0000	SURCHARGED
960 minute winter	SW05	930	25.600	0.840	7.8	12.1862	0.0000	SURCHARGED
960 minute winter	SW06	930	25.600	1.020	7.0	13.2869	0.0000	SURCHARGED
15 minute summer	SW07	12	26.009	0.509	71.0	1.6394	0.0000	SURCHARGED
15 minute summer	SW08	12	25.847	0.627	130.0	9.1337	0.0000	SURCHARGED
960 minute winter	SW09	930	25.600	0.750	8.4	11.8323	0.0000	SURCHARGED
960 minute winter	SW10	930	25.600	0.800	7.4	0.9518	0.0000	SURCHARGED
960 minute winter	SW11	930	25.600	0.935	7.7	1.4238	0.0000	SURCHARGED
960 minute winter	POND 1	930	25.600	1.125	13.9	232.1811	0.0000	SURCHARGED
960 minute winter	SW12	930	25.600	1.155	1.8	2.0417	0.0000	SURCHARGED
960 minute winter	OUTFALL	930	24.276	0.031	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SG01	1.000	SW01	33.0	0.983	0.823	0.7954	
15 minute summer	SW01	1.001	SW02	32.5	0.914	0.816	0.4375	
30 minute summer	SW02	1.002	SW03	31.1	0.818	0.793	0.2784	
30 minute summer	SW03	1.003	SW04	40.6	1.115	1.029	1.5113	
960 minute winter	SW04	1.004	SW05	5.2	0.402	0.075	4.0139	
960 minute winter	SW05	1.005	SW06	7.0	0.409	0.105	3.4505	
960 minute winter	SW06	1.006	POND 1	6.4	0.431	0.082	0.4225	
15 minute summer	SW07	2.000	SW08	62.1	0.980	0.815	4.1547	
15 minute summer	SW08	2.001	SW09	96.8	1.374	1.236	5.2110	
960 minute winter	SW09	2.002	SW10	7.2	0.567	0.092	0.7042	
960 minute winter	SW10	2.003	SW11	7.4	0.541	0.094	0.8450	
960 minute winter	SW11	2.004	POND 1	7.6	0.442	0.054	1.2133	
960 minute winter	POND 1	1.007	SW12	1.8	0.135	0.014	0.7721	
960 minute winter	SW12	1.008	OUTFALL	1.8	0.682	0.094	0.0453	114.4

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	SG01	21	26.428	0.928	46.3	1.4437	0.0000	FLOOD RISK
30 minute summer	SW01	22	26.276	0.896	42.5	0.2535	0.0000	SURCHARGED
30 minute summer	SW02	22	26.185	0.870	41.1	2.8797	0.0000	SURCHARGED
30 minute summer	SW03	22	26.115	0.840	46.9	0.5067	0.0000	SURCHARGED
960 minute winter	SW04	945	25.845	0.865	7.2	8.1960	0.0000	SURCHARGED
960 minute winter	SW05	945	25.845	1.085	9.9	16.6255	0.0000	SURCHARGED
960 minute winter	SW06	945	25.845	1.265	9.1	17.0327	0.0000	SURCHARGED
15 minute summer	SW07	13	26.356	0.856	95.6	5.0841	0.0000	FLOOD RISK
15 minute summer	SW08	13	26.190	0.970	177.2	16.1661	0.0000	SURCHARGED
960 minute winter	SW09	945	25.845	0.995	9.9	17.5332	0.0000	SURCHARGED
960 minute winter	SW10	945	25.845	1.045	8.8	1.2425	0.0000	SURCHARGED
960 minute winter	SW11	945	25.845	1.180	9.1	1.7959	0.0000	SURCHARGED
960 minute winter	POND 1	945	25.845	1.370	17.2	328.7541	0.0000	SURCHARGED
960 minute winter	SW12	945	25.845	1.400	2.0	2.4737	0.0000	SURCHARGED
960 minute winter	OUTFALL	945	24.277	0.032	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	SG01	1.000	SW01	42.5	1.070	1.060	0.7954	
30 minute summer	SW01	1.001	SW02	41.1	1.033	1.031	0.4375	
30 minute summer	SW02	1.002	SW03	40.2	1.010	1.025	0.2784	
30 minute summer	SW03	1.003	SW04	46.8	1.176	1.186	1.5113	
960 minute winter	SW04	1.004	SW05	6.5	0.387	0.095	4.0139	
960 minute winter	SW05	1.005	SW06	9.1	0.441	0.136	3.4505	
960 minute winter	SW06	1.006	POND 1	8.3	0.462	0.106	0.4225	
15 minute summer	SW07	2.000	SW08	81.6	1.159	1.070	4.1547	
15 minute summer	SW08	2.001	SW09	114.6	1.627	1.463	5.2110	
960 minute winter	SW09	2.002	SW10	8.6	0.558	0.110	0.7042	
960 minute winter	SW10	2.003	SW11	8.7	0.512	0.111	0.8450	
960 minute winter	SW11	2.004	POND 1	9.1	0.465	0.064	1.2133	
960 minute winter	POND 1	1.007	SW12	2.0	0.083	0.015	0.7721	
960 minute winter	SW12	1.008	OUTFALL	2.0	0.699	0.103	0.0482	122.4

