

LAND NORTH OF SOLENT ROAD (ADJACENT TO BOSMERE MEDICAL CENTRE), HAVANT.

Planning Ref: APP/21/00601

Consolidated Response to Environment Agency, Portsmouth Water and LLFA

Environment Agency Letter, ref: HA/2021/123441/01 – dated 17 August 2021

The submitted FRA is based upon the assumption of modelling outputs that have not been reviewed by us for planning purposes. The modelling undertaken by the Applicant places the site within Flood Zone 1, which is contrary to our Flood Map for Planning which places the site largely within Flood Zone 3 (i.e. an area at high risk of flooding). The FRA does not therefore adequately assess the flood risks posed by the development. This is because its contents are based upon the outputs of modelling that we have not had the opportunity to scrutinise and ultimately verify for practical use in the allocation of Flood Zones.

I&L Response:

Arden modelling files have been submitted to the Environment Agency direct on the 25th of October 2021. Arden are in discussion with the Environment Agency over the model submitted and working on agreeing the results.

Havant Planning and Development email from Santiago Manzanero – dated 28 September 2021

- *Detailed drainage layout drawings at an identified scale indicating catchment areas, referenced drainage features, manhole cover and invert levels and pipe diameters, lengths, and gradients.*
- *Detailed network hydraulic calculations for all rainfall events, including the listed below. The hydraulic calculations should take into account the connectivity of the entire drainage features including the discharge location. The results should include design and simulation criteria, network design and result tables, manholes schedule tables and summary of critical result by maximum level during the 1 in 1, 1 in 30 and 1 in 100 (plus an allowance for climate change) rainfall events. The drainage features should have the same reference that the submitted drainage layout.*
- *Additionally, and since the proposed outfall will be within the fluvial flood extent, the hydraulic calculations should include a surcharged outfall equivalent to the predicted 1 in 100-year flood level showing how that event will be managed safely.*
- *Confirmation that sufficient water quality measures have been included to satisfy the methodology in the Ciria SuDS Manual C753.*

- *Exceedance plans demonstrating the flow paths and areas of ponding in the event of blockages or storms exceeding design criteria.*

I&L Response:

Please see **Appendix A** attached which provides requested layout plan along with calculations and comments to address all points raised above.

Portsmouth Water Ltd letter dated 17 August 2021

Condition 1 – Surface Water Drainage

No development shall take place until a surface water drainage scheme, based on sustainable drainage principles and a comprehensive assessment of the hydrological and hydrogeological context of the development, has been submitted to and approved in writing by the local planning authority in consultation with the Environment Agency and Portsmouth Water. The scheme shall subsequently be implemented in accordance with the approved details before any building within that phase is occupied. Details of how the scheme shall be maintained and managed after completion shall also be included.

I&L Response:

The flood risk assessment submitted as part of the planning pack has addressed the drainage design for the site along with relevant SUDS for the site. The attached detailed drainage plan along with calculations show how these SUDS features have been incorporated into the drainage for the proposed development, therefore no condition required.

Condition 2- Foul Water Drainage

No phase of development shall commence until such time as a scheme to dispose of foul water has been submitted to, and approved in writing by, the local planning authority in consultation with the Environment Agency, Portsmouth Water and Southern Water.

The scheme shall be implemented in accordance with the timetable agreed as part of the approved scheme. The scheme shall also include:

- *details of how the scheme shall be maintained and managed after completion.*
- *details of the sewage pipe work layout and specifications.*

I&L Response:

The attached detailed drainage plan shows the diversion of the Southern Water public foul water sewer along with the proposed drainage for the site. This public sewer diversion has been agreed with Southern Water, see correspondence attached (**Appendix B**), therefore no condition required.

Condition 3- Unidentified Contamination

If, during development, contamination not previously identified is found to be present at the site then the local planning authority must be notified immediately. No further development (unless otherwise agreed in writing with the local planning authority in consultation with the Environment Agency and Portsmouth Water) shall be undertaken in that phase until the developer has submitted and had approved a site investigation, risk assessment and remediation strategy report, detailing how to mitigate the contamination identified. The remediation strategy approved by the local planning authority shall be implemented in full before development in that phase recommences.

I&L Response:

A watching brief will be implemented during the construction process. A typical example of a Discovery Strategy has been included with this response which will form part of the tender pack, see **Appendix C**.

Condition 4- Piling & Foundations

Piling or deep foundation using penetrative methods shall not be carried out other than with the written consent of the local planning authority in consultation with the Environment agency and Portsmouth Water. The development shall be carried out in accordance with the approved details.

