herrington CONSULTING LIMITED

Planning Development Management
London Borough of Camden
Town Hall
Judd Street
London
WC1H 8ND

Date: 12 February 2018
Your Ref: 2014/4658/P
Our Ref: 1971/SJB/7640
email: sebastian@herringtonconsulting.co.uk

Dear Sir/Madam,

Discharge of Planning Condition 6 for the proposed development at, 27 Oakhill Avenue, London, NW3 7RD.

I am writing to you on behalf of our client Mr Mark Kaplan, in response to your previous correspondence dated the 24th March 2015 (reference 2014/4658/P), with the aim of discharging planning Condition 6 for the proposed development at the address above. This condition relates to the submission of a Sustainable Drainage System (SuDS) for the proposed rear extension.

Whilst this letter, along with the associated drawings and calculations, does not constitute a detailed drainage design, the following paragraphs outline the sustainable drainage strategy for the proposed development. Where required, the relevant calculations and hydrological analysis routines have been undertaken using Causeway Flow + software, to demonstrate that the system will operate as intended.

This analysis has been undertaken with reference to: Building Regulations Part H, CIRIA 753 (The SuDS Manual) and the Environment Agency's groundwater protection principles and practice guidance.

Planning Condition 6

"Prior to commencement of development details of a sustainable urban drainage system shall be submitted to and approved in writing by the local planning authority. Such system shall be based on demonstrating a 50% attenuation of all runoff. The system shall be implemented as part of the development and thereafter retained and maintained.

Reason: To reduce the rate of surface water run-off from the buildings and limit the impact on the storm-water drainage system in accordance with policies CS13 and CS16 of the London Borough of Camden Local Development Framework Core Strategy and policies DP22, DP23 and DP32 of the London Borough of Camden Local Development Framework Development Policies"

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Proposed Development

"Erection of a single storey ground floor rear extension, rear patio extension and excavation of single storey basement level below rear garden, including lightwell to rear of site".

National Technical Standards

The proposals are classified as 'minor development' and as such, the National Technical Standards for Sustainable Drainage Systems (SuDS) do not apply.

Design Storm Parameters – (FSR methodology)

i) Design Storm Duration - The proposed drainage system has been assessed for a continuous "time series" of rainfall durations, ranging between 15 minutes and 7 days.

ii) Design Storm Period – The drainage system has been designed based on synthetic rainfall runoff hyetographs for the one in one-hundred-year return period rainfall event (1 in 100).

iii) Design Storm Intensity - Rainfall data from the flood studies report (FSR) has been used to generate synthetic hyetographs for each design storm. These have been applied as inflows to the proposed drainage system.

Climate Change

To account for expected increases in rainfall intensity due to climate change, a 20% increase has been applied to the hyetographs and consequently, the inflows into the drainage system include an appropriate allowance for climate change. Where this climate change factor has been applied the abbreviation (20%cc) has been used.

The system has also been checked and verified against a 40% increase, which has been included within the design calculations.

Building Regulations Part H3

The "SuDS Hierarchy", requires developments to drain surface water run-off in line with a hierarchy of available methods. Surface water runoff should be discharged in the following way, (listed in order of preference):

1. to the ground, wherever infiltration is possible,

2. to a watercourse,

3. to the public sewer system, if no alternative option is available.

Opportunities for Managing Surface Water Runoff

The following opportunities for managing the surface water runoff discharged from the development site are listed in order of preference:

Infiltration – A geological statement dated 5th January 2014, forming part of the basement impact assessment identifies the site is located wholly within the London Clay formation, with very low permeability. Typically infiltration within this formation is below 0.01m/hr and therefore, the use of infiltration at this site is considered to be unsuitable.

Watercourse – There are no watercourses located in close proximity to the site and as such, the opportunity for discharging surface water runoff from the site has been discounted.

Public Sewer System – There is an existing foul sewer system located in the public highway, adjacent to the property. It is believed that the existing surface water runoff from the roof and the foul water from the property drain into this system. Given that discharging the site via infiltration or to a watercourse is not feasible in this instance, this option remains the only viable alternative for draining the site.

Constraints and Further Considerations

There are several constraints that have been considered as part of the drainage strategy. The key constraints that are relevant to this development are listed below:

- All surface water runoff from the roof of the existing building is currently drained to the front of the property and into the foul sewer system.
- There is very little open space within the site to incorporate SuDS that require significant land, such as wetlands or ponds.
- There is insufficient soakage for infiltration into the ground

Proposed Surface Water Drainage Strategy

Blue/Green roof and attenuation

It is understood that the current roof design for the basement, which has been accepted for planning, includes an area of intensive green roof. Policy 2.13 of the London Plan states that where infiltration, or discharge to watercourse cannot be achieved the use of attenuation for gradual release of runoff water should be considered.

In this case, area between the overlying soil and basement could be used to attenuate surface water from the rear of the existing property before discharging at a gradual rate into the existing Thames Water sewer.

In order to achieve the 50% reduction in the rate of discharge, an assessment has been undertaken to appraise the rate at which surface water runoff is currently discharged from the property. A summary of the Causeway Flow+ analysis is shown in Table 1 below:

Parameter	Value
Existing roof area to be drained	180 m^2
Critical storm duration	15 minutes
Existing discharge rate to foul sewer network	**10.0 l/s**

Table 1 – Summary of Causeway Flow+ analysis for the existing runoff rate for a 100 year storm.

Drainage Layout

The drainage from the rear roof of the property will need to be redirected into the blue roof attenuation system, utilising the area above the proposed basement. In order to provide adequate attenuation, the storage area would be required to be a minimum depth of 500mm, infilled with a close graded type 1 sub-base.

The attenuation system will have a controlled outlet, restricting discharge to 2 l/s, into the drainage system which accepts the surface water runoff from the front of the property.

A summary of the Causeway Flow+ analysis for storage system is shown in Table 2 below.