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

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	Auto Increment (mm)	75
Shape	Circular	Follow Ground	✓
Barrels	1		

Available Diameters (mm)

100 | 150

Filter Link Type

Template	Filter Drain	Base Inf Coefficient (m/hr)	0.00000
Trench Width (mm)	1000	Side Inf Coefficient (m/hr)	0.00000
Underdrain height above base (m)	0.000	Safety Factor	2.0
Auto Increment (mm)	75	Porosity	0.30
Follow Ground	x		

Available Diameters (mm)

150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
SW17	0.019	5.00	26.840	600	0.950	25.890
SW18			27.050	1200	1.360	25.690
SW19	0.050	5.00	26.525	600	0.925	25.600
SW20	0.034	5.00	26.650	1200	1.340	25.310
SW21	0.009	5.00	26.700	600	1.050	25.650
SW22			26.700	1200	1.545	25.155
SW23	0.065	5.00	27.000	600	1.425	25.575
SW24			26.900	1200	1.895	25.005
SW25			27.100	600	2.175	24.925
SW26			27.000	600	2.145	24.855

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
SW27			27.000	600	2.285	24.715
SW28			26.800	600	2.405	24.395
SW29	0.313	5.00	26.575	1500	1.775	24.800
SW30			26.700	1500	2.200	24.500
SG01	0.205	5.00	25.625	300	1.025	24.600
SG02	0.490	5.00	26.550	300	1.575	24.975
SW31			26.650	1500	2.425	24.225
TANK 2			26.550	100	2.550	24.000
SW32	0.160	5.00	26.550	1500	2.650	23.900
OUTFALL			25.500	1200	2.100	23.400

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)
2.000	SW17	SW18	27.000	0.600	25.890	25.690	0.200	135.0	150	5.52	99.9
2.001	SW18	SW20	11.000	0.600	25.690	25.385	0.305	36.1	150	5.63	99.1
1.000	SW19	SW20	42.000	0.600	25.600	25.310	0.290	144.8	225	5.65	99.0
1.001	SW20	SW22	14.000	0.600	25.310	25.230	0.080	175.0	225	5.88	97.3
3.000	SW21	SW22	8.000	0.600	25.650	25.550	0.100	80.0	150	5.12	103.2
1.002	SW22	SW24	31.000	0.600	25.155	25.005	0.150	206.7	300	6.36	94.0
4.000	SW23	SW24	25.000	0.600	25.575	25.455	0.120	208.3	225	5.46	100.4
1.003	SW24	SW25	16.000	0.600	25.005	24.925	0.080	200.0	300	6.60	92.4
1.004	SW25	SW26	13.000	0.600	24.925	24.855	0.070	185.7	300	6.79	91.2
1.005	SW26	SW27	26.000	0.600	24.855	24.715	0.140	185.7	300	7.16	89.0
1.006	SW27	SW28	65.000	0.600	24.715	24.395	0.320	203.1	300	8.15	83.6
1.007	SW28	TANK 2	21.000	0.600	24.395	24.295	0.100	210.0	300	8.47	82.0
5.000	SW29	SW30	53.000	0.600	24.800	24.500	0.300	176.7	375	5.65	99.0
5.001	SW30	TANK 2	5.000	0.600	24.500	24.450	0.050	100.0	375	5.70	98.6
6.000	SG01	SW31	27.000	0.600	24.600	24.450	0.150	180.0	300	5.39	101.0
7.000	SG02	SW31	13.000	0.600	24.975	24.825	0.150	86.7	375	5.11	103.2

