

Land East of Hook Lane, Westergate

West Sussex

OWNERS MANUAL

Relating to Surface Water Drainage Maintenance

The site has been designed in accordance with Sustainable Drainage Systems (SUDS) techniques.

The SUDS Manual (CIRIA C697) states that “Sedimentation is one of the primary removal mechanisms in SUDS. Most pollution in runoff is attached to sediment particles and therefore removal of sediment results in a significant reduction in pollutant loads”.

In order to remove sedimentation the surface water drainage design utilises deep seal trapped gullies throughout, catchpit manholes upstream of the surface water storage/infiltration devices and distribution tanks within the permeable paved areas.

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1) Explanation of the Surface Water Drainage System

The Principle of SUDs has been adopted for the whole of the site, calculations have been carried out using MicroDrainage with a storm return period of 100 years and an allowance of 30% for climate change.

Generally roof water drains direct to the domestic drainage system within each curtilage and from there will be directed to the below ground surface water network

Hardstanding areas and access roads or drives, drain to trapped gullies. All of these systems outfall to the surface water drainage system within the site.

The parking bays within the site are proposed to be lined permeable paving systems to provide a level of pre-treatment of surface water prior to discharging to the below ground surface water network.

Plots 1-33 and 39-79

Attenuation of the surface water flows is proposed using below ground cellular storage tanks as well as a SuDS attenuation basin at the south eastern corner of the site.

The final discharge from the site will be passed via a petrol interceptor to provide the required level of treatment in accordance with the SuDS manual Ciria C753.

The run-off from the site will eventually discharge to the existing ordinary watercourse along the eastern boundary of the site via a surface water pumping station.

A 1m easement will be kept between the fences of plots 58-60, 66 and the edge of the existing ditch to allow a route for future maintenance. The fences along the edge of these plots will have removable panels to allow for major maintenance operations if required in the future.

Maintenance of the surface water pumping system and petrol interceptor will be in accordance with the manufacturer's recommendations.

Plots 34-38

Run –off from the roofs are conveyed directly into the new swales proposed at the north eastern boundary of the site with a final discharge proposed to the existing ditch north of the site.

2) Maintenance Schedule for permeable paving

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Brushing & vacuuming	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed.	As required.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required.
	Remedial work to any depression's, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure.	As required (if infiltration performance is reduced as a result of significant clogging).
Monitoring	Initial Inspection	Monthly for 3 months after installation.
	Inspect for evidence of poor operation and/or weed growth.	3-monthly, 48h after large storms.
	If required take remedial action.	
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

3) Maintenance Schedule for catchpits and gullies

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment and oil deposits from all trapped gullies.	Annually, or as required.
	Remove sediment structures upstream of the cellular storage tanks.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms

4) Maintenance Schedule Cellular storage

Maintenance Schedule	Required Action	Recommended Frequency
Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance)	Monthly

maintenance	Inspect catchpits and clear silt / debris as necessary	Monthly for 3 months, then six monthly.
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms

5) Maintenance Schedule for Detention basins

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal.	Monthly
	Grass cutting – for spillways and access routes.	Monthly (during growing season), or as required.
	Grass cutting – meadow grass in and around basin.	Half yearly (spring before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Tidy all dead growth before start of growing season.	Annually.
	Remove sediment from inlets, outlet and forebay.	Annually (or as required).
Occasional maintenance	Re-seed areas of poor vegetation growth.	Annually (or as required).
	Prune and trim trees and remove cuttings.	2 years (or as required).

Remedial actions	Repair of erosion or other damage by re-turfing or reseeding.	As required
	Re-level uneven surfaces and reinstate design levels.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly/ after large storms.
	Inspect banksides, structures, pipework etc. for evidence of physical damage.	Monthly/ after large storms.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
	Check flow control device and other mechanical devices.	Half yearly.

6) Maintenance Schedule for Filter trenches and porous pipework

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal from trench surface, access chambers and pre-treatment devices.	Monthly (or as required).
	Removal and washing of exposed stones on the trench surface.	Annual (bi-annual the first year) or when silt is evident on the surface.
	Trimming of any roots that may be causing blockages.	Annual (semi-annual the first year).
	Remove weeds on the trench surface.	Monthly (at start, then as required).
	Removal of sediment from pre-treatment devices.	Six monthly

Occasional maintenance	Remove tree roots or trees that grow close to the trench.	As required.
	At locations with high pollution loads, remove surface geotextile and replace, ad wash or replace filter media.	Five yearly.
Remedial actions	Clear perforated pipework of blockages.	As required.
	Rehabilitate infiltration or filtration surfaces.	As required.
	Replace geotextiles and clean and replace filter media, if clogging occurs.	As required.
	Inspect inlets, outlets and inspection points for blockages, clogging, standing water and structural damage.	As required.
Monitoring	Inspect pre-treatment systems, inlets, trench surfaces and perforated pipework for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

7) Maintenance Schedule Ditches and Swales

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal.	Monthly (or as required).
	Grass cutting – to retain grass height within specified design range. Close cut around outlet & structure. 100 – 150mm generally.	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10% or more of the swale treatment area.

Remedial actions	Repair erosion or other damage by re-turfing or reseeded.	As required
	Re-level uneven surfaces and reinstate design levels.	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required.
	Remove and dispose of oils or petrol residues using safe standard practices.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation. Record areas where water is ponding for >48 hours.	Monthly, or when required.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

8) Reasons for Maintenance

Surface water contains variable amounts of sediment which settles out at certain locations and could cause blockages if left.

