

**MEDLOCK FRB LTD.,
VICTORIA MILL, LOWER
VICKERS STREET,
MANCHESTER.**

DRAINAGE STRATEGY REPORT UPDATE
HAMILTON TECHNICAL SERVICES
1 CHILTERN AVE, EUXTON, CHORLEY, LANCS, PR7 6NU

**ISSUE 3
12/16/2021
C-0808-M**

Document Control Sheet

Medlock FRB Ltd., Victoria Mill, Lower Vickers St, Manchester, M40 7LH.

Drainage Strategy Report

Job	Date	Issue	Copy
C0808	29 th Nov 2017	1	
C0808M	25 th Oct 2021	2	
C0808M	16 th Dec 2021	3	

Originator.....G Hamilton... ..

Checker.....G Hamilton.....

Approver.....G Hamilton.....

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- 2.0 Description of existing site**
- 3.0 Proposals for Development**
- 4.0 Drainage Strategy**
- 5.0 Conclusions**

1. Introduction

- 1.1. Hamilton Technical Services were originally commissioned by Signature Victoria Mill Ltd. to prepare a Drainage Strategy Report, in support of a planning application. Signature Victoria Mill progressed with construction on site, having appointed Hamilton Technical Services to prepare a verification report on completion of the surface water drainage works. Signature Victoria Mill then went into Administration part way through the construction works, in autumn 2019.
- 1.2. FRP Advisory was subsequently appointed as Company Administrators. Signature Victoria Mill (In Administration) appointed Medlock FRB as main contractor in autumn 2020, to complete the development. To maintain design continuity, Hamilton Technical Services have subsequently been appointed by Medlock FRB to complete the final drainage design and compile the required Verification Report to discharge the planning drainage conditions.
- 1.3. The site comprises an area of land close to the centre of Miles Platting, Manchester that has been in use as industrial, office and commercial accommodation along with associated parking areas, for many decades. The area around the site is occupied by a mixture of commercial, residential, office and leisure properties. The location of the site is illustrated in **Figure 1** appended to this report.
- 1.4. The national grid reference for the site is 385916E, 399294N.
- 1.5. It is understood that permission is being sought to internally restructure and refurbish the existing building to provide a number of residential apartments.

2. Description of the existing site.

- 2.1. The site is bounded to the north east and north west by a mix of residential, commercial and business properties. To the south west the site is bounded by a local park and to the south east by the Rochdale Canal. The site is occupied by the main mill buildings, approximately half of which has been redeveloped as residential properties. The remaining, north eastern end of the main building is partially occupied at ground floor level by local health care facilities. The remaining basement and upper floors are unoccupied at present.
- 2.2. The remainder of the site is occupied by car parking areas and access roads to serve the existing and proposed occupancies. These areas were formerly built up and in use as residential and commercial premises and roadways.
- 2.3. The site is presently served by combined drainage systems that discharge to a large public combined sewer / culvert that runs through the site from north east to south west along the former Lower Vickers Street.
- 2.4. Prior to our preparation of the original Drainage Strategy (Issue 1) a number of requests were made to the original Signature Victoria Mill design team for detailed information about the existing drainage systems, manholes and pipework and for a CCTV survey of these assets to be carried out. Information was also requested in regard to other existing services within the site, such as gas and electric conduits etc. We also requested a below ground survey to ascertain existing ground make up and permeability. None of this information was forthcoming at any time during our service to Signature Victoria Mill Ltd.
- 2.5. The only information and guidance we received was that the ground was clay in nature and therefore was not suitable for the use of soak-aways or porous surfacing. We were to asked proceed with producing a drainage strategy based on this scenario with the essential requirement being to separate as much of the surface water run-off from the site out of the existing combined drains and to subsequently discharge flows back to the public sewer passing through the site with a 50% reduction in the rate of run-off (85.0 l/s) as set out in Issue 1 of our strategy and agreed by the local flood team and United Utilities.

- 2.6. A series of CCTV surveys and dye tests have now been completed through Medlock FRB to ascertain the extents of the existing on site drainage and its condition. Medlock FRB have also had a detailed survey carried out to find and locate all existing services (gas, electric etc.) within the site and their age and depths etc. See **Figure 3** of this report.
- 2.7. When the results of these investigations were collated it showed that there would be several major clashes between the existing services and the proposed new drainage works. Of particular concern are several high voltage mains running to and from the sub-station at the southwest edge of the site, parallel with the large brick culvert towards Varley Street. These main supply lines are found to be very close to the proposed main surface water collector drain and of considerable age, and are likely to be in very delicate condition and their ducting is liable to be fragile. A plan showing the relationship between existing services and the proposed drainage design is attached as **Figure 4** of this report.
- 2.8. Construction of the proposed drainage layout as it stands at present would entail several major crossings of these services and the other supply lines for gas, water telecoms etc. Each crossing would entail major engineering works to complete safely and without damaging the existing networks.
- 2.9. We feel therefore that at the least a major redesign of the surface water drainage is required to alleviate these major restrictions. It is also proposed that the use of alternative means of discharge are fully appraised and investigated. This will inevitably take time as will the gaining of approval through the planning process and it would be helpful if the wording of the drainage conditions could be revised to allow this time whilst allowing other aspects of the development to proceed unaffected.

3. Proposals for Redevelopment

- 3.1. A set out in Issue 1 of our Drainage Strategy documents, the following proposals have been approved.
- 3.2. The development of the site will consist of the internal reconstruction of the building to provide a number of apartments.
- 3.3. As part of the site redevelopment, it will be necessary to provide and maintain a substantial reduction in the rate at which surface water is discharged from the site, in line with best SUDS practice.
- 3.4. A new system of surface water drainage will be installed to allow attenuation of flows entering the public sewer system. Where ever possible surface water flows will be removed from the existing site combined drains, mainly by diverting the majority of the roof run-off and the road and carpark gully outlets into a new surface water drainage system.
- 3.5. As stated in the previous section of this report, a great deal of new information has been collected through Medlock FRB, showing the detail of the existing site utilities and the existing drainage network. Because of the major problems highlighted by the new information and outlined above; there are major implications on the existing drainage design and construction and the costs thereof. Hamilton Technical Services are now, in conjunction with Medlock FRB, considering all alternative options for a redesign of the surface water drainage of the site.
- 3.6. A detailed investigation of the permeability of the ground underlying the car park areas is to be carried out and reviewed with the intention, if feasible, of converting the car park surfacing to a porous finish to allow rainfall to dissipate to ground. If this solution were to prove viable, the vast majority of run-off from the site could be removed for the public sewer systems as well as removing the need for the majority of “crossing” points between drains and services.
- 3.7. The site investigation work into determining the suitability of the ground to absorb surface water run-off has been completed. The attempted percolation testing proved to be a failure as water levels in the excavations did not drop at all. The ground across the site was shown to be a surface layer of car park construction materials overlying deep stiff impermeable clay.

- 3.8. It will therefore be necessary to continue to discharge surface water run-off from all areas of the site into the public sewer which passes through the site as previously approved, with the intention that the rate of discharge could be reduced from the presently approved 85.0 l/s to 80.0 l/s in total.

4. Drainage Strategy Proposals

4.1. The drainage systems serving the existing building and car park areas on the site drain primarily to the existing combined public sewer running through the site along the line of Lower Vickers Street. Presently the internal systems serving the building are fully combined but are in sound condition. The drains serving the access roads and parking areas are mainly separate from the building drainage but still discharge into the public combined systems.

4.2. The percolation tests described in 3.7 above have proved unsuccessful; therefore the overall drainage strategy will have to be revised to include the flows from the car parking areas whilst attempting to avoid clashes between the new drainage works and the existing highly vulnerable services within the site, before flows are discharged to the public sewer system.

4.3 The revised surface water system will be designed to operate in two separate sections. The first is to serve the western half of the site; primarily the parking areas and entrance road. The second will collect the roof water run-off along with the eastern car park areas. Each zone will collect and control its portion of the site run-off by means of a Hydro-brake and attenuation facilities prior to discharge to the public sewer passing through the site.

4.4 The new surface water systems have been redesigned to better tie in with existing site utility services and reduce “crossings” to an absolute minimum. This redesign incorporates two distinct connections to the existing sewer system and each discharge will be controlled to be a maximum of 40.0 l/s. This will enable the run-off from the full site to be limited to a total of 80.0 l/s maximum whilst safeguarding the existing service assets. A plan showing the redesigned drainage layout is attached as **Figure 2** of this report.

4.5 As part of the redesign works, the catchment areas have also been rescheduled and a plan showing these areas is attached as **Figure 3** of this report. As part of the redesign a full suite of run-off calculations has been completed and a selection of the results is contained in **Appendix 1** of this report. These calculations show that the redesigned systems will contain and control the surface water flows without surface flooding during design storms up to the 100 Year events of 600 minutes duration, inclusive of climate change.

4.6 Apart from the two flow control chambers, all the new surface water manholes will be constructed as “catch pit” chambers to intercept any silt or debris that may enter the drainage systems. This will prevent the accumulation of deleterious materials in the attenuation tanks and make future system maintenance much simpler. A drawing showing the proposed construction details of the new drainage systems is attached as **Figure 4** of this report. For information, a drawing showing a manhole schedule is included as **Figure 5** of this report.

4.5 These works will when completed provide a very substantial benefit to the existing public sewer network by greatly reducing the rates of discharge into the public sewers, making a significant contribution to future flood prevention.

5. Maintenance and Management

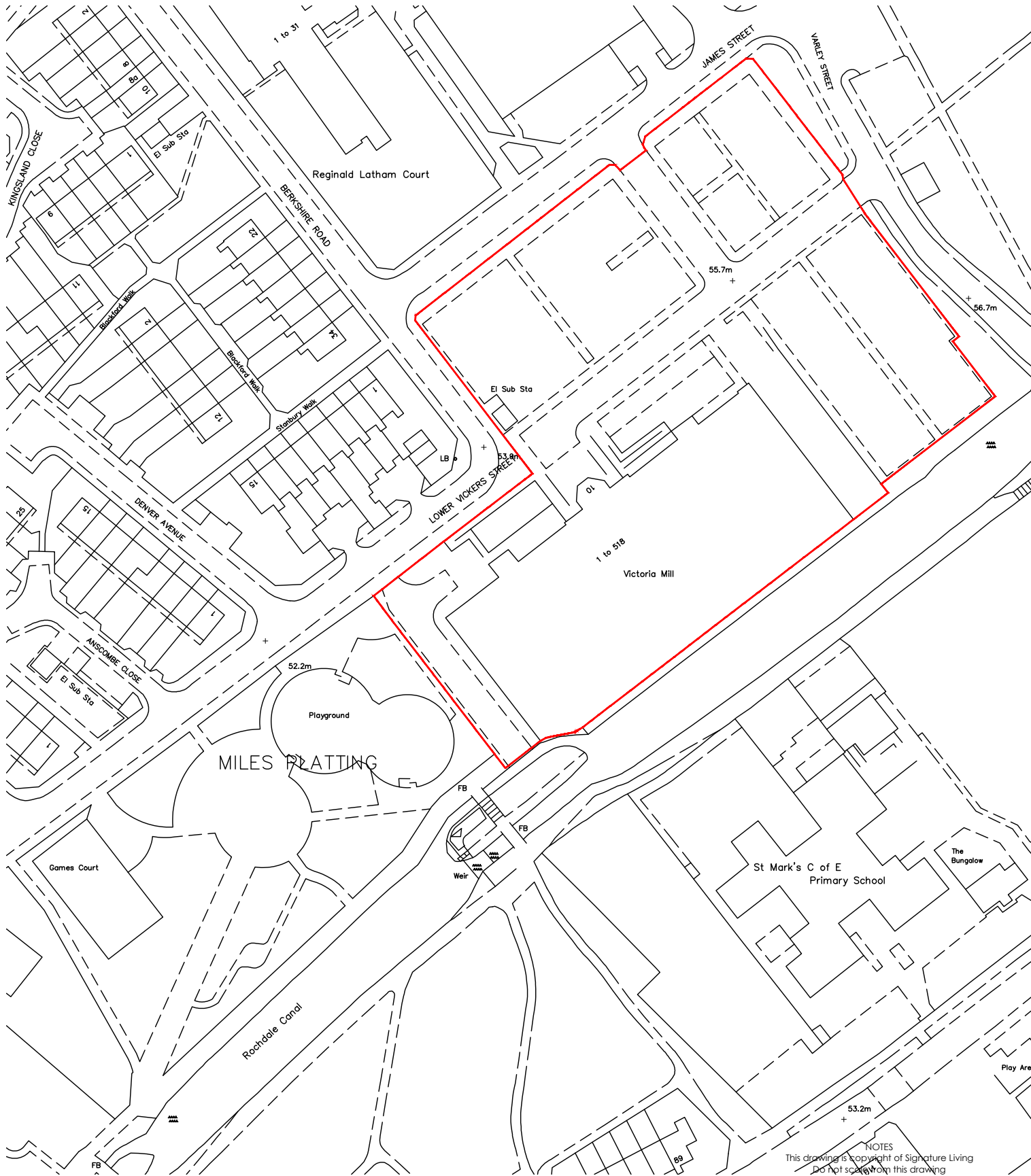
5.1. The new and extended drainage systems will become part of the general site infrastructure and will be included in the general site maintenance programme. The drainage assets will be inspected on a regular programme, initially on a six monthly cycle, and any repairs, cleaning or servicing required will be carried out by the management team. The costs of providing these services will be drawn from the rental income derived from the residential and office tenants occupying the building.

6. Conclusions

Based on the above principals and proposals it will be possible to design and construct suitable systems of foul and surface water drainage that are sustainable and that will prevent any increased risk of flooding on or out with the development site. These proposals will help reduce the risks of flooding within the site and outside the site boundaries.

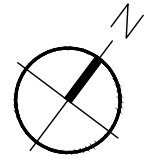
Figures;

- Figure 1 – Site Location Plan
- Figure 2 – Proposed Redesigned Drainage Layout
- Figure 3 – Surface Water Catchment Plan
- Figure 4 – Construction Details
- Figure 5 – Manhole Schedule



NOTES
 This drawing is copyright of Signature Living
 Do not scale from this drawing
 Use figured dimensions only
 All dimensions to be checked on site