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)
2.000	0.863	15.2	6.9	0.800	1.210	0.019	0.0	71	0.841
2.001	1.681	29.7	6.8	1.210	1.115	0.019	0.0	49	1.370
1.000	1.084	43.1	17.9	0.700	1.115	0.050	0.0	101	1.033
1.001	0.985	39.2	36.2	1.115	1.245	0.103	0.0	172	1.114
3.000	1.125	19.9	3.4	0.900	1.000	0.009	0.0	42	0.842
1.002	1.090	77.0	38.0	1.245	1.595	0.112	0.0	149	1.087
4.000	0.902	35.9	23.6	1.200	1.220	0.065	0.0	133	0.961
1.003	1.108	78.3	59.1	1.595	1.875	0.177	0.0	195	1.214
1.004	1.150	81.3	58.4	1.875	1.845	0.177	0.0	188	1.247
1.005	1.150	81.3	56.9	1.845	1.985	0.177	0.0	185	1.241
1.006	1.099	77.7	53.5	1.985	2.105	0.177	0.0	183	1.182
1.007	1.081	76.4	52.5	2.105	1.955	0.177	0.0	183	1.162
5.000	1.360	150.2	112.0	1.400	1.825	0.313	0.0	242	1.485
5.001	1.812	200.1	111.6	1.825	1.725	0.313	0.0	200	1.859
6.000	1.168	82.6	74.8	0.725	1.900	0.205	0.0	225	1.317
7.000	1.947	215.0	182.8	1.200	1.450	0.490	0.0	267	2.174

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)
6.001	SW31	TANK 2	12.000	0.600	24.225	24.175	0.050	240.0	525	5.52	99.9
1.008	TANK 2	SW32	5.000	0.600	24.000	23.900	0.100	50.0	525	8.50	81.9
1.009	SW32	OUTFALL	8.000	0.600	23.900	23.400	0.500	16.0	225	8.54	81.7

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)
6.001	1.441	312.0	251.0	1.900	1.850	0.695	0.0	358	1.594
1.008	3.173	686.8	350.7	2.025	2.125	1.185	0.0	266	3.189
1.009	3.287	130.7	397.1	2.425	1.875	1.345	0.0	225	3.348

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	27.000	135.0	150	Circular	26.840	25.890	0.800	27.050	25.690	1.210
2.001	11.000	36.1	150	Circular	27.050	25.690	1.210	26.650	25.385	1.115
1.000	42.000	144.8	225	Circular	26.525	25.600	0.700	26.650	25.310	1.115
1.001	14.000	175.0	225	Circular	26.650	25.310	1.115	26.700	25.230	1.245
3.000	8.000	80.0	150	Circular	26.700	25.650	0.900	26.700	25.550	1.000
1.002	31.000	206.7	300	Circular	26.700	25.155	1.245	26.900	25.005	1.595
4.000	25.000	208.3	225	Filter	27.000	25.575	1.200	26.900	25.455	1.220
1.003	16.000	200.0	300	Circular	26.900	25.005	1.595	27.100	24.925	1.875
1.004	13.000	185.7	300	Filter	27.100	24.925	1.875	27.000	24.855	1.845
1.005	26.000	185.7	300	Filter	27.000	24.855	1.845	27.000	24.715	1.985
1.006	65.000	203.1	300	Filter	27.000	24.715	1.985	26.800	24.395	2.105
1.007	21.000	210.0	300	Circular	26.800	24.395	2.105	26.550	24.295	1.955
5.000	53.000	176.7	375	Circular	26.575	24.800	1.400	26.700	24.500	1.825
5.001	5.000	100.0	375	Circular	26.700	24.500	1.825	26.550	24.450	1.725
6.000	27.000	180.0	300	Circular	25.625	24.600	0.725	26.650	24.450	1.900
7.000	13.000	86.7	375	Circular	26.550	24.975	1.200	26.650	24.825	1.450
6.001	12.000	240.0	525	Circular	26.650	24.225	1.900	26.550	24.175	1.850