I&L Response:

The proposal is to use CMC (controlled Modulus Columns) at this site. This method of construction is well known and accepted on sensitive sites. A foundation risk assessment has been completed by TRC for this site which shows the proposed foundation solution is appropriate for this site, see **Appendix D**.

Condition 5- Construction Environmental Management Plan (CEMP)

No development shall commence until a construction environmental management plan (CEMP) has been submitted to and approved in writing by the Planning Authority in consultation with Portsmouth Water detailing all pollution mitigation measures to be adopted during the construction phase. This should include management of overland runoff, storage of hazardous materials, chemical and hydrocarbons on site and temporary drainage infrastructure to ensure that water resources are not put at risk from leaks or spillages.

I&L Response:

CEMP has been submitted as part of the original planning submission, therefore no condition required.

APPENDIX A (HAVANT PLANNING EMAIL)

DETAILED DRAINAGE LAYOUT & DESIGN CALCULATIONS

LINEAR DRAINAGE CHANNEL (LDC) SCHEDULE

CHANNELS TO BE DESIGNED BY SPECIALIST BASED ON 50mm/hr RAINFALL INTENSITY, A 5yr RETURN PERIOD AND THE FOLLOWING PARAMETERS:

CHANNEL REFERENCE	LOCATION	AREA DRAINED	LENGTH	GROUND LEVEL BOX	OUTLET	PIPE	DUTY	PREFERENCE
A	SERVICE YARD	2,002m²	77.15m	5.020	2ND END	2250	D400	SLOT
B	ACCESS ROAD	6,007m²	22.55m	24.683	1ND END	2250	C250	KERB DRAIN
C	ACCESS ROAD	2376m²	105.85m	25.43-24.66	1ND END	3000	D400	KERB DRAIN

NUMBER & SPACING OF ACCESS BOXES TO BE SPECIFIED BY SUPPLIER OUTLET BOXES TO BE SILT TRAP DEEP HEAVY DUTY. OUTFALL BOXES TO HAVE SUMP AS FIRST STAGE OF TREATMENT

ATTENUATION TANK - 1

CONTRACTOR TO OBTAIN DESIGN/QUOTE FROM SUPPLIER BASED ON FOLLOWING PARAMETERS

SIZE	50.5 x 13.5 x 0.80m (545m³)
GROUND LEVEL	5.072m-5.296m
TANK TOP	3.600m
TANK BASE	2.800m
ALLOW FOR VENTING, BEDDING & SURROUND, MEMBRANE WITH WELDED JOINTS	

POROUS PAVING 1 & 2

CONTRIBUTING AREA	PP1 1,295m²	PP2 1,563m²
POROUS PAVEMENT SUBBASE AREA	1,038m²	1,420m²
SUBBASE STORAGE DEPTH REQUIRE FOR 100%+40%CC	300mm	300mm
BASE LEVEL	4.800m	5.075m
OUTFALL RESTRICTED BY Ø150 PIPE		

PETROL INTERCEPTOR

CONTRACTOR TO OBTAIN DESIGN/QUOTE FROM SUPPLIER BASED ON FOLLOWING PARAMETERS

AREA DRAINED	3,260m²
IL IN	Ø300 @ 3.428m
IL OUT	Ø300 @ 3.328m
ALLOW FOR CONCRETE SURROUND, POWER SUPPLY, CONTROL PANEL, VENTING AND HIGH LEVEL ALARM	

