APPENDIX C
FOUL AND SURFACE WATER DRAINAGE STRATEGY

APPENDIX D

PRE / POST DEVELOPMENT RUNOFF AND STORAGE CALCULATIONS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	0.920	Urban	0.000
SAAR (mm)	729	Region Number	Region 7

Results l/s

QBAR Rural	3.3
QBAR Urban	3.3
Q100 years	10.5
Q1 year	2.8
Q30 years	7.4
Q100 years	10.5

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Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.500
Ratio R	0.349
Areal Reduction Factor	1.00
Area (ha)	0.920
SAAR (mm)	789
CWI	116.484
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	49.10
Greenfield Runoff Volume (m^3)	291.412

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Cascade Summary of Results for Pond.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	Deep Borehole Soakaway.SRCX	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	5.640	0.440	1.3	261.6	O K
30 min Summer	5.771	0.571	1.3	351.3	O K
60 min Summer	5.905	0.705	1.4	449.3	O K
120 min Summer	6.039	0.839	1.4	552.9	O K
180 min Summer	6.114	0.914	1.5	613.4	O K
240 min Summer	6.163	0.963	1.5	654.3	O K
360 min Summer	6.234	1.034	1.5	714.6	O K
480 min Summer	6.284	1.084	1.6	757.9	O K
600 min Summer	6.321	1.121	1.6	791.2	O K
720 min Summer	6.351	1.151	1.6	817.8	O K
960 min Summer	6.395	1.195	1.6	857.9	O K
1440 min Summer	6.448	1.248	1.6	907.7	O K
2160 min Summer	6.486	1.286	1.6	943.7	O K
2880 min Summer	6.499	1.299	1.6	956.1	O K
4320 min Summer	6.488	1.288	1.6	945.6	O K
5760 min Summer	6.461	1.261	1.6	920.3	O K
7200 min Summer	6.433	1.233	1.6	893.5	O K
8640 min Summer	6.405	1.205	1.6	867.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	127.517	0.0	104.8	35
30 min Summer	85.701	0.0	110.6	49
60 min Summer	54.957	0.0	226.1	78
120 min Summer	34.010	0.0	237.1	138
180 min Summer	25.295	0.0	242.7	198
240 min Summer	20.351	0.0	246.1	256
360 min Summer	14.971	0.0	250.4	376
480 min Summer	12.028	0.0	253.0	496
600 min Summer	10.141	0.0	254.5	614
720 min Summer	8.817	0.0	255.3	734
960 min Summer	7.063	0.0	255.5	972
1440 min Summer	5.157	0.0	252.9	1450
2160 min Summer	3.757	0.0	511.2	2168
2880 min Summer	2.997	0.0	506.6	2884
4320 min Summer	2.176	0.0	489.2	4284
5760 min Summer	1.731	0.0	980.6	4904
7200 min Summer	1.449	0.0	966.3	5632
8640 min Summer	1.255	0.0	946.0	6400

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Cascade Summary of Results for Pond.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
10080 min Summer	6.381	1.181	1.6	845.1	O K
15 min Winter	5.640	0.440	1.3	261.6	O K
30 min Winter	5.771	0.571	1.3	351.3	O K
60 min Winter	5.905	0.705	1.4	449.3	O K
120 min Winter	6.040	0.840	1.4	553.1	O K
180 min Winter	6.114	0.914	1.5	613.6	O K
240 min Winter	6.164	0.964	1.5	654.7	O K
360 min Winter	6.235	1.035	1.5	715.2	O K
480 min Winter	6.285	1.085	1.6	758.7	O K
600 min Winter	6.322	1.122	1.6	792.2	O K
720 min Winter	6.352	1.152	1.6	818.9	O K
960 min Winter	6.396	1.196	1.6	859.4	O K
1440 min Winter	6.450	1.250	1.6	909.9	O K
2160 min Winter	6.490	1.290	1.6	947.3	O K
2880 min Winter	6.505	1.305	1.6	961.6	O K
4320 min Winter	6.499	1.299	1.6	956.4	O K
5760 min Winter	6.471	1.271	1.6	929.2	O K
7200 min Winter	6.438	1.238	1.6	898.5	O K
8640 min Winter	6.409	1.209	1.6	871.2	O K
10080 min Winter	6.378	1.178	1.6	842.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.111	0.0	917.4	7168
15 min Winter	127.517	0.0	104.8	34
30 min Winter	85.701	0.0	110.6	49
60 min Winter	54.957	0.0	226.1	78
120 min Winter	34.010	0.0	237.0	136
180 min Winter	25.295	0.0	242.6	194
240 min Winter	20.351	0.0	246.0	254
360 min Winter	14.971	0.0	250.3	370
480 min Winter	12.028	0.0	252.8	488
600 min Winter	10.141	0.0	254.2	606
720 min Winter	8.817	0.0	254.9	722
960 min Winter	7.063	0.0	255.1	958
1440 min Winter	5.157	0.0	252.3	1426
2160 min Winter	3.757	0.0	510.4	2120
2880 min Winter	2.997	0.0	505.5	2804
4320 min Winter	2.176	0.0	487.2	4120
5760 min Winter	1.731	0.0	977.8	5360
7200 min Winter	1.449	0.0	962.2	5768
8640 min Winter	1.255	0.0	940.9	6664
10080 min Winter	1.111	0.0	914.4	7568

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Cascade Rainfall Details for Pond.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.900
Region	England and Wales	Cv (Winter)	0.900
M5-60 (mm)	19.400	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.920

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.200	8	12	0.200	16	20	0.120
4	8	0.200	12	16	0.200			

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Cascade Model Details for Pond.SRCX

Storage is Online Cover Level (m) 7.000

Tank or Pond Structure

Invert Level (m) 5.200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	528.0	0.500	683.0	1.000	852.0	1.500	1036.0
0.100	558.0	0.600	716.0	1.100	888.0	1.600	1074.0
0.200	588.0	0.700	749.0	1.200	924.0		
0.300	619.0	0.800	782.0	1.300	961.0		
0.400	651.0	0.900	817.0	1.400	998.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0052-1500-1600-1500
Design Head (m)	1.600
Design Flow (l/s)	1.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	52
Invert Level (m)	4.550
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)	1.600	1.5	Kick-Flo®	0.460	0.9
Flush-Flo™	0.228	1.0	Mean Flow over Head Range	-	1.1

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	0.9	1.200	1.3	3.000	2.0	7.000	2.9
0.200	1.0	1.400	1.4	3.500	2.1	7.500	3.0
0.300	1.0	1.600	1.5	4.000	2.3	8.000	3.1
0.400	1.0	1.800	1.6	4.500	2.4	8.500	3.2
0.500	0.9	2.000	1.7	5.000	2.5	9.000	3.3
0.600	1.0	2.200	1.7	5.500	2.6	9.500	3.4
0.800	1.1	2.400	1.8	6.000	2.7		
1.000	1.2	2.600	1.9	6.500	2.8		