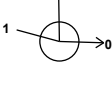
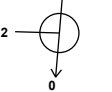
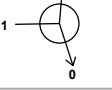
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	SW17	600	Manhole	Adoptable	SW18	1200	Manhole	Adoptable
2.001	SW18	1200	Manhole	Adoptable	SW20	1200	Manhole	Adoptable
1.000	SW19	600	Manhole	Adoptable	SW20	1200	Manhole	Adoptable
1.001	SW20	1200	Manhole	Adoptable	SW22	1200	Manhole	Adoptable
3.000	SW21	600	Manhole	Adoptable	SW22	1200	Manhole	Adoptable
1.002	SW22	1200	Manhole	Adoptable	SW24	1200	Manhole	Adoptable
4.000	SW23	600	Manhole	Adoptable	SW24	1200	Manhole	Adoptable
1.003	SW24	1200	Manhole	Adoptable	SW25	600	Manhole	Adoptable
1.004	SW25	600	Manhole	Adoptable	SW26	600	Manhole	Adoptable
1.005	SW26	600	Manhole	Adoptable	SW27	600	Manhole	Adoptable
1.006	SW27	600	Manhole	Adoptable	SW28	600	Manhole	Adoptable
1.007	SW28	600	Manhole	Adoptable	TANK 2	100	Manhole	Adoptable
5.000	SW29	1500	Manhole	Adoptable	SW30	1500	Manhole	Adoptable
5.001	SW30	1500	Manhole	Adoptable	TANK 2	100	Manhole	Adoptable
6.000	SG01	300	Manhole	Adoptable	SW31	1500	Manhole	Adoptable
7.000	SG02	300	Manhole	Adoptable	SW31	1500	Manhole	Adoptable
6.001	SW31	1500	Manhole	Adoptable	TANK 2	100	Manhole	Adoptable

Pipeline Schedule

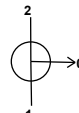
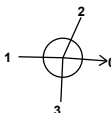
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.008	5.000	50.0	525	Circular	26.550	24.000	2.025	26.550	23.900	2.125
1.009	8.000	16.0	225	Circular	26.550	23.900	2.425	25.500	23.400	1.875

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.008	TANK 2	100	Manhole	Adoptable	SW32	1500	Manhole	Adoptable
1.009	SW32	1500	Manhole	Adoptable	OUTFALL	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW17	-26.125	91.392	26.840	0.950	600		0	2.000	25.890	150
SW18	-24.637	67.163	27.050	1.360	1200		1	2.000	25.690	150
							0	2.001	25.690	150
SW19	-12.522	92.455	26.525	0.925	600		0	1.000	25.600	225
SW20	-12.084	63.762	26.650	1.340	1200		1	2.001	25.385	150
							2	1.000	25.310	225
							0	1.001	25.310	225
SW21	10.758	78.753	26.700	1.050	600		0	3.000	25.650	150
SW22	9.482	63.124	26.700	1.545	1200		1	3.000	25.550	150
							2	1.001	25.230	225
							0	1.002	25.155	300
SW23	-25.077	31.456	27.000	1.425	600		0	4.000	25.575	225
SW24	6.819	32.018	26.900	1.895	1200		1	4.000	25.455	225
							2	1.002	25.005	300
							0	1.003	25.005	300
SW25	11.419	17.777	27.100	2.175	600		1	1.003	24.925	300
							0	1.004	24.925	300
SW26	27.435	11.614	27.000	2.145	600		1	1.004	24.855	300
							0	1.005	24.855	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW27	65.693	3.188	27.000	2.285	600		1	1.005	24.715	300
							0	1.006	24.715	300
SW28	114.501	3.188	26.800	2.405	600		1	1.006	24.395	300
							0	1.007	24.395	300
SW29	157.085	81.828	26.575	1.775	1500		0	5.000	24.800	375
SW30	120.103	41.020	26.700	2.200	1500		1	5.000	24.500	375
							0	5.001	24.500	375
SG01	99.911	76.892	25.625	1.025	300		0	6.000	24.600	300
SG02	100.337	18.066	26.550	1.575	300		0	7.000	24.975	375
							0	7.000	24.975	375
SW31	100.124	31.834	26.650	2.425	1500		1	7.000	24.825	375
							2	6.000	24.450	300
							0	6.001	24.225	525
TANK 2	115.789	31.484	26.550	2.550	100		1	6.001	24.175	525
							2	5.001	24.450	375
							3	1.007	24.295	300
							0	1.008	24.000	525
SW32	130.730	30.393	26.550	2.650	1500		1	1.008	23.900	525
							0	1.009	23.900	225
OUTFALL	149.221	24.655	25.500	2.100	1200		1	1.009	23.400	225

