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
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Reviewed	Signature	Date
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Contents

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.

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 1 - 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 2 – 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 3–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:

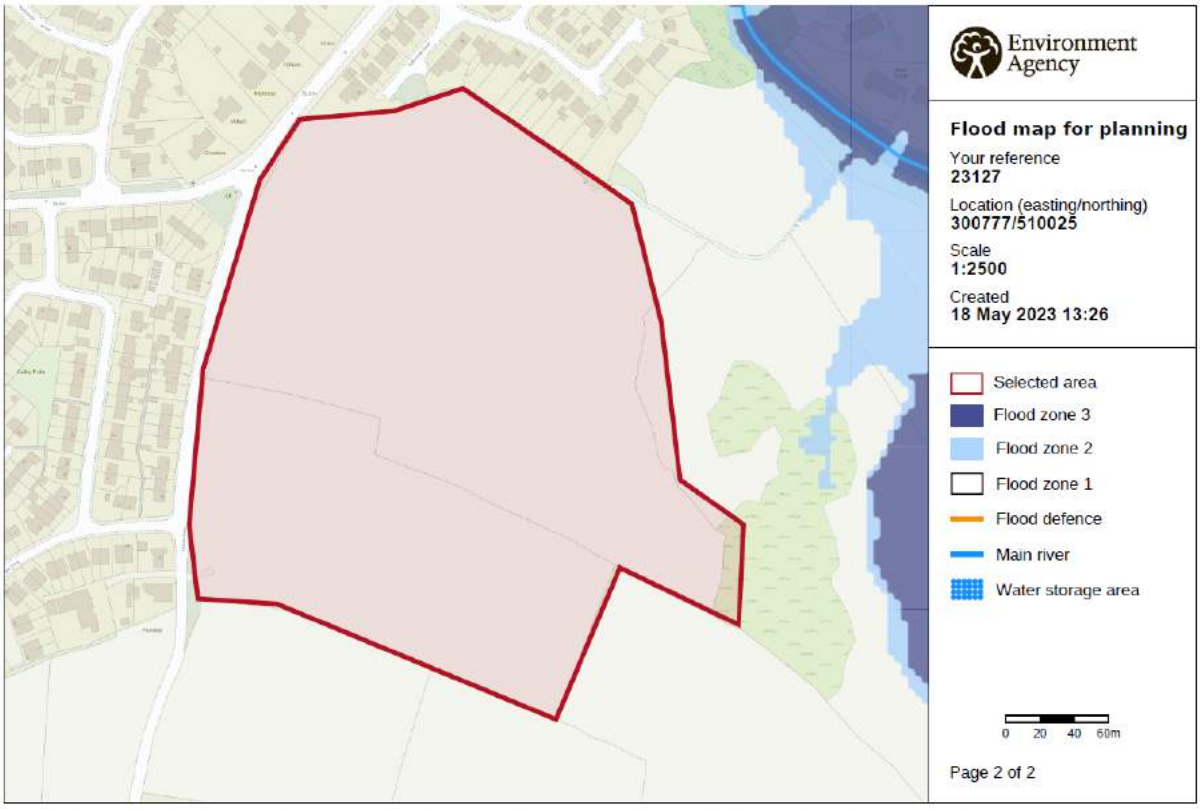
- Tidal
- Fluvial
- Groundwater
- Drainage systems

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)



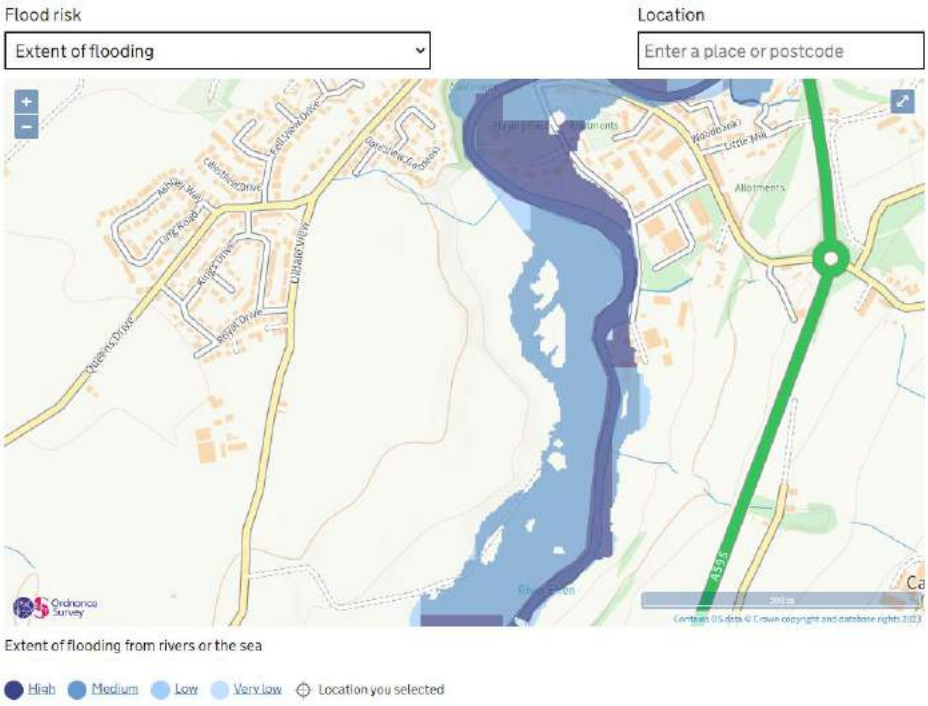
4.3 Tidal Flooding

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 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.

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 hydro-international downstream defender and also a series of attenuation basins. Ot will then discharge into the existing watercourse on the northern boundary at a controlled rate using a vortex flow control device. This will also pass through a wetland area to promote a laminar and more natural flow.

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.

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 hydro-international downstream defender as an additional SUDS treatment in the final manhole before entering the basin.

The surface water system will attenuate for storm periods up to and including the 100 year plus 40% 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 40% allowance for climate change.

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 40% 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.

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, wetland area, attenuation basins, conveyance swale, permeable surfacing, hydro-international downstream defender and geocellular soakaways.
- All attenuation features designed for storms up to and including the 1 in 100 year event with a 40% 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 40% 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

N

BOUNDARY & STREAMUNCLEAR, DENSE WOODLAND

HEIGHTS SHOWN
BEYOND TO INDICATE
STEEP SLOPE

Manure heap

Manure heap

eaves

eaves

eaves

510200N

510150N

510100N

510050N

510000N

509950N

509900N

509850N

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

REVISION

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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	SCALE	PAPER SIZE
10-08-21	1:500	A0

Appendix B

hrwallingford

Greenfield runoff
estimation for s

www.uksuds.com | Greenfield runc

Calculated by:	Rob Bruce
Site name:	
Site location:	

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:	54.47506°
Longitude:	3.53089°
Reference:	6570288
Date:	Jun 01 2023 15:

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	4.35

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):	1098	1098
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):	35.56	21.16
1 in 1 year (l/s):	30.94	18.41
1 in 30 years (l/s):	60.46	35.97
1 in 100 year (l/s):	73.97	44.01
1 in 200 years (l/s):	84.28	50.15