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Cascade Summary of Results for Deep Borehole Soakaway.SRCX

Upstream Structures	Outflow To	Overflow To
Pond.SRCX	(None)	(None)

Half Drain Time : 18 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	88.309	39.809	1.3	1.3	O K
30 min Summer	90.429	41.929	1.3	1.3	O K
60 min Summer	92.493	43.993	1.4	1.4	O K
120 min Summer	94.449	45.949	1.4	1.4	O K
180 min Summer	95.499	46.999	1.5	1.5	O K
240 min Summer	96.175	47.675	1.5	1.5	O K
360 min Summer	97.123	48.623	1.5	1.5	O K
480 min Summer	97.776	49.276	1.5	1.5	O K
600 min Summer	98.261	49.761	1.6	1.6	O K
720 min Summer	98.520	50.020	1.6	1.6	O K
960 min Summer	98.772	50.272	1.6	1.9	O K
1440 min Summer	99.292	50.792	1.6	2.5	O K
2160 min Summer	99.797	51.297	1.6	3.0	Flood Risk
2880 min Summer	100.000	51.500	1.6	3.4	FLOOD
4320 min Summer	100.000	51.500	1.6	3.6	FLOOD
5760 min Summer	99.932	51.432	1.6	3.2	Flood Risk
7200 min Summer	99.580	51.080	1.6	2.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	127.517	0.0	125
30 min Summer	85.701	0.0	132
60 min Summer	54.957	0.0	148
120 min Summer	34.010	0.0	188
180 min Summer	25.295	0.0	238
240 min Summer	20.351	0.0	292
360 min Summer	14.971	0.0	404
480 min Summer	12.028	0.0	520
600 min Summer	10.141	0.0	638
720 min Summer	8.817	0.0	844
960 min Summer	7.063	0.0	1314
1440 min Summer	5.157	0.0	1912
2160 min Summer	3.757	0.0	2604
2880 min Summer	2.997	0.1	3296
4320 min Summer	2.176	0.3	4624
5760 min Summer	1.731	0.0	5696
7200 min Summer	1.449	0.0	6360

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Cascade Summary of Results for Deep Borehole Soakaway.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	99.243	50.743	1.6	2.4	O K
10080 min Summer	98.947	50.447	1.6	2.1	O K
15 min Winter	88.309	39.809	1.3	1.3	O K
30 min Winter	90.429	41.929	1.3	1.3	O K
60 min Winter	92.492	43.992	1.4	1.4	O K
120 min Winter	94.450	45.950	1.4	1.4	O K
180 min Winter	95.501	47.001	1.5	1.5	O K
240 min Winter	96.181	47.681	1.5	1.5	O K
360 min Winter	97.133	48.633	1.5	1.5	O K
480 min Winter	97.790	49.290	1.6	1.5	O K
600 min Winter	98.278	49.778	1.6	1.6	O K
720 min Winter	98.525	50.025	1.6	1.6	O K
960 min Winter	98.783	50.283	1.6	1.9	O K
1440 min Winter	99.303	50.803	1.6	2.5	O K
2160 min Winter	99.809	51.309	1.6	3.1	Flood Risk
2880 min Winter	100.000	51.500	1.6	3.4	FLOOD
4320 min Winter	100.000	51.500	1.6	3.7	FLOOD
5760 min Winter	100.000	51.500	1.6	3.3	FLOOD
7200 min Winter	99.650	51.150	1.6	2.9	O K
8640 min Winter	99.266	50.766	1.6	2.4	O K
10080 min Winter	98.897	50.397	1.6	2.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
8640 min Summer	1.255	0.0	7080
10080 min Summer	1.111	0.0	7792
15 min Winter	127.517	0.0	125
30 min Winter	85.701	0.0	132
60 min Winter	54.957	0.0	146
120 min Winter	34.010	0.0	188
180 min Winter	25.295	0.0	236
240 min Winter	20.351	0.0	288
360 min Winter	14.971	0.0	400
480 min Winter	12.028	0.0	512
600 min Winter	10.141	0.0	626
720 min Winter	8.817	0.0	844
960 min Winter	7.063	0.0	1310
1440 min Winter	5.157	0.0	1910
2160 min Winter	3.757	0.0	2608
2880 min Winter	2.997	0.1	3308
4320 min Winter	2.176	0.4	4644
5760 min Winter	1.731	0.0	5736
7200 min Winter	1.449	0.0	6760
8640 min Winter	1.255	0.0	7360
10080 min Winter	1.111	0.0	8128

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Cascade Rainfall Details for Deep Borehole Soakaway.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.900
Region	England and Wales	Cv (Winter)	0.900
M5-60 (mm)	19.400	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Cascade Model Details for Deep Borehole Soakaway.SRCX

Storage is Online Cover Level (m) 100.000

Deep Bore Soakaway Structure

Chamber Invert Level (m)	98.500	Infiltration Coefficient Base (m/hr)	0.36000
Chamber Diameter/Length (m)	1.200	Safety Factor	2.0
Borehole Diameter (m)	0.200		
Borehole Depth (m)	50.000		

Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)
0.000	0.36000	50.000	0.36000

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APPENDIX E
PUBLIC SEWER RECORDS

Southern Water

THE CIVIL ENGINEERING PRACTICE
14 AUG 2017
RECEIVED

P	PM	SPM	
Project No:	22863		
Engineer:			
Action By:			
Action Date:			

The Civil Engineering Practice
Unit 11
Tungsten Building
George Street
Fishersgate
West Sussex
BN41 1RA

Developer Services
Southern Water
Sparrowgrove House
Sparrowgrove
Otterbourne
Hampshire
SO21 2SW

Tel: **0330 303 0119**
Email: ***developerservices@southernwater.co.uk***

Your Ref:

Our Ref:
CC/003497

Date:
09 August 2017

F.A.O: Mr. Magowan,

Site: Manor Farm, Bedhampton, Havant, Hampshire, PO9 3LH.

