HAMILTON TECHNICAL SERVICES

CIVIL AND ENVIRONMENTAL ENGINEERING CONSULTANTS

PROPOSED DEVELOPMENT
ON LAND TO THE EAST OF
THE A 59, Nr CLITHEROE.

SURFACE WATER DRAINAGE STRATEGY

Re; Planning Approval N° 3/2015/0426
Condition N° 4.

Our Ref; C - 0678 - SW
Issue 1
06.01.2016

HAMILTON TECHNICAL SERVICES

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Nr Chorley, Lancs,
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06th January 2016

Dear Sirs,

PROPOSED DEVELOPMENT ON
LAND TO THE EAST OF THE A59, Nr CLITHEROE
AT PENDLE VIEW FISHERIES.
SURFACE WATER DRAINAGE STRATEGY.

Hamilton Technical Services have been commissioned, through BTI Building, who are project managers for this development, to prepare a surface water drainage strategy, in support of a Planning Approval for the development of the above site to provide new vacation properties and other associated facilities.

This report has been compiled in response to Condition 4 of Planning Approval N° 3/2015/0426

Present Site Details

The site lies on the eastern side of the A59, close to and immediately east of its junction with Hey Road, south of Clitheroe, Lancashire. The site comprises an area of approximately 4.60Ha. The site is located at Nat Grid Ref 374249E, 438292N and the land within the site area is generally level, with a raised area in the north-west corner of the site.

The site area is bounded to its northern, eastern and southern sides by agricultural land. West of the site, lies the A59 and beyond that a mixture of commercial and residential properties.

A location plan showing the site position is appended to this report, showing the existing land with nearby buildings and hard standings, roads etc.

The site area is presently in use as a fishery and has been for some years. The majority of the site boundaries, with the exception of the southern, are well clothed by trees, shrubberies and hedgerows. The majority of the site is taken up by the main fishing lakes, with a number of smaller working ponds in the north-west corner, all surrounded by grassland. Higher ground lies to the north, east and south east of the site and a number of small watercourses drain form the higher ground into the on-site lake system.

These existing streams and ditches all enter the lakes through short culverted sections which pass below the perimeter access track. These culverts are effectually flow control devices for the incoming surface water flows from the surrounding fells and farmland. These culverts will be retained in perpetuity and will continue to serve their existing functions of flow and control without alteration. Our plan No C-0678-02 attached to this report shows the locations of these existing culverted connections.

Also shown on this plan are the existing fishing and breeding ponds located on the higher part of the site to the west of the lakes. The drains serving these ponds and preventing overflow or flooding on the higher ground are also indicated on the plan, following investigations of the various systems. These drains form two relatively distinct drainage areas which we have entitled Zone 1 and Zone 2. The rainfall run-off from these areas discharges into the main lakes at the lower level and the actual pond areas are effectively impermeable areas of the site and will create a quick accumulation of flows into the lakes during rainfall.

We have carried out simulated storm calculations for each area when subjected to a 1 in 3 Yr storm event and calculated a rate of discharge into the lakes.

Zone 1 produces a discharge of 90.7 l/s whilst Zone 2 produces a discharge of 14.8 l/s. We have used these figures to guide our designs for the new drainage systems that will be installed. The new proposed systems will produce an overall reduction in the rates of discharge into the lakes and thus reduce the site contribution to flows out of the outfall from the main lake.

The existing surface water run-off from the site including the buildings and roads drains into the onsite lakes. The lakes outfall to a watercourse that leaves the south-west corner of the site. It meets and crosses under the A59 a short distance outside the site boundary. The stream crosses the A59 by means of a concrete culvert and then continues to run to the south of and parallel to Hey Road in a westerly direction. This watercourse becomes Barrow Brook some way downstream.

Development Proposals

The proposed redevelopment of the site is to be carried out in such a manner as to provide a parkland and woodland feel and is therefore intended to be less dense than could be expected. This approach will enable the introduction of a number of measures related to the drainage of surface water from the site that promote a sustainable system of storm water management.

The major proportion of the re-development will be carried out to the western and southern sides of the existing lakes/reservoirs. It is in these areas that most of the new lodges, camping pods and car parks will be provided. Along the eastern side of the main lake will be another area where lodges will be introduced along the bank area. A copy of our plan numbered C-0678-01, incorporating the illustrative site layout prepared by NU Architects, is attached to this report and shows our proposed outline drainage layouts for the development. These proposals include the following measures.

The new surface water systems of drainage, for the western areas of the site have been broken down into three separate zones. Plans are attached to this report showing Zone 1 and Zone 2, the second plan for Zone 2 also shows the proposed drainage for the restaurant building.

A large part of the existing Zone 1 is occupied by a number of large fishing ponds which are linked by a series of 225mm Dia pipes to control the water at a constant level. The final pond discharges through a 300mm Dia pipe that discharges into the smaller of the two lakes. During rainfall these ponds react like any 100% impermeable surface and the rainwater runs directly away to flow into the main lakes. Calculations are attached to show the rates of discharge from Zone 1 to the lake during a 1 in 3 Yr storm, with a discharge rate of 90.7 l/s.

Zone 2 is also occupied by a series of smaller ponds, used mainly for growing ponds for stock fish, but still with a controlled water level in each pond and again the ponds are interlinked by a series of 150mm Dia pipes. These ponds outfall through a 150mm Dia pipe, into the main lake and when subject to the same scrutiny as Zone 1, Zone 2 produces a run-off rate of 14.9 l/s during the 1 in 3 Yr storm.

It was intended that the new development would include the widespread use of soak-aways for drainage of the lodges, pods and access tracks. However due to the requirements of the planning permission for a major reduction of ground levels in these areas, there will be insufficient porous material remaining on these residential areas, for soak-aways to be viable. We have had to design a different system of drainage for these zones, consisting of a combination of porous roads and parking spaces, shallow swales and stone filled “French” drains. The run-off through these will then be directed into the existing outfalls entering the lakes.

In Zone 1, the new lodges and the access ways will represent a significant reduction in impervious areas and thus a significant reduction in the run-off discharged into the lake. A series of calculations are appended to illustrate the future discharges during storms ranging from the basic 1 in 3 Yr event up to and including a 1 in 100 Yr event that includes an allowance of 30% increase in rainfall representative of climate change. During the base 3 Yr storm the maximum run-off rate will be 33.0 l/s, a reduction of 63% from the existing 90.7 l/s. Even during the most intense 1 in 100 Yr event the maximum rate of run-off will be 71.0 l/s, a reduction over the 1 in 3 Yr existing storm, of 22%.

In Zone 2, the new car park and the new camping pods and access paths will present a slight increase I the impermeable areas and measures have been incorporated into the design to ensure the run-off rate from Zone 2 remains at present day values. Again, in the residential part of Zone 2 we have incorporated porous roads and paths and these will discharge to combined Swales and “French” drains. The main car park will also have a porous construction to allow the maximum amount of rainfall to soak into the ground. There will also be a small overflow system from the car park base into the Zone 2 outfall drains. The rate of discharge into the lake will be controlled at a maximum of 15.0 l/s by means of a Hydro-brake system and this will necessitate a small area of attenuation built into the system and located within the car park area as illustrated on the Zone 2 drainage plan. This attenuation will provide 100 CuM of storage and will allow the system to operate with no surface water flooding occurring.

Roof water run-off from the new restaurant will be directed into a rain water harvesting system, with a capacity of approximately 15 CuM, to serve toilets and laundry facilities in the building. Excess run-off will be passed forward into a soak-away and infiltration trenches to again provide irrigation to the surrounding grassed and planted areas. Calculations are attached to demonstrate the capacity of this soak-away. Additional infiltration drains will run off the soak-away to disperse water to the roots of the nearby trees.

Whilst these surface water drainage systems are designed to operate during storm events of up to a 1 in 100 Yr return period without surface flooding occurring, there may be an exceptional storm event or unforeseen circumstances that cause an Exceedance event. In such circumstances the excess flow will be directed by on site contours and landscaping along the routes indicated in magenta and will discharge into the lakes as with the normal run-off flows.

Conclusions

Through suitable design, detailing and implementation, the above range of measures will enable the proposed development to be carried through to completion in a safe and sustainable manner without risk of additional or increased flooding being caused to property within the new development or to existing neighbouring properties or land outside the site.

We would finally restate that all the above measures can and will be designed to provide an integrated system of surface water drainage with a total rate of discharge from the re-developed site limited to the equivalent of present day discharges.

Report compiled by,

RG Hamilton

R.G.HAMILTON
HAMILTON TECHNICAL SERVICES.