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	0.159	5.00	57.942	1800	300763.117	510037.958	1.642
2	0.072	5.00	57.620	2100	300752.195	510015.635	1.520
3	0.127	5.00	58.170	1800	300687.976	510034.574	2.470
4	0.139	5.00	56.735	1800	300704.065	510099.736	1.610
5	0.056	5.00	55.281	1800	300673.531	510107.838	2.802
6	0.000	5.00	54.413	1800	300656.646	510112.241	2.138
7	0.084	5.00	53.812	1800	300659.968	510139.022	1.737
8	0.000	5.00	53.179	1800	300668.417	510160.413	1.229
9	0.000	5.00	52.635	450	300684.299	510177.008	0.775
10	0.028	5.00	54.451	1800	300726.767	510157.298	2.701
30	0.166	5.00	56.099	1500	300737.854	510129.016	1.652
11	0.045	5.00	54.837	1500	300734.398	510154.108	3.112
12	0.050	5.00	54.045	1350	300742.798	510168.193	2.361
13	0.071	5.00	53.144	1800	300761.059	510172.125	2.894
14	0.085	5.00	52.436	1800	300780.527	510161.959	2.241
15	0.088	5.00	52.089	1800	300801.683	510144.241	1.972
16	0.088	5.00	51.826	1800	300814.999	510127.152	1.763
17	0.087	5.00	52.015	1800	300826.373	510107.003	2.010
18	0.136	5.00	52.753	1800	300831.479	510087.992	2.805
40	0.080	5.00	59.297	1800	300625.167	509974.185	1.622
41	0.048	5.00	59.076	1800	300681.914	509973.806	1.776
60	0.063	5.00	59.012	1800	300681.080	509918.810	1.312
61	0.000	5.00	58.569	1800	300681.537	509951.242	1.269
42	0.033	5.00	58.646	1800	300684.894	509957.319	1.746
43	0.047	5.00	58.307	1800	300693.030	509952.937	1.507
44	0.060	5.00	57.129	1800	300716.883	509950.767	1.929
70	0.072	5.00	54.606	1800	300743.180	509886.522	1.456
45	0.047	5.00	55.186	1800	300761.536	509932.532	2.286
46	0.047	5.00	54.810	1800	300777.074	509931.939	2.084
47	0.088	5.00	54.400	2700	300790.945	509943.397	1.770
48	0.099	5.00	54.567	2400	300811.863	509991.973	2.117
49	0.065	5.00	54.356	2400	300826.191	510020.808	2.011
50	0.084	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	0.000	5.00	53.082	1350	300860.357	510051.478	2.000
19	0.058	5.00	50.856	1500	300855.571	510087.118	1.114
20	0.000	5.00	50.577	1500	300854.459	510112.720	1.500
21	0.000	5.00	50.071	1500	300853.487	510118.873	1.056
22			49.874	1500	300862.233	510121.130	0.949

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	52.075	0.200	134.9	450	7.59	50.0
1.006	7	8	22.999	0.600	52.075	51.950	0.125	184.0	450	7.84	50.0
1.007	8	9	22.970	0.600	51.950	51.860	0.090	255.2	450	8.14	50.0
1.008	9	10	46.819	0.600	51.860	51.750	0.110	425.6	450	8.94	50.0
1.009	10	11	8.271	0.600	51.750	51.729	0.021	400.0	450	9.08	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	51.725	51.684	0.041	400.0	450	9.35	50.0
1.011	12	13	18.680	0.600	51.684	51.500	0.184	101.5	450	9.50	50.0
1.012	13	14	21.962	0.600	50.250	50.195	0.055	400.0	450	9.87	50.0
1.013	14	15	27.595	0.600	50.195	50.126	0.069	400.0	450	10.32	50.0
1.014	15	16	21.664	0.600	50.117	50.063	0.054	400.0	450	10.68	50.0
1.015	16	17	23.138	0.600	50.063	50.005	0.058	400.0	525	11.02	50.0
1.016	17	18	19.685	0.600	50.005	49.956	0.049	400.0	525	11.32	50.0
1.017	18	19	24.108	0.600	49.948	49.888	0.060	400.0	525	11.68	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	21.5	1.342	1.220	0.159	0.0
1.001	1.212	85.7	31.3	1.220	2.170	0.231	0.0
1.002	1.355	95.8	48.5	2.170	1.235	0.358	0.0
1.003	5.192	573.4	67.4	1.235	2.352	0.497	0.0
1.004	1.556	171.8	74.9	2.427	1.688	0.553	0.0
1.005	1.748	278.0	74.9	1.688	1.287	0.553	0.0
1.006	1.495	237.8	86.3	1.287	0.779	0.637	0.0
1.007	1.268	201.6	86.3	0.779	0.325	0.637	0.0
1.008	0.979	155.7	86.3	0.325	2.251	0.637	0.0
1.009	1.010	160.7	90.1	2.251	2.658	0.665	0.0
2.000	3.522	248.9	22.5	1.352	1.350	0.166	0.0
1.010	1.010	160.7	118.7	2.662	1.911	0.876	0.0
1.011	2.017	320.8	125.5	1.911	1.194	0.926	0.0
1.012	1.010	160.7	135.1	2.444	1.791	0.997	0.0
1.013	1.010	160.7	146.6	1.791	1.513	1.082	0.0
1.014	1.010	160.7	158.6	1.522	1.313	1.170	0.0
1.015	1.114	241.0	170.5	1.238	1.485	1.258	0.0
1.016	1.114	241.0	182.3	1.485	2.272	1.345	0.0
1.017	1.114	241.0	200.7	2.280	0.443	1.481	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)
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	49.742	49.678	0.064	400.4	525	12.06	49.3
1.019	20	21	6.229	0.600	49.077	49.015	0.062	100.0	300	12.13	49.2
1.020	21	22	9.033	0.600	49.015	48.925	0.090	100.0	300	12.23	48.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
3.000	1.275	90.2	10.8	1.322	1.476	0.080	0.0
3.001	2.436	172.2	17.3	1.476	1.446	0.128	0.0
4.000	1.747	123.5	8.5	1.012	0.969	0.063	0.0
4.001	3.791	268.0	8.5	0.969	1.446	0.063	0.0
3.002	1.636	115.6	30.4	1.446	1.207	0.224	0.0
3.003	4.083	288.6	36.7	1.207	1.629	0.271	0.0
3.004	3.333	235.6	44.9	1.629	1.836	0.331	0.0
5.000	1.440	229.1	9.8	1.006	1.836	0.072	0.0
3.005	2.151	342.1	61.0	1.836	1.634	0.450	0.0
3.006	1.434	228.0	67.4	1.634	1.314	0.497	0.0
3.007	1.181	187.8	79.3	1.320	1.667	0.585	0.0
3.008	1.155	183.8	92.7	1.667	1.561	0.684	0.0
3.009	1.010	160.7	101.5	1.561	1.230	0.749	0.0
3.010	1.012	161.0	112.9	1.230	0.409	0.833	0.0
3.011	3.708	589.8	112.9	1.550	0.514	0.833	0.0
1.018	1.113	240.9	317.2	0.589	0.374	2.372	0.0
1.019	1.572	111.1	316.2	1.200	0.756	2.372	0.0
1.020	1.572	111.1	314.7	0.756	0.649	2.372	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	134.9	450	Circular_Default Sewer Type	54.413	52.275	1.688	53.812	52.075	1.287
1.006	22.999	184.0	450	Circular_Default Sewer Type	53.812	52.075	1.287	53.179	51.950	0.779
1.007	22.970	255.2	450	Circular_Default Sewer Type	53.179	51.950	0.779	52.635	51.860	0.325
1.008	46.819	425.6	450	Circular_Default Sewer Type	52.635	51.860	0.325	54.451	51.750	2.251
1.009	8.271	400.0	450	Circular_Default Sewer Type	54.451	51.750	2.251	54.837	51.729	2.658
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	51.725	2.662	54.045	51.684	1.911
1.011	18.680	101.5	450	Circular_Default Sewer Type	54.045	51.684	1.911	53.144	51.500	1.194
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	50.063	1.238	52.015	50.005	1.485
1.016	19.685	400.0	525	Circular_Default Sewer Type	52.015	50.005	1.485	52.753	49.956	2.272
1.017	24.108	400.0	525	Circular_Default Sewer Type	52.753	49.948	2.280	50.856	49.888	0.443
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