Dear Mr. Magowan,

We have completed the capacity check for the above development site and the results are as follows:-

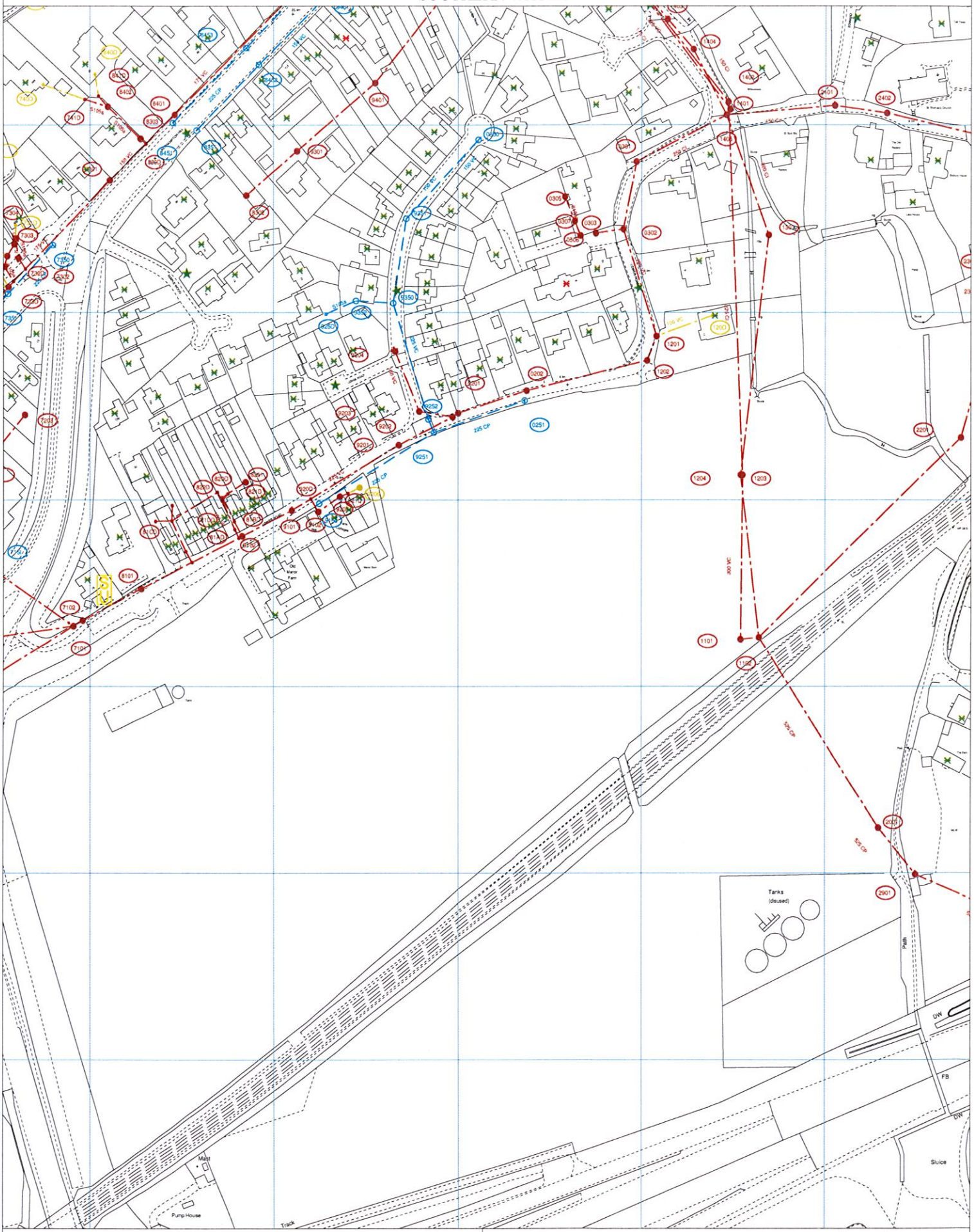
Foul capacity check:

There is currently inadequate capacity within the foul sewerage network to accommodate a foul flow for the above development at manhole reference SU70061101. The proposed development would increase flows to the public sewerage system, and existing properties and land may be subject to a greater risk of flooding as a result. Additional off-site sewers, or improvements to existing sewers, will be required to provide sufficient capacity to service the development.

The nearest point where capacity is currently available is at Budds Farm Havant WTW which is located approximately 880 m South East of the proposed development site.

Section 98 of the Water Industry Act 1991 provides a legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location.