Issue 1; 06/01/2016

List of attached plans;

1 General Location Plan
2 Site Plan
3 Existing Site Topographic Survey Plan
4 Existing site plan showing incoming and outgoing watercourses and existing Zone 1&2 Drainage
5 Proposed Zone 1 SW Drainage.
6 Proposed Zone 2 SW Drainage
7 Existing Run-off Calculations Zones 1&2
8 Proposed Run-off Calculations Zone 1
9 Proposed Run-off Calculations Zone 2
10 Soak-away Calculations for the Restaurant

Lancashire County Council
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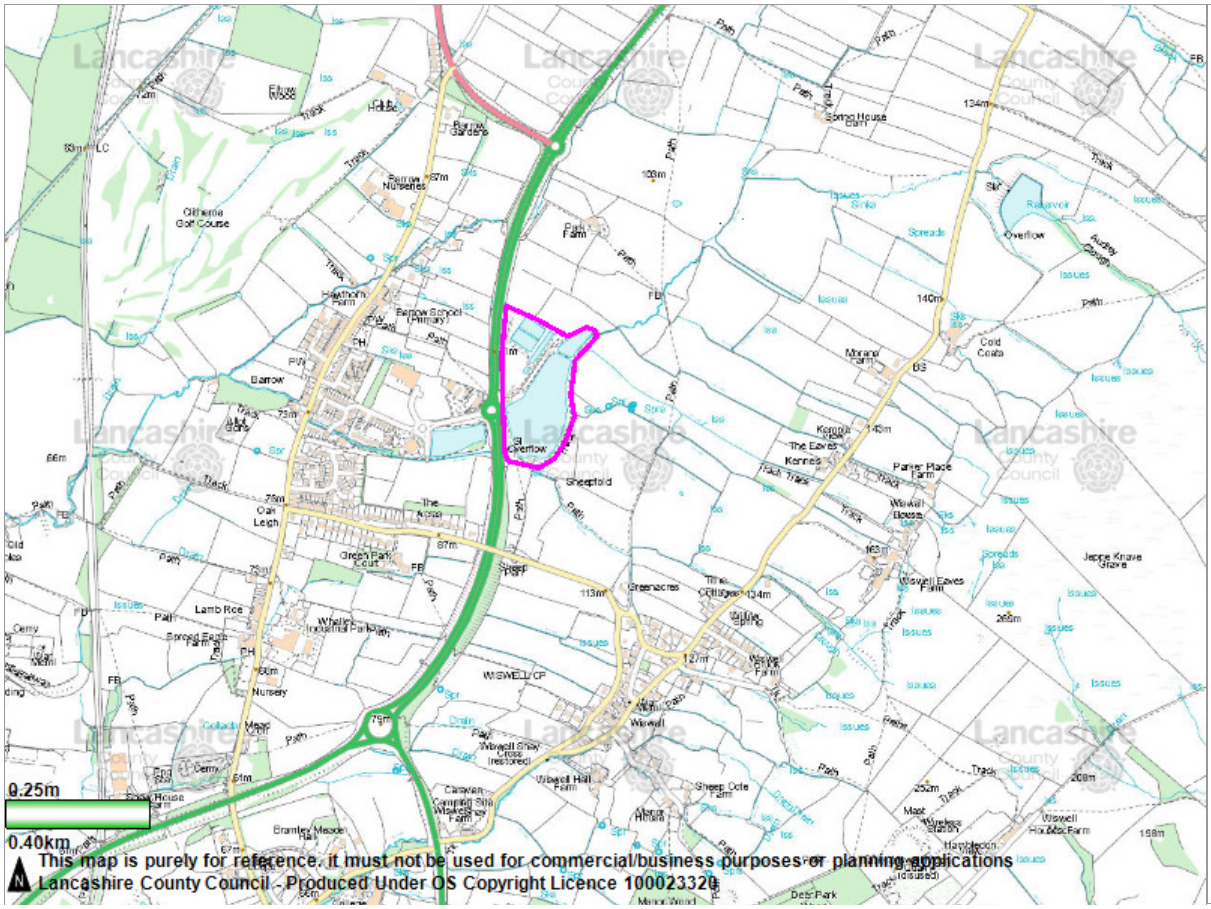
Pendle View Fisheries



Local Government Offices
- County Council
- Borough or City Council

Lancashire County Council
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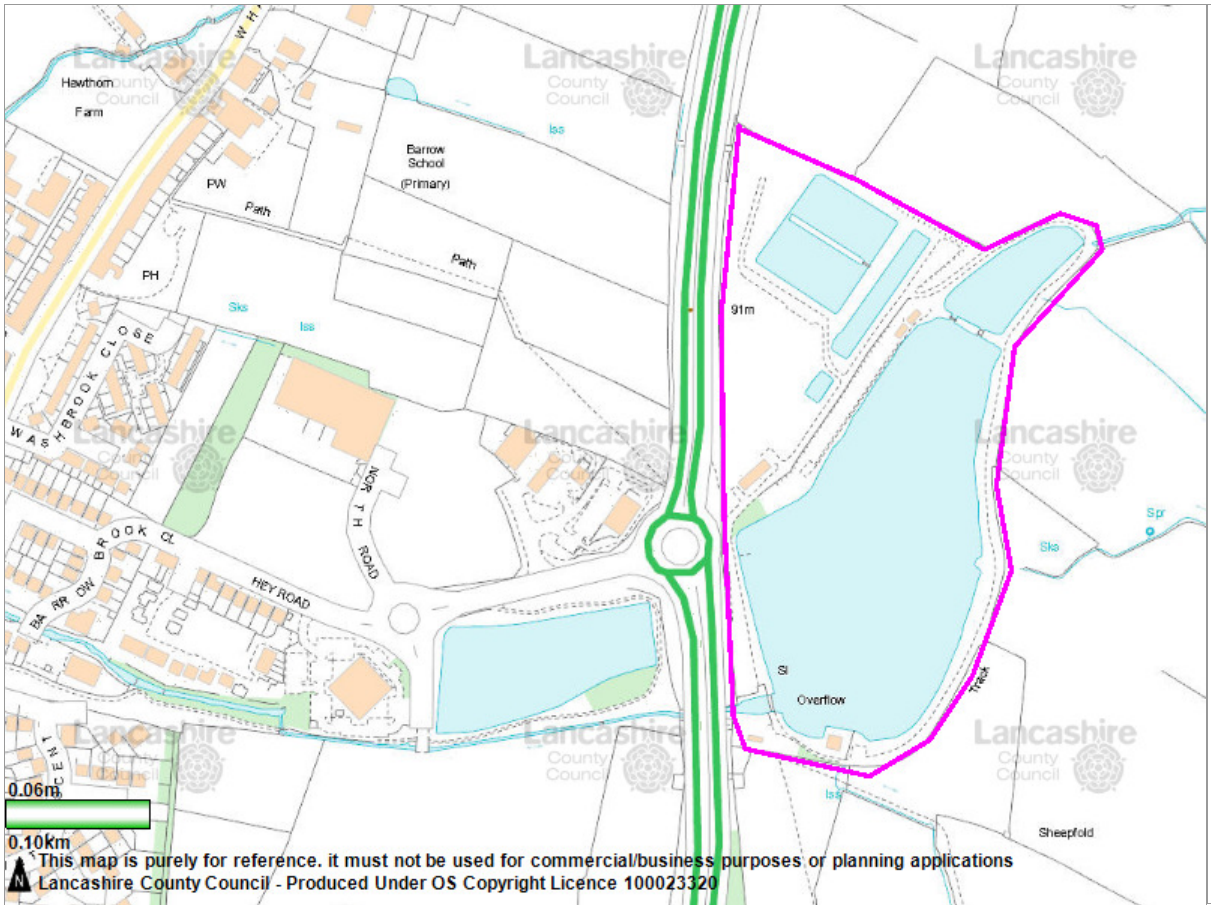
Pendle View Fisheries



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STN1	374295.262	438276.998	92.764
STN2	374280.632	438319.034	95.608
STN3	374225.945	438329.402	94.427
STN4	374264.745	438290.158	92.104
STN5	374222.741	438290.130	93.704
STN6	374222.271	438290.135	95.132
STN7	374227.894	438301.167	96.572
STN8	374239.010	438344.104	96.052
STN9	374301.312	438339.107	95.844
STN10	374301.515	438349.123	98.153
STN11	374241.440	438458.092	97.902
STN12	374227.293	438412.567	97.756
STN13	374227.343	438377.527	96.666
STN14	374285.312	438504.555	97.006
STN15	374311.525	438492.955	95.961
STN16	374359.171	438446.739	94.481
STN17	374408.658	438424.673	92.470
STN18	374408.664	438283.683	92.186
STN19	374401.396	438196.710	92.420
STN20	374382.007	438154.891	92.723
STN21	374339.095	438117.075	92.623
STN22	374337.256	438101.574	91.574
STN23	374270.256	438103.952	91.425
STN24	374250.252	438132.613	90.143
STN25	374236.063	438143.950	

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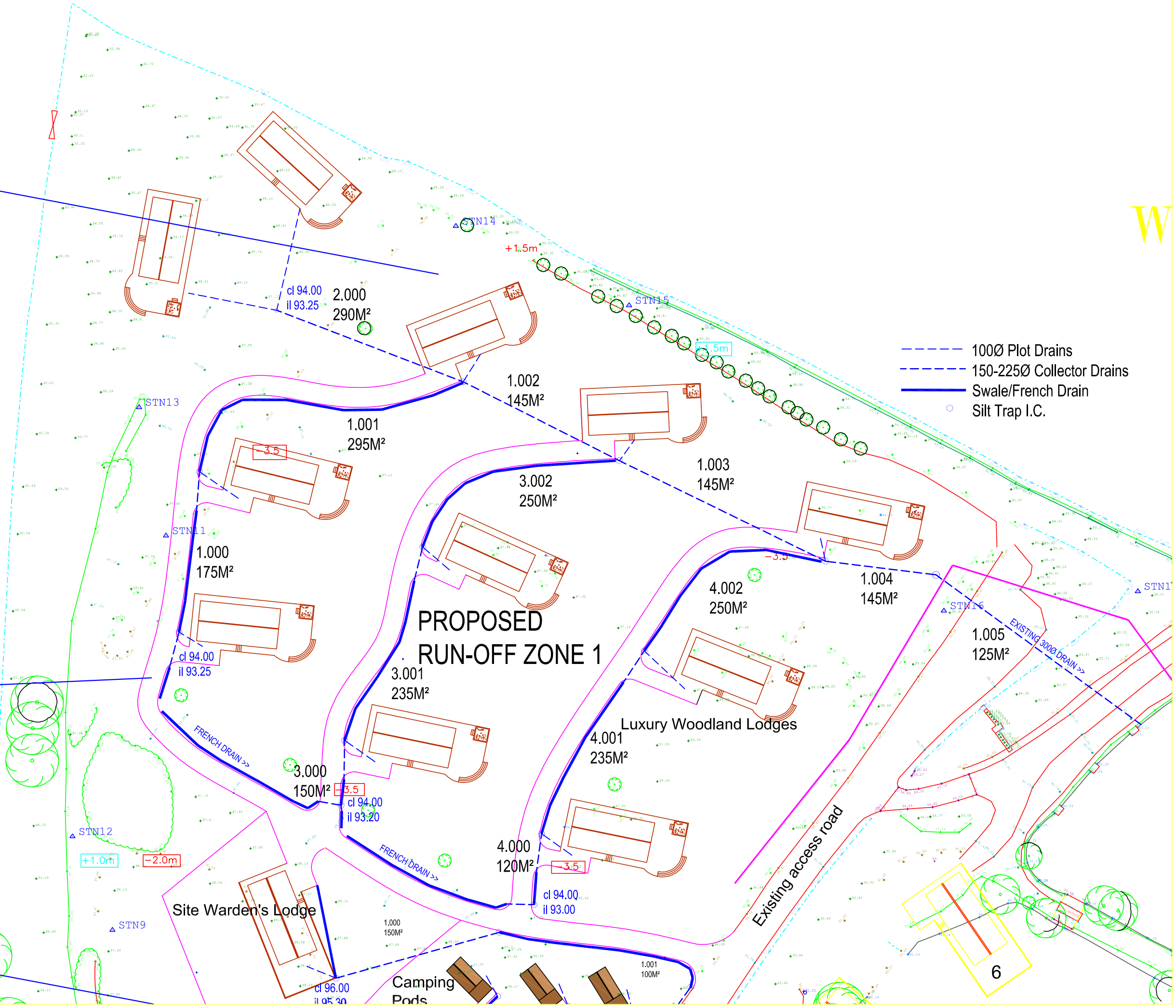

Rev	Details	By	Date

Hamilton Technical Services

Civil & Environmental Engineering Consultants

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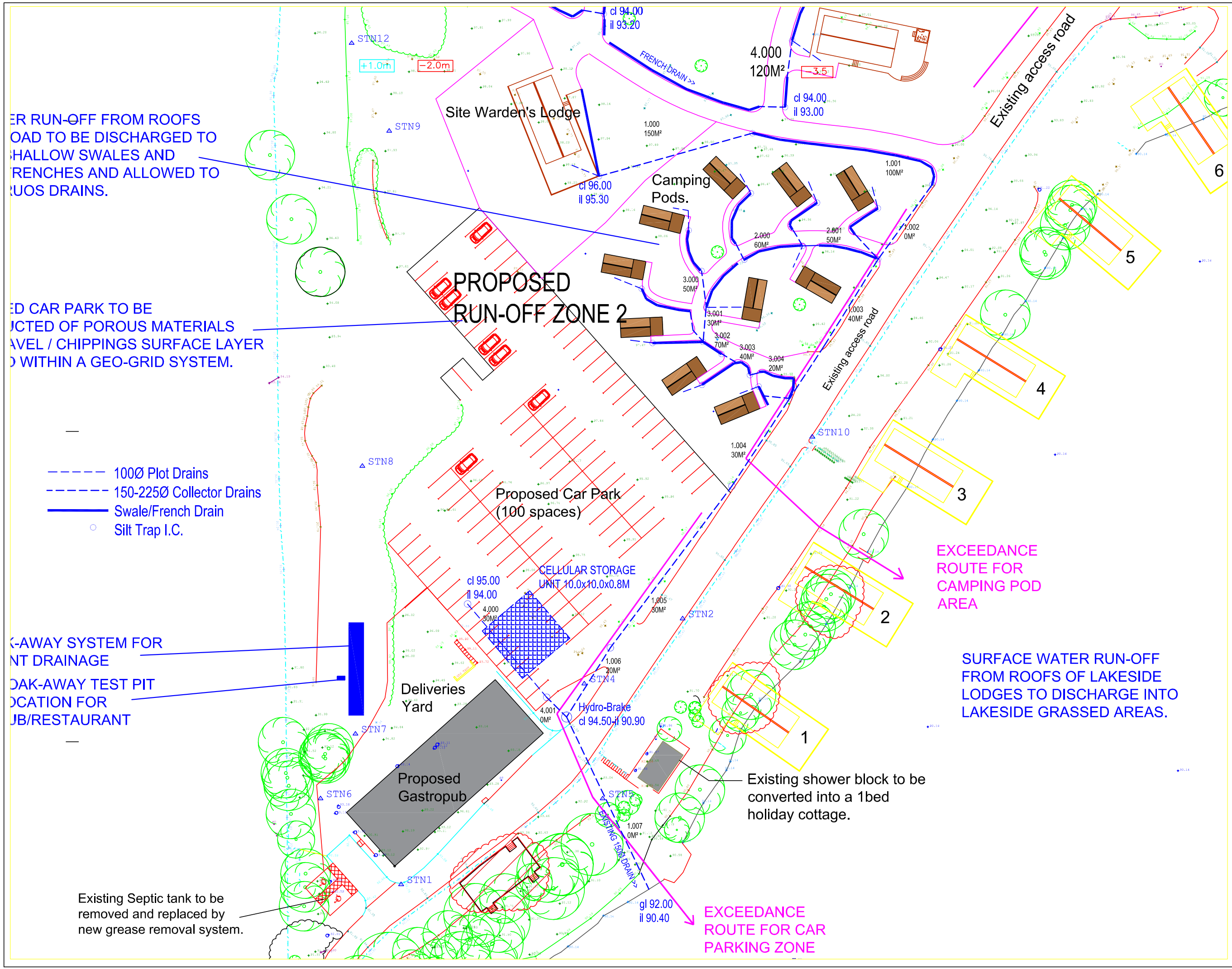
Client: LODGE INNS LTD.
BTi

Project: LEISURE DEVELOPMENT AT
PENDLE VIEW FISHERIES
CLITHEROE

Title: ZONE 1
SURFACE WATER
DRAINAGE PROPOSALS

Drg.No.	Rev.n	Date	Scale
C - 0678 - 04	-	02.12.2015	1:200@A0
		Drawn RGH	Check RGH



Rev	Details	By	Date

Hamilton Technical Services

Civil & Environmental Engineering Consultants

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Client: LODGE INNS LTD. BTi

Project: LEISURE DEVELOPMENT AT PENDLE VIEW FISHERIES CLITHEROE

Title: ZONE 2 SURFACE WATER DRAINAGE PROPOSALS

Drg.No.	Rev.n	Date	Scale
C - 0678 - 06	-	02.12.2015	1:200@A0
		Drawn RGH	Chk'd RGH

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes PLOTS

FSR Rainfall Model - England and Wales

Return Period (years)	3	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.296	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.613	4-8	0.057

Total Area Contributing (ha) = 0.670

Total Pipe Volume (m³) = 4.524

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	25.000	0.208	120.0	0.525	4.00	0.0	0.600	o	300
1.001	39.000	5.000	7.8	0.145	0.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.29	96.200	0.525	0.0	0.0	0.0	1.43	101.4	71.1
1.001	50.00	4.41	95.992	0.670	0.0	0.0	0.0	5.66	400.3	90.7

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)
1.001	Lake	92.000	90.992	90.800	10000	0

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes PLOTS

FSR Rainfall Model - England and Wales

Return Period (years)	3	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.296	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.084	4-8	0.025

Total Area Contributing (ha) = 0.109

Total Pipe Volume (m³) = 2.003

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	30.000	0.250	120.0	0.056	4.00	0.0	0.600	o	150
2.000	30.000	0.250	120.0	0.038	4.00	0.0	0.600	o	100
1.001	70.000	6.000	11.7	0.015	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.55	97.360	0.056	0.0	0.0	0.0	0.92	16.2	7.6
2.000	50.00	4.71	96.700	0.038	0.0	0.0	0.0	0.70	5.5	5.1
1.001	50.00	5.11	96.400	0.109	0.0	0.0	0.0	2.97	52.4	14.8

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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)
1.001	Lake	92.000	90.400	90.200	10000	0

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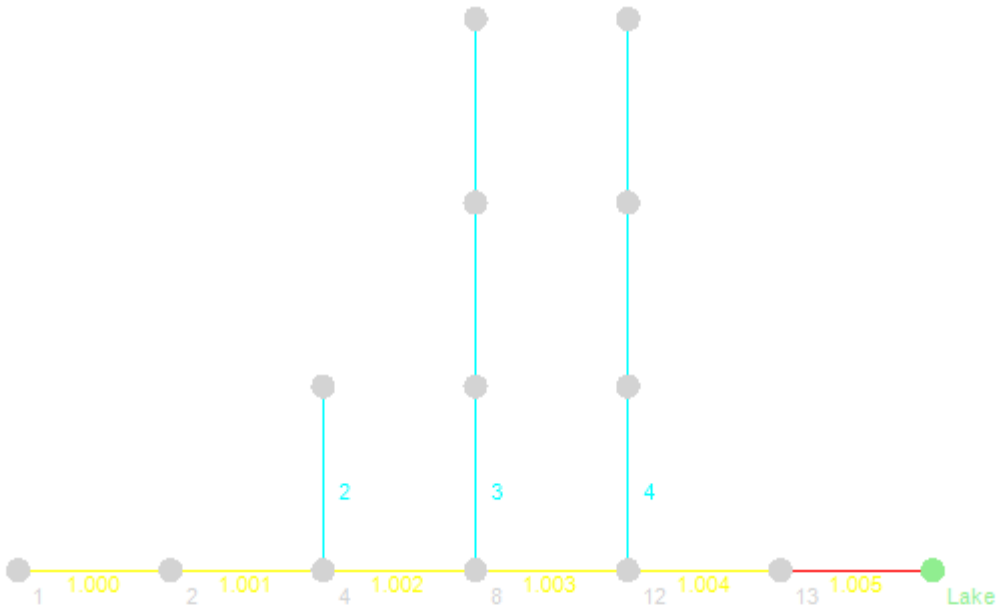
Hamilton Technical Services		Page 1
1 Chiltern Ave Euxton Chorley PR7 6NU	Pendle View Fishery Site Drainage Zone 1 Proposed Schematic Layout	
Date 01.12.2015 File	Designed by Geoff Hamilton Checked by	
Micro Drainage	Network 2014.1	



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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes PLOTS

FSR Rainfall Model - England and Wales

Return Period (years)	3	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.296	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.121	4-8	0.123

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m³) = 7.521

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	25.000	0.208	120.0	0.017	4.00	0.0	0.600	o	100
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	120.0	0.029	4.00	0.0	0.600	o	100
1.002	26.500	0.177	150.0	0.015	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.59	93.250	0.017	0.0	0.0	0.0	0.70	5.5	2.3
1.001	50.00	5.57	92.992	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.72	93.400	0.029	0.0	0.0	0.0	0.70	5.5	3.9
1.002	50.00	6.11	92.674	0.090	0.0	0.0	0.0	0.82	14.5	12.2

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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)
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	100
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	100
4.002	34.000	0.386	88.0	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.65	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.29	93.000	0.012	0.0	0.0	0.0	0.70	5.5	1.6
4.001	50.00	5.08	92.900	0.036	0.0	0.0	0.0	0.63	4.9	4.9
4.002	50.00	5.61	92.650	0.061	0.0	0.0	0.0	1.07	18.9	8.3
1.004	50.00	6.96	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.26	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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	Lake	92.000	91.004	90.800	10000	0

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.296		

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Summary of Results for 30 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.299	-0.101	0.000	0.23	0.0	3.6	OK
1.001	2	93.134	-0.058	0.000	0.67	0.0	9.4	OK
2.000	3	93.466	-0.084	0.000	0.39	0.0	6.1	OK
1.002	4	92.931	0.057	0.000	1.12	0.0	17.5	SURCHARGED
3.000	5	93.257	-0.043	0.000	0.62	0.0	3.2	OK
3.001	6	93.150	-0.066	0.000	0.59	0.0	8.2	OK
3.002	7	92.965	-0.052	0.000	0.75	0.0	13.2	OK
1.003	8	92.643	-0.004	0.000	0.81	0.0	32.4	OK
4.000	9	93.042	-0.108	0.000	0.17	0.0	2.5	OK
4.001	10	92.980	-0.070	0.000	0.54	0.0	7.5	OK
4.002	11	92.789	-0.061	0.000	0.65	0.0	12.7	OK
1.004	12	92.489	0.075	0.000	1.42	0.0	46.2	SURCHARGED
1.005	13	92.224	-0.105	0.000	0.56	0.0	46.1	OK

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Rainfall Hyetograph for 30 minute 10 year Winter (Storm)

Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
1	4.809	7	18.036	13	69.563	19	57.968	25	16.052
2	11.815	8	21.961	14	79.520	20	46.778	26	15.544
3	14.798	9	28.085	15	86.586	21	36.655	27	15.538
4	15.538	10	36.655	16	86.586	22	28.085	28	14.798
5	15.544	11	46.778	17	79.520	23	21.961	29	11.815
6	16.052	12	57.968	18	69.563	24	18.036	30	4.809

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	60
Ratio R	0.296		

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Summary of Results for 60 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.290	-0.110	0.000	0.16	0.0	2.5	OK
1.001	2	93.114	-0.078	0.000	0.47	0.0	6.6	OK
2.000	3	93.453	-0.097	0.000	0.27	0.0	4.2	OK
1.002	4	92.828	-0.046	0.000	0.82	0.0	12.9	OK
3.000	5	93.245	-0.055	0.000	0.42	0.0	2.2	OK
3.001	6	93.133	-0.084	0.000	0.41	0.0	5.6	OK
3.002	7	92.944	-0.073	0.000	0.52	0.0	9.2	OK
1.003	8	92.549	-0.098	0.000	0.61	0.0	24.2	OK
4.000	9	93.034	-0.116	0.000	0.12	0.0	1.7	OK
4.001	10	92.964	-0.086	0.000	0.37	0.0	5.2	OK
4.002	11	92.771	-0.079	0.000	0.45	0.0	8.8	OK
1.004	12	92.414	0.000	0.000	1.05	0.0	34.2	SURCHARGED
1.005	13	92.204	-0.125	0.000	0.41	0.0	34.2	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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Summary of Results for 120 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.282	-0.118	0.000	0.10	0.0	1.6	OK
1.001	2	93.099	-0.093	0.000	0.31	0.0	4.3	OK
2.000	3	93.442	-0.108	0.000	0.17	0.0	2.7	OK
1.002	4	92.802	-0.072	0.000	0.54	0.0	8.4	OK
3.000	5	93.235	-0.065	0.000	0.27	0.0	1.4	OK
3.001	6	93.119	-0.098	0.000	0.26	0.0	3.7	OK
3.002	7	92.927	-0.090	0.000	0.34	0.0	6.0	OK
1.003	8	92.520	-0.127	0.000	0.40	0.0	15.8	OK
4.000	9	93.027	-0.123	0.000	0.08	0.0	1.1	OK
4.001	10	92.950	-0.100	0.000	0.24	0.0	3.4	OK
4.002	11	92.755	-0.095	0.000	0.29	0.0	5.7	OK
1.004	12	92.327	-0.086	0.000	0.70	0.0	22.7	OK
1.005	13	92.183	-0.145	0.000	0.27	0.0	22.7	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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Summary of Results for 120 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.282	-0.118	0.000	0.10	0.0	1.6	OK
1.001	2	93.099	-0.093	0.000	0.31	0.0	4.3	OK
2.000	3	93.442	-0.108	0.000	0.17	0.0	2.7	OK
1.002	4	92.802	-0.072	0.000	0.54	0.0	8.4	OK
3.000	5	93.235	-0.065	0.000	0.27	0.0	1.4	OK
3.001	6	93.119	-0.098	0.000	0.26	0.0	3.7	OK
3.002	7	92.927	-0.090	0.000	0.34	0.0	6.0	OK
1.003	8	92.520	-0.127	0.000	0.40	0.0	15.8	OK
4.000	9	93.027	-0.123	0.000	0.08	0.0	1.1	OK
4.001	10	92.950	-0.100	0.000	0.24	0.0	3.4	OK
4.002	11	92.755	-0.095	0.000	0.29	0.0	5.7	OK
1.004	12	92.327	-0.086	0.000	0.70	0.0	22.7	OK
1.005	13	92.183	-0.145	0.000	0.27	0.0	22.7	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	30
Ratio R	0.296		

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.372	-0.028	0.000	0.32	0.0	4.9	OK
1.001	2	93.352	0.160	0.000	0.77	0.0	10.8	SURCHARGED
2.000	3	93.480	-0.070	0.000	0.55	0.0	8.5	OK
1.002	4	93.194	0.320	0.000	1.32	0.0	20.6	SURCHARGED
3.000	5	93.272	-0.028	0.000	0.86	0.0	4.4	OK
3.001	6	93.193	-0.024	0.000	0.81	0.0	11.2	OK
3.002	7	93.093	0.076	0.000	0.91	0.0	16.1	SURCHARGED
1.003	8	92.807	0.160	0.000	0.98	0.0	39.1	SURCHARGED
4.000	9	93.050	-0.100	0.000	0.24	0.0	3.5	OK
4.001	10	92.999	-0.051	0.000	0.76	0.0	10.5	OK
4.002	11	92.873	0.023	0.000	0.83	0.0	16.1	SURCHARGED
1.004	12	92.582	0.168	0.000	1.76	0.0	57.4	SURCHARGED
1.005	13	92.241	-0.087	0.000	0.69	0.0	57.3	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	60
Ratio R	0.296		

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.298	-0.102	0.000	0.22	0.0	3.4	OK
1.001	2	93.131	-0.061	0.000	0.65	0.0	9.2	OK
2.000	3	93.464	-0.086	0.000	0.38	0.0	5.9	OK
1.002	4	92.930	0.056	0.000	1.11	0.0	17.5	SURCHARGED
3.000	5	93.256	-0.044	0.000	0.59	0.0	3.0	OK
3.001	6	93.148	-0.069	0.000	0.57	0.0	7.9	OK
3.002	7	92.962	-0.054	0.000	0.73	0.0	12.9	OK
1.003	8	92.648	0.001	0.000	0.82	0.0	32.6	SURCHARGED
4.000	9	93.041	-0.109	0.000	0.17	0.0	2.4	OK
4.001	10	92.977	-0.073	0.000	0.52	0.0	7.3	OK
4.002	11	92.787	-0.063	0.000	0.63	0.0	12.3	OK
1.004	12	92.493	0.079	0.000	1.43	0.0	46.8	SURCHARGED
1.005	13	92.225	-0.104	0.000	0.56	0.0	46.8	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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Summary of Results for 120 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.288	-0.112	0.000	0.14	0.0	2.2	OK
1.001	2	93.110	-0.082	0.000	0.43	0.0	6.0	OK
2.000	3	93.450	-0.100	0.000	0.24	0.0	3.8	OK
1.002	4	92.821	-0.053	0.000	0.75	0.0	11.8	OK
3.000	5	93.243	-0.057	0.000	0.38	0.0	2.0	OK
3.001	6	93.130	-0.087	0.000	0.37	0.0	5.1	OK
3.002	7	92.939	-0.077	0.000	0.48	0.0	8.4	OK
1.003	8	92.542	-0.105	0.000	0.55	0.0	22.1	OK
4.000	9	93.033	-0.117	0.000	0.11	0.0	1.6	OK
4.001	10	92.960	-0.090	0.000	0.34	0.0	4.7	OK
4.002	11	92.767	-0.083	0.000	0.41	0.0	8.0	OK
1.004	12	92.365	-0.048	0.000	0.98	0.0	31.8	OK
1.005	13	92.200	-0.129	0.000	0.38	0.0	31.8	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	30
Ratio R	0.296		

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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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.916	0.516	0.000	0.38	0.0	5.8	FLOOD RISK
1.001	2	93.892	0.700	0.000	0.89	0.0	12.6	SURCHARGED
2.000	3	93.702	0.152	0.000	0.75	0.0	11.7	SURCHARGED
1.002	4	93.632	0.758	0.000	1.59	0.0	24.8	SURCHARGED
3.000	5	93.684	0.384	0.000	0.98	0.0	5.0	SURCHARGED
3.001	6	93.624	0.407	0.000	0.87	0.0	12.0	SURCHARGED
3.002	7	93.487	0.471	0.000	1.07	0.0	18.9	SURCHARGED
1.003	8	93.062	0.415	0.000	1.20	0.0	47.8	SURCHARGED
4.000	9	93.309	0.159	0.000	0.29	0.0	4.3	SURCHARGED
4.001	10	93.295	0.245	0.000	0.84	0.0	11.6	SURCHARGED
4.002	11	93.158	0.308	0.000	1.00	0.0	19.5	SURCHARGED
1.004	12	92.723	0.310	0.000	2.18	0.0	71.1	SURCHARGED
1.005	13	92.264	-0.065	0.000	0.85	0.0	71.0	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	60
Ratio R	0.296		

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.505	0.105	0.000	0.31	0.0	4.8	SURCHARGED
1.001	2	93.483	0.291	0.000	0.77	0.0	10.9	SURCHARGED
2.000	3	93.478	-0.072	0.000	0.54	0.0	8.3	OK
1.002	4	93.291	0.417	0.000	1.38	0.0	21.7	SURCHARGED
3.000	5	93.296	-0.004	0.000	0.84	0.0	4.3	OK
3.001	6	93.252	0.036	0.000	0.78	0.0	10.8	SURCHARGED
3.002	7	93.155	0.138	0.000	0.90	0.0	15.9	SURCHARGED
1.003	8	92.856	0.209	0.000	1.03	0.0	41.0	SURCHARGED
4.000	9	93.049	-0.101	0.000	0.24	0.0	3.5	OK
4.001	10	93.002	-0.048	0.000	0.75	0.0	10.3	OK
4.002	11	92.908	0.058	0.000	0.83	0.0	16.2	SURCHARGED
1.004	12	92.609	0.195	0.000	1.85	0.0	60.3	SURCHARGED
1.005	13	92.246	-0.082	0.000	0.73	0.0	60.3	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.296	-0.104	0.000	0.21	0.0	3.2	OK
1.001	2	93.127	-0.065	0.000	0.61	0.0	8.6	OK
2.000	3	93.461	-0.089	0.000	0.35	0.0	5.4	OK
1.002	4	92.893	0.019	0.000	1.06	0.0	16.5	SURCHARGED
3.000	5	93.253	-0.047	0.000	0.55	0.0	2.8	OK
3.001	6	93.144	-0.073	0.000	0.52	0.0	7.3	OK
3.002	7	92.957	-0.059	0.000	0.68	0.0	11.9	OK
1.003	8	92.617	-0.030	0.000	0.78	0.0	31.0	OK
4.000	9	93.039	-0.111	0.000	0.15	0.0	2.2	OK
4.001	10	92.974	-0.076	0.000	0.48	0.0	6.7	OK
4.002	11	92.783	-0.067	0.000	0.59	0.0	11.4	OK
1.004	12	92.476	0.063	0.000	1.37	0.0	44.6	SURCHARGED
1.005	13	92.221	-0.108	0.000	0.54	0.0	44.6	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	240
Ratio R	0.296		

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.285	-0.115	0.000	0.13	0.0	2.0	OK
1.001	2	93.106	-0.086	0.000	0.38	0.0	5.3	OK
2.000	3	93.447	-0.103	0.000	0.21	0.0	3.3	OK
1.002	4	92.813	-0.061	0.000	0.66	0.0	10.3	OK
3.000	5	93.240	-0.060	0.000	0.34	0.0	1.7	OK
3.001	6	93.125	-0.092	0.000	0.32	0.0	4.5	OK
3.002	7	92.934	-0.083	0.000	0.42	0.0	7.4	OK
1.003	8	92.533	-0.114	0.000	0.49	0.0	19.4	OK
4.000	9	93.031	-0.119	0.000	0.09	0.0	1.4	OK
4.001	10	92.956	-0.094	0.000	0.30	0.0	4.1	OK
4.002	11	92.762	-0.088	0.000	0.36	0.0	7.0	OK
1.004	12	92.350	-0.064	0.000	0.86	0.0	28.0	OK
1.005	13	92.194	-0.135	0.000	0.34	0.0	28.0	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	480
Ratio R	0.296		

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Summary of Results for 480 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.277	-0.123	0.000	0.08	0.0	1.2	OK
1.001	2	93.090	-0.102	0.000	0.23	0.0	3.2	OK
2.000	3	93.436	-0.114	0.000	0.13	0.0	2.0	OK
1.002	4	92.790	-0.084	0.000	0.40	0.0	6.3	OK
3.000	5	93.231	-0.069	0.000	0.20	0.0	1.0	OK
3.001	6	93.112	-0.105	0.000	0.20	0.0	2.7	OK
3.002	7	92.918	-0.099	0.000	0.25	0.0	4.5	OK
1.003	8	92.505	-0.142	0.000	0.30	0.0	11.8	OK
4.000	9	93.023	-0.127	0.000	0.06	0.0	0.8	OK
4.001	10	92.943	-0.107	0.000	0.18	0.0	2.5	OK
4.002	11	92.747	-0.103	0.000	0.22	0.0	4.3	OK
1.004	12	92.304	-0.110	0.000	0.52	0.0	17.0	OK
1.005	13	92.172	-0.156	0.000	0.21	0.0	17.0	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.127	4-8	0.117

Total Area Contributing (ha) = 0.244

Total Pipe Volume (m^3) = 8.475

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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	25.000	0.208	120.2	0.017	4.00	0.0	0.600	o	150
1.001	47.700	0.318	150.0	0.029	0.00	0.0	0.600	o	150
2.000	30.200	0.252	119.8	0.029	4.00	0.0	0.600	o	150
1.002	26.500	0.227	116.7	0.015	0.00	0.0	0.600	o	150
3.000	10.000	0.083	120.0	0.015	4.00	0.0	0.600	o	100
3.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
3.002	35.000	0.370	94.7	0.025	0.00	0.0	0.600	o	150
1.003	35.000	0.233	150.0	0.015	0.00	0.0	0.600	o	225
4.000	12.000	0.100	120.0	0.012	4.00	0.0	0.600	o	150
4.001	30.000	0.200	150.0	0.024	0.00	0.0	0.600	o	150
4.002	34.000	0.436	77.9	0.025	0.00	0.0	0.600	o	150
1.004	17.000	0.085	200.0	0.014	0.00	0.0	0.600	o	225
1.005	39.000	1.100	35.5	0.000	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.46	93.250	0.017	0.0	0.0	0.0	0.92	16.2	2.3
1.001	50.00	5.43	93.042	0.046	0.0	0.0	0.0	0.82	14.5	6.2
2.000	50.00	4.55	93.400	0.029	0.0	0.0	0.0	0.92	16.2	3.9
1.002	50.00	5.90	92.724	0.090	0.0	0.0	0.0	0.93	16.4	12.2
3.000	50.00	4.24	93.200	0.015	0.0	0.0	0.0	0.70	5.5	2.0
3.001	50.00	4.85	93.067	0.039	0.0	0.0	0.0	0.82	14.5	5.3
3.002	50.00	5.41	92.867	0.064	0.0	0.0	0.0	1.03	18.3	8.7
1.003	50.00	6.45	92.422	0.169	0.0	0.0	0.0	1.07	42.4	22.9
4.000	50.00	4.22	93.000	0.012	0.0	0.0	0.0	0.92	16.2	1.6
4.001	50.00	4.83	92.900	0.036	0.0	0.0	0.0	0.82	14.5	4.9
4.002	50.00	5.33	92.700	0.061	0.0	0.0	0.0	1.14	20.1	8.3
1.004	50.00	6.76	92.189	0.244	0.0	0.0	0.0	0.92	36.6	33.0
1.005	50.00	7.05	92.104	0.244	0.0	0.0	0.0	2.20	87.6	33.0

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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	Lake	92.000	91.004	90.800	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	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)	19.000	Storm Duration (mins)	720
Ratio R	0.296		

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Summary of Results for 720 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	93.273	-0.127	0.000	0.06	0.0	0.9	OK
1.001	2	93.083	-0.109	0.000	0.17	0.0	2.4	OK
2.000	3	93.431	-0.119	0.000	0.10	0.0	1.5	OK
1.002	4	92.780	-0.094	0.000	0.30	0.0	4.7	OK
3.000	5	93.226	-0.074	0.000	0.15	0.0	0.8	OK
3.001	6	93.105	-0.112	0.000	0.15	0.0	2.0	OK
3.002	7	92.910	-0.106	0.000	0.19	0.0	3.3	OK
1.003	8	92.493	-0.154	0.000	0.22	0.0	8.8	OK
4.000	9	93.020	-0.130	0.000	0.04	0.0	0.6	OK
4.001	10	92.936	-0.114	0.000	0.13	0.0	1.9	OK
4.002	11	92.740	-0.110	0.000	0.16	0.0	3.2	OK
1.004	12	92.286	-0.128	0.000	0.39	0.0	12.7	OK
1.005	13	92.162	-0.167	0.000	0.15	0.0	12.7	OK

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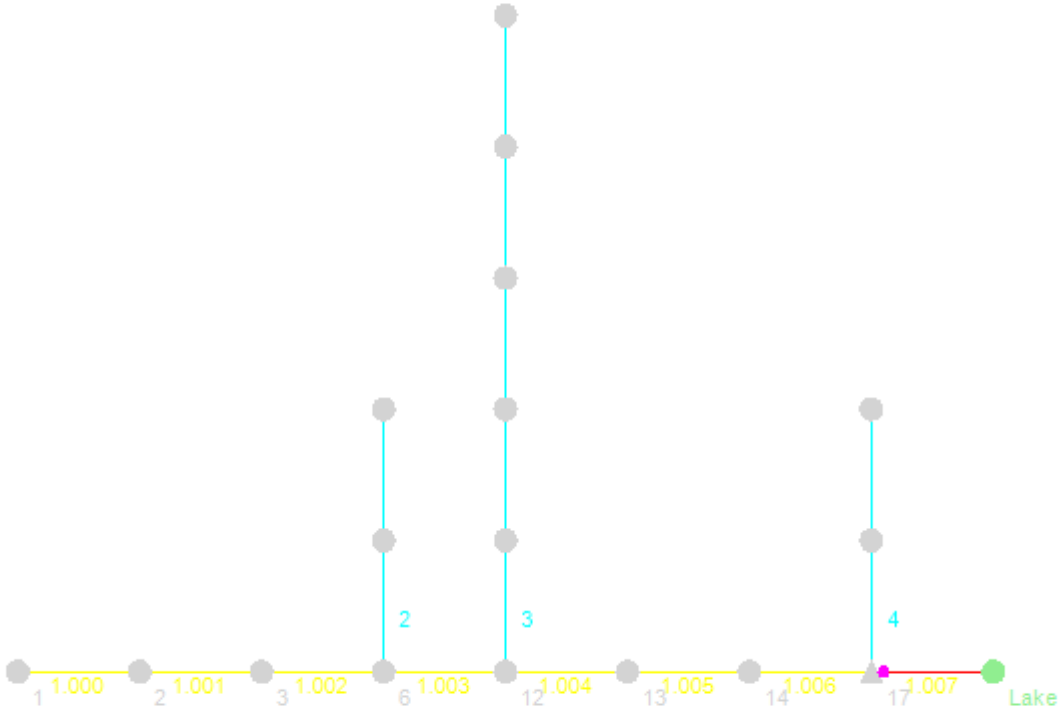
Hamilton Technical Services		Page 1
1 Chiltern Ave Euxton Chorley PR7 6NU	Pendle View Fisheries Zone 2 Drainage Schematic Layout	
Date 09.12.2015 File ZONE 2 PROPOSED.MDX	Designed by Geoff Hamilton Checked by	
Micro Drainage	Network 2014.1	



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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes PLOTS

FSR Rainfall Model - England and Wales

Return Period (years)	3	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.296	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.118	4-8	0.051

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 3.424

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	25.000	0.250	100.0	0.015	4.00	0.0	0.600	o	100
1.001	32.000	0.320	100.0	0.010	0.00	0.0	0.600	o	100
1.002	15.000	0.150	100.0	0.000	0.00	0.0	0.600	o	100
2.000	19.000	0.190	100.0	0.006	4.00	0.0	0.600	o	100
2.001	12.000	0.120	100.0	0.005	0.00	0.0	0.600	o	100

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.54	95.300	0.015	0.0	0.0	0.0	0.77	6.0	2.0
1.001	50.00	5.24	95.050	0.025	0.0	0.0	0.0	0.77	6.0	3.4
1.002	50.00	5.56	94.730	0.025	0.0	0.0	0.0	0.77	6.0	3.4
2.000	50.00	4.41	95.100	0.006	0.0	0.0	0.0	0.77	6.0	0.8
2.001	50.00	4.67	94.910	0.011	0.0	0.0	0.0	0.77	6.0	1.5

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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)
1.003	27.000	0.270	100.0	0.004	0.00	0.0	0.600	o	100
3.000	13.000	0.130	100.0	0.005	4.00	0.0	0.600	o	100
3.001	6.000	0.060	100.0	0.003	0.00	0.0	0.600	o	100
3.002	6.000	0.060	100.0	0.007	0.00	0.0	0.600	o	100
3.003	7.000	0.070	100.0	0.004	0.00	0.0	0.600	o	100
3.004	10.000	0.100	100.0	0.002	0.00	0.0	0.600	o	100
1.004	16.500	0.165	100.0	0.003	0.00	0.0	0.600	o	150
1.005	32.600	0.408	79.9	0.003	0.00	0.0	0.600	o	150
1.006	13.000	0.163	80.0	0.002	0.00	0.0	0.600	o	150
4.000	20.000	0.200	100.0	0.100	4.00	0.0	0.600	o	150
4.001	4.500	0.075	60.0	0.000	0.00	0.0	0.600	o	150
1.007	30.700	3.300	9.3	0.000	0.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	6.15	94.580	0.040	0.0	0.0	0.0	0.77	6.0	5.4
3.000	50.00	4.28	95.000	0.005	0.0	0.0	0.0	0.77	6.0	0.7
3.001	50.00	4.41	94.870	0.008	0.0	0.0	0.0	0.77	6.0	1.1
3.002	50.00	4.54	94.810	0.015	0.0	0.0	0.0	0.77	6.0	2.0
3.003	50.00	4.69	94.750	0.019	0.0	0.0	0.0	0.77	6.0	2.6
3.004	50.00	4.91	94.680	0.021	0.0	0.0	0.0	0.77	6.0	2.8
1.004	50.00	6.42	94.260	0.064	0.0	0.0	0.0	1.00	17.8	8.7
1.005	50.00	6.90	94.095	0.067	0.0	0.0	0.0	1.13	19.9	9.1
1.006	50.00	7.10	93.687	0.069	0.0	0.0	0.0	1.12	19.9	9.3
4.000	50.00	4.33	94.000	0.100	0.0	0.0	0.0	1.00	17.8	13.5
4.001	50.00	4.39	93.800	0.100	0.0	0.0	0.0	1.30	23.0	13.5
1.007	50.00	7.25	93.525	0.169	0.0	0.0	0.0	3.32	58.7	22.9

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)
1.007	Lake	92.000	90.225	90.200	10000	0