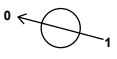
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1800	Manhole	Adoptable	2	2100	Manhole	Adoptable
1.001	2	2100	Manhole	Adoptable	3	1800	Manhole	Adoptable
1.002	3	1800	Manhole	Adoptable	4	1800	Manhole	Adoptable
1.003	4	1800	Manhole	Adoptable	5	1800	Manhole	Adoptable
1.004	5	1800	Manhole	Adoptable	6	1800	Manhole	Adoptable
1.005	6	1800	Manhole	Adoptable	7	1800	Manhole	Adoptable
1.006	7	1800	Manhole	Adoptable	8	1800	Manhole	Adoptable
1.007	8	1800	Manhole	Adoptable	9	450	Manhole	Adoptable
1.008	9	450	Manhole	Adoptable	10	1800	Manhole	Adoptable
1.009	10	1800	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

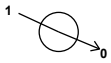
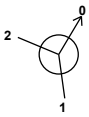
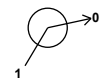
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.004	48.233	22.4	300	Circular_Default Sewer Type	57.129	55.200	1.629	55.186	53.050	1.836
5.000	49.536	198.1	450	Circular_Default Sewer Type	54.606	53.150	1.006	55.186	52.900	1.836
3.005	15.549	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	53.082	52.223	0.409
3.011	35.960	30.2	450	Circular_Default Sewer Type	53.082	51.082	1.550	50.856	49.892	0.514
1.018	25.626	400.4	525	Circular_Default Sewer Type	50.856	49.742	0.589	50.577	49.678	0.374
1.019	6.229	100.0	300	Circular_Default Sewer Type	50.577	49.077	1.200	50.071	49.015	0.756
1.020	9.033	100.0	300	Circular_Default Sewer Type	50.071	49.015	0.756	49.874	48.925	0.649

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	1500	Manhole	Adoptable
1.019	20	1500	Manhole	Adoptable	21	1500	Manhole	Adoptable
1.020	21	1500	Manhole	Adoptable	22	1500	Manhole	Adoptable

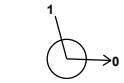
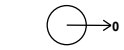
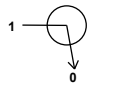
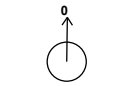
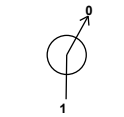
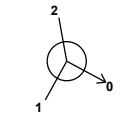
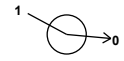
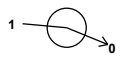
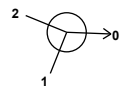
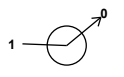
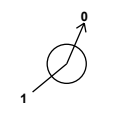
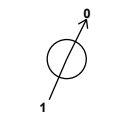
Manhole Schedule

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
5	300673.531	510107.838	55.281	2.802	1800	1	1.003	52.554	375
						 0	1.004	52.479	375

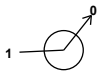
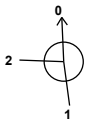
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
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	1.737	1800	 1	1.005	52.075	450
						0	1.006	52.075	450
8	300668.417	510160.413	53.179	1.229	1800	 1	1.006	51.950	450
						0	1.007	51.950	450
9	300684.299	510177.008	52.635	0.775	450	 1	1.007	51.860	450
						0	1.008	51.860	450
10	300726.767	510157.298	54.451	2.701	1800	 1	1.008	51.750	450
						0	1.009	51.750	450
30	300737.854	510129.016	56.099	1.652	1500				
						0	2.000	54.447	300
11	300734.398	510154.108	54.837	3.112	1500	 1	2.000	53.187	300
						2	1.009	51.729	450
						0	1.010	51.725	450
12	300742.798	510168.193	54.045	2.361	1350	 1	1.010	51.684	450
						0	1.011	51.684	450
13	300761.059	510172.125	53.144	2.894	1800	 1	1.011	51.500	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	1.763	1800	 1	1.014	50.063	450
						0	1.015	50.063	525
17	300826.373	510107.003	52.015	2.010	1800	 1	1.015	50.005	525
						0	1.016	50.005	525

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
18	300831.479	510087.992	52.753	2.805	1800		1	1.016	49.956	525
							0	1.017	49.948	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
48	300811.863	509991.973	54.567	2.117	2400		1	3.007	52.450	450
							0	3.008	52.450	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
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	53.082	2.000	1350	1	3.010	52.223	450
									
						0	3.011	51.082	450
19	300855.571	510087.118	50.856	1.114	1500	1	3.011	49.892	450
						2	1.017	49.888	525
									
						0	1.018	49.742	525
20	300854.459	510112.720	50.577	1.500	1500	1	1.018	49.678	525
									
						0	1.019	49.077	300
21	300853.487	510118.873	50.071	1.056	1500	1	1.019	49.015	300
									
						0	1.020	49.015	300
22	300862.233	510121.130	49.874	0.949	1500	1	1.020	48.925	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 %)
2	0	0	0
30	0	0	0
100	40	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 20 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	49.077	Product Number	CTL-SHE-0196-2110-1500-2110
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	21.1	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)	51.750	Product Number	CTL-SHE-0199-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.0	Min Node Diameter (mm)	1500

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-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	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 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	51.750
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	224

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	291.0	0.0	0.885	599.0	0.0	0.886	0.0	0.0

Node 20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.077
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	512.0	0.0	1.500	977.0	0.0	1.501	0.0	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	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

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
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
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 +40% CC +10% A 15 minute summer	441.486	124.925
100 year +40% CC +10% A 15 minute winter	309.815	124.925
100 year +40% CC +10% A 30 minute summer	304.460	86.152
100 year +40% CC +10% A 30 minute winter	213.656	86.152
100 year +40% CC +10% A 60 minute summer	214.603	56.713
100 year +40% CC +10% A 60 minute winter	142.577	56.713
100 year +40% CC +10% A 120 minute summer	135.791	35.885
100 year +40% CC +10% A 120 minute winter	90.216	35.885
100 year +40% CC +10% A 180 minute summer	104.615	26.921
100 year +40% CC +10% A 180 minute winter	68.003	26.921

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC +10% A 240 minute summer	82.776	21.875
100 year +40% CC +10% A 240 minute winter	54.994	21.875
100 year +40% CC +10% A 360 minute summer	63.377	16.309
100 year +40% CC +10% A 360 minute winter	41.197	16.309
100 year +40% CC +10% A 480 minute summer	50.006	13.215
100 year +40% CC +10% A 480 minute winter	33.223	13.215
100 year +40% CC +10% A 600 minute summer	40.997	11.214
100 year +40% CC +10% A 600 minute winter	28.011	11.214
100 year +40% CC +10% A 720 minute summer	36.560	9.799
100 year +40% CC +10% A 720 minute winter	24.571	9.799
100 year +40% CC +10% A 960 minute summer	30.041	7.911
100 year +40% CC +10% A 960 minute winter	19.900	7.911
100 year +40% CC +10% A 1440 minute summer	21.775	5.836
100 year +40% CC +10% A 1440 minute winter	14.634	5.836
100 year +40% CC +10% A 2160 minute summer	15.533	4.293
100 year +40% CC +10% A 2160 minute winter	10.703	4.293
100 year +40% CC +10% A 2880 minute summer	12.860	3.447
100 year +40% CC +10% A 2880 minute winter	8.643	3.447
100 year +40% CC +10% A 4320 minute summer	9.676	2.530
100 year +40% CC +10% A 4320 minute winter	6.372	2.530
100 year +40% CC +10% A 5760 minute summer	7.943	2.033
100 year +40% CC +10% A 5760 minute winter	5.141	2.033
100 year +40% CC +10% A 7200 minute summer	6.731	1.717
100 year +40% CC +10% A 7200 minute winter	4.344	1.717
100 year +40% CC +10% A 8640 minute summer	5.865	1.496
100 year +40% CC +10% A 8640 minute winter	3.785	1.496
100 year +40% CC +10% A 10080 minute summer	5.222	1.332
100 year +40% CC +10% A 10080 minute winter	3.370	1.332