SURFACE WATER PUMP

CONTRACTOR TO OBTAIN DESIGN/QUOTE FROM SUPPLIER BASED ON FOLLOWING PARAMETERS

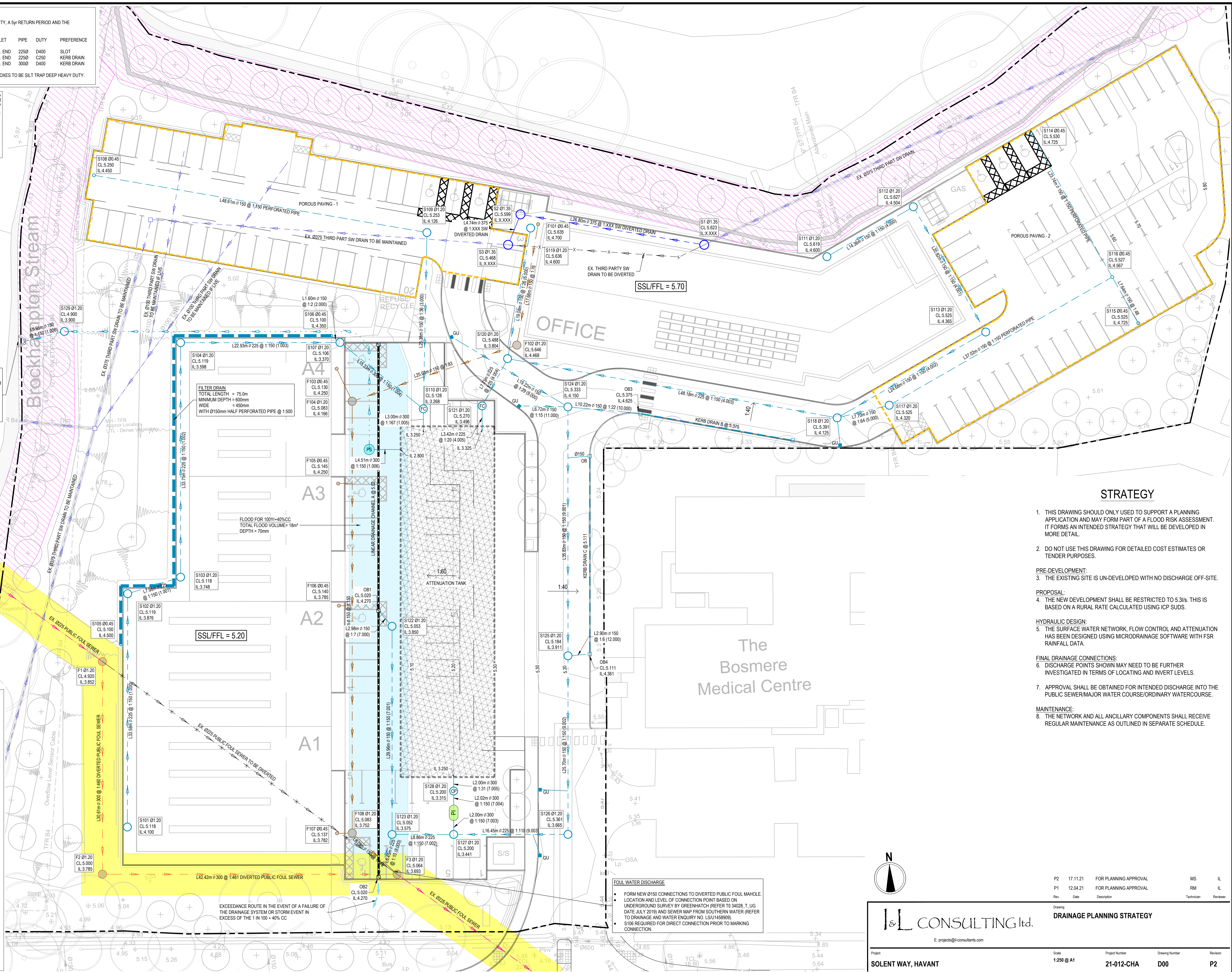
CHAMBER CL	5.040m
CHAMBER IL	2.695m
DISHCHARGE RATE	5.30 l/s
RISE MAIN 60m FROM 2.695m TO 3.900m	

STORM WATER DISCHARGE

- WORKS SUBJECT TO WATERCOURSE CONSENT WITH LOCAL COUNCIL.
- DISCHARGE TO EXISTING DITCH VIA NEW CONCRETE BAGWORK HEADWALL.
- PIPE IL 3.860m
- CHANNEL BASE XXXXXm
- TOP OF BANK 4.990m

LEGEND

EXISTING PUBLIC FOUL WATER SEWER	NEW FOUL WATER PIPE	NEW FOUL WATER INSPECTION CHAMBER	NEW FOUL WATER MANHOLE
EXISTING THIRD PARTY STORM WATER DRAIN	NEW STORM WATER PIPE	NEW STORM WATER INSPECTION CHAMBER	NEW STORM WATER MANHOLE
DIVERTED THIRD PARTY STORM WATER DRAIN	NEW STORM WATER CATCHMENT MANHOLE	NEW STORM WATER FILTER CHAMBER	NEW HYDROBRAKE
PETROL INTERCEPTOR	GULLY	LINEAR DRAINAGE CHANNEL	KERB CHANNEL
PROPOSED CELLULAR STORAGE	POROUS PAVING	6m DRAINAGE EASEMENT	8m BUFFER ZONE TO THE EDGE OF WATERCOURSE
SITE BOUNDARY			



STRATEGY

- THIS DRAWING SHOULD ONLY USED TO SUPPORT A PLANNING APPLICATION AND MAY FORM PART OF A FLOOD RISK ASSESSMENT. IT FORMS AN INTENDED STRATEGY THAT WILL BE DEVELOPED IN MORE DETAIL.
- DO NOT USE THIS DRAWING FOR DETAILED COST ESTIMATES OR TENDER PURPOSES.

