

• **confirm TPH has NOT arisen from diesel or petrol**

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on risk phrases

cadmium {cadmium sulfide}

Worst case species based on risk phrases

chromium {chromium(VI) oxide}

Worst case species based on risk phrases

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead chromate}

Worst case species based on risk phrases

mercury {mercury dichloride}

Worst case species based on risk phrases

nickel {nickel dihydroxide}

Worst case species based on risk phrases

zinc {zinc chromate}

Worst case species based on risk phrases

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.1, May 2018**

HazWasteOnline Classification Engine Version: 2021.246.4869.9247 (05 Sep 2021)

HazWasteOnline Database: 2021.246.4869.9247 (05 Sep 2021)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2019 - UK: 2019 No. 720 of 27th March 2019

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK:

2020 No. 1540 of 16th December 2020

POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

Appendix C BGS Records

GEORGE STOW CO. LTD.

Waterworks Engineers

READING ROAD - HENLEY-on-THAMES, OXON.

RECORD OF WELL (SHAFT OR BOREHOLE)

Borehole No. 9

DATE COMPLETED 1.8.78

317/453
Su 90/93

All depths to be measured below Ground Level

Work carried out for Southern Water Authority, SUSSEX River & Water Division (Brighton)
Locality (Exact Site) Woodgate, Nr. Chichester, SUSSEX - N.G.P. SU 40 SW (4383 0400)
Level of Ground Surface above Sea Level (O.D.) 20 m.
Depth of Shaft 156 (171.4 ft) m. Diameter 100 (1.0 m) mm. (3 inch)
Depth of Bore 156 (171.4 ft) m. Diameter: At Top 100 mm. At Bottom 100 mm.

Details of Permanent Lining Tubes

Diameter	Length Inserted	Plain	Slotted	Top At	above Ground Level
200 mm	135.65 m.	NIL		0.15 m	below

Water Struck at depth of (in m.) 135.65

Rest Level of Water below Ground Level 5.5 m.

Yield on 1 Hour test. Pumping litres per sec. Date

Pump Water level 135.65 m. below Ground Level.

Time of Recovery

Remarks X Borehole drilled by mud flush Rotary therefore depth at which water struck not apparent. The borehole was developed by swabbing and jetting. No test pumping was carried out.

Loc. by O.M. 6" Map Sheet 62 SW/E
see back for Strata Record.

DETAILS OF STRATA

317/453

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA (and any additional remarks)	THICKNESS	DEPTH
		METRES	METRES
	Topsoil	0.50	0.50
	Sandy brown clay	0.50	1.00
DRIFT	C lay with stones	1.00	2.00
	Bed of gravel	1.00	3.00
	Sandy blue clay	9.00	12.00
LOAMING CLAY	Blue clay with bands of hard stone	62.00	74.00
	Bed of blue coloured clay	5.00	79.00
	Very hard black stone with pyrites	0.50	84.50
	Blue clay with bands of stone	17.50	102.00
	Sandy/green/brown clay	1.00	103.00
BROWN CLAY	Red mottled clay	9.00	112.00
BROWN CLAY	Dark blue mottled clay	2.00	114.00
	Red mottled clay	2.00	116.00
	Red clay with bands of blue/green shale	3.00	119.00
	Red/blue mottled clay	14.00	133.00
	Red clay mottled green and yellow	3.00	136.00
Upper chalk	Chalk and flints	20.00	156.00
REST 9/78			(512 ft)



Appendix D Southern Water Public Sewer Records

04429



SU9304SE

Drawn by: kumaria

Scale: 1:2500

Date: 05/10/2017

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.

in the event of inaccuracy.
The actual positions should be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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41/21/REF
e 215
156X
7X
8X
DX
8X
4X
1X
2X
3X
1X

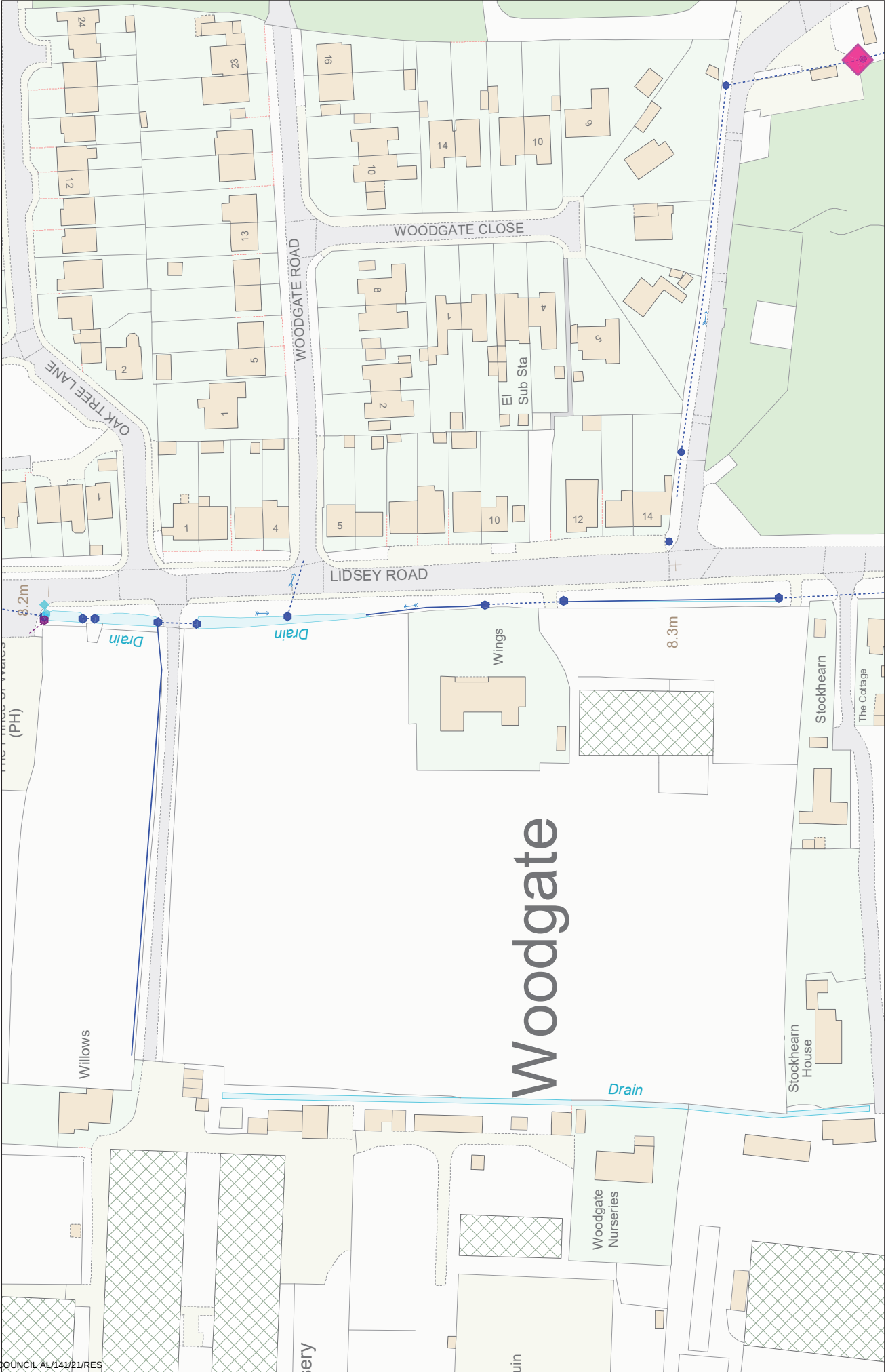


Title: 263390_Land at Wings Nursery,



Appendix E Arun District Council Correspondence

Arun District Council Maps



Mapping produced by Arun District Council

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Production Date: 08 January 2020

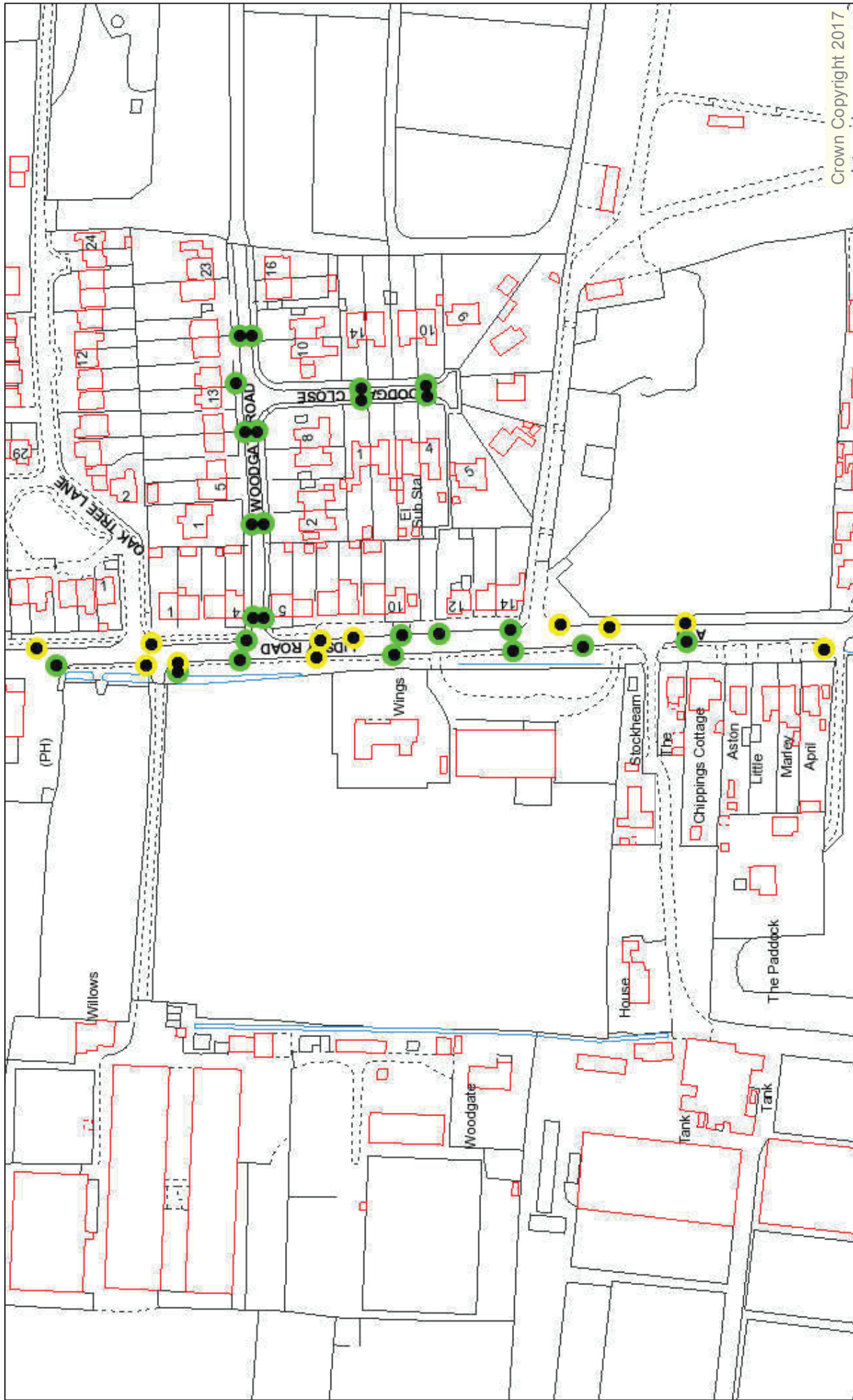
Scale: 1:1000 @ A3

www.arun.gov.uk



Appendix F West Sussex County Council Correspondence

A29 Lidsey Road, Woodgate - Existing Highway Gullies



Date: January 2020
Author: K Macknay
Scale: 1:2,000
Map Notes:

Crown Copyright. All rights reserved.
 West Sussex County Council
 100023447 (2017)

Appendix G Lidsey Surface Water Management Plan

Lidsey Surface Water Management Plan

West Sussex County Council

ATKINS

A Partnership between:

- West Sussex County Council
- Southern Water
- Arun District Council
- Environment Agency

**Summary**

Opportunity Area Reference	Lidsey Road & Oak Tree Lane
Local Flood Risk Zone	LFRZ_018
Properties at Risk (1 in 100 Year)	10
Average Annual Damages	£6,861
Preferred Intervention	Asset Management. Reduce surface water and infiltration entering public foul sewers. Improve surface water conveyance.
Present Value Damage Avoided (Assuming a 1 in 30 year level of protection scheme is identified and implemented)	£2,406
Key Stakeholders	WSCC, ADC, SWS

Flood History	Pluvial flooding experienced during the summer 2012 storm along Lidsey Road - otherwise flooding has not occurred here in recent history. Hydraulic overload of sewers reported in Oak Tree Lane on 02/01/2013 and on Westergate Street on 29/01/2013 and 09/11/2010.
Constraints	Limited detail on surface water drainage records in this area.
Receptors	Property and Highway
Opportunities	Asset Management. Reduce surface water and infiltration entering public foul sewers. Improve surface water conveyance.

Overview of Key Flood Risk Sources, Mechanisms, and Pathways

Property flooding caused by pluvial runoff from highway. Flooding from foul manholes in highway due to hydraulic overload.

Flood Risk Damage Estimates

Rainfall Return Period	Number of Properties at Risk		Average Annual Damages
	Residential	Commercial	
1 in 30 Year	8	0	£6,861
1 in 100 Year	10	0	
1 in 100 Year + CC (2080's)	16	1	

Shortlisting of Interventions

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Scoring (-2 to +2)					Summary of scheme / General discussion
					Economic	Environmental	Objectives	Social	Technical	
1	Do Nothing	Do Nothing	No	No	0	0	0	0	0	
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7
3	Source	Green Roof	No	No	0	0	0	0	0	
4	Source	Detention Basins (Attenuation / Retention)	No	No	0	0	0	0	0	
5	Source	Permeable Paving	No	No	0	0	0	0	0	
6	Source	Ponds and Wetlands	No	No	0	0	0	0	0	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9
8	Source	Soakaways	No	No	0	0	0	0	0	
9	Source	Swales	No	No	0	0	0	0	0	
10	Source	Bioretention Basins	No	No	0	0	0	0	0	
11	Source	Bioretention Street Planting	No	No	0	0	0	0	0	
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7
14	Source	Other Source Measures	No	No	0	0	0	0	0	
15	Pathway	Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4
16	Pathway	Deculverting Watercourse(s)	No	No	0	0	0	0	0	0
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5
19	Pathway	Land management practices	No	No	0	0	0	0	0	0
20	Pathway	Managing overland flows (above ground storage)	Yes	No	0	0	0	0	0	0
21	Pathway	Managing overland flows (preferential flow paths during exceedance)	Yes	No	0	0	0	0	0	0
22	Pathway	Separation of foul and surfacewater	Yes	Yes	0	2	2	0	0	4
23	Receptor	Improve Weather Warning	No	No	0	0	0	0	0	0
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9
25	Receptor	Social change, education and awareness	No	No	0	0	0	0	0	0
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9
27	Receptor	Planning policies to influence development (Development Control, SUDS Strategy, Blue Development Corridors, New Development).	Yes	No	0	0	0	0	0	0
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5
30	Strategy	Survey, Advise & Monitoring	No	No	0	0	0	0	0	0
31	Strategy	Community Awareness	No	No	0	0	0	0	0	0

Key Stakeholders

Provisionally Identified
ADC / WSCC (Action 1) SWS (Action 2), ADC (Action 3), SWS WSCC (Action 4)

Actions

As Agreed by Partner Organisations
1 Survey private road existing highway drainage and confirm condition and arrangements. Implement clearance of the ditch on the west side of Lidsey Road and investigate capacity downstream of the highway ditch
2 Area to be considered as part of the DSF study.
3 Consider use of flood mitigation to protect properties from pluvial flooding from highway based on outputs from the DSF study
4 Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.
5

Figure 7.37 - Flood Risk LFRZ_018 (1 in 100 year storm event)

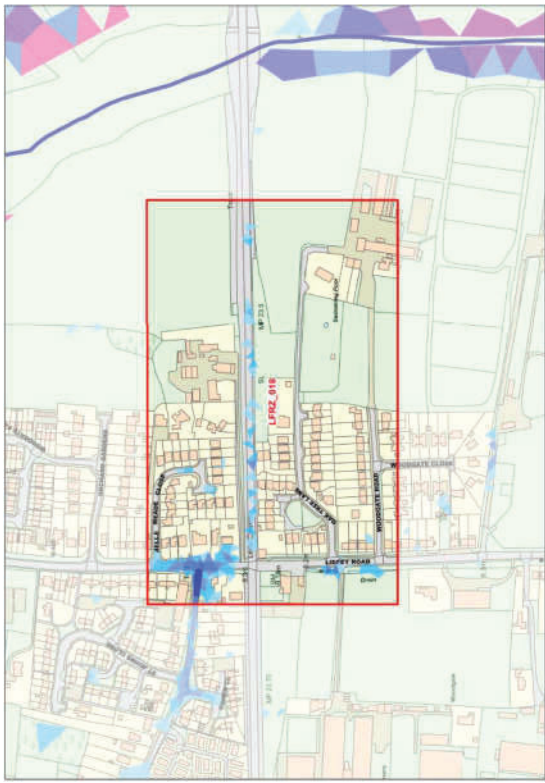


Table 7-36 - Predicted Residential and Commercial Property Flood Impact LFRZ_018

Rainfall Return Period	Predicted number of properties at risk of flooding	
	Residential	Commercial
1 in 30 Year	8	0
1 in 100 Year	10	0
1 in 100 Year + (Climate Change (2080's)	16	1

Table 7-37 - Summary of local flood risk within the LFRZ_018

Flood Risk Source			
Pluvial Flood Risk	Fluvial Flood Risk	Ground Water Flood Risk	Public Sewer Flood Risk
Medium	Low	Low	High
Flood Mechanism			
Property flooding caused by pluvial runoff from highway. Flooding from foul manholes in highway due to hydraulic overload.			
Flood Risk Receptors			
Residential, commercial properties and highway.			
Flood Hazard			
A 'low' flood hazard is predicted for 1% annual chance storm event (1 in 100 year return period) of Burndeil Road			
Validation			
Pluvial flooding experienced during the summer 2012 storm along Lidsey Road - otherwise flooding has not occurred here in recent history. Hydraulic overload of sewers reported in Oak Tree Lane on 02/01/2013 and on Westergate Street on 29/01/2013 and 09/11/2010.			

Figure 7.38 - Flood Hazard LFRZ_018 (1 in 100 year storm event)