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.409	0.109	26.4	0.4863	0.0000	OK
15 minute winter	2	11	56.238	0.138	37.8	0.6095	0.0000	OK
15 minute winter	3	11	55.866	0.166	57.5	0.5940	0.0000	OK
15 minute winter	4	11	55.216	0.091	75.8	0.3885	0.0000	OK
15 minute winter	5	11	52.680	0.201	84.2	0.5926	0.0000	OK
15 minute winter	6	12	52.458	0.183	82.9	0.4653	0.0000	OK
15 minute winter	7	12	52.295	0.220	95.1	0.7724	0.0000	OK
15 minute winter	8	12	52.183	0.233	95.5	0.5934	0.0000	OK
120 minute winter	9	88	52.028	0.168	38.4	60.0705	0.0000	OK
120 minute winter	10	88	52.024	0.274	17.6	0.7551	0.0000	OK
15 minute winter	30	10	54.516	0.069	27.5	0.2599	0.0000	OK
15 minute winter	11	10	51.866	0.141	34.9	0.2908	0.0000	OK
15 minute winter	12	11	51.801	0.117	42.6	0.2174	0.0000	OK
15 minute winter	13	11	50.454	0.204	54.0	0.6183	0.0000	OK
15 minute winter	14	11	50.418	0.223	67.3	0.7365	0.0000	OK
15 minute winter	15	11	50.367	0.250	80.0	0.8579	0.0000	OK
15 minute winter	16	12	50.318	0.255	91.6	0.9036	0.0000	OK
15 minute winter	17	12	50.274	0.269	102.4	0.9173	0.0000	OK
15 minute winter	18	12	50.219	0.271	120.4	0.9530	0.0000	OK
15 minute winter	40	10	57.753	0.078	13.3	0.2766	0.0000	OK
15 minute winter	41	11	57.370	0.070	20.8	0.2146	0.0000	OK
15 minute winter	60	10	57.763	0.063	10.4	0.2197	0.0000	OK
15 minute winter	61	11	57.340	0.040	10.2	0.1009	0.0000	OK
15 minute winter	42	11	57.027	0.127	35.9	0.3725	0.0000	OK
15 minute winter	43	11	56.878	0.078	43.5	0.2478	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	25.9	0.956	0.260	0.6744	
15 minute winter	2	1.001	3	37.7	1.052	0.440	2.4017	
15 minute winter	3	1.002	4	54.9	1.403	0.573	2.6254	
15 minute winter	4	1.003	5	75.5	3.004	0.132	0.8396	
15 minute winter	5	1.004	6	82.9	1.479	0.482	0.9831	
15 minute winter	6	1.005	7	83.6	1.217	0.301	1.8537	
15 minute winter	7	1.006	8	95.5	1.198	0.402	1.8382	
15 minute winter	8	1.007	9	95.1	1.215	0.472	1.7995	
120 minute winter	9	1.008	10	17.1	0.268	0.110	3.6310	
120 minute winter	10	Hydro-Brake®	11	17.7				
15 minute winter	30	2.000	11	27.1	2.288	0.109	0.3005	
15 minute winter	11	1.010	12	34.6	0.923	0.215	0.6163	
15 minute winter	12	1.011	13	42.9	1.373	0.134	0.5839	
15 minute winter	13	1.012	14	54.0	0.739	0.336	1.6255	
15 minute winter	14	1.013	15	66.3	0.808	0.413	2.2706	
15 minute winter	15	1.014	16	77.9	0.857	0.485	1.9807	
15 minute winter	16	1.015	17	90.5	0.841	0.375	2.4911	
15 minute winter	17	1.016	18	102.8	0.936	0.426	2.1614	
15 minute winter	18	1.017	19	121.4	1.187	0.504	2.4656	
15 minute winter	40	3.000	41	12.9	0.961	0.143	0.7618	
15 minute winter	41	3.001	42	20.6	1.025	0.120	0.3421	
15 minute winter	60	4.000	61	10.2	1.282	0.082	0.2613	
15 minute winter	61	4.001	42	10.1	0.639	0.038	0.1179	
15 minute winter	42	3.002	43	36.2	1.695	0.313	0.1990	
15 minute winter	43	3.003	44	43.6	2.514	0.151	0.4162	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	11	55.299	0.099	53.0	0.3126	0.0000	OK
15 minute winter	70	11	53.217	0.067	11.9	0.2381	0.0000	OK
15 minute winter	45	11	53.059	0.159	71.7	0.4700	0.0000	OK
15 minute winter	46	11	52.932	0.206	78.5	0.6165	0.0000	OK
15 minute winter	47	12	52.856	0.226	91.4	1.5175	0.0000	OK
15 minute winter	48	12	52.719	0.269	103.7	1.4705	0.0000	OK
15 minute winter	49	13	52.654	0.309	109.6	1.5992	0.0000	OK
15 minute winter	50	13	52.609	0.289	117.6	1.5960	0.0000	OK
480 minute winter	51	376	51.407	0.325	20.8	146.2143	0.0000	OK
15 minute winter	19	12	50.024	0.282	129.9	0.7922	0.0000	OK
480 minute winter	20	368	49.433	0.356	38.0	202.4815	0.0000	SURCHARGED
480 minute winter	21	368	49.110	0.095	20.6	0.1684	0.0000	OK
480 minute winter	22	368	49.012	0.087	20.6	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	53.0	2.678	0.225	0.9545	
15 minute winter	70	5.000	45	11.4	0.390	0.050	1.6064	
15 minute winter	45	3.005	46	71.2	1.183	0.208	0.9381	
15 minute winter	46	3.006	47	77.7	1.056	0.341	1.3233	
15 minute winter	47	3.007	48	90.9	1.026	0.484	4.7232	
15 minute winter	48	3.008	49	101.2	0.944	0.551	3.4498	
15 minute winter	49	3.009	50	107.1	0.965	0.666	1.1297	
15 minute winter	50	3.010	51	117.0	1.211	0.727	3.7278	
480 minute winter	51	Hydro-Brake®	19	5.0				
15 minute winter	19	1.018	20	129.7	1.210	0.538	2.7474	
480 minute winter	20	Hydro-Brake®	21	20.6				
480 minute winter	21	1.020	22	20.6	1.144	0.186	0.1631	542.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.459	0.159	49.8	0.7111	0.0000	OK
15 minute winter	2	10	56.306	0.206	71.8	0.9082	0.0000	OK
15 minute winter	3	12	55.993	0.293	109.2	1.0471	0.0000	OK
15 minute winter	4	11	55.250	0.125	141.0	0.5343	0.0000	OK
15 minute winter	5	11	52.797	0.318	157.4	0.9372	0.0000	OK
15 minute winter	6	11	52.551	0.276	156.5	0.7014	0.0000	OK
15 minute winter	7	12	52.418	0.343	180.6	1.2051	0.0000	OK
15 minute winter	8	12	52.302	0.352	177.5	0.8958	0.0000	OK
120 minute winter	9	94	52.187	0.327	71.7	126.2212	0.0000	OK
120 minute winter	10	94	52.186	0.436	20.9	1.1989	0.0000	OK
15 minute winter	30	10	54.544	0.097	52.0	0.3654	0.0000	OK
15 minute winter	11	10	51.925	0.200	65.7	0.4119	0.0000	OK
15 minute winter	12	10	51.850	0.166	80.6	0.3075	0.0000	OK
15 minute winter	13	11	50.597	0.347	101.8	1.0541	0.0000	OK
15 minute winter	14	11	50.569	0.374	124.6	1.2362	0.0000	OK
15 minute winter	15	11	50.521	0.404	147.2	1.3900	0.0000	OK
15 minute winter	16	12	50.462	0.399	169.8	1.4129	0.0000	OK
15 minute winter	17	12	50.413	0.408	191.9	1.3907	0.0000	OK
15 minute winter	18	12	50.345	0.397	228.4	1.3953	0.0000	OK
15 minute winter	40	10	57.785	0.110	25.1	0.3879	0.0000	OK
15 minute winter	41	11	57.396	0.096	39.5	0.2976	0.0000	OK
15 minute winter	60	10	57.787	0.087	19.8	0.3057	0.0000	OK
15 minute winter	61	10	57.354	0.054	19.4	0.1378	0.0000	OK
15 minute winter	42	11	57.085	0.185	68.1	0.5416	0.0000	OK
15 minute winter	43	11	56.910	0.110	82.6	0.3485	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	49.2	1.099	0.494	1.1104	
15 minute winter	2	1.001	3	71.1	1.203	0.830	4.0315	
15 minute winter	3	1.002	4	100.0	1.547	1.044	4.4180	
15 minute winter	4	1.003	5	140.9	3.039	0.246	1.7029	
15 minute winter	5	1.004	6	156.5	1.682	0.911	1.6229	
15 minute winter	6	1.005	7	155.8	1.341	0.560	3.1230	
15 minute winter	7	1.006	8	177.5	1.363	0.746	3.0214	
15 minute winter	8	1.007	9	179.1	1.460	0.888	2.8092	
120 minute winter	9	1.008	10	19.6	0.268	0.126	6.5653	
120 minute winter	10	Hydro-Brake®	11	20.0				
15 minute winter	30	2.000	11	51.5	2.721	0.207	0.4799	
15 minute winter	11	1.010	12	65.0	1.073	0.404	0.9935	
15 minute winter	12	1.011	13	79.9	1.615	0.249	0.9269	
15 minute winter	13	1.012	14	99.5	0.802	0.619	2.9891	
15 minute winter	14	1.013	15	121.3	0.866	0.755	3.9804	
15 minute winter	15	1.014	16	143.8	0.964	0.895	3.2322	
15 minute winter	16	1.015	17	167.0	0.938	0.693	4.1186	
15 minute winter	17	1.016	18	191.0	1.086	0.792	3.4606	
15 minute winter	18	1.017	19	227.7	1.444	0.945	3.7898	
15 minute winter	40	3.000	41	24.4	1.145	0.271	1.2149	
15 minute winter	41	3.001	42	39.1	1.205	0.227	0.5463	
15 minute winter	60	4.000	61	19.4	1.539	0.157	0.4156	
15 minute winter	61	4.001	42	19.2	0.742	0.072	0.1884	
15 minute winter	42	3.002	43	68.7	1.990	0.594	0.3191	
15 minute winter	43	3.003	44	82.9	2.956	0.287	0.6728	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	11	55.342	0.142	100.6	0.4494	0.0000	OK
15 minute winter	70	10	53.242	0.092	22.6	0.3268	0.0000	OK
15 minute winter	45	11	53.142	0.242	136.8	0.7149	0.0000	OK
15 minute winter	46	12	53.133	0.407	150.6	1.2183	0.0000	OK
15 minute winter	47	12	53.094	0.464	172.5	3.1182	0.0000	SURCHARGED
15 minute winter	48	12	52.959	0.509	179.9	2.7787	0.0000	SURCHARGED
15 minute winter	49	12	52.836	0.491	186.9	2.5366	0.0000	SURCHARGED
15 minute winter	50	12	52.768	0.448	205.8	2.4752	0.0000	OK
720 minute winter	51	690	51.701	0.619	26.8	311.5641	0.0000	SURCHARGED
15 minute winter	19	12	50.163	0.421	245.4	1.1822	0.0000	OK
480 minute winter	20	456	49.775	0.698	60.8	434.2209	0.0000	SURCHARGED
960 minute summer	21	540	49.111	0.096	21.1	0.1703	0.0000	OK
360 minute summer	22	224	49.013	0.088	21.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	44	3.004	45	101.1	3.169	0.429	1.5399	
15 minute winter	70	5.000	45	21.9	0.433	0.095	2.7262	
15 minute winter	45	3.005	46	136.7	1.289	0.400	1.8242	
15 minute winter	46	3.006	47	146.5	1.149	0.642	2.7811	
15 minute winter	47	3.007	48	150.7	1.101	0.802	8.3798	
15 minute winter	48	3.008	49	169.8	1.072	0.924	5.1017	
15 minute winter	49	3.009	50	184.1	1.162	1.146	1.5995	
15 minute winter	50	3.010	51	204.1	1.420	1.267	5.3754	
720 minute winter	51	Hydro-Brake®	19	5.0				
15 minute winter	19	1.018	20	246.9	1.481	1.025	4.2511	
480 minute winter	20	Hydro-Brake®	21	21.1				
960 minute summer	21	1.020	22	21.1	1.150	0.190	0.1655	1035.2