Parameter	Value
SuDS	Attenuation – Blue Roof
Area to be drained	250 m^2
Restricted discharge rate from attenuation system	2 l/s (via 37mm orifice)
Total discharge rate from the entire Surface Water system into the sewer	5.6 l/s
Approximate storage volume	28m^3
Critical storm duration	60 minutes
Half drain time	82 minutes

Table 2 – Summary of Causeway Flow+ analysis for the Blue Roof Attenuation System (100 yr+20%cc).

From Table 2 above the system achieves a 44% reduction in surface water runoff from the property by implementing attenuation to the rear of the property.

Whilst the full 50% reduction has not been achieved for the design event, there is a significant decrease in surface water runoff into the foul sewer when compared with existing conditions. Further reduction in runoff can only be achieved by undertaking amendments to the property frontage area including roof drainage adjustments and additional storage to the undeveloped part of the site. As this front section of the existing building is to remain undeveloped, changing the existing drainage may conflict with the Listed Building Consent which has been granted. Notwithstanding this, it should also be recognised that the under a pluvial event with a 1 in 100 year return period, (excluding an increase for 20% climate change) a 50% reduction can be achieved by installing the proposed SuDS.

<u>Drainage Layout</u>

Figure 1 (below) is an indicative drainage layout showing how the blue roof attenuation system can be incorporated into the scheme proposals to achieve the required attenuation.

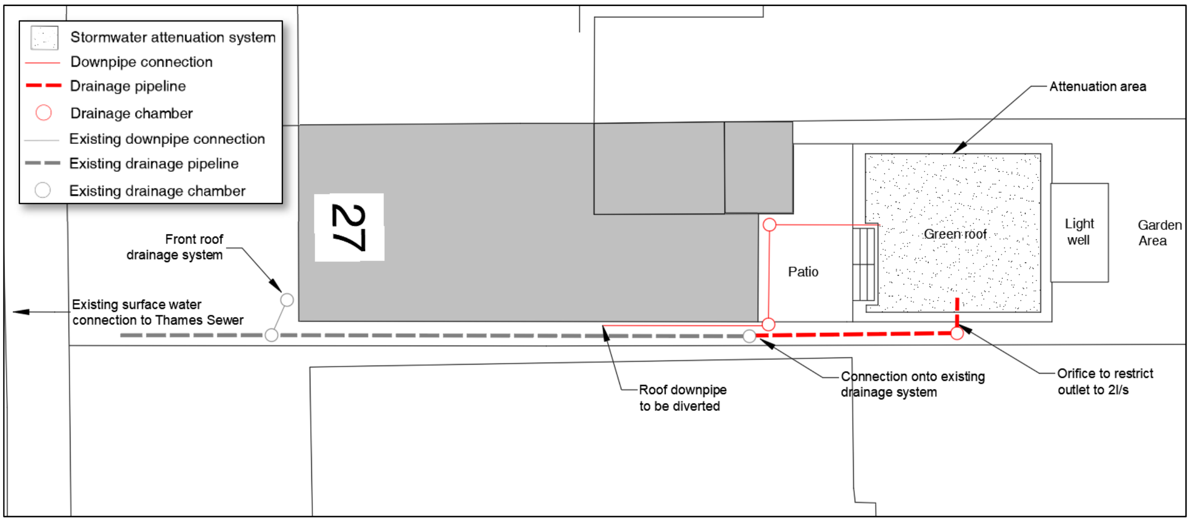

Figure 1 – Indicative drainage layout showing the proposed drainage system.

<u>Design and Construction</u>

The use of blue roof attenuation above the proposed basement will provide adequate attenuation for surface water runoff from the roof of the property, as well as from the patio and proposed grassed areas. The storage system will also store surface water for rainfall events with a return period less than the 1:100 years +20%cc design event, thus allowing the runoff to be discharged from the site at a reduced rate of 5.6 l/s.

The area of the lightwell has been included in the calculations, and it is assumed that a sump and pump system will be used to pump water collected in the lightwell into the proposed attenuation system. An small upstand wall (or equivalent barrier) around the lightwell will help to prevent any additional surface water runoff from entering the well area.

The runoff from the proposed development will be discharged into the existing Thames Water fowl network, via the (assumed) existing connection to the public sewer system. In the unlikely event that there is no existing drainage connection from the site to the public sewer system, it will be necessary to construct a new connection to one of the existing surface water sewers located on Oakhill Avenue. Sections 98 and 109 of the Water Industry Act, provide mechanisms for the developer to requisition a new connection to the public sewer system. If upgrades to the public sewer network are required to accommodate additional surface water runoff from the proposed development, then these will need to be completed (at cost to the developer) prior to construction of the development.

It is recommended that Thames Water are contacted before construction, firstly to confirm whether there is sufficient capacity within the public sewer system and secondly, to confirm whether there are any additional upgrade works that may be required before the development can be erected.

<u>Maintenance and Management</u>

The ongoing maintenance and management of the proposed SuDS will be the responsibility of the owner / occupiers of the development. Specific maintenance requirements for the permeable attenuation storage will be provided by the contractors responsible for the detailed design/installation of the system. A typical maintenance regime for permeable attenuation storage is outlined in Table 3 (below).

Attenuation Storage Maintenance	
Ongoing monitoring and maintenance	• Remove debris from the catchment surfaces, clear gutters and ensure hardstanding is free from debris. • Inspection and cleaning of sedimentation from pre-treatment structures. • inspection and repair of the inlet and outlet mechanisms • cleaning of the tank, inlets, outlets, filters, and removal of debris • inspection to ensure crates remain undamaged and inflow and outflow systems (Orifice Plate) are still operational • Removal of weeds on a regular basis • Fix any depressions in overlying soil
Maintenance following storms	• Inspection of the tank for debris, leaks, or other damage. • Inspection and remediation of inlets outlets overflows and vents. • Reinstatement of any landscaping • Rehabilitation of surface and upper sub-structure
Occasional maintenance (when required)	• An initial inspection is usually required around three months after installation to inspect the surface

Table 3 – Typical maintenance requirements for attenuation system.