SOUTHERN WATER



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

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O.S. REF: SU7006SW

Scale: 1:1250

Screen Print

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Southern Water

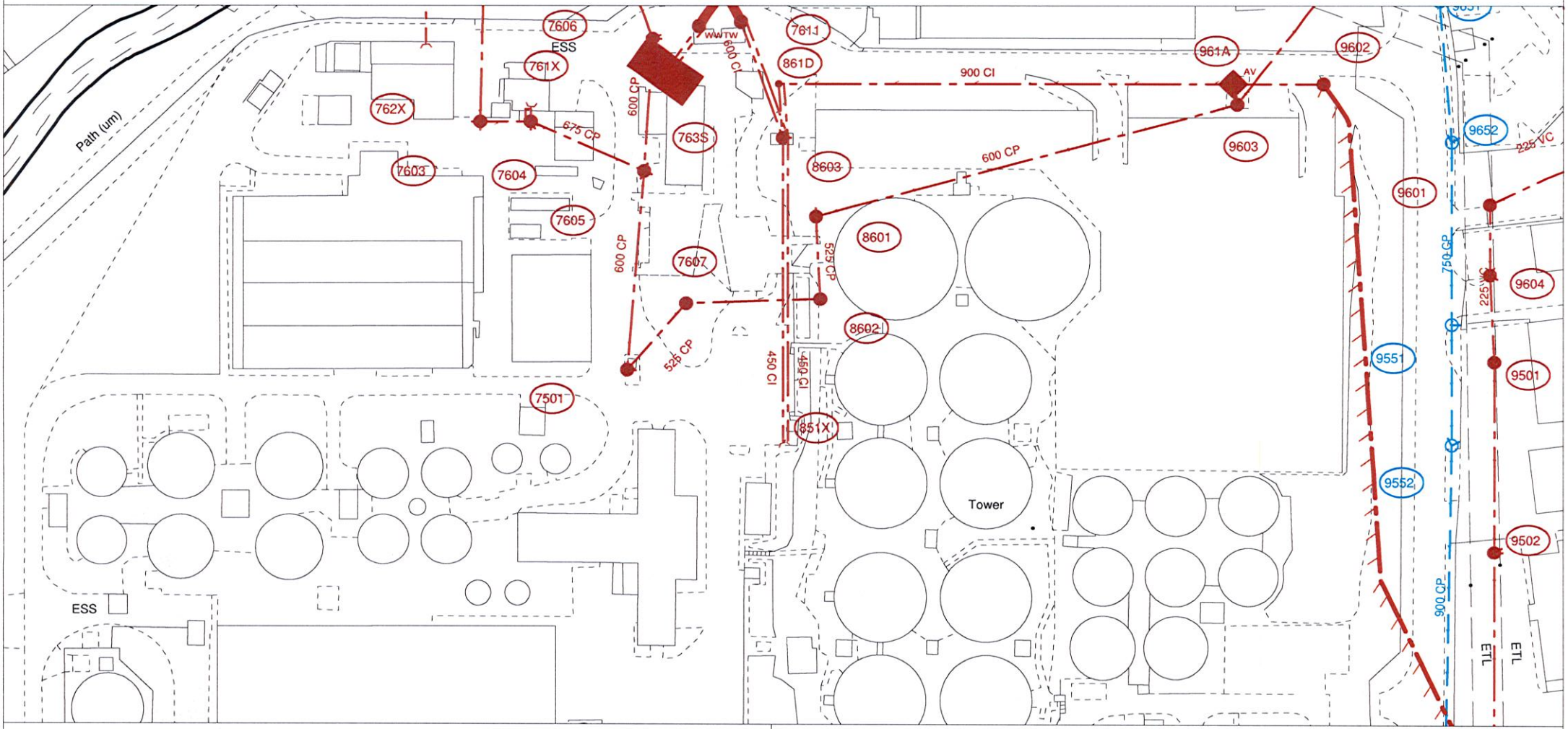
Printed By: Giri

Date: 27-7-2017

Site Plan

Requested By:

SOUTHERN WATER



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

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Southern Water

O.S. REF: SU7005NE

Scale: 1:1250

N

Printed By: kolacha

Date: 9-8-2017

Sewer Plot

Nearest Point of Available Capacity

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Requested By:

APPENDIX F
SUDS COMPATIBILITY MATRIX

SuDS Type	Description	Suitable for this site	Comments
Green Roofs	Green roofs comprise a multi-layered system that covers the roof of a building with vegetation cover over a drainage layer. They are designed to intercept and retain rainfall, reducing the volume of runoff and attenuating	✗	Living Roofs would not be technically feasible at this develoment due to factors such as loadings, steep roof pitch of proposed dwellings, visual impact and high maintenance burden to homeowners.
Rainwater Harvesting	Re-using rainwater for non-potable purposes such as irrigation and toilet flushing.	✗	Rainwater harvesting cannot be relied upon to guarantee a reduction in the volume of water leaving the site as it relies upon tanks having available capacity. During intense/prolonged periods of rainfall it is likely that the tanks will be full and will overflow into the system. These systems can also be a high maintenance burden for residential home owners. Cost benifit of system is not recoverd unitl 10-15years.
Soakaways	Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge.	✓	Onsite infiltration via soakaways is not feasble in the superfical and upper chalk geology. However deep borehole soakaways could be used in this instance where infiltration rates are 1x10-4 m/s about 15m below ground level.
Filter Strip / Trenches / Swales	Filter strips are linear grassed or vegetated strips of land / channels designed to accept runoff as overland sheet flow from impermeable surfaces usually located adjacent road or parking areas and used to treat infiltrated or convey runoff.	✓	Potentially viable on this site.
Permeable Paving	Pervious pavements provide a pavement suitable for pedestrian and vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system.	✓	Potentially on private drives / parking areas/ roads . This would improve water quality into the ground and subsiquent aquifer/river.
Bio Retention	Bioretention areas are shallow landscaped depressions which are typically under-drained and rely on engineered soils and enhanced vegetation and filtration to remove pollution and reduce runoff downstream. They are aimed at managing and treating runoff from frequent rainfall events.	✓	A bio retention pond could be utilised at this development if the receiving waterbody is considered sensitive and additional treatment is required. Although likely not required.
Ponds / Basins	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.	✓	A pond / basin can be utilised at this development to provide attenuation and improvements in water quality. There is sufficent open space.
Underground Storage	Underground large diameter Concrete pipes or Geocellular Tanks to reduce and attenuate peak flows	✓	Underground storage tanks can be utilised at this development if required.

Hampshire County Council

Economy, Transport and Environment Department
Elizabeth II Court West, The Castle
Winchester, Hampshire SO23 8UD

Tel: 0300 555 1375 (General Enquiries)
0300 555 1388 (Roads and Transport)
0300 555 1389 (Planning)
Textphone 0300 555 1390
Fax 01962 847055
www.hants.gov.uk

Stuart Magowan
The Civil Engineering Practice
11 Tungsten Building, George Street, Fishergate,
West Sussex
BN41 1RA

Enquiries to	Flood & Water Management	*My reference*	LLFA/Pre-app/2018/0023
Direct line	01962 846730	*Your reference*	C4C 101296239
Date	30th November 2018	*E-mail*	Swm.consultee@hants.gov.uk

Dear Sir,

Re: Land to the south of Lower Road (Manor Farm), Bedhampton PO9 3LH

We refer to your request for pre-application advice on 14th November 2018 and our subsequent meeting on 22nd November 2018.

Pre-application advice
As the Lead Local Flood Authority (LLFA) Hampshire County Council is a statutory consultee for Surface Water Drainage on applications for major development. From 15 April 2015 Hampshire County Council were required to be consulted on these developments when a planning application is received by the Local Planning Authority. Further to this we have a regulatory role in relation to consenting works on ordinary watercourses.

Historic Flooding information
We have reviewed our records of flood incidents for this area and have the following records of flooding within a 500m radius of the site. Any improvements in the run-off from this site may help alleviate further flooding incidents. This does not necessarily mean that other flood events have not occurred, they either may not have been reported or events may have occurred prior to 2012 – HCC records have only been maintained since then. The EA may hold data on flood events prior to this date.

- **13030**: Pluvial flooding event prior to 2012 on Bedhampton Road. Lack of capacity in SW sewer. Gully grates upsized in 2013/14 drainage programme

Please refer to attached map for the location of flooding events.

There is a range of modelling information from the EA which highlights the potential risk from surface water flooding in a GIS format. Each model makes different assumptions regarding drainage provision, permeability of the area, routing around

buildings etc. Therefore, each model should be considered. The different models are as follows:
Areas susceptible to surface water flooding (AStSWf)
Flood Map for Surface Water (FMfSW)
Updated Flood Map for Surface Water (uFMfSW)

It is recommended that all modelling sets are used to assess the site for surface water flooding events and a suitable model be developed. The level of complexity should be site dependant including for topography and permeability of the area.

In general, it is considered that the surface water flood risk within the site boundaries is low and providing flow routes are considered should be manageable. The site is within **Flood Zone 1** only.

For information regarding Fluvial flooding please contact the Environment Agency. Please refer to the following EA website: https://flood-map-for-planning.service.gov.uk/

For information regarding foul flooding, please contact the relevant sewerage provider.

The site is located within the Waterbody Catchment of Hermitage Stream with Main River Bedhampton Brook leading to Hermitage Stream.