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	57.736	1.436	99.3	6.7155	0.0000	FLOOD RISK
15 minute winter	2	12	57.606	1.506	112.2	6.7857	0.0000	FLOOD RISK
15 minute winter	3	12	56.989	1.289	165.1	4.7392	0.0000	SURCHARGED
15 minute winter	4	11	55.290	0.165	235.6	0.7333	0.0000	OK
15 minute winter	5	12	53.529	1.050	268.3	3.1325	0.0000	SURCHARGED
15 minute winter	6	12	53.089	0.814	259.5	2.0710	0.0000	SURCHARGED
15 minute winter	7	12	52.842	0.767	301.5	2.7670	0.0000	SURCHARGED
180 minute winter	8	172	52.571	0.621	108.1	1.5803	0.0000	SURCHARGED
180 minute winter	9	172	52.570	0.710	106.2	321.5292	0.0000	FLOOD RISK
180 minute winter	10	172	52.569	0.819	21.5	2.2700	0.0000	SURCHARGED
15 minute winter	30	10	54.591	0.144	103.7	0.5727	0.0000	OK
15 minute winter	11	10	52.030	0.305	130.9	0.6357	0.0000	OK
15 minute winter	12	11	51.934	0.250	159.7	0.4750	0.0000	OK
15 minute winter	13	11	51.766	1.516	201.8	4.6739	0.0000	SURCHARGED
15 minute winter	14	11	51.652	1.457	237.7	4.9245	0.0000	SURCHARGED
15 minute winter	15	11	51.454	1.337	283.8	4.7156	0.0000	SURCHARGED
15 minute winter	16	11	51.210	1.147	330.9	4.1792	0.0000	SURCHARGED
15 minute winter	17	11	51.045	1.040	376.8	3.6365	0.0000	SURCHARGED
15 minute winter	18	11	50.850	0.902	452.0	3.2565	0.0000	SURCHARGED
15 minute winter	40	10	57.838	0.163	50.0	0.5919	0.0000	OK
15 minute winter	41	11	57.443	0.143	78.7	0.4496	0.0000	OK
15 minute winter	60	10	57.827	0.127	39.4	0.4555	0.0000	OK
15 minute winter	61	10	57.376	0.076	38.8	0.1944	0.0000	OK
15 minute winter	42	11	57.261	0.361	136.9	1.0688	0.0000	SURCHARGED
15 minute winter	43	10	56.967	0.167	164.0	0.5403	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	1.187	0.721	1.7501	
15 minute winter	2	1.001	3	103.2	1.466	1.205	4.7148	
15 minute winter	3	1.002	4	159.7	2.268	1.668	4.6787	
15 minute winter	4	1.003	5	235.3	2.992	0.410	2.4795	
15 minute winter	5	1.004	6	259.5	2.353	1.510	1.9247	
15 minute winter	6	1.005	7	260.5	1.644	0.937	4.2758	
15 minute winter	7	1.006	8	302.7	1.910	1.273	3.6440	
180 minute winter	8	1.007	9	106.2	0.999	0.527	3.6394	
180 minute winter	9	1.008	10	19.7	0.225	0.127	7.4182	
180 minute winter	10	Hydro-Brake®	11	20.0				
15 minute winter	30	2.000	11	102.8	3.234	0.413	0.8053	
15 minute winter	11	1.010	12	128.4	1.253	0.799	1.6780	
15 minute winter	12	1.011	13	157.5	1.891	0.491	1.7549	
15 minute winter	13	1.012	14	187.8	1.185	1.169	3.4797	
15 minute winter	14	1.013	15	234.1	1.477	1.457	4.3722	
15 minute winter	15	1.014	16	282.5	1.783	1.758	3.4325	
15 minute winter	16	1.015	17	330.5	1.530	1.371	4.9986	
15 minute winter	17	1.016	18	377.5	1.748	1.566	4.2526	
15 minute winter	18	1.017	19	448.0	2.074	1.859	5.2081	
15 minute winter	40	3.000	41	48.7	1.356	0.540	2.0385	
15 minute winter	41	3.001	42	77.9	1.320	0.452	0.8679	
15 minute winter	60	4.000	61	38.8	1.854	0.315	0.6864	
15 minute winter	61	4.001	42	38.6	0.822	0.144	0.2934	
15 minute winter	42	3.002	43	136.3	2.211	1.179	0.5118	
15 minute winter	43	3.003	44	164.3	3.399	0.569	1.3027	