SuDS Carriers

Link	US Node	DS Node	Link Type	Base Inf Coef (m/hr)	Sides Inf Coef (m/hr)	Safety Factor	Time to Half Empty (mins)
4.000	SW23	SW24	Filter	0.00000	0.00000	2.0	2
1.004	SW25	SW26	Filter	0.00000	0.00000	2.0	132
1.005	SW26	SW27	Filter	0.00000	0.00000	2.0	152
1.006	SW27	SW28	Filter	0.00000	0.00000	2.0	312

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m ³ /ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	35	0	0
100	40	0	0

Node SW32 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	23.900	Product Number	CTL-SHE-0132-1020-2000-1020
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	10.2	Min Node Diameter (mm)	1500

Node TANK 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	24.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	600.0	600.0	1.200	600.0	704.2	1.201	0.0	704.2

Approval Settings

Node Size	✓	Maximum Full Bore Velocity (m/s)	3.000
Node Losses	✓	Proportional Velocity	✓
Link Size	✓	Return Period (years)	
Minimum Diameter (mm)	150	Minimum Proportional Velocity (m/s)	0.750
Link Length	✓	Maximum Proportional Velocity (m/s)	3.000
Maximum Length (m)	100.000	Surcharged Depth	✓
Coordinates	✓	Return Period (years)	
Accuracy (m)	1.000	Maximum Surcharged Depth (m)	0.100
Crossings	✓	Flooding	✓
Cover Depth	✓	Return Period (years)	30
Minimum Cover Depth (m)		Time to Half Empty	x
Maximum Cover Depth (m)	3.000	Discharge Rates	✓
Backdrops	✓	Discharge Volume	✓
Minimum Backdrop Height (m)		100 year 360 minute (m ³)	
Maximum Backdrop Height (m)	1.500	First Flush	✓
Full Bore Velocity	✓	Return Period (years)	30
Minimum Full Bore Velocity (m/s)		First Flush Depth (mm)	5