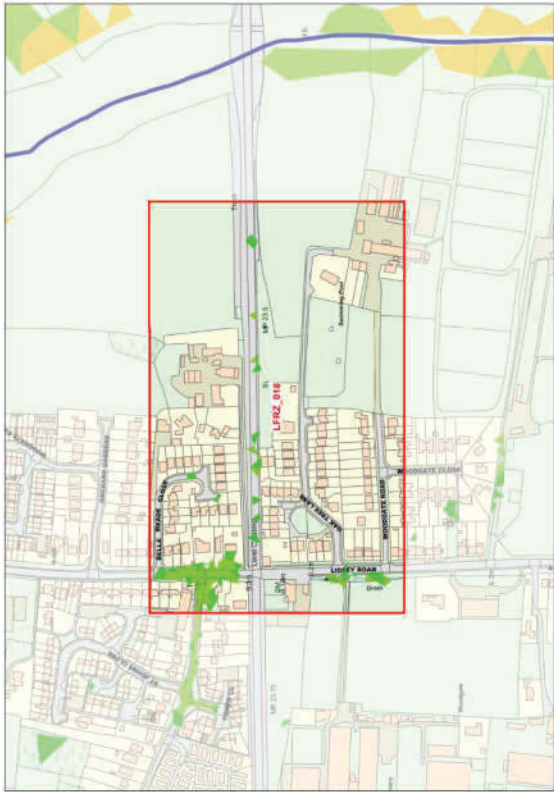


Table 0-1 - LFRZ Average Annual Damages

Local Flood Risk Zone	Location Name	Average Annual Damages (£)	Assuming a flood relief scheme was implemented providing 1 in 30 year level of flood protection	
			Predicted Residual Annual Average Damages (£)	Annual Average Damages Avoided (£)
LFRZ_006	Lake Lane, Barnham	£277,702	£76,471	£201,231
LFRZ_017	Felpham Road, Felpham	£74,582	£22,367	£52,215
LFRZ_013	Elmer Sands, Middleton on Sea	£70,270	£18,790	£51,481
LFRZ_019	Wandleys Lane, Eastergate	£42,018	£10,454	£31,564
LFRZ_023	Rudwicks Close, Broomcroft Road, The Loop, Jacken Close, Bramfield Road, Leverton Avenue, Limmer Lane (east end), Burley Road and Dryad Way in Felpham	£40,048	£17,538	£22,510
LFRZ_025	Limmer Lane, Felpham	£39,629	£13,084	£26,545
LFRZ_003	Walberton Village (Barnham Lane (A))	£36,918	£10,881	£26,037
LFRZ_002	Elm Grove, Barnham	£31,363	£11,984	£19,379
LFRZ_026	Eastergate Lane, Eastergate	£27,116	£15,545	£11,572
LFRZ_024	West Close, Middleton on Sea	£24,643	£5,608	£19,035
LFRZ_014	Lodge Close & Willow Brook, Middleton on Sea	£22,553	£9,285	£13,268
LFRZ_015	Sea Way, Middleton on Sea	£14,495	£2,965	£11,530
LFRZ_004	Maple Road, Walberton	£13,692	£3,298	£10,394
LFRZ_021	Marshalls Close / Church Lane, Barnham	£13,006	£3,839	£9,167
LFRZ_022	Southdean Close, Middleton on Sea	£9,816	£4,502	£5,313
LFRZ_018	Oak Tree Lane, Woodgate	£6,861	£2,406	£4,454
LFRZ_020	Highground Lane, Barnham	£5,916	£1,885	£4,030
LFRZ_012	Yapton Road, Middleton on Sea	£4,439	£2,197	£2,242
LFRZ_010	Burndell Road, Yapton	£4,065	£1,722	£2,343
LFRZ_027	Downsview Road, Barnham	£3,794	£825	£2,970
LFRZ_001	West Walberton Lane, Walberton	£3,693	£723	£2,970
LFRZ_016	Golf Links Road, Felpham	£524	£330	£194
LFRZ_009	Yapton Road, Yapton	£429	£429	£-
LFRZ_008	Barnham Lane, Barnham (C)	£362	£362	£-
LFRZ_005	Barnham Lane, Barnham (B)	£68	£68	£-
LFRZ_007	Park Road, Barnham	£-	£-	£-
LFRZ_011	West View Drive, Yapton	£-	£-	£-
Total		£768,001	£237,559	£530,442

Analysis from the integrated modelling predicts that there are 592 residential properties and 215 non-residential properties at risk across the catchment for a 3.33 probability storm event. This totals £2.7 million estimated Average Annual Damages (AAD), of which £0.77 million is within 27 LFRZs. As such, the LFRZs account for 28% of the Lidsey SWMP study areas AADs predicted to be incurred. If schemes were implemented in all of the LFRZs and continued for 100 years, then the Present Value benefits would be in the order of £15.8M based on the current Treasury variable discount rate which starts at 3.5%.

7.6 LFRZ Prioritisation

To assist with prioritising future works on all LFRZs a prioritisation methodology was applied. It is considered important to use a simple approach to ensure clear interpretation of the prioritisation process between one LFRZ over another. Given the economic AADs for the LFRZ incorporates the predicted number of properties flooded and accounts for apportioned damages to commercial properties it is considered appropriate that the following priority is given to each of the LFRZs as shown in Table 7.57.

Table 0-2 - LFRZ Prioritisation

Local Flood Risk Zone	Location Name	Priority
LFRZ_006	Lake Lane, Barnham	High
LFRZ_017	Felpham Road, Felpham	High
LFRZ_013	Elmer Sands, Middleton on Sea	High
LFRZ_019	Wandleys Lane, Eastergate	High
LFRZ_023	Rudwicks Close, Broomcroft Road, The Loop, Jacken Close, Bramfield Road, Leverton Avenue, Limmer Lane (East), Burley Road and Dryad Way in Felpham	High
LFRZ_025	Limmer Lane, Felpham	High
LFRZ_003	Walberton Village (Barnham Lane (A))	High
LFRZ_002	Elm Grove, Barnham	Medium
LFRZ_026	Eastergate Lane, Eastergate	Medium
LFRZ_024	West Close, Middleton on Sea	Medium
LFRZ_014	Lodge Close & Willow Brook, Middleton on Sea	Medium
LFRZ_015	Sea Way, Middleton on Sea	Medium
LFRZ_004	Maple Road, Walberton	Medium
LFRZ_021	Marshalls Close / Church Lane, Barnham	Medium
LFRZ_022	Southdean Close, Middleton on Sea	Medium
LFRZ_018	Oak Tree Lane, Woodgate	Medium
LFRZ_020	Highground Lane, Barnham	Medium
LFRZ_012	Yapton Road, Middleton on Sea	Medium
LFRZ_010	Burndell Road, Yapton	Medium
LFRZ_027	Downsview Road, Barnham	Medium
LFRZ_001	West Walberton Lane, Walberton	Medium
LFRZ_016	Golf Links Road, Felpham	Low
LFRZ_009	Yapton Road, Yapton	Low
LFRZ_008	Barnham Lane, Barnham (C)	Low
LFRZ_005	Barnham Lane, Barnham (B)	Low
LFRZ_007	Park Road, Barnham	Low
LFRZ_011	West View Drive, Yapton	Low

LFRZ_018 – Oak Tree Lane, Woodgate**Preferred Interventions:** Asset Management. Reduce surface water and infiltration entering public foul sewers. Improve surface water conveyance.**Table 10-19 - LFRZ_018 Options**

Option Ref.	Option Category (Source / Pathway / Receptor / Other)	Option	Potential	Considered	Economic	Environmental	Objectiveness	Social	Technical	Total Score	Summary of scheme / General discussion
2	Do minimum	Do minimum - continue current maintenance	Yes	Yes	2	2	0	2	1	7	
7	Source	Rainwater Harvesting	Yes	Yes	2	2	1	2	2	9	Installation of water butts in upstream catchment.
12	Source	Sealing of manhole covers and protecting gullies	Yes	Yes	1	2	2	2	1	8	Reduce surface water inflow.
13	Source	Sealing Sewers (Reduce ground water / rainfall induced infiltration)	Yes	Yes	1	2	2	2	0	7	Reduce ground water inflows.
15		Increasing Capacity in Drainage System (Storage, Upsize)	Yes	Yes	0	0	2	0	2	4	Investigate conveying surface water away from properties. This should be completed after survey of existing drainage assets. See figure 9.9.
17	Pathway	Improved maintenance regimes	Yes	Yes	-2	0	2	0	2	2	Optimisation of existing assets. WSCC and ADC are planning to clear the ditch on the west side of Lidsey Road
18	Pathway	Increase Gully Assets	Yes	Yes	0	0	2	1	2	5	This should be investigated to remove highway flooding.
22	Pathway	Separation of foul and surface water	Yes	Yes	0	2	2	0	0	4	Control at source see activities 12 & 13
24	Receptor	Improve resilience to flooding	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation.
26	Receptor	Raising doorway / access threshold	Yes	Yes	2	2	2	2	1	9	To be considered in a hydraulic investigation.
28	Receptor	Temporary demountable flood defences	Yes	Yes	1	0	2	0	2	5	Potentially applicable.
29	Strategy	Further Study / Investigations	Yes	Yes	1	1	1	1	1	5	Detailed hydraulic investigation is required. As detailed in Option 15.

LFRZ_018 – Oak Tree Lane, Woodgate (Cont.)

Increased Surface Water Conveyance

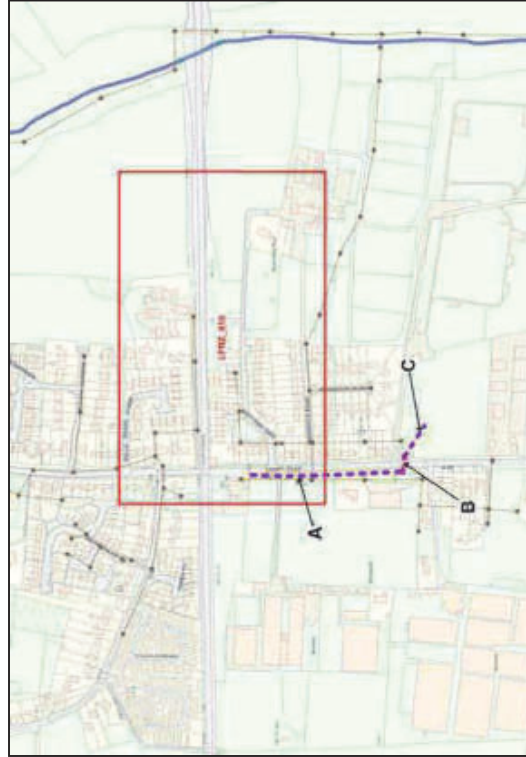
A: Improve / maintain existing ditch. The conveyance system upgrade may also need to extend further north to the level crossing as the hydraulic model indicates that surface water runoff is predicted to occur north of the railway line. Conveying surface water from Lidsey Road (north of railway crossing) to the south would require construction of a culvert. If practical this would be costly element of works.

B: New Culvert

C: Install new ditch to convey water to open green space

Note: This option has not been hydraulically modelled.