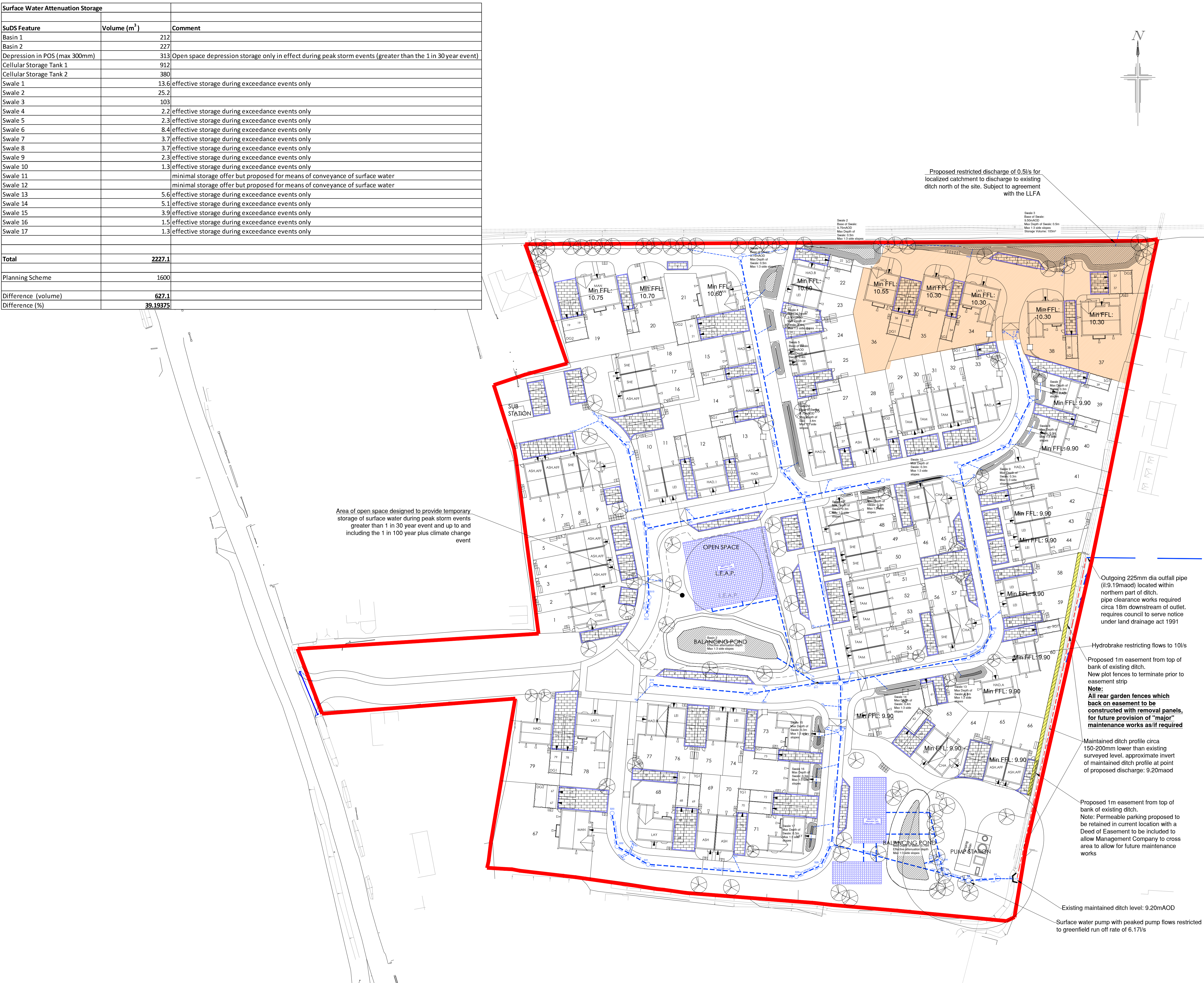
Road gullies also trap oil and prevent it entering the surface water sewer system.

APPENDIX (1)

DRAINAGE LAYOUTS

DWG Nos.BSO/E4462/031D

Surface Water Attenuation Storage		
SuDS Feature	Volume (m ³)	Comment
Basin 1	212	
Basin 2	227	
Depression in POS (max 300mm)	313	Open space depression storage only in effect during peak storm events (greater than the 1 in 30 year event)
Cellular Storage Tank 1	912	
Cellular Storage Tank 2	380	
Swale 1	13.6	effective storage during exceedance events only
Swale 2	25.2	
Swale 3	103	
Swale 4	2.2	effective storage during exceedance events only
Swale 5	2.3	effective storage during exceedance events only
Swale 6	8.4	effective storage during exceedance events only
Swale 7	3.7	effective storage during exceedance events only
Swale 8	3.7	effective storage during exceedance events only
Swale 9	2.3	effective storage during exceedance events only
Swale 10	1.3	effective storage during exceedance events only
Swale 11		minimal storage offer but proposed for means of conveyance of surface water
Swale 12		minimal storage offer but proposed for means of conveyance of surface water
Swale 13	5.6	effective storage during exceedance events only
Swale 14	5.1	effective storage during exceedance events only
Swale 15	3.9	effective storage during exceedance events only
Swale 16	1.5	effective storage during exceedance events only
Swale 17	1.3	effective storage during exceedance events only
Total	2227.1	
Planning Scheme	1600	
Difference (volume)	627.1	
Difference (%)	39.19375	



NOTES

- Min FFL: 10.30
- Proposed minimum finished floor level to accommodate surface water drainage design
- Localised catchment area draining under gravity to ditch to the north of the site
- Proposed surface water sewers and manholes
- Proposed SuDS swales and basins
- Proposed cellular crate storage tanks
- SuDS permeable paving
- Flow path within maintained ditch
- Maintained ditch (circa 150mm-200mm lower than surveyed levels)
- 1m easement for drainage ditch - To allow access for maintenance by Management Company