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year +35% CC 360 minute summer	42.149	10.846
1 year 15 minute winter	76.857	30.991	30 year +35% CC 360 minute winter	27.398	10.846
1 year 30 minute summer	71.439	20.215	30 year +35% CC 480 minute summer	32.837	8.678
1 year 30 minute winter	50.133	20.215	30 year +35% CC 480 minute winter	21.816	8.678
1 year 60 minute summer	48.435	12.800	30 year +35% CC 600 minute summer	26.670	7.295
1 year 60 minute winter	32.179	12.800	30 year +35% CC 600 minute winter	18.223	7.295
1 year 120 minute summer	30.053	7.942	30 year +35% CC 720 minute summer	23.611	6.328
1 year 120 minute winter	19.966	7.942	30 year +35% CC 720 minute winter	15.868	6.328
1 year 180 minute summer	23.233	5.979	30 year +35% CC 960 minute summer	19.190	5.053
1 year 180 minute winter	15.102	5.979	30 year +35% CC 960 minute winter	12.712	5.053
1 year 240 minute summer	18.475	4.882	30 year +35% CC 1440 minute summer	13.717	3.676
1 year 240 minute winter	12.274	4.882	30 year +35% CC 1440 minute winter	9.219	3.676
1 year 360 minute summer	14.169	3.646	100 year +40% CC 15 minute summer	488.233	138.153
1 year 360 minute winter	9.210	3.646	100 year +40% CC 15 minute winter	342.620	138.153
1 year 480 minute summer	11.185	2.956	100 year +40% CC 30 minute summer	320.551	90.705
1 year 480 minute winter	7.431	2.956	100 year +40% CC 30 minute winter	224.948	90.705
1 year 600 minute summer	9.182	2.511	100 year +40% CC 60 minute summer	214.603	56.713
1 year 600 minute winter	6.274	2.511	100 year +40% CC 60 minute winter	142.577	56.713
1 year 720 minute summer	8.203	2.199	100 year +40% CC 120 minute summer	129.587	34.246
1 year 720 minute winter	5.513	2.199	100 year +40% CC 120 minute winter	86.094	34.246
1 year 960 minute summer	6.768	1.782	100 year +40% CC 180 minute summer	97.729	25.149
1 year 960 minute winter	4.483	1.782	100 year +40% CC 180 minute winter	63.526	25.149
1 year 1440 minute summer	4.949	1.326	100 year +40% CC 240 minute summer	75.977	20.078
1 year 1440 minute winter	3.326	1.326	100 year +40% CC 240 minute winter	50.477	20.078
30 year +35% CC 15 minute summer	362.754	102.647	100 year +40% CC 360 minute summer	56.677	14.585
30 year +35% CC 15 minute winter	254.564	102.647	100 year +40% CC 360 minute winter	36.841	14.585
30 year +35% CC 30 minute summer	236.154	66.823	100 year +40% CC 480 minute summer	43.979	11.622
30 year +35% CC 30 minute winter	165.722	66.823	100 year +40% CC 480 minute winter	29.219	11.622
30 year +35% CC 60 minute summer	157.395	41.595	100 year +40% CC 600 minute summer	35.604	9.738
30 year +35% CC 60 minute winter	104.570	41.595	100 year +40% CC 600 minute winter	24.327	9.738
30 year +35% CC 120 minute summer	95.091	25.130	100 year +40% CC 720 minute summer	31.433	8.424
30 year +35% CC 120 minute winter	63.176	25.130	100 year +40% CC 720 minute winter	21.125	8.424
30 year +35% CC 180 minute summer	71.952	18.516	100 year +40% CC 960 minute summer	25.432	6.697
30 year +35% CC 180 minute winter	46.771	18.516	100 year +40% CC 960 minute winter	16.847	6.697
30 year +35% CC 240 minute summer	56.165	14.843	100 year +40% CC 1440 minute summer	18.055	4.839
30 year +35% CC 240 minute winter	37.315	14.843	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW17	10	25.941	0.051	3.4	0.0345	0.0000	OK
15 minute summer	SW18	10	25.724	0.034	3.3	0.0390	0.0000	OK
15 minute summer	SW19	10	25.668	0.068	8.9	0.0928	0.0000	OK
15 minute summer	SW20	11	25.423	0.113	18.0	0.1851	0.0000	OK
15 minute summer	SW21	10	25.680	0.030	1.6	0.0134	0.0000	OK
15 minute summer	SW22	11	25.256	0.101	19.4	0.1144	0.0000	OK
15 minute summer	SW23	10	25.665	0.090	11.6	0.1070	0.0000	OK
15 minute summer	SW24	11	25.145	0.140	30.6	0.1583	0.0000	OK
15 minute summer	SW25	12	25.062	0.137	30.3	0.0388	0.0000	OK
15 minute summer	SW26	12	24.988	0.133	30.1	0.3378	0.0000	OK
15 minute summer	SW27	12	24.845	0.130	30.4	0.4033	0.0000	OK
15 minute summer	SW28	14	24.528	0.133	29.9	0.4536	0.0000	OK
15 minute summer	SW29	10	24.962	0.162	55.9	0.8551	0.0000	OK
15 minute summer	SW30	11	24.658	0.158	55.1	0.2785	0.0000	OK
15 minute summer	SG01	10	24.745	0.145	36.7	0.5899	0.0000	OK
15 minute summer	SG02	10	25.161	0.186	87.5	1.1734	0.0000	OK
15 minute summer	SW31	10	24.475	0.250	122.3	0.4419	0.0000	OK
240 minute summer	TANK 2	188	24.294	0.294	61.6	167.6507	0.0000	OK
180 minute winter	SW32	188	24.300	0.400	39.2	1.1907	0.0000	SURCHARGED
360 minute summer	OUTFALL	256	23.441	0.041	9.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW17	2.000	SW18	3.3	0.813	0.219	0.1116	
15 minute summer	SW18	2.001	SW20	3.3	1.060	0.112	0.0359	
15 minute summer	SW19	1.000	SW20	8.7	0.603	0.202	0.6302	
15 minute summer	SW20	1.001	SW22	17.9	0.935	0.456	0.2676	
15 minute summer	SW21	3.000	SW22	1.6	0.660	0.079	0.0191	
15 minute summer	SW22	1.002	SW24	19.3	0.729	0.250	0.8228	
15 minute summer	SW23	4.000	SW24	11.3	0.794	0.316	0.3580	
15 minute summer	SW24	1.003	SW25	30.3	0.954	0.387	0.5080	
15 minute summer	SW25	1.004	SW26	30.1	0.990	0.371	0.3988	
15 minute summer	SW26	1.005	SW27	30.4	1.035	0.373	0.7716	
15 minute summer	SW27	1.006	SW28	29.9	1.042	0.385	1.9178	
15 minute summer	SW28	1.007	TANK 2	28.6	0.986	0.374	0.6096	
15 minute summer	SW29	5.000	SW30	55.1	1.245	0.367	2.3433	
15 minute summer	SW30	5.001	TANK 2	55.2	1.403	0.276	0.1970	
15 minute summer	SG01	6.000	SW31	35.8	1.111	0.434	0.8747	
15 minute summer	SG02	7.000	SW31	86.5	1.721	0.402	0.6539	
15 minute summer	SW31	6.001	TANK 2	121.5	1.296	0.389	1.1292	
240 minute summer	TANK 2	1.008	SW32	40.9	0.595	0.059	0.7469	
180 minute winter	SW32	1.009	OUTFALL	9.7	1.866	0.074	0.0415	196.6