Ordinary Watercourse consenting
HCC have no records of Ordinary Watercourse Consents within the search area.

Any works to ordinary watercourses that impact on capacity will require Ordinary Watercourse Consent. Please refer to the HCC OWC website for further information and the forms for consents. Consenting process takes approximately 2 months.

Drainage Assets
Please refer to the attached map which shows Hampshire CC drainage assets.

Please Note: *The data supplied has been compiled from a variety of sources of varying reliability. The data is constantly being revised and validated to ensure the highest accuracy possible. However, the data should not be relied upon or considered completely accurate and the data is provided on the understanding that neither the County Council nor the disclosing officer is to be held responsible should you rely on this data and consequently suffer damage.*

Surface Water drainage
Notes from meeting held between HCC Flood and Water Management Team, The Civil Engineering Practice and Bargate Homes held on 22nd November 2018.

Summary of Development and location:

- The site is located immediately south of Source Protection Zone 1 (Inner Protection). *HCC note that liaison with the EA and Portsmouth Water has already been undertaken*

- The development will be submitted for full planning permission by Bargate Homes.
- 50 dwellings are proposed
- HCC and Southern Water drainage assets are to the north of the site (uphill) therefore not possible to connect to.

Potential existing flooding constraints:

- The site is currently Greenfield therefore proposed discharge rates and volumes must not exceed existing Greenfield runoff rates.
- The site falls to the South-West with the southern boundary formed by the railway in a cutting
- An access bridge over the railway exists and will be retained for future use by the farmer to access land on the southern side of the railway
- The site does not currently flood, nor does it appear to infiltrate following soakage tests carried out to BRE365 in recent months
- There are no watercourses on or near the site to discharge surface water to

Drainage proposals:

- The site is not thought to be suitable for infiltration following site investigations undertaken in accordance with BRE365. *HCC request that all infiltration testing data be included in the surface water management plan as evidence that the site is not suitable for infiltration.*
- Where possible green corridors should be used to take exceedance flows and follow modelled flow routes thereby mimicking the existing situation.
- Surface level SuDS features such as permanent wet ponds would be considered highly beneficial from both a water quality and quantity point of view as well as providing the site with bio-diversity and amenity value and should be considered at the outset. *HCC note that swales, detention basins and some permeable paving is being considered*
- Increased tree planting – particularly within public open space and as tree belts along with areas of vegetation naturally slow down water and increases infiltration. Appropriately selected tree species can intercept up to 60% of rainfall. Trees (and their associated rooting environments) help to reduce flood risk by increasing transpiration (water loss by vegetation), provide rainfall interception, increase infiltration and storage. Further guidance on appropriate tree species for SuDS can be found in the Tree Selector tool produced by the Trees and Design Action Group (Tdag). It is also worth noting that at least two credits are available towards BREEAM certification if SuDS schemes are effectively integrated into a development.
- As stated on the HCC website we would expect to have demonstrated existing Greenfield runoff rates and volumes as well as proposed rates and volumes to reflect existing
- The proposals being considered are to eventually discharge surface water into the ground via a deep bore hole incorporating one additional mitigation step more than is required by the Ciria SuDS Manual (Tables 26.2, 3 and 4 within Chapter 26. *Whilst there are times when deep bore soakaways may be appropriate we would consider this as a drainage option of last resort. A suitable assessment should therefore be provided to prove why other*

systems are not viable. If it is necessary to consider deep bore soakaways, then appropriate silt removal processes/features will be required upstream. We do note that the system proposed for this site does incorporate several SuDS features prior to water entering the bore hole and note that neither Portsmouth Water nor the EA have concerns.

- HCC would expect to see reference made to a maintenance/management plan in the Surface Water Drainage Plan for all SuDS features within the site – who will be responsible for which features. *HCC note that the whole site will be managed through the developer. Details of the management strategy must be provided as part of the Surface Water Plan submission.*
- *We would also recommend consideration of phasing work in particular SuDS features throughout the construction period in order to ensure they are protected and thereby work effectively following completion of the works.*

Drainage Provision
The SuDS Manual Ciria C753 provides best practise and design advice on SuDS design and should be referred to during the design process. Drainage systems should look to mimic the natural processes as far as practicable, collecting and storing / infiltrating rain water as close to the source as possible. If infiltration is not possible, attenuation options should be considered with a controlled outfall so that water leaving the site is minimised and the 'peak runoff value' flattened.

The site geology appears to be located bedrock: Lewes Nodular Chalk formation and Seaford Chal with a superficial layer of: River terrace deposits, Sand, silt, clay http://www.bgs.ac.uk/downloads/start.cfm?id=2920

Vulnerability of site from surface or ground water information

- EA mapping shows that the site is at low risk of surface water flooding.
- The site is at a greater risk of groundwater flooding (greater than 75%) on the eastern side to the western at around 50-75% chance

For further information on the vulnerability of the area from either surface water or river/sea flooding, please see the maps available from the Environment Agency on the .GOV website.

Hampshire also have a draft Groundwater Management Plan that was never published but is available on our website which contains useful information

HCC prepared Surface Water Management Plans which are available on our website however these will be replaced by Catchment Approach Plans over the forthcoming months.

Planning requirements
Hampshire County Council's website lists all the information required when assessing planning applications. This information should be provided within a Flood Risk Assessment, Drainage Strategy, drawings and calculations.
We would recommend the inclusion of an executive summary to provide key information in a more accessible format or the inclusion of our checklist (available in section 3 on our website)

Please note: the Environment Agency guidance relating to climate change was updated in February 2016. A link is provided on the County Council webpage. *We would expect that the system is tested to a 40% climate change uplift.*

We would also expect to see a suitable allowance for urban creep, this factor reflects the future predicted increase of urban development, and with it, the increase of the impervious area. An allowance of 10% on impermeable areas is suitable in relation to confirming that the proposed system is acceptable.

This response has been provided using the best knowledge and information submitted as part of the planning application at the time of responding and is reliant on the accuracy of that information.

If you have any queries on this pre-application advice please contact the FWM Team quoting the above reference.

Regards

FWM Team
fwm@hants.gov.uk

Users' declaration

I understand that in using advice provided by the Hampshire Flood and Water Management Team I am aware of the following:

1. The Flood and Water Management (FWM) Team is part of Hampshire County Council ("We/Us/Our"). The Council holds copyright of this information and advice on behalf of the FWM team except where service level agreements state otherwise. No direct reproduction of this advice will be allowed as a direct copy, except for the purpose of Environment Information Requests.

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5. I am aware of the Hampshire FWM Team charging schedule and understand I may be charged for the advice.