Rev.	Date	Details	By	Chkd	Appd
D	13.03.17	Drawing retitled	SLW	TS	TS
C	09.03.17	Site Layout updated to 160104. SL rev V	SLW	TS	TS
B	06.03.17	1m easement to drainage ditch added	TS	TS	TS
A	20.01.17	OUTFALL AND EASTERN DITCH UPDATED	SLW	TS	TS

Client:-

BARRATT HOMES

Site:-
**Hook Lane
Westergate
West Sussex**

Drawing Title:-
**Surface Water
Drainage
Strategy**

Date:	January 2017	Scales:	1:500 at A1
Drawn:	TS	Checked:	TS
		Approved:	TS

Drawing No. **BSO/E4462/031 D**

PRELIMINARY

Rogers Cory Partnership
Civil, Structural and Architectural Consultants

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APPENDIX (2)

SURFACE WATER CALCULATIONS

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The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 12/01/2017 12:51 File SW1 -alternative.MDX	Designed by Terry Checked by	
Micro Drainage	Network 2015.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 4462-SW2.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	1.000
Ratio R	0.350	Maximum Backdrop Height (m)	0.000
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)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for 4462-SW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	62.242	0.417	149.3	0.129	5.00	0.0	0.600	o	225	
1.001	9.519	0.259	36.7	0.119	0.00	0.0	0.600	o	225	
2.000	5.152	0.118	43.7	0.012	5.00	0.0	0.600	o	150	
2.001	19.712	0.384	51.3	0.000	0.00	0.0	0.600	o	150	
3.000	10.972	0.115	95.4	0.040	5.00	0.0	0.600	o	150	
3.001	24.027	0.202	118.7	0.064	0.00	0.0	0.600	o	150	
2.002	46.170	0.156	296.1	0.070	0.00	0.0	0.600	o	225	
4.000	23.063	0.675	34.2	0.061	5.00	0.0	0.600	o	150	
1.002	54.451	0.175	310.7	0.089	0.00	0.0	0.600	o	375	
5.000	28.633	0.412	69.5	0.086	5.00	0.0	0.600	o	150	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.97	9.102	0.129	0.0	0.0	0.0	1.07	42.5	17.5
1.001	50.00	6.04	8.685	0.248	0.0	0.0	0.0	2.17	86.1	33.6
2.000	50.00	5.06	9.159	0.012	0.0	0.0	0.0	1.53	27.0	1.6
2.001	50.00	5.29	9.041	0.012	0.0	0.0	0.0	1.41	24.9	1.6
3.000	50.00	5.18	8.974	0.040	0.0	0.0	0.0	1.03	18.2	5.4
3.001	50.00	5.61	8.859	0.104	0.0	0.0	0.0	0.92	16.3	14.1
2.002	50.00	6.63	8.582	0.186	0.0	0.0	0.0	0.75	30.0	25.2
4.000	50.00	5.22	9.226	0.061	0.0	0.0	0.0	1.73	30.5	8.3
1.002	50.00	7.52	8.276	0.584	0.0	0.0	0.0	1.02	112.9	79.1
5.000	50.00	5.40	9.138	0.086	0.0	0.0	0.0	1.21	21.3	11.6

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Micro Drainage	Network 2015.1	

Network Design Table for 4462-SW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
5.001	18.791	0.303	62.1	0.059	0.00	0.0	0.600	o	150	
6.000	15.345	0.077	200.0	0.000	5.00	0.0	0.600	o	150	
5.002	7.018	0.098	71.6	0.000	0.00	0.0	0.600	o	150	
7.000	17.122	0.098	174.7	0.000	5.00	0.0	0.600	o	225	
7.001	18.355	0.062	296.0	0.000	0.00	0.0	0.600	o	225	
7.002	14.494	0.049	296.5	0.034	0.00	0.0	0.600	o	225	
7.003	14.976	0.051	296.5	0.022	0.00	0.0	0.600	o	225	
7.004	48.501	0.114	427.1	0.059	0.00	0.0	0.600	o	225	
7.005	5.949	0.014	427.1	0.036	0.00	0.0	0.600	o	225	
7.006	4.402	0.010	427.1	0.016	0.00	0.0	0.600	o	225	
7.007	37.370	0.087	427.1	0.058	0.00	0.0	0.600	o	300	
1.003	14.331	0.029	500.0	0.035	0.00	0.0	0.600	o	450	
1.004	31.931	0.064	500.0	0.065	0.00	0.0	0.600	o	450	
8.000	9.581	0.093	103.0	0.024	5.00	0.0	0.600	o	150	
8.001	10.256	0.059	174.8	0.048	0.00	0.0	0.600	o	150	
8.002	42.619	0.144	296.9	0.045	0.00	0.0	0.600	o	225	
8.003	7.645	0.026	296.9	0.000	0.00	0.0	0.600	o	225	
8.004	6.882	0.239	28.8	0.000	0.00	0.0	0.600	o	225	
1.005	32.855	0.066	500.0	0.023	0.00	0.0	0.600	o	525	
1.006	7.738	0.015	515.9	0.073	0.00	0.0	0.600	o	525	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.001	50.00	5.64	8.726	0.145	0.0	0.0	0.0	1.28	22.6	19.6
6.000	50.00	5.36	7.150	0.000	0.0	0.0	0.0	0.71	12.5	0.0
5.002	50.00	5.74	7.073	0.145	0.0	0.0	0.0	1.19	21.0	19.6
7.000	50.00	5.29	8.810	0.000	0.0	0.0	0.0	0.99	39.2	0.0
7.001	50.00	5.69	8.712	0.000	0.0	0.0	0.0	0.75	30.0	0.0
7.002	50.00	6.01	8.650	0.034	0.0	0.0	0.0	0.75	30.0	4.6
7.003	50.00	6.35	8.601	0.056	0.0	0.0	0.0	0.75	30.0	7.6
7.004	50.00	7.64	8.551	0.115	0.0	0.0	0.0	0.63	24.9	15.6
7.005	50.00	7.79	8.437	0.151	0.0	0.0	0.0	0.63	24.9	20.4
7.006	50.00	7.91	8.423	0.167	0.0	0.0	0.0	0.63	24.9	22.6
7.007	48.43	8.74	8.338	0.225	0.0	0.0	0.0	0.75	53.3	29.5
1.003	47.71	9.00	6.675	0.989	0.0	0.0	0.0	0.90	143.5	127.8
1.004	46.20	9.59	6.647	1.054	0.0	0.0	0.0	0.90	143.5	131.9
8.000	50.00	5.16	8.793	0.024	0.0	0.0	0.0	0.99	17.5	3.2
8.001	50.00	5.39	8.700	0.072	0.0	0.0	0.0	0.76	13.4	9.7
8.002	50.00	6.33	8.566	0.117	0.0	0.0	0.0	0.75	30.0	15.8
8.003	50.00	6.50	8.423	0.117	0.0	0.0	0.0	0.75	30.0	15.8
8.004	50.00	6.55	8.397	0.117	0.0	0.0	0.0	2.45	97.4	15.8
1.005	44.89	10.14	6.508	1.194	0.0	0.0	0.0	0.99	215.4	145.2
1.006	44.59	10.27	6.442	1.267	0.0	0.0	0.0	0.98	212.0	153.0