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW17	10	25.992	0.102	11.3	0.0695	0.0000	OK
15 minute summer	SW18	12	25.775	0.085	11.1	0.0966	0.0000	OK
15 minute summer	SW19	12	25.854	0.254	29.6	0.3461	0.0000	SURCHARGED
15 minute summer	SW20	12	25.751	0.441	58.5	0.7229	0.0000	SURCHARGED
15 minute summer	SW21	10	25.706	0.056	5.3	0.0254	0.0000	OK
15 minute summer	SW22	12	25.574	0.419	58.9	0.4736	0.0000	SURCHARGED
15 minute summer	SW23	10	25.780	0.205	38.5	0.2452	0.0000	OK
15 minute summer	SW24	12	25.480	0.475	91.9	0.5543	0.0000	SURCHARGED
15 minute summer	SW25	12	25.334	0.409	91.2	0.1158	0.0000	SURCHARGED
15 minute summer	SW26	12	25.208	0.353	90.5	1.0680	0.0000	SURCHARGED
480 minute winter	SW27	472	25.156	0.441	10.7	2.4689	0.0000	SURCHARGED
480 minute winter	SW28	472	25.156	0.761	10.7	10.5603	0.0000	SURCHARGED
15 minute summer	SW29	11	25.307	0.507	185.3	2.6835	0.0000	SURCHARGED
480 minute winter	SW30	472	25.157	0.657	19.0	1.1601	0.0000	SURCHARGED
15 minute summer	SG01	11	25.194	0.594	121.4	2.4181	0.0000	SURCHARGED
15 minute summer	SG02	10	25.624	0.649	290.1	4.0852	0.0000	SURCHARGED
480 minute winter	SW31	472	25.156	0.931	42.1	1.6456	0.0000	SURCHARGED
480 minute winter	TANK 2	472	25.156	1.156	67.8	659.1274	0.0000	SURCHARGED
480 minute winter	SW32	464	25.162	1.262	29.4	3.7530	0.0000	SURCHARGED
15 minute summer	OUTFALL	16	23.442	0.042	10.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW17	2.000	SW18	11.1	1.123	0.730	0.2822	
15 minute summer	SW18	2.001	SW20	11.0	1.023	0.370	0.1538	
15 minute summer	SW19	1.000	SW20	27.4	0.768	0.635	1.6704	
15 minute summer	SW20	1.001	SW22	53.6	1.348	1.368	0.5568	
15 minute summer	SW21	3.000	SW22	5.3	0.916	0.265	0.0460	
15 minute summer	SW22	1.002	SW24	55.0	0.838	0.714	2.1830	
15 minute summer	SW23	4.000	SW24	37.5	1.082	1.046	0.8577	
15 minute summer	SW24	1.003	SW25	91.2	1.295	1.164	1.1267	
15 minute summer	SW25	1.004	SW26	90.5	1.286	1.114	0.9155	
15 minute summer	SW26	1.005	SW27	87.9	1.287	1.082	1.8309	
480 minute winter	SW27	1.006	SW28	10.7	0.744	0.138	4.5773	
480 minute winter	SW28	1.007	TANK 2	9.1	0.691	0.119	1.4788	
15 minute summer	SW29	5.000	SW30	179.0	1.624	1.192	5.7044	
480 minute winter	SW30	5.001	TANK 2	18.8	1.051	0.094	0.5515	
15 minute summer	SG01	6.000	SW31	118.6	1.684	1.436	1.9013	
15 minute summer	SG02	7.000	SW31	285.7	2.590	1.328	1.4194	
480 minute winter	SW31	6.001	TANK 2	41.2	0.860	0.132	2.5924	
480 minute winter	TANK 2	1.008	SW32	26.5	0.417	0.039	1.0802	
480 minute winter	SW32	1.009	OUTFALL	10.1	1.886	0.077	0.0427	347.9