Appendix H
SUDS MANAGEMENT AND MAINTENANCE PLAN

MJA CONSULTING
Civil & Structural Engineers

PROPOSED RESIDENTIAL DEVELOPMENT
PHASE 2 MANOR FARM
BEDHAMPTON
HAMPSHIRE

SUDS MANAGEMENT & MAINTENANCE PLAN

BARGATE HOMES LTD

SEPTEMBER 2021
REF: SS/21/0433/6430

DOCUMENT CONTROL RECORD

Document Issue:

Rev	Date	Issue Status	Prepared by	Checked by
-	24.09.21	First Issue	S. Smith	C. Pendle

References:

The SUDS manual – CIRIA C753 (2015) ISBN 9780-86017-760-9

National Planning Policy Framework (NPPF) – Communities and Local Government
Technical Guidance - Flood Risk & Coastal Change (March 2012)

1 Introduction

1.1 This document sets out the principles for the long term management and maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) installed at the residential development at land adjacent to Lower Road, Bedhampton.

1.2 The purpose of this document is to set out the basis of the development SuDS Maintenance Plan and to ensure that the adopting management company is entrusted with a robust inspection and maintenance programme, ensuring the optimum operation of the surface water drainage network is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).

1.3 The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required. Specific maintenance needs of the SuDS elements should be monitored and maintenance schedules adjusted to suit requirements.

1.4 The installed SuDS system at this development are the initial responsibility of Bargate Homes.
Following installation and after an initial period (TBC) of operation, all SuDS are to be transferred to an appointed Management Company.
An agreement shall be set up by Bargate Homes, who shall confirm in writing to the Principle Planning Officer at Hampshire County Council when the maintenance agreement is completed and is operative.

1.5 The Management Company will then be responsible for maintaining the surface water system including all SuDS in perpetuity. All property owners should be advised that an annual management fee will need to be paid to the management company for this service.

1.6 All those responsible for maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) for all activities listed within this report including lone working, if relevant) and risk assessments should always be undertaken.

1.7 Any contractor employed by the Management Company shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this report. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

1.8 This report is to read in conjunction with MJA drawing '*5992:P01 'Drainage Strategy'* for the location of all SuDS elements present within the development. Reference should also be made to the detailed landscape proposals for the proposed treatment / maintenance regime for all landscape features. The operations contained within this plan shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

2 SuDS Layout & Design

2.1 The storm water drainage strategy for the proposed development is to utilise a range of SuDS features to attenuate all surface water runoff from impermeable areas, with a restricted discharge via a flow control into deep borehole soakaways.

2.2 The proposed storm water system consists of the following drainage and SuDS components:

- Attenuation Basin
- Storm water pipe work and road gullies
- Flow control chambers
- Outfall headwall
- Up-Flo Filter
- Penstock Valve

2.3 There are three categories of maintenance activities referred to in this report:

- **Regular maintenance** (including inspections and monitoring).
  Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.
- **Occasional maintenance**
  Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).
- **Remedial maintenance**
  Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design.
  Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

2.4 It is also important that measures are taken to protect and ensure continued operation of drainage features during the construction phase. All road gullies will be blocked until the site is complete. Mesh will be placed over the outfalls and swales to prevent construction silts clogging up the drainage system and basins. The penstock valve will be set to the **CLOSED** position until all construction is complete on site. Any permeable paving will be capped with a layer of concrete during construction and cored through once the majority of the construction is complete.

3 SUDS Management & Maintenance

3.1 Storm water pipe work and road gullies

3.2 The key maintenance requirement for the upstream surface water drainage system includes the removal of sediments and debris from the system as required.

3.3 All storm water pipe work should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once year.
As road gullies are the first on the treatment train and susceptible to higher silt loadings, these will need to be inspected a minimum of monthly for the first three months after installation and then a minimum of every four months.

3.4 During this inspection identify any gully pots or pipes that require remedial maintenance such removal of sediment, debris, leaves and litter as required.
This involves the removal all protective covers and grids and the cleaning out of channels or gully pots by hand or with suitable jetting equipment.

3.5 During the inspections the general operation and structural integrity of all components should be recorded and repaired as required.

3.6 Flow Control Chamber

3.7 The key maintenance requirement for the flow control chambers will be the inspection of the units for blockages of the vortex flow control unit and silt removal from sump of chamber.

3.8 The hydraulic vortex flow control unit has no moving parts and is self-activating, requiring minimal maintenance. After initial installation, it is recommended that the unit be inspected monthly for three months.

3.9 Thereafter the manhole chamber and control device should be inspected at least every six months to verify the condition and operation of the unit and check for blockages within the inlet of the chamber and of the flow control device. During these inspections, accumulated silts should be removed and the sump cleaned out using a conventional sump vacuum cleaner. Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

3.10 Outfall Headwalls

3.11 Outfall headwalls should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once a year.
Accumulated sediments, debris and any overgrown vegetative material should be removed from the culvert and margins of the outlet headwalls as necessary.

3.12 During the inspections the general operation, and structural condition of the headwall and any erosion of banks or scour control features should be identified and rehabilitated as required.

3.13 Attenuation Basins

Key Maintenance Requirements:

- Litter/trash removal
- Inlet/outlet headwall inspection and cleaning
- Vegetation management
- Sediment monitoring and removal when required

3.14 Regular inspection and maintenance is important for the effective operation of the attenuation basin.
The basin will be subject to a routine monitoring and maintenance schedule as part of the general site management.
This will be carried out at intervals detailed below, and shall comprise of the following operations:
Collection and removal of all litter/large debris from the attenuation pond, inlets, outflows, and water margins once a month.
Monthly inspection of the attenuation ponds to check the following, and repair as necessary:
1. Any failure in the operation of the inlet and outlet headwalls unless adopted by others in which case they will be notified of any observed defect.
2. Any damage or erosion to the perimeter edges and slopes of the attenuation ponds.

3.15 The attenuation basin will be sown with two grassland seed mixes to create a simple mosaic of grassland habitat. The floor of the basin will be seeded with a wet meadow mix (WF2), whilst the banks will be seeded with a standard wildflower meadow mix (WF1) as detailed on the landscape proposals drawings.

3.16 **Ground preparation**
The basin should be constructed of predominantly low fertility subsoil, with only a thin upper layer of topsoil to be left after ground modelling to take up in-perfections in the soil surface. Final surface to be harrowed / fully cultivated to break-up large soil clods.
The basin area should then be continually cultivated of a period of several weeks to remove unwanted surface vegetation and weeds prior to meadow seeding.
No herbicide is to be used due to the sensitive location for the basin construction. The ground should be cultivated to form a medium tilth and basin to be seeded at the recommended sowing rate, followed by light rolling (if necessary) throughout the meadow area.