Design Exceedance and Ground Levels

The drainage system should be designed to accommodate the runoff from a rainfall event with a 1 in 100 year return period (including a 20% allowance for climate change), however, it is also recognised that under an exceedance event (i.e. an event which exceeds the design criteria), the system should be designed to ensure that the risk of flooding is not increased as a result of the proposed development.

The SuDS system that has been specified has therefore been tested to assess the impact that an event with a 1 in 100 year return period, including a 40% increase in climate change, could have with regard to flooding. The associated calculations demonstrate that there is sufficient capacity within the attenuation storage to accommodate the additional runoff generated under the 40% increase in climate change and as such, the site is not shown to flood.

Notwithstanding this, in the event of a more extreme exceedance event, it is necessary to ensure that if the system does become surcharged the overland flow routes would not increase the risk of flooding to the proposed development, or to the surrounding area.

Aerial height data (LiDAR) has been used to establish the overland flow path that water is likely to take and from this dataset it can be seen that the land levels at the front of the property, within the site boundary, fall towards the existing carriageway. As such, if the on-site drainage system was to become surcharged during an exceedance event, floodwater would be directed towards the carriageway in front of the building, reducing the risk of flooding to the proposed development and surrounding houses. At the rear of the property, the garden lies approximately 500mm below the building level and as such, during an extreme exceedance event, flood water is likely pond in the garden area away from the building. This will reduce the risk of flooding to the proposed development and to the neighbouring houses. An upstand wall around the lightwell will also help to reduce the risk of surface water runoff entering the basement via the lightwell. Figure 2 below delineates the flow routes which are likely to occur.

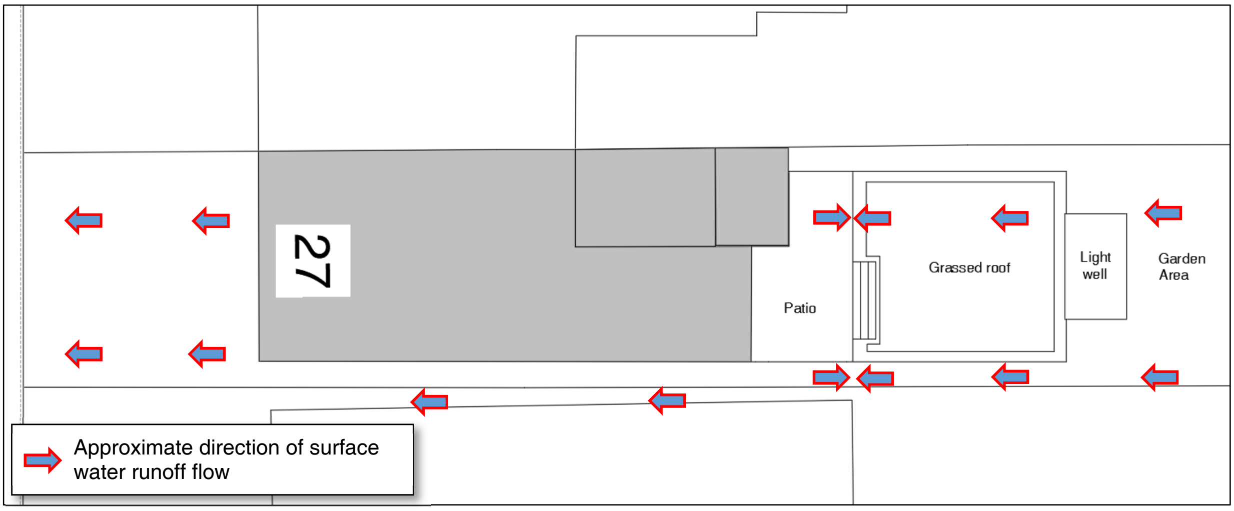

Figure 2 – Approximate overland flow routes from LiDAR mapping contours

Summary and Conclusions

Details of the proposed surface water drainage system have been provided in the text above, along with the associated hydraulic calculations, and these demonstrate that the proposed development can drain surface water in a sustainable manner. The details contained within this report should therefore enable the LPA to discharge Planning Condition 6, for the proposed development at 27 Oakhill Avenue, London.

The opportunities for draining surface water runoff from the proposed development have been assessed in detail, referencing the drainage hierarchy (i.e. discharge via infiltration, watercourse, public sewer). Site conditions suggest that there are very poor soakage rates at this location. As such, the use of infiltration at this location is not considered viable and the absence of a watercourse suggests that the only remaining option is to utilise the existing connection to the Thames Water sewer.

The most sustainable solution has therefore been considered on this basis and by utilising attenuation storage onsite, it will be possible to attenuate the rate at which surface water runoff is discharged from the property under the design event, (i.e. an event with a 1 in 100 year return period, including an allowance for a 20% increase in climate change). The system has been further tested to demonstrate that the proposed SuDS network will not surcharge when the climate change allowance is increased to 40%. In addition, the risk of flooding has also been considered in the event that the SuDS system was to become overwhelmed and the results show that the risk of flooding both on-site and off-site would not be increased as a result of the development proposals.

The drainage strategy above shows that a significant reduction can be made to the rate in which surface water runoff is discharged from the redeveloped site, thus reducing the impact to the existing drainage network.

I trust that the proposed method of managing surface water runoff discharged from the development is acceptable to the LPA and that this letter contains sufficient information and explanation to enable you to discharge Planning Condition 6. Nonetheless, if you would like any additional detail or clarification, then I would be happy to discuss this further.