SITE LOCATION PLAN
 1:1250

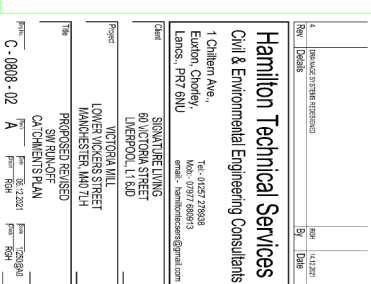


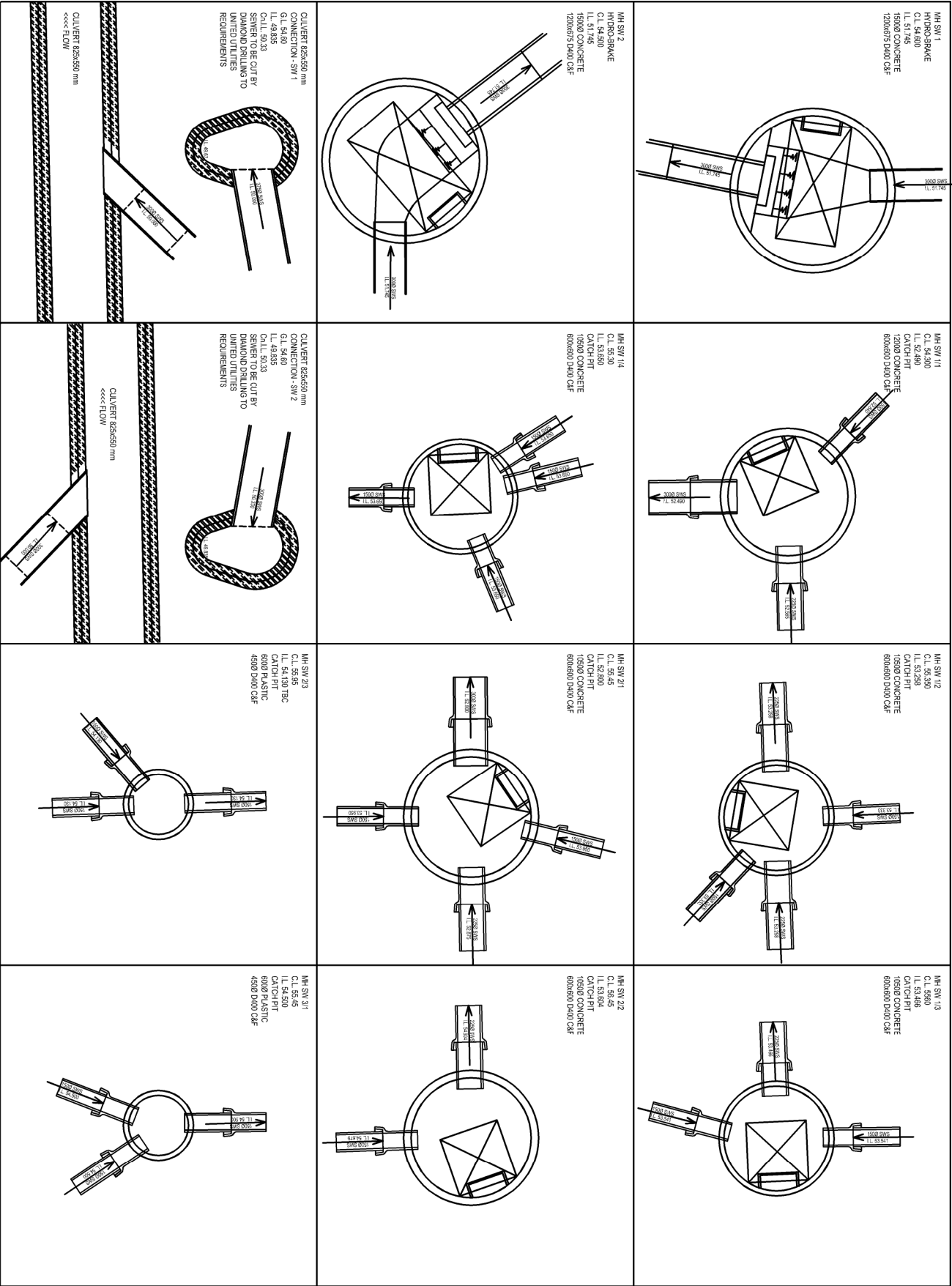
APPLICATION SITE ———

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 www.signatureliving.co.uk

Status	PLANNING	Drawn	Checked
		-	-

Victoria Mill Lower Vickers St Manchester M40 7LH			
Title	Site Location Plan		
Dwg No	1607-E-(SP)002	Revision	-
Scale	1:1250	Date	November 2016





Victoria Mill, Lower Vickers Street.

Appendix 1

Proposed Drainage System Simulation Calculations

Hamilton Technical Services		Page 1
1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
Date 14.12.2021 File PROP'D SW FLOWS 15-12-2...	Designed by Geoff Hamilton Checked by	
Micro Drainage Network 2014.1		

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

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Hamilton Technical Services		Page 2
1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
Date 14.12.2021 File PROP'D SW FLOWS 15-12-2...	Designed by Geoff Hamilton Checked by	
Micro Drainage	Network 2014.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	8.744	0.109	80.2	0.096	4.00	0.0	0.600	o	150
1.001	13.511	0.208	65.0	0.042	0.00	0.0	0.600	o	225
1.002	45.025	0.693	65.0	0.103	0.00	0.0	0.600	o	225
1.003	15.587	0.745	20.9	0.085	0.00	0.0	0.600	o	300
1.004	8.025	1.415	5.7	0.000	0.00	0.0	0.600	o	300
2.000	38.920	0.451	86.3	0.179	4.00	0.0	0.600	o	225
2.001	28.153	0.804	35.0	0.038	0.00	0.0	0.600	o	225
3.000	12.145	1.550	7.8	0.142	4.00	0.0	0.600	o	150
2.002	33.510	1.055	31.8	0.047	0.00	0.0	0.600	o	300
2.003	10.530	1.415	7.4	0.041	0.00	0.0	0.600	o	300
1.005	82.770	0.835	99.1	0.000	0.00	0.0	0.600	800 []	825

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.13	53.650	0.096	0.0	0.0	0.0	1.12	19.9	13.0
1.001	50.00	4.27	53.466	0.138	0.0	0.0	0.0	1.63	64.6	18.7
1.002	50.00	4.73	53.258	0.241	0.0	0.0	0.0	1.63	64.6	32.6
1.003	50.00	4.81	52.490	0.326	0.0	0.0	0.0	3.45	244.0	44.1
1.004	50.00	4.83	51.745	0.326	0.0	0.0	0.0	6.64	469.6	44.1
2.000	50.00	4.46	54.130	0.179	0.0	0.0	0.0	1.41	56.0	24.2
2.001	50.00	4.67	53.679	0.217	0.0	0.0	0.0	2.22	88.2	29.4
3.000	50.00	4.06	54.500	0.142	0.0	0.0	0.0	3.62	64.0	19.2
2.002	50.00	4.87	52.800	0.406	0.0	0.0	0.0	2.80	197.9	55.0
2.003	50.00	4.90	51.745	0.447	0.0	0.0	0.0	5.80	409.8	60.5
1.005	50.00	5.36	49.805	0.773	0.0	0.0	0.0	3.00	1741.6	104.7

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
Date 14.12.2021 File PROP'D SW FLOWS 15-12-2...	Designed by Geoff Hamilton Checked by	
Micro Drainage Network 2014.1		
<p style="text-align: center;"><u>Simulation Criteria for Storm</u></p> <p> Volumetric Runoff Coeff 0.840 Foul Sewage per hectare (l/s) 0.000 Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Run Time (mins) 1440 Manhole Headloss Coeff (Global) 0.500 Output Interval (mins) 1 </p> <p> Number of Input Hydrographs 0 Number of Storage Structures 2 Number of Online Controls 2 Number of Time/Area Diagrams 0 Number of Offline Controls 0 </p> <p style="text-align: center;"><u>Synthetic Rainfall Details</u></p> <p> Rainfall Model FSR Profile Type Winter Return Period (years) 2 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 18.000 Storm Duration (mins) 15 Ratio R 0.358 </p>		
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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
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Micro Drainage	Network 2014.1	

Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

Hamilton Technical Services		Page 6
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Micro Drainage	Network 2014.1	

Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Micro Drainage		Network 2014.1

Summary of Results for 15 minute 2 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

PN	US/MH Name	Water	Surcharged	Flooded	Pipe			Status
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
1.000	1/4	53.763	-0.037	0.000	0.92	0.0	16.0	OK
1.001	1/3	53.563	-0.128	0.000	0.39	0.0	21.6	OK
1.002	1/2	53.380	-0.103	0.000	0.57	0.0	35.1	OK
1.003	1/1	52.587	-0.203	0.000	0.23	0.0	46.4	OK
1.004	1	51.988	-0.057	0.000	0.10	0.0	30.7	OK
2.000	2/3	54.251	-0.104	0.000	0.56	0.0	29.5	OK
2.001	2/2	53.781	-0.123	0.000	0.42	0.0	34.3	OK
3.000	3/1	54.567	-0.083	0.000	0.41	0.0	23.7	OK
2.002	2/1	52.924	-0.176	0.000	0.35	0.0	63.9	OK
2.003	2	52.024	-0.021	0.000	0.11	0.0	33.4	OK
1.005	JCN	49.892	-0.713	0.000	0.04	0.0	63.9	OK

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Micro Drainage	Network 2014.1	

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

1.005 CULVERT CON'T 52.010 48.970 0.000 1500 0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.840 Foul Sewage per hectare (l/s) 0.000
 Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Run Time (mins) 1440
 Manhole Headloss Coeff (Global) 0.500 Output Interval (mins) 1

 Number of Input Hydrographs 0 Number of Storage Structures 2
 Number of Online Controls 2 Number of Time/Area Diagrams 0
 Number of Offline Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Profile Type Winter
 Return Period (years) 2 Cv (Summer) 0.750
 Region England and Wales Cv (Winter) 0.840
 M5-60 (mm) 18.000 Storm Duration (mins) 30
 Ratio R 0.358

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
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Flush-Flo™ Calculated
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Diameter (mm) 242
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Control Points	Head (m)	Flow (l/s)
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Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms																																																																																		
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Micro Drainage	Network 2014.1	

Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
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Summary of Results for 30 minute 2 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water	Surcharged	Flooded			Pipe	Status
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
1.000	1/4	53.743	-0.057	0.000	0.69	0.0	12.0	OK
1.001	1/3	53.550	-0.141	0.000	0.30	0.0	16.8	OK
1.002	1/2	53.365	-0.118	0.000	0.46	0.0	28.3	OK
1.003	1/1	52.577	-0.213	0.000	0.18	0.0	38.0	OK
1.004	1	51.984	-0.061	0.000	0.10	0.0	30.1	OK
2.000	2/3	54.232	-0.123	0.000	0.42	0.0	22.3	OK
2.001	2/2	53.767	-0.137	0.000	0.33	0.0	26.7	OK
3.000	3/1	54.557	-0.093	0.000	0.31	0.0	17.8	OK
2.002	2/1	52.907	-0.193	0.000	0.27	0.0	49.8	OK
2.003	2	52.030	-0.015	0.000	0.11	0.0	33.5	OK
1.005	JCN	49.891	-0.714	0.000	0.04	0.0	63.4	OK

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	60
Ratio R	0.358		

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 2 Yr Storms	
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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
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0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Micro Drainage Network 2014.1		

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	15
Ratio R	0.358		

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Date 14.12.2021 File PROP'D SW FLOWS 15-12-2...	Designed by Geoff Hamilton Checked by	
Micro Drainage	Network 2014.1	

Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 30 Yr Storms + CC																																																																																		
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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 30 Yr Storms + CC	
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Summary of Results for 15 minute 30 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water Surcharged Flooded			Pipe			Status
		Level (m)	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
1.000	1/4	54.490	0.690	0.000	1.83	0.0	31.9	SURCHARGED
1.001	1/3	54.118	0.427	0.000	0.83	0.0	46.6	SURCHARGED
1.002	1/2	53.978	0.495	0.000	1.29	0.0	79.8	SURCHARGED
1.003	1/1	52.649	-0.141	0.000	0.54	0.0	110.0	OK
1.004	1	52.580	0.535	0.000	0.13	0.0	37.6	SURCHARGED
2.000	2/3	54.682	0.327	0.000	1.29	0.0	68.6	SURCHARGED
2.001	2/2	53.868	-0.036	0.000	1.00	0.0	82.0	OK
3.000	3/1	54.630	-0.020	0.000	1.00	0.0	58.0	OK
2.002	2/1	53.067	-0.033	0.000	0.85	0.0	155.0	OK
2.003	2	52.615	0.570	0.000	0.13	0.0	38.2	SURCHARGED
1.005	JCN	49.900	-0.705	0.000	0.05	0.0	75.7	OK

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 30 Yr Storms + CC	
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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.358		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Micro Drainage	Network 2014.1	

Summary of Results for 30 minute 30 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water Surcharged Flooded			Pipe			Status
		Level (m)	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
1.000	1/4	54.035	0.235	0.000	1.64	0.0	28.6	SURCHARGED
1.001	1/3	53.758	0.067	0.000	0.71	0.0	39.7	SURCHARGED
1.002	1/2	53.655	0.172	0.000	1.12	0.0	69.0	SURCHARGED
1.003	1/1	52.658	-0.132	0.000	0.45	0.0	93.2	OK
1.004	1	52.620	0.575	0.000	0.13	0.0	37.9	SURCHARGED
2.000	2/3	54.371	0.016	0.000	1.02	0.0	54.3	SURCHARGED
2.001	2/2	53.833	-0.071	0.000	0.80	0.0	65.7	OK
3.000	3/1	54.599	-0.051	0.000	0.76	0.0	44.2	OK
2.002	2/1	52.983	-0.117	0.000	0.68	0.0	123.7	OK
2.003	2	52.709	0.664	0.000	0.13	0.0	38.8	SURCHARGED
1.005	JCN	49.901	-0.704	0.000	0.05	0.0	76.7	OK

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Date 14.12.2021 File PROP'D SW FLOWS 15-12-2...	Designed by Geoff Hamilton Checked by	
Micro Drainage Network 2014.1		

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	60
Ratio R	0.358		

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Micro Drainage	Network 2014.1	

Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 30 Yr Storms + CC																																																																																		
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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Summary of Results for 60 minute 30 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water Surcharged Flooded			Pipe			Status
		Level (m)	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
1.000	1/4	53.826	0.026	0.000	1.14	0.0	19.9	SURCHARGED
1.001	1/3	53.580	-0.111	0.000	0.51	0.0	28.6	OK
1.002	1/2	53.412	-0.071	0.000	0.81	0.0	49.8	OK
1.003	1/1	52.608	-0.182	0.000	0.33	0.0	67.3	OK
1.004	1	52.473	0.428	0.000	0.12	0.0	36.7	SURCHARGED
2.000	2/3	54.269	-0.086	0.000	0.70	0.0	37.0	OK
2.001	2/2	53.798	-0.106	0.000	0.55	0.0	44.9	OK
3.000	3/1	54.576	-0.074	0.000	0.51	0.0	29.5	OK
2.002	2/1	52.944	-0.156	0.000	0.46	0.0	84.0	OK
2.003	2	52.646	0.601	0.000	0.13	0.0	38.4	SURCHARGED
1.005	JCN	49.900	-0.705	0.000	0.05	0.0	75.1	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	15
Ratio R	0.358		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
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Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
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Minimum Outlet Pipe Diameter (mm) 300
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Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
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Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
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Summary of Results for 15 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

		Water	Surcharged	Flooded			Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m ³)	Cap.	(l/s)	(l/s)	Status
1.000	1/4	55.243	1.443	0.000	2.19	0.0	38.2	FLOOD RISK
1.001	1/3	54.716	1.025	0.000	0.99	0.0	55.7	SURCHARGED
1.002	1/2	54.519	1.036	0.000	1.56	0.0	96.2	SURCHARGED
1.003	1/1	52.916	0.126	0.000	0.64	0.0	131.1	SURCHARGED
1.004	1	52.863	0.818	0.000	0.13	0.0	39.0	SURCHARGED
2.000	2/3	55.241	0.886	0.000	1.51	0.0	80.2	SURCHARGED
2.001	2/2	54.312	0.408	0.000	1.07	0.0	88.1	SURCHARGED
3.000	3/1	55.065	0.415	0.000	1.07	0.0	62.0	SURCHARGED
2.002	2/1	53.432	0.332	0.000	0.90	0.0	162.7	SURCHARGED
2.003	2	52.934	0.889	0.000	0.13	0.0	38.7	SURCHARGED
1.005	JCN	49.901	-0.704	0.000	0.05	0.0	77.0	OK

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Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

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Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.358		

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Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 100 Yr Storms + CC	
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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 100 Yr Storms + CC	
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Summary of Results for 30 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

		Water	Surcharged	Flooded			Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	1/4	54.659	0.859	0.000	1.92	0.0	33.5	SURCHARGED
1.001	1/3	54.250	0.559	0.000	0.86	0.0	48.2	SURCHARGED
1.002	1/2	54.097	0.614	0.000	1.37	0.0	84.2	SURCHARGED
1.003	1/1	53.279	0.489	0.000	0.54	0.0	111.9	SURCHARGED
1.004	1	53.247	1.202	0.000	0.13	0.0	39.0	SURCHARGED
2.000	2/3	54.717	0.362	0.000	1.29	0.0	68.7	SURCHARGED
2.001	2/2	54.490	0.586	0.000	0.96	0.0	78.5	SURCHARGED
3.000	3/1	54.644	-0.006	0.000	0.98	0.0	56.9	OK
2.002	2/1	54.444	1.344	0.000	0.81	0.0	146.4	SURCHARGED
2.003	2	54.399	2.354	0.000	0.13	0.0	39.3	FLOOD RISK
1.005	JCN	49.901	-0.704	0.000	0.05	0.0	76.7	OK

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 100 Yr Storms + CC	
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Micro Drainage Network 2014.1		

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	60
Ratio R	0.358		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	–	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Date 14.12.2021 File PROP'D SW FLOWS 15-12-2...	Designed by Geoff Hamilton Checked by	
Micro Drainage	Network 2014.1	

Summary of Results for 60 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status
		Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1/4	53.928	0.128	0.000	1.50	0.0	26.0	SURCHARGED
1.001	1/3	53.616	-0.075	0.000	0.66	0.0	37.1	OK
1.002	1/2	53.526	0.043	0.000	1.04	0.0	63.9	SURCHARGED
1.003	1/1	52.914	0.124	0.000	0.42	0.0	86.1	SURCHARGED
1.004	1	52.877	0.832	0.000	0.13	0.0	39.0	SURCHARGED
2.000	2/3	54.544	0.189	0.000	0.92	0.0	48.6	SURCHARGED
2.001	2/2	54.499	0.595	0.000	0.72	0.0	59.0	SURCHARGED
3.000	3/1	54.590	-0.060	0.000	0.67	0.0	38.7	OK
2.002	2/1	54.453	1.353	0.000	0.61	0.0	109.9	SURCHARGED
2.003	2	54.408	2.363	0.000	0.13	0.0	39.3	FLOOD RISK
1.005	JCN	49.902	-0.703	0.000	0.05	0.0	78.1	OK

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Micro Drainage Network 2014.1		

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	120
Ratio R	0.358		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 100 Yr Storms + CC																																																																																		
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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Summary of Results for 120 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water Surcharged Flooded			Pipe			Status
		Level (m)	Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
1.000	1/4	53.765	-0.035	0.000	0.95	0.0	16.5	OK
1.001	1/3	53.568	-0.123	0.000	0.42	0.0	23.7	OK
1.002	1/2	53.393	-0.090	0.000	0.67	0.0	41.3	OK
1.003	1/1	52.596	-0.194	0.000	0.27	0.0	55.9	OK
1.004	1	52.504	0.459	0.000	0.12	0.0	37.0	SURCHARGED
2.000	2/3	54.253	-0.102	0.000	0.58	0.0	30.7	OK
2.001	2/2	53.785	-0.119	0.000	0.45	0.0	37.2	OK
3.000	3/1	54.568	-0.082	0.000	0.42	0.0	24.4	OK
2.002	2/1	52.929	-0.171	0.000	0.38	0.0	69.6	OK
2.003	2	52.826	0.781	0.000	0.13	0.0	38.8	SURCHARGED
1.005	JCN	49.900	-0.705	0.000	0.05	0.0	75.5	OK

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 100 Yr Storms + CC	
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Micro Drainage Network 2014.1		

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	240
Ratio R	0.358		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Micro Drainage	Network 2014.1	

Summary of Results for 240 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water Surcharged Flooded			Flow / Overflow Cap. (l/s)		Pipe Flow (l/s)	Status
		Level (m)	Depth (m)	Volume (m ³)				
1.000	1/4	53.731	-0.069	0.000	0.57	0.0	10.0	OK
1.001	1/3	53.543	-0.148	0.000	0.26	0.0	14.3	OK
1.002	1/2	53.357	-0.126	0.000	0.41	0.0	25.0	OK
1.003	1/1	52.571	-0.219	0.000	0.16	0.0	33.9	OK
1.004	1	52.010	-0.035	0.000	0.11	0.0	32.8	OK
2.000	2/3	54.222	-0.133	0.000	0.35	0.0	18.6	OK
2.001	2/2	53.759	-0.145	0.000	0.27	0.0	22.5	OK
3.000	3/1	54.551	-0.099	0.000	0.25	0.0	14.8	OK
2.002	2/1	52.898	-0.202	0.000	0.23	0.0	42.2	OK
2.003	2	52.297	0.252	0.000	0.12	0.0	35.6	SURCHARGED
1.005	JCN	49.895	-0.710	0.000	0.04	0.0	67.9	OK

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Micro Drainage	Network 2014.1	

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	400
Ratio R	0.358		

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1 Chiltern Ave Euxton Chorley PR7 6NU	Victoria Mill Mcr, Medlock FRB Proposed SW Run-off 1 in 100 Yr Storms + CC	
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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
0.400	36.6	1.800	32.3	4.500	50.2	8.500	68.4
0.500	38.2	2.000	34.0	5.000	52.9	9.000	70.3
0.600	39.1	2.200	35.6	5.500	55.4	9.500	72.2
0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Summary of Results for 400 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status
		Level (m)	Depth (m)	Volume (m³)			Flow (l/s)	
1.000	1/4	53.715	-0.085	0.000	0.39	0.0	6.8	OK
1.001	1/3	53.529	-0.162	0.000	0.17	0.0	9.7	OK
1.002	1/2	53.338	-0.145	0.000	0.27	0.0	17.0	OK
1.003	1/1	52.556	-0.234	0.000	0.11	0.0	22.9	OK
1.004	1	51.934	-0.111	0.000	0.08	0.0	22.8	OK
2.000	2/3	54.204	-0.151	0.000	0.24	0.0	12.6	OK
2.001	2/2	53.744	-0.160	0.000	0.19	0.0	15.3	OK
3.000	3/1	54.542	-0.108	0.000	0.17	0.0	10.0	OK
2.002	2/1	52.879	-0.221	0.000	0.16	0.0	28.6	OK
2.003	2	51.990	-0.055	0.000	0.10	0.0	30.9	OK
1.005	JCN	49.884	-0.721	0.000	0.03	0.0	53.6	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.583	4-8	0.190

Total Area Contributing (ha) = 0.773

Total Pipe Volume (m³) = 58.152

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	CULVERT CON'T	52.010	48.970	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	30.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	1440
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	600
Ratio R	0.358		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 1, DS/PN: 1.004, Volume (m³): 6.0

Unit Reference MD-SHE-0242-4000-2750-4000
Design Head (m) 2.750
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.750	39.6
Flush-Flo™	0.795	39.6
Kick-Flo®	1.680	31.3
Mean Flow over Head Range	-	34.5

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)
0.100	7.9	1.200	38.3	3.000	41.3	7.000	62.2
0.200	24.6	1.400	36.6	3.500	44.5	7.500	64.4
0.300	34.1	1.600	33.3	4.000	47.5	8.000	66.4
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0.800	39.6	2.400	37.1	6.000	57.8		
1.000	39.3	2.600	38.6	6.500	60.0		

Hydro-Brake Optimum® Manhole: 2, DS/PN: 2.003, Volume (m³): 7.1

Unit Reference MD-SHE-0242-4000-2650-4000
Design Head (m) 2.650
Design Flow (l/s) 40.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 242
Invert Level (m) 51.745
Minimum Outlet Pipe Diameter (mm) 300
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Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.650	39.3
Flush-Flo™	0.760	39.2

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Storage Structures for Storm

Cellular Storage Manhole: 1, DS/PN: 1.004

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	1.200	42.0	0.0
0.600	42.0	0.0	1.201	0.0	0.0

Cellular Storage Manhole: 2, DS/PN: 2.003

Invert Level (m) 51.745 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	0.0	1.200	64.0	0.0
0.600	64.0	0.0	1.201	0.0	0.0

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Micro Drainage		Network 2014.1

Summary of Results for 600 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 200.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

PN	US/MH Name	Water	Surcharged	Flooded	Pipe		Status
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	
1.000	1/4	53.704	-0.096	0.000	0.28	0.0	5.0 OK
1.001	1/3	53.519	-0.172	0.000	0.13	0.0	7.1 OK
1.002	1/2	53.326	-0.157	0.000	0.20	0.0	12.4 OK
1.003	1/1	52.547	-0.243	0.000	0.08	0.0	16.8 OK
1.004	1	51.900	-0.145	0.000	0.06	0.0	16.8 OK
2.000	2/3	54.193	-0.162	0.000	0.17	0.0	9.2 OK
2.001	2/2	53.734	-0.170	0.000	0.14	0.0	11.2 OK
3.000	3/1	54.535	-0.115	0.000	0.13	0.0	7.3 OK
2.002	2/1	52.867	-0.233	0.000	0.12	0.0	20.9 OK
2.003	2	51.935	-0.110	0.000	0.08	0.0	22.9 OK
1.005	JCN	49.871	-0.734	0.000	0.03	0.0	39.7 OK