3.17 **Landscape Maintenance (Year 1)**
In the first year, meadow areas should be managed more intensively to prevent the intrusion of invasive ground flora and allow a diverse sward to develop. The first cut should occur when the grass reaches approximately 100mm, down to 50mm, followed by subsequent cuts every 4-6 weeks down to 50mm throughout the first growing season.

Meadow areas should be monitored to assess the growth of any invasive species and grassland areas should be hand-weeded or spot swiped for any perennial weeds such as docks, nettles and ragwort.

3.18 **Landscape Maintenance (Year 2 onwards)**
Meadow areas will be maintained with a bi-annual cuts in May / June and after seed has dropped in late September. Meadow grassland should be cut to a height of approximately 100mm. All arising should be allowed to lay in–situ for 24 hours before being removed from site in order to allow any wildlife using the basin to disperse.
No fertiliser should be added to the grassland at any time and an annual monitoring visit to the grassland should be conducted to inform management that may be required.

3.19 An annual check carried out by a suitably qualified person, to assess the condition and operation of the attenuation basin inlet and outflow, and the accumulation of silt/sediment.

3.20 A record of maintenance visits and remedial operations shall be maintained.

3.21 The above operations shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

Basin Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter, debris and trash removal.	Monthly.
	Grass cutting – for landscaped areas 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).
Occasional maintenance	Re-seed areas of poor vegetation growth.	Annually, or as required.
	Prune and trim trees and remove cuttings.	As required.
	Remove sediment from pre-treatment system when 50% full.	As required.
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing.	As required.
	Realignment of rip-rap.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect banksides, structures, pipework, etc for evidence of physical damage.	Monthly.
	Inspect inlets and pre-treatment systems for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
	Inspect infiltration surfaces for compaction and ponding.	Monthly.

3.22 **Desilting of Attenuation Basins**
In addition to regular routine items, SuDS maintenance will be carried out which may include de-silting the attenuation ponds, usually on a 10-15 year cycle depending on the on-going silt level checking.
This can be an intrusive operation when carried out within housing areas and prior to any planned desilting or dredging, consultation will be undertaken with both Buckinghamshire County Council and the Environment Agency.

3.23 Before any desilting operations are carried out, residents and members of the public in the general area will be informed and those in the immediate vicinity will be notified in writing well in advance of commencement of works.

3.24 The desilting work will be carried out under the supervision of consulting engineers and to a pre-agreed method statement. Such a method statement should be submitted in writing to the local authority and agreed in advance of the commencement of the works.

3.25 Prior to desilting works commencing, a suitably qualified ecologist shall be appointed to undertake an assessment of the ecological interest within the pond and its margins. In the event that the attenuation ponds develop particular ecological interest, then careful consideration will be given to the timing of this operation.

3.26 Up-Flo™ Filter (by Hydro International)

3.27 The Up-Flo Filter is a modular high-rate stormwater filtration device.
The frequency of the maintenance interval can be site specific and generally the first year of inspections and monitoring of pollutant accumulations will determine the required future maintenance intervals.

3.28 The inspection of the device is a simple process that requires monitoring of pollutant accumulations.
The key maintenance activities include floatable, oil and sediment removal, media pack replacement and drain down filter replacement.
Maintenance consists of removing sediments, floatable trash, oils, and other debris from the sump with a standard vacuum tanker. The media bags are easily replaced by hand, with no heavy lifting equipment required.

3.29 Recommended Equipment

- Safety Equipment and Personal Protective Equipment
- Scale to measure the weight of the filter bags
- Tools to remove grate or cover
- Pole with skimmer or net
- Sediment probe
- Hydro International Up-Flo™ Filter Maintenance Log
- Rubbish bags for removed floatables

3.30 Inspection Procedures

1. Set up any necessary safety equipment to provide access to the Up-Flo™ Filter.
Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or cover to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe measure the depth of sediment that has collected in the sump of the vessel. Maximum sediment depth is 400 mm.

6. Remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (refer to manufacturer's specification for replacement procedures).
Weigh the filter bags from one or two modules. Filter bags should be replaced if the wet weight exceeds 18kg.
7. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level (Standing water level is no higher than the base of the filter module).
8. Securely replace the grate or lid.
9. Remove safety equipment.
10. Contact Hydro International on 01275 878371 to discuss any irregularities noted during inspection or for further information.

3.31 First-Year Monitoring

Hydro International recommends that inspections be performed at least every six months during the first year of operation.
Use the following guidelines for determining maintenance intervals:

• Floatables and Oil Monitoring:
The water surface in the Up-Flo™ Filter should be monitored for accumulation of floatables and oil.
Floatables should not be allowed to accumulate to the point where they completely cover the surface of the water.
Oil should not be allowed to accumulate to the point where it has formed a measurable thickness on the surface of the water.
The rate of floatables and oil accumulation can be estimated by dividing the surface area covered by floatables and/or oil by the number of months since the Up-Flo™ Filter was installed.

• Sediment Monitoring:
A simple probe should be used to determine the depth of sediment in the sump.
The maximum allowable sediment depth in a typical 1200 mm diameter manhole equipped with an Up-Flo™ Filter is 400 mm.
In any case, sediment must be removed before it blocks the inlet to the Drain Down Filter.
The rate of sediment accumulation can be estimated by dividing the measured depth of sediment by the number of months since the Up-Flo™ Filter was installed.

• Media Pack Monitoring:
Filter bags should be weighed to determine the amount of particles that have been captured in the bags. Filter bags from one or two modules should be weighed.
Spent filter bags weigh approximately 18kg wet. The rate of filter bag clogging can be estimated by subtracting the wet weight of a new bag (approximately 9 kg) from the measured wet weight of the bags being checked and dividing by the number of months since the bags were installed.

• Drain Down Filter Monitoring:
The water level in the Up-Flo™ Filter should be monitored to ensure that the Drain Down Filter is operating properly. One to two days after a significant rainfall, the water level inside the vessel should have dropped to a point where it is equal with the base of the Filter Modules.
If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris. If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.
The rate of Drain Down Filter clogging can be estimated by noting the number of months since the Up-Flo™ Filter was installed.

3.32 Floatables, Oil, and Sump Cleanout

A commercially or council owned vac-truck is used to remove captured sediment, oil and floatables.
Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vac-truck hose and skimmer pole to be lowered to the base of the sump.

Scheduling
• Floatables and sump cleanout may typically be done during any season of the year.
• Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area.