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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Summary of Results for 30 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.353	-0.047	0.000	0.54	0.0	3.1	OK
1.001	2	95.124	-0.026	0.000	0.88	0.0	5.2	OK
1.002	3	94.893	0.063	0.000	0.80	0.0	4.6	SURCHARGED
2.000	4	95.132	-0.068	0.000	0.22	0.0	1.3	OK
2.001	5	94.954	-0.056	0.000	0.41	0.0	2.3	OK
1.003	6	94.798	0.118	0.000	1.20	0.0	7.1	SURCHARGED
3.000	7	95.029	-0.071	0.000	0.18	0.0	1.0	OK
3.001	8	94.908	-0.062	0.000	0.31	0.0	1.7	OK
3.002	9	94.865	-0.045	0.000	0.58	0.0	3.2	OK
3.003	10	94.814	-0.036	0.000	0.73	0.0	4.0	OK
3.004	11	94.747	-0.033	0.000	0.78	0.0	4.4	OK
1.004	12	94.354	-0.056	0.000	0.71	0.0	11.7	OK
1.005	13	94.182	-0.063	0.000	0.64	0.0	12.2	OK
1.006	14	93.779	-0.058	0.000	0.69	0.0	12.5	OK
4.000	15	94.252	0.102	0.000	1.18	0.0	19.8	SURCHARGED
4.001	16	93.967	0.017	0.000	1.15	0.0	19.8	SURCHARGED
1.007	17	93.635	-0.040	0.000	0.07	0.0	11.3	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	60
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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Summary of Results for 60 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.342	-0.058	0.000	0.37	0.0	2.2	OK
1.001	2	95.107	-0.043	0.000	0.61	0.0	3.6	OK
1.002	3	94.787	-0.043	0.000	0.62	0.0	3.6	OK
2.000	4	95.126	-0.074	0.000	0.15	0.0	0.9	OK
2.001	5	94.946	-0.064	0.000	0.28	0.0	1.6	OK
1.003	6	94.659	-0.021	0.000	0.97	0.0	5.7	OK
3.000	7	95.024	-0.076	0.000	0.13	0.0	0.7	OK
3.001	8	94.901	-0.069	0.000	0.21	0.0	1.2	OK
3.002	9	94.854	-0.056	0.000	0.40	0.0	2.2	OK
3.003	10	94.800	-0.050	0.000	0.50	0.0	2.7	OK
3.004	11	94.732	-0.048	0.000	0.54	0.0	3.0	OK
1.004	12	94.340	-0.070	0.000	0.55	0.0	9.1	OK
1.005	13	94.170	-0.075	0.000	0.50	0.0	9.5	OK
1.006	14	93.766	-0.071	0.000	0.54	0.0	9.8	OK
4.000	15	94.108	-0.042	0.000	0.86	0.0	14.4	OK
4.001	16	93.906	-0.044	0.000	0.84	0.0	14.5	OK
1.007	17	93.642	-0.032	0.000	0.07	0.0	11.4	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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Summary of Results for 120 minute 10 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.333	-0.067	0.000	0.24	0.0	1.4	OK
1.001	2	95.094	-0.056	0.000	0.40	0.0	2.3	OK
1.002	3	94.774	-0.056	0.000	0.41	0.0	2.3	OK
2.000	4	95.121	-0.079	0.000	0.10	0.0	0.6	OK
2.001	5	94.939	-0.071	0.000	0.18	0.0	1.0	OK
1.003	6	94.638	-0.042	0.000	0.64	0.0	3.7	OK
3.000	7	95.019	-0.081	0.000	0.08	0.0	0.5	OK
3.001	8	94.895	-0.075	0.000	0.14	0.0	0.7	OK
3.002	9	94.844	-0.066	0.000	0.26	0.0	1.4	OK
3.003	10	94.789	-0.061	0.000	0.32	0.0	1.8	OK
3.004	11	94.721	-0.059	0.000	0.35	0.0	2.0	OK
1.004	12	94.322	-0.088	0.000	0.36	0.0	6.0	OK
1.005	13	94.154	-0.091	0.000	0.33	0.0	6.2	OK
1.006	14	93.749	-0.088	0.000	0.35	0.0	6.4	OK
4.000	15	94.080	-0.070	0.000	0.56	0.0	9.4	OK
4.001	16	93.879	-0.071	0.000	0.55	0.0	9.4	OK
1.007	17	93.620	-0.055	0.000	0.07	0.0	11.2	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	30
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.398	-0.002	0.000	0.74	0.0	4.3	OK
1.001	2	95.318	0.168	0.000	0.95	0.0	5.6	SURCHARGED
1.002	3	95.062	0.232	0.000	0.96	0.0	5.5	SURCHARGED
2.000	4	95.138	-0.062	0.000	0.30	0.0	1.8	OK
2.001	5	94.964	-0.046	0.000	0.57	0.0	3.2	OK
1.003	6	94.937	0.257	0.000	1.40	0.0	8.2	SURCHARGED
3.000	7	95.034	-0.066	0.000	0.26	0.0	1.5	OK
3.001	8	94.916	-0.054	0.000	0.43	0.0	2.3	OK
3.002	9	94.884	-0.026	0.000	0.80	0.0	4.3	OK
3.003	10	94.847	-0.003	0.000	0.97	0.0	5.3	OK
3.004	11	94.782	0.002	0.000	1.03	0.0	5.8	SURCHARGED
1.004	12	94.369	-0.041	0.000	0.88	0.0	14.5	OK
1.005	13	94.197	-0.048	0.000	0.79	0.0	15.2	OK
1.006	14	93.795	-0.042	0.000	0.86	0.0	15.6	OK
4.000	15	94.546	0.396	0.000	1.58	0.0	26.4	SURCHARGED
4.001	16	94.045	0.095	0.000	1.53	0.0	26.3	SURCHARGED
1.007	17	93.717	0.043	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	60
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.351	-0.049	0.000	0.52	0.0	3.0	OK
1.001	2	95.121	-0.029	0.000	0.85	0.0	5.0	OK
1.002	3	94.916	0.086	0.000	0.80	0.0	4.6	SURCHARGED
2.000	4	95.131	-0.069	0.000	0.21	0.0	1.2	OK
2.001	5	94.953	-0.057	0.000	0.39	0.0	2.2	OK
1.003	6	94.819	0.139	0.000	1.24	0.0	7.3	SURCHARGED
3.000	7	95.028	-0.072	0.000	0.18	0.0	1.0	OK
3.001	8	94.907	-0.063	0.000	0.30	0.0	1.6	OK
3.002	9	94.864	-0.046	0.000	0.56	0.0	3.0	OK
3.003	10	94.812	-0.038	0.000	0.70	0.0	3.8	OK
3.004	11	94.745	-0.035	0.000	0.75	0.0	4.2	OK
1.004	12	94.354	-0.056	0.000	0.72	0.0	11.8	OK
1.005	13	94.183	-0.062	0.000	0.65	0.0	12.4	OK
1.006	14	93.780	-0.057	0.000	0.70	0.0	12.7	OK
4.000	15	94.242	0.092	0.000	1.17	0.0	19.6	SURCHARGED
4.001	16	93.965	0.015	0.000	1.14	0.0	19.6	SURCHARGED
1.007	17	93.741	0.066	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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	20.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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Summary of Results for 120 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.340	-0.060	0.000	0.34	0.0	2.0	OK
1.001	2	95.103	-0.047	0.000	0.55	0.0	3.3	OK
1.002	3	94.784	-0.046	0.000	0.57	0.0	3.3	OK
2.000	4	95.124	-0.076	0.000	0.14	0.0	0.8	OK
2.001	5	94.944	-0.066	0.000	0.25	0.0	1.4	OK
1.003	6	94.653	-0.027	0.000	0.89	0.0	5.2	OK
3.000	7	95.022	-0.078	0.000	0.11	0.0	0.7	OK
3.001	8	94.900	-0.070	0.000	0.19	0.0	1.0	OK
3.002	9	94.852	-0.058	0.000	0.36	0.0	2.0	OK
3.003	10	94.797	-0.053	0.000	0.45	0.0	2.5	OK
3.004	11	94.729	-0.051	0.000	0.49	0.0	2.7	OK
1.004	12	94.336	-0.074	0.000	0.51	0.0	8.4	OK
1.005	13	94.166	-0.079	0.000	0.46	0.0	8.7	OK
1.006	14	93.762	-0.075	0.000	0.50	0.0	9.0	OK
4.000	15	94.101	-0.049	0.000	0.78	0.0	13.1	OK
4.001	16	93.899	-0.051	0.000	0.76	0.0	13.1	OK
1.007	17	93.712	0.038	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	30
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.773	0.373	0.000	0.79	0.0	4.7	SURCHARGED
1.001	2	95.666	0.516	0.000	1.10	0.0	6.5	SURCHARGED
1.002	3	95.306	0.476	0.000	1.09	0.0	6.3	SURCHARGED
2.000	4	95.168	-0.032	0.000	0.43	0.0	2.5	OK
2.001	5	95.153	0.143	0.000	0.70	0.0	4.0	SURCHARGED
1.003	6	95.129	0.449	0.000	1.62	0.0	9.5	SURCHARGED
3.000	7	95.042	-0.058	0.000	0.36	0.0	2.1	OK
3.001	8	95.020	0.050	0.000	0.53	0.0	2.8	SURCHARGED
3.002	9	95.002	0.092	0.000	0.97	0.0	5.2	SURCHARGED
3.003	10	94.945	0.095	0.000	1.20	0.0	6.6	SURCHARGED
3.004	11	94.842	0.062	0.000	1.29	0.0	7.3	SURCHARGED
1.004	12	94.421	0.011	0.000	1.05	0.0	17.4	SURCHARGED
1.005	13	94.231	-0.014	0.000	0.94	0.0	18.0	OK
1.006	14	93.934	0.097	0.000	0.99	0.0	17.9	SURCHARGED
4.000	15	95.000	0.850	0.477	2.04	0.0	34.1	FLOOD
4.001	16	94.166	0.216	0.000	1.99	0.0	34.1	SURCHARGED
1.007	17	93.845	0.171	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	60
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.504	0.104	0.000	0.69	0.0	4.0	SURCHARGED
1.001	2	95.421	0.271	0.000	0.96	0.0	5.7	SURCHARGED
1.002	3	95.139	0.309	0.000	0.97	0.0	5.6	SURCHARGED
2.000	4	95.137	-0.063	0.000	0.30	0.0	1.7	OK
2.001	5	95.022	0.012	0.000	0.55	0.0	3.1	SURCHARGED
1.003	6	95.001	0.321	0.000	1.48	0.0	8.7	SURCHARGED
3.000	7	95.034	-0.066	0.000	0.25	0.0	1.4	OK
3.001	8	94.916	-0.054	0.000	0.43	0.0	2.3	OK
3.002	9	94.884	-0.026	0.000	0.80	0.0	4.3	OK
3.003	10	94.848	-0.002	0.000	0.97	0.0	5.3	OK
3.004	11	94.783	0.003	0.000	1.04	0.0	5.8	SURCHARGED
1.004	12	94.372	-0.038	0.000	0.91	0.0	15.1	OK
1.005	13	94.200	-0.045	0.000	0.83	0.0	15.8	OK
1.006	14	93.950	0.113	0.000	0.86	0.0	15.6	SURCHARGED
4.000	15	94.594	0.444	0.000	1.63	0.0	27.3	SURCHARGED
4.001	16	94.057	0.107	0.000	1.59	0.0	27.3	SURCHARGED
1.007	17	93.905	0.231	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	120
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.349	-0.051	0.000	0.48	0.0	2.8	OK
1.001	2	95.117	-0.033	0.000	0.79	0.0	4.7	OK
1.002	3	94.889	0.059	0.000	0.78	0.0	4.5	SURCHARGED
2.000	4	95.130	-0.070	0.000	0.19	0.0	1.1	OK
2.001	5	94.951	-0.059	0.000	0.36	0.0	2.1	OK
1.003	6	94.799	0.119	0.000	1.21	0.0	7.1	SURCHARGED
3.000	7	95.027	-0.073	0.000	0.16	0.0	0.9	OK
3.001	8	94.906	-0.064	0.000	0.28	0.0	1.5	OK
3.002	9	94.861	-0.049	0.000	0.52	0.0	2.8	OK
3.003	10	94.809	-0.041	0.000	0.65	0.0	3.5	OK
3.004	11	94.742	-0.038	0.000	0.70	0.0	3.9	OK
1.004	12	94.352	-0.058	0.000	0.69	0.0	11.4	OK
1.005	13	94.181	-0.064	0.000	0.62	0.0	12.0	OK
1.006	14	93.915	0.078	0.000	0.65	0.0	11.9	SURCHARGED
4.000	15	94.197	0.047	0.000	1.10	0.0	18.4	SURCHARGED
4.001	16	93.954	0.004	0.000	1.07	0.0	18.4	SURCHARGED
1.007	17	93.893	0.219	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	240
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.337	-0.063	0.000	0.29	0.0	1.7	OK
1.001	2	95.099	-0.051	0.000	0.49	0.0	2.9	OK
1.002	3	94.780	-0.050	0.000	0.50	0.0	2.9	OK
2.000	4	95.123	-0.077	0.000	0.12	0.0	0.7	OK
2.001	5	94.942	-0.068	0.000	0.22	0.0	1.3	OK
1.003	6	94.647	-0.033	0.000	0.78	0.0	4.6	OK
3.000	7	95.021	-0.079	0.000	0.10	0.0	0.6	OK
3.001	8	94.898	-0.072	0.000	0.17	0.0	0.9	OK
3.002	9	94.849	-0.061	0.000	0.32	0.0	1.7	OK
3.003	10	94.794	-0.056	0.000	0.40	0.0	2.2	OK
3.004	11	94.726	-0.054	0.000	0.43	0.0	2.4	OK
1.004	12	94.330	-0.080	0.000	0.45	0.0	7.4	OK
1.005	13	94.161	-0.084	0.000	0.40	0.0	7.7	OK
1.006	14	93.791	-0.046	0.000	0.44	0.0	7.9	OK
4.000	15	94.092	-0.058	0.000	0.69	0.0	11.5	OK
4.001	16	93.890	-0.060	0.000	0.67	0.0	11.5	OK
1.007	17	93.771	0.096	0.000	0.07	0.0	11.8	SURCHARGED