Figure 10.9 - Oak Tree Lane, Woodgate

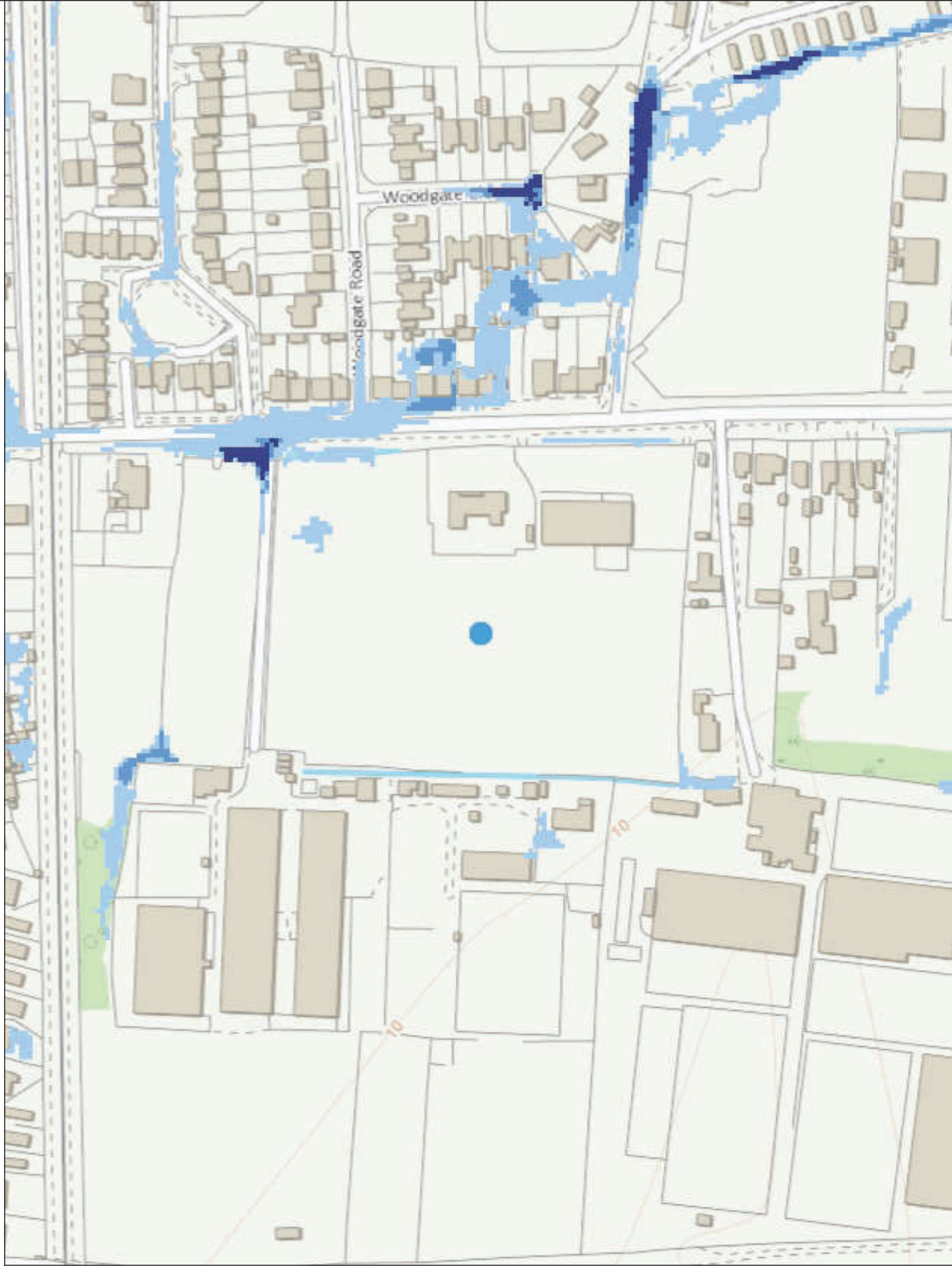


WSCC and ADC are planning to clear the ditch on the west side of Lidsey Road and are investigating liaising with land owners to ensure capacity is available downstream of the highway ditch.

13	LFRZ_004 Maple Road, Walberton	 Carry out a detailed investigation of flooding issue and where required develop hydraulic solution.	 Investigate fat, oil, grease problems reported by residents.	 Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.	 Continue proactive maintenance of highway gullies and jetting of sewers to optimise existing drainage assets.	
14	LFRZ_021 Marshalls Close / Church Lane, Barnham	 Investigate the Operation of Marshalls Close CSO	 Investigate options to reduce flood risk as part of the EA 2014 ARIFRM project.	 Investigate additional flood protection measures for two properties in Marshalls Close i.e. sealing floors and walls.		
15	LFRZ_022 Southdean Close, Middleton on Sea	 Confirm surface water drainage arrangements and condition in Southdean Close.	 Consider connecting existing or new highway drainage system into the Rose Avenue public storm water system. The storm system may require upgrade to accommodate increased inflows.	 Consider use of ATAC (Temporary Treatment Plant)		
16	LFRZ_018 Oak Tree Lane, Woodgate	 Survey private road existing highway drainage and confirm condition and arrangements. Implement clearance of the ditch on the west side of Lidsey Road and investigate capacity downstream of the highway ditch	 Area to be considered as part of the DSF study.	 Consider use of flood mitigation to protect properties from pluvial flooding from highway based on outputs from the DSF study	 Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.	
17	LFRZ_020 Highground Lane	 Investigate and prioritise interventions to reduce clear water inflow and infiltration of public foul sewers. Work with Local Authority to target resilience improvements.				
18	LFRZ_012 Yapton Road, Middleton on Sea	 Optimise existing drainage assets. Continue maintenance of ditch system.	 Monitor flooding to evaluate improvements in the ditch system.	 Consider increased conveyance and provide attenuation for surface water flows into the fields to the north or east.	 Consider more gullies along Yapton Lane to intercept highway runoff from Norton Road and Yapton Road.	 Investigate flood mitigations.

Appendix H Environment Agency Correspondence

Surface Water Flooding - Map



Legend

- High ($\geq 3.3\%$)
- Medium (3.3% - 1%)
- Low (1% - 0.1%)



Appendix I CD Surveys Topographical Survey

Appendix J Calculations



BRIGHT PLAN CIVILS

Project No: D2019
Project Name: Lee's Yard, Lidsey
Sheet No: 1

BASIN LINER HYDROSTATIC UPLIFT ANALYSIS FOR SOFT CONSTRUCTION (@BED LEVEL)

Level Data:

Ground Level = 7.04 m
Depth to Groundwater = 0.21 m
Invert of Basin = 6.5 m
Level of Liner = 5.9 m

Depth between
groundwater & Liner = 0.93 m

Hydrostatic Uplift = 9.27 kN/m²

Factor of Safety = 1.2

Min' downward force required = 11.13 kN/m²

Thickness of surfacing layers above Liner:

Topsoil = 150 mm
Clay = 350 mm
Sand = 100 mm
TOTAL = 600 mm

DMRB, CD 350 (Highway Structures, for Dead loads = 1.32)

Densities:

Top Soil = 15.7 kN/m³
Clay = 22 kN/m³
Sand = 14 kN/m³

Weight of Topsoil = 2.36 kN/m²
Weight of Clay = 7.70 kN/m²
Weight of Sand = 1.40 kN/m²

Downward force of layers over liner = 11.46 kN/m²

Make-up over Liner OK

Anchor Trench:

Dimension =
Pond area = 0 m²
(Base exl sides)

Width	Height	Total Length
0	0	0

Weight of Clay = 0.00 kN

Total min downward force required over pond area = 0 kN

Total downwards force over pond area from layers over liner = 0 kN

Total downward force from anchor trenches = 0.00 kN

Total resisting force = 0.00 kN

Design Sufficient



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	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)	19.400	Minimum Backdrop Height (m)	0.500
Ratio-R	0.333	Preferred Cover Depth (m)	0.900
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)
1	0.029	5.00	8.825	1200	493832.202	104055.549	1.525
2	0.029	5.00	8.825	1200	493834.231	104040.801	1.575
3	0.029	5.00	8.775	1200	493841.632	104029.356	1.575
4	0.026	5.00	8.100	450	493872.616	104061.386	0.700
5	0.055	5.00	8.550	1200	493871.167	104028.072	1.500
6	0.010	5.00	8.150	1200	493898.051	104036.412	1.050
7	0.006	5.00	8.150	1200	493921.341	104035.399	1.200
8	0.022	5.00	8.125	450	493917.233	104030.093	0.510
9	0.007	5.00	8.070	1200	493926.695	104026.709	0.610
10	0.050	5.00	8.125	1200	493923.483	104025.797	1.275
11	0.029	5.00	8.050	1200	493929.240	104020.087	1.200
12	0.009	5.00	7.950	450	493931.103	104009.504	0.610
13	0.009	5.00	7.950	450	493930.817	104002.990	0.610
14	0.029	5.00	7.975	1200	493928.499	104003.045	1.175
15	0.030	5.00	8.925	1200	493826.842	103989.460	1.825
16	0.050	5.00	8.725	450	493846.281	103987.108	0.610
17	0.016	5.00	8.725	1200	493848.622	103988.513	1.700
18	0.040	5.00	8.725	1200	493866.845	104003.736	1.700
19	0.029	5.00	8.600	1200	493866.150	103987.750	1.650
20	0.050	5.00	8.125	1200	493920.724	103985.377	1.375
21	0.040	5.00	8.000	450	493929.503	103988.648	0.610
22			8.025	1350	493927.945	103990.314	1.325
22_OUT	0.072		7.800	1350	493941.250	103988.699	1.271
23		5.00	7.600	1200	493953.873	103961.990	1.100
24			7.600	1200	493954.713	103960.849	1.110
24_OUT			7.100	1200	493960.277	103953.288	0.660

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	14.887	0.600	7.300	7.250	0.050	297.7	375	5.24	50.0
1.001	2	3	13.629	0.600	7.250	7.200	0.050	272.6	375	5.45	50.0
1.002	3	5	29.563	0.600	7.200	7.050	0.150	197.1	375	5.83	50.0
2.000	4	5	33.345	0.600	7.400	7.200	0.200	166.7	150	5.72	50.0
1.003	5	10	52.365	0.600	7.050	6.875	0.175	299.2	375	6.67	50.0
3.000	6	7	23.312	0.600	7.100	6.950	0.150	155.4	150	5.48	50.0
3.001	7	10	9.838	0.600	6.950	6.850	0.100	98.4	150	5.65	50.0
4.000	8	10	7.584	0.600	7.615	7.565	0.050	151.7	150	5.16	50.0
5.000	9	10	3.339	0.600	7.460	7.435	0.025	133.6	150	5.06	50.0
1.004	10	11	8.108	0.600	6.875	6.850	0.025	324.3	375	6.80	50.0
1.005	11	14	17.058	0.600	6.850	6.800	0.050	341.2	375	7.09	50.0
6.000	12	14	6.964	0.600	7.340	7.290	0.050	139.3	150	5.14	50.0
7.000	13	14	2.319	0.600	7.340	7.315	0.025	92.7	150	5.04	50.0
1.006	14	22	12.743	0.600	6.800	6.760	0.040	318.6	375	7.30	50.0
8.000	15	17	21.801	0.600	7.100	7.025	0.075	290.7	375	5.34	50.0
9.000	16	17	2.730	0.600	8.115	8.090	0.025	109.2	150	5.05	50.0
8.001	17	19	17.545	0.600	7.025	6.950	0.075	233.9	375	5.59	50.0
10.000	18	19	16.001	0.600	7.025	6.950	0.075	213.3	300	5.25	50.0
8.002	19	20	54.626	0.600	6.950	6.750	0.200	273.1	375	6.43	50.0
8.003	20	22	8.747	0.600	6.750	6.700	0.050	174.9	375	6.53	50.0
11.000	21	22	2.281	0.600	7.390	7.365	0.025	91.2	150	5.04	50.0
1.007	22	22_OUT	13.403	0.600	6.700	6.650	0.050	268.1	375	7.51	50.0
12.000	23	24	1.417	0.600	6.500	6.490	0.010	141.7	150	5.03	50.0
12.001	24	24_OUT	9.388	0.600	6.490	6.440	0.050	187.8	150	5.24	50.0