Network Design Table for 4462-SW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.007	4.294	0.009	500.0	0.000	0.00	0.0	0.600	o	525	
1.008	6.167	0.012	500.0	0.000	0.00	0.0	0.600	o	525	
1.009	3.340	0.199	16.8	0.000	0.00	0.0	0.600	o	525	

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)
1.007	44.42	10.35	6.427	1.267	0.0	0.0	0.0	0.99	215.4	153.0
1.008	44.19	10.45	6.418	1.267	0.0	0.0	0.0	0.99	215.4	153.0
1.009	44.17	10.46	6.406	1.267	0.0	0.0	0.0	5.49	1188.0	153.0

Free Flowing Outfall Details for 4462-SW2.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.009	1	9.282	6.207	0.000	0	0
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Simulation Criteria for 4462-SW2.SWS

Volumetric Runoff Coeff 0.840	Additional Flow - % of Total Flow 0.000
Areal Reduction Factor 1.000	MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0	Inlet Coefficient 0.800
Hot Start Level (mm) 0	Flow per Person per Day (l/per/day) 0.000
Manhole Headloss Coeff (Global) 0.500	Run Time (mins) 60
Foul Sewage per hectare (l/s) 0.000	Output Interval (mins) 1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 3	Number of Storage Structures 3	Number of Real Time 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	0.350	

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Online Controls for 4462-SW2.SWS

Hydro-Brake Optimum® Manhole: 8, DS/PN: 1.003, Volume (m³): 12.9

Unit Reference	MD-SHE-0131-1000-2000-1000
Design Head (m)	2.000
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	131
Invert Level (m)	6.675
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	10.0	Kick-Flo®	1.167	7.8
Flush-Flo™	0.569	9.8	Mean Flow over Head Range	-	8.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.7	0.800	9.6	2.000	10.0	4.000	13.9	7.000	18.1
0.200	8.3	1.000	9.0	2.200	10.5	4.500	14.7	7.500	18.7
0.300	9.2	1.200	7.9	2.400	10.9	5.000	15.4	8.000	19.3
0.400	9.6	1.400	8.5	2.600	11.3	5.500	16.2	8.500	19.9
0.500	9.8	1.600	9.0	3.000	12.1	6.000	16.8	9.000	20.5
0.600	9.8	1.800	9.5	3.500	13.0	6.500	17.5	9.500	21.0

Hydro-Brake Optimum® Manhole: 5, DS/PN: 1.006, Volume (m³): 13.0

Unit Reference	MD-SHE-0147-1080-1280-1080
Design Head (m)	1.280
Design Flow (l/s)	10.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	147
Invert Level (m)	6.442
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.280	10.8	Kick-Flo®	0.822	8.7
Flush-Flo™	0.378	10.8	Mean Flow over Head Range	-	9.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.1	2.000	13.3	4.000	18.5	7.000	24.2
0.200	10.1	1.000	9.6	2.200	13.9	4.500	19.6	7.500	25.0
0.300	10.7	1.200	10.4	2.400	14.5	5.000	20.6	8.000	25.8
0.400	10.8	1.400	11.2	2.600	15.1	5.500	21.6	8.500	26.6
0.500	10.6	1.600	12.0	3.000	16.1	6.000	22.5	9.000	27.3
0.600	10.4	1.800	12.7	3.500	17.4	6.500	23.4	9.500	28.0

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Depth/Flow Relationship Manhole: 4, DS/PN: 1.007, Volume (m³): 7.0

Invert Level (m) 6.427

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.1700	0.700	6.1700	1.300	6.1700	1.900	6.1700	2.500	6.1700
0.200	6.1700	0.800	6.1700	1.400	6.1700	2.000	6.1700	2.600	6.1700
0.300	6.1700	0.900	6.1700	1.500	6.1700	2.100	6.1700	2.700	6.1700
0.400	6.1700	1.000	6.1700	1.600	6.1700	2.200	6.1700	2.800	6.1700
0.500	6.1700	1.100	6.1700	1.700	6.1700	2.300	6.1700	2.900	6.1700
0.600	6.1700	1.200	6.1700	1.800	6.1700	2.400	6.1700	3.000	6.1700

