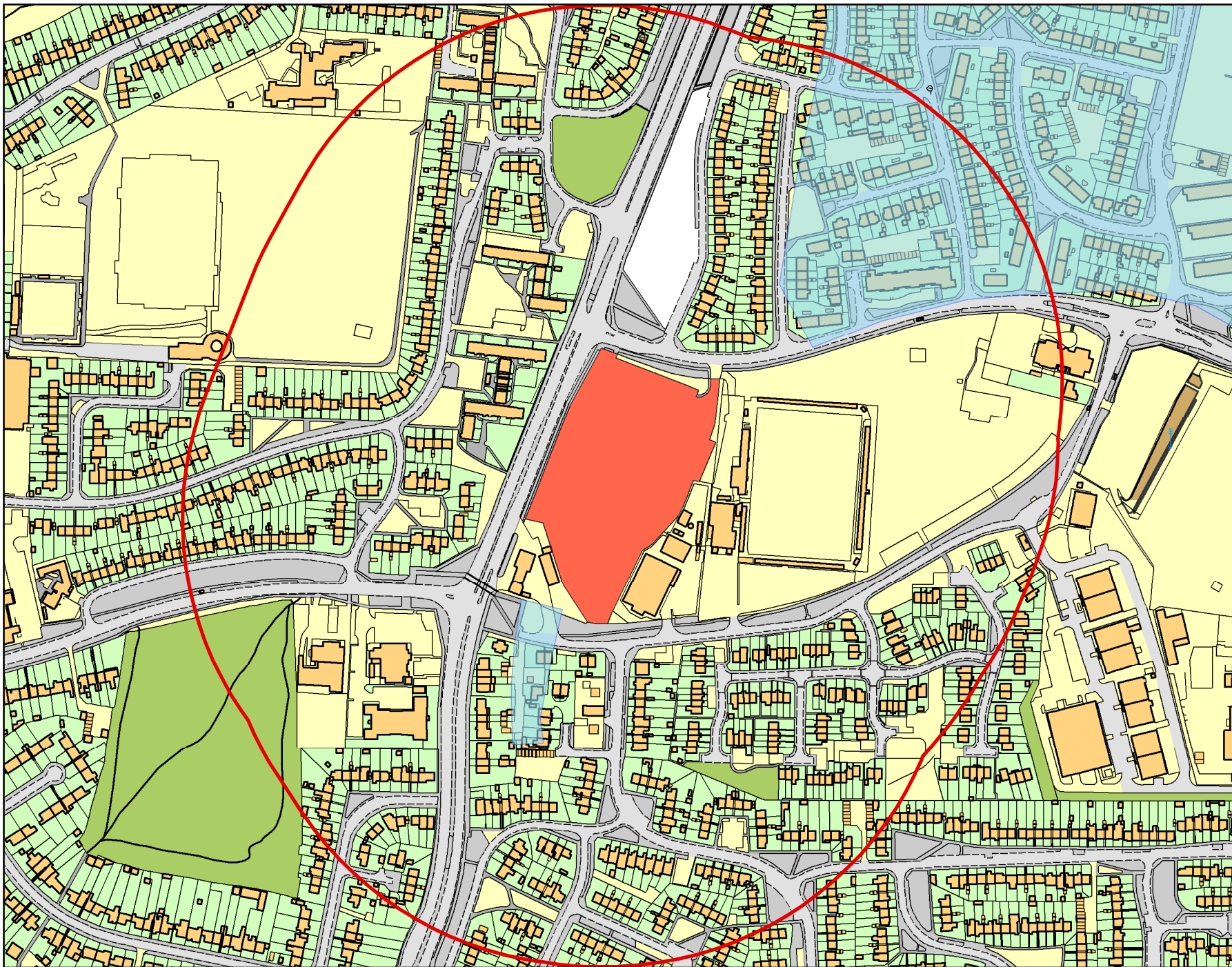




Legend

-  Site Buffer
-  Site
-  EA Recorded Flood Outlines
-  Recorded Highway Flooding in Hampshire

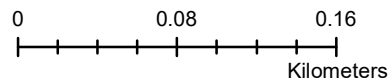
Historic Flood Information Request

Historic Flooding Records

Vectos

SCOTTISH AND
SOUTHERN ENERGY

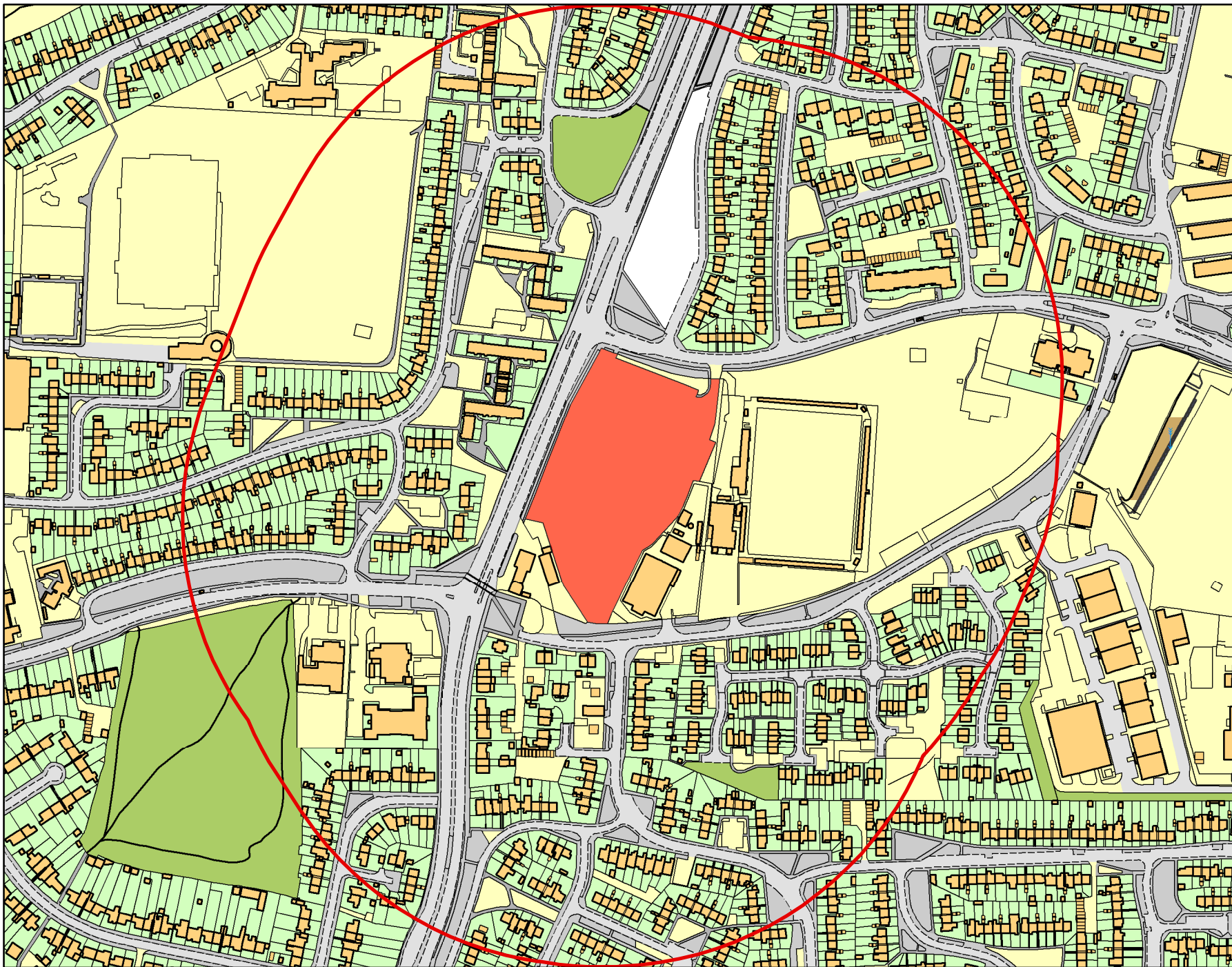
Notes:



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1:3,808

Date:	12/03/2020	Sheet:	1 of 1
Revision:	1	Initials:	SML



Legend

- Site Buffer
- Site

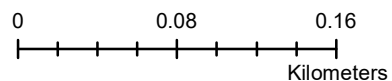
Historic Flood Information Request

Detailed River Network

Vectos

SCOTTISH AND SOUTHERN ENERGY

Notes:



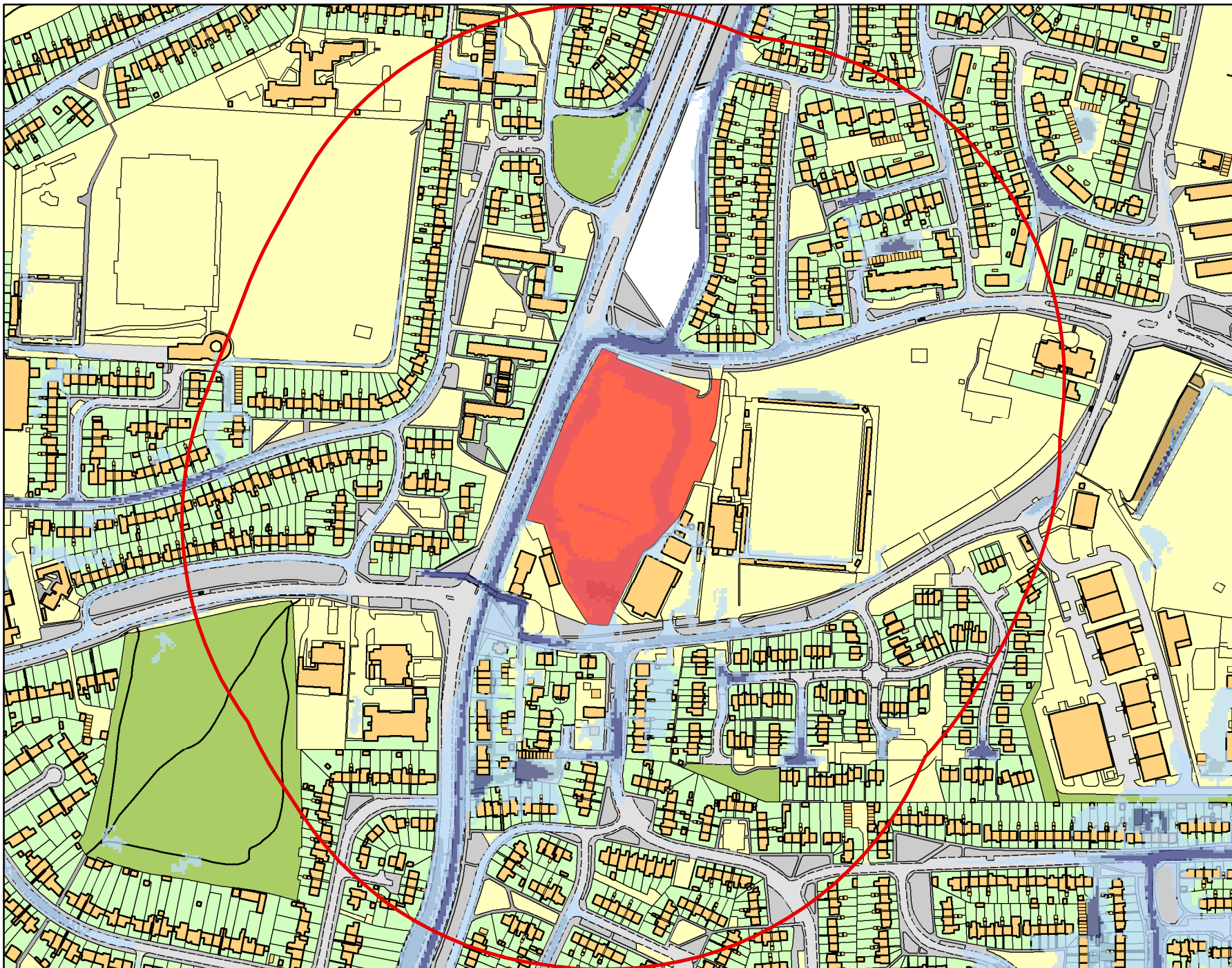
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1:3,808

Date:	12/03/2020	Sheet:	1 of 1
Revision:	1	Initials:	SML



Hampshire
County Council



Legend

-  Site Buffer
-  Site
-  Flood Map for Surface Water
-  Flood Map for Surface Water (Medium)
-  Flood Map for Surface Water

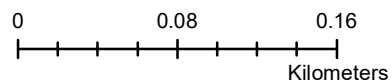
Historic Flood Information Request

Flood Map for Surface Water (FMfSW)

Vectos

SCOTTISH AND SOUTHERN ENERGY

Notes:



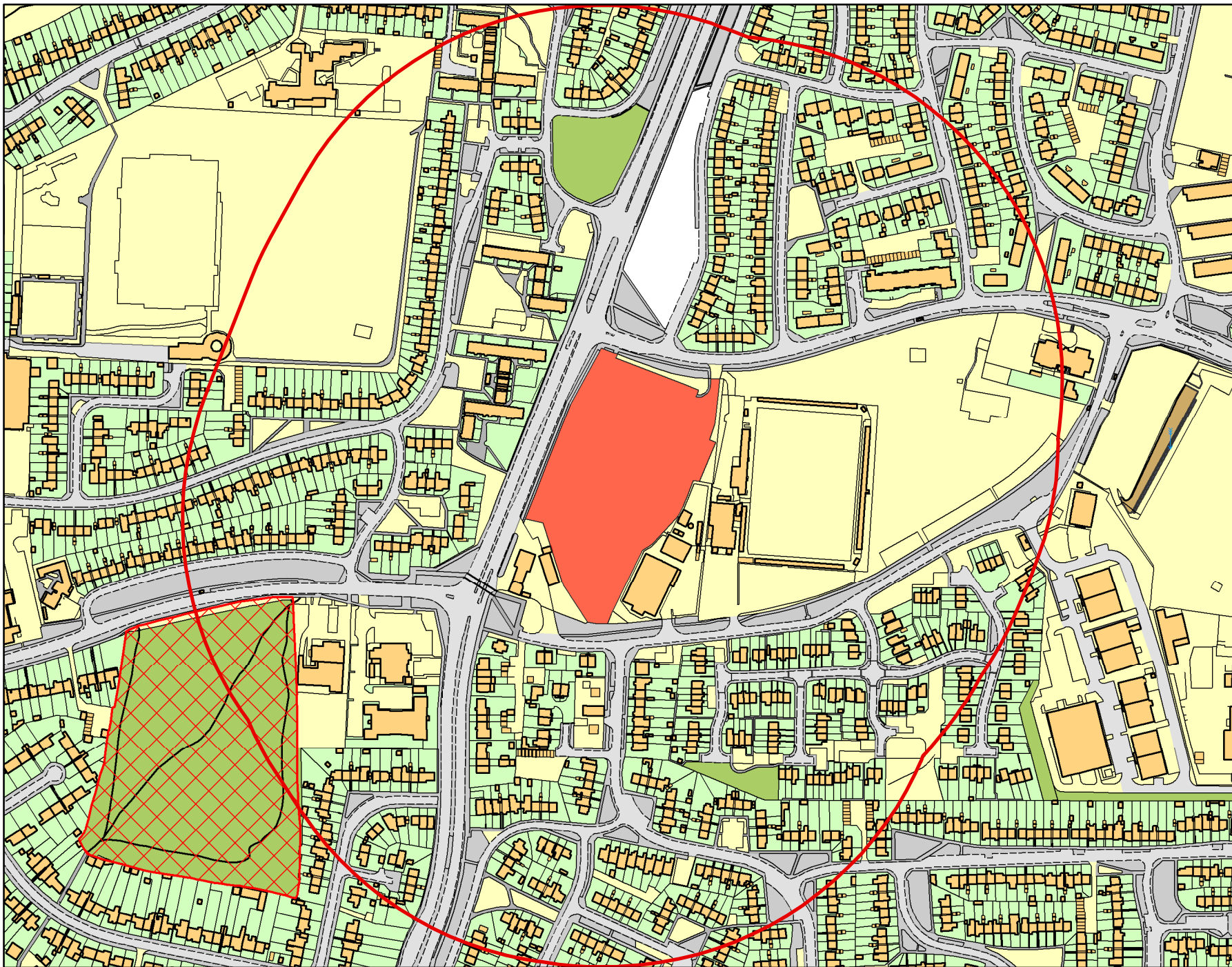
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Date:	12/03/2020	Sheet:	1 of 1
Revision:	1	Initials:	SML



Hampshire
County Council



Legend

- Site
- Site
- SINC

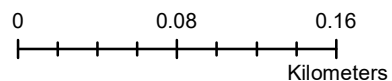
Historic Flood Information Request

Environmental Designations

Vectos

SCOTTISH AND
SOUTHERN ENERGY

Notes:



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Date:	12/03/2020	Sheet:	1 of 1
Revision:	1	Initials:	SML



Hampshire
County Council

APPENDIX H RAINFALL INTENSITY CALCULATION

Vectos (South) Limited		Page 1
Unit 704 The Paintworks Bristol BS4 3EH		
Date 06/07/2020 10:14 File 195104 Havant Brownfiel...	Designed by Lizzie.Todd-Davies Checked by	
XP Solutions	Source Control 2019.1	

Rainfall profile

Storm duration (mins) 60

FSR Data

Region England and Wales

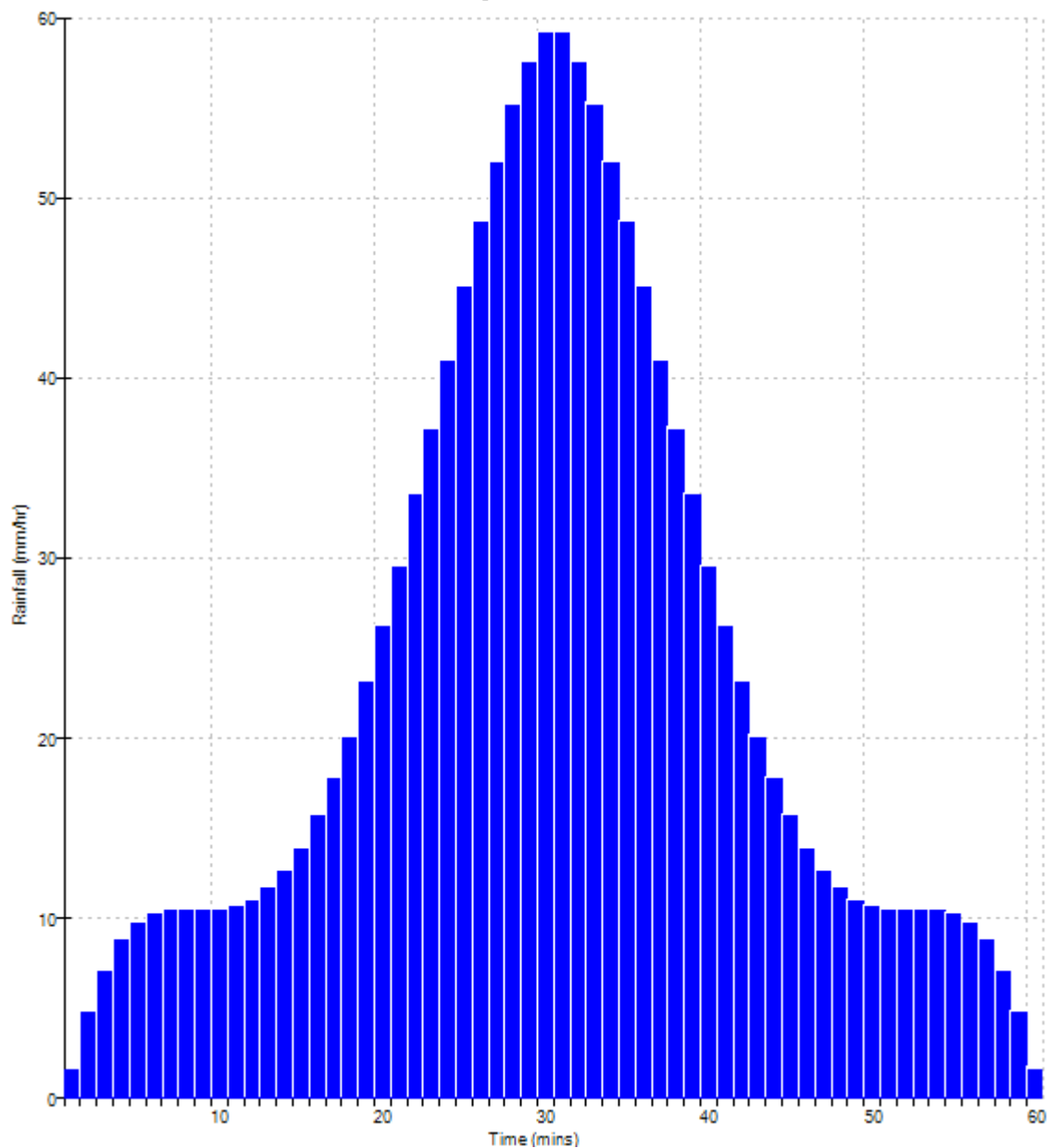
M5-60 (mm) 19.600

Ratio R 0.346

Peak Intensity (mm/hr) 59.156

Ave. Intensity (mm/hr) 23.519

Return Period (years) 10.0

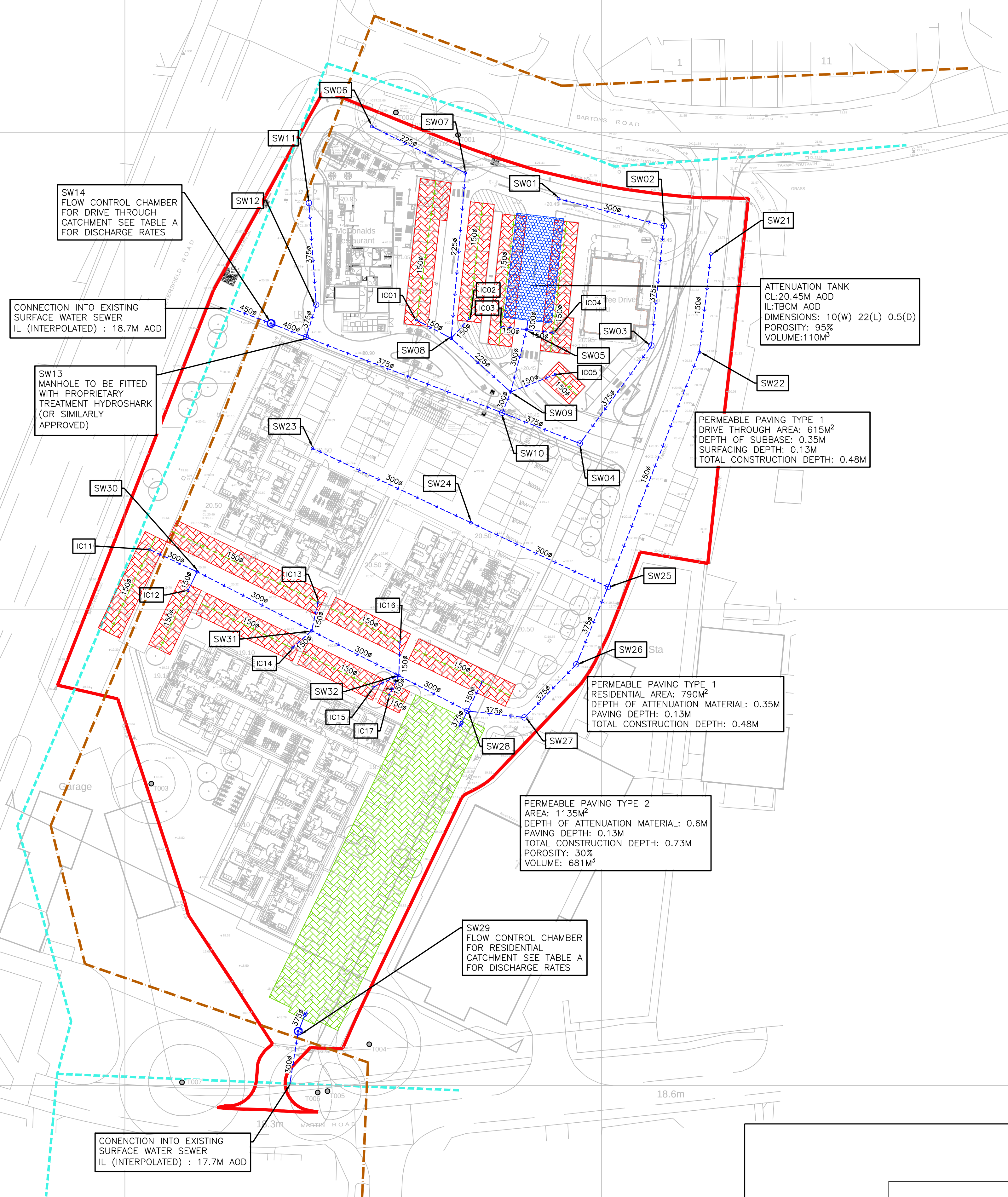


APPENDIX I PRELIMINARY SURFACE WATER DRAINAGE STRATEGY



108000mN

107900mN



NOTE: THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN VECTOS (SOUTH) LTD
IT MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THEIR PRIOR WRITTEN CONSENT

TABLE A

CATCHMENT	PROPOSED USE	PROPOSED DISCHARGE RATE IN 1 YEAR EVENT (l/s)	PROPOSED DISCHARGE RATE ALL OTHER EVENTS (l/s)
1 (NORTH)	DRIVE THROUGH	12.8	16.8
2 (SOUTH)	RESIDENTIAL	25.9	34.1

NOTES:

1. DRAINAGE IS NOT SUITABLE FOR CONSTRUCTION AND IS SUBJECT TO DETAILED DESIGN AND PROPOSED SITE LEVELS.
2. ALL PRIVATE DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH BUILDING REGULATIONS PART H TO COMPLY WITH BS EN-752 DRAINAGE AND SEWER SYSTEMS FOR UNSEWERED BUILDINGS AND OTHER RELEVANT BRITISH STANDARDS AND CODES OF PRACTICES.
3. INTERNAL DRAINAGE TO BE DESIGNED BY OTHERS.
4. ALL PRIVATE DRAINAGE WORKS DRAINAGE DESIGNED TO THE 100 YEAR PLUS 40% CLIMATE CHANGE ALLOWANCE.
5. COVER LEVELS ASSUMED USING EXISTING TOPOGRAPHIC SURVEY & ARCHITECTURAL PROFILES AND USED LEVELS.
6. EXISTING SERVICES ARE FROM THIRD PARTY SOURCES AND ARE SUBJECT TO CONFIRMATION ON SITE.
7. LOCAL LAND RAISING MAY BE REQUIRED TO OBTAIN MINIMUM COVER DEPTHS.
8. ALL LEVELS ARE TO OS DATUM.
9. NEW BUILDINGS TO BE OFFSET FROM EXISTING SEWERS BY AT LEAST 3 METRES. SEWER ALIGNMENTS WILL NEED TO BE SURVEYED TO CONFIRM EXACT LOCATIONS.
10. PROPOSED SURFACE WATER DRAINAGE PIPES HAVE BEEN UPSIZED TO PREVENT FLOODING AND SURCHARGING DURING THE 1 IN 1 YEAR EVENT.
11. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH VECTOS FLOOD RISK ASSESSMENT AND OTHER SUPPORTING DOCUMENTATION.

KEY

- | | |
|---|--|
|  | PROPOSED SITE BOUNDARY |
|  | EXISTING PUBLIC SURFACE WATER NETWORK |
|  | EXISTING PUBLIC FOUL WATER NETWORK |
|  | PROPOSED SURFACE WATER NETWORK (PRIVATE) |
|  | PROPOSED SW PERFORATED PIPE |
|  | PROPOSED SW FLOW CONTROL CHAMBER |
|  | PROPOSED DISTRIBUTION TANK |
|  | PROPOSED PERMEABLE SURFACE TYPE 1 |
|  | PROPOSED PERMEABLE SURFACE TYPE 2 WITH UNDERLYING SW STORAGE SUBBASE |
|  | PROPOSED SW ATTENUATION/STORAGE TANK |

A	ARCHITECT LAYOUT UPDATED [REC. 27.11.20]. DRAINAGE LAYOUT & DESIGN AMENDED TO SUIT. TITLE FRAME UPDATED TO LATEST COMPANY LOGO.
---	---

HE	NB	07/12/2020
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REV.	DETAILS	DRAWN	CHECKED	DATE
------	---------	-------	---------	------

STATUS:

INFORMATION ONLY

CLIENT:

FORTITUDO LIMITED

PROJECT:

BARTONS ROAD, HAVANT

DRAWING TITLE:

PRELIMINARY SURFACE WATER DRAINAGE STRATEGY

SCALES:

1:500 @ A1

DRAWN: JE	CHECKED: NB	DATE: JULY 2020
--------------	----------------	--------------------

vectos.

5th Floor, 4 Colston Avenue, Bristol, BS1 4ST
t: 0117 203 5240 e: enquiries@vectors.co.uk

DRAWING NUMBER:	195104 PDL 01	REVISION:	A
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DRIVE THROUGH MANHOLE SCHEDULE								
REFERENCE NUMBER	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO INVERT (m)	DIAMETER (mm)	EASTING	NORTHING	OUTGOING PIPE DIAMETER (mm)	NOTES
SW01	20.450	19.500	0.950	600	472191.042	108086.114	300	
SW02	20.450	19.400	1.050	1200	472213.135	108080.448	375	
SW03	20.450	19.325	1.125	1200	472210.532	108055.314	375	
SW04	20.450	19.200	1.250	1200	472195.511	108034.758	375	
SW05	20.450	19.300	1.150	600	472184.351	108058.671	300	
SW06	20.900	19.700	1.200	600	472151.860	108101.280	225	
SW07	20.900	19.600	1.300	600	472171.482	108091.541	225	
SW08	20.900	19.400	1.500	600	472168.487	108056.833	225	
SW09	20.450	19.200	1.250	600	472180.972	108045.581	300	
SW10	20.450	19.100	1.350	1200	472179.220	108041.204	375	
SW11	20.900	19.200	1.700	1200	472138.626	108085.212	375	
SW12	20.900	19.000	1.900	1200	472140.159	108063.879	375	
SW13	20.900	18.900	2.000	1200	472138.051	108057.085	450	TO BE FITTED WITH PROPRIETARY HYDROSHARK OR SIMILARLY APPROVED
SW14	20.600	18.800	1.800	1500	472130.710	108059.953	450	TO BE FITTED WITH A FLOW CONTROL DEVICE (SEE TABLE A FOR DISCHARGE RATES)
IC01	20.900	20.420	0.480	450	472161.219	108060.684	150	
IC02	20.900	20.420	0.480	450	472172.299	108061.006	150	
IC03	20.450	19.970	0.480	450	472178.956	108059.313	150	
IC04	20.450	19.970	0.480	450	472189.826	108058.019	150	
IC05	20.450	19.970	0.480	450	472190.362	108049.255	150	

RESIDENTIAL MANHOLE SCHEDULE								
REFERENCE NUMBER	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO INVERT (m)	DIAMETER (mm)	EASTING	NORTHING	OUTGOING PIPE DIAMETER (mm)	NOTES
SW21	21.600	19.800	1.800	600	472223.021	108074.509	150	
SW22	20.790	19.300	1.490	600	472220.578	108053.901	150	
SW23	20.500	18.950	1.550	600	472139.396	108033.744	300	
SW24	20.500	18.700	1.800	600	472172.631	108018.130	300	
SW25	19.710	18.400	1.310	1200	472201.400	108004.644	375	
SW26	19.520	18.300	1.220	1200	472194.749	107988.407	375	
SW27	19.240	18.200	1.040	1200	472183.895	107977.260	375	
SW28	19.420	18.100	1.320	1200	472171.905	107978.612	375	
SW29	18.700	17.800	0.900	1500	472136.405	107911.401	300	TO BE FITTED WITH A FLOW CONTROL DEVICE (SEE TABLE A FOR DISCHARGE RATES)
SW30	20.000	18.800	1.200	600	472115.175	108007.836	300	
SW31	20.000	18.500	1.500	600	472139.206	107995.457	300	
SW32	20.000	18.175	1.825	600	472157.485	107986.040	300	
IC11	19.100	18.620	0.480	450	472105.186	108012.499	150	
IC12	20.500	20.020	0.480	450	472113.240	108003.905	150	
IC13	19.100	18.620	0.480	450	472140.532	108001.464	150	
IC14	20.500	20.020	0.480	450	472135.135	107991.857	150	
IC15	20.500	20.020	0.480	450	472152.111	107983.608	150	
IC16	19.100	18.620	0.480	450	472157.726	107993.109	150	
IC17	20.500	20.020	0.480	450	472155.502	107981.960	150	

NOTES:
1. MANHOLE SCHEDULE TO BE READ IN CONJUNCTION WITH DRAWING 195104_PDL_01.

REV	DETAILS	DRAWN	CHECKED	DATE

STATUS:			
INFORMATION ONLY			
CLIENT:			
FORTITUDO LIMITED			
PROJECT:			
BARTONS ROAD, HAVANT			
DRAWING TITLE:			
PROPOSED SURFACE WATER MANHOLE SCHEDULE			
SCALES:			
N.T.S @ A1			
DRAWN:	HE	CHECKED:	NB
		DATE:	DECEMBER 2020

5th Floor, 4 Colston Avenue, Bristol, BS1 4ST

t: 0117 203 5240

e: enquiries@vectos.co.uk

DRAWING NUMBER:

195104_PDL_02

REVISION:

-

APPENDIX J MICRODRAINAGE NETWORK

Vectos (South) Limited		Page 1
Unit 704	Catchment 2	
The Paintworks	Residential	
Bristol BS4 3EH	Havant	
Date 04/12/2020	Designed by LTD	
File 195104 HAVANT STORM NETWORK SOUTH V7.MDX	Checked by NB	
XP Solutions	Network 2019.1	

Existing Network Details for Resi

```
# - Indicates pipe length does not match coordinates
```

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	20.752	0.500	41.5	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	52.859	0.675	78.3	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.000	36.720	0.250	146.9	0.064	5.00	0.0	0.600	o	300	Pipe/Conduit
S2.001	31.773	0.225	141.2	0.103	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.002	17.547	0.100	175.5	0.122	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.003	15.558	0.100	155.6	0.025	0.00	0.0	0.600	o	375	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	19.800	0.010	0.0	1.57	27.7
S1.001	19.300	0.029	0.0	1.14	20.1
S2.000	18.950	0.064	0.0	1.30	91.5
S2.001	18.700	0.167	0.0	1.32	93.4
S1.002	18.400	0.318	0.0	1.36	150.7
S1.003	18.300	0.343	0.0	1.45	160.2

Existing Network Details for Resi

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.004	12.065	0.100	120.7	0.011	0.00	0.0	0.600	o	375	Pipe/Conduit
S3.000	8.341	0.000	0.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit
S3.001	4.161	0.025	166.4	0.219	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.005	1.658#	0.030	55.3	0.010	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.006	2.766	0.270	10.2	0.226	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.007	11.124	0.100	111.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.004	18.200	0.354	0.0	1.65	182.1
S3.000	19.250	0.000	0.0	0.00	0.0
S3.001	18.200	0.219	0.0	1.22	85.9
S1.005	18.100	0.582	0.0	2.44	269.7
S1.006	18.070	0.808	0.0	5.69	628.3
S1.007	17.800	0.808	0.0	1.49	105.3

Vectos (South) Limited		Page 4
Unit 704 The Paintworks Bristol BS4 3EH	Catchment 2 Residential Havant	
Date 04/12/2020 File 195104 HAVANT STORM NETWORK SOUTH V7.MDX	Designed by LTD Checked by NB	
XP Solutions	Network 2019.1	

Free Flowing Outfall Details for Resi

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.007	S	18.600	17.700	0.000	0	0

Vectos (South) Limited		Page 5
Unit 704 The Paintworks Bristol BS4 3EH	Catchment 2 Residential Havant	
Date 04/12/2020 File 195104 HAVANT STORM NETWORK SOUTH V7.MDX	Designed by LTD Checked by NB	
XP Solutions	Network 2019.1	

Online Controls for Resi

Orifice Manhole: SPCP 1, DS/PN: S3.001, Volume (m³): 0.5

Diameter (m) 0.054 Discharge Coefficient 0.600 Invert Level (m) 18.200

Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.007, Volume (m³): 1.7

Unit Reference	MD-SCU-0196-3610-0900-3610	Sump Available	Yes
Design Head (m)	0.900	Diameter (mm)	196
Design Flow (l/s)	36.1	Invert Level (m)	17.800
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Linear discharge profile	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	36.1	Kick-Flo®	0.293	21.2
Flush-Flo™	0.233	21.7	Mean Flow over Head Range	-	23.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.5	0.500	27.2	1.200	41.5	2.000	53.0	3.000	64.6	5.000	82.8
0.200	20.2	0.600	29.7	1.400	44.7	2.200	55.6	3.500	69.6	5.500	86.7
0.300	21.4	0.800	34.1	1.600	47.6	2.400	57.9	4.000	74.3	6.000	90.5
0.400	24.5	1.000	38.0	1.800	50.4	2.600	60.2	4.500	78.6	6.500	94.1

Vectos (South) Limited				Page 6																											
Unit 704		Catchment 2																													
The Paintworks		Residential																													
Bristol BS4 3EH		Havant																													
Date 04/12/2020		Designed by LTD																													
File 195104 HAVANT STORM NETWORK SOUTH V7.MDX		Checked by NB																													
XP Solutions		Network 2019.1																													
<u>Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.007, Volume (m³): 1.7</u> <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>7.000</td><td>97.5</td><td>7.500</td><td>100.9</td><td>8.000</td><td>104.1</td><td>8.500</td><td>107.3</td><td>9.000</td><td>110.3</td><td>9.500</td><td>112.7</td></tr></table>								Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	7.000	97.5	7.500	100.9	8.000	104.1	8.500	107.3	9.000	110.3	9.500	112.7
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																				
7.000	97.5	7.500	100.9	8.000	104.1	8.500	107.3	9.000	110.3	9.500	112.7																				
©1982-2019 Innovyze																															

Vectos (South) Limited		Page 7																																																
Unit 704 The Paintworks Bristol BS4 3EH	Catchment 2 Residential Havant																																																	
Date 04/12/2020 File 195104 HAVANT STORM NETWORK SOUTH V7.MDX	Designed by LTD Checked by NB																																																	
XP Solutions	Network 2019.1																																																	
<u>Storage Structures for Resi</u> <u>Porous Car Park Manhole: SPCP 1, DS/PN: S3.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>18.940</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>372.1</td><td>Width (m)</td><td>36.6</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>36.6</td><td>Membrane Depth (mm)</td><td>130</td></tr></table> <u>Porous Car Park Manhole: SPCP 2, DS/PN: S1.006</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>18.070</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>313.6</td><td>Width (m)</td><td>33.6</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>33.6</td><td>Membrane Depth (mm)</td><td>130</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.940	Depression Storage (mm)	5	Max Percolation (l/s)	372.1	Width (m)	36.6	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	36.6	Membrane Depth (mm)	130	Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.070	Depression Storage (mm)	5	Max Percolation (l/s)	313.6	Width (m)	33.6	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	33.6	Membrane Depth (mm)	130
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																																													
Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.940	Depression Storage (mm)	5																																													
Max Percolation (l/s)	372.1	Width (m)	36.6	Evaporation (mm/day)	3																																													
Safety Factor	2.0	Length (m)	36.6	Membrane Depth (mm)	130																																													
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																																													
Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.070	Depression Storage (mm)	5																																													
Max Percolation (l/s)	313.6	Width (m)	33.6	Evaporation (mm/day)	3																																													
Safety Factor	2.0	Length (m)	33.6	Membrane Depth (mm)	130																																													
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The Paintworks	Residential	
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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Resi

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S2.000	S3	15 minute 1 year Winter I+0%	20.500	19.013	-0.237	0.000	0.10		8.2	OK
S2.001	S4	15 minute 1 year Winter I+0%	20.500	18.798	-0.202	0.000	0.23		19.4	OK
S1.002	S5	15 minute 1 year Winter I+0%	19.710	18.538	-0.237	0.000	0.29		36.1	OK
S1.003	S6	15 minute 1 year Winter I+0%	19.520	18.443	-0.232	0.000	0.31		38.5	OK
S1.004	S7	15 minute 1 year Winter I+0%	19.240	18.346	-0.229	0.000	0.32		39.7	OK
S3.000	SDummy Pipe	60 minute 1 year Winter I+0%	19.400	19.250	-0.150	0.000	0.00		0.0	OK
S3.001	SPCP 1	60 minute 1 year Winter I+0%	19.420	18.954	0.454	0.000	0.10		5.2	SURCHARGED
S1.005	S8	15 minute 1 year Winter I+0%	19.420	18.267	-0.208	0.000	0.41		43.6	OK
S1.006	SPCP 2	60 minute 1 year Winter I+0%	18.800	18.162	-0.283	0.000	0.12		24.2	OK
S1.007	S9	60 minute 1 year Winter I+0%	18.700	18.156	0.056	0.000	0.29		23.2	SURCHARGED

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XP Solutions	Network 2019.1	

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Resi

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S2.000	S3	15 minute 30 year Winter I+0%	20.500	19.050	-0.200	0.000	0.24		20.0	OK
S2.001	S4	15 minute 30 year Winter I+0%	20.500	18.876	-0.124	0.000	0.62		53.1	OK
S1.002	S5	15 minute 30 year Winter I+0%	19.710	18.770	-0.005	0.000	0.82		101.5	OK
S1.003	S6	15 minute 30 year Winter I+0%	19.520	18.695	0.020	0.000	0.86		106.2	SURCHARGED
S1.004	S7	15 minute 30 year Summer I+0%	19.240	18.558	-0.017	0.000	0.85		104.6	OK
S3.000	SDummy Pipe	60 minute 30 year Winter I+0%	19.400	19.250	-0.150	0.000	0.00		0.0	OK
S3.001	SPCP 1	240 minute 30 year Winter I+0%	19.420	19.020	0.520	0.000	0.10		5.4	SURCHARGED
S1.005	S8	30 minute 30 year Summer I+0%	19.420	18.405	-0.070	0.000	1.00		107.1	OK
S1.006	SPCP 2	15 minute 30 year Summer I+0%	18.800	18.242	-0.203	0.000	0.14		28.5	OK
S1.007	S9	60 minute 30 year Winter I+0%	18.700	18.344	0.244	0.000	0.35		27.9	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Resi

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S2.000	S3	15 minute 100 year Winter I+40%	20.500	19.598	0.348	0.000	0.40		33.9	SURCHARGED
S2.001	S4	15 minute 100 year Winter I+40%	20.500	19.485	0.485	0.000	1.00		85.5	SURCHARGED
S1.002	S5	15 minute 100 year Winter I+40%	19.710	19.250	0.475	0.000	1.30		160.4	SURCHARGED
S1.003	S6	15 minute 100 year Winter I+40%	19.520	19.074	0.399	0.000	1.38		171.0	SURCHARGED
S1.004	S7	15 minute 100 year Winter I+40%	19.240	18.872	0.297	0.000	1.43		177.3	SURCHARGED
S3.000	SDummy Pipe	60 minute 100 year Winter I+40%	19.400	19.250	-0.150	0.000	0.00		0.0	OK
S3.001	SPCP 1	360 minute 100 year Winter I+40%	19.420	19.142	0.642	0.000	0.11		5.7	FLOOD RISK
S1.005	S8	15 minute 100 year Winter I+40%	19.420	18.659	0.184	0.000	1.74		186.1	SURCHARGED
S1.006	SPCP 2	30 minute 100 year Winter I+40%	18.800	18.540	0.095	0.000	0.17		35.0	FLOOD RISK
S1.007	S9	120 minute 100 year Winter I+40%	18.700	18.585	0.485	0.000	0.43		33.9	FLOOD RISK

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Existing Network Details for Resi

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# - Indicates pipe length does not match coordinates
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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	20.752	0.500	41.5	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	52.859	0.675	78.3	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit
S2.000	36.720	0.250	146.9	0.064	5.00	0.0	0.600	o	300	Pipe/Conduit
S2.001	31.773	0.225	141.2	0.103	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.002	17.547	0.100	175.5	0.122	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.003	15.558	0.100	155.6	0.025	0.00	0.0	0.600	o	375	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	19.800	0.010	0.0	1.57	27.7
S1.001	19.300	0.029	0.0	1.14	20.1
S2.000	18.950	0.064	0.0	1.30	91.5
S2.001	18.700	0.167	0.0	1.32	93.4
S1.002	18.400	0.318	0.0	1.36	150.7
S1.003	18.300	0.343	0.0	1.45	160.2

Existing Network Details for Resi

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.004	12.065	0.100	120.7	0.011	0.00	0.0	0.600	o	375	Pipe/Conduit
S3.000	8.341	0.000	0.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit
S3.001	4.161	0.025	166.4	0.219	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.005	1.658#	0.030	55.3	0.010	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.006	2.766	0.270	10.2	0.226	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.007	11.124	0.100	111.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.004	18.200	0.354	0.0	1.65	182.1
S3.000	19.250	0.000	0.0	0.00	0.0
S3.001	18.200	0.219	0.0	1.22	85.9
S1.005	18.100	0.582	0.0	2.44	269.7
S1.006	18.070	0.808	0.0	5.69	628.3
S1.007	17.800	0.808	0.0	1.49	105.3

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Area Summary for Resi

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Default	100	0.010	0.010	0.010
1.001	Classification	Default	100	0.018	0.018	0.018
2.000	Classification	Default	100	0.015	0.015	0.015
	Classification	Default	100	0.049	0.049	0.064
2.001	Classification	Default	100	0.076	0.076	0.076
	Classification	Default	100	0.027	0.027	0.103
1.002	Classification	Default	100	0.059	0.059	0.059
	Classification	Default	100	0.063	0.063	0.122
1.003	Classification	Default	100	0.021	0.021	0.021
	Classification	Default	100	0.004	0.004	0.025
1.004	Classification	Default	100	0.011	0.011	0.011
3.000	-	-	100	0.000	0.000	0.000
3.001	Classification	Default	100	0.032	0.032	0.032
	Classification	Default	100	0.134	0.134	0.167
	Classification	Default	100	0.030	0.030	0.197
	Classification	Default	100	0.021	0.021	0.219
1.005	Classification	Default	100	0.010	0.010	0.010
1.006	User	-	100	0.089	0.089	0.089
	Classification	Default	100	0.003	0.003	0.092
	Classification	Default	100	0.015	0.015	0.107
	Classification	Default	100	0.113	0.113	0.220
	Classification	Default	100	0.004	0.004	0.224
	Classification	Default	100	0.001	0.001	0.226
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.808	0.808	0.808

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Free Flowing Outfall Details for Resi

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.007	S	18.600	17.700	0.000	0	0

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Online Controls for Resi

Orifice Manhole: SPCP 1, DS/PN: S3.001, Volume (m³): 0.5

Diameter (m) 0.054 Discharge Coefficient 0.600 Invert Level (m) 18.200

Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.007, Volume (m³): 1.7

Unit Reference	MD-SCU-0196-3610-0900-3610	Sump Available	Yes
Design Head (m)	0.900	Diameter (mm)	196
Design Flow (l/s)	36.1	Invert Level (m)	17.800
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Linear discharge profile	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	36.1	Kick-Flo®	0.293	21.2
Flush-Flo™	0.233	21.7	Mean Flow over Head Range	-	23.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.5	0.500	27.2	1.200	41.5	2.000	53.0	3.000	64.6	5.000	82.8
0.200	20.2	0.600	29.7	1.400	44.7	2.200	55.6	3.500	69.6	5.500	86.7
0.300	21.4	0.800	34.1	1.600	47.6	2.400	57.9	4.000	74.3	6.000	90.5
0.400	24.5	1.000	38.0	1.800	50.4	2.600	60.2	4.500	78.6	6.500	94.1

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XP Solutions	Network 2019.1																																																	
<u>Storage Structures for Resi</u> <u>Porous Car Park Manhole: SPCP 1, DS/PN: S3.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>18.940</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>372.1</td><td>Width (m)</td><td>36.6</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>36.6</td><td>Membrane Depth (mm)</td><td>130</td></tr></table> <u>Porous Car Park Manhole: SPCP 2, DS/PN: S1.006</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>18.070</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>313.6</td><td>Width (m)</td><td>33.6</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>33.6</td><td>Membrane Depth (mm)</td><td>130</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.940	Depression Storage (mm)	5	Max Percolation (l/s)	372.1	Width (m)	36.6	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	36.6	Membrane Depth (mm)	130	Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.070	Depression Storage (mm)	5	Max Percolation (l/s)	313.6	Width (m)	33.6	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	33.6	Membrane Depth (mm)	130
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																																													
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Max Percolation (l/s)	372.1	Width (m)	36.6	Evaporation (mm/day)	3																																													
Safety Factor	2.0	Length (m)	36.6	Membrane Depth (mm)	130																																													
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																																													
Membrane Percolation (mm/hr)	1000	Invert Level (m)	18.070	Depression Storage (mm)	5																																													
Max Percolation (l/s)	313.6	Width (m)	33.6	Evaporation (mm/day)	3																																													
Safety Factor	2.0	Length (m)	33.6	Membrane Depth (mm)	130																																													
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Resi

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S2.000	S3	15 minute 1 year Winter I+0%	20.500	19.013	-0.237	0.000	0.10		8.2	OK
S2.001	S4	15 minute 1 year Winter I+0%	20.500	18.798	-0.202	0.000	0.23		19.4	OK
S1.002	S5	15 minute 1 year Winter I+0%	19.710	18.538	-0.237	0.000	0.29		36.1	OK
S1.003	S6	15 minute 1 year Winter I+0%	19.520	18.443	-0.232	0.000	0.31		38.5	OK
S1.004	S7	15 minute 1 year Winter I+0%	19.240	18.346	-0.229	0.000	0.32		39.7	OK
S3.000	SDummy Pipe	60 minute 1 year Winter I+0%	19.400	19.250	-0.150	0.000	0.00		0.0	OK
S3.001	SPCP 1	60 minute 1 year Winter I+0%	19.420	18.954	0.454	0.000	0.10		5.2	SURCHARGED
S1.005	S8	15 minute 1 year Winter I+0%	19.420	18.267	-0.208	0.000	0.41		43.6	OK
S1.006	SPCP 2	60 minute 1 year Winter I+0%	18.800	18.162	-0.283	0.000	0.12		24.2	OK
S1.007	S9	60 minute 1 year Winter I+0%	18.700	18.156	0.056	0.000	0.29		23.2	SURCHARGED

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<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Resi</u>													
<u>Simulation Criteria</u>													
Areal Reduction Factor		1.000		Manhole Headloss Coeff (Global)		0.500		MADD Factor * 10m³/ha Storage		2.000			
Hot Start (mins)		0		Foul Sewage per hectare (l/s)		0.000		Inlet Coefficient		0.800			
Hot Start Level (mm)		0		Additional Flow - % of Total Flow		0.000		Flow per Person per Day (l/per/day)		0.000			
Number of Input Hydrographs				0		Number of Offline Controls		0		Number of Time/Area Diagrams		0	
Number of Online Controls				2		Number of Storage Structures		2		Number of Real Time Controls		0	
<u>Synthetic Rainfall Details</u>													
Rainfall Model				FSR M5-60 (mm)		19.600		Cv (Summer)		0.750			
Region England and Wales				Ratio R		0.346		Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)				300.0		DVD Status		ON					
Analysis Timestep				2.5 Second Increment (Extended)		Inertia Status		ON					
DTS Status						OFF							
Profile(s)				Summer and Winter									
Duration(s) (mins)				15, 30, 60, 120, 240, 360, 480, 960, 1440									
Return Period(s) (years)				1, 30, 100									
Climate Change (%)				0, 0, 40									

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Resi

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S2.000	S3	15 minute 30 year Winter I+0%	20.500	19.050	-0.200	0.000	0.24		20.0	OK
S2.001	S4	15 minute 30 year Winter I+0%	20.500	18.876	-0.124	0.000	0.62		53.1	OK
S1.002	S5	15 minute 30 year Winter I+0%	19.710	18.770	-0.005	0.000	0.82		101.5	OK
S1.003	S6	15 minute 30 year Winter I+0%	19.520	18.695	0.020	0.000	0.86		106.2	SURCHARGED
S1.004	S7	15 minute 30 year Winter I+0%	19.240	18.608	0.033	0.000	0.83		102.8	SURCHARGED
S3.000	SDummy Pipe	60 minute 30 year Winter I+0%	19.400	19.250	-0.150	0.000	0.00		0.0	OK
S3.001	SPCP 1	120 minute 30 year Winter I+0%	19.420	19.029	0.529	0.000	0.10		5.4	SURCHARGED
S1.005	S8	15 minute 30 year Winter I+0%	19.420	18.519	0.044	0.000	1.00		106.7	SURCHARGED
S1.006	SPCP 2	60 minute 30 year Winter I+0%	18.800	18.341	-0.104	0.000	0.14		28.4	OK
S1.007	S9	60 minute 30 year Winter I+0%	18.700	18.344	0.244	0.000	0.35		27.9	SURCHARGED

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File 195104 HAVANT STORM NETWORK SOUTH V7.MDX	Checked by NB	
XP Solutions	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Resi

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S2.000	S3	15 minute 100 year Winter I+40%	20.500	19.598	0.348	0.000	0.40		33.9	SURCHARGED
S2.001	S4	15 minute 100 year Winter I+40%	20.500	19.485	0.485	0.000	1.00		85.5	SURCHARGED
S1.002	S5	15 minute 100 year Winter I+40%	19.710	19.250	0.475	0.000	1.30		160.4	SURCHARGED
S1.003	S6	15 minute 100 year Winter I+40%	19.520	19.074	0.399	0.000	1.38		171.0	SURCHARGED
S1.004	S7	15 minute 100 year Winter I+40%	19.240	18.872	0.297	0.000	1.43		177.3	SURCHARGED
S3.000	SDummy Pipe	60 minute 100 year Winter I+40%	19.400	19.250	-0.150	0.000	0.00		0.0	OK
S3.001	SPCP 1	120 minute 100 year Winter I+40%	19.420	19.164	0.664	0.000	0.10		5.6	FLOOD RISK
S1.005	S8	120 minute 100 year Winter I+40%	19.420	18.729	0.254	0.000	0.68		72.5	SURCHARGED
S1.006	SPCP 2	120 minute 100 year Winter I+40%	18.800	18.636	0.191	0.000	0.17		34.1	FLOOD RISK
S1.007	S9	60 minute 100 year Winter I+40%	18.700	18.586	0.486	0.000	0.42		33.5	FLOOD RISK

Existing Network Details for Drive Thru

Network Results Table

Area Summary for Drive Thru

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Default	100	0.009	0.009	0.009
1.001	Classification	Default	100	0.014	0.014	0.014
1.002	Classification	Default	100	0.052	0.052	0.052
1.003	Classification	Default	100	0.035	0.035	0.035
2.000	Classification	Default	100	0.051	0.051	0.051
3.000	Classification	Default	100	0.010	0.010	0.010
3.001	Classification	Default	100	0.024	0.024	0.024
3.002	Classification	Default	100	0.115	0.115	0.115
2.001	Classification	Default	100	0.011	0.011	0.011
	Classification	Default	100	0.011	0.011	0.022
	Classification	Default	100	0.004	0.004	0.025
1.004	Classification	Default	100	0.014	0.014	0.014
4.000	Classification	Default	100	0.009	0.009	0.009
4.001	Classification	Default	100	0.010	0.010	0.010
1.005	Classification	Default	100	0.028	0.028	0.028
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.397	0.397	0.397

Free Flowing Outfall Details for Drive Thru

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.006	S	20.600	18.700	0.000	0	0

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Unit 704 The Paintworks Bristol BS4 3EH		Catchment 1 Drive Through Havant																																																																																																																					
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XP Solutions		Network 2019.1																																																																																																																					
<u>Online Controls for Drive Thru</u> <u>Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.006, Volume (m³): 4.2</u> <table><tr><td>Unit Reference</td><td>MD-SHE-0167-1280-0700-1280</td><td>Sump Available</td><td>Yes</td></tr><tr><td>Design Head (m)</td><td>0.700</td><td>Diameter (mm)</td><td>167</td></tr><tr><td>Design Flow (l/s)</td><td>12.8</td><td>Invert Level (m)</td><td>18.800</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td><td>Minimum Outlet Pipe Diameter (mm)</td><td>225</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr><tr><td>Application</td><td>Surface</td><td></td><td></td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>0.700</td><td>12.8</td><td>Kick-Flo®</td><td>0.526</td><td>11.2</td></tr><tr><td>Flush-Flo™</td><td>0.266</td><td>12.8</td><td>Mean Flow over Head Range</td><td>-</td><td>10.5</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>5.9</td><td>0.600</td><td>11.9</td><td>1.600</td><td>18.9</td><td>2.600</td><td>23.9</td><td>5.000</td><td>32.7</td><td>7.500</td><td>39.7</td></tr><tr><td>0.200</td><td>12.6</td><td>0.800</td><td>13.6</td><td>1.800</td><td>20.0</td><td>3.000</td><td>25.6</td><td>5.500</td><td>34.3</td><td>8.000</td><td>41.0</td></tr><tr><td>0.300</td><td>12.8</td><td>1.000</td><td>15.2</td><td>2.000</td><td>21.1</td><td>3.500</td><td>27.6</td><td>6.000</td><td>35.8</td><td>8.500</td><td>42.3</td></tr><tr><td>0.400</td><td>12.4</td><td>1.200</td><td>16.5</td><td>2.200</td><td>22.1</td><td>4.000</td><td>29.4</td><td>6.500</td><td>37.2</td><td>9.000</td><td>43.5</td></tr><tr><td>0.500</td><td>11.6</td><td>1.400</td><td>17.8</td><td>2.400</td><td>23.0</td><td>4.500</td><td>31.1</td><td>7.000</td><td>38.5</td><td>9.500</td><td>44.7</td></tr></table>						Unit Reference	MD-SHE-0167-1280-0700-1280	Sump Available	Yes	Design Head (m)	0.700	Diameter (mm)	167	Design Flow (l/s)	12.8	Invert Level (m)	18.800	Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225	Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200	Application	Surface			Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.700	12.8	Kick-Flo®	0.526	11.2	Flush-Flo™	0.266	12.8	Mean Flow over Head Range	-	10.5	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	5.9	0.600	11.9	1.600	18.9	2.600	23.9	5.000	32.7	7.500	39.7	0.200	12.6	0.800	13.6	1.800	20.0	3.000	25.6	5.500	34.3	8.000	41.0	0.300	12.8	1.000	15.2	2.000	21.1	3.500	27.6	6.000	35.8	8.500	42.3	0.400	12.4	1.200	16.5	2.200	22.1	4.000	29.4	6.500	37.2	9.000	43.5	0.500	11.6	1.400	17.8	2.400	23.0	4.500	31.1	7.000	38.5	9.500	44.7
Unit Reference	MD-SHE-0167-1280-0700-1280	Sump Available	Yes																																																																																																																				
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Unit 704 The Paintworks Bristol BS4 3EH	Catchment 1 Drive Through Havant																			
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XP Solutions Network 2019.1																				
Storage Structures for Drive Thru Cellular Storage Manhole: SCell. Storage 1, DS/PN: S2.000 Invert Level (m) 19.300 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>220.0</td><td>220.0</td><td>0.500</td><td>220.0</td><td>252.0</td><td>0.501</td><td>0.0</td><td>252.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	220.0	220.0	0.500	220.0	252.0	0.501	0.0	252.0
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)												
0.000	220.0	220.0	0.500	220.0	252.0	0.501	0.0	252.0												
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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Drive Thru

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.346 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
 DTS Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water		Surcharged		Flooded		Pipe		Status
				Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)			
S1.000	S1 15 minute	1 year Winter I+0%	20.450	19.545	-0.255	0.000	0.05		1.2		OK	
S1.001	S2 15 minute	1 year Winter I+0%	20.450	19.445	-0.330	0.000	0.03		2.7		OK	

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Drive Thru

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.002	S3	15 minute 1 year Winter I+0%	20.450	19.389	-0.311	0.000	0.07		8.3	OK
S1.003	S4	15 minute 1 year Winter I+0%	20.450	19.327	-0.248	0.000	0.10		11.9	OK
S2.000	SCell. Storage 1	60 minute 1 year Winter I+0%	20.450	19.319	-0.281	0.000	0.01		1.1	OK
S3.000	S6	15 minute 1 year Winter I+0%	20.900	19.729	-0.196	0.000	0.04		1.3	OK
S3.001	S7	15 minute 1 year Winter I+0%	20.900	19.649	-0.176	0.000	0.10		3.8	OK
S3.002	S8	15 minute 1 year Winter I+0%	20.900	19.501	-0.124	0.000	0.41		16.3	OK
S2.001	S9	15 minute 1 year Winter I+0%	20.450	19.326	-0.174	0.000	0.36		18.9	OK
S1.004	S10	15 minute 1 year Winter I+0%	20.450	19.325	-0.150	0.000	0.25		30.6	OK
S4.000	S11	15 minute 1 year Winter I+0%	20.900	19.317	-0.258	0.000	0.01		1.2	OK
S4.001	S12	15 minute 1 year Winter I+0%	20.900	19.317	-0.058	0.000	0.03		2.5	OK
S1.005	S13	15 minute 1 year Winter I+0%	20.900	19.317	-0.033	0.000	0.10		17.3	OK
S1.006	S14	120 minute 1 year Winter I+0%	20.600	19.150	-0.100	0.000	0.07		12.8	OK

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Drive Thru

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.002		S3 15 minute 30 year Winter I+0%	20.450	19.716	0.016	0.000	0.17		20.5	SURCHARGED
S1.003		S4 15 minute 30 year Summer I+0%	20.450	19.698	0.123	0.000	0.20		25.3	SURCHARGED
S2.000	SCell. Storage 1	60 minute 30 year Winter I+0%	20.450	19.491	-0.109	0.000	0.13		10.2	OK
S3.000		S6 15 minute 30 year Winter I+0%	20.900	19.816	-0.109	0.000	0.10		3.1	OK
S3.001		S7 15 minute 30 year Summer I+0%	20.900	19.759	-0.066	0.000	0.28		10.3	OK
S3.002		S8 15 minute 30 year Summer I+0%	20.900	19.760	0.135	0.000	1.10		43.8	SURCHARGED
S2.001		S9 15 minute 30 year Winter I+0%	20.450	19.685	0.185	0.000	0.79		41.4	SURCHARGED
S1.004		S10 15 minute 30 year Summer I+0%	20.450	19.702	0.227	0.000	0.44		53.6	SURCHARGED
S4.000		S11 15 minute 30 year Winter I+0%	20.900	19.755	0.180	0.000	0.03		4.5	SURCHARGED
S4.001		S12 15 minute 30 year Winter I+0%	20.900	19.749	0.374	0.000	0.10		8.2	SURCHARGED
S1.005		S13 15 minute 30 year Summer I+0%	20.900	19.705	0.355	0.000	0.12		20.7	SURCHARGED
S1.006		S14 15 minute 30 year Winter I+0%	20.600	19.744	0.494	0.000	0.08		14.5	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Drive Thru

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.002		S3 15 minute 100 year Winter I+40%	20.450	20.219	0.519	0.000	0.27		32.5	FLOOD RISK
S1.003		S4 15 minute 100 year Winter I+40%	20.450	20.115	0.540	0.000	0.39		48.1	SURCHARGED
S2.000	SCell. Storage 1	60 minute 100 year Winter I+40%	20.450	19.848	0.248	0.000	0.19		15.3	SURCHARGED
S3.000		S6 15 minute 100 year Summer I+40%	20.900	20.467	0.542	0.000	0.21		6.6	SURCHARGED
S3.001		S7 15 minute 100 year Winter I+40%	20.900	20.503	0.678	0.000	0.49		18.0	SURCHARGED
S3.002		S8 15 minute 100 year Winter I+40%	20.900	20.456	0.831	0.000	2.00		79.6	SURCHARGED
S2.001		S9 15 minute 100 year Summer I+40%	20.450	19.921	0.421	0.000	0.85		44.4	SURCHARGED
S1.004		S10 15 minute 100 year Winter I+40%	20.450	20.007	0.532	0.000	0.44		54.0	SURCHARGED
S4.000		S11 15 minute 100 year Winter I+40%	20.900	20.013	0.438	0.000	0.04		6.0	SURCHARGED
S4.001		S12 15 minute 100 year Summer I+40%	20.900	20.019	0.644	0.000	0.15		12.2	SURCHARGED
S1.005		S13 15 minute 100 year Winter I+40%	20.900	20.009	0.659	0.000	0.15		27.4	SURCHARGED
S1.006		S14 15 minute 100 year Winter I+40%	20.600	20.005	0.755	0.000	0.09		16.5	SURCHARGED

Existing Network Details for Drive Thru

Network Results Table

Area Summary for Drive Thru

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Default	100	0.009	0.009	0.009
1.001	Classification	Default	100	0.014	0.014	0.014
1.002	Classification	Default	100	0.052	0.052	0.052
1.003	Classification	Default	100	0.035	0.035	0.035
2.000	Classification	Default	100	0.051	0.051	0.051
3.000	Classification	Default	100	0.010	0.010	0.010
3.001	Classification	Default	100	0.024	0.024	0.024
3.002	Classification	Default	100	0.115	0.115	0.115
2.001	Classification	Default	100	0.011	0.011	0.011
	Classification	Default	100	0.011	0.011	0.022
	Classification	Default	100	0.004	0.004	0.025
1.004	Classification	Default	100	0.014	0.014	0.014
4.000	Classification	Default	100	0.009	0.009	0.009
4.001	Classification	Default	100	0.010	0.010	0.010
1.005	Classification	Default	100	0.028	0.028	0.028
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.397	0.397	0.397

Free Flowing Outfall Details for Drive Thru

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.006	S	20.600	18.700	0.000	0	0

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<u>Online Controls for Drive Thru</u>																																																																													
<u>Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.006, Volume (m³): 4.2</u>																																																																													
<table><tr><td>Unit Reference</td><td>MD-SHE-0167-1280-0700-1280</td><td>Sump Available</td><td>Yes</td></tr><tr><td>Design Head (m)</td><td>0.700</td><td>Diameter (mm)</td><td>167</td></tr><tr><td>Design Flow (l/s)</td><td>12.8</td><td>Invert Level (m)</td><td>18.800</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td><td>Minimum Outlet Pipe Diameter (mm)</td><td>225</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr><tr><td>Application</td><td>Surface</td><td></td><td></td></tr></table>						Unit Reference	MD-SHE-0167-1280-0700-1280	Sump Available	Yes	Design Head (m)	0.700	Diameter (mm)	167	Design Flow (l/s)	12.8	Invert Level (m)	18.800	Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225	Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200	Application	Surface																																																		
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The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated																																																																													
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Unit 704 The Paintworks Bristol BS4 3EH		Catchment 1 Drive Through Havant																					
Date 04/12/2020		Designed by LTD																					
File 195104 Havant Storm Network Drive Through...		Checked by NB																					
XP Solutions		Network 2019.1																					
<u>Storage Structures for Drive Thru</u> <u>Cellular Storage Manhole: SCell. Storage 1, DS/PN: S2.000</u> Invert Level (m) 19.300 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>220.0</td><td>220.0</td><td>0.500</td><td>220.0</td><td>252.0</td><td>0.501</td><td>0.0</td><td>252.0</td></tr></tbody></table>						Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	220.0	220.0	0.500	220.0	252.0	0.501	0.0	252.0
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)															
0.000	220.0	220.0	0.500	220.0	252.0	0.501	0.0	252.0															
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Date 04/12/2020 File 195104 Havant Storm Network Drive Through...	Designed by LTD Checked by NB	
XP Solutions	Network 2019.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Drive Thru

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.002		S3 15 minute 1 year Winter I+0%	20.450	19.389	-0.311	0.000	0.07		8.3	OK
S1.003		S4 30 minute 1 year Winter I+0%	20.450	19.343	-0.232	0.000	0.08		10.3	OK
S2.000	SCell. Storage 1	S30 minute 1 year Winter I+0%	20.450	19.320	-0.280	0.000	0.01		1.0	OK
S3.000		S6 15 minute 1 year Winter I+0%	20.900	19.729	-0.196	0.000	0.04		1.3	OK
S3.001		S7 15 minute 1 year Winter I+0%	20.900	19.649	-0.176	0.000	0.10		3.8	OK
S3.002		S8 15 minute 1 year Winter I+0%	20.900	19.501	-0.124	0.000	0.41		16.3	OK
S2.001		S9 30 minute 1 year Winter I+0%	20.450	19.343	-0.157	0.000	0.31		16.5	OK
S1.004		S10 30 minute 1 year Winter I+0%	20.450	19.341	-0.134	0.000	0.21		26.4	OK
S4.000		S11 30 minute 1 year Winter I+0%	20.900	19.334	-0.241	0.000	0.01		0.9	OK
S4.001		S12 30 minute 1 year Winter I+0%	20.900	19.334	-0.041	0.000	0.03		2.4	OK
S1.005		S13 30 minute 1 year Winter I+0%	20.900	19.333	-0.017	0.000	0.09		16.0	OK
S1.006		S14 30 minute 1 year Winter I+0%	20.600	19.320	0.070	0.000	0.07		12.8	SURCHARGED

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Unit 704 The Paintworks Bristol BS4 3EH	Catchment 1 Drive Through Havant		
Date 04/12/2020	Designed by LTD		
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XP Solutions		Network 2019.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Drive Thru

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.002		S3 15 minute 30 year Winter I+0%	20.450	19.716	0.016	0.000	0.17		20.5	SURCHARGED
S1.003		S4 15 minute 30 year Winter I+0%	20.450	19.712	0.137	0.000	0.17		21.4	SURCHARGED
S2.000	SCell. Storage 1	60 minute 30 year Winter I+0%	20.450	19.491	-0.109	0.000	0.13		10.2	OK
S3.000		S6 15 minute 30 year Winter I+0%	20.900	19.816	-0.109	0.000	0.10		3.1	OK
S3.001		S7 15 minute 30 year Winter I+0%	20.900	19.811	-0.014	0.000	0.27		10.1	OK
S3.002		S8 15 minute 30 year Winter I+0%	20.900	19.790	0.165	0.000	1.04		41.4	SURCHARGED
S2.001		S9 15 minute 30 year Winter I+0%	20.450	19.685	0.185	0.000	0.79		41.4	SURCHARGED
S1.004		S10 15 minute 30 year Winter I+0%	20.450	19.712	0.237	0.000	0.43		53.1	SURCHARGED
S4.000		S11 15 minute 30 year Winter I+0%	20.900	19.755	0.180	0.000	0.03		4.5	SURCHARGED
S4.001		S12 15 minute 30 year Winter I+0%	20.900	19.749	0.374	0.000	0.10		8.2	SURCHARGED
S1.005		S13 15 minute 30 year Winter I+0%	20.900	19.745	0.395	0.000	0.11		19.6	SURCHARGED
S1.006		S14 15 minute 30 year Winter I+0%	20.600	19.744	0.494	0.000	0.08		14.5	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Drive Thru

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.346 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
 DTS Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1 15 minute	100 year Winter I+40%	20.450	20.232	0.432	0.000	0.20		4.6	FLOOD RISK
S1.001	S2 15 minute	100 year Winter I+40%	20.450	20.226	0.451	0.000	0.12		11.1	FLOOD RISK

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XP Solutions	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Drive Thru

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.002	S3	15 minute 100 year Winter I+40%	20.450	20.219	0.519	0.000	0.27		32.5	FLOOD RISK
S1.003	S4	15 minute 100 year Winter I+40%	20.450	20.115	0.540	0.000	0.39		48.1	SURCHARGED
S2.000	SCell. Storage 1	120 minute 100 year Winter I+40%	20.450	19.894	0.294	0.000	0.18		14.1	SURCHARGED
S3.000	S6	15 minute 100 year Winter I+40%	20.900	20.514	0.589	0.000	0.19		6.1	SURCHARGED
S3.001	S7	15 minute 100 year Winter I+40%	20.900	20.503	0.678	0.000	0.49		18.0	SURCHARGED
S3.002	S8	15 minute 100 year Winter I+40%	20.900	20.456	0.831	0.000	2.00		79.6	SURCHARGED
S2.001	S9	15 minute 100 year Winter I+40%	20.450	19.939	0.439	0.000	0.77		40.3	SURCHARGED
S1.004	S10	15 minute 100 year Winter I+40%	20.450	20.007	0.532	0.000	0.44		54.0	SURCHARGED
S4.000	S11	15 minute 100 year Summer I+40%	20.900	20.023	0.448	0.000	0.04		5.9	SURCHARGED
S4.001	S12	15 minute 100 year Summer I+40%	20.900	20.019	0.644	0.000	0.15		12.2	SURCHARGED
S1.005	S13	15 minute 100 year Summer I+40%	20.900	20.014	0.664	0.000	0.14		24.8	SURCHARGED
S1.006	S14	15 minute 100 year Summer I+40%	20.600	20.011	0.761	0.000	0.09		16.5	SURCHARGED