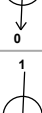
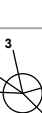
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.045	115.4	3.9	1.150	1.200	0.029	0.0
1.001	1.092	120.6	7.9	1.200	1.200	0.058	0.0
1.002	1.287	142.1	11.8	1.200	1.125	0.087	0.0
2.000	0.775	13.7	3.5	0.550	1.200	0.026	0.0
1.003	1.042	115.1	22.8	1.125	0.875	0.168	0.0
3.000	0.803	14.2	1.4	0.900	1.050	0.010	0.0
3.001	1.013	17.9	2.2	1.050	1.125	0.016	0.0
4.000	0.813	14.4	3.0	0.360	0.410	0.022	0.0
5.000	0.868	15.3	0.9	0.460	0.540	0.007	0.0
1.004	1.000	110.5	35.6	0.875	0.825	0.263	0.0
1.005	0.975	107.7	39.6	0.825	0.800	0.292	0.0
6.000	0.849	15.0	1.2	0.460	0.535	0.009	0.0
7.000	1.044	18.4	1.2	0.460	0.510	0.009	0.0
1.006	1.009	111.5	45.9	0.800	0.890	0.339	0.0
8.000	1.057	116.8	4.1	1.450	1.325	0.030	0.0
9.000	0.961	17.0	6.8	0.460	0.485	0.050	0.0
8.001	1.180	130.3	13.0	1.325	1.275	0.096	0.0
10.000	1.072	75.8	5.4	1.400	1.350	0.040	0.0
8.002	1.091	120.5	22.4	1.275	1.000	0.165	0.0
8.003	1.367	150.9	29.1	1.000	0.950	0.215	0.0
11.000	1.052	18.6	5.4	0.460	0.510	0.040	0.0
1.007	1.102	121.7	80.5	0.950	0.775	0.594	0.0
12.000	0.842	14.9	0.0	0.950	0.960	0.000	0.0
12.001	0.730	12.9	0.0	0.960	0.510	0.000	0.0

Pipeline Schedule

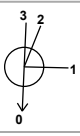
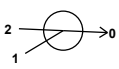
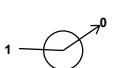
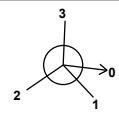
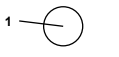
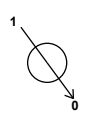
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	14.887	297.7	375	Circular	8.825	7.300	1.150	8.825	7.250	1.200
1.001	13.629	272.6	375	Circular	8.825	7.250	1.200	8.775	7.200	1.200
1.002	29.563	197.1	375	Circular	8.775	7.200	1.200	8.550	7.050	1.125
2.000	33.345	166.7	150	Circular	8.100	7.400	0.550	8.550	7.200	1.200
1.003	52.365	299.2	375	Circular	8.550	7.050	1.125	8.125	6.875	0.875
3.000	23.312	155.4	150	Circular	8.150	7.100	0.900	8.150	6.950	1.050
3.001	9.838	98.4	150	Circular	8.150	6.950	1.050	8.125	6.850	1.125
4.000	7.584	151.7	150	Circular	8.125	7.615	0.360	8.125	7.565	0.410
5.000	3.339	133.6	150	Circular	8.070	7.460	0.460	8.125	7.435	0.540
1.004	8.108	324.3	375	Circular	8.125	6.875	0.875	8.050	6.850	0.825
1.005	17.058	341.2	375	Circular	8.050	6.850	0.825	7.975	6.800	0.800
6.000	6.964	139.3	150	Circular	7.950	7.340	0.460	7.975	7.290	0.535
7.000	2.319	92.7	150	Circular	7.950	7.340	0.460	7.975	7.315	0.510
1.006	12.743	318.6	375	Circular	7.975	6.800	0.800	8.025	6.760	0.890
8.000	21.801	290.7	375	Circular	8.925	7.100	1.450	8.725	7.025	1.325
9.000	2.730	109.2	150	Circular	8.725	8.115	0.460	8.725	8.090	0.485
8.001	17.545	233.9	375	Circular	8.725	7.025	1.325	8.600	6.950	1.275
10.000	16.001	213.3	300	Circular	8.725	7.025	1.400	8.600	6.950	1.350
8.002	54.626	273.1	375	Circular	8.600	6.950	1.275	8.125	6.750	1.000
8.003	8.747	174.9	375	Circular	8.125	6.750	1.000	8.025	6.700	0.950
11.000	2.281	91.2	150	Circular	8.000	7.390	0.460	8.025	7.365	0.510
1.007	13.403	268.1	375	Circular	8.025	6.700	0.950	7.800	6.650	0.775
12.000	1.417	141.7	150	Circular	7.600	6.500	0.950	7.600	6.490	0.960
12.001	9.388	187.8	150	Circular	7.600	6.490	0.960	7.100	6.440	0.510

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
1.002	3	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
2.000	4	450	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.003	5	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
3.000	6	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
3.001	7	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
4.000	8	450	Manhole	Adoptable	10	1200	Manhole	Adoptable
5.000	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
1.004	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
1.005	11	1200	Manhole	Adoptable	14	1200	Manhole	Adoptable
6.000	12	450	Manhole	Adoptable	14	1200	Manhole	Adoptable
7.000	13	450	Manhole	Adoptable	14	1200	Manhole	Adoptable
1.006	14	1200	Manhole	Adoptable	22	1350	Manhole	Adoptable
8.000	15	1200	Manhole	Adoptable	17	1200	Manhole	Adoptable
9.000	16	450	Manhole	Adoptable	17	1200	Manhole	Adoptable
8.001	17	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
10.000	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
8.002	19	1200	Manhole	Adoptable	20	1200	Manhole	Adoptable
8.003	20	1200	Manhole	Adoptable	22	1350	Manhole	Adoptable
11.000	21	450	Manhole	Adoptable	22	1350	Manhole	Adoptable
1.007	22	1350	Manhole	Adoptable	22_OUT	1350	Manhole	Adoptable
12.000	23	1200	Manhole	Adoptable	24	1200	Manhole	Adoptable
12.001	24	1200	Manhole	Adoptable	24_OUT	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	493832.202	104055.549	8.825	1.525	1200		0	1.000	7.300	375
2	493834.231	104040.801	8.825	1.575	1200		1	1.000	7.250	375
3	493841.632	104029.356	8.775	1.575	1200		0	1.001	7.250	375
4	493872.616	104061.386	8.100	0.700	450		1	1.001	7.200	375
5	493871.167	104028.072	8.550	1.500	1200		0	1.002	7.200	375
6	493898.051	104036.412	8.150	1.050	1200		0	2.000	7.400	150
7	493871.167	104028.072	8.550	1.500	1200		1	2.000	7.200	150
8	493898.051	104036.412	8.150	1.050	1200		2	1.002	7.050	375
9	493921.341	104035.399	8.150	1.200	1200		0	1.003	7.050	375
10	493921.341	104035.399	8.150	1.200	1200		0	3.000	7.100	150
11	493921.341	104035.399	8.150	1.200	1200		1	3.000	6.950	150
12	493917.233	104030.093	8.125	0.510	450		0	3.001	6.950	150
13	493926.695	104026.709	8.070	0.610	1200		0	4.000	7.615	150
14	493926.695	104026.709	8.070	0.610	1200		0	5.000	7.460	150
15	493923.483	104025.797	8.125	1.275	1200		1	5.000	7.435	150
16	493923.483	104025.797	8.125	1.275	1200		2	4.000	7.565	150
17	493923.483	104025.797	8.125	1.275	1200		3	3.001	6.850	150
18	493923.483	104025.797	8.125	1.275	1200		4	1.003	6.875	375
19	493923.483	104025.797	8.125	1.275	1200		0	1.004	6.875	375
20	493929.240	104020.087	8.050	1.200	1200		1	1.004	6.850	375
21	493929.240	104020.087	8.050	1.200	1200		0	1.005	6.850	375
22	493931.103	104009.504	7.950	0.610	450		0	6.000	7.340	150
23	493930.817	104002.990	7.950	0.610	450		0	7.000	7.340	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
14	493928.499	104003.045	7.975	1.175	1200		1	7.000	7.315	150
							2	6.000	7.290	150
							3	1.005	6.800	375
							0	1.006	6.800	375
15	493826.842	103989.460	8.925	1.825	1200		0	8.000	7.100	375
16	493846.281	103987.108	8.725	0.610	450		0	9.000	8.115	150
17	493848.622	103988.513	8.725	1.700	1200		1	9.000	8.090	150
							2	8.000	7.025	375
							0	8.001	7.025	375
18	493866.845	104003.736	8.725	1.700	1200		0	10.000	7.025	300
19	493866.150	103987.750	8.600	1.650	1200		1	10.000	6.950	300
							2	8.001	6.950	375
							0	8.002	6.950	375
20	493920.724	103985.377	8.125	1.375	1200		1	8.002	6.750	375
							0	8.003	6.750	375
21	493929.503	103988.648	8.000	0.610	450		0	11.000	7.390	150
22	493927.945	103990.314	8.025	1.325	1350		1	11.000	7.365	150
							2	8.003	6.700	375
							3	1.006	6.760	375
							0	1.007	6.700	375
22_OUT	493941.250	103988.699	7.800	1.271	1350		1	1.007	6.650	375
23	493953.873	103961.990	7.600	1.100	1200		0	12.000	6.500	150
24	493954.713	103960.849	7.600	1.110	1200		1	12.000	6.490	150
							0	12.001	6.490	150
24_OUT	493960.277	103953.288	7.100	0.660	1200		1	12.001	6.440	150

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	1440
M5-60 (mm)	19.400	Additional Storage (m³/ha)	21.0
Ratio-R	0.333	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x
Analysis Speed	Detailed		

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	40	5	0
10	40	5	0
30	0	0	0
30	40	5	0
100	0	0	0
100	20	5	0
100	40	5	0

Node 22 OUT Online Orifice Control

Flap Valve	x	Invert Level (m)	6.530	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.375		

Node 24 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	6.490	Product Number	CTL-SHE-0066-2000-1100-2000
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 16 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.610	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		
Invert Level (m)	8.115	Diameter (m)	0.017		

Node 8 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.610	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		
Invert Level (m)	7.615	Diameter (m)	0.017		

Node 9 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.610	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		
Invert Level (m)	7.460	Diameter (m)	0.017		

Node 12 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.610	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		
Invert Level (m)	7.340	Diameter (m)	0.017		

Node 13 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.610	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		
Invert Level (m)	7.340	Diameter (m)	0.017		

Node 21 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.610	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.3		
Invert Level (m)	7.390	Diameter (m)	0.017		

Node 23 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	29.500
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.500	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.025

Inlets

22_OUT

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	440.0	0.0	1.100	719.6	0.0

Node 16 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.115	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	1095	Depth (m)	0.500
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	0.500
Porosity	0.32	Length (m)	35.600		

Node 8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.615	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	440	Depth (m)	0.500
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	0.500
Porosity	0.32	Length (m)	46.250		

Node 9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.460	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	148	Depth (m)	0.500
Safety Factor	2.0	Width (m)	4.200	Inf Depth (m)	0.500
Porosity	0.32	Length (m)	10.000		



Node 12 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.340	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	138	Depth (m)	0.500
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	0.500
Porosity	0.32	Length (m)	5.200		

Node 13 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.340	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	148	Depth (m)	0.500
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	0.500
Porosity	0.32	Length (m)	5.800		

Node 21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.390	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	930	Depth (m)	0.500
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	0.500
Porosity	0.32	Length (m)	30.000		

Results for 2 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.368	0.068	8.4	0.1054	0.0000	OK
15 minute winter	2	10	7.349	0.099	16.6	0.1528	0.0000	OK
15 minute winter	3	11	7.304	0.104	24.7	0.1593	0.0000	OK
15 minute winter	4	11	7.479	0.079	7.6	0.0776	0.0000	OK
15 minute winter	5	11	7.213	0.163	47.2	0.3168	0.0000	OK
15 minute winter	6	10	7.145	0.045	2.9	0.0605	0.0000	OK
15 minute winter	7	12	7.140	0.190	4.5	0.2360	0.0000	SURCHARGED
480 minute winter	8	360	7.800	0.185	0.9	5.4760	0.0000	SURCHARGED
120 minute winter	9	96	7.565	0.105	0.7	1.2171	0.0000	OK
15 minute winter	10	12	7.134	0.284	64.7	0.5664	0.0000	OK
15 minute winter	11	12	7.109	0.259	69.8	0.4311	0.0000	OK
120 minute winter	12	90	7.541	0.201	0.9	1.6042	0.0000	SURCHARGED
120 minute winter	13	90	7.527	0.187	0.9	1.6254	0.0000	SURCHARGED
15 minute winter	14	12	7.068	0.268	76.5	0.4493	0.0000	OK
15 minute winter	15	10	7.169	0.069	8.7	0.1028	0.0000	OK
720 minute winter	16	660	8.351	0.236	1.5	17.2576	0.0000	SURCHARGED
15 minute winter	17	11	7.104	0.079	13.4	0.1063	0.0000	OK
15 minute winter	18	10	7.103	0.078	11.6	0.1288	0.0000	OK
15 minute winter	19	11	7.080	0.130	32.9	0.1981	0.0000	OK
15 minute winter	20	12	7.028	0.278	46.0	0.5379	0.0000	OK
960 minute winter	21	720	7.596	0.206	1.0	12.9294	0.0000	SURCHARGED
15 minute winter	22	12	7.022	0.322	117.3	0.4612	0.0000	OK
1440 minute winter	22_OUT	1410	7.020	0.490	10.4	1.3147	0.0000	OK
1440 minute winter	23	1410	7.020	0.520	6.1	0.5885	0.0000	SURCHARGED
1440 minute winter	24	1410	7.020	0.530	1.9	0.5994	0.0000	SURCHARGED

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	8.2	0.450	0.071	0.2748	
15 minute winter	2	1.001	3	16.3	0.680	0.135	0.3264	
15 minute winter	3	1.002	5	24.4	0.705	0.172	1.0469	
15 minute winter	4	2.000	5	7.3	0.785	0.534	0.3109	
15 minute winter	5	1.003	10	46.8	0.754	0.406	3.3078	
15 minute winter	6	3.000	7	2.8	0.440	0.198	0.2571	
15 minute winter	7	3.001	10	4.0	0.230	0.226	0.1732	
480 minute winter	8	4.000	10	0.2	0.308	0.017	0.0061	
120 minute winter	9	5.000	10	0.2	0.291	0.012	0.0021	
15 minute winter	10	1.004	11	61.9	0.775	0.561	0.6581	
15 minute winter	11	1.005	14	68.4	0.853	0.635	1.4122	
120 minute winter	12	6.000	14	0.3	0.322	0.017	0.0057	
120 minute winter	13	7.000	14	0.3	0.361	0.014	0.0016	
15 minute winter	14	1.006	22	75.6	0.974	0.678	1.0621	
15 minute winter	15	8.000	17	8.6	0.559	0.073	0.3346	
720 minute winter	16	9.000	17	0.3	0.354	0.017	0.0022	
15 minute winter	17	8.001	19	13.2	0.531	0.101	0.4474	
15 minute winter	18	10.000	19	11.5	0.549	0.151	0.3488	
15 minute winter	19	8.002	20	32.3	0.649	0.268	3.2803	
15 minute winter	20	8.003	22	41.5	0.520	0.275	0.8245	
960 minute winter	21	11.000	22	0.3	0.369	0.014	0.0016	
15 minute winter	22	1.007	22_OUT	117.3	1.282	0.964	1.2565	
1440 minute winter	22_OUT	Flow through pond	23	6.1	0.016	0.000	254.7931	
1440 minute winter	23	12.000	24	1.9	0.187	0.126	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	1.9				278.1



Results for 2 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
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Results for 10 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.389	0.089	12.6	0.1381	0.0000	OK
15 minute winter	2	10	7.375	0.125	24.9	0.1920	0.0000	OK
15 minute winter	3	13	7.331	0.131	37.1	0.2007	0.0000	OK
15 minute winter	4	11	7.505	0.105	11.3	0.1024	0.0000	OK
15 minute winter	5	12	7.338	0.288	71.0	0.5581	0.0000	OK
15 minute winter	6	11	7.324	0.224	4.4	0.3000	0.0000	SURCHARGED
15 minute winter	7	12	7.306	0.356	5.8	0.4412	0.0000	SURCHARGED
360 minute winter	8	328	7.851	0.236	1.5	8.8070	0.0000	FLOOD RISK
120 minute winter	9	94	7.616	0.156	1.0	1.9803	0.0000	SURCHARGED
15 minute winter	10	12	7.296	0.446	88.7	0.8911	0.0000	SURCHARGED
15 minute winter	11	12	7.269	0.419	90.7	0.6980	0.0000	SURCHARGED
120 minute winter	12	94	7.641	0.301	1.3	2.4494	0.0000	SURCHARGED
120 minute winter	13	94	7.618	0.278	1.3	2.4819	0.0000	SURCHARGED
15 minute winter	14	12	7.218	0.418	100.6	0.6994	0.0000	SURCHARGED
1440 minute winter	15	1410	7.209	0.109	0.8	0.1621	0.0000	OK
720 minute winter	16	675	8.429	0.314	2.1	26.2661	0.0000	FLOOD RISK
1440 minute winter	17	1410	7.209	0.184	1.5	0.2458	0.0000	OK
1440 minute winter	18	1410	7.209	0.184	1.0	0.3030	0.0000	OK
1440 minute winter	19	1410	7.209	0.259	3.2	0.3929	0.0000	OK
1440 minute winter	20	1410	7.209	0.459	4.5	0.8865	0.0000	SURCHARGED
960 minute winter	21	735	7.664	0.274	1.4	19.5567	0.0000	SURCHARGED
1440 minute winter	22	1410	7.209	0.509	12.4	0.7278	0.0000	SURCHARGED
1440 minute winter	22_OUT	1410	7.209	0.679	14.0	1.8212	0.0000	OK
1440 minute winter	23	1410	7.208	0.708	8.0	0.8011	0.0000	SURCHARGED
1440 minute winter	24	1410	7.208	0.718	1.9	0.8120	0.0000	SURCHARGED

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	12.3	0.477	0.107	0.3876	
15 minute winter	2	1.001	3	24.5	0.753	0.203	0.4428	
15 minute winter	3	1.002	5	36.7	0.769	0.258	1.8351	
15 minute winter	4	2.000	5	10.9	0.870	0.799	0.4694	
15 minute winter	5	1.003	10	64.9	0.800	0.564	5.2646	
15 minute winter	6	3.000	7	3.5	0.449	0.249	0.4104	
15 minute winter	7	3.001	10	6.7	0.382	0.375	0.1732	
360 minute winter	8	4.000	10	0.3	0.320	0.020	0.0067	
120 minute winter	9	5.000	10	0.2	0.311	0.015	0.0024	
15 minute winter	10	1.004	11	80.8	0.800	0.731	0.8943	
15 minute winter	11	1.005	14	90.2	0.875	0.838	1.8814	
120 minute winter	12	6.000	14	0.3	0.342	0.021	0.0066	
120 minute winter	13	7.000	14	0.3	0.383	0.017	0.0019	
15 minute winter	14	1.006	22	100.5	0.978	0.901	1.4055	
1440 minute winter	15	8.000	17	0.8	0.259	0.007	0.8722	
720 minute winter	16	9.000	17	0.3	0.370	0.019	0.0024	
1440 minute winter	17	8.001	19	1.5	0.290	0.011	1.1814	
1440 minute winter	18	10.000	19	1.0	0.245	0.013	0.8782	
1440 minute winter	19	8.002	20	3.2	0.431	0.026	5.2266	
1440 minute winter	20	8.003	22	4.2	0.329	0.028	0.9648	
960 minute winter	21	11.000	22	0.3	0.385	0.017	0.0018	
1440 minute winter	22	1.007	22_OUT	12.2	0.635	0.100	1.4783	
1440 minute winter	22_OUT	Flow through pond	23	8.0	0.016	0.000	366.0791	
1440 minute winter	23	12.000	24	1.9	0.193	0.126	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	1.9				260.8



Results for 10 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.381	0.081	10.9	0.1233	0.0000	OK
15 minute winter	2	10	7.365	0.115	21.6	0.1743	0.0000	OK
15 minute winter	3	11	7.318	0.118	32.0	0.1797	0.0000	OK
15 minute winter	4	11	7.494	0.094	9.7	0.0879	0.0000	OK
15 minute winter	5	12	7.243	0.193	61.0	0.3674	0.0000	OK
15 minute winter	6	12	7.234	0.134	3.7	0.1777	0.0000	OK
15 minute winter	7	12	7.224	0.274	5.4	0.3391	0.0000	SURCHARGED
360 minute winter	8	288	7.829	0.214	1.3	7.2493	0.0000	FLOOD RISK
120 minute winter	9	92	7.595	0.135	0.9	1.6710	0.0000	OK
15 minute winter	10	12	7.214	0.364	80.2	0.7107	0.0000	OK
15 minute winter	11	12	7.192	0.342	84.0	0.5598	0.0000	OK
120 minute winter	12	92	7.603	0.263	1.2	2.1172	0.0000	SURCHARGED
120 minute winter	13	96	7.583	0.243	1.2	2.1478	0.0000	SURCHARGED
15 minute winter	14	12	7.153	0.353	92.5	0.5813	0.0000	OK
15 minute winter	15	10	7.179	0.079	11.2	0.1161	0.0000	OK
600 minute winter	16	555	8.388	0.273	2.0	21.4913	0.0000	SURCHARGED
15 minute winter	17	13	7.133	0.108	17.3	0.1434	0.0000	OK
15 minute winter	18	12	7.129	0.104	15.0	0.1691	0.0000	OK
15 minute winter	19	12	7.129	0.179	42.2	0.2686	0.0000	OK
15 minute winter	20	12	7.118	0.368	58.5	0.6971	0.0000	OK
600 minute winter	21	555	7.627	0.237	1.6	15.9460	0.0000	SURCHARGED
15 minute winter	22	12	7.110	0.410	136.3	0.5868	0.0000	SURCHARGED
1440 minute winter	22_OUT	1410	7.109	0.579	11.8	1.5178	0.0000	OK
1440 minute winter	23	1410	7.109	0.609	6.8	0.6886	0.0000	SURCHARGED
1440 minute winter	24	1410	7.109	0.619	1.9	0.6995	0.0000	SURCHARGED

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	10.7	0.468	0.092	0.3416	
15 minute winter	2	1.001	3	21.1	0.726	0.175	0.3956	
15 minute winter	3	1.002	5	31.6	0.753	0.222	1.2736	
15 minute winter	4	2.000	5	9.4	0.835	0.687	0.3757	
15 minute winter	5	1.003	10	59.7	0.785	0.518	4.2412	
15 minute winter	6	3.000	7	3.5	0.466	0.247	0.3982	
15 minute winter	7	3.001	10	5.7	0.325	0.319	0.1732	
360 minute winter	8	4.000	10	0.3	0.315	0.019	0.0065	
120 minute winter	9	5.000	10	0.2	0.304	0.014	0.0023	
15 minute winter	10	1.004	11	74.1	0.791	0.671	0.8522	
15 minute winter	11	1.005	14	83.6	0.863	0.776	1.8167	
120 minute winter	12	6.000	14	0.3	0.335	0.020	0.0062	
120 minute winter	13	7.000	14	0.3	0.376	0.016	0.0018	
15 minute winter	14	1.006	22	93.2	0.965	0.836	1.3678	
15 minute winter	15	8.000	17	11.1	0.593	0.095	0.4152	
600 minute winter	16	9.000	17	0.3	0.362	0.018	0.0023	
15 minute winter	17	8.001	19	17.0	0.556	0.130	0.6800	
15 minute winter	18	10.000	19	14.7	0.576	0.194	0.5245	
15 minute winter	19	8.002	20	39.8	0.673	0.330	4.4155	
15 minute winter	20	8.003	22	49.2	0.521	0.326	0.9624	
600 minute winter	21	11.000	22	0.3	0.377	0.015	0.0017	
15 minute winter	22	1.007	22_OUT	137.2	1.296	1.127	1.4659	
1440 minute winter	22_OUT	Flow through pond	23	6.8	0.016	0.000	306.0503	
1440 minute winter	23	12.000	24	1.9	0.187	0.126	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	1.9				261.6



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
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Results for 30 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	7.539	0.239	16.0	0.3704	0.0000	OK
15 minute winter	2	13	7.538	0.288	31.6	0.4421	0.0000	OK
15 minute winter	3	13	7.551	0.351	47.0	0.5389	0.0000	OK
15 minute winter	4	12	7.660	0.260	14.3	0.2545	0.0000	SURCHARGED
15 minute winter	5	12	7.532	0.482	89.0	0.9350	0.0000	SURCHARGED
15 minute winter	6	13	7.493	0.393	5.5	0.5267	0.0000	SURCHARGED
15 minute winter	7	13	7.486	0.536	7.6	0.6651	0.0000	SURCHARGED
480 minute winter	8	376	7.891	0.276	1.5	11.7326	0.0000	FLOOD RISK
180 minute winter	9	136	7.661	0.201	1.0	2.6466	0.0000	SURCHARGED
15 minute winter	10	13	7.470	0.620	96.3	1.2376	0.0000	SURCHARGED
15 minute winter	11	13	7.441	0.591	96.5	0.9839	0.0000	SURCHARGED
120 minute winter	12	96	7.745	0.405	1.7	3.3298	0.0000	FLOOD RISK
120 minute winter	13	96	7.713	0.373	1.7	3.3724	0.0000	FLOOD RISK
1440 minute winter	14	1440	7.381	0.581	9.4	0.9730	0.0000	SURCHARGED
1440 minute winter	15	1410	7.381	0.281	0.9	0.4194	0.0000	OK
960 minute winter	16	885	8.497	0.382	2.1	34.1077	0.0000	FLOOD RISK
15 minute winter	17	12	7.385	0.360	25.6	0.4818	0.0000	OK
1440 minute winter	18	1410	7.381	0.356	1.2	0.5872	0.0000	SURCHARGED
1440 minute winter	19	1440	7.381	0.431	3.8	0.6547	0.0000	SURCHARGED
1440 minute winter	20	1440	7.381	0.631	5.3	1.2196	0.0000	SURCHARGED
720 minute winter	21	675	7.730	0.340	2.1	25.9989	0.0000	FLOOD RISK
1440 minute winter	22	1440	7.381	0.681	14.4	0.9744	0.0000	SURCHARGED
1440 minute winter	22_OUT	1410	7.381	0.852	16.3	2.2832	0.0000	OK
1440 minute winter	23	1440	7.381	0.881	9.5	0.9962	0.0000	FLOOD RISK
1440 minute winter	24	1440	7.380	0.890	1.9	1.0070	0.0000	FLOOD RISK

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	15.6	0.491	0.136	1.2267	
15 minute winter	2	1.001	3	31.0	0.795	0.257	1.3488	
15 minute winter	3	1.002	5	44.9	0.796	0.316	3.2152	
15 minute winter	4	2.000	5	13.8	0.875	1.010	0.5870	
15 minute winter	5	1.003	10	68.8	0.805	0.598	5.7757	
15 minute winter	6	3.000	7	4.5	0.471	0.318	0.4104	
15 minute winter	7	3.001	10	7.6	0.433	0.425	0.1732	
480 minute winter	8	4.000	10	0.3	0.328	0.021	0.0071	
180 minute winter	9	5.000	10	0.3	0.323	0.017	0.0027	
15 minute winter	10	1.004	11	86.5	0.797	0.783	0.8943	
15 minute winter	11	1.005	14	95.4	0.874	0.885	1.8814	
120 minute winter	12	6.000	14	0.4	0.358	0.025	0.0073	
120 minute winter	13	7.000	14	0.4	0.400	0.020	0.0021	
1440 minute winter	14	1.006	22	9.3	0.597	0.083	1.4055	
1440 minute winter	15	8.000	17	0.9	0.265	0.008	2.1445	
960 minute winter	16	9.000	17	0.4	0.380	0.021	0.0026	
15 minute winter	17	8.001	19	22.5	0.581	0.173	1.9216	
1440 minute winter	18	10.000	19	1.2	0.256	0.016	1.1268	
1440 minute winter	19	8.002	20	3.8	0.431	0.031	6.0251	
1440 minute winter	20	8.003	22	5.0	0.330	0.033	0.9648	
720 minute winter	21	11.000	22	0.3	0.397	0.019	0.0020	
1440 minute winter	22	1.007	22_OUT	14.2	0.633	0.117	1.4783	
1440 minute winter	22_OUT	Flow through pond	23	9.5	0.014	0.000	476.1620	
1440 minute winter	23	12.000	24	1.9	0.191	0.126	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	1.9				284.6



Results for 30 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
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Results for 100 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	7.406	0.106	14.1	0.1624	0.0000	OK
15 minute winter	2	12	7.423	0.173	27.9	0.2629	0.0000	OK
15 minute winter	3	13	7.409	0.209	41.4	0.3166	0.0000	OK
15 minute winter	4	10	7.514	0.114	12.6	0.1066	0.0000	OK
15 minute winter	5	12	7.405	0.355	79.1	0.6754	0.0000	OK
15 minute winter	6	12	7.382	0.282	4.8	0.3756	0.0000	SURCHARGED
15 minute winter	7	12	7.370	0.420	8.6	0.5195	0.0000	SURCHARGED
240 minute winter	8	232	7.866	0.251	2.3	9.9106	0.0000	FLOOD RISK
120 minute winter	9	98	7.640	0.180	1.2	2.3345	0.0000	SURCHARGED
15 minute winter	10	12	7.355	0.505	90.7	0.9869	0.0000	SURCHARGED
15 minute winter	11	12	7.328	0.478	94.1	0.7823	0.0000	SURCHARGED
120 minute winter	12	94	7.701	0.361	1.5	2.9510	0.0000	FLOOD RISK
120 minute winter	13	96	7.672	0.332	1.5	2.9899	0.0000	FLOOD RISK
15 minute winter	14	12	7.274	0.474	105.6	0.7810	0.0000	SURCHARGED
15 minute winter	15	12	7.263	0.163	14.5	0.2399	0.0000	OK
600 minute winter	16	585	8.449	0.334	2.6	28.5517	0.0000	FLOOD RISK
15 minute winter	17	12	7.264	0.239	22.3	0.3177	0.0000	OK
15 minute winter	18	13	7.252	0.227	19.4	0.3688	0.0000	OK
15 minute winter	19	13	7.257	0.307	52.9	0.4610	0.0000	OK
1440 minute winter	20	1410	7.250	0.500	4.7	0.9469	0.0000	SURCHARGED
600 minute winter	21	570	7.689	0.299	2.1	21.9487	0.0000	SURCHARGED
1440 minute winter	22	1410	7.250	0.550	13.1	0.7867	0.0000	SURCHARGED
1440 minute winter	22_OUT	1410	7.249	0.720	14.8	1.8867	0.0000	OK
1440 minute winter	23	1410	7.249	0.749	8.5	0.8476	0.0000	SURCHARGED
1440 minute winter	24	1410	7.249	0.759	1.9	0.8585	0.0000	SURCHARGED

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	13.8	0.484	0.119	0.5466	
15 minute winter	2	1.001	3	27.3	0.773	0.226	0.7548	
15 minute winter	3	1.002	5	40.5	0.785	0.285	2.4901	
15 minute winter	4	2.000	5	12.0	0.882	0.874	0.5249	
15 minute winter	5	1.003	10	66.1	0.800	0.575	5.7173	
15 minute winter	6	3.000	7	5.9	0.447	0.418	0.4104	
15 minute winter	7	3.001	10	7.6	0.433	0.426	0.1732	
240 minute winter	8	4.000	10	0.3	0.323	0.020	0.0069	
120 minute winter	9	5.000	10	0.2	0.318	0.016	0.0026	
15 minute winter	10	1.004	11	81.0	0.802	0.733	0.8943	
15 minute winter	11	1.005	14	92.0	0.876	0.854	1.8814	
120 minute winter	12	6.000	14	0.4	0.352	0.024	0.0070	
120 minute winter	13	7.000	14	0.3	0.393	0.018	0.0020	
15 minute winter	14	1.006	22	103.5	0.970	0.928	1.4055	
15 minute winter	15	8.000	17	14.3	0.613	0.123	1.3065	
600 minute winter	16	9.000	17	0.3	0.373	0.020	0.0025	
15 minute winter	17	8.001	19	20.7	0.573	0.159	1.4961	
15 minute winter	18	10.000	19	19.9	0.603	0.262	1.0209	
15 minute winter	19	8.002	20	44.7	0.670	0.371	5.6531	
1440 minute winter	20	8.003	22	4.4	0.330	0.029	0.9648	
600 minute winter	21	11.000	22	0.3	0.389	0.017	0.0019	
1440 minute winter	22	1.007	22_OUT	12.9	0.645	0.106	1.4783	
1440 minute winter	22_OUT	Flow through pond	23	8.5	0.016	0.000	391.6411	
1440 minute winter	23	12.000	24	1.9	0.193	0.126	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	1.9				265.8



Results for 100 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
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Results for 100 year +20% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	7.731	0.431	17.7	0.6673	0.0000	SURCHARGED
15 minute winter	2	13	7.725	0.475	50.0	0.7294	0.0000	SURCHARGED
15 minute winter	3	12	7.756	0.556	58.2	0.8549	0.0000	SURCHARGED
15 minute winter	4	12	7.852	0.452	15.9	0.4425	0.0000	FLOOD RISK
15 minute winter	5	13	7.717	0.667	89.5	1.2927	0.0000	SURCHARGED
15 minute winter	6	13	7.686	0.586	6.1	0.7854	0.0000	SURCHARGED
15 minute winter	7	13	7.672	0.722	10.3	0.8960	0.0000	SURCHARGED
480 minute winter	8	384	7.912	0.297	1.7	13.2573	0.0000	FLOOD RISK
120 minute winter	9	112	7.689	0.229	1.5	3.0575	0.0000	SURCHARGED
15 minute winter	10	13	7.637	0.787	102.2	1.5713	0.0000	SURCHARGED
15 minute winter	11	13	7.598	0.748	106.5	1.2439	0.0000	SURCHARGED
180 minute winter	12	136	7.802	0.462	1.4	3.8118	0.0000	FLOOD RISK
180 minute winter	13	136	7.766	0.426	1.4	3.8733	0.0000	FLOOD RISK
15 minute winter	14	13	7.525	0.725	118.7	1.2136	0.0000	SURCHARGED
15 minute winter	15	12	7.513	0.413	19.4	0.6161	0.0000	SURCHARGED
720 minute winter	16	690	8.526	0.411	2.8	37.4573	0.0000	FLOOD RISK
15 minute winter	17	12	7.514	0.489	25.9	0.6548	0.0000	SURCHARGED
15 minute winter	18	12	7.521	0.496	24.4	0.8186	0.0000	SURCHARGED
15 minute winter	19	13	7.503	0.553	62.3	0.8405	0.0000	SURCHARGED
15 minute winter	20	12	7.474	0.724	78.9	1.3993	0.0000	SURCHARGED
600 minute winter	21	570	7.759	0.369	2.6	28.7914	0.0000	FLOOD RISK
15 minute winter	22	12	7.450	0.750	187.6	1.0736	0.0000	SURCHARGED
1440 minute winter	22_OUT	1410	7.449	0.919	17.5	2.4642	0.0000	OK
1440 minute winter	23	1440	7.448	0.948	9.6	1.0725	0.0000	FLOOD RISK
1440 minute winter	24	1440	7.448	0.958	1.9	1.0833	0.0000	FLOOD RISK

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	33.4	0.498	0.289	1.6420	
15 minute winter	2	1.001	3	34.1	0.794	0.283	1.5032	
15 minute winter	3	1.002	5	45.3	0.797	0.319	3.2607	
15 minute winter	4	2.000	5	14.1	0.892	1.031	0.5870	
15 minute winter	5	1.003	10	73.8	0.810	0.641	5.7757	
15 minute winter	6	3.000	7	6.6	0.482	0.467	0.4104	
15 minute winter	7	3.001	10	9.1	0.514	0.506	0.1732	
480 minute winter	8	4.000	10	0.3	0.331	0.022	0.0073	
120 minute winter	9	5.000	10	0.3	0.329	0.018	0.0028	
15 minute winter	10	1.004	11	96.3	0.874	0.872	0.8943	
15 minute winter	11	1.005	14	106.7	0.968	0.991	1.8814	
180 minute winter	12	6.000	14	0.4	0.365	0.027	0.0077	
180 minute winter	13	7.000	14	0.4	0.408	0.021	0.0022	
15 minute winter	14	1.006	22	120.2	1.090	1.078	1.4055	
15 minute winter	15	8.000	17	17.8	0.633	0.152	2.4046	
720 minute winter	16	9.000	17	0.4	0.385	0.022	0.0027	
15 minute winter	17	8.001	19	27.7	0.572	0.212	1.9352	
15 minute winter	18	10.000	19	24.5	0.621	0.323	1.1268	
15 minute winter	19	8.002	20	55.0	0.696	0.456	6.0251	
15 minute winter	20	8.003	22	78.8	0.714	0.522	0.9648	
600 minute winter	21	11.000	22	0.4	0.402	0.019	0.0020	
15 minute winter	22	1.007	22_OUT	187.6	1.701	1.542	1.4783	
1440 minute winter	22_OUT	Flow through pond	23	9.6	0.014	0.000	521.2836	
1440 minute winter	23	12.000	24	1.9	0.192	0.126	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	1.9				292.9



Results for 100 year +20% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.9	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)
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Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	8.058	0.758	58.4	1.1743	0.0000	SURCHARGED
15 minute winter	2	13	8.038	0.788	58.2	1.2117	0.0000	SURCHARGED
15 minute winter	3	12	8.067	0.867	55.3	1.3333	0.0000	SURCHARGED
15 minute winter	4	12	8.100	0.700	18.5	0.6846	0.5239	FLOOD
15 minute winter	5	13	8.021	0.971	101.6	1.8825	0.0000	SURCHARGED
15 minute winter	6	12	7.991	0.891	9.5	1.1944	0.0000	FLOOD RISK
15 minute winter	7	13	7.965	1.015	10.0	1.2601	0.0000	FLOOD RISK
360 minute winter	8	352	7.951	0.336	2.5	16.0298	0.0000	FLOOD RISK
180 minute winter	9	140	7.725	0.265	1.3	3.5965	0.0000	SURCHARGED
15 minute winter	10	13	7.936	1.086	120.1	2.1683	0.0000	FLOOD RISK
15 minute winter	11	13	7.888	1.038	122.6	1.7270	0.0000	FLOOD RISK
180 minute winter	12	120	7.950	0.610	1.7	4.1907	0.2832	FLOOD
180 minute winter	13	140	7.893	0.553	1.7	4.5987	0.0000	FLOOD RISK
15 minute winter	14	13	7.793	0.993	136.7	1.6625	0.0000	FLOOD RISK
15 minute winter	15	12	7.768	0.668	33.9	0.9978	0.0000	SURCHARGED
960 minute winter	16	900	8.591	0.476	2.7	45.0429	0.0000	FLOOD RISK
15 minute winter	17	13	7.772	0.747	41.6	0.9999	0.0000	SURCHARGED
15 minute winter	18	12	7.808	0.783	28.5	1.2916	0.0000	SURCHARGED
15 minute winter	19	12	7.788	0.838	73.5	1.2736	0.0000	SURCHARGED
15 minute winter	20	12	7.723	0.973	101.3	1.8814	0.0000	SURCHARGED
720 minute winter	21	690	7.816	0.426	2.6	34.4277	0.0000	FLOOD RISK
15 minute winter	22	13	7.694	0.994	215.4	1.4225	0.0000	SURCHARGED
1440 minute winter	22_OUT	1440	7.579	1.049	19.7	2.8136	0.0000	OK
1440 minute winter	23	1440	7.579	1.079	10.9	1.2201	0.0000	FLOOD RISK
1440 minute winter	24	1440	7.578	1.088	2.0	1.2308	0.0000	FLOOD RISK

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	38.7	0.500	0.335	1.6420	
15 minute winter	2	1.001	3	35.9	0.821	0.297	1.5032	
15 minute winter	3	1.002	5	51.6	0.803	0.363	3.2607	
15 minute winter	4	2.000	5	14.7	0.872	1.072	0.5870	
15 minute winter	5	1.003	10	86.6	0.807	0.752	5.7757	
15 minute winter	6	3.000	7	6.3	0.475	0.440	0.4104	
15 minute winter	7	3.001	10	11.5	0.654	0.643	0.1732	
360 minute winter	8	4.000	10	0.3	0.338	0.024	0.0077	
180 minute winter	9	5.000	10	0.3	0.337	0.020	0.0030	
15 minute winter	10	1.004	11	107.8	0.978	0.976	0.8943	
15 minute winter	11	1.005	14	121.1	1.098	1.125	1.8814	
180 minute winter	12	6.000	14	0.5	0.381	0.031	0.0085	
180 minute winter	13	7.000	14	0.4	0.424	0.024	0.0024	
15 minute winter	14	1.006	22	135.7	1.230	1.217	1.4055	
15 minute winter	15	8.000	17	23.5	0.634	0.201	2.4046	
960 minute winter	16	9.000	17	0.4	0.393	0.024	0.0028	
15 minute winter	17	8.001	19	35.6	0.586	0.273	1.9352	
15 minute winter	18	10.000	19	34.2	0.638	0.451	1.1268	
15 minute winter	19	8.002	20	67.8	0.701	0.563	6.0251	
15 minute winter	20	8.003	22	92.8	0.842	0.615	0.9648	
720 minute winter	21	11.000	22	0.8	0.407	0.045	0.0286	
15 minute winter	22	1.007	22_OUT	217.0	1.968	1.784	1.4783	
1440 minute winter	22_OUT	Flow through pond	23	10.9	0.028	0.000	611.8173	
1440 minute winter	23	12.000	24	2.0	0.189	0.134	0.0249	
1440 minute winter	24	Hydro-Brake®	24_OUT	2.0				308.5



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	24_OUT	1	6.440	0.000	1.9	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)
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