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Water	Surcharged
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Overflow	Act.	Level (m)	Depth (m)
1.000	11	15 Winter	1	+0%	30/15 Summer	100/15 Winter				9.201	-0.126
1.001	10	15 Winter	1	+0%	30/15 Summer					8.783	-0.127
2.000	14	15 Winter	1	+0%	100/15 Summer					9.185	-0.124
2.001	13	15 Winter	1	+0%	30/15 Winter					9.066	-0.125
3.000	16	15 Winter	1	+0%	30/15 Summer	100/15 Summer				9.031	-0.093
3.001	15	15 Winter	1	+0%	30/15 Summer	100/15 Summer				8.959	-0.050
2.002	12	15 Winter	1	+0%	30/15 Summer					8.723	-0.083
4.000	28	15 Winter	1	+0%	100/15 Summer					9.279	-0.097
1.002	9	15 Winter	1	+0%	30/15 Summer					8.540	-0.111
5.000	19	15 Winter	1	+0%	30/15 Summer	100/15 Summer				9.216	-0.072
5.001	18	15 Winter	1	+0%	30/15 Summer	100/15 Summer				8.829	-0.047
6.000	34	240 Winter	1	+0%	1/60 Summer					7.395	0.095
5.002	17	15 Winter	1	+0%	1/15 Summer					8.265	1.042
7.000	27	360 Winter	1	+0%	100/15 Summer					8.810	-0.225
7.001	26	15 Winter	1	+0%	100/15 Summer					8.712	-0.225
7.002	25	15 Winter	1	+0%	30/15 Summer					8.713	-0.162
7.003	24	15 Winter	1	+0%	30/15 Summer					8.686	-0.140
7.004	23	15 Winter	1	+0%	30/15 Summer					8.663	-0.113
7.005	22	15 Winter	1	+0%	30/15 Summer					8.571	-0.091
7.006	21	15 Winter	1	+0%	30/15 Summer					8.553	-0.095
7.007	20	15 Winter	1	+0%	30/15 Summer					8.532	-0.106
1.003	8	15 Winter	1	+0%	1/15 Summer					8.514	1.388
1.004	7	120 Winter	1	+0%	1/15 Summer					7.585	0.488
8.000	33	15 Winter	1	+0%	30/15 Summer					8.838	-0.105
8.001	32	15 Winter	1	+0%	30/15 Summer					8.792	-0.058
8.002	31	15 Winter	1	+0%	30/15 Summer					8.673	-0.119
8.003	30	15 Winter	1	+0%	30/15 Summer					8.538	-0.110
8.004	29	15 Winter	1	+0%						8.461	-0.161
1.005	6	120 Winter	1	+0%	1/15 Summer					7.584	0.551
1.006	5	120 Winter	1	+0%	1/15 Summer					7.582	0.615

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Flow / (l/s)	Flow (l/s)		
1.000	11	0.000	0.38		15.6	OK	1
1.001	10	0.000	0.39		28.1	OK	
2.000	14	0.000	0.07		1.5	OK	
2.001	13	0.000	0.06		1.5	OK	
3.000	16	0.000	0.31		5.0	OK	4
3.001	15	0.000	0.76		11.8	OK	5
2.002	12	0.000	0.70		20.0	OK	
4.000	28	0.000	0.27		7.7	OK	
1.002	9	0.000	0.56		59.2	OK	
5.000	19	0.000	0.52		10.7	OK	4
5.001	18	0.000	0.81		17.1	OK	2
6.000	34	0.000	0.52		6.0	SURCHARGED	
5.002	17	0.000	0.32		5.8	SURCHARGED	
7.000	27	0.000	0.00		0.0	OK	
7.001	26	0.000	0.00		0.0	OK	
7.002	25	0.000	0.13		3.5	OK	
7.003	24	0.000	0.22		5.7	OK	
7.004	23	0.000	0.47		11.3	OK	
7.005	22	0.000	0.63		14.3	OK	
7.006	21	0.000	0.63		15.6	OK	
7.007	20	0.000	0.40		19.8	OK	
1.003	8	0.000	0.11		9.7	SURCHARGED	
1.004	7	0.000	0.10		12.5	SURCHARGED	
8.000	33	0.000	0.19		3.0	OK	
8.001	32	0.000	0.68		8.1	OK	
8.002	31	0.000	0.44		12.5	OK	
8.003	30	0.000	0.52		12.3	OK	
8.004	29	0.000	0.18		12.3	OK	
1.005	6	0.000	0.10		18.5	SURCHARGED	
1.006	5	0.000	0.07		9.5	SURCHARGED	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)
1.007	4	120 Winter	1	+0%	1/15 Summer				7.451	0.499	0.000
1.008	3	15 Winter	1	+0%					6.486	-0.458	0.000
1.009	2	15 Summer	1	+0%					6.451	-0.480	0.000

PN	US/MH Name	Flow / Cap.	Overflow (1/s)	Pipe Flow (1/s)	Status	Level Exceeded
1.007	4	0.04		6.2	SURCHARGED	
1.008	3	0.04		6.2	OK	
1.009	2	0.02		6.2	OK	



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Simulation Criteria

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	3	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	OFF		