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	480
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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Summary of Results for 480 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.328	-0.072	0.000	0.18	0.0	1.0	OK
1.001	2	95.087	-0.063	0.000	0.30	0.0	1.7	OK
1.002	3	94.768	-0.062	0.000	0.30	0.0	1.7	OK
2.000	4	95.118	-0.082	0.000	0.07	0.0	0.4	OK
2.001	5	94.934	-0.076	0.000	0.14	0.0	0.8	OK
1.003	6	94.628	-0.052	0.000	0.48	0.0	2.8	OK
3.000	7	95.016	-0.084	0.000	0.06	0.0	0.3	OK
3.001	8	94.891	-0.079	0.000	0.10	0.0	0.6	OK
3.002	9	94.840	-0.070	0.000	0.19	0.0	1.0	OK
3.003	10	94.783	-0.067	0.000	0.24	0.0	1.3	OK
3.004	11	94.715	-0.065	0.000	0.26	0.0	1.5	OK
1.004	12	94.313	-0.097	0.000	0.27	0.0	4.5	OK
1.005	13	94.145	-0.100	0.000	0.24	0.0	4.7	OK
1.006	14	93.739	-0.098	0.000	0.27	0.0	4.8	OK
4.000	15	94.067	-0.083	0.000	0.42	0.0	7.0	OK
4.001	16	93.866	-0.084	0.000	0.41	0.0	7.0	OK
1.007	17	93.618	-0.057	0.000	0.07	0.0	11.0	OK

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.120	4-8	0.049

Total Area Contributing (ha) = 0.169

Total Pipe Volume (m³) = 4.102

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)
1.007	Lake	92.000	90.150	90.200	10000	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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	2880
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	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)	19.000	Storm Duration (mins)	720
Ratio R	0.296		

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Online Controls for Storm

Hydro-Brake Optimum® Manhole: 17, DS/PN: 1.007, Volume (m³): 1.2

Unit Reference	MD-SHE-0158-1200-1000-1200
Design Head (m)	1.000
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	158
Invert Level (m)	93.450
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	11.9
Flush-Flo™	0.309	11.8
Kick-Flo®	0.684	9.9
Mean Flow over Head Range	-	10.1

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	5.7	1.200	12.9	3.000	20.0	7.000	30.1
0.200	11.5	1.400	13.9	3.500	21.5	7.500	31.1
0.300	11.8	1.600	14.8	4.000	23.0	8.000	32.1
0.400	11.7	1.800	15.7	4.500	24.3	8.500	33.0
0.500	11.5	2.000	16.5	5.000	25.6	9.000	34.0
0.600	11.0	2.200	17.3	5.500	26.8	9.500	34.9
0.800	10.7	2.400	18.0	6.000	27.9		
1.000	11.9	2.600	18.7	6.500	29.0		

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Storage Structures for Storm

Cellular Storage Manhole: 17, DS/PN: 1.007

Invert Level (m) 93.450 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0
0.400	100.0	0.0			

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Summary of Results for 720 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 Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	95.324	-0.076	0.000	0.13	0.0	0.8	OK
1.001	2	95.082	-0.068	0.000	0.22	0.0	1.3	OK
1.002	3	94.762	-0.068	0.000	0.23	0.0	1.3	OK
2.000	4	95.115	-0.085	0.000	0.05	0.0	0.3	OK
2.001	5	94.931	-0.079	0.000	0.10	0.0	0.6	OK
1.003	6	94.621	-0.059	0.000	0.35	0.0	2.1	OK
3.000	7	95.014	-0.086	0.000	0.05	0.0	0.3	OK
3.001	8	94.888	-0.082	0.000	0.08	0.0	0.4	OK
3.002	9	94.835	-0.075	0.000	0.14	0.0	0.8	OK
3.003	10	94.778	-0.072	0.000	0.18	0.0	1.0	OK
3.004	11	94.710	-0.070	0.000	0.19	0.0	1.1	OK
1.004	12	94.305	-0.105	0.000	0.20	0.0	3.3	OK
1.005	13	94.138	-0.107	0.000	0.18	0.0	3.5	OK
1.006	14	93.732	-0.105	0.000	0.20	0.0	3.6	OK
4.000	15	94.057	-0.093	0.000	0.31	0.0	5.2	OK
4.001	16	93.856	-0.094	0.000	0.30	0.0	5.2	OK
1.007	17	93.582	-0.092	0.000	0.05	0.0	8.5	OK

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Summary of Results for 30 year Return Period (+30%)

Half Drain Time : 424 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	90.432	0.432	0.5	12.3	O K
30 min Summer	90.592	0.592	0.6	16.8	O K
60 min Summer	90.766	0.766	0.7	21.8	O K
120 min Summer	90.937	0.937	0.7	26.7	O K
180 min Summer	91.019	1.019	0.8	29.0	O K
240 min Summer	91.061	1.061	0.8	30.2	O K
360 min Summer	91.101	1.100	0.8	31.4	O K
480 min Summer	91.120	1.119	0.8	31.9	O K
600 min Summer	91.128	1.127	0.8	32.1	O K
720 min Summer	91.129	1.128	0.8	32.2	O K
960 min Summer	91.117	1.116	0.8	31.8	O K
1440 min Summer	91.073	1.073	0.8	30.6	O K
2160 min Summer	90.997	0.997	0.8	28.4	O K
2880 min Summer	90.922	0.922	0.7	26.3	O K
4320 min Summer	90.785	0.785	0.7	22.4	O K
5760 min Summer	90.670	0.670	0.6	19.1	O K
7200 min Summer	90.573	0.573	0.6	16.3	O K
8640 min Summer	90.490	0.490	0.6	14.0	O K
10080 min Summer	90.419	0.419	0.5	11.9	O K
15 min Winter	90.486	0.486	0.6	13.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	82.322	0.0	29
30 min Summer	56.909	0.0	43
60 min Summer	37.803	0.0	72
120 min Summer	24.355	0.0	128
180 min Summer	18.571	0.0	184
240 min Summer	15.244	0.0	242
360 min Summer	11.539	0.0	316
480 min Summer	9.455	0.0	380
600 min Summer	8.094	0.0	444
720 min Summer	7.126	0.0	512
960 min Summer	5.822	0.0	654
1440 min Summer	4.371	0.0	930
2160 min Summer	3.275	0.0	1344
2880 min Summer	2.666	0.0	1740
4320 min Summer	1.995	0.0	2516
5760 min Summer	1.625	0.0	3288
7200 min Summer	1.387	0.0	4032
8640 min Summer	1.218	0.0	4760
10080 min Summer	1.092	0.0	5456
15 min Winter	82.322	0.0	29

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Summary of Results for 30 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	90.666	0.666	0.6	19.0	O K
60 min Winter	90.864	0.864	0.7	24.6	O K
120 min Winter	91.063	1.063	0.8	30.3	O K
180 min Winter	91.161	1.160	0.8	33.1	O K
240 min Winter	91.216	1.215	0.8	34.6	O K
360 min Winter	91.271	1.270	0.8	36.2	O K
480 min Winter	91.288	1.287	0.8	36.7	O K
600 min Winter	91.298	1.297	0.8	37.0	O K
720 min Winter	91.296	1.295	0.8	36.9	O K
960 min Winter	91.272	1.271	0.8	36.2	O K
1440 min Winter	91.190	1.189	0.8	33.9	O K
2160 min Winter	91.066	1.066	0.8	30.4	O K
2880 min Winter	90.948	0.948	0.7	27.0	O K
4320 min Winter	90.749	0.749	0.7	21.3	O K
5760 min Winter	90.591	0.591	0.6	16.8	O K
7200 min Winter	90.464	0.464	0.5	13.2	O K
8640 min Winter	90.361	0.361	0.5	10.3	O K
10080 min Winter	90.275	0.275	0.5	7.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	56.909	0.0	43
60 min Winter	37.803	0.0	70
120 min Winter	24.355	0.0	126
180 min Winter	18.571	0.0	182
240 min Winter	15.244	0.0	238
360 min Winter	11.539	0.0	346
480 min Winter	9.455	0.0	400
600 min Winter	8.094	0.0	474
720 min Winter	7.126	0.0	552
960 min Winter	5.822	0.0	706
1440 min Winter	4.371	0.0	1002
2160 min Winter	3.275	0.0	1436
2880 min Winter	2.666	0.0	1852
4320 min Winter	1.995	0.0	2648
5760 min Winter	1.625	0.0	3416
7200 min Winter	1.387	0.0	4184
8640 min Winter	1.218	0.0	4928
10080 min Winter	1.092	0.0	5656

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.900	Shortest Storm (mins)	15
Ratio R	0.278	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.021	4	8	0.021	8	12	0.021	12	16	0.021

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Model Details

Storage is Online Cover Level (m) 92.000

Cellular Storage Structure

Invert Level (m) 90.000 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.06479 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.06479

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	30.0	1.000	30.0	64.0
0.500	30.0	47.0	1.200	30.0	70.8

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.900	Shortest Storm (mins)	15
Ratio R	0.278	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.021	4	8	0.021	8	12	0.021	12	16	0.021

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Model Details

Storage is Online Cover Level (m) 92.000

Cellular Storage Structure

Invert Level (m) 90.000 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.06479 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.06479

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.0	30.0	1.000	30.0	64.0
0.500	30.0	47.0	1.200	30.0	70.8

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