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	44	12	55.822	0.622	200.5	2.0090	0.0000	SURCHARGED
15 minute winter	70	13	54.533	1.383	45.0	5.0231	0.0000	FLOOD RISK
15 minute winter	45	13	54.524	1.624	264.1	4.8676	0.0000	SURCHARGED
15 minute winter	46	13	54.412	1.686	236.3	5.1276	0.0000	SURCHARGED
15 minute winter	47	13	54.266	1.636	270.6	11.1577	0.0000	FLOOD RISK
15 minute winter	48	13	53.831	1.381	304.2	7.6694	0.0000	SURCHARGED
15 minute winter	49	13	53.448	1.103	328.5	5.7746	0.0000	SURCHARGED
15 minute winter	50	13	53.231	0.911	363.4	5.1258	0.0000	SURCHARGED
960 minute winter	51	930	52.271	1.189	42.7	719.8709	0.0000	SURCHARGED
15 minute winter	19	11	50.530	0.788	486.6	2.2947	0.0000	SURCHARGED
960 minute winter	20	945	50.521	1.444	68.8	1065.0870	0.0000	FLOOD RISK
240 minute winter	21	116	49.111	0.096	21.1	0.1703	0.0000	OK
240 minute winter	22	116	49.013	0.088	21.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	44	3.004	45	185.9	3.300	0.789	3.3965	
15 minute winter	70	5.000	45	57.1	0.479	0.249	7.8487	
15 minute winter	45	3.005	46	212.4	1.341	0.621	2.4636	
15 minute winter	46	3.006	47	230.4	1.454	1.010	2.8506	
15 minute winter	47	3.007	48	265.5	1.676	1.414	8.3798	
15 minute winter	48	3.008	49	303.9	1.918	1.654	5.1017	
15 minute winter	49	3.009	50	329.4	2.079	2.050	1.6003	
15 minute winter	50	3.010	51	361.9	2.286	2.248	5.9771	
960 minute winter	51	Hydro-Brake®	19	5.4				
15 minute winter	19	1.018	20	484.1	2.244	2.009	5.3491	
960 minute winter	20	Hydro-Brake®	21	21.1				
240 minute winter	21	1.020	22	21.1	1.150	0.190	0.1655	468.1

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	✓

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

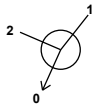
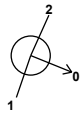
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.022	35.7	10.7	1.200	1.390	0.079	0.0	56	1.766
3.000	1.000	17.7	10.7	1.200	1.436	0.079	0.0	84	1.046
1.001	2.174	153.7	32.1	1.436	1.651	0.237	0.0	93	1.733
2.000	2.561	181.0	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	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	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

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
1440 minute winter	106	1440	50.519	0.180	0.8	0.2970	0.0000	OK
1440 minute winter	103	1440	50.519	0.261	3.2	0.2952	0.0000	OK
1440 minute winter	104	1440	50.519	0.317	3.1	110.6660	0.0000	OK

Link Event (Outflow)	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
15 minute winter	106	2.001	103	10.8	0.359	0.152	0.6712
15 minute winter	103	1.002	104	44.7	1.052	0.627	0.5732
15 minute summer	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
1440 minute winter	106	1440	50.696	0.357	1.4	0.5900	0.0000	SURCHARGED
1440 minute winter	103	1440	50.696	0.438	5.5	0.4958	0.0000	SURCHARGED
1440 minute winter	104	1440	50.696	0.494	5.4	187.2989	0.0000	OK

Link Event (Outflow)	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
15 minute winter	106	2.001	103	20.5	0.376	0.289	1.2264
15 minute winter	103	1.002	104	81.7	1.267	1.147	0.8520
15 minute summer	104	Infiltration		0.0			

Results for 100 year +40% 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	53.063	0.512	43.9	1.2372	0.0000	SURCHARGED
15 minute winter	107	12	52.326	1.107	43.9	2.6759	0.0000	FLOOD RISK
15 minute winter	102	11	51.266	0.405	114.4	0.8627	0.0000	SURCHARGED
15 minute winter	105	10	51.151	0.069	21.7	0.1124	0.0000	OK
1440 minute winter	106	1470	51.035	0.696	2.6	1.1861	0.0000	SURCHARGED
1440 minute winter	103	1470	51.035	0.777	10.6	0.8793	0.0000	SURCHARGED
1440 minute winter	104	1470	51.035	0.833	10.5	363.8908	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
30 minute summer	101	1.000	102	37.0	2.260	1.036	0.6577
15 minute winter	107	3.000	102	37.0	2.101	2.093	0.3695
15 minute winter	102	1.001	103	112.4	1.596	0.731	2.2291
15 minute winter	105	2.000	106	21.5	0.623	0.119	1.1654
15 minute summer	106	2.001	103	40.2	0.571	0.566	1.3809
15 minute winter	103	1.002	104	151.5	2.152	2.127	0.9387
15 minute summer	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	1.884
15	5	52.755	Adoptable	300675.426	510171.538	1.301
16	5	54.213	Adoptable	300721.695	510160.754	3.076
3	5	54.679	Adoptable	300737.320	510156.837	3.650
4	5	54.023	Adoptable	300744.645	510167.421	3.080
5	5	53.299	Adoptable	300757.602	510170.074	2.444
6	5	52.632	Adoptable	300772.299	510165.126	1.880
7		52.127	Adoptable	300797.540	510146.058	1.586
17		51.800	Adoptable	300815.366	510124.116	1.447
20	5	59.374	Adoptable	300650.119	509971.277	1.209
21	5	59.055	Adoptable	300684.555	509971.277	1.320
22	5	58.818	Adoptable	300685.696	509962.425	1.195
40	5	58.839	Adoptable	300683.998	509930.208	1.110
41	5	58.610	Adoptable	300683.763	509951.022	1.185
23	5	58.560	Adoptable	300689.466	509957.454	1.236
24	5	58.096	Adoptable	300697.682	509954.517	1.149
25	5	57.287	Adoptable	300713.890	509953.538	1.353
26	5	56.820	Adoptable	300723.093	509950.983	2.120
50	5	54.524	Adoptable	300746.469	509901.567	1.106
27	5	55.282	Adoptable	300759.250	509936.354	2.482
28	5	54.996	Adoptable	300770.143	509933.633	2.271
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	52.865	Adoptable	300822.341	509946.164	1.449
31	5	54.169	Adoptable	300794.974	509957.654	3.124
32	5	54.508	Adoptable	300808.007	509989.042	3.690
80	5	53.853	Adoptable	300839.860	510012.487	1.645
33	5	54.427	Adoptable	300822.688	510018.757	3.830