									Water	Surcharged	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)
1.000	11	15	Winter	30	+0%	30/15 Summer	100/15 Winter			9.405	0.078
1.001	10	15	Winter	30	+0%	30/15 Summer				9.103	0.193
2.000	14	15	Winter	30	+0%	100/15 Summer				9.235	-0.074
2.001	13	15	Winter	30	+0%	30/15 Winter				9.229	0.038
3.000	16	15	Winter	30	+0%	30/15 Summer	100/15 Summer			9.691	0.567
3.001	15	15	Winter	30	+0%	30/15 Summer	100/15 Summer			9.651	0.642
2.002	12	15	Winter	30	+0%	30/15 Summer				9.226	0.419
4.000	28	15	Winter	30	+0%	100/15 Summer				9.315	-0.061
1.002	9	15	Winter	30	+0%	30/15 Summer				8.925	0.274
5.000	19	15	Winter	30	+0%	30/15 Summer	100/15 Summer			9.809	0.521
5.001	18	15	Winter	30	+0%	30/15 Summer	100/15 Summer			9.385	0.509
6.000	34	600	Winter	30	+0%	1/60 Summer				7.816	0.516
5.002	17	30	Winter	30	+0%	1/15 Summer				8.628	1.405
7.000	27	15	Winter	30	+0%	100/15 Summer				8.924	-0.111
7.001	26	15	Winter	30	+0%	100/15 Summer				8.925	-0.012
7.002	25	15	Winter	30	+0%	30/15 Summer				8.953	0.078
7.003	24	15	Winter	30	+0%	30/15 Summer				8.951	0.125
7.004	23	15	Winter	30	+0%	30/15 Summer				8.937	0.162
7.005	22	30	Winter	30	+0%	30/15 Summer				8.872	0.210
7.006	21	30	Winter	30	+0%	30/15 Summer				8.866	0.218
7.007	20	30	Winter	30	+0%	30/15 Summer				8.860	0.223
1.003	8	30	Winter	30	+0%	1/15 Summer				8.846	1.721
1.004	7	180	Winter	30	+0%	1/15 Summer				7.906	0.810
8.000	33	15	Winter	30	+0%	30/15 Summer				9.051	0.108
8.001	32	15	Winter	30	+0%	30/15 Summer				9.027	0.177
8.002	31	15	Winter	30	+0%	30/15 Summer				8.856	0.065
8.003	30	15	Winter	30	+0%	30/15 Summer				8.664	0.017
8.004	29	15	Winter	30	+0%					8.505	-0.117
1.005	6	180	Winter	30	+0%	1/15 Summer				7.903	0.870
1.006	5	180	Winter	30	+0%	1/15 Summer				7.902	0.935

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow / Cap.			
1.000	11	0.000	0.85	35.0	SURCHARGED	1
1.001	10	0.000	0.85	60.4	SURCHARGED	
2.000	14	0.000	0.17	3.7	OK	
2.001	13	0.000	0.17	4.0	SURCHARGED	
3.000	16	0.000	0.61	9.9	SURCHARGED	4
3.001	15	0.000	1.45	22.5	SURCHARGED	5
2.002	12	0.000	1.37	39.3	SURCHARGED	
4.000	28	0.000	0.65	18.8	OK	
1.002	9	0.000	1.28	134.8	SURCHARGED	
5.000	19	0.000	1.04	21.3	SURCHARGED	4
5.001	18	0.000	1.63	34.5	SURCHARGED	2
6.000	34	0.000	0.52	6.0	SURCHARGED	
5.002	17	0.000	0.19	3.5	SURCHARGED	
7.000	27	0.000	0.01	0.5	OK	
7.001	26	0.000	0.08	2.3	OK	
7.002	25	0.000	0.27	7.0	SURCHARGED	
7.003	24	0.000	0.39	10.4	SURCHARGED	
7.004	23	0.000	1.02	24.4	SURCHARGED	
7.005	22	0.000	1.19	27.0	SURCHARGED	
7.006	21	0.000	1.19	29.4	SURCHARGED	
7.007	20	0.000	0.84	41.4	SURCHARGED	
1.003	8	0.000	0.12	9.8	SURCHARGED	
1.004	7	0.000	0.12	14.7	SURCHARGED	
8.000	33	0.000	0.49	7.6	SURCHARGED	
8.001	32	0.000	1.72	20.5	SURCHARGED	
8.002	31	0.000	1.13	32.3	SURCHARGED	
8.003	30	0.000	1.36	32.5	SURCHARGED	
8.004	29	0.000	0.47	32.4	OK	
1.005	6	0.000	0.14	25.5	SURCHARGED	
1.006	5	0.000	0.06	8.4	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)
1.007	4	180 Winter	30	+0%	1/15 Summer				7.771	0.819	0.000
1.008	3	15 Summer	30	+0%					6.486	-0.458	0.000
1.009	2	15 Winter	30	+0%					6.451	-0.480	0.000

		US/MH		Flow / Overflow		Pipe Flow	Level	
PN	Name	Cap.		(1/s)	(1/s)	Status	Exceeded	
1.007	4	0.04			6.2	SURCHARGED		
1.008	3	0.04			6.2	OK		
1.009	2	0.02			6.2	OK		



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Simulation Criteria

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	3	Number of Real Time Controls	0