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW17	12	26.400	0.510	15.2	0.3481	0.0000	SURCHARGED
15 minute summer	SW18	12	26.262	0.572	13.7	0.6471	0.0000	SURCHARGED
15 minute summer	SW19	12	26.381	0.781	39.9	1.0657	0.0000	FLOOD RISK
15 minute summer	SW20	12	26.201	0.891	69.6	1.4591	0.0000	SURCHARGED
15 minute summer	SW21	12	25.914	0.264	7.2	0.1200	0.0000	SURCHARGED
15 minute summer	SW22	12	25.905	0.750	70.8	0.8487	0.0000	SURCHARGED
15 minute summer	SW23	12	25.939	0.364	51.8	0.4353	0.0000	SURCHARGED
240 minute winter	SW24	164	25.767	0.762	24.8	2.4656	0.0000	SURCHARGED
240 minute winter	SW25	164	25.765	0.840	24.7	0.2376	0.0000	SURCHARGED
240 minute winter	SW26	164	25.763	0.908	24.7	3.3858	0.0000	SURCHARGED
240 minute winter	SW27	164	25.760	1.045	27.8	7.3442	0.0000	SURCHARGED
240 minute winter	SW28	164	25.750	1.355	45.0	22.3159	0.0000	SURCHARGED
15 minute summer	SW29	11	25.909	1.109	249.5	5.8693	0.0000	SURCHARGED
240 minute winter	SW30	164	25.749	1.249	43.8	2.2063	0.0000	SURCHARGED
480 minute winter	SG01	296	25.625	1.025	61.1	4.1728	241.8467	FLOOD
15 minute summer	SG02	10	25.972	0.997	390.6	6.2766	0.0000	SURCHARGED
240 minute winter	SW31	164	25.746	1.521	95.2	2.6873	0.0000	SURCHARGED
240 minute winter	TANK 2	164	25.747	1.746	165.1	684.2990	0.0000	SURCHARGED
240 minute winter	SW32	164	25.747	1.847	22.4	5.4945	0.0000	SURCHARGED
240 minute summer	OUTFALL	112	23.442	0.042	10.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW17	2.000	SW18	13.7	1.137	0.901	0.4753	
15 minute summer	SW18	2.001	SW20	13.6	1.021	0.458	0.1937	
15 minute summer	SW19	1.000	SW20	35.0	0.880	0.811	1.6704	
15 minute summer	SW20	1.001	SW22	65.8	1.655	1.680	0.5568	
15 minute summer	SW21	3.000	SW22	7.2	0.966	0.364	0.1408	
15 minute summer	SW22	1.002	SW24	69.3	0.984	0.899	2.1830	
15 minute summer	SW23	4.000	SW24	50.6	1.287	1.412	0.9943	
240 minute winter	SW24	1.003	SW25	24.7	0.915	0.316	1.1267	
240 minute winter	SW25	1.004	SW26	24.7	0.973	0.304	0.9155	
240 minute winter	SW26	1.005	SW27	24.9	0.980	0.307	1.8309	
240 minute winter	SW27	1.006	SW28	-27.8	0.906	-0.357	4.5773	
240 minute winter	SW28	1.007	TANK 2	-45.0	0.826	-0.588	1.4788	
15 minute summer	SW29	5.000	SW30	240.6	2.181	1.602	5.8457	
240 minute winter	SW30	5.001	TANK 2	41.2	1.264	0.206	0.5515	
480 minute winter	SG01	6.000	SW31	-50.5	0.850	-0.612	1.9013	
15 minute summer	SG02	7.000	SW31	381.8	3.462	1.776	1.4194	
240 minute winter	SW31	6.001	TANK 2	94.5	1.029	0.303	2.5924	
240 minute winter	TANK 2	1.008	SW32	16.4	0.340	0.024	1.0802	
240 minute winter	SW32	1.009	OUTFALL	10.1	1.886	0.077	0.0427	239.4