Nodes

Name	Dwellings	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
34	5	53.856	Adoptable	300830.825	510045.226	3.444
35	5	53.499	Adoptable	300832.012	510069.248	3.247
36	5	52.799	Adoptable	300829.769	510086.294	2.662
8	5	52.101	Adoptable	300825.647	510104.703	2.501
9		50.253	Adoptable	300851.952	510115.892	1.753
18		48.702	Adoptable	300880.968	510123.172	1.500
19		40.511	Adoptable	300913.075	510118.286	1.500
37		40.000	Adoptable	300921.203	510133.072	1.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
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	52.000	51.454	0.546	69.6	150
2.005	15	16	47.509	1.500	51.454	51.137	0.317	149.9	150
2.006	16	3	16.108	1.500	51.137	51.029	0.108	149.2	150
1.002	3	4	12.872	1.500	51.029	50.943	0.086	150.0	150
1.003	4	5	13.226	1.500	50.943	50.855	0.088	150.0	150
1.004	5	6	15.508	1.500	50.855	50.752	0.103	150.0	150
1.005	6	7	31.634	1.500	50.752	50.541	0.211	150.0	150
1.006	7	17	28.270	1.500	50.541	50.353	0.188	150.0	150
1.007	17	8	21.967	1.500	50.353	49.600	0.753	29.2	150
3.000	20	21	34.436	1.500	58.165	57.735	0.430	80.0	150
3.001	21	22	8.925	1.500	57.735	57.623	0.112	80.0	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)
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	1.050	18.6	1.2	1.734	1.151	0.000	25	0.0	0.0
2.005	0.714	12.6	1.4	1.151	2.926	0.000	30	0.0	0.0
2.006	0.716	12.7	1.6	2.926	3.500	0.000	35	0.0	0.0
1.002	0.714	12.6	2.3	3.500	2.930	0.000	50	0.0	0.0
1.003	0.714	12.6	2.5	2.930	2.294	0.000	55	0.0	0.0
1.004	0.714	12.6	2.8	2.294	1.730	0.000	60	0.0	0.0
1.005	0.714	12.6	3.0	1.730	1.436	0.000	65	0.0	0.0
1.006	0.714	12.6	3.0	1.436	1.297	0.000	65	0.0	0.0
1.007	1.626	28.7	3.0	1.297	2.351	0.000	65	0.0	0.0
3.000	0.980	17.3	0.2	1.059	1.170	0.000	5	0.0	0.0
3.001	0.980	17.3	0.5	1.170	1.045	0.000	10	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)
3.002	22	23	6.239	1.500	57.623	57.324	0.299	20.9	150
4.000	40	41	20.815	1.500	57.729	57.425	0.304	68.5	150
4.001	41	23	8.596	1.500	57.425	57.324	0.101	85.1	150
3.003	23	24	8.725	1.500	57.324	56.947	0.377	23.1	150
3.004	24	25	16.238	1.500	56.947	55.934	1.013	16.0	150
3.005	25	26	9.551	1.500	55.934	55.326	0.608	15.7	150
3.006	26	27	39.004	1.500	54.700	53.811	0.889	43.9	150
5.000	50	27	37.061	1.500	53.418	52.800	0.618	60.0	150
3.007	27	28	11.228	1.500	52.800	52.725	0.075	149.7	150
3.008	28	29	10.577	1.500	52.725	52.654	0.071	149.0	150
6.000	60	61	23.615	1.500	51.941	51.646	0.295	80.0	150
6.001	61	29	14.980	1.500	51.646	51.459	0.187	80.0	150
3.009	29	30	9.608	1.500	51.459	51.395	0.064	150.0	150
3.010	30	31	16.591	1.500	51.364	51.045	0.319	52.0	150
7.000	70	31	29.681	1.500	51.416	51.045	0.371	80.0	150
3.011	31	32	33.986	1.500	51.045	50.818	0.227	150.0	150
3.012	32	33	33.144	1.500	50.818	50.597	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	50.597	50.412	0.185	150.0	150
3.014	34	35	24.051	1.500	50.412	50.252	0.160	150.0	150
3.015	35	36	17.193	1.500	50.252	50.137	0.115	150.0	150
3.016	36	8	18.865	1.500	50.137	49.600	0.537	35.1	150
1.008	8	9	28.586	1.500	49.600	48.500	1.100	26.0	150
1.009	9	18	29.915	1.500	48.500	47.202	1.298	23.0	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)
3.002	1.923	34.0	0.7	1.045	1.086	0.000	15	0.0	0.0
4.000	1.059	18.7	0.2	0.960	1.035	0.000	5	0.0	0.0
4.001	0.950	16.8	0.5	1.035	1.086	0.000	10	0.0	0.0
3.003	1.826	32.3	1.4	1.086	0.999	0.000	30	0.0	0.0
3.004	2.195	38.8	1.6	0.999	1.203	0.000	35	0.0	0.0
3.005	2.217	39.2	1.9	1.203	1.344	0.000	40	0.0	0.0
3.006	1.325	23.4	2.1	1.970	1.321	0.000	45	0.0	0.0
5.000	1.132	20.0	0.2	0.956	2.332	0.000	5	0.0	0.0
3.007	0.715	12.6	2.5	2.332	2.121	0.000	55	0.0	0.0
3.008	0.717	12.7	2.8	2.121	1.901	0.000	60	0.0	0.0
6.000	0.980	17.3	0.2	1.356	2.512	0.000	5	0.0	0.0
6.001	0.980	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	1.299	2.974	0.000	5	0.0	0.0
3.011	0.714	12.6	4.2	2.974	3.540	0.000	90	0.0	0.0
3.012	0.714	12.6	4.4	3.540	3.680	0.000	95	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	4.9	3.680	3.294	0.000	105	0.0	0.0
3.014	0.714	12.6	5.1	3.294	3.097	0.000	110	0.0	0.0
3.015	0.714	12.6	5.3	3.097	2.512	0.000	115	0.0	0.0
3.016	1.481	26.2	5.6	2.512	2.351	0.000	120	0.0	0.0
1.008	1.723	30.4	8.8	2.351	1.603	0.000	190	0.0	0.0
1.009	1.830	32.3	8.8	1.603	1.350	0.000	190	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)
1.010	18	19	32.477	1.500	47.202	39.011	8.191	4.0	150
1.011	19	37	16.873	1.500	39.011	38.500	0.511	33.0	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)
1.010	4.419	78.1	8.8	1.350	1.350	0.000	190	0.0	0.0
1.011	1.528	27.0	8.8	1.350	1.350	0.000	190	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	69.6	150	Circular_Default Sewer Type	53.884	52.000	1.734	52.755	51.454	1.151
2.005	47.509	149.9	150	Circular_Default Sewer Type	52.755	51.454	1.151	54.213	51.137	2.926
2.006	16.108	149.2	150	Circular_Default Sewer Type	54.213	51.137	2.926	54.679	51.029	3.500
1.002	12.872	150.0	150	Circular_Default Sewer Type	54.679	51.029	3.500	54.023	50.943	2.930
1.003	13.226	150.0	150	Circular_Default Sewer Type	54.023	50.943	2.930	53.299	50.855	2.294
1.004	15.508	150.0	150	Circular_Default Sewer Type	53.299	50.855	2.294	52.632	50.752	1.730
1.005	31.634	150.0	150	Circular_Default Sewer Type	52.632	50.752	1.730	52.127	50.541	1.436
1.006	28.270	150.0	150	Circular_Default Sewer Type	52.127	50.541	1.436	51.800	50.353	1.297
1.007	21.967	29.2	150	Circular_Default Sewer Type	51.800	50.353	1.297	52.101	49.600	2.351
3.000	34.436	80.0	150	Circular_Default Sewer Type	59.374	58.165	1.059	59.055	57.735	1.170
3.001	8.925	80.0	150	Circular_Default Sewer Type	59.055	57.735	1.170	58.818	57.623	1.045
3.002	6.239	20.9	150	Circular_Default Sewer Type	58.818	57.623	1.045	58.560	57.324	1.086

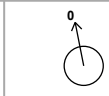
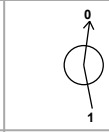
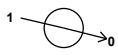
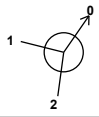
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
2.000	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
2.001	11	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
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
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

Pipeline Schedule

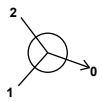
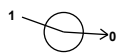
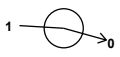
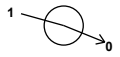
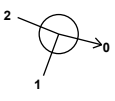
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
4.000	20.815	68.5	150	Circular_Default Sewer Type	58.839	57.729	0.960	58.610	57.425	1.035
4.001	8.596	85.1	150	Circular_Default Sewer Type	58.610	57.425	1.035	58.560	57.324	1.086
3.003	8.725	23.1	150	Circular_Default Sewer Type	58.560	57.324	1.086	58.096	56.947	0.999
3.004	16.238	16.0	150	Circular_Default Sewer Type	58.096	56.947	0.999	57.287	55.934	1.203
3.005	9.551	15.7	150	Circular_Default Sewer Type	57.287	55.934	1.203	56.820	55.326	1.344
3.006	39.004	43.9	150	Circular_Default Sewer Type	56.820	54.700	1.970	55.282	53.811	1.321
5.000	37.061	60.0	150	Circular_Default Sewer Type	54.524	53.418	0.956	55.282	52.800	2.332
3.007	11.228	149.7	150	Circular_Default Sewer Type	55.282	52.800	2.332	54.996	52.725	2.121
3.008	10.577	149.0	150	Circular_Default Sewer Type	54.996	52.725	2.121	54.705	52.654	1.901
6.000	23.615	80.0	150	Circular_Default Sewer Type	53.447	51.941	1.356	54.308	51.646	2.512
6.001	14.980	80.0	150	Circular_Default Sewer Type	54.308	51.646	2.512	54.705	51.459	3.096
3.009	9.608	150.0	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	29.681	80.0	150	Circular_Default Sewer Type	52.865	51.416	1.299	54.169	51.045	2.974
3.011	33.986	150.0	150	Circular_Default Sewer Type	54.169	51.045	2.974	54.508	50.818	3.540
3.012	33.144	150.0	150	Circular_Default Sewer Type	54.508	50.818	3.540	54.427	50.597	3.680
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	50.597	3.680	53.856	50.412	3.294
3.014	24.051	150.0	150	Circular_Default Sewer Type	53.856	50.412	3.294	53.499	50.252	3.097
3.015	17.193	150.0	150	Circular_Default Sewer Type	53.499	50.252	3.097	52.799	50.137	2.512
3.016	18.865	35.1	150	Circular_Default Sewer Type	52.799	50.137	2.512	52.101	49.600	2.351
1.008	28.586	26.0	150	Circular_Default Sewer Type	52.101	49.600	2.351	50.253	48.500	1.603
1.009	29.915	23.0	150	Circular_Default Sewer Type	50.253	48.500	1.603	48.702	47.202	1.350
1.010	32.477	4.0	150	Circular_Default Sewer Type	48.702	47.202	1.350	40.511	39.011	1.350
1.011	16.873	33.0	150	Circular_Default Sewer Type	40.511	39.011	1.350	40.000	38.500	1.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
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	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
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

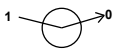
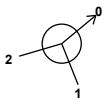
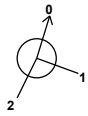
Manhole Schedule

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	1.884	1200		1	2.003	52.000	150
						0	2.004	52.000	150
15	300675.426	510171.538	52.755	1.301	1200		1	2.004	51.454	150
						0	2.005	51.454	150
16	300721.695	510160.754	54.213	3.076	1200		1	2.005	51.137	150
						0	2.006	51.137	150
3	300737.320	510156.837	54.679	3.650	1200		1	2.006	51.029	150
							2	1.001	53.328	150
						0	1.002	51.029	150
4	300744.645	510167.421	54.023	3.080	1200		1	1.002	50.943	150
						0	1.003	50.943	150
5	300757.602	510170.074	53.299	2.444	1200		1	1.003	50.855	150
						0	1.004	50.855	150
6	300772.299	510165.126	52.632	1.880	1200		1	1.004	50.752	150
						0	1.005	50.752	150

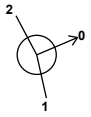
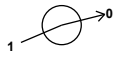
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
7	300797.540	510146.058	52.127	1.586	1200	 1	1.005	50.541	150
						0	1.006	50.541	150
17	300815.366	510124.116	51.800	1.447	1200	 1	1.006	50.353	150
						0	1.007	50.353	150
20	300650.119	509971.277	59.374	1.209	1200				
						0	3.000	58.165	150
21	300684.555	509971.277	59.055	1.320	1200	 1	3.000	57.735	150
						0	3.001	57.735	150
22	300685.696	509962.425	58.818	1.195	1200	 1	3.001	57.623	150
						0	3.002	57.623	150
40	300683.998	509930.208	58.839	1.110	1200				
						0	4.000	57.729	150
41	300683.763	509951.022	58.610	1.185	1200	 1	4.000	57.425	150
						0	4.001	57.425	150
23	300689.466	509957.454	58.560	1.236	1200	 1	4.001	57.324	150
						2	3.002	57.324	150
						0	3.003	57.324	150
24	300697.682	509954.517	58.096	1.149	1200	 1	3.003	56.947	150
						0	3.004	56.947	150
25	300713.890	509953.538	57.287	1.353	1200	 1	3.004	55.934	150
						0	3.005	55.934	150
26	300723.093	509950.983	56.820	2.120	1200	 1	3.005	55.326	150
						0	3.006	54.700	150
50	300746.469	509901.567	54.524	1.106	1200				
						0	5.000	53.418	150
27	300759.250	509936.354	55.282	2.482	1200	 1	5.000	52.800	150
						2	3.006	53.811	150
						0	3.007	52.800	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
28	300770.143	509933.633	54.996	2.271	1200	 1	3.007	52.725	150
						0	3.008	52.725	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	52.654	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	300822.341	509946.164	52.865	1.449	1200	 0	7.000	51.416	150
31	300794.974	509957.654	54.169	3.124	1200	 1	7.000	51.045	150
						2	3.010	51.045	150
						0	3.011	51.045	150
32	300808.007	509989.042	54.508	3.690	1200	 1	3.011	50.818	150
						0	3.012	50.818	150
80	300839.860	510012.487	53.853	1.645	1200	 0	8.000	52.208	150
33	300822.688	510018.757	54.427	3.830	1200	 1	8.000	51.900	150
						2	3.012	50.597	150
						0	3.013	50.597	150
34	300830.825	510045.226	53.856	3.444	1200	 1	3.013	50.412	150
						0	3.014	50.412	150
35	300832.012	510069.248	53.499	3.247	1200	 1	3.014	50.252	150
						0	3.015	50.252	150
36	300829.769	510086.294	52.799	2.662	1200	 1	3.015	50.137	150
						0	3.016	50.137	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	300825.647	510104.703	52.101	2.501	1200		1	3.016	49.600	150
							2	1.007	49.600	150
							0	1.008	49.600	150
9	300851.952	510115.892	50.253	1.753	1200		1	1.008	48.500	150
							0	1.009	48.500	150
18	300880.968	510123.172	48.702	1.500	1200		1	1.009	47.202	150
							0	1.010	47.202	150
19	300913.075	510118.286	40.511	1.500	1200		1	1.010	39.011	150
							0	1.011	39.011	150
37	300921.203	510133.072	40.000	1.500	1200		1	1.011	38.500	150

Appendix D

GADSDEN CONSULTING
CIVIL & STRUCTURAL ENGINEERS

GADSDEN CONSULTING
Unit 20
Meetings Industrial Estate
Park Road
Barrow-in-Furness
Cumbria
LA14 4TL
Email: info@gadsdens.co.uk
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Tel: 01229 813 333

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	
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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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

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	
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	
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