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	OFF		

									Water	Surcharged
PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth
	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)
1.000	11	15 Winter	100	+30%	30/15 Summer	100/15 Winter			10.527	1.200
1.001	10	15 Winter	100	+30%	30/15 Summer				9.908	0.998
2.000	14	15 Winter	100	+30%	100/15 Summer				9.910	0.601
2.001	13	15 Winter	100	+30%	30/15 Winter				9.903	0.712
3.000	16	15 Winter	100	+30%	30/15 Summer	100/15 Summer			10.274	1.150
3.001	15	15 Winter	100	+30%	30/15 Summer	100/15 Summer			10.164	1.155
2.002	12	15 Winter	100	+30%	30/15 Summer				9.895	1.089
4.000	28	15 Winter	100	+30%	100/15 Summer				9.936	0.560
1.002	9	15 Winter	100	+30%	30/15 Summer				9.424	0.774
5.000	19	15 Winter	100	+30%	30/15 Summer	100/15 Summer			10.491	1.203
5.001	18	15 Winter	100	+30%	30/15 Summer	100/15 Summer			10.076	1.200
6.000	34	720 Winter	100	+30%	1/60 Summer				8.362	1.062
5.002	17	30 Winter	100	+30%	1/15 Summer				8.981	1.758
7.000	27	15 Winter	100	+30%	100/15 Summer				9.560	0.525
7.001	26	15 Winter	100	+30%	100/15 Summer				9.561	0.624
7.002	25	15 Winter	100	+30%	30/15 Summer				9.578	0.703
7.003	24	15 Winter	100	+30%	30/15 Summer				9.564	0.738
7.004	23	15 Winter	100	+30%	30/15 Summer				9.538	0.762
7.005	22	30 Winter	100	+30%	30/15 Summer				9.276	0.614
7.006	21	60 Winter	100	+30%	30/15 Summer				9.260	0.612
7.007	20	60 Winter	100	+30%	30/15 Summer				9.254	0.616
1.003	8	60 Winter	100	+30%	1/15 Summer				9.238	2.113
1.004	7	360 Winter	100	+30%	1/15 Summer				8.362	1.266
8.000	33	15 Winter	100	+30%	30/15 Summer				9.655	0.712
8.001	32	15 Winter	100	+30%	30/15 Summer				9.613	0.763
8.002	31	15 Winter	100	+30%	30/15 Summer				9.204	0.413
8.003	30	15 Winter	100	+30%	30/15 Summer				8.736	0.088
8.004	29	15 Winter	100	+30%					8.540	-0.082
1.005	6	360 Winter	100	+30%	1/15 Summer				8.360	1.328
1.006	5	360 Winter	100	+30%	1/15 Summer				8.358	1.391

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Flooded		Overflow (l/s)	Pipe	Status	Level
		Volume (m³)	Flow / Cap.		Flow (l/s)		Exceeded
1.000	11	0.350	1.26		51.9	FLOOD	1
1.001	10	0.000	1.35		96.1	FLOOD RISK	
2.000	14	0.000	0.26		5.7	SURCHARGED	
2.001	13	0.000	0.31		7.2	SURCHARGED	
3.000	16	0.437	0.99		16.2	FLOOD	4
3.001	15	4.893	1.94		30.0	FLOOD	5
2.002	12	0.000	1.70		48.9	FLOOD RISK	
4.000	28	0.000	0.88		25.4	SURCHARGED	
1.002	9	0.000	1.91		201.2	SURCHARGED	
5.000	19	3.304	1.41		28.8	FLOOD	4
5.001	18	0.242	2.16		45.8	FLOOD	2
6.000	34	0.000	0.35		4.0	SURCHARGED	
5.002	17	0.000	0.25		4.5	SURCHARGED	
7.000	27	0.000	0.05		1.8	SURCHARGED	
7.001	26	0.000	0.13		3.6	SURCHARGED	
7.002	25	0.000	0.44		11.6	SURCHARGED	
7.003	24	0.000	0.69		18.2	SURCHARGED	
7.004	23	0.000	1.51		36.1	SURCHARGED	
7.005	22	0.000	1.91		43.5	SURCHARGED	
7.006	21	0.000	1.46		35.9	SURCHARGED	
7.007	20	0.000	1.01		49.7	SURCHARGED	
1.003	8	0.000	0.12		9.8	SURCHARGED	
1.004	7	0.000	0.12		14.8	SURCHARGED	
8.000	33	0.000	0.79		12.2	SURCHARGED	
8.001	32	0.000	2.63		31.4	SURCHARGED	
8.002	31	0.000	1.75		50.0	SURCHARGED	
8.003	30	0.000	2.09		49.9	SURCHARGED	
8.004	29	0.000	0.72		49.5	OK	
1.005	6	0.000	0.14		25.8	SURCHARGED	
1.006	5	0.000	0.06		7.5	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

US/MH		Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
PN	Name								(m)	(m)	(m³)
1.007	4 360	Winter	100	+30%	1/15	Summer			8.228	1.276	0.000
1.008	3 15	Summer	100	+30%					6.486	-0.458	0.000
1.009	2 15	Winter	100	+30%					6.451	-0.480	0.000

US/MH		Flow / Cap.	Overflow (1/s)	Pipe Flow (1/s)		Status	Level
PN	Name						Exceeded
1.007	4	0.04		6.2		SURCHARGED	
1.008	3	0.04		6.2		OK	
1.009	2	0.02		6.2		OK	

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Date 09/03/2017 16:05 File S50 - SWALE NETWORK.mdx	Designed by SLW Checked by	
Micro Drainage	Network 2014.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for S50 - SWALE NETWORK.SWS

Pipe Sizes SW1 17.02.17 Manhole Sizes SW1 17.02.17

FSR Rainfall Model - England and Wales			
Return Period (years)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	1.000
Ratio R	0.350	Maximum Backdrop Height (m)	0.000
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)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for S50 - SWALE NETWORK.SWS