Yours faithfully

Stephen Hayward BSc (Hons) ARSM MCIWEM
Drainage Analyst

- *Enclosed documents:* *Causeway Flow+ Calculations*

Drainage Design Report

Flow+

v6.0

Network	Storm Network
Filename	S:\LIVE Project Files\1971 - Oakhill Avenue, London\SS Data\Causeway\Proposed.pfd
Username	Sebastian Bures (sebastian@herringtonconsulting.co.uk)
Last analysed	19/01/2018 16:26:59
Report produced on	19/01/2018 16:29:28

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Rainfall Methodology	FSR
Return Period (years)	100
Additional Flow (%)	20
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.400
CV	1.000
Time of Entry (mins)	4.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	150.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Inverts
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	0.500
Enforce best practice design rules	

	Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)	Notes
	DownpipeA	0.007	4.00		10.000	Manhole	Adoptable	1200		525663.000	185608.000	0.668	
	DownpipeB	0.007	4.00		10.000	Manhole	Adoptable	1200		525658.000	185604.000	0.600	
	Storage	0.011	4.00		9.600	Manhole	Adoptable	1200		525667.000	185601.000	0.650	
	MH1				9.600	Manhole	Adoptable	1200		525662.000	185597.500	0.726	
	MH2	0.006	4.00		9.500	Manhole	Adoptable	1800		525644.000	185622.000	0.930	
	MH3				9.400	Manhole	Adoptable	1200		525640.000	185630.000	0.866	

	Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)	Con Offset (m)	Min DS IL (m)
	1.001	DownpipeB	DownpipeA	6.403	0.060	Colebrook-White	9.400	9.332	0.068	94.2	100	Circular	4.11	150.0		
	1.002	DownpipeA	Storage	8.062	0.060	Colebrook-White	9.332	8.950	0.382	21.1	100	Circular	4.17	150.0		
	1.003	Storage	MH1	6.103	0.060	Colebrook-White	8.950	8.874	0.076	80.3	150	Circular	4.24	150.0		
	1.004	MH1	MH2	30.401	0.060	Colebrook-White	8.874	8.570	0.304	100.0	150	Circular	4.64	150.0		
	1.005	MH2	MH3	8.944	0.060	Colebrook-White	8.570	8.534	0.036	248.5	225	Circular	4.79	150.0		

	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)	Notes
	1.001	DownpipeB	DownpipeA	1.002	7.9	4.6	0.500	0.568	0.500	0.568	0.007	0.0	54	1.036	
	1.002	DownpipeA	Storage	2.202	17.3	9.1	0.568	0.550	0.550	0.568	0.014	0.0	52	2.236	
	1.003	Storage	MH1	1.419	25.1	16.3	0.500	0.576	0.500	0.576	0.025	0.0	88	1.508	
	1.004	MH1	MH2	1.264	22.3	16.3	0.576	0.780	0.576	0.780	0.025	0.0	95	1.376	
	1.005	MH2	MH3	1.015	40.3	20.2	0.705	0.641	0.641	0.705	0.031	0.0	112	1.013	

Link ID	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)	US Node ID	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node ID	Dia (mm)	Width (mm)	Node Type	MH Type
1.001	6.403	94.2	100	Circular	10.000	9.400	0.500	10.000	9.332	0.568	DownpipeB	1200		Manhole	Adoptable	DownpipeA	1200		Manhole	Adoptable
1.002	8.062	21.1	100	Circular	10.000	9.332	0.568	9.600	8.950	0.550	DownpipeA	1200		Manhole	Adoptable	Storage	1200		Manhole	Adoptable
1.003	6.103	80.3	150	Circular	9.600	8.950	0.500	9.600	8.874	0.576	Storage	1200		Manhole	Adoptable	MH1	1200		Manhole	Adoptable
1.004	30.401	100.0	150	Circular	9.600	8.874	0.576	9.500	8.570	0.780	MH1	1200		Manhole	Adoptable	MH2	1800		Manhole	Adoptable
1.005	8.944	248.5	225	Circular	9.500	8.570	0.705	9.400	8.534	0.641	MH2	1800		Manhole	Adoptable	MH3	1200		Manhole	Adoptable

Node ID	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Node Type	MH Type		Link ID	IL (m)	Dia (mm)	Link Type
DownpipeA	525663.000	185608.000	10.000	0.668	1200		Manhole	Adoptable	1	1.001	9.332	100	Circular
									0	1.002	9.332	100	Circular
DownpipeB	525658.000	185604.000	10.000	0.600	1200		Manhole	Adoptable					
									0	1.001	9.400	100	Circular
Storage	525667.000	185601.000	9.600	0.650	1200		Manhole	Adoptable	1	1.002	8.950	100	Circular
									0	1.003	8.950	150	Circular
MH1	525662.000	185597.500	9.600	0.726	1200		Manhole	Adoptable	1	1.003	8.874	150	Circular
									0	1.004	8.874	150	Circular
MH2	525644.000	185622.000	9.500	0.930	1800		Manhole	Adoptable	1	1.004	8.570	150	Circular
									0	1.005	8.570	225	Circular
MH3	525640.000	185630.000	9.400	0.866	1200		Manhole	Adoptable	1	1.005	8.534	225	Circular

Rainfall Methodology	FSR		**Return Period (years)**	**Climate Change (%)**
FSR Region	England and Wales		100	20
M5-60 (mm)	20.000			
Ratio-R	0.400			
Summer CV	1.000			
Winter CV	1.000			
Analysis Speed	Normal			
Drain Down Time (mins)	240			
Additional Storage (m³/ha)	20.0			
Storm Durations (mins)	15			
	30			
	60			
	120			
	180			
	240			
	360			
	1440			
	2880			
	10080			
Check Discharge Rate(s)	x			
1 year (l/s)				
30 year (l/s)				
100 year (l/s)				
Check Discharge Volume	x			
100 year 360 minute (m³)				

Orifice										
Node	**Flap Valve**	**Online / Offline**	**Downstream Link**	**Replaces Downstream Link**	**Loop to Node**	**Invert Level (m)**	**Design Depth (m)**	**Design Flow (l/s)**	**Diameter (m)**	**Discharge Coefficient**
Storage		Online				8.950	0.500	2.0	0.037	0.600
MH10		Online				0.000	0.500	5.0	0.059	0.600

Soakaway											
Node	Base Inf Coefficient (m/hr)	Side Inf Coefficient (m/hr)	Safety Factor	Porosity	Invert Level (m)	Time to half empty (mins)	Pit Width (m)	Pit Length (m)	Depth (m)	Inf Depth (m)	Number Required
Storage	0.00000	0.00000	2.0	0.30	8.950	69	8.000	7.000	0.500		1

Default Values			Overrides					
Entry Loss (manhole)	0.250		Link	Entry Loss	Exit Loss		Node	Flood Risk (m)
Exit Loss (manhole)	0.250							
Entry Loss (junction)	0.000							
Exit Loss (junction)	0.000							
Flood Risk (m)	0.300							

Node Size	
Node Losses	
Link Size	
Minimum Diameter (mm)	150
Link Length	
Maximum Length (m)	100.000
Coordinates	
Accuracy (m)	1.000
Crossings	
Cover Depth	
Minimum Cover Depth (m)	
Maximum Cover Depth (m)	3.000
Backdrops	
Minimum Backdrop Height (m)	
Maximum Backdrop Height (m)	1.500
Full Bore Velocity	
Minimum Full Bore Velocity (m/s)	
Maximum Full Bore Velocity (m/s)	3.000
Proportional Velocity	
Return Period (years)	
Minimum Proportional Velocity (m/s)	0.750
Maximum Proportional Velocity (m/s)	3.000
Surcharged Depth	
Return Period (years)	
Maximum Surcharged Depth (m)	0.100
Flooding	
Return Period (years)	30
Discharge Rates	
1 year (l/s)	
30 year (l/s)	
100 year (l/s)	
Discharge Volume	

100 year 360 minute (m^3)	

Results for 100 year +20% Critical Storm Duration. Lowest mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	DownpipeA	10	9.395	0.063	10.6	0.0840	0.0000	OK	1.002	Storage	10.4	1.741	0.600	0.0523	
15 minute summer	DownpipeB	10	9.463	0.063	5.3	0.0865	0.0000	OK	1.001	DownpipeA	5.3	1.064	0.671	0.0333	
60 minute summer	Storage	46	9.393	0.443	11.6	8.1014	0.0000	FLOOD RISK	Orifice	MH1	1.9				
60 minute summer	MH1	46	8.901	0.027	1.9	0.0306	0.0000	OK	1.004	MH2	1.9	0.752	0.083	0.1030	
15 minute summer	MH2	10	8.626	0.056	5.7	0.1509	0.0000	OK	1.005	MH3	5.6	0.767	0.139	0.0652	9.1
15 minute summer	MH3	10	8.585	0.051	5.6	0.0000	0.0000	OK							

Results for 100 year +20% 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	DownpipeA	10	9.395	0.063	10.6	0.0840	0.0000	OK	1.002	Storage	10.4	1.741	0.600	0.0523	
15 minute summer	DownpipeB	10	9.463	0.063	5.3	0.0865	0.0000	OK	1.001	DownpipeA	5.3	1.064	0.671	0.0333	
15 minute summer	Storage	17	9.295	0.345	18.8	6.3039	0.0000	SURCHARGED	Orifice	MH1	1.6				
15 minute summer	MH1	17	8.899	0.025	1.6	0.0287	0.0000	OK	1.004	MH2	1.6	0.729	0.073	0.1153	
15 minute summer	MH2	10	8.626	0.056	5.7	0.1509	0.0000	OK	1.005	MH3	5.6	0.767	0.139	0.0652	9.1
15 minute summer	MH3	10	8.585	0.051	5.6	0.0000	0.0000	OK							

Results for 100 year +20% 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	DownpipeA	11	9.389	0.057	9.4	0.0760	0.0000	OK	1.002	Storage	9.2	1.746	0.534	0.0500	
15 minute winter	DownpipeB	10	9.458	0.058	4.7	0.0794	0.0000	OK	1.001	DownpipeA	4.7	1.052	0.596	0.0297	
15 minute winter	Storage	17	9.297	0.347	16.7	6.3331	0.0000	SURCHARGED	Orifice	MH1	1.6				
15 minute winter	MH1	17	8.899	0.025	1.6	0.0287	0.0000	OK	1.004	MH2	1.6	0.730	0.073	0.1097	
15 minute winter	MH2	10	8.624	0.054	5.2	0.1438	0.0000	OK	1.005	MH3	5.1	0.750	0.127	0.0610	9.1
15 minute winter	MH3	10	8.583	0.049	5.1	0.0000	0.0000	OK							

Results for 100 year +20% 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	DownpipeA	18	9.395	0.063	9.3	0.0839	0.0000	OK	1.002	Storage	9.0	1.597	0.523	0.0523	
30 minute summer	DownpipeB	17	9.458	0.058	4.7	0.0791	0.0000	OK	1.001	DownpipeA	4.6	1.016	0.587	0.0311	
30 minute summer	Storage	30	9.365	0.415	16.3	7.5907	0.0000	FLOOD RISK	Orifice	MH1	1.8				
30 minute summer	MH1	30	8.901	0.027	1.8	0.0301	0.0000	OK	1.004	MH2	1.8	0.750	0.080	0.1136	
30 minute summer	MH2	18	8.624	0.054	5.2	0.1446	0.0000	OK	1.005	MH3	5.2	0.754	0.129	0.0616	12.0
30 minute summer	MH3	18	8.583	0.049	5.2	0.0000	0.0000	OK							

Results for 100 year +20% 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	DownpipeA	19	9.384	0.052	7.2	0.0697	0.0000	OK	1.002	Storage	7.0	1.602	0.407	0.0481	
30 minute winter	DownpipeB	17	9.449	0.049	3.6	0.0665	0.0000	OK	1.001	DownpipeA	3.6	0.991	0.454	0.0247	
30 minute winter	Storage	30	9.365	0.415	12.7	7.5846	0.0000	FLOOD RISK	Orifice	MH1	1.8				
30 minute winter	MH1	31	8.901	0.027	1.8	0.0301	0.0000	OK	1.004	MH2	1.8	0.750	0.080	0.1028	
30 minute winter	MH2	18	8.619	0.049	4.4	0.1316	0.0000	OK	1.005	MH3	4.3	0.719	0.108	0.0540	12.0
30 minute winter	MH3	18	8.579	0.045	4.3	0.0000	0.0000	OK							

Results for 100 year +20% 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%															
Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	DownpipeA	45	9.394	0.062	6.6	0.0836	0.0000	OK	1.002	Storage	6.4	1.442	0.371	0.0522	
60 minute summer	DownpipeB	32	9.446	0.046	3.3	0.0630	0.0000	OK	1.001	DownpipeA	3.3	0.953	0.416	0.0241	
60 minute summer	Storage	46	9.393	0.443	11.6	8.1014	0.0000	FLOOD RISK	Orifice	MH1	1.9				
60 minute summer	MH1	46	8.901	0.027	1.9	0.0306	0.0000	OK	1.004	MH2	1.9	0.752	0.083	0.1030	
60 minute summer	MH2	33	8.619	0.049	4.3	0.1301	0.0000	OK	1.005	MH3	4.3	0.715	0.106	0.0533	14.9
60 minute summer	MH3	33	8.579	0.045	4.3	0.0000	0.0000	OK							

Results for 100 year +20% 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	DownpipeA	49	9.393	0.061	4.6	0.0823	0.0000	OK	1.002	Storage	4.6	1.420	0.265	0.0519	
60 minute winter	DownpipeB	32	9.438	0.038	2.3	0.0512	0.0000	OK	1.001	DownpipeA	2.3	0.928	0.292	0.0189	
60 minute winter	Storage	48	9.392	0.442	8.3	8.0831	0.0000	FLOOD RISK	Orifice	MH1	1.9				
60 minute winter	MH1	49	8.901	0.027	1.9	0.0306	0.0000	OK	1.004	MH2	1.9	0.753	0.083	0.0927	
60 minute winter	MH2	34	8.613	0.043	3.4	0.1160	0.0000	OK	1.005	MH3	3.4	0.674	0.085	0.0454	15.0
60 minute winter	MH3	34	8.574	0.040	3.4	0.0000	0.0000	OK							

Results for 100 year +20% 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
120 minute summer	DownpipeA	82	9.389	0.057	4.4	0.0767	0.0000	OK	1.002	Storage	4.3	1.282	0.251	0.0502	
120 minute summer	DownpipeB	62	9.436	0.036	2.2	0.0496	0.0000	OK	1.001	DownpipeA	2.2	0.915	0.276	0.0174	
120 minute summer	Storage	80	9.389	0.439	7.7	8.0156	0.0000	FLOOD RISK	Orifice	MH1	1.8				
120 minute summer	MH1	80	8.901	0.027	1.8	0.0305	0.0000	OK	1.004	MH2	1.8	0.726	0.082	0.0906	
120 minute summer	MH2	64	8.612	0.042	3.3	0.1131	0.0000	OK	1.005	MH3	3.3	0.666	0.081	0.0439	18.0
120 minute summer	MH3	64	8.573	0.039	3.3	0.0000	0.0000	OK							

Results for 100 year +20% 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%															
Event	**US Node ID**	**Peak (mins)**	**Level (m)**	**Depth (m)**	**Inflow (l/s)**	**Node Vol (m³)**	**Flood (m³)**	**Status**	**Link ID**	**DS Node ID**	**Outflow (l/s)**	**Velocity (m/s)**	**Flow/Cap**	**Link Vol (m³)**	**Discharge Vol (m³)**
120 minute winter	DownpipeA	86	9.377	0.045	2.8	0.0601	0.0000	OK	1.002	Storage	2.8	1.195	0.162	0.0452	
120 minute winter	DownpipeB	60	9.428	0.028	1.4	0.0388	0.0000	OK	1.001	DownpipeA	1.4	0.819	0.178	0.0135	
120 minute winter	Storage	86	9.376	0.426	5.1	7.7896	0.0000	FLOOD RISK	Orifice	MH1	1.8				
120 minute winter	MH1	86	8.901	0.027	1.8	0.0303	0.0000	OK	1.004	MH2	1.8	0.730	0.081	0.0845	
120 minute winter	MH2	66	8.609	0.039	2.8	0.1034	0.0000	OK	1.005	MH3	2.7	0.633	0.068	0.0386	18.1
120 minute winter	MH3	66	8.570	0.036	2.7	0.0000	0.0000	OK							

Results for 100 year +20% 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%															
Event	**US Node ID**	**Peak (mins)**	**Level (m)**	**Depth (m)**	**Inflow (l/s)**	**Node Vol (m³)**	**Flood (m³)**	**Status**	**Link ID**	**DS Node ID**	**Outflow (l/s)**	**Velocity (m/s)**	**Flow/Cap**	**Link Vol (m³)**	**Discharge Vol (m³)**
180 minute summer	DownpipeA	116	9.368	0.036	3.2	0.0479	0.0000	OK	1.002	Storage	3.2	1.045	0.183	0.0417	
180 minute summer	DownpipeB	92	9.430	0.030	1.6	0.0416	0.0000	OK	1.001	DownpipeA	1.6	0.845	0.201	0.0120	
180 minute summer	Storage	116	9.368	0.418	5.8	7.6284	0.0000	FLOOD RISK	Orifice	MH1	1.8				
180 minute summer	MH1	116	8.901	0.027	1.8	0.0302	0.0000	OK	1.004	MH2	1.8	0.719	0.080	0.0841	
180 minute summer	MH2	92	8.609	0.039	2.8	0.1041	0.0000	OK	1.005	MH3	2.8	0.636	0.069	0.0390	19.9
180 minute summer	MH3	96	8.570	0.036	2.8	0.0000	0.0000	OK							

Results for 100 year +20% 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	DownpipeA	92	9.355	0.023	2.2	0.0305	0.0000	OK	1.002	Storage	2.2	1.062	0.126	0.0369	
180 minute winter	DownpipeB	92	9.425	0.025	1.1	0.0340	0.0000	OK	1.001	DownpipeA	1.1	0.766	0.139	0.0091	
180 minute winter	Storage	124	9.337	0.387	3.9	7.0707	0.0000	FLOOD RISK	Orifice	MH1	1.7				
180 minute winter	MH1	124	8.900	0.026	1.7	0.0296	0.0000	OK	1.004	MH2	1.7	0.709	0.077	0.0794	
180 minute winter	MH2	104	8.606	0.036	2.4	0.0967	0.0000	OK	1.005	MH3	2.4	0.612	0.060	0.0351	20.0
180 minute winter	MH3	104	8.568	0.034	2.4	0.0000	0.0000	OK							

Results for 100 year +20% 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	DownpipeA	124	9.357	0.025	2.6	0.0332	0.0000	OK	1.002	Storage	2.6	1.045	0.150	0.0376	
240 minute summer	DownpipeB	124	9.427	0.027	1.3	0.0373	0.0000	OK	1.001	DownpipeA	1.3	0.803	0.165	0.0104	
240 minute summer	Storage	148	9.342	0.392	4.6	7.1597	0.0000	FLOOD RISK	Orifice	MH1	1.7				
240 minute summer	MH1	148	8.900	0.026	1.7	0.0297	0.0000	OK	1.004	MH2	1.7	0.708	0.078	0.0798	
240 minute summer	MH2	124	8.607	0.037	2.6	0.0994	0.0000	OK	1.005	MH3	2.5	0.620	0.063	0.0365	21.1
240 minute summer	MH3	124	8.569	0.035	2.5	0.0000	0.0000	OK							

Results for 100 year +20% 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	DownpipeA	116	9.351	0.019	1.6	0.0261	0.0000	OK	1.002	Storage	1.6	1.059	0.093	0.0359	
240 minute winter	DownpipeB	116	9.421	0.021	0.8	0.0288	0.0000	OK	1.001	DownpipeA	0.8	0.705	0.102	0.0073	
240 minute winter	Storage	156	9.295	0.345	2.9	6.2993	0.0000	SURCHARGED	Orifice	MH1	1.6				
240 minute winter	MH1	160	8.899	0.025	1.6	0.0287	0.0000	OK	1.004	MH2	1.6	0.695	0.073	0.0750	
240 minute winter	MH2	132	8.604	0.034	2.2	0.0918	0.0000	OK	1.005	MH3	2.2	0.595	0.054	0.0327	21.0
240 minute winter	MH3	132	8.566	0.032	2.2	0.0000	0.0000	OK							

Results for 100 year +20% 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	DownpipeA	184	9.353	0.021	1.8	0.0276	0.0000	OK	1.002	Storage	1.8	0.865	0.104	0.0362	
360 minute summer	DownpipeB	184	9.422	0.022	0.9	0.0306	0.0000	OK	1.001	DownpipeA	0.9	0.726	0.114	0.0079	
360 minute summer	Storage	216	9.279	0.329	3.3	6.0174	0.0000	SURCHARGED	Orifice	MH1	1.6				
360 minute summer	MH1	216	8.899	0.025	1.6	0.0284	0.0000	OK	1.004	MH2	1.6	0.688	0.071	0.0740	
360 minute summer	MH2	192	8.604	0.034	2.1	0.0911	0.0000	OK	1.005	MH3	2.1	0.592	0.053	0.0323	23.1
360 minute summer	MH3	192	8.566	0.032	2.1	0.0000	0.0000	OK							

Results for 100 year +20% 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	DownpipeA	176	9.349	0.017	1.2	0.0227	0.0000	OK	1.002	Storage	1.2	1.105	0.069	0.0351	
360 minute winter	DownpipeB	176	9.418	0.018	0.6	0.0249	0.0000	OK	1.001	DownpipeA	0.6	0.651	0.076	0.0059	
360 minute winter	Storage	224	9.233	0.283	2.2	5.1659	0.0000	SURCHARGED	Orifice	MH1	1.5				
360 minute winter	MH1	224	8.898	0.024	1.5	0.0273	0.0000	OK	1.004	MH2	1.5	0.670	0.065	0.0689	
360 minute winter	MH2	200	8.602	0.032	1.9	0.0853	0.0000	OK	1.005	MH3	1.9	0.571	0.047	0.0294	23.4
360 minute winter	MH3	200	8.564	0.030	1.9	0.0000	0.0000	OK							

Results for 100 year +20% 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute summer	DownpipeA	720	9.344	0.012	0.6	0.0163	0.0000	OK	1.002	Storage	0.6	0.273	0.035	0.0337	
1440 minute summer	DownpipeB	720	9.413	0.013	0.3	0.0175	0.0000	OK	1.001	DownpipeA	0.3	0.534	0.038	0.0036	
1440 minute summer	Storage	780	9.086	0.136	1.1	2.4858	0.0000	OK	Orifice	MH1	1.0				
1440 minute summer	MH1	780	8.894	0.020	1.0	0.0224	0.0000	OK	1.004	MH2	1.0	0.588	0.044	0.0510	
1440 minute summer	MH2	750	8.596	0.026	1.2	0.0692	0.0000	OK	1.005	MH3	1.2	0.507	0.031	0.0218	27.0
1440 minute summer	MH3	750	8.559	0.025	1.2	0.0000	0.0000	OK							

Results for 100 year +20% 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%															
Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	DownpipeA	630	9.342	0.010	0.4	0.0134	0.0000	OK	1.002	Storage	0.4	0.272	0.023	0.0283	
1440 minute winter	DownpipeB	630	9.411	0.011	0.2	0.0144	0.0000	OK	1.001	DownpipeA	0.2	0.474	0.025	0.0027	
1440 minute winter	Storage	840	9.029	0.079	0.7	1.4392	0.0000	OK	Orifice	MH1	0.7				
1440 minute winter	MH1	840	8.891	0.017	0.7	0.0192	0.0000	OK	1.004	MH2	0.7	0.545	0.031	0.0409	
1440 minute winter	MH2	810	8.592	0.022	0.9	0.0590	0.0000	OK	1.005	MH3	0.9	0.462	0.022	0.0173	29.1
1440 minute winter	MH3	810	8.555	0.021	0.9	0.0000	0.0000	OK							