Procedures
1. Set up any necessary safety equipment around the access of the Up-Flo™ Filter.
Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. If the standing water level in the sump is above the base of the Filter Modules, tug the Pull Chain(s) to release the Drain Down Plug(s). Allow the excess water to drain out of the chamber.
5. Use the skimmer pole to fit the Drain Down plug back into the open port.
6. Once all floatables have been removed, drop the vactruck hose to the base of the sump. Vac-truck out the sediment and gross debris from the sump floor.
7. Retract the vac-truck hose from the vessel.
8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragged materials from the surface using a hose or other screen-cleaning device.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
10. Securely replace the grate or lid.
11. Remove safety equipment.
12. Contact Hydro International on 01275 878371 to discuss any irregularities noted during cleanout.

3.33 Replacement of Media Packs and Drain Down Filter

Unless the Up-Flo™ Filter has been installed as a very shallow unit, it is necessary to have an confined space entry trained person enter the vessel to replace Media Packs.

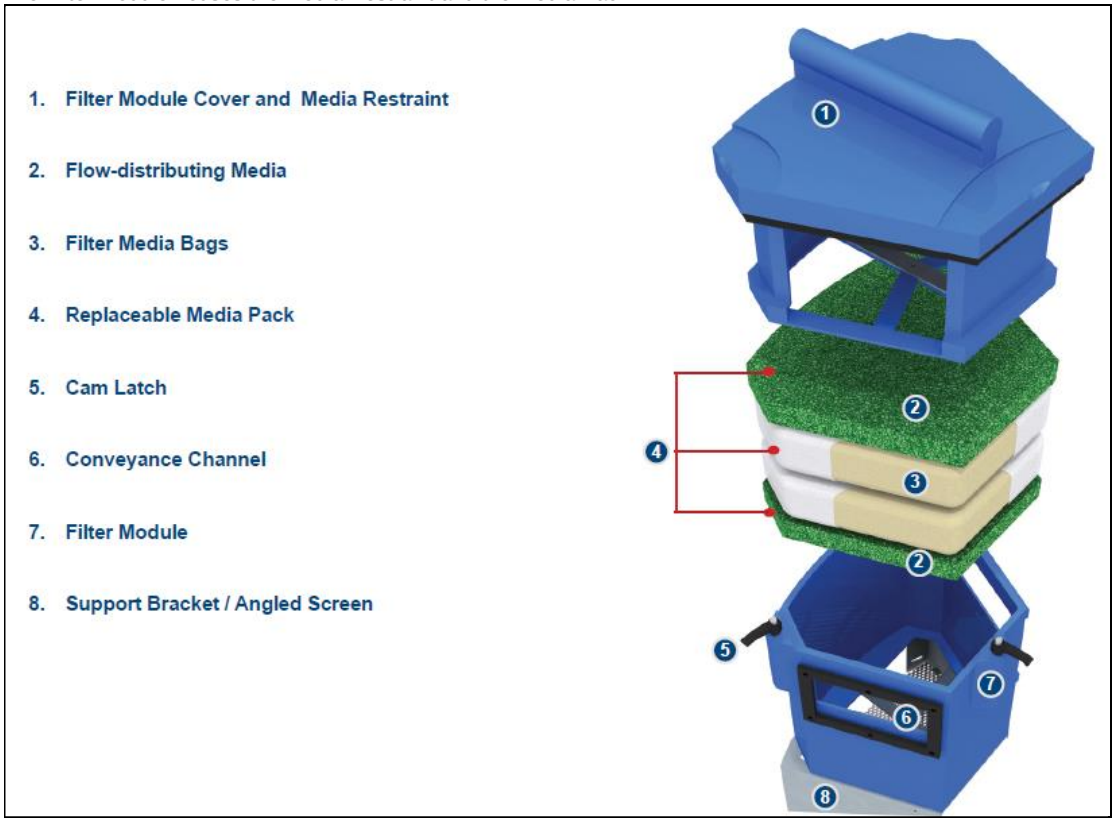
Scheduling

• Call Hydro International on 01275 878371 to order replacement Media Packs and Drain Down filter prior to scheduling maintenance.
• Because Media Pack replacement requires entry into the Up-Flo™ chamber, maintenance events should be scheduled during dry weather.
• Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.

Procedures

1. Follow Floatables and Sump Cleanout Procedures, 1 – 10.
2. Following Confined Space Entry procedures, enter the Up-Flo™ Filter Chamber.
3. Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid 1 to gain access to the Media Pack
4. Remove and discard the spent Media Pack. The Media Pack contents include:
• A top layer of green Flow-Distributing Media.
• Two Media Bags equipped with nylon handles.
• A bottom layer of green 2 Flow-Distributing Media.
5. Insert a new Media Pack, supplied by Hydro International.
• First, insert a bottom layer of green Flow-Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
• Next, insert the first of two replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
• Insert the second Media Bag, following the same procedure.
• Insert the top layer of green Flow-Distributing Media.
Be sure that the piece fits snugly against the walls and corners of the Filter Module.
• Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.
6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module DO NOT DISCARD THIS PIECE.
7. Install new Drain Down Filter supplied by Hydro International.
8. Exit the Up-Flo™ Filter chamber and securely replace the grate or lid.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured.
Note the number of Media Packs replaced.
Note any irregularities such as damaged components or blockages.
10. Remove safety equipment.
11. Dispose of spent media packs at your local landfill, following local regulations.
12. Return the spent Drain Down Filter to Hydro International.
13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

The Filter Module houses the Media Restraint and the Media Pack



Up-Flo Filter Operation and Maintenance Requirements

ACTIVITY	FREQUENCY
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Media Pack Replacement	- Once per year or as needed - Following a contaminated spill in the drainage area
Drain Down Filter Replacement	- Once per year with Media Pack replacement - As needed, in the event of continuous base flow conditions

3.34 For further detailed inspection and maintenance information and procedures refer to the manufacture's document 'Up-Flo Filter Operating and Maintenance Manual'.

3.35 To order replacement parts contact Hydro International on:
Tel: 01275 878371 (Monday to Friday 9.00 am to 5.30 pm)
Fax: 01275 874979
Email: enquiries@hydro-international.co.uk

3.36 Penstock Valve

A penstock valve is included within the SuDS train to act as an emergency shut off in the instance of a spillage event. If pollution such as an oil spill is seen within the development then the shut-off valve must be set to the off position immediately and the management company contacted. The Environment Agency should also be contacted immediately on their incident hotline: **0800 80 70 60**.

4 Contact Information

For further information on the management and maintenance of SuDS on the development please contact:

MJA Consulting
Ipsum Court
24 The Quadrant
Abingdon Science Park
Oxfordshire
OX14 3YS

Tel: 01235 555173
Email: mail@mjaconsulting.co.uk

MJA CONSULTING
Civil & Structural Engineers

Monarch House • Abingdon Science Park
Barton Lane • Abingdon • Oxon • OX14 3NB
Tel: (01235) 555173 • www.mjaconsulting.co.uk