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	18.010	0.072	250.1	0.030	5.00	0.0	0.600	o	150	
1.001	11.997	0.040	299.9	0.060	0.00	0.0	0.600	o	150	
1.002	57.577	0.128	449.8	0.060	0.00	0.0	0.600	o	150	
1.003	4.737	0.024	200.0	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)
1.000	50.00	5.48	9.750	0.030	0.0	0.0	0.0	0.63	11.1	4.1
1.001	50.00	5.82	9.603	0.090	0.0	0.0	0.0	0.58	10.2«	12.2
1.002	50.00	7.88	9.563	0.150	0.0	0.0	0.0	0.47	8.3«	20.3
1.003	50.00	7.99	9.360	0.150	0.0	0.0	0.0	0.71	12.5«	20.3

Free Flowing Outfall Details for S50 - SWALE NETWORK.SWS

Outfall Pipe Number	Outfall C. Name	Level I. (m)	Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	1	10.200	9.336	9.200	0	0

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Online Controls for S50 - SWALE NETWORK.SWS

Hydro-Brake Optimum® Manhole: 2, DS/PN: 1.003, Volume (m³): 1.8

Unit Reference	MD-SHE-0037-5000-0500-5000
Design Head (m)	0.500
Design Flow (l/s)	0.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	37
Invert Level (m)	9.360
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	0.5	Kick-Flo®	0.328	0.4
Flush-Flo™	0.162	0.5	Mean Flow over Head Range	-	0.4

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.5	0.800	0.6	2.000	0.9	4.000	1.2	7.000	1.6
0.200	0.5	1.000	0.7	2.200	0.9	4.500	1.3	7.500	1.7
0.300	0.4	1.200	0.7	2.400	1.0	5.000	1.4	8.000	1.7
0.400	0.4	1.400	0.8	2.600	1.0	5.500	1.4	8.500	1.8
0.500	0.5	1.600	0.8	3.000	1.1	6.000	1.5	9.000	1.8
0.600	0.5	1.800	0.9	3.500	1.2	6.500	1.6	9.500	1.9

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Storage Structures for S50 - SWALE NETWORK.SWS

Tank or Pond Manhole: 4, DS/PN: 1.001

Invert Level (m) 9.750

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	21.0	0.500	87.0

Tank or Pond Manhole: 2, DS/PN: 1.003

Invert Level (m) 9.510

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	138.6	0.500	311.0

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for S50 - SWALE NETWORK.SWS

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	1	0%	30/15	Summer			
1.001	15 Winter	1	0%	1/15	Summer			
1.002	15 Winter	1	0%	1/15	Summer			
1.003	360 Winter	1	0%	1/15	Summer			

PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m ³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	5	9.813	-0.087	0.000	0.36	0.0	3.7	OK
1.001	4	9.794	0.041	0.000	0.78	0.0	7.2	SURCHARGED
1.002	3	9.773	0.060	0.000	1.22	0.0	9.9	SURCHARGED
1.003	2	9.621	0.111	0.000	0.05	0.0	0.5	SURCHARGED

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Micro Drainage	Network 2014.1.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for S50 - SWALE NETWORK.SWS

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	30 Winter	30	0%	30/15 Summer				
1.001	30 Winter	30	0%	1/15 Summer				
1.002	30 Winter	30	0%	1/15 Summer				
1.003	720 Winter	30	0%	1/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m ³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	5	10.024	0.124	0.000	0.59	0.0	6.1	SURCHARGED
1.001	4	10.008	0.255	0.000	1.16	0.0	10.7	FLOOD RISK
1.002	3	9.979	0.266	0.000	1.76	0.0	14.2	FLOOD RISK
1.003	2	9.787	0.277	0.000	0.05	0.0	0.5	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for S50 - SWALE NETWORK.SWS

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%	30/15 Summer				
1.001	30 Winter	100	+30%	1/15 Summer				
1.002	30 Winter	100	+30%	1/15 Summer				
1.003	960 Winter	100	+30%	1/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m ³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	5	10.227	0.327	0.000	1.23	0.0	12.8	FLOOD RISK
1.001	4	10.199	0.446	0.000	1.51	0.0	14.0	FLOOD RISK
1.002	3	10.156	0.443	0.000	2.11	0.0	17.0	FLOOD RISK
1.003	2	9.950	0.440	0.000	0.05	0.0	0.5	FLOOD RISK

APPENDIX (3)

PUMP SUPPLIER – MAINTENANCE SCHEDULE



Unit 9 Lordswood Industrial Estate
 Revenge Road, Lordswood, Chatham
 Kent ME5 8UD

DATE:

SITE:

ENGINEER:

Pump Station Ref:

6 MONTHLY SERVICE SCHEDULE

ACTION	PUMP 1		PUMP 2		PUMP 3	
	Pass	Fail	Pass	Fail	Pass	Fail
Pump Down On Manual						
Check Valve Operation						
Check Pipework For Leaks						
Check Control Panel						
Check Panel Bulbs						
Amp Meter Reading (Panel or Hand Meter)						
Hours Run						
Electricity Meter Reading						
Check Overloads & Fuses						
Check Condition of Motor Cables						
Megga Test Windings						
Condition Guide Rails/						
Check Lifting Chains/ Shackles/Lifting Gear						

	Checked	Pass	Fail	Status
Clean Floats/Ultrasonic Transducer				
Check Float/Ultrasonic Operation & Sequence				
Check High Level Alarm				
Condition of Wet Well/ Valve Chest				
Condition of Access Covers & Grease as Required				
Clean Wet Well (if water & power available)				
Advise if Tanker/ Jetter Required				
Check Heater & Lights				
Inspect Earthing System				
Condition of Kiosk				
Ensure System Reset and Left In Auto.				

PUMP DESCRIPTION	SERIAL NO.s
1	
2	
3	
4	
Notes:	
Client Signature:	Print: