GADSDEN CONSULTING

FRA AND DRAINAGE STRATEGY REPORT

LOCATION: ULDALE VIEW, EGREONT
CLIENT: GLEESON HOMES
JOB No: 23127

Gadsden Consulting, Unit 20, Meetings Industrial Estate, Park Road, Barrow-in-Furness, Cumbria. LA14 4TL

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P01	First Issue	RB	RG	23/05/2023
P02	Amended Strategy	RB	RG	23/06/2023
P03	Updated Climate Change and Notes	RB	RG	29/01/2024
P04	Removed Wetland Area	RB	RG	13/03/2024

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Reviewed	Signature	Date
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1. Introduction

1.1 Project Background

Gadsden Consulting have been appointed by Gleeson Homes to undertake a detailed drainage strategy report in support of a planning application for 163 family homes at Uldale View, Egremont, Cumbria.

The site will be accessed from the existing carriageway known as Uldale View. The new dwellings will be served by a mixture of tarmac and block paved highways.

The site is currently vacant with no above ground structures present.

The purpose of this report is to comment upon the flood risk status of the area with a view to constructing the proposed dwellings and the likelihood of increased flood risk to the development land or the surrounding area. The report also aims to provide proposals regarding the drainage

1.2 Surface Water Strategy

The following policies, documents, guidance and standards for managing surface water flood risk and the design of SuDS have been flowed wherever possible for this surface water drainage strategy:

- Relevant District Local Plans, relevant Neighbourhood Plans and Supplementary Planning Documents
- National Planning Policy Framework
- Planning Practice Guidance
- The National Model Design Code
- The SuDS Manual (C753)
- Defra Technical Standards for Sustainable Drainage Systems
- The Natural Flood Management Manual (C802)

2. Existing Development Site

2.1 Site Characteristics

The application site is approximately 600m south west of Egremont Town centre. The site is approximately 7.80ha and is irregular in shape. The site was previously used for agricultural purposes and is currently vacant. It is accessed from the existing carriageway known as Uldale View.

2.2 Existing Drainage Arrangements for the Site

United Utilities sewer records show a 525mm diameter public surface water running from south to north along Uldale View, before discharging into the watercourse that runs along the northern boundary of the site.

There are two combined public sewers to the east of the site, running parallel to the eastern boundary. One is 450mm vitrified clay and the other is a 900mm diameter concrete sewer. There is also a combined 300mm diameter concrete sewer running along the northern boundary of the site.

2.3 Topography

The site has a high point roughly centrally and generally falls in all directions from this point. The levels then begin to rise again in the south east and south west corners of the site.

The high point of the site is roughly central at approximately 60.00m AOD. The low point of the site is in the north eastern corner near the watercourse at 40.00m AOD.

The topographical survey can be seen in Appendix A.

2.4 Hydrology

There is an unnamed watercourse that runs along the northern boundary of the site from west to east. This is a tributary of the River Ehen which is approximately 115m to the north east of the site.

The River Ehen ultimately discharges into the Irish Sea approximately 7.60km to the south of the site.

2.5 Contamination and Geology

A Phase 2 Ground Investigation Report (Ref: 2022-5346) was undertaken by Geo Environmental Engineering.

The report states that '*none of the contaminant concentrations exceed the assessment criteria for a residential development'* and 'the topsoil does not pose a risk to human health and is suitable for re-use in areas of private gardens and soft landscaping'.

Preliminary geological information has been sourced from Geo Environmental Engineering 'Phase 2 Ground Investigation' report (Ref: 2022-5346) and local geological maps. A Summary of this information is as follows:-

- Made ground – made ground was not encountered during the site investigation.
- Superficial geology – varied significantly across the site. Summarised as:
    - Silty very sandy gravel with occasional cobbles and boulders – frequent lenses/pockets of firm to stiff sandy gravelly clay were also noted within the gravel
    - Firm to stiff and stiff slightly sandy very gravelly clay with occasional cobbles and boulders – occasional lenses of silty sandy gravel were also noted within the clay
    - Slightly silty fine to medium sand
- Bedrock – The solid geology comprises of St Bees Sandstone Member - Sandstone. Sedimentary bedrock formed between 252.2 and 247.1 million years ago during the Triassic period.

2.6 Source Protection Zone

The site falls within source protection zone 3. This is defined as:

The area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

The proposed development of this site must therefore have due consideration of the potential impacts of the development on groundwater and surface water quality during its construction and operation, including from the potential mobilisation of any contaminants that may be associated with the site and the disposal of any potentially contaminated surface water from the development.

The table below shows the minimum number of treatment stages required for surface water discharging into a SPZ based on the level of hazard.

Table 1 - Minimum Number of Treatment Stages (Defra, 2011)

Table C2. Minimum number of treatment stages		low	med	high
G1	Source Protection Zone I, within 50m of a well, spring or borehole that supplies potable water.	1	3	Consult the EA (C6)
G2	Into or immediately adjacent to a sensitive receptor that could be influenced by infiltrated water. Includes designated nature conservation, heritage and landscape sites – including Biodiversity Action Plan (BAP) habitats and Protected Species.	1	3	
G3	Source Protection Zone II or III or Principal Aquifer	1	3	
G4	Secondary Aquifer	1	2	

The simple index approach from the SuDS manual provides pollution hazard indices for different land use classifications as can be seen in the below table:

Table 2 - Pollution Hazard Indices (Ciria, 2015)

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

The hazard indices are then offset against the SuDS mitigation indices for discharge to groundwater in the table below. If the total pollution mitigation index equals or exceeds the pollution hazard index, then the treatment is sufficient. When discharging to protected surface water or groundwater, a more cautious approach may be adopted.

Table 3 - SuDS Mitigation Indices for Discharge to Groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

3. Planning Policy Context

3.1 Planning Policy

Current planning policy for flood risk and surface water management is dictated by the National Planning Policy Framework (NPPF). This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements of the NPPF.

The NPPF states "A Site Specific Flood Risk Assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems". The NPPF explains that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

A sequential, risk-based approach to the location of development is outlined in the NPPF with the aim to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

- applying the Sequential Test
- if necessary, applying the Exception Test
- safeguarding land from development that is required for current and future flood management
- using opportunities offered by new development to reduce the causes and impacts of flooding
- where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

3.2 Sequential Test

The NPPF states that the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding and that a sequential approach should be used in areas known to be at risk from any form of flooding. Development types are given a "Flood Risk Vulnerability Classification" in one of the following groups:

- Essential Infrastructure – including essential transport infrastructure, essential utility infrastructure, wind turbines
- Highly Vulnerable – including police, ambulance and fire stations, command centres, basements, caravan and mobile home parks for residential use and installations requiring hazardous consent.

- More Vulnerable – including hospitals, residential institutions, dwellings, educational facilities, landfill for hazardous substances and sites used for short stay holiday lets such as camping and caravans.
- Less Vulnerable – including shops, offices, restaurants, cafes and takeaways, general industry, storage and distribution, non-residential institutions, leisure facilities, agricultural and forestry activities.
- Water-Compatible Development – including flood control infrastructure, MOD installations etc

Table 1 below defines whether the development is appropriate based on the vulnerability classification and the environment agency's flood zone.

Table 4 - Flood Risk Vulnerability and Flood Zone Compatibility (extract from NPPF)

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

3.3 Climate Change

The NPPF explains that global sea level will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. It states that, in preparing an FRA, the allowances for the rates of relative sea level rise shown in Table 2 should be used as a starting point for considering flooding from the sea.

Table 5 – Recommended Contingency Allowances for Sea Level Rises

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
North west	Higher central	4.5 (158)	7.3 (219)	10 (300)	11.2 (336)	1.01
North west	Upper end	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41

The Technical Guidance to NPPF also states that when "the Environment Agency, as a statutory consultee, uses the management catchment climate change allowances from the peak river flow map as benchmarks." For flood risk assessments where the development site falls within flood zones 2 and 3a, the central allowance should be used for the vulnerability classification of 'more vulnerable'.

Table 6–Eden and Esk Management Catchment Peak River Flow Allowances

	Central	Higher	Upper
2020s	18%	22%	32%
2050s	27%	35%	56%
2080s	47%	61%	94%

3.4 Local Policy Guidance

The NPPF sets out that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA). For this development, the relevant guidance is the Copeland Borough Council SFRA and this has been referred to in the production of this site specific FRA.

4. Existing Flood Hazards

4.1 Introduction

This section considers the following sources of flood hazards:

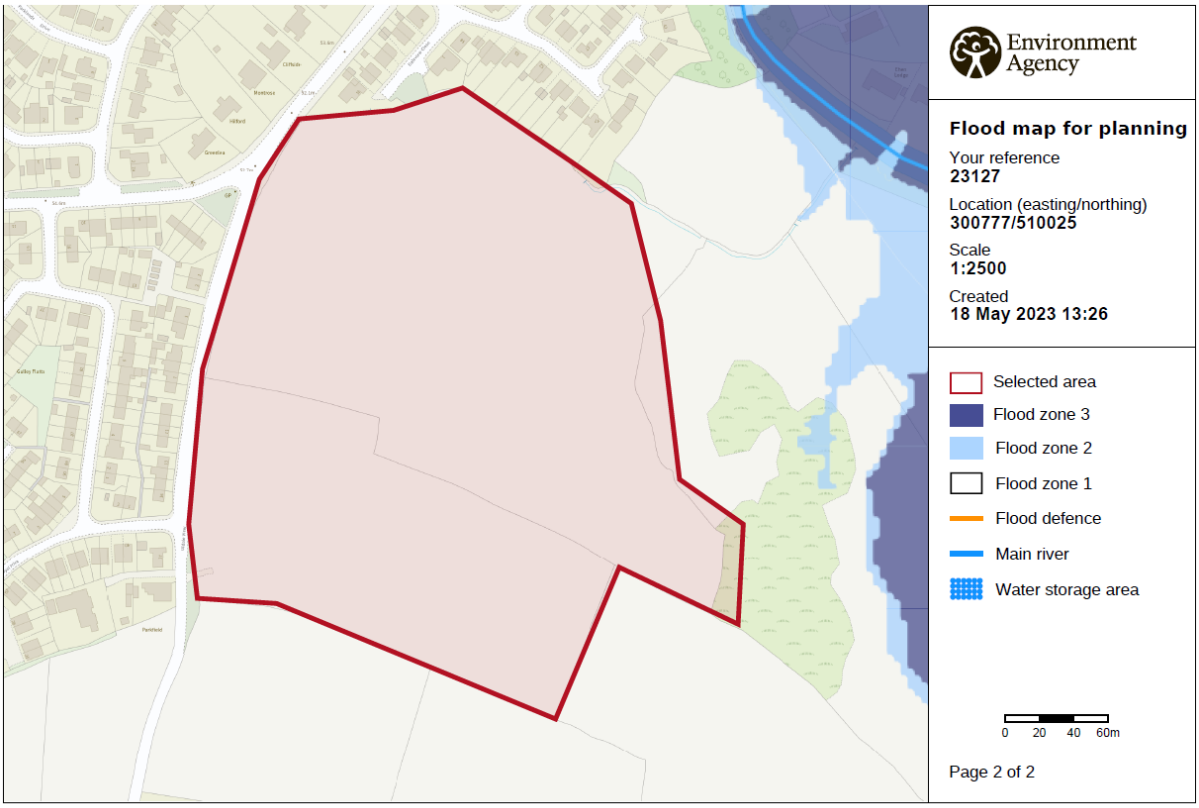
- Tidal
- Fluvial
- Groundwater
- Drainage systems

4.2 Tidal & Fluvial Flooding

The EA flood map shows the flood hazard from tidal and river sources. The latest flood information from the EA shows the site to be within flood zone 1. EA Flood Zones are defined as follows: -

- **Flood Zone 1** (low probability) is defined as land assessed as having less than a 0.1% annual probability of flooding from a river or the sea.
- **Flood Zone 2** (medium probability) is defined as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- **Flood Zone 3** (high probability) is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The Technical Guidance to NPPF splits Flood Zone 3 in to two sub-categories:
    1. **Flood Zone 3a** (high probability) is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
    2. **Flood Zone 3b** is defined as functional floodplain.

Map 1 EA Flood Map for Planning (River & Sea)



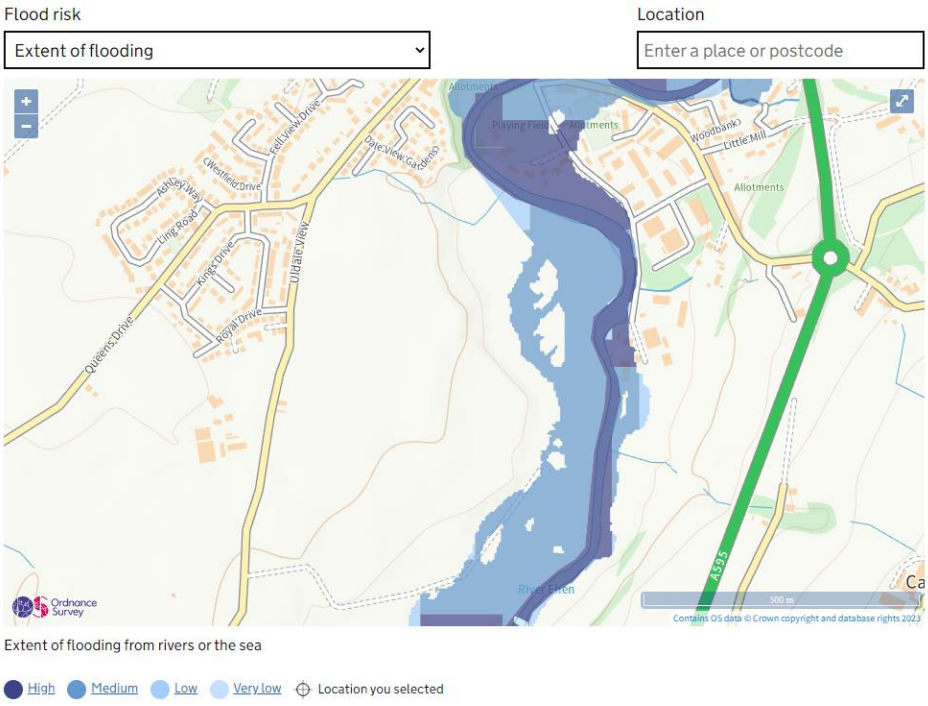
4.3 Tidal Flooding

Due to the sites location and its height relative to sea level the risk of flooding from tidal events is negligible.

4.4 Fluvial Flooding

Although the site is within close proximity to the River Ehen and unnamed watercourse to the northern boundary, it is at .very low risk from fluvial flooding due to the level difference. This is illustrated on the map below.

Map 2 - EA River Flooding Map



4.5 Groundwater

Geo Environmental installed 5 groundwater monitoring wells and undertook a number of trial holes as part of the site investigation.

The exploratory holes were predominantly dry during the fieldworks, however localized groundwater ingress was encountered in the north western and western parts of the site where granular deposits were present. Standing groundwater was recorded between 0.45m and 2.45m below ground level during the monitoring, although wells in the southern field were noted as dry.

The ground investigation report concludes that it is likely that the water is locally trapped/perched within the soils rather than a continuous groundwater table. Localised groundwater ingress should be anticipated, and it is recommended that allowance is made for groundwater control measures particularly during wetter periods of the year.

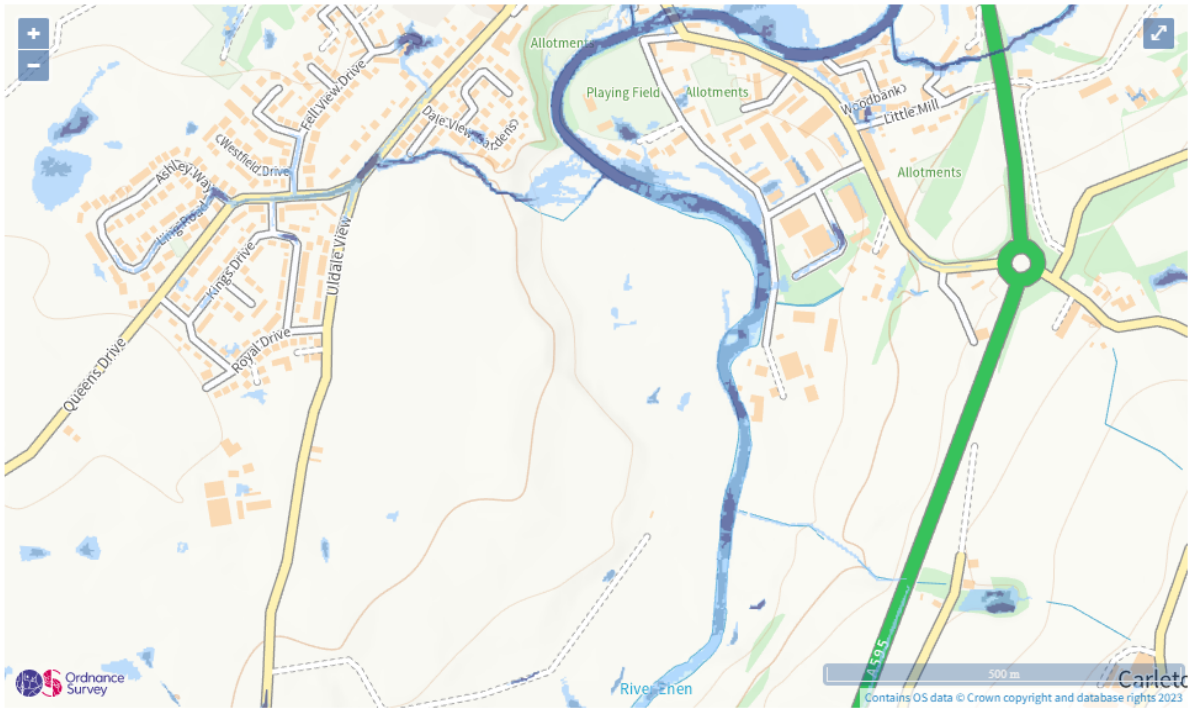
4.6 Drainage Systems & Pluvial Flooding (Surface Water)

Surface Water (pluvial) flooding is defined as flooding caused by rainfall-generated overland flow before the runoff enters a watercourse or sewer. In such events, sewerage and drainage systems and watercourses may be entirely overwhelmed.

The surface water flood map shown below indicates that the majority of the site is at very low risk of surface water flooding. This means that each year the site has less than 0.1% chance of flooding.

Around the watercourse to the northern boundary and riparian areas the flood risk ranges from high (greater than 3.3% annual chance of flooding) to low (between 0.1% and 1.0% annual chance of flooding).

Map 3 EA Surface Water Flood Map



Extent of flooding from surface water

High Medium Low Very low Location you selected

5. Proposed Development

5.1 Introduction

As detailed in section 3 of this report the following flood hazards need to be considered in the development of this site: -

Table 5 – Flood Hazards & Mitigation Measures

Flood Hazard	Mitigation for Impact on Development
Tidal	N/A
Fluvial (Zones 1,2,3)	N/A
Groundwater	Infiltration drainage only suitable in areas where no groundwater has been encountered
Surface Water	N/A - New Drainage network to be installed limiting discharge off site

5.2 Sequential Test

As previously discussed the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding.

The site falls within flood zone 1. The vulnerability classification from Table 1 of this report is “more vulnerable” and as a result the exception test does not need to be applied meaning the development is deemed appropriate.

5.3 Proposed Drainage Strategy

Any proposed drainage scheme should minimise the rate of runoff from the site to greenfield runoff rates. Planning Policy guidance suggests the following hierarchy for surface water discharge: -

1. Into the ground (Infiltration)
2. To a surface water body;
3. To a surface water sewer;
4. To a combined sewer.

BRE365 Soakaway testing has been undertaken by Geo Environmental. The testing showed varying results and localised groundwater ingress in areas to the north west and west of the site. As a result, the site has been split into three sections, with infiltration drainage being utilised in the areas where groundwater was not encountered.

The site investigation noted differing ground conditions across the site as described in section 2.5. When assessing the greenfield runoff rate for the site, soil classification 3 has been adopted due to

the site investigation report, instead of the default soil classification 4 that was identified by the HR Wallingford greenfield runoff calculation tool. Soil classification 4 is heavy clay, which would be impermeable – whereas there is permeability on this site.

All highways are impermeable, with surface water being collected in gulleys and entering the piped network.

The northern and south western highway, roof and driveway areas will enter the piped system that will pass through a catchpit manhole and also a series of attenuation basins. It will then discharge into the existing watercourse on the northern boundary at a controlled rate using a vortex flow control device.

The surface water run-off from the private roads/driveways/roofs in the northern portion of the site will also connect into the main drainage network.

In the south-west of the site the private roads/driveways/roofs will drain via a combination of geocellular soakaways and permeable surfaces with attenuation provided beneath the surface within the immediate vicinity of the catchment. Using the simple index approach, this method of discharge to groundwater is deemed suitable.

In the south-east of the site all impermeable surfaces will drain to the infiltration basin in the south-east corner of the site. This section of the drainage network will contain a catchpit manhole as an additional SUDS treatment in the final manhole before entering the basin. Using the simple index approach, this method of discharge to groundwater is deemed suitable.

The surface water system will attenuate for storm periods up to and including the 100 year plus 50% climate change event with an allowance of 10% for urban creep and a 30 % allowance for the remaining greenfield areas on site.

The discharge to the watercourse will be restricted using a vortex flow control device. The runoff rate will match the one year return period and QBAR for all storms above this up to and including the 100 year event plus a 50% allowance for climate change.

When calculating the allowable discharge, the total site area of 7.78ha minus the area to infiltrate (3.225ha) was used. This left 4.555ha, of which 1.82ha is impermeable. A 30% allowance for the remaining greenfield areas of 2.735ha was then included, pro-rata into the design.

In addition to the SuDS treatments highlighted previously, back inlet gullies, silt trap manholes etc will also be provided to remove sediment/silt and therefore assisting with cleaning the water.

The foul drainage will be a traditional gravity fed piped network that will discharge into the existing combined sewer to the north east of the site.

See Appendix B for runoff rate calculations and Appendix C for drainage design.

5.4 Future Flood Risk & Exceedance Routes

Flood risk to the new dwellings is low. All attenuation features have been designed to a return period of 100 years plus climate change of 50% and a 10% allowance for urban creep.

Exceedance routes are provided that will guide surface water away from the new properties and into the adjacent field and ultimately into the River Ehen.

5.5 Future Management

Maintenance of driveways and roof water drainage will be the sole responsibility of the homeowners. A householder sustainable drainage maintenance plan will be included within the sales pack for each property making the homeowners aware of their responsibilities relating to surface water (see Appendix D).

The highway and highway drainage will be adopted by the Highway Authority and therefore they will be responsible for the maintenance of these features.

The main foul and surface water drainage, including the swales and basins will be adopted by United Utilities and therefore they will be responsible for the maintenance and upkeep of the systems serving the site.

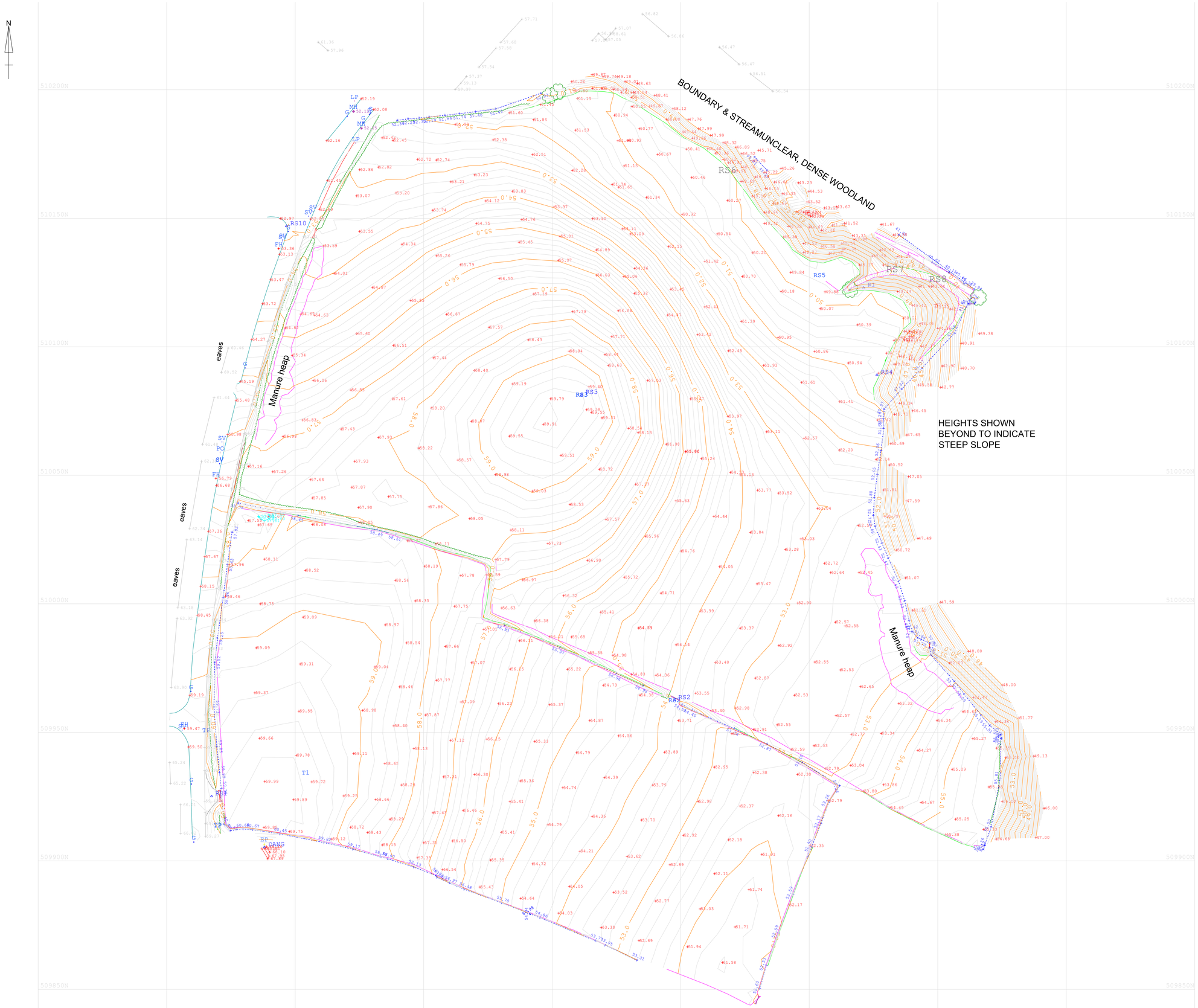
6. Summary

The application site falls within flood zone 1. Based on NPPF the sequential test has been applied. An exception test is not required due to the flood risk vulnerability classification of 'more vulnerable' and therefore development is appropriate.

This report provides a detailed strategy for the management of surface water from the proposed housing development at Uldale View, Egremont. The strategy includes for the following restrictions, measures and improvements: -

- Infiltration drainage only deemed suitable for part of the site due to the presence of groundwater.
- Part of the site to discharge into adjacent watercourse at a controlled rate with the remainder utilising infiltration drainage.
- SuDS provided in the form of infiltration basin, attenuation basins, conveyance swale, permeable surfacing, catchpit manholes and geocellular soakaways.
- All attenuation features designed for storms up to and including the 1 in 100 year event with a 50% allowance for climate change and a 10% allowance for urban creep and a 30% allowance for the remaining greenfield areas.
- Runoff to the watercourse to be restricted using a vortex flow control device.
- The proposed development runoff rate matches that of the 1 year return period and QBAR for all other return periods up to and including the 100 year event plus a 50% allowance for climate change.
- The highway and highway drainage will be adopted by the highway authority.
- The main foul and surface water drainage will be adopted by United Utilities
- Individual plot drainage will be maintained by the homeowners.

Appendix A



NOTES

Survey is related directly to OSgb36(15) using GPS RTK and post processed observations

LEGEND

LINETYPES

- VERGE
- FENCE - CHAIN LINK
- FENCE - secure
- FENCE - WOODEN
- FENCE - POST & RAIL
- HEDGE
- WALL
- BARRIER
- CHANNEL LINE
- REINSTATEMENT SCAR
- FOUL WATER SEWER
- COMBINED WATER SEWER
- STORM WATER SEWER
- CONCRETE EDGE
- FOOTPATH
- TRACK
- BUILDING
- TREE
- GATE
- SURVEY STATION
- EAVES
- BUILDING/ structure
- SURVEY BOUNDARY

Window Sample

Trial Pit

Cable percussion Hole

ABBREVIATIONS

(AC)	ASSUMED CONNECTION	INT	INTERCEPTOR
A/G	ABOVE GROUND	KV	KILO VOLT
(AR)	ASSUMED ROUTE		
AW	A & A REMEDIATION EXTRACTION WELL		
AV	AIR VALVE	LP	LAMP POST
BB	BELISHA BEACON	LV	LOW VOLTAGE
BD	BACK DROP	MK	MARKER
BH	BORE HOLE	MH	MANHOLE
BL	BASE LEVEL	MT	METER
BO	BOLLARD	MWELL	MONITORING WELL
BOL	BOLLARD LIGHT	O/H	OVERHEAD
BT	BRITISH TELECOM		
CATV	CABLE TELEVISION	PTG	PIPE TO GROUND
CB	CONTROL BOX	PIPE	ABOVE GROUND PIPE
CL	COVER LEVEL		
		RE	RODDING EYE
CWS	COMBINED WATER SEWER	RED	REDUNDANT SERVICE
		RWP	RAIN WATER PIPE
DCH	DRAINAGE CHANNEL	SC	STOP COCK
		SOFFIT	
DIS	DISUSED	SVP	SOIL PIPE
		SWS	SURFACE WATER SEWER
EP	ELECTRIC POLE	SV	STOP VALVE
ER	EARTH ROD	TH	TRIAL PIT
		TL	TRAFFIC LIGHT
FH	FIRE HYDRANT	TLC	TRAFFIC LIGHT COVER
FWS	FOUL WATER SEWER	TP	TELECOM POLE
		UTL	UNABLE TO LIFT
GR	GAS RISER	UTS	UNABLE TO SURVEY
GV	GAS VALVE	UTT	UNABLE TO TRACE
GY	GULLY	VC	VITRIFIED CLAY
HV	HIGH VOLTAGE	VP	VENT PIPE
IC	INSPECTION COVER	WL	WATER LEVEL
id	INVERT DEPTH	WO	WASH OUT
IL	INVERT LEVEL	WR	WATER RISER

DISCLAIMER

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CLIENT

ROBERTS ENVIRONMENTAL LTD

SITE

LAND OFF ULDALE VIEW, EGREMONT, CUMBRIA

DRAWING TITLE

TOPOGRAPHIC SURVEY

DRAWING NO.	REVISION NO.
>>	>>
DRAWN BY: A.R.	APPROVED BY: >>
DATE: 10-08-21	SCALE: 1:500
PAPER SIZE: A0	

Appendix B

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Rob Bruce
Site name:	ULLDALE VIEW
Site location:	EGREMONT

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	54.47676° N
Longitude:	3.53414° W
Reference:	2561188499
Date:	Jan 24 2024 12:41

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 4.555

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	1135	1135
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	38.71	23.03
1 in 1 year (l/s):	33.68	20.04
1 in 30 years (l/s):	65.81	39.16
1 in 100 year (l/s):	80.52	47.91
1 in 200 years (l/s):	91.74	54.59

Appendix C

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
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	0.500	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	x
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Circular_Default Sewer Type Link Type

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

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.163	5.00	57.942	1800	300763.117	510037.958	1.642
2	0.070	5.00	57.620	2100	300752.195	510015.635	1.520
3	0.125	5.00	58.170	1800	300687.976	510034.574	2.470
4	0.142	5.00	56.735	1800	300704.065	510099.736	1.610
5	0.058	5.00	55.281	1800	300673.531	510107.838	2.802
6	0.023	5.00	54.413	1800	300656.646	510112.241	2.138
7	0.084	5.00	53.812	3000	300659.968	510139.022	1.916
8	0.092	5.00	53.179	3000	300668.417	510160.413	1.375
9	0.023	5.00	52.640	3000	300684.299	510177.008	0.928
10	0.026	5.00	54.451	3000	300726.767	510157.298	3.496
30	0.175	5.00	56.099	1500	300737.854	510129.016	1.652
11	0.043	5.00	54.837	1500	300734.398	510154.108	3.903
12	0.049	5.00	54.045	1350	300742.798	510168.193	3.152
13	0.071	5.00	53.144	1800	300761.059	510172.125	2.894
14	0.086	5.00	52.436	1800	300780.527	510161.959	2.241
15	0.089	5.00	52.089	1800	300801.683	510144.241	1.972
16	0.095	5.00	51.826	1800	300814.999	510127.152	1.838
17	0.088	5.00	52.015	1800	300826.373	510107.003	2.085
18	0.174	5.00	52.753	1800	300831.479	510087.992	2.872
40	0.078	5.00	59.297	1800	300625.167	509974.185	1.622
41	0.046	5.00	59.076	1800	300681.914	509973.806	1.776
60	0.061	5.00	59.012	1800	300681.080	509918.810	1.312
61	0.023	5.00	58.569	1800	300681.537	509951.242	1.269
42	0.031	5.00	58.646	1800	300684.894	509957.319	1.746
43	0.045	5.00	58.307	1800	300693.030	509952.937	1.507
44	0.058	5.00	57.129	1800	300716.883	509950.767	1.929
70	0.070	5.00	54.606	1800	300743.180	509886.522	1.456
45	0.045	5.00	55.186	1800	300761.536	509932.532	2.286
46	0.045	5.00	54.810	1800	300777.074	509931.939	2.084
47	0.096	5.00	54.400	2700	300790.945	509943.397	1.770
48	0.087	5.00	54.567	2400	300811.863	509991.973	2.117
49	0.140	5.00	54.356	2400	300826.191	510020.808	2.011
50	0.080	5.00	54.000	2400	300836.280	510021.271	1.680

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
51	0.023	5.00	53.081	1350	300860.357	510051.478	1.999
19	0.058	5.00	50.856	1500	300855.571	510087.118	1.039
20	0.023	5.00	50.677	1800	300854.459	510112.720	2.000
21	0.000	5.00	50.071	1500	300853.487	510118.873	1.456
22	0.000	5.00	47.223	1500	300883.618	510124.693	1.623
43_1	0.000	5.00	40.700	100	300911.011	510121.916	0.400

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)
1.000	1	2	24.852	0.600	56.300	56.100	0.200	124.3	300	5.29	50.0
1.001	2	3	66.953	0.600	56.100	55.700	0.400	167.4	300	6.21	50.0
1.002	3	4	67.119	0.600	55.700	55.200	0.500	134.2	300	7.04	50.0
1.003	4	5	31.591	0.600	55.125	52.554	2.571	12.3	375	7.14	50.0
1.004	5	6	17.450	0.600	52.479	52.350	0.129	135.3	375	7.33	50.0
1.005	6	7	26.986	0.600	52.275	51.896	0.379	71.2	450	7.51	50.0
1.006	7	8	22.999	0.600	51.896	51.804	0.092	250.0	450	7.81	50.0
1.007	8	9	22.970	0.600	51.804	51.712	0.092	250.0	450	8.11	50.0
1.008	9	10	46.819	0.600	51.712	51.525	0.187	250.0	450	8.72	50.0
1.009	10	11	8.271	0.600	50.955	50.934	0.021	400.0	450	8.86	50.0
2.000	30	11	25.329	0.600	54.447	53.187	1.260	20.1	300	5.12	50.0
1.010	11	12	16.400	0.600	50.934	50.893	0.041	400.0	450	9.13	50.0
1.011	12	13	18.680	0.600	50.893	50.250	0.643	29.1	450	9.21	50.0
1.012	13	14	21.962	0.600	50.250	50.195	0.055	400.0	450	9.57	50.0
1.013	14	15	27.595	0.600	50.195	50.126	0.069	400.0	450	10.03	50.0
1.014	15	16	21.664	0.600	50.117	50.063	0.054	400.0	450	10.39	50.0
1.015	16	17	23.138	0.600	49.988	49.930	0.058	400.0	525	10.73	50.0
1.016	17	18	19.685	0.600	49.930	49.881	0.049	400.0	525	11.03	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.409	99.6	22.1	1.342	1.220	0.163	0.0
1.001	1.212	85.7	31.6	1.220	2.170	0.233	0.0
1.002	1.355	95.8	48.5	2.170	1.235	0.358	0.0
1.003	5.192	573.4	67.8	1.235	2.352	0.500	0.0
1.004	1.556	171.8	75.6	2.427	1.688	0.558	0.0
1.005	2.411	383.5	78.7	1.688	1.466	0.581	0.0
1.006	1.281	203.7	90.1	1.466	0.925	0.665	0.0
1.007	1.281	203.7	102.6	0.925	0.478	0.757	0.0
1.008	1.281	203.7	105.7	0.478	2.476	0.780	0.0
1.009	1.010	160.7	109.2	3.046	3.453	0.806	0.0
2.000	3.522	248.9	23.7	1.352	1.350	0.175	0.0
1.010	1.010	160.7	138.8	3.453	2.702	1.024	0.0
1.011	3.782	601.6	145.4	2.702	2.444	1.073	0.0
1.012	1.010	160.7	155.0	2.444	1.791	1.144	0.0
1.013	1.010	160.7	166.7	1.791	1.513	1.230	0.0
1.014	1.010	160.7	178.8	1.522	1.313	1.319	0.0
1.015	1.114	241.0	191.6	1.313	1.560	1.414	0.0
1.016	1.114	241.0	203.6	1.560	2.347	1.502	0.0

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)
1.017	18	19	24.108	0.600	49.881	49.817	0.064	376.7	525	11.38	50.0
3.000	40	41	56.748	0.600	57.675	57.300	0.375	151.3	300	5.74	50.0
3.001	41	42	16.754	0.600	57.300	56.900	0.400	41.9	300	5.86	50.0
4.000	60	61	32.435	0.600	57.700	57.300	0.400	81.1	300	5.31	50.0
4.001	61	42	6.943	0.600	57.300	56.900	0.400	17.4	300	5.34	50.0
3.002	42	43	9.241	0.600	56.900	56.800	0.100	92.4	300	5.95	50.0
3.003	43	44	23.952	0.600	56.800	55.200	1.600	15.0	300	6.05	50.0
3.004	44	45	48.233	0.600	55.200	53.050	2.150	22.4	300	6.29	50.0
5.000	70	45	49.536	0.600	53.150	52.900	0.250	198.1	450	5.57	50.0
3.005	45	46	15.549	0.600	52.900	52.726	0.174	89.4	450	6.41	50.0
3.006	46	47	17.991	0.600	52.726	52.636	0.090	200.0	450	6.62	50.0
3.007	47	48	52.888	0.600	52.630	52.450	0.180	293.8	450	7.37	50.0
3.008	48	49	32.199	0.600	52.450	52.345	0.105	306.7	450	7.83	50.0
3.009	49	50	10.100	0.600	52.345	52.320	0.025	400.0	450	8.00	50.0
3.010	50	51	38.629	0.600	52.320	52.223	0.097	398.2	450	8.63	50.0
3.011	51	19	35.960	0.600	51.082	49.892	1.190	30.2	450	8.79	50.0
1.018	19	20	25.626	0.600	49.817	49.753	0.064	400.4	525	11.76	50.0
1.019	20	21	6.229	0.600	48.677	48.615	0.062	100.0	300	11.83	49.9
1.020	21	22	30.688	0.600	48.615	45.600	3.015	10.2	300	11.93	49.7
1.021	22	43_1	27.533	0.600	45.600	40.300	5.300	5.2	300	12.00	49.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.017	1.148	248.5	227.1	2.347	0.514	1.676	0.0
3.000	1.275	90.2	10.6	1.322	1.476	0.078	0.0
3.001	2.436	172.2	16.8	1.476	1.446	0.124	0.0
4.000	1.747	123.5	8.3	1.012	0.969	0.061	0.0
4.001	3.791	268.0	11.4	0.969	1.446	0.084	0.0
3.002	1.636	115.6	32.4	1.446	1.207	0.239	0.0
3.003	4.083	288.6	38.5	1.207	1.629	0.284	0.0
3.004	3.333	235.6	46.3	1.629	1.836	0.342	0.0
5.000	1.440	229.1	9.5	1.006	1.836	0.070	0.0
3.005	2.151	342.1	61.9	1.836	1.634	0.457	0.0
3.006	1.434	228.0	68.0	1.634	1.314	0.502	0.0
3.007	1.181	187.8	81.0	1.320	1.667	0.598	0.0
3.008	1.155	183.8	92.8	1.667	1.561	0.685	0.0
3.009	1.010	160.7	111.8	1.561	1.230	0.825	0.0
3.010	1.012	161.0	122.7	1.230	0.408	0.905	0.0
3.011	3.708	589.8	125.8	1.549	0.514	0.928	0.0
1.018	1.113	240.9	360.8	0.514	0.399	2.662	0.0
1.019	1.572	111.1	363.4	1.700	1.156	2.685	0.0
1.020	4.955	350.2	361.5	1.156	1.323	2.685	0.0
1.021	6.941	490.6	360.3	1.323	0.100	2.685	0.0

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	24.852	124.3	300	Circular_Default Sewer Type	57.942	56.300	1.342	57.620	56.100	1.220
1.001	66.953	167.4	300	Circular_Default Sewer Type	57.620	56.100	1.220	58.170	55.700	2.170
1.002	67.119	134.2	300	Circular_Default Sewer Type	58.170	55.700	2.170	56.735	55.200	1.235
1.003	31.591	12.3	375	Circular_Default Sewer Type	56.735	55.125	1.235	55.281	52.554	2.352
1.004	17.450	135.3	375	Circular_Default Sewer Type	55.281	52.479	2.427	54.413	52.350	1.688
1.005	26.986	71.2	450	Circular_Default Sewer Type	54.413	52.275	1.688	53.812	51.896	1.466
1.006	22.999	250.0	450	Circular_Default Sewer Type	53.812	51.896	1.466	53.179	51.804	0.925
1.007	22.970	250.0	450	Circular_Default Sewer Type	53.179	51.804	0.925	52.640	51.712	0.478
1.008	46.819	250.0	450	Circular_Default Sewer Type	52.640	51.712	0.478	54.451	51.525	2.476
1.009	8.271	400.0	450	Circular_Default Sewer Type	54.451	50.955	3.046	54.837	50.934	3.453
2.000	25.329	20.1	300	Circular_Default Sewer Type	56.099	54.447	1.352	54.837	53.187	1.350
1.010	16.400	400.0	450	Circular_Default Sewer Type	54.837	50.934	3.453	54.045	50.893	2.702
1.011	18.680	29.1	450	Circular_Default Sewer Type	54.045	50.893	2.702	53.144	50.250	2.444
1.012	21.962	400.0	450	Circular_Default Sewer Type	53.144	50.250	2.444	52.436	50.195	1.791
1.013	27.595	400.0	450	Circular_Default Sewer Type	52.436	50.195	1.791	52.089	50.126	1.513
1.014	21.664	400.0	450	Circular_Default Sewer Type	52.089	50.117	1.522	51.826	50.063	1.313
1.015	23.138	400.0	525	Circular_Default Sewer Type	51.826	49.988	1.313	52.015	49.930	1.560
1.016	19.685	400.0	525	Circular_Default Sewer Type	52.015	49.930	1.560	52.753	49.881	2.347
1.017	24.108	376.7	525	Circular_Default Sewer Type	52.753	49.881	2.347	50.856	49.817	0.514
3.000	56.748	151.3	300	Circular_Default Sewer Type	59.297	57.675	1.322	59.076	57.300	1.476
3.001	16.754	41.9	300	Circular_Default Sewer Type	59.076	57.300	1.476	58.646	56.900	1.446
4.000	32.435	81.1	300	Circular_Default Sewer Type	59.012	57.700	1.012	58.569	57.300	0.969
4.001	6.943	17.4	300	Circular_Default Sewer Type	58.569	57.300	0.969	58.646	56.900	1.446
3.002	9.241	92.4	300	Circular_Default Sewer Type	58.646	56.900	1.446	58.307	56.800	1.207
3.003	23.952	15.0	300	Circular_Default Sewer Type	58.307	56.800	1.207	57.129	55.200	1.629

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1800	Manhole	Adoptable	2	2100	Manhole	Adoptable
1.001	2	2100	Manhole	Adoptable	3	1800	Manhole	Adoptable
1.002	3	1800	Manhole	Adoptable	4	1800	Manhole	Adoptable
1.003	4	1800	Manhole	Adoptable	5	1800	Manhole	Adoptable
1.004	5	1800	Manhole	Adoptable	6	1800	Manhole	Adoptable
1.005	6	1800	Manhole	Adoptable	7	3000	Manhole	Adoptable
1.006	7	3000	Manhole	Adoptable	8	3000	Manhole	Adoptable
1.007	8	3000	Manhole	Adoptable	9	3000	Manhole	Adoptable
1.008	9	3000	Manhole	Adoptable	10	3000	Manhole	Adoptable
1.009	10	3000	Manhole	Adoptable	11	1500	Manhole	Adoptable
2.000	30	1500	Manhole	Adoptable	11	1500	Manhole	Adoptable
1.010	11	1500	Manhole	Adoptable	12	1350	Manhole	Adoptable
1.011	12	1350	Manhole	Adoptable	13	1800	Manhole	Adoptable
1.012	13	1800	Manhole	Adoptable	14	1800	Manhole	Adoptable
1.013	14	1800	Manhole	Adoptable	15	1800	Manhole	Adoptable
1.014	15	1800	Manhole	Adoptable	16	1800	Manhole	Adoptable
1.015	16	1800	Manhole	Adoptable	17	1800	Manhole	Adoptable
1.016	17	1800	Manhole	Adoptable	18	1800	Manhole	Adoptable
1.017	18	1800	Manhole	Adoptable	19	1500	Manhole	Adoptable
3.000	40	1800	Manhole	Adoptable	41	1800	Manhole	Adoptable
3.001	41	1800	Manhole	Adoptable	42	1800	Manhole	Adoptable
4.000	60	1800	Manhole	Adoptable	61	1800	Manhole	Adoptable
4.001	61	1800	Manhole	Adoptable	42	1800	Manhole	Adoptable
3.002	42	1800	Manhole	Adoptable	43	1800	Manhole	Adoptable
3.003	43	1800	Manhole	Adoptable	44	1800	Manhole	Adoptable

Pipeline Schedule

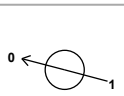
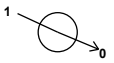
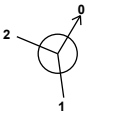
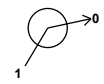
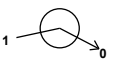
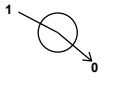
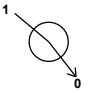
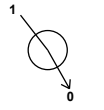
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.004	48.233	22.4	300	Circular_Default Sewer Type	57.129	55.200	1.629	55.186	53.050	1.836
5.000	49.536	198.1	450	Circular_Default Sewer Type	54.606	53.150	1.006	55.186	52.900	1.836
3.005	15.549	89.4	450	Circular_Default Sewer Type	55.186	52.900	1.836	54.810	52.726	1.634
3.006	17.991	200.0	450	Circular_Default Sewer Type	54.810	52.726	1.634	54.400	52.636	1.314
3.007	52.888	293.8	450	Circular_Default Sewer Type	54.400	52.630	1.320	54.567	52.450	1.667
3.008	32.199	306.7	450	Circular_Default Sewer Type	54.567	52.450	1.667	54.356	52.345	1.561
3.009	10.100	400.0	450	Circular_Default Sewer Type	54.356	52.345	1.561	54.000	52.320	1.230
3.010	38.629	398.2	450	Circular_Default Sewer Type	54.000	52.320	1.230	53.081	52.223	0.408
3.011	35.960	30.2	450	Circular_Default Sewer Type	53.081	51.082	1.549	50.856	49.892	0.514
1.018	25.626	400.4	525	Circular_Default Sewer Type	50.856	49.817	0.514	50.677	49.753	0.399
1.019	6.229	100.0	300	Circular_Default Sewer Type	50.677	48.677	1.700	50.071	48.615	1.156
1.020	30.688	10.2	300	Circular_Default Sewer Type	50.071	48.615	1.156	47.223	45.600	1.323
1.021	27.533	5.2	300	Circular_Default Sewer Type	47.223	45.600	1.323	40.700	40.300	0.100

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.004	44	1800	Manhole	Adoptable	45	1800	Manhole	Adoptable
5.000	70	1800	Manhole	Adoptable	45	1800	Manhole	Adoptable
3.005	45	1800	Manhole	Adoptable	46	1800	Manhole	Adoptable
3.006	46	1800	Manhole	Adoptable	47	2700	Manhole	Adoptable
3.007	47	2700	Manhole	Adoptable	48	2400	Manhole	Adoptable
3.008	48	2400	Manhole	Adoptable	49	2400	Manhole	Adoptable
3.009	49	2400	Manhole	Adoptable	50	2400	Manhole	Adoptable
3.010	50	2400	Manhole	Adoptable	51	1350	Manhole	Adoptable
3.011	51	1350	Manhole	Adoptable	19	1500	Manhole	Adoptable
1.018	19	1500	Manhole	Adoptable	20	1800	Manhole	Adoptable
1.019	20	1800	Manhole	Adoptable	21	1500	Manhole	Adoptable
1.020	21	1500	Manhole	Adoptable	22	1500	Manhole	Adoptable
1.021	22	1500	Manhole	Adoptable	43_1	100	Manhole	Adoptable

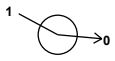
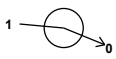
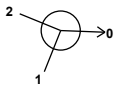
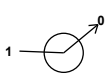
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	300763.117	510037.958	57.942	1.642	1800		0	1.000	56.300	300
2	300752.195	510015.635	57.620	1.520	2100		1	1.000	56.100	300
							0	1.001	56.100	300
3	300687.976	510034.574	58.170	2.470	1800		1	1.001	55.700	300
							0	1.002	55.700	300
4	300704.065	510099.736	56.735	1.610	1800		1	1.002	55.200	300
							0	1.003	55.125	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
5	300673.531	510107.838	55.281	2.802	1800		1	1.003	52.554	375
							0	1.004	52.479	375
6	300656.646	510112.241	54.413	2.138	1800		1	1.004	52.350	375
							0	1.005	52.275	450
7	300659.968	510139.022	53.812	1.916	3000		1	1.005	51.896	450
							0	1.006	51.896	450
8	300668.417	510160.413	53.179	1.375	3000		1	1.006	51.804	450
							0	1.007	51.804	450
9	300684.299	510177.008	52.640	0.928	3000		1	1.007	51.712	450
							0	1.008	51.712	450
10	300726.767	510157.298	54.451	3.496	3000		1	1.008	51.525	450
							0	1.009	50.955	450
30	300737.854	510129.016	56.099	1.652	1500		0	2.000	54.447	300
11	300734.398	510154.108	54.837	3.903	1500		1	2.000	53.187	300
							2	1.009	50.934	450
							0	1.010	50.934	450
12	300742.798	510168.193	54.045	3.152	1350		1	1.010	50.893	450
							0	1.011	50.893	450
13	300761.059	510172.125	53.144	2.894	1800		1	1.011	50.250	450
							0	1.012	50.250	450
14	300780.527	510161.959	52.436	2.241	1800		1	1.012	50.195	450
							0	1.013	50.195	450
15	300801.683	510144.241	52.089	1.972	1800		1	1.013	50.126	450
							0	1.014	50.117	450
16	300814.999	510127.152	51.826	1.838	1800		1	1.014	50.063	450
							0	1.015	49.988	525

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
17	300826.373	510107.003	52.015	2.085	1800	 1	1.015	49.930	525
						0	1.016	49.930	525
18	300831.479	510087.992	52.753	2.872	1800	 1	1.016	49.881	525
						0	1.017	49.881	525
40	300625.167	509974.185	59.297	1.622	1800				
						0	3.000	57.675	300
41	300681.914	509973.806	59.076	1.776	1800	1	3.000	57.300	300
						 0	3.001	57.300	300
60	300681.080	509918.810	59.012	1.312	1800				
						0	4.000	57.700	300
61	300681.537	509951.242	58.569	1.269	1800	 1	4.000	57.300	300
						0	4.001	57.300	300
42	300684.894	509957.319	58.646	1.746	1800	 1	4.001	56.900	300
						2	3.001	56.900	300
						0	3.002	56.900	300
43	300693.030	509952.937	58.307	1.507	1800	1	3.002	56.800	300
						 0	3.003	56.800	300
44	300716.883	509950.767	57.129	1.929	1800	1	3.003	55.200	300
						 0	3.004	55.200	300
70	300743.180	509886.522	54.606	1.456	1800				
						0	5.000	53.150	450
45	300761.536	509932.532	55.186	2.286	1800	1	5.000	52.900	450
						 2	3.004	53.050	300
						0	3.005	52.900	450
46	300777.074	509931.939	54.810	2.084	1800	1	3.005	52.726	450
						 0	3.006	52.726	450
47	300790.945	509943.397	54.400	1.770	2700	 1	3.006	52.636	450
						0	3.007	52.630	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
48	300811.863	509991.973	54.567	2.117	2400	1	3.007	52.450	450
						0	3.008	52.450	450
49	300826.191	510020.808	54.356	2.011	2400	1	3.008	52.345	450
						0	3.009	52.345	450
50	300836.280	510021.271	54.000	1.680	2400	1	3.009	52.320	450
						0	3.010	52.320	450
51	300860.357	510051.478	53.081	1.999	1350	1	3.010	52.223	450
						0	3.011	51.082	450
19	300855.571	510087.118	50.856	1.039	1500	1	3.011	49.892	450
						2	1.017	49.817	525
						0	1.018	49.817	525
20	300854.459	510112.720	50.677	2.000	1800	1	1.018	49.753	525
						0	1.019	48.677	300
21	300853.487	510118.873	50.071	1.456	1500	1	1.019	48.615	300
						0	1.020	48.615	300
22	300883.618	510124.693	47.223	1.623	1500	1	1.020	45.600	300
						0	1.021	45.600	300
43_1	300911.011	510121.916	40.700	0.400	100	1	1.021	40.300	300

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
100	0	0	0
100	50	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m^3)	

Node 20 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	48.677	Product Number	CTL-SHE-0198-2050-1185-2050
Design Depth (m)	1.185	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.5	Min Node Diameter (mm)	1500

Node 10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	50.955	Product Number	CTL-SHE-0200-2250-1650-2250
Design Depth (m)	1.650	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	22.5	Min Node Diameter (mm)	1800

Node 51 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	51.082	Product Number	CTL-SHE-0085-4000-1700-4000
Design Depth (m)	1.700	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	4.0	Min Node Diameter (mm)	1200

Node 51 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	51.082
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)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	390.0	0.0	2.000	1110.0	0.0	2.001	0.0	0.0

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.955
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	96

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	57.0	0.0	1.685	600.0	0.0	1.686	0.0	0.0

Node 20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	48.677
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	437.0	0.0	2.000	1045.0	0.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	99.562	28.172
1 year 15 minute winter	69.868	28.172
1 year 30 minute summer	67.776	19.178
1 year 30 minute winter	47.562	19.178
1 year 60 minute summer	48.435	12.800
1 year 60 minute winter	32.179	12.800
1 year 120 minute summer	31.831	8.412
1 year 120 minute winter	21.148	8.412
1 year 180 minute summer	25.499	6.562
1 year 180 minute winter	16.575	6.562
1 year 240 minute summer	20.693	5.468
1 year 240 minute winter	13.748	5.468
1 year 360 minute summer	16.369	4.212
1 year 360 minute winter	10.640	4.212
1 year 480 minute summer	13.246	3.501
1 year 480 minute winter	8.801	3.501
1 year 600 minute summer	11.089	3.033
1 year 600 minute winter	7.577	3.033
1 year 720 minute summer	10.069	2.699
1 year 720 minute winter	6.767	2.699
1 year 960 minute summer	8.526	2.245
1 year 960 minute winter	5.648	2.245
1 year 1440 minute summer	6.448	1.728
1 year 1440 minute winter	4.334	1.728
1 year 2160 minute summer	4.820	1.332

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 2160 minute winter	3.321	1.332
1 year 2880 minute summer	4.137	1.109
1 year 2880 minute winter	2.780	1.109
1 year 4320 minute summer	3.261	0.853
1 year 4320 minute winter	2.147	0.853
1 year 5760 minute summer	2.757	0.706
1 year 5760 minute winter	1.784	0.706
1 year 7200 minute summer	2.390	0.610
1 year 7200 minute winter	1.543	0.610
1 year 8640 minute summer	2.122	0.541
1 year 8640 minute winter	1.369	0.541
1 year 10080 minute summer	1.909	0.487
1 year 10080 minute winter	1.232	0.487
2 year 15 minute summer	128.797	36.445
2 year 15 minute winter	90.384	36.445
2 year 30 minute summer	87.307	24.705
2 year 30 minute winter	61.268	24.705
2 year 60 minute summer	61.301	16.200
2 year 60 minute winter	40.727	16.200
2 year 120 minute summer	39.487	10.435
2 year 120 minute winter	26.234	10.435
2 year 180 minute summer	31.221	8.034
2 year 180 minute winter	20.295	8.034
2 year 240 minute summer	25.171	6.652
2 year 240 minute winter	16.723	6.652
2 year 360 minute summer	19.759	5.085
2 year 360 minute winter	12.844	5.085
2 year 480 minute summer	15.896	4.201
2 year 480 minute winter	10.561	4.201
2 year 600 minute summer	13.242	3.622
2 year 600 minute winter	9.048	3.622
2 year 720 minute summer	11.973	3.209
2 year 720 minute winter	8.047	3.209
2 year 960 minute summer	10.067	2.651
2 year 960 minute winter	6.669	2.651
2 year 1440 minute summer	7.548	2.023
2 year 1440 minute winter	5.073	2.023
2 year 2160 minute summer	5.588	1.544
2 year 2160 minute winter	3.850	1.544
2 year 2880 minute summer	4.760	1.276
2 year 2880 minute winter	3.199	1.276
2 year 4320 minute summer	3.721	0.973
2 year 4320 minute winter	2.450	0.973
2 year 5760 minute summer	3.132	0.802
2 year 5760 minute winter	2.027	0.802
2 year 7200 minute summer	2.705	0.690
2 year 7200 minute winter	1.746	0.690
2 year 8640 minute summer	2.394	0.611
2 year 8640 minute winter	1.545	0.611
2 year 10080 minute summer	2.154	0.550
2 year 10080 minute winter	1.390	0.550
30 year 15 minute summer	243.818	68.992

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 15 minute winter	171.101	68.992
30 year 30 minute summer	166.387	47.082
30 year 30 minute winter	116.763	47.082
30 year 60 minute summer	116.589	30.811
30 year 60 minute winter	77.459	30.811
30 year 120 minute summer	73.902	19.530
30 year 120 minute winter	49.099	19.530
30 year 180 minute summer	57.313	14.749
30 year 180 minute winter	37.255	14.749
30 year 240 minute summer	45.598	12.050
30 year 240 minute winter	30.295	12.050
30 year 360 minute summer	35.178	9.053
30 year 360 minute winter	22.867	9.053
30 year 480 minute summer	27.920	7.379
30 year 480 minute winter	18.550	7.379
30 year 600 minute summer	23.001	6.291
30 year 600 minute winter	15.716	6.291
30 year 720 minute summer	20.598	5.520
30 year 720 minute winter	13.843	5.520
30 year 960 minute summer	17.043	4.488
30 year 960 minute winter	11.289	4.488
30 year 1440 minute summer	12.485	3.346
30 year 1440 minute winter	8.390	3.346
30 year 2160 minute summer	9.010	2.490
30 year 2160 minute winter	6.208	2.490
30 year 2880 minute summer	7.526	2.017
30 year 2880 minute winter	5.058	2.017
30 year 4320 minute summer	5.732	1.499
30 year 4320 minute winter	3.775	1.499
30 year 5760 minute summer	4.745	1.215
30 year 5760 minute winter	3.071	1.215
30 year 7200 minute summer	4.047	1.032
30 year 7200 minute winter	2.612	1.032
30 year 8640 minute summer	3.543	0.904
30 year 8640 minute winter	2.287	0.904
30 year 10080 minute summer	3.168	0.808
30 year 10080 minute winter	2.045	0.808
100 year 15 minute summer	315.347	89.232
100 year 15 minute winter	221.296	89.232
100 year 30 minute summer	217.471	61.537
100 year 30 minute winter	152.611	61.537
100 year 60 minute summer	153.288	40.510
100 year 60 minute winter	101.841	40.510
100 year 120 minute summer	96.993	25.632
100 year 120 minute winter	64.440	25.632
100 year 180 minute summer	74.725	19.229
100 year 180 minute winter	48.573	19.229
100 year 240 minute summer	59.126	15.625
100 year 240 minute winter	39.282	15.625
100 year 360 minute summer	45.269	11.649
100 year 360 minute winter	29.426	11.649
100 year 480 minute summer	35.719	9.439

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 480 minute winter	23.731	9.439
100 year 600 minute summer	29.283	8.010
100 year 600 minute winter	20.008	8.010
100 year 720 minute summer	26.115	6.999
100 year 720 minute winter	17.551	6.999
100 year 960 minute summer	21.458	5.650
100 year 960 minute winter	14.214	5.650
100 year 1440 minute summer	15.553	4.168
100 year 1440 minute winter	10.453	4.168
100 year 2160 minute summer	11.095	3.066
100 year 2160 minute winter	7.645	3.066
100 year 2880 minute summer	9.186	2.462
100 year 2880 minute winter	6.173	2.462
100 year 4320 minute summer	6.911	1.807
100 year 4320 minute winter	4.551	1.807
100 year 5760 minute summer	5.674	1.452
100 year 5760 minute winter	3.672	1.452
100 year 7200 minute summer	4.808	1.226
100 year 7200 minute winter	3.103	1.226
100 year 8640 minute summer	4.189	1.069
100 year 8640 minute winter	2.704	1.069
100 year 10080 minute summer	3.730	0.952
100 year 10080 minute winter	2.407	0.952
100 year +50% CC 15 minute summer	473.020	133.848
100 year +50% CC 15 minute winter	331.944	133.848
100 year +50% CC 30 minute summer	326.207	92.305
100 year +50% CC 30 minute winter	228.917	92.305
100 year +50% CC 60 minute summer	229.932	60.764
100 year +50% CC 60 minute winter	152.761	60.764
100 year +50% CC 120 minute summer	145.490	38.449
100 year +50% CC 120 minute winter	96.660	38.449
100 year +50% CC 180 minute summer	112.088	28.844
100 year +50% CC 180 minute winter	72.860	28.844
100 year +50% CC 240 minute summer	88.689	23.438
100 year +50% CC 240 minute winter	58.923	23.438
100 year +50% CC 360 minute summer	67.904	17.474
100 year +50% CC 360 minute winter	44.139	17.474
100 year +50% CC 480 minute summer	53.578	14.159
100 year +50% CC 480 minute winter	35.596	14.159
100 year +50% CC 600 minute summer	43.925	12.014
100 year +50% CC 600 minute winter	30.012	12.014
100 year +50% CC 720 minute summer	39.172	10.498
100 year +50% CC 720 minute winter	26.326	10.498
100 year +50% CC 960 minute summer	32.187	8.476
100 year +50% CC 960 minute winter	21.321	8.476
100 year +50% CC 1440 minute summer	23.330	6.253
100 year +50% CC 1440 minute winter	15.679	6.253
100 year +50% CC 2160 minute summer	16.643	4.600
100 year +50% CC 2160 minute winter	11.468	4.600
100 year +50% CC 2880 minute summer	13.779	3.693
100 year +50% CC 2880 minute winter	9.260	3.693
100 year +50% CC 4320 minute summer	10.367	2.710

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +50% CC 4320 minute winter	6.827	2.710
100 year +50% CC 5760 minute summer	8.511	2.179
100 year +50% CC 5760 minute winter	5.509	2.179
100 year +50% CC 7200 minute summer	7.212	1.840
100 year +50% CC 7200 minute winter	4.655	1.840
100 year +50% CC 8640 minute summer	6.284	1.603
100 year +50% CC 8640 minute winter	4.056	1.603
100 year +50% CC 10080 minute summer	5.595	1.427
100 year +50% CC 10080 minute winter	3.611	1.427

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.395	0.095	20.9	0.4296	0.0000	OK
15 minute winter	2	11	56.220	0.120	29.5	0.5265	0.0000	OK
15 minute winter	3	12	55.841	0.141	44.4	0.5023	0.0000	OK
15 minute winter	4	11	55.205	0.080	58.3	0.3435	0.0000	OK
15 minute winter	5	11	52.651	0.172	65.0	0.5081	0.0000	OK
15 minute winter	6	11	52.403	0.128	66.5	0.3537	0.0000	OK
15 minute winter	7	12	52.105	0.209	76.1	1.6611	0.0000	OK
15 minute winter	8	12	52.022	0.218	85.1	1.8297	0.0000	OK
15 minute winter	9	13	51.922	0.210	86.5	1.5867	0.0000	OK
60 minute winter	10	49	51.341	0.386	57.2	48.7632	0.0000	OK
15 minute winter	30	10	54.509	0.062	22.4	0.2404	0.0000	OK
60 minute winter	11	38	51.064	0.130	32.5	0.2581	0.0000	OK
60 minute winter	12	37	50.966	0.073	35.5	0.1275	0.0000	OK
15 minute winter	13	11	50.422	0.172	41.7	0.5207	0.0000	OK
15 minute winter	14	11	50.382	0.187	52.2	0.6178	0.0000	OK
15 minute winter	15	12	50.314	0.197	62.0	0.6794	0.0000	OK
15 minute winter	16	12	50.210	0.222	71.2	0.7943	0.0000	OK
15 minute winter	17	12	50.172	0.242	80.0	0.8190	0.0000	OK
15 minute winter	18	12	50.133	0.252	97.9	0.9453	0.0000	OK
15 minute winter	40	10	57.743	0.068	10.0	0.2368	0.0000	OK
15 minute winter	41	11	57.360	0.060	15.4	0.1844	0.0000	OK
15 minute winter	60	10	57.753	0.053	7.8	0.1846	0.0000	OK
15 minute winter	61	11	57.340	0.040	10.5	0.1170	0.0000	OK
15 minute winter	42	11	57.014	0.114	29.5	0.3316	0.0000	OK
15 minute winter	43	11	56.870	0.070	35.1	0.2206	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 winter	1	1.000	2	20.5	0.914	0.206	0.5585	
15 minute winter	2	1.001	3	29.3	1.001	0.342	1.9695	
15 minute winter	3	1.002	4	42.2	1.317	0.441	2.1527	
15 minute winter	4	1.003	5	58.0	2.999	0.101	0.6243	
15 minute winter	5	1.004	6	64.1	1.390	0.373	0.8058	
15 minute winter	6	1.005	7	67.0	1.243	0.175	1.4731	
15 minute winter	7	1.006	8	75.9	1.026	0.373	1.7021	
15 minute winter	8	1.007	9	84.2	1.154	0.413	1.6853	
15 minute winter	9	1.008	10	85.2	1.218	0.418	3.2764	
60 minute winter	10	Hydro-Brake®	11	21.5				
15 minute winter	30	2.000	11	22.1	2.160	0.089	0.2591	
60 minute winter	11	1.010	12	32.6	1.219	0.203	0.4473	
60 minute winter	12	1.011	13	35.4	1.064	0.059	0.6467	
15 minute winter	13	1.012	14	41.8	0.711	0.260	1.2906	
15 minute winter	14	1.013	15	51.3	0.824	0.319	1.7201	
15 minute winter	15	1.014	16	61.1	1.006	0.380	1.3171	
15 minute winter	16	1.015	17	71.2	0.776	0.296	2.1260	
15 minute winter	17	1.016	18	80.5	0.808	0.334	1.9609	
15 minute winter	18	1.017	19	98.0	0.967	0.395	2.4435	
15 minute winter	40	3.000	41	9.7	0.887	0.107	0.6204	
15 minute winter	41	3.001	42	15.4	0.906	0.089	0.2906	
15 minute winter	60	4.000	61	7.6	1.096	0.062	0.2268	
15 minute winter	61	4.001	42	10.4	0.738	0.039	0.1050	
15 minute winter	42	3.002	43	29.7	1.616	0.257	0.1717	
15 minute winter	43	3.003	44	35.2	2.387	0.122	0.3538	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	11	55.287	0.087	42.1	0.2747	0.0000	OK
15 minute winter	70	11	53.209	0.059	9.0	0.2061	0.0000	OK
15 minute winter	45	11	53.036	0.136	56.1	0.3989	0.0000	OK
15 minute winter	46	11	52.902	0.176	61.0	0.5239	0.0000	OK
15 minute winter	47	12	52.826	0.196	71.8	1.3324	0.0000	OK
15 minute winter	48	12	52.676	0.226	80.4	1.2069	0.0000	OK
15 minute winter	49	13	52.619	0.274	91.7	1.6206	0.0000	OK
15 minute winter	50	13	52.577	0.257	96.8	1.4046	0.0000	OK
960 minute winter	51	720	51.429	0.347	12.2	157.7153	0.0000	OK
15 minute winter	19	12	50.065	0.248	104.5	0.7161	0.0000	OK
360 minute winter	20	272	49.033	0.356	42.5	176.0543	0.0000	SURCHARGED
360 minute winter	21	272	48.666	0.051	20.5	0.0908	0.0000	OK
360 minute winter	22	272	45.642	0.042	20.5	0.0749	0.0000	OK
360 minute winter	43_1	272	40.341	0.041	20.5	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 winter	44	3.004	45	42.1	2.517	0.179	0.8072	
15 minute winter	70	5.000	45	8.6	0.361	0.038	1.2974	
15 minute winter	45	3.005	46	55.6	1.142	0.163	0.7593	
15 minute winter	46	3.006	47	60.2	1.001	0.264	1.0821	
15 minute winter	47	3.007	48	71.7	0.990	0.382	3.8522	
15 minute winter	48	3.008	49	77.7	0.865	0.423	2.8949	
15 minute winter	49	3.009	50	89.2	0.929	0.555	0.9814	
15 minute winter	50	3.010	51	96.5	1.145	0.599	3.2545	
960 minute winter	51	Hydro-Brake®	19	3.4				
15 minute winter	19	1.018	20	103.3	1.136	0.429	2.3420	
360 minute winter	20	Hydro-Brake®	21	20.5				
360 minute winter	21	1.020	22	20.5	2.923	0.058	0.2156	
360 minute winter	22	1.021	43_1	20.5	3.438	0.042	0.1639	432.8

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.410	0.110	27.0	0.4981	0.0000	OK
15 minute winter	2	11	56.239	0.139	38.1	0.6092	0.0000	OK
15 minute winter	3	11	55.866	0.166	57.5	0.5910	0.0000	OK
15 minute winter	4	11	55.216	0.091	76.2	0.3931	0.0000	OK
15 minute winter	5	11	52.682	0.203	85.0	0.5993	0.0000	OK
15 minute winter	6	11	52.426	0.151	87.3	0.4175	0.0000	OK
15 minute winter	7	12	52.145	0.249	99.7	1.9772	0.0000	OK
15 minute winter	8	12	52.063	0.259	111.1	2.1752	0.0000	OK
15 minute winter	9	13	51.959	0.247	113.3	1.8687	0.0000	OK
60 minute winter	10	51	51.424	0.469	72.6	65.6226	0.0000	SURCHARGED
15 minute winter	30	10	54.518	0.071	29.0	0.2748	0.0000	OK
30 minute winter	11	20	51.078	0.144	40.1	0.2856	0.0000	OK
30 minute winter	12	20	50.976	0.083	45.4	0.1439	0.0000	OK
15 minute winter	13	11	50.453	0.203	54.5	0.6150	0.0000	OK
15 minute winter	14	11	50.414	0.219	67.7	0.7261	0.0000	OK
15 minute winter	15	11	50.347	0.230	81.0	0.7915	0.0000	OK
15 minute winter	16	12	50.254	0.266	93.5	0.9529	0.0000	OK
15 minute winter	17	12	50.218	0.288	104.9	0.9768	0.0000	OK
15 minute winter	18	12	50.179	0.298	127.8	1.1180	0.0000	OK
15 minute winter	40	10	57.752	0.077	12.9	0.2707	0.0000	OK
15 minute winter	41	11	57.368	0.068	20.0	0.2094	0.0000	OK
15 minute winter	60	10	57.760	0.060	10.1	0.2098	0.0000	OK
15 minute winter	61	10	57.346	0.046	13.7	0.1325	0.0000	OK
15 minute winter	42	11	57.032	0.132	38.2	0.3824	0.0000	OK
15 minute winter	43	11	56.880	0.080	45.4	0.2513	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 winter	1	1.000	2	26.5	0.966	0.266	0.6822	
15 minute winter	2	1.001	3	38.0	1.058	0.443	2.4083	
15 minute winter	3	1.002	4	54.9	1.403	0.573	2.6267	
15 minute winter	4	1.003	5	76.0	2.992	0.132	0.8480	
15 minute winter	5	1.004	6	83.7	1.482	0.487	0.9905	
15 minute winter	6	1.005	7	87.3	1.297	0.228	1.8391	
15 minute winter	7	1.006	8	99.2	1.077	0.487	2.1186	
15 minute winter	8	1.007	9	110.3	1.219	0.541	2.0955	
15 minute winter	9	1.008	10	111.6	1.300	0.548	4.0196	
60 minute winter	10	Hydro-Brake®	11	22.2				
15 minute winter	30	2.000	11	28.6	2.322	0.115	0.3124	
30 minute winter	11	1.010	12	40.1	1.290	0.249	0.5203	
30 minute winter	12	1.011	13	45.4	1.078	0.075	0.8163	
15 minute winter	13	1.012	14	54.3	0.745	0.338	1.6015	
15 minute winter	14	1.013	15	67.1	0.872	0.418	2.1234	
15 minute winter	15	1.014	16	79.4	1.084	0.494	1.5891	
15 minute winter	16	1.015	17	92.6	0.807	0.384	2.6759	
15 minute winter	17	1.016	18	105.1	0.849	0.436	2.4375	
15 minute winter	18	1.017	19	128.3	1.031	0.516	3.0009	
15 minute winter	40	3.000	41	12.5	0.955	0.139	0.7459	
15 minute winter	41	3.001	42	19.9	0.968	0.116	0.3506	
15 minute winter	60	4.000	61	9.9	1.182	0.080	0.2726	
15 minute winter	61	4.001	42	13.5	0.787	0.050	0.1267	
15 minute winter	42	3.002	43	38.4	1.730	0.332	0.2072	
15 minute winter	43	3.003	44	45.5	2.558	0.158	0.4276	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	11	55.300	0.100	54.6	0.3159	0.0000	OK
15 minute winter	70	11	53.217	0.067	11.6	0.2332	0.0000	OK
15 minute winter	45	11	53.061	0.161	72.9	0.4720	0.0000	OK
15 minute winter	46	11	52.934	0.208	79.4	0.6181	0.0000	OK
15 minute winter	47	12	52.859	0.229	93.5	1.5577	0.0000	OK
15 minute winter	48	12	52.726	0.276	104.2	1.4762	0.0000	OK
15 minute winter	49	13	52.670	0.325	119.2	1.9218	0.0000	OK
15 minute winter	50	13	52.623	0.303	126.9	1.6566	0.0000	OK
960 minute winter	51	750	51.504	0.422	14.5	197.2464	0.0000	OK
15 minute winter	19	12	50.108	0.291	137.0	0.8385	0.0000	OK
360 minute winter	20	288	49.132	0.455	50.5	231.4952	0.0000	SURCHARGED
240 minute winter	21	160	48.666	0.051	20.5	0.0908	0.0000	OK
120 minute winter	22	120	45.642	0.042	20.5	0.0749	0.0000	OK
120 minute winter	43_1	120	40.341	0.041	20.5	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 winter	44	3.004	45	54.7	2.702	0.232	0.9773	
15 minute winter	70	5.000	45	11.1	0.379	0.049	1.6174	
15 minute winter	45	3.005	46	72.4	1.187	0.212	0.9501	
15 minute winter	46	3.006	47	78.6	1.051	0.345	1.3447	
15 minute winter	47	3.007	48	92.9	1.032	0.495	4.8364	
15 minute winter	48	3.008	49	101.1	0.899	0.550	3.6143	
15 minute winter	49	3.009	50	116.5	0.992	0.725	1.1910	
15 minute winter	50	3.010	51	125.9	1.239	0.782	3.9195	
960 minute winter	51	Hydro-Brake®	19	3.4				
15 minute winter	19	1.018	20	136.5	1.228	0.567	2.8487	
360 minute winter	20	Hydro-Brake®	21	20.5				
240 minute winter	21	1.020	22	20.5	2.923	0.058	0.2157	
120 minute winter	22	1.021	43_1	20.5	3.438	0.042	0.1639	323.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.462	0.162	51.2	0.7320	0.0000	OK
15 minute winter	2	10	56.308	0.208	72.5	0.9104	0.0000	OK
15 minute winter	3	12	55.993	0.293	109.0	1.0437	0.0000	OK
15 minute winter	4	11	55.251	0.126	141.8	0.5408	0.0000	OK
15 minute winter	5	11	52.801	0.322	158.8	0.9520	0.0000	OK
15 minute winter	6	11	52.488	0.213	164.7	0.5882	0.0000	OK
15 minute winter	7	12	52.327	0.431	190.4	3.4250	0.0000	OK
15 minute winter	8	12	52.233	0.429	208.1	3.6101	0.0000	OK
15 minute winter	9	12	52.102	0.390	210.0	2.9529	0.0000	OK
120 minute winter	10	98	51.755	0.800	90.8	154.3588	0.0000	SURCHARGED
15 minute winter	30	10	54.547	0.100	54.9	0.3868	0.0000	OK
30 minute summer	11	19	51.131	0.197	75.3	0.3910	0.0000	OK
30 minute summer	12	19	51.008	0.115	87.8	0.1996	0.0000	OK
15 minute winter	13	12	50.596	0.346	107.0	1.0495	0.0000	OK
15 minute winter	14	12	50.563	0.368	129.0	1.2196	0.0000	OK
15 minute winter	15	12	50.509	0.392	150.9	1.3508	0.0000	OK
15 minute winter	16	12	50.438	0.450	173.9	1.6111	0.0000	OK
15 minute winter	17	12	50.397	0.467	194.0	1.5822	0.0000	OK
15 minute winter	18	12	50.347	0.466	240.0	1.7491	0.0000	OK
15 minute winter	40	10	57.783	0.108	24.5	0.3803	0.0000	OK
15 minute winter	41	11	57.395	0.095	38.2	0.2898	0.0000	OK
15 minute winter	60	10	57.784	0.084	19.1	0.2911	0.0000	OK
15 minute winter	61	10	57.362	0.062	26.0	0.1815	0.0000	OK
15 minute winter	42	11	57.092	0.192	72.7	0.5580	0.0000	OK
15 minute winter	43	11	56.913	0.113	86.2	0.3548	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 winter	1	1.000	2	50.5	1.110	0.507	1.1270	
15 minute winter	2	1.001	3	71.9	1.209	0.839	4.0466	
15 minute winter	3	1.002	4	100.0	1.547	1.044	4.4189	
15 minute winter	4	1.003	5	141.8	3.028	0.247	1.7242	
15 minute winter	5	1.004	6	157.9	1.683	0.919	1.6366	
15 minute winter	6	1.005	7	165.7	1.427	0.432	3.0478	
15 minute winter	7	1.006	8	182.7	1.194	0.897	3.5888	
15 minute winter	8	1.007	9	204.4	1.372	1.003	3.4679	
15 minute winter	9	1.008	10	206.1	1.539	1.012	6.2319	
120 minute winter	10	Hydro-Brake®	11	22.5				
15 minute winter	30	2.000	11	54.3	2.758	0.218	0.4989	
30 minute summer	11	1.010	12	75.3	1.549	0.469	0.8064	
30 minute summer	12	1.011	13	87.9	1.160	0.146	1.4841	
15 minute winter	13	1.012	14	103.6	0.823	0.645	2.9602	
15 minute winter	14	1.013	15	125.0	0.931	0.778	3.8988	
15 minute winter	15	1.014	16	147.7	1.100	0.919	3.1171	
15 minute winter	16	1.015	17	172.2	0.865	0.714	4.6286	
15 minute winter	17	1.016	18	195.0	0.966	0.809	3.9907	
15 minute winter	18	1.017	19	239.1	1.214	0.962	4.7426	
15 minute winter	40	3.000	41	23.8	1.141	0.264	1.1874	
15 minute winter	41	3.001	42	37.8	1.135	0.219	0.5593	
15 minute winter	60	4.000	61	18.8	1.418	0.152	0.4322	
15 minute winter	61	4.001	42	25.7	0.910	0.096	0.2020	
15 minute winter	42	3.002	43	73.0	2.026	0.631	0.3325	
15 minute winter	43	3.003	44	86.6	2.999	0.300	0.6925	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	11	55.345	0.145	103.7	0.4548	0.0000	OK
15 minute winter	70	10	53.241	0.091	22.0	0.3197	0.0000	OK
15 minute winter	45	12	53.182	0.282	138.8	0.8288	0.0000	OK
15 minute winter	46	12	53.173	0.447	152.3	1.3303	0.0000	OK
15 minute winter	47	12	53.122	0.492	167.8	3.3526	0.0000	SURCHARGED
15 minute winter	48	12	53.001	0.551	177.2	2.9435	0.0000	SURCHARGED
15 minute winter	49	12	52.883	0.538	202.4	3.1826	0.0000	SURCHARGED
15 minute winter	50	12	52.802	0.482	220.9	2.6401	0.0000	SURCHARGED
960 minute winter	51	930	51.858	0.776	24.4	412.2415	0.0000	SURCHARGED
15 minute winter	19	12	50.251	0.434	256.1	1.2516	0.0000	OK
480 minute winter	20	448	49.589	0.912	66.5	527.8021	0.0000	SURCHARGED
60 minute winter	21	42	48.666	0.051	20.5	0.0908	0.0000	OK
60 minute summer	22	45	45.642	0.042	20.5	0.0749	0.0000	OK
60 minute summer	43_1	45	40.341	0.041	20.5	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 winter	44	3.004	45	104.4	3.193	0.443	1.5767	
15 minute winter	70	5.000	45	21.3	0.419	0.093	3.1105	
15 minute winter	45	3.005	46	139.0	1.292	0.406	2.0437	
15 minute winter	46	3.006	47	137.8	1.140	0.604	2.8485	
15 minute winter	47	3.007	48	150.0	1.090	0.799	8.3798	
15 minute winter	48	3.008	49	169.0	1.067	0.920	5.1017	
15 minute winter	49	3.009	50	201.3	1.271	1.253	1.6003	
15 minute winter	50	3.010	51	219.1	1.455	1.361	5.4677	
960 minute winter	51	Hydro-Brake®	19	3.4				
15 minute winter	19	1.018	20	257.3	1.500	1.068	4.3665	
480 minute winter	20	Hydro-Brake®	21	20.5				
60 minute winter	21	1.020	22	20.5	2.923	0.058	0.2157	
60 minute summer	22	1.021	43_1	20.5	3.438	0.042	0.1639	330.5

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	56.618	0.318	66.2	1.4422	0.0000	SURCHARGED
15 minute winter	2	12	56.549	0.449	94.4	1.9672	0.0000	SURCHARGED
15 minute winter	3	12	56.197	0.497	125.6	1.7693	0.0000	SURCHARGED
15 minute winter	4	11	55.263	0.138	169.2	0.5935	0.0000	OK
15 minute winter	5	11	52.910	0.431	191.3	1.2766	0.0000	SURCHARGED
15 minute winter	6	12	52.614	0.339	199.0	0.9356	0.0000	OK
15 minute winter	7	12	52.531	0.635	221.5	5.0469	0.0000	SURCHARGED
15 minute winter	8	12	52.384	0.580	242.5	4.8779	0.0000	SURCHARGED
15 minute winter	9	13	52.201	0.489	245.8	3.6983	0.0000	SURCHARGED
120 minute winter	10	112	51.941	0.986	119.2	220.0288	0.0000	SURCHARGED
15 minute winter	30	10	54.562	0.115	71.1	0.4472	0.0000	OK
30 minute summer	11	18	51.159	0.225	97.5	0.4474	0.0000	OK
30 minute summer	12	18	51.024	0.131	114.7	0.2282	0.0000	OK
15 minute winter	13	12	50.951	0.701	140.6	2.1274	0.0000	SURCHARGED
15 minute winter	14	12	50.895	0.700	162.5	2.3181	0.0000	SURCHARGED
15 minute winter	15	12	50.796	0.679	191.8	2.3394	0.0000	SURCHARGED
15 minute winter	16	12	50.678	0.690	223.8	2.4688	0.0000	SURCHARGED
15 minute winter	17	12	50.600	0.670	253.7	2.2695	0.0000	SURCHARGED
15 minute winter	18	12	50.509	0.628	310.3	2.3603	0.0000	SURCHARGED
15 minute winter	40	10	57.800	0.125	31.7	0.4377	0.0000	OK
15 minute winter	41	11	57.412	0.112	49.6	0.3421	0.0000	OK
15 minute winter	60	10	57.796	0.096	24.8	0.3341	0.0000	OK
15 minute winter	61	10	57.371	0.071	33.7	0.2067	0.0000	OK
15 minute winter	42	11	57.129	0.229	94.3	0.6632	0.0000	OK
15 minute winter	43	11	56.933	0.133	111.8	0.4169	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 winter	1	1.000	2	66.0	1.153	0.663	1.7501	
15 minute winter	2	1.001	3	76.8	1.238	0.896	4.7148	
15 minute winter	3	1.002	4	115.9	1.652	1.210	4.5461	
15 minute winter	4	1.003	5	169.1	3.041	0.295	2.2888	
15 minute winter	5	1.004	6	190.2	1.737	1.107	1.8316	
15 minute winter	6	1.005	7	189.4	1.452	0.494	3.8666	
15 minute winter	7	1.006	8	212.5	1.341	1.043	3.6440	
15 minute winter	8	1.007	9	238.5	1.505	1.171	3.6394	
15 minute winter	9	1.008	10	243.6	1.586	1.196	6.7849	
120 minute winter	10	Hydro-Brake®	11	22.5				
15 minute winter	30	2.000	11	70.4	2.949	0.283	0.6046	
30 minute summer	11	1.010	12	96.8	1.665	0.603	0.9643	
30 minute summer	12	1.011	13	114.3	1.206	0.190	1.8375	
15 minute winter	13	1.012	14	134.4	0.848	0.837	3.4797	
15 minute winter	14	1.013	15	163.6	1.033	1.018	4.3722	
15 minute winter	15	1.014	16	193.7	1.223	1.206	3.4325	
15 minute winter	16	1.015	17	225.8	1.045	0.937	4.9986	
15 minute winter	17	1.016	18	255.1	1.181	1.058	4.2526	
15 minute winter	18	1.017	19	311.6	1.442	1.254	5.2081	
15 minute winter	40	3.000	41	30.9	1.203	0.343	1.4621	
15 minute winter	41	3.001	42	49.1	1.191	0.285	0.6828	
15 minute winter	60	4.000	61	24.4	1.523	0.198	0.5222	
15 minute winter	61	4.001	42	33.4	0.958	0.125	0.2437	
15 minute winter	42	3.002	43	94.6	2.134	0.818	0.4051	
15 minute winter	43	3.003	44	112.3	3.274	0.389	0.8344	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	10	55.367	0.167	134.5	0.5246	0.0000	OK
15 minute winter	70	13	53.515	0.365	61.5	1.2793	0.0000	OK
15 minute winter	45	12	53.490	0.590	176.0	1.7322	0.0000	SURCHARGED
15 minute winter	46	13	53.441	0.715	159.1	2.1299	0.0000	SURCHARGED
15 minute winter	47	13	53.382	0.752	182.9	5.1184	0.0000	SURCHARGED
15 minute winter	48	13	53.189	0.739	200.3	3.9511	0.0000	SURCHARGED
15 minute winter	49	12	53.018	0.673	237.7	3.9815	0.0000	SURCHARGED
15 minute winter	50	12	52.909	0.589	259.1	3.2245	0.0000	SURCHARGED
960 minute winter	51	945	52.053	0.971	30.8	549.9589	0.0000	SURCHARGED
15 minute winter	19	12	50.360	0.543	333.0	1.5671	0.0000	SURCHARGED
600 minute winter	20	585	49.835	1.158	70.2	712.8906	0.0000	SURCHARGED
30 minute summer	21	226	48.666	0.051	20.5	0.0908	0.0000	OK
60 minute summer	22	38	45.642	0.042	20.5	0.0749	0.0000	OK
60 minute summer	43_1	38	40.341	0.041	20.5	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 winter	44	3.004	45	135.1	3.349	0.573	2.6281	
15 minute winter	70	5.000	45	36.4	0.436	0.159	7.3345	
15 minute winter	45	3.005	46	144.8	1.310	0.423	2.4636	
15 minute winter	46	3.006	47	150.4	1.161	0.659	2.8506	
15 minute winter	47	3.007	48	180.1	1.137	0.959	8.3798	
15 minute winter	48	3.008	49	205.1	1.295	1.116	5.1017	
15 minute winter	49	3.009	50	240.2	1.516	1.495	1.6003	
15 minute winter	50	3.010	51	263.2	1.692	1.635	5.6878	
960 minute winter	51	Hydro-Brake®	19	3.4				
15 minute winter	19	1.018	20	334.1	1.644	1.387	4.9872	
600 minute winter	20	Hydro-Brake®	21	20.5				
30 minute summer	21	1.020	22	20.5	2.923	0.058	0.2157	
60 minute summer	22	1.021	43_1	20.5	3.438	0.042	0.1639	326.1

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	57.689	1.389	99.2	6.2923	0.0000	FLOOD RISK
15 minute winter	2	12	57.556	1.455	111.1	6.3824	0.0000	FLOOD RISK
15 minute winter	3	12	56.942	1.242	162.2	4.4183	0.0000	SURCHARGED
15 minute winter	4	12	55.292	0.167	232.9	0.7187	0.0000	OK
15 minute winter	5	12	53.712	1.233	264.2	3.6484	0.0000	SURCHARGED
15 minute winter	6	12	53.311	1.036	258.5	2.8591	0.0000	SURCHARGED
15 minute winter	7	13	53.086	1.190	295.9	9.4557	0.0000	SURCHARGED
15 minute winter	8	13	52.824	1.020	329.5	8.5730	0.0000	SURCHARGED
15 minute winter	9	13	52.491	0.779	331.5	5.8887	0.0000	FLOOD RISK
180 minute winter	10	176	52.297	1.342	134.2	376.1241	0.0000	SURCHARGED
15 minute winter	30	10	54.593	0.146	106.5	0.5687	0.0000	OK
15 minute winter	11	11	51.671	0.737	131.8	1.4644	0.0000	SURCHARGED
15 minute winter	12	12	51.646	0.753	147.9	1.3126	0.0000	SURCHARGED
15 minute winter	13	12	51.606	1.356	173.0	4.1148	0.0000	SURCHARGED
15 minute winter	14	12	51.527	1.332	208.3	4.4128	0.0000	SURCHARGED
15 minute winter	15	12	51.373	1.256	252.1	4.3306	0.0000	SURCHARGED
15 minute winter	16	11	51.175	1.187	299.4	4.2488	0.0000	SURCHARGED
15 minute winter	17	11	51.041	1.111	344.9	3.7666	0.0000	SURCHARGED
15 minute winter	18	11	50.879	0.998	439.5	3.7486	0.0000	SURCHARGED
15 minute winter	40	10	57.834	0.159	47.5	0.5559	0.0000	OK
15 minute winter	41	11	57.438	0.138	74.4	0.4227	0.0000	OK
15 minute winter	60	10	57.820	0.120	37.1	0.4163	0.0000	OK
15 minute winter	61	10	57.387	0.087	50.6	0.2540	0.0000	OK
15 minute winter	42	11	57.284	0.384	142.2	1.1130	0.0000	SURCHARGED
15 minute winter	43	10	56.968	0.168	167.2	0.5284	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 winter	1	1.000	2	71.8	1.197	0.721	1.7501	
15 minute winter	2	1.001	3	102.6	1.458	1.198	4.7148	
15 minute winter	3	1.002	4	157.3	2.234	1.642	4.6761	
15 minute winter	4	1.003	5	231.1	2.987	0.403	2.4898	
15 minute winter	5	1.004	6	247.6	2.245	1.441	1.9247	
15 minute winter	6	1.005	7	255.3	1.611	0.666	4.2758	
15 minute winter	7	1.006	8	285.8	1.804	1.403	3.6440	
15 minute winter	8	1.007	9	321.2	2.027	1.576	3.6394	
15 minute winter	9	1.008	10	330.6	2.090	1.623	7.1725	
180 minute winter	10	Hydro-Brake®	11	22.5				
15 minute winter	30	2.000	11	105.6	3.254	0.424	0.8220	
15 minute winter	11	1.010	12	119.8	1.706	0.746	2.5985	
15 minute winter	12	1.011	13	133.9	1.228	0.223	2.9597	
15 minute winter	13	1.012	14	164.9	1.041	1.026	3.4797	
15 minute winter	14	1.013	15	204.8	1.293	1.275	4.3722	
15 minute winter	15	1.014	16	252.7	1.595	1.573	3.4325	
15 minute winter	16	1.015	17	303.0	1.403	1.257	4.9986	
15 minute winter	17	1.016	18	349.3	1.617	1.449	4.2526	
15 minute winter	18	1.017	19	436.3	2.020	1.756	5.2081	
15 minute winter	40	3.000	41	46.4	1.353	0.514	1.9462	
15 minute winter	41	3.001	42	73.5	1.260	0.427	0.8549	
15 minute winter	60	4.000	61	36.6	1.698	0.296	0.7018	
15 minute winter	61	4.001	42	50.2	1.009	0.188	0.3036	
15 minute winter	42	3.002	43	141.4	2.284	1.223	0.5131	
15 minute winter	43	3.003	44	166.7	3.411	0.577	1.3203	

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	12	55.890	0.690	200.5	2.1709	0.0000	SURCHARGED
15 minute winter	70	13	54.604	1.454	42.6	5.0984	0.0000	FLOOD RISK
15 minute winter	45	13	54.597	1.697	269.0	4.9867	0.0000	SURCHARGED
15 minute winter	46	13	54.488	1.762	233.9	5.2452	0.0000	SURCHARGED
15 minute winter	47	13	54.347	1.717	268.5	11.6903	0.0000	FLOOD RISK
15 minute winter	48	13	53.919	1.469	293.2	7.8526	0.0000	SURCHARGED
15 minute winter	49	13	53.553	1.208	351.3	7.1459	0.0000	SURCHARGED
15 minute winter	50	13	53.309	0.989	383.1	5.4176	0.0000	SURCHARGED
1440 minute winter	51	1410	52.479	1.397	33.7	898.5009	0.0000	SURCHARGED
15 minute winter	19	11	50.576	0.759	471.2	2.1902	0.0000	FLOOD RISK
960 minute winter	20	990	50.263	1.586	72.5	1080.1460	0.0000	SURCHARGED
960 minute winter	21	990	48.670	0.055	23.6	0.0974	0.0000	OK
960 minute winter	22	990	45.645	0.045	23.6	0.0803	0.0000	OK
960 minute winter	43_1	990	40.344	0.044	23.6	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 winter	44	3.004	45	184.9	3.307	0.785	3.3965	
15 minute winter	70	5.000	45	56.7	0.461	0.247	7.8487	
15 minute winter	45	3.005	46	209.3	1.326	0.612	2.4636	
15 minute winter	46	3.006	47	226.2	1.428	0.992	2.8506	
15 minute winter	47	3.007	48	262.8	1.659	1.399	8.3798	
15 minute winter	48	3.008	49	296.5	1.871	1.613	5.1017	
15 minute winter	49	3.009	50	349.5	2.206	2.176	1.6003	
15 minute winter	50	3.010	51	380.7	2.403	2.364	6.0096	
1440 minute winter	51	Hydro-Brake®	19	3.7				
15 minute winter	19	1.018	20	470.0	2.183	1.951	5.3235	
960 minute winter	20	Hydro-Brake®	21	23.6				
960 minute winter	21	1.020	22	23.6	3.040	0.067	0.2385	
960 minute winter	22	1.021	43_1	23.6	3.584	0.048	0.1811	1353.9

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Circular_Default Sewer Type Link Type

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

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
101	0.079	5.00	53.901	1200	300791.115	509917.699	1.350
107	0.079	5.00	52.569	1200	300838.431	509919.390	1.350
102	0.079	5.00	52.597	1200	300825.427	509902.918	1.736
105	0.039	5.00	52.841	1200	300779.913	509865.908	1.759
106	0.039	5.00	51.839	1200	300806.089	509855.498	1.500
103	0.000		52.209	1200	300812.444	509874.049	1.951
104			52.089	1200	300824.962	509868.989	1.887

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	101	102	37.360	0.600	52.551	51.057	1.494	25.0	150	5.31	50.0
3.000	107	102	20.986	0.600	51.219	51.011	0.208	100.9	150	5.35	50.0
1.001	102	103	31.654	0.600	50.861	50.258	0.603	52.5	300	5.59	50.0
2.000	105	106	28.170	0.600	51.082	50.339	0.743	37.9	300	5.18	50.0
2.001	106	103	19.609	0.600	50.339	50.258	0.081	242.1	300	5.51	50.0
1.002	103	104	13.502	0.600	50.258	50.202	0.056	241.1	300	5.82	50.0

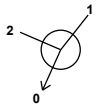
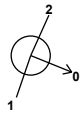
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.022	35.7	10.7	1.200	1.390	0.079	0.0	56	1.766
3.000	1.000	17.7	10.7	1.200	1.436	0.079	0.0	84	1.046
1.001	2.174	153.7	32.1	1.436	1.651	0.237	0.0	93	1.733
2.000	2.561	181.0	5.3	1.459	1.200	0.039	0.0	35	1.153
2.001	1.006	71.1	10.6	1.200	1.651	0.078	0.0	78	0.726
1.002	1.008	71.2	42.7	1.651	1.587	0.315	0.0	167	1.051

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	37.360	25.0	150	Circular_Default Sewer Type	53.901	52.551	1.200	52.597	51.057	1.390
3.000	20.986	100.9	150	Circular_Default Sewer Type	52.569	51.219	1.200	52.597	51.011	1.436
1.001	31.654	52.5	300	Circular_Default Sewer Type	52.597	50.861	1.436	52.209	50.258	1.651
2.000	28.170	37.9	300	Circular_Default Sewer Type	52.841	51.082	1.459	51.839	50.339	1.200
2.001	19.609	242.1	300	Circular_Default Sewer Type	51.839	50.339	1.200	52.209	50.258	1.651
1.002	13.502	241.1	300	Circular_Default Sewer Type	52.209	50.258	1.651	52.089	50.202	1.587

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	101	1200	Manhole	Adoptable	102	1200	Manhole	Adoptable
3.000	107	1200	Manhole	Adoptable	102	1200	Manhole	Adoptable
1.001	102	1200	Manhole	Adoptable	103	1200	Manhole	Adoptable
2.000	105	1200	Manhole	Adoptable	106	1200	Manhole	Adoptable
2.001	106	1200	Manhole	Adoptable	103	1200	Manhole	Adoptable
1.002	103	1200	Manhole	Adoptable	104	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
101	300791.115	509917.699	53.901	1.350	1200		0	1.000	52.551	150
107	300838.431	509919.390	52.569	1.350	1200		0	3.000	51.219	150
102	300825.427	509902.918	52.597	1.736	1200		1	3.000	51.011	150
							2	1.000	51.057	150
							0	1.001	50.861	300
105	300779.913	509865.908	52.841	1.759	1200		0	2.000	51.082	300
106	300806.089	509855.498	51.839	1.500	1200		1	2.000	50.339	300
							0	2.001	50.339	300
103	300812.444	509874.049	52.209	1.951	1200		1	2.001	50.258	300
							2	1.001	50.258	300
							0	1.002	50.258	300
104	300824.962	509868.989	52.089	1.887	1200		1	1.002	50.202	300

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	50	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 104 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.05760	Safety Factor	2.0	Invert Level (m)	50.200
Side Inf Coefficient (m/hr)	0.05760	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	291.0	0.0	1.500	806.0	0.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	115.582	32.706
2 year 15 minute winter	81.110	32.706
2 year 30 minute summer	78.274	22.149
2 year 30 minute winter	54.929	22.149
2 year 60 minute summer	54.898	14.508
2 year 60 minute winter	36.473	14.508
2 year 120 minute summer	35.318	9.333
2 year 120 minute winter	23.464	9.333
2 year 180 minute summer	27.902	7.180
2 year 180 minute winter	18.137	7.180
2 year 240 minute summer	22.534	5.955
2 year 240 minute winter	14.971	5.955
2 year 360 minute summer	17.706	4.556
2 year 360 minute winter	11.509	4.556
2 year 480 minute summer	14.238	3.763
2 year 480 minute winter	9.459	3.763
2 year 600 minute summer	11.857	3.243
2 year 600 minute winter	8.102	3.243
2 year 720 minute summer	10.718	2.872
2 year 720 minute winter	7.203	2.872
2 year 960 minute summer	9.007	2.372
2 year 960 minute winter	5.967	2.372
2 year 1440 minute summer	6.757	1.811
2 year 1440 minute winter	4.541	1.811
2 year 2160 minute summer	4.999	1.382
2 year 2160 minute winter	3.445	1.382
2 year 2880 minute summer	4.256	1.141
2 year 2880 minute winter	2.860	1.141
2 year 4320 minute summer	3.332	0.871
2 year 4320 minute winter	2.195	0.871
2 year 5760 minute summer	2.807	0.719
2 year 5760 minute winter	1.817	0.719
2 year 7200 minute summer	2.424	0.618
2 year 7200 minute winter	1.565	0.618
2 year 8640 minute summer	2.145	0.547
2 year 8640 minute winter	1.384	0.547
2 year 10080 minute summer	1.934	0.493
2 year 10080 minute winter	1.248	0.493
30 year 15 minute summer	218.051	61.701
30 year 15 minute winter	153.018	61.701
30 year 30 minute summer	148.919	42.139
30 year 30 minute winter	104.504	42.139
30 year 60 minute summer	104.640	27.653
30 year 60 minute winter	69.521	27.653
30 year 120 minute summer	66.723	17.633
30 year 120 minute winter	44.329	17.633
30 year 180 minute summer	52.039	13.391
30 year 180 minute winter	33.827	13.391
30 year 240 minute summer	41.446	10.953
30 year 240 minute winter	27.535	10.953
30 year 360 minute summer	31.970	8.227
30 year 360 minute winter	20.781	8.227

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 480 minute summer	25.394	6.711
30 year 480 minute winter	16.871	6.711
30 year 600 minute summer	20.933	5.726
30 year 600 minute winter	14.303	5.726
30 year 720 minute summer	18.756	5.027
30 year 720 minute winter	12.605	5.027
30 year 960 minute summer	15.532	4.090
30 year 960 minute winter	10.289	4.090
30 year 1440 minute summer	11.393	3.053
30 year 1440 minute winter	7.657	3.053
30 year 2160 minute summer	8.233	2.275
30 year 2160 minute winter	5.673	2.275
30 year 2880 minute summer	6.883	1.845
30 year 2880 minute winter	4.626	1.845
30 year 4320 minute summer	5.242	1.370
30 year 4320 minute winter	3.452	1.370
30 year 5760 minute summer	4.337	1.110
30 year 5760 minute winter	2.807	1.110
30 year 7200 minute summer	3.697	0.943
30 year 7200 minute winter	2.386	0.943
30 year 8640 minute summer	3.236	0.826
30 year 8640 minute winter	2.089	0.826
30 year 10080 minute summer	2.892	0.738
30 year 10080 minute winter	1.867	0.738
100 year +50% CC +10% A 15 minute summer	421.338	119.224
100 year +50% CC +10% A 15 minute winter	295.676	119.224
100 year +50% CC +10% A 30 minute summer	290.933	82.324
100 year +50% CC +10% A 30 minute winter	204.164	82.324
100 year +50% CC +10% A 60 minute summer	206.006	54.441
100 year +50% CC +10% A 60 minute winter	136.865	54.441
100 year +50% CC +10% A 120 minute summer	131.622	34.784
100 year +50% CC +10% A 120 minute winter	87.446	34.784
100 year +50% CC +10% A 180 minute summer	102.344	26.337
100 year +50% CC +10% A 180 minute winter	66.526	26.337
100 year +50% CC +10% A 240 minute summer	81.117	21.437
100 year +50% CC +10% A 240 minute winter	53.892	21.437
100 year +50% CC +10% A 360 minute summer	62.092	15.978
100 year +50% CC +10% A 360 minute winter	40.361	15.978
100 year +50% CC +10% A 480 minute summer	49.055	12.964
100 year +50% CC +10% A 480 minute winter	32.591	12.964
100 year +50% CC +10% A 600 minute summer	40.258	11.012
100 year +50% CC +10% A 600 minute winter	27.507	11.012
100 year +50% CC +10% A 720 minute summer	35.933	9.631
100 year +50% CC +10% A 720 minute winter	24.150	9.631
100 year +50% CC +10% A 960 minute summer	29.568	7.786
100 year +50% CC +10% A 960 minute winter	19.586	7.786
100 year +50% CC +10% A 1440 minute summer	21.477	5.756
100 year +50% CC +10% A 1440 minute winter	14.434	5.756
100 year +50% CC +10% A 2160 minute summer	15.354	4.243
100 year +50% CC +10% A 2160 minute winter	10.579	4.243
100 year +50% CC +10% A 2880 minute summer	12.731	3.412
100 year +50% CC +10% A 2880 minute winter	8.556	3.412

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +50% CC +10% A 4320 minute summer	9.575	2.503
100 year +50% CC +10% A 4320 minute winter	6.306	2.503
100 year +50% CC +10% A 5760 minute summer	7.853	2.010
100 year +50% CC +10% A 5760 minute winter	5.083	2.010
100 year +50% CC +10% A 7200 minute summer	6.652	1.697
100 year +50% CC +10% A 7200 minute winter	4.293	1.697
100 year +50% CC +10% A 8640 minute summer	5.792	1.478
100 year +50% CC +10% A 8640 minute winter	3.738	1.478
100 year +50% CC +10% A 10080 minute summer	5.154	1.315
100 year +50% CC +10% A 10080 minute winter	3.326	1.315

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	10	52.611	0.060	11.8	0.1377	0.0000	OK
15 minute winter	107	10	51.311	0.092	11.8	0.2120	0.0000	OK
15 minute winter	102	10	50.957	0.096	34.7	0.1955	0.0000	OK
15 minute winter	105	10	51.118	0.036	5.8	0.0574	0.0000	OK
7200 minute winter	106	6600	50.699	0.360	0.2	0.5939	0.0000	SURCHARGED
7200 minute winter	103	6600	50.699	0.441	1.1	0.4984	0.0000	SURCHARGED
7200 minute winter	104	6600	50.699	0.497	1.1	188.3765	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	101	1.000	102	11.5	1.785	0.323	0.2413
15 minute winter	107	3.000	102	11.4	1.043	0.647	0.2308
15 minute winter	102	1.001	103	34.4	1.108	0.224	1.0263
15 minute winter	105	2.000	106	5.7	0.573	0.032	0.3879
7200 minute winter	106	2.001	103	0.2	0.086	0.003	1.3809
7200 minute winter	103	1.002	104	1.1	0.267	0.015	0.9508
7200 minute winter	104	Infiltration		0.0			

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	10	52.638	0.087	22.2	0.2008	0.0000	OK
15 minute winter	107	11	51.449	0.230	22.2	0.5288	0.0000	SURCHARGED
15 minute winter	102	10	50.994	0.133	63.6	0.2709	0.0000	OK
15 minute winter	105	10	51.131	0.049	10.9	0.0778	0.0000	OK
10080 minute winter	106	9600	50.965	0.626	0.4	1.0340	0.0000	SURCHARGED
10080 minute winter	103	9600	50.965	0.707	1.3	0.7999	0.0000	SURCHARGED
10080 minute winter	104	9600	50.965	0.763	1.3	324.0981	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	101	1.000	102	21.7	2.087	0.609	0.3894
15 minute winter	107	3.000	102	20.7	1.179	1.171	0.3559
15 minute winter	102	1.001	103	63.2	1.273	0.411	1.5831
15 minute winter	105	2.000	106	10.8	0.617	0.060	0.8795
10080 minute winter	106	2.001	103	0.4	0.033	0.005	1.3809
10080 minute winter	103	1.002	104	1.3	0.267	0.018	0.9508
10080 minute winter	104	Infiltration		0.0			

Results for 100 year +50% CC +10% A Critical Storm Duration. Lowest mass balance: 99.47%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	101	12	53.294	0.743	47.1	1.7970	0.0000	SURCHARGED
15 minute winter	107	12	52.531	1.312	47.1	3.1715	0.0000	FLOOD RISK
10080 minute winter	102	9900	51.444	0.583	2.1	1.2439	0.0000	SURCHARGED
10080 minute winter	105	9900	51.444	0.362	0.3	0.5868	0.0000	SURCHARGED
10080 minute winter	106	9900	51.444	1.105	0.6	1.8826	0.0000	SURCHARGED
10080 minute winter	103	9900	51.444	1.186	2.7	1.3419	0.0000	SURCHARGED
10080 minute winter	104	9900	51.444	1.242	2.7	629.4069	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	101	1.000	102	38.7	2.225	1.084	0.6577
15 minute winter	107	3.000	102	38.9	2.212	2.203	0.3695
10080 minute winter	102	1.001	103	2.1	0.324	0.014	2.2291
10080 minute winter	105	2.000	106	0.3	0.178	0.002	1.9837
10080 minute winter	106	2.001	103	0.6	0.156	0.008	1.3809
10080 minute winter	103	1.002	104	2.7	0.267	0.037	0.9508
10080 minute winter	104	Infiltration		0.0			

Design Settings

Frequency of use (kDU)	1.00	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	4000	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	150.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Circular_Default Sewer Type Link Type

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

Available Diameters (mm)

100 | 150

Nodes

Name	Dwellings	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
1	5	55.879	Adoptable	300739.266	510133.507	1.358
2	5	55.103	Adoptable	300736.239	510148.844	1.391
10	5	57.620	Adoptable	300750.230	510017.928	1.350
11	5	58.114	Adoptable	300691.034	510035.611	2.498
12	5	56.807	Adoptable	300707.053	510101.989	1.647
13	5	54.600	Adoptable	300661.059	510113.413	1.609
14	5	53.884	Adoptable	300661.860	510136.014	1.934
15	5	52.755	Adoptable	300675.426	510171.538	1.355
16	5	54.213	Adoptable	300721.695	510160.754	3.576
3	5	54.679	Adoptable	300737.320	510156.837	4.150
4	5	54.023	Adoptable	300744.645	510167.421	3.580
5	5	53.299	Adoptable	300757.602	510170.074	2.944
6	5	52.632	Adoptable	300772.299	510165.126	2.380
7	0	52.127	Adoptable	300797.540	510146.058	2.086
17	0	51.800	Adoptable	300815.366	510124.116	1.947
20	5	59.374	Adoptable	300650.119	509971.277	1.359
21	5	59.055	Adoptable	300684.555	509971.277	1.470
22	5	58.818	Adoptable	300685.696	509962.425	1.353
40	5	58.839	Adoptable	300683.998	509930.208	1.389
41	5	58.610	Adoptable	300683.763	509951.022	1.920
23	5	58.560	Adoptable	300689.466	509957.454	1.927
24	5	58.096	Adoptable	300697.682	509954.517	1.521
25	5	57.287	Adoptable	300713.890	509953.538	1.424
26	5	56.820	Adoptable	300723.093	509950.983	1.620
50	5	54.524	Adoptable	300746.469	509901.567	1.374
27	5	55.282	Adoptable	300759.250	509936.354	2.595
28	5	54.996	Adoptable	300770.143	509933.633	2.449
60	5	53.447	Adoptable	300807.630	509913.609	1.506
61	5	54.308	Adoptable	300785.836	509922.702	2.662
29	5	54.705	Adoptable	300780.290	509936.618	3.246
30	5	54.447	Adoptable	300787.687	509942.749	3.083
70	5	52.400	Adoptable	300831.766	509941.815	1.200
31	5	54.169	Adoptable	300794.974	509957.654	3.470
39	5	52.848	Adoptable	300853.858	509957.499	1.348
42	5	53.106	Adoptable	300844.682	509950.805	1.748
38	5	54.240	Adoptable	300799.768	509969.201	3.697

Nodes

Name	Dwellings	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
32	5	54.508	Adoptable	300808.007	509989.042	4.108
80	5	53.853	Adoptable	300839.860	510012.487	1.645
33	5	54.427	Adoptable	300822.688	510018.757	4.248
34	5	53.856	Adoptable	300830.825	510045.226	3.862
35	5	53.499	Adoptable	300832.012	510069.248	3.665
36	5	52.799	Adoptable	300829.769	510086.294	3.080
8	5	52.101	Adoptable	300825.647	510104.703	2.508
9	0	50.253	Adoptable	300851.952	510115.892	2.053
18	0	48.701	Adoptable	300880.968	510123.172	1.350
19	0	40.511	Adoptable	300913.075	510118.286	1.350
37			Adoptable	300921.203	510133.072	

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	1	2	15.633	1.500	54.521	53.712	0.809	19.3	150
1.001	2	3	8.066	1.500	53.712	53.328	0.384	21.0	150
2.000	10	11	61.781	1.500	56.270	55.616	0.654	94.5	150
2.001	11	12	68.284	1.500	55.616	55.160	0.456	149.7	150
2.002	12	13	47.392	1.500	55.160	53.248	1.912	24.8	150
2.003	13	14	22.615	1.500	52.991	52.000	0.991	22.8	150
2.004	14	15	38.026	1.500	51.950	51.400	0.550	69.1	150
2.005	15	16	47.509	1.500	51.400	51.083	0.317	149.9	150
2.006	16	3	16.108	1.500	50.637	50.529	0.108	149.1	150
1.002	3	4	12.872	1.500	50.529	50.443	0.086	149.7	150
1.003	4	5	13.226	1.500	50.443	50.355	0.088	150.3	150
1.004	5	6	15.508	1.500	50.355	50.252	0.103	150.6	150
1.005	6	7	31.634	1.500	50.252	50.041	0.211	149.9	150
1.006	7	17	28.270	1.500	50.041	49.853	0.188	150.4	150
1.007	17	8	21.967	1.500	49.853	49.600	0.253	86.8	150
3.000	20	21	34.436	1.500	58.015	57.585	0.430	80.1	150

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)
1.000	1.999	35.3	0.2	1.208	1.241	0.000	5	0.0	0.0
1.001	1.917	33.9	0.5	1.241	1.201	0.000	10	0.0	0.0
2.000	0.901	15.9	0.2	1.200	2.348	0.000	5	0.0	0.0
2.001	0.715	12.6	0.5	2.348	1.497	0.000	10	0.0	0.0
2.002	1.764	31.2	0.7	1.497	1.202	0.000	15	0.0	0.0
2.003	1.839	32.5	0.9	1.459	1.734	0.000	20	0.0	0.0
2.004	1.054	18.6	1.2	1.784	1.205	0.000	25	0.0	0.0
2.005	0.714	12.6	1.4	1.205	2.980	0.000	30	0.0	0.0
2.006	0.716	12.7	1.6	3.426	4.000	0.000	35	0.0	0.0
1.002	0.715	12.6	2.3	4.000	3.430	0.000	50	0.0	0.0
1.003	0.713	12.6	2.5	3.430	2.794	0.000	55	0.0	0.0
1.004	0.713	12.6	2.8	2.794	2.230	0.000	60	0.0	0.0
1.005	0.714	12.6	3.0	2.230	1.936	0.000	65	0.0	0.0
1.006	0.713	12.6	3.0	1.936	1.797	0.000	65	0.0	0.0
1.007	0.940	16.6	3.0	1.797	2.351	0.000	65	0.0	0.0
3.000	0.979	17.3	0.2	1.209	1.320	0.000	5	0.0	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
3.001	21	22	8.925	1.500	57.585	57.465	0.120	74.4	150
3.002	22	23	6.239	1.500	57.465	57.153	0.312	20.0	150
4.000	40	41	20.815	1.500	57.450	57.190	0.260	80.1	150
4.001	41	23	8.596	1.500	56.690	56.633	0.057	150.8	150
3.003	23	24	8.725	1.500	56.633	56.575	0.058	150.4	150
3.004	24	25	16.238	1.500	56.575	55.863	0.712	22.8	150
3.005	25	26	9.551	1.500	55.863	55.200	0.663	14.4	150
3.006	26	27	39.004	1.500	55.200	53.700	1.500	26.0	150
5.000	50	27	37.061	1.500	53.150	52.687	0.463	80.0	150
3.007	27	28	11.228	1.500	52.687	52.547	0.140	80.2	150
3.008	28	29	10.577	1.500	52.547	52.415	0.132	80.1	150
6.000	60	61	23.615	1.500	51.941	51.646	0.295	80.1	150
6.001	61	29	14.980	1.500	51.646	51.459	0.187	80.1	150
3.009	29	30	9.608	1.500	51.459	51.395	0.064	150.1	150
3.010	30	31	16.591	1.500	51.364	51.045	0.319	52.0	150
7.000	70	31	40.057	1.500	51.200	50.699	0.501	80.0	150
3.011	31	38	12.503	1.500	50.699	50.543	0.156	80.0	150
9.000	39	42	11.358	1.500	51.500	51.358	0.142	80.0	150
9.001	42	38	48.535	1.500	51.358	50.543	0.815	59.6	150
3.012_1	38	32	21.484	1.500	50.543	50.400	0.143	150.0	150
3.012	32	33	33.144	1.500	50.400	50.179	0.221	150.0	150
8.000	80	33	18.281	1.500	52.208	51.900	0.308	59.4	150
3.013	33	34	27.691	1.500	50.179	49.994	0.185	150.0	150
3.014	34	35	24.051	1.500	49.994	49.834	0.160	150.0	150

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)
3.001	1.016	18.0	0.5	1.320	1.203	0.000	10	0.0	0.0
3.002	1.965	34.7	0.7	1.203	1.257	0.000	15	0.0	0.0
4.000	0.979	17.3	0.2	1.239	1.270	0.000	5	0.0	0.0
4.001	0.712	12.6	0.5	1.770	1.777	0.000	10	0.0	0.0
3.003	0.713	12.6	1.4	1.777	1.371	0.000	30	0.0	0.0
3.004	1.839	32.5	1.6	1.371	1.274	0.000	35	0.0	0.0
3.005	2.316	40.9	1.9	1.274	1.470	0.000	40	0.0	0.0
3.006	1.722	30.4	2.1	1.470	1.432	0.000	45	0.0	0.0
5.000	0.979	17.3	0.2	1.224	2.445	0.000	5	0.0	0.0
3.007	0.978	17.3	2.5	2.445	2.299	0.000	55	0.0	0.0
3.008	0.979	17.3	2.8	2.299	2.140	0.000	60	0.0	0.0
6.000	0.979	17.3	0.2	1.356	2.512	0.000	5	0.0	0.0
6.001	0.979	17.3	0.5	2.512	3.096	0.000	10	0.0	0.0
3.009	0.714	12.6	3.5	3.096	2.902	0.000	75	0.0	0.0
3.010	1.216	21.5	3.7	2.933	2.974	0.000	80	0.0	0.0
7.000	0.980	17.3	0.2	1.050	3.320	0.000	5	0.0	0.0
3.011	0.980	17.3	4.2	3.320	3.547	0.000	90	0.0	0.0
9.000	0.980	17.3	0.2	1.198	1.598	0.000	5	0.0	0.0
9.001	1.136	20.1	0.5	1.598	3.547	0.000	10	0.0	0.0
3.012_1	0.714	12.6	4.9	3.547	3.958	0.000	105	0.0	0.0
3.012	0.714	12.6	5.1	3.958	4.098	0.000	110	0.0	0.0
8.000	1.138	20.1	0.2	1.495	2.377	0.000	5	0.0	0.0
3.013	0.714	12.6	5.6	4.098	3.712	0.000	120	0.0	0.0
3.014	0.714	12.6	5.8	3.712	3.515	0.000	125	0.0	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
3.015	35	36	17.193	1.500	49.834	49.719	0.115	150.0	150
3.016	36	8	18.865	1.500	49.719	49.593	0.126	150.0	150
1.008	8	9	28.586	1.500	49.593	48.813	0.780	36.6	150
1.009	9	18	29.915	1.500	48.200	47.351	0.849	35.2	150
1.010	18	19	32.477	1.500	47.351	39.161	8.190	4.0	150
1.011	19	37	16.873	1.500	39.161	39.048	0.113	149.3	150

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)
3.015	0.714	12.6	6.0	3.515	2.930	0.000	130	0.0	0.0
3.016	0.714	12.6	6.3	2.930	2.358	0.000	135	0.0	0.0
1.008	1.450	25.6	9.5	2.358	1.290	0.000	205	0.0	0.0
1.009	1.479	26.1	9.5	1.903	1.200	0.000	205	0.0	0.0
1.010	4.419	78.1	9.5	1.200	1.200	0.000	205	0.0	0.0
1.011	0.716	12.6	9.5	1.200		0.000	205	0.0	0.0

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	15.633	19.3	150	Circular_Default Sewer Type	55.879	54.521	1.208	55.103	53.712	1.241
1.001	8.066	21.0	150	Circular_Default Sewer Type	55.103	53.712	1.241	54.679	53.328	1.201
2.000	61.781	94.5	150	Circular_Default Sewer Type	57.620	56.270	1.200	58.114	55.616	2.348
2.001	68.284	149.7	150	Circular_Default Sewer Type	58.114	55.616	2.348	56.807	55.160	1.497
2.002	47.392	24.8	150	Circular_Default Sewer Type	56.807	55.160	1.497	54.600	53.248	1.202
2.003	22.615	22.8	150	Circular_Default Sewer Type	54.600	52.991	1.459	53.884	52.000	1.734
2.004	38.026	69.1	150	Circular_Default Sewer Type	53.884	51.950	1.784	52.755	51.400	1.205
2.005	47.509	149.9	150	Circular_Default Sewer Type	52.755	51.400	1.205	54.213	51.083	2.980
2.006	16.108	149.1	150	Circular_Default Sewer Type	54.213	50.637	3.426	54.679	50.529	4.000
1.002	12.872	149.7	150	Circular_Default Sewer Type	54.679	50.529	4.000	54.023	50.443	3.430
1.003	13.226	150.3	150	Circular_Default Sewer Type	54.023	50.443	3.430	53.299	50.355	2.794
1.004	15.508	150.6	150	Circular_Default Sewer Type	53.299	50.355	2.794	52.632	50.252	2.230
1.005	31.634	149.9	150	Circular_Default Sewer Type	52.632	50.252	2.230	52.127	50.041	1.936
1.006	28.270	150.4	150	Circular_Default Sewer Type	52.127	50.041	1.936	51.800	49.853	1.797

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
2.000	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
2.001	11	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
2.002	12	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable
2.003	13	1200	Manhole	Adoptable	14	1200	Manhole	Adoptable
2.004	14	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
2.005	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
2.006	16	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.003	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.004	5	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
1.005	6	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.006	7	1200	Manhole	Adoptable	17	1200	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)
1.007	21.967	86.8	150	Circular_Default Sewer Type	51.800	49.853	1.797	52.101	49.600	2.351
3.000	34.436	80.1	150	Circular_Default Sewer Type	59.374	58.015	1.209	59.055	57.585	1.320
3.001	8.925	74.4	150	Circular_Default Sewer Type	59.055	57.585	1.320	58.818	57.465	1.203
3.002	6.239	20.0	150	Circular_Default Sewer Type	58.818	57.465	1.203	58.560	57.153	1.257
4.000	20.815	80.1	150	Circular_Default Sewer Type	58.839	57.450	1.239	58.610	57.190	1.270
4.001	8.596	150.8	150	Circular_Default Sewer Type	58.610	56.690	1.770	58.560	56.633	1.777
3.003	8.725	150.4	150	Circular_Default Sewer Type	58.560	56.633	1.777	58.096	56.575	1.371
3.004	16.238	22.8	150	Circular_Default Sewer Type	58.096	56.575	1.371	57.287	55.863	1.274
3.005	9.551	14.4	150	Circular_Default Sewer Type	57.287	55.863	1.274	56.820	55.200	1.470
3.006	39.004	26.0	150	Circular_Default Sewer Type	56.820	55.200	1.470	55.282	53.700	1.432
5.000	37.061	80.0	150	Circular_Default Sewer Type	54.524	53.150	1.224	55.282	52.687	2.445
3.007	11.228	80.2	150	Circular_Default Sewer Type	55.282	52.687	2.445	54.996	52.547	2.299
3.008	10.577	80.1	150	Circular_Default Sewer Type	54.996	52.547	2.299	54.705	52.415	2.140
6.000	23.615	80.1	150	Circular_Default Sewer Type	53.447	51.941	1.356	54.308	51.646	2.512
6.001	14.980	80.1	150	Circular_Default Sewer Type	54.308	51.646	2.512	54.705	51.459	3.096
3.009	9.608	150.1	150	Circular_Default Sewer Type	54.705	51.459	3.096	54.447	51.395	2.902
3.010	16.591	52.0	150	Circular_Default Sewer Type	54.447	51.364	2.933	54.169	51.045	2.974
7.000	40.057	80.0	150	Circular_Default Sewer Type	52.400	51.200	1.050	54.169	50.699	3.320
3.011	12.503	80.0	150	Circular_Default Sewer Type	54.169	50.699	3.320	54.240	50.543	3.547
9.000	11.358	80.0	150	Circular_Default Sewer Type	52.848	51.500	1.198	53.106	51.358	1.598
9.001	48.535	59.6	150	Circular_Default Sewer Type	53.106	51.358	1.598	54.240	50.543	3.547
3.012_1	21.484	150.0	150	Circular_Default Sewer Type	54.240	50.543	3.547	54.508	50.400	3.958
3.012	33.144	150.0	150	Circular_Default Sewer Type	54.508	50.400	3.958	54.427	50.179	4.098
8.000	18.281	59.4	150	Circular_Default Sewer Type	53.853	52.208	1.495	54.427	51.900	2.377
3.013	27.691	150.0	150	Circular_Default Sewer Type	54.427	50.179	4.098	53.856	49.994	3.712

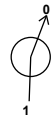
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.007	17	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
3.000	20	1200	Manhole	Adoptable	21	1200	Manhole	Adoptable
3.001	21	1200	Manhole	Adoptable	22	1200	Manhole	Adoptable
3.002	22	1200	Manhole	Adoptable	23	1200	Manhole	Adoptable
4.000	40	1200	Manhole	Adoptable	41	1200	Manhole	Adoptable
4.001	41	1200	Manhole	Adoptable	23	1200	Manhole	Adoptable
3.003	23	1200	Manhole	Adoptable	24	1200	Manhole	Adoptable
3.004	24	1200	Manhole	Adoptable	25	1200	Manhole	Adoptable
3.005	25	1200	Manhole	Adoptable	26	1200	Manhole	Adoptable
3.006	26	1200	Manhole	Adoptable	27	1200	Manhole	Adoptable
5.000	50	1200	Manhole	Adoptable	27	1200	Manhole	Adoptable
3.007	27	1200	Manhole	Adoptable	28	1200	Manhole	Adoptable
3.008	28	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
6.000	60	1200	Manhole	Adoptable	61	1200	Manhole	Adoptable
6.001	61	1200	Manhole	Adoptable	29	1200	Manhole	Adoptable
3.009	29	1200	Manhole	Adoptable	30	1200	Manhole	Adoptable
3.010	30	1200	Manhole	Adoptable	31	1200	Manhole	Adoptable
7.000	70	1200	Manhole	Adoptable	31	1200	Manhole	Adoptable
3.011	31	1200	Manhole	Adoptable	38	1200	Manhole	Adoptable
9.000	39	1200	Manhole	Adoptable	42	1200	Manhole	Adoptable
9.001	42	1200	Manhole	Adoptable	38	1200	Manhole	Adoptable
3.012_1	38	1200	Manhole	Adoptable	32	1200	Manhole	Adoptable
3.012	32	1200	Manhole	Adoptable	33	1200	Manhole	Adoptable
8.000	80	1200	Manhole	Adoptable	33	1200	Manhole	Adoptable
3.013	33	1200	Manhole	Adoptable	34	1200	Manhole	Adoptable

Pipeline Schedule

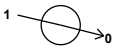
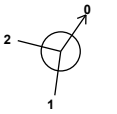
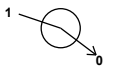
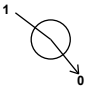
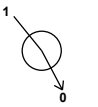
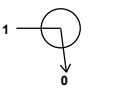
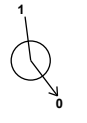
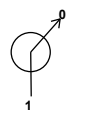
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.014	24.051	150.0	150	Circular_Default Sewer Type	53.856	49.994	3.712	53.499	49.834	3.515
3.015	17.193	150.0	150	Circular_Default Sewer Type	53.499	49.834	3.515	52.799	49.719	2.930
3.016	18.865	150.0	150	Circular_Default Sewer Type	52.799	49.719	2.930	52.101	49.593	2.358
1.008	28.586	36.6	150	Circular_Default Sewer Type	52.101	49.593	2.358	50.253	48.813	1.290
1.009	29.915	35.2	150	Circular_Default Sewer Type	50.253	48.200	1.903	48.701	47.351	1.200
1.010	32.477	4.0	150	Circular_Default Sewer Type	48.701	47.351	1.200	40.511	39.161	1.200
1.011	16.873	149.3	150	Circular_Default Sewer Type	40.511	39.161	1.200		39.048	

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.014	34	1200	Manhole	Adoptable	35	1200	Manhole	Adoptable
3.015	35	1200	Manhole	Adoptable	36	1200	Manhole	Adoptable
3.016	36	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
1.008	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
1.009	9	1200	Manhole	Adoptable	18	1200	Manhole	Adoptable
1.010	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
1.011	19	1200	Manhole	Adoptable	37	1200	Manhole	Adoptable

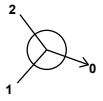
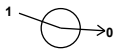
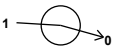
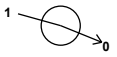
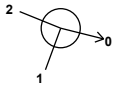
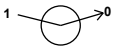
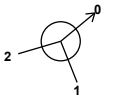
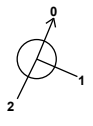
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	300739.266	510133.507	55.879	1.358	1200				
						0	1.000	54.521	150
2	300736.239	510148.844	55.103	1.391	1200		1	1.000	53.712	150
							0	1.001	53.712	150
10	300750.230	510017.928	57.620	1.350	1200				
						0	2.000	56.270	150
11	300691.034	510035.611	58.114	2.498	1200		1	2.000	55.616	150
							0	2.001	55.616	150
12	300707.053	510101.989	56.807	1.647	1200		1	2.001	55.160	150
							0	2.002	55.160	150
13	300661.059	510113.413	54.600	1.609	1200		1	2.002	53.248	150
							0	2.003	52.991	150
14	300661.860	510136.014	53.884	1.934	1200		1	2.003	52.000	150
							0	2.004	51.950	150

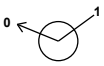
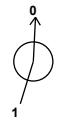
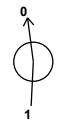
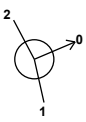
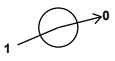
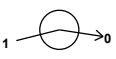
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
15	300675.426	510171.538	52.755	1.355	1200	1	2.004	51.400	150
									
						0	2.005	51.400	150
16	300721.695	510160.754	54.213	3.576	1200	1	2.005	51.083	150
									
						0	2.006	50.637	150
3	300737.320	510156.837	54.679	4.150	1200	1	1.001	53.328	150
						2	2.006	50.529	150
									
						0	1.002	50.529	150
4	300744.645	510167.421	54.023	3.580	1200	1	1.002	50.443	150
									
						0	1.003	50.443	150
5	300757.602	510170.074	53.299	2.944	1200	1	1.003	50.355	150
									
						0	1.004	50.355	150
6	300772.299	510165.126	52.632	2.380	1200	1	1.004	50.252	150
									
						0	1.005	50.252	150
7	300797.540	510146.058	52.127	2.086	1200	1	1.005	50.041	150
									
						0	1.006	50.041	150
17	300815.366	510124.116	51.800	1.947	1200	1	1.006	49.853	150
									
						0	1.007	49.853	150
20	300650.119	509971.277	59.374	1.359	1200				
						0	3.000	58.015	150
21	300684.555	509971.277	59.055	1.470	1200	1	3.000	57.585	150
									
						0	3.001	57.585	150
22	300685.696	509962.425	58.818	1.353	1200	1	3.001	57.465	150
									
						0	3.002	57.465	150
40	300683.998	509930.208	58.839	1.389	1200				
						0	4.000	57.450	150
41	300683.763	509951.022	58.610	1.920	1200	1	4.000	57.190	150
									
						0	4.001	56.690	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
23	300689.466	509957.454	58.560	1.927	1200		1	4.001	56.633	150
							2	3.002	57.153	150
							0	3.003	56.633	150
24	300697.682	509954.517	58.096	1.521	1200		1	3.003	56.575	150
							0	3.004	56.575	150
25	300713.890	509953.538	57.287	1.424	1200		1	3.004	55.863	150
							0	3.005	55.863	150
26	300723.093	509950.983	56.820	1.620	1200		1	3.005	55.200	150
							0	3.006	55.200	150
50	300746.469	509901.567	54.524	1.374	1200		0	5.000	53.150	150
27	300759.250	509936.354	55.282	2.595	1200		1	5.000	52.687	150
							2	3.006	53.700	150
							0	3.007	52.687	150
28	300770.143	509933.633	54.996	2.449	1200		1	3.007	52.547	150
							0	3.008	52.547	150
60	300807.630	509913.609	53.447	1.506	1200		0	6.000	51.941	150
61	300785.836	509922.702	54.308	2.662	1200		1	6.000	51.646	150
							0	6.001	51.646	150
29	300780.290	509936.618	54.705	3.246	1200		1	6.001	51.459	150
							2	3.008	52.415	150
							0	3.009	51.459	150
30	300787.687	509942.749	54.447	3.083	1200		1	3.009	51.395	150
							0	3.010	51.364	150
70	300831.766	509941.815	52.400	1.200	1200		0	7.000	51.200	150
31	300794.974	509957.654	54.169	3.470	1200		1	7.000	50.699	150
							2	3.010	51.045	150
							0	3.011	50.699	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
39	300853.858	509957.499	52.848	1.348	1200		0 9.000	51.500	150
42	300844.682	509950.805	53.106	1.748	1200		1 9.000	51.358	150
							0 9.001	51.358	150
38	300799.768	509969.201	54.240	3.697	1200		1 9.001	50.543	150
							2 3.011	50.543	150
							0 3.012_1	50.543	150
32	300808.007	509989.042	54.508	4.108	1200		1 3.012_1	50.400	150
							0 3.012	50.400	150
80	300839.860	510012.487	53.853	1.645	1200		0 8.000	52.208	150
33	300822.688	510018.757	54.427	4.248	1200		1 8.000	51.900	150
							2 3.012	50.179	150
							0 3.013	50.179	150
34	300830.825	510045.226	53.856	3.862	1200		1 3.013	49.994	150
							0 3.014	49.994	150
35	300832.012	510069.248	53.499	3.665	1200		1 3.014	49.834	150
							0 3.015	49.834	150
36	300829.769	510086.294	52.799	3.080	1200		1 3.015	49.719	150
							0 3.016	49.719	150
8	300825.647	510104.703	52.101	2.508	1200		1 3.016	49.593	150
							2 1.007	49.600	150
							0 1.008	49.593	150
9	300851.952	510115.892	50.253	2.053	1200		1 1.008	48.813	150
							0 1.009	48.200	150
18	300880.968	510123.172	48.701	1.350	1200		1 1.009	47.351	150
							0 1.010	47.351	150
19	300913.075	510118.286	40.511	1.350	1200		1 1.010	39.161	150
							0 1.011	39.161	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
37	300921.203	510133.072			1200	1	1.011	39.048	150

Appendix D

GADSDEN CONSULTING
CIVIL & STRUCTURAL ENGINEERS

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Householder Sustainable Drainage Maintenance Plan

Development at Uldale View, Egremont

1.0 Introduction

Sustainable drainage systems or SuDS are an environmentally friendly approach to managing rainfall that uses the landscape. SuDS aim to: -

- Control the flow, volume and frequency of water leaving a development site
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

2.0 Surface water drainage & SuDS serving this property

House roof areas are served by a soakaway under the driveway/garden. This soakaway is constructed using geocellular drainage baskets that allow water to discharge vertically and horizontally.

Where applicable an Aco drain has been provided to collect water from steep driveways. Driveways are constructed using permeable surfacing, with attenuation provided in the stone layer beneath. As the property owner you are responsible for maintenance and upkeep of the system serving your house and permeable driveways.

The soakaway is the key to draining surface water from your property and the system should therefore be maintained regularly. The area in which it is located should remain grassed/paved.

Silt traps and trapped gullies protect the system from silting and blocking up as well as enhancing water quality. These features are key to ensuring the systems longevity. As the property owner you are responsible for maintenance and upkeep of the system serving your house.

SuDS features should not be interfered with in any fashion without the prior approval of the Lead Local Flood Authority (Cumbria County Council).

3.0 Management & Maintenance

The surface water drainage and SuDs requiring management and maintenance for this property are summarized in Table 1 below: -

Table 1 – Householder Maintenance Schedule

Maintenance Item	Regularity	Action	Purpose	Diagram
ACO or similar channel to driveway	Monthly	Remove litter, grass cuttings and other vegetation from the surface of the grills	Prevent grills becoming blocked allowing water to get away	
ACO or similar channel to driveway	Annually	Remove debris, grass cuttings etc from inside the channel itself. This can be easily done by lifting the lid to the corner unit and cleaning out the sump by hand wearing a suitable pair of gloves	Prevent the silt trap filling up and debris entering the soakaway system	 Corner unit Sump unit
Gullies to downspouts	Monthly	Remove litter, grass cuttings and other vegetation from the gulley grate	Prevent grate/cover becoming blocked allowing water to get away	
Gullies to downspouts	Annually	Remove debris, grass cuttings etc from inside the gulley itself. This can be easily done by lifting the cover and cleaning out the gulley by hand wearing a suitable pair of gloves	Prevent the trap filling up and debris entering the soakaway system	

Soakaway (joint responsibility)	As Required	-Reconstruct soakaway and/or replace or clean baskets if performance deteriorates. -Replace clogged geotextile membrane surround	On failure or deterioration of performance to ensure adequate infiltration	
Permeable Paving	Monthly	Remove litter, grass cuttings and other vegetation from the surface	Prevent blockages within the openings that allowing water to get away	
Permeable Paving	As required	Lift paving, replace sub-base layer below and reinstate	On failure or deterioration of performance to ensure adequate infiltration (and voids in sub-base)	
Permeable Paving	As required	-Reconstruct filter drains below permeable paving if performance deteriorates. -Replace clogged geotextile membrane	On failure or deterioration of performance to ensure system is working effectively	
Silt Trap Manhole and Inspection Chambers	Annually	-Remove silt from base of silt trap manhole	Prevent silt trap filling up and debris entering the system	

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- Control the flow, volume and frequency of water leaving a development site
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

2.0 Surface water drainage & SuDS serving this property

The highway drainage serving the site as well as the roof and driveway surface water from your property discharge into the public sewer network that is served by an attenuation basin. Once the surface water enters their system, the water company are responsible for it.

House roof and driveway surfaces are served by downspouts, gulleys and ACO channel drains (or similar) within your property before entering the public sewer. As the property owner you are responsible for maintenance and upkeep of the system serving your property.

3.0 Management & Maintenance

The surface water drainage and SuDs requiring management and maintenance for this property are summarised in Table 1 below: -

Table 1 – Householder Maintenance Schedule

Maintenance Item	Regularity	Action	Purpose	Diagram
ACO or similar channel to driveway	Monthly	Remove litter, grass cuttings and other vegetation from the surface of the grills	Prevent grills becoming blocked allowing water to get away	
ACO or similar channel to driveway	Annually	Remove debris, grass cuttings etc from inside the channel itself. This can be easily done by lifting the lid to the corner unit and cleaning out the sump by hand wearing a suitable pair of gloves	Prevent the silt trap filling up and debris entering the soakaway system	 Corner unit Sump unit
Gullies to downspouts	Monthly	Remove litter, grass cuttings and other vegetation from the gulley grate	Prevent grate/cover becoming blocked allowing water to get away	
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Silt Trap Manhole and Inspection Chambers	Annually	-Remove silt from base of silt trap manhole	Prevent silt trap filling up and debris entering the system