Results for 100 year +20% 2880 minute summer. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%															
Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	DownpipeA	1500	9.342	0.010	0.4	0.0134	0.0000	OK	1.002	Storage	0.4	0.232	0.023	0.0260	
2880 minute summer	DownpipeB	1500	9.411	0.011	0.2	0.0144	0.0000	OK	1.001	DownpipeA	0.2	0.474	0.025	0.0027	
2880 minute summer	Storage	1500	9.022	0.072	0.7	1.3153	0.0000	OK	Orifice	MH1	0.7				
2880 minute summer	MH1	1500	8.890	0.016	0.7	0.0186	0.0000	OK	1.004	MH2	0.7	0.534	0.029	0.0375	
2880 minute summer	MH2	1500	8.590	0.020	0.8	0.0543	0.0000	OK	1.005	MH3	0.8	0.441	0.019	0.0153	25.9
2880 minute summer	MH3	1500	8.554	0.020	0.8	0.0000	0.0000	OK							

Results for 100 year +20% 2880 minute winter. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute winter	DownpipeA	1020	9.339	0.007	0.2	0.0097	0.0000	OK	1.002	Storage	0.2	0.232	0.012	0.0121	
2880 minute winter	DownpipeB	1020	9.408	0.008	0.1	0.0103	0.0000	OK	1.001	DownpipeA	0.1	0.385	0.013	0.0017	
2880 minute winter	Storage	1680	8.988	0.038	0.4	0.6999	0.0000	OK	Orifice	MH1	0.4				
2880 minute winter	MH1	1680	8.887	0.013	0.4	0.0147	0.0000	OK	1.004	MH2	0.4	0.446	0.018	0.0273	
2880 minute winter	MH2	1680	8.587	0.017	0.5	0.0445	0.0000	OK	1.005	MH3	0.5	0.389	0.012	0.0115	29.5
2880 minute winter	MH3	1680	8.550	0.016	0.5	0.0000	0.0000	OK							

Results for 100 year +20% 10080 minute summer. 10320 minute analysis at 60 minute timestep. Mass balance: 100.00%															
Event	**US Node ID**	**Peak (mins)**	**Level (m)**	**Depth (m)**	**Inflow (l/s)**	**Node Vol (m³)**	**Flood (m³)**	**Status**	**Link ID**	**DS Node ID**	**Outflow (l/s)**	**Velocity (m/s)**	**Flow/Cap**	**Link Vol (m³)**	**Discharge Vol (m³)**
10080 minute summer	DownpipeA	4860	9.339	0.007	0.2	0.0097	0.0000	OK	1.002	Storage	0.2	0.230	0.012	0.0098	
10080 minute summer	DownpipeB	4860	9.408	0.008	0.1	0.0103	0.0000	OK	1.001	DownpipeA	0.1	0.385	0.013	0.0017	
10080 minute summer	Storage	5160	8.982	0.032	0.3	0.5899	0.0000	OK	Orifice	MH1	0.3				
10080 minute summer	MH1	5160	8.885	0.011	0.3	0.0129	0.0000	OK	1.004	MH2	0.3	0.447	0.013	0.0231	
10080 minute summer	MH2	5160	8.585	0.015	0.4	0.0402	0.0000	OK	1.005	MH3	0.4	0.365	0.010	0.0098	19.4
10080 minute summer	MH3	5160	8.549	0.015	0.4	0.0000	0.0000	OK							

Results for 100 year +20% 10080 minute winter. 10320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
10080 minute winter	DownpipeA	60	9.332	0.000	0.0	0.0000	0.0000	OK	1.002	Storage	0.0	0.000	0.000	0.0032	
10080 minute winter	DownpipeB	60	9.400	0.000	0.0	0.0000	0.0000	OK	1.001	DownpipeA	0.0	0.000	0.000	0.0000	
10080 minute winter	Storage	4860	8.966	0.016	0.1	0.2876	0.0000	OK	Orifice	MH1	0.1				
10080 minute winter	MH1	4800	8.881	0.007	0.1	0.0078	0.0000	OK	1.004	MH2	0.1	0.312	0.004	0.0097	
10080 minute winter	MH2	4740	8.578	0.008	0.1	0.0215	0.0000	OK	1.005	MH3	0.1	0.269	0.002	0.0033	10.8
10080 minute winter	MH3	4800	8.541	0.007	0.1	0.0000	0.0000	OK							

Adoptable						
Max Width (mm)	**Diameter (mm)**	**Width (mm)**		**Max Depth (m)**	**Diameter (mm)**	**Width (mm)**
374	1200			1.500	1050	
499	1350			99.999	1200	
749	1500					
900	1800					
>900	Link+900 mm					
Short Name						

Circular						
Shape	Circular		**Dia (mm)**			
Barrels	1		100			
Height (mm)			150			
Width (mm)						
Side Slope (1:X)						
Auto Increment (mm)	75					
Preferred Cover (m)						
Steep Slope (1:X)						
Follow Ground	x					
Velocity	Default					
ks (mm) / n						
Short Name						
Linear Drain						
Shape	Rectangular		**Dia (mm)**			
Barrels	1		150			
Height (mm)			225			
Width (mm)	150		300			
Side Slope (1:X)						
Auto Increment (mm)	75					
Preferred Cover (m)						
Steep Slope (1:X)						
Follow Ground						
Velocity	Default					
ks (mm) / n						
Short Name						
Ditch						

Shape	Open User Defined		**Dia (mm)**		**Width / Total**	**Depth / Total**
Barrels	1		500		0.000	1.000
Height (mm)					0.500	0.000
Width (mm)					1.000	0.000
Side Slope (1:X)					1.500	1.000
Auto Increment (mm)	100					
Preferred Cover (m)						
Steep Slope (1:X)	3					
Follow Ground						
Velocity	Colebrook-White					
ks (mm) / n	1.000					
Short Name	Dit					
Ditch2						
Shape	Trapezoidal		**Dia (mm)**			
Barrels	1		1000			
Height (mm)						
Width (mm)						
Side Slope (1:X)	3.0					
Auto Increment (mm)	100					
Preferred Cover (m)						
Steep Slope (1:X)						
Follow Ground						
Velocity	Manning					
ks (mm) / n	0.030					
Short Name	Dit					