PRE-DEVELOPMENT:
3. THE EXISTING SITE IS UN-DEVELOPED WITH NO DISCHARGE OFF-SITE.

PROPOSAL:
4. THE NEW DEVELOPMENT SHALL BE RESTRICTED TO 5.3 l/s. THIS IS BASED ON A RURAL RATE CALCULATED USING ICP SUDS.

HYDRAULIC DESIGN:
5. THE SURFACE WATER NETWORK, FLOW CONTROL AND ATTENUATION HAS BEEN DESIGNED USING MICRODRAINAGE SOFTWARE WITH FSR RAINFALL DATA.

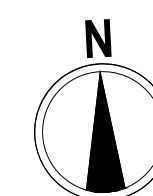
FINAL DRAINAGE CONNECTIONS:
6. DISCHARGE POINTS SHOWN MAY NEED TO BE FURTHER INVESTIGATED IN TERMS OF LOCATING AND INVERT LEVELS.

7. APPROVAL SHALL BE OBTAINED FOR INTENDED DISCHARGE INTO THE PUBLIC SEWER/MAJOR WATER COURSE/ORDINARY WATERCOURSE.

MAINTENANCE:
8. THE NETWORK AND ALL ANCILLARY COMPONENTS SHALL RECEIVE REGULAR MAINTENANCE AS OUTLINED IN SEPARATE SCHEDULE.

P2	17.11.21	FOR PLANNING APPROVAL	MS	IL
P1	12.04.21	FOR PLANNING APPROVAL	RM	IL
Rev.	Date	Description	Technician	Reviewer

DRAINAGE PLANNING STRATEGY



I&L CONSULTING Ltd.

E: projects@i-consultants.com

Project	Scale	Project Number	Drawing Number	Revision
SOLENT WAY, HAVANT	1:250 @ A1	21-012-CHA	D00	P2

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.316	4-8	0.346	8-12	0.011

Total Area Contributing (ha) = 0.674

Total Pipe Volume (m³) = 14.956

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	33.580	0.224	149.9	0.044	4.00	0.0	0.600	o	225	Pipe/Conduit
1.001	7.980	0.053	150.6	0.044	0.00	0.0	0.600	o	225	Pipe/Conduit
1.002	33.750	0.225	150.0	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit
1.003	22.930	0.153	150.0	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit
2.000	1.470	0.580	2.5	0.065	8.00	0.0	0.600	o	150	Pipe/Conduit
1.004	15.330	0.102	150.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
3.000	25.380	0.708	35.8	0.000	4.00	0.0	0.600	o	150	Pipe/Conduit
1.005	3.000	0.018	166.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
4.000	14.360	0.096	149.6	0.025	4.00	0.0	0.600	o	150	Pipe/Conduit
4.001	20.820	0.139	149.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
4.002	24.680	0.165	149.6	0.016	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	4.100	0.044	0.0	1.07	42.4
1.001	3.876	0.088	0.0	1.06	42.3
1.002	3.823	0.131	0.0	1.07	42.4
1.003	3.598	0.174	0.0	1.07	42.4
2.000	4.100	0.065	0.0	6.38	112.7
1.004	3.370	0.239	0.0	1.28	90.5
3.000	4.126	0.000	0.0	1.69	29.8
1.005	3.268	0.239	0.0	1.22	85.9
4.000	4.600	0.025	0.0	0.82	14.5
4.001	4.504	0.025	0.0	0.82	14.5
4.002	4.365	0.041	0.0	0.82	14.5

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
5.000	7.700	0.120	64.2	0.000	4.00	0.0	0.600	o	150	Pipe/Conduit
4.003	48.480	0.321	151.0	0.044	0.00	0.0	0.600	o	225	Pipe/Conduit
6.000	19.080	0.721	26.5	0.025	4.00	0.0	0.600	o	150	Pipe/Conduit
4.004	7.730	0.308	25.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
4.005	3.420	0.171	20.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
7.000	2.980	0.420	7.1	0.100	4.00	0.0	0.600	o	150	Pipe/Conduit
7.001	29.960	0.200	149.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
8.000	6.450	0.620	10.4	0.100	4.00	0.0	0.600	o	150	Pipe/Conduit
7.002	8.860	0.059	150.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
5.000	4.320	0.000	0.0	1.26	22.2
4.003	4.125	0.085	0.0	1.06	42.2
6.000	4.600	0.025	0.0	1.97	34.7
4.004	3.804	0.110	0.0	2.62	104.3
4.005	3.496	0.110	0.0	2.94	116.9
7.000	4.270	0.100	0.0	3.81	67.3
7.001	3.850	0.100	0.0	0.82	14.5
8.000	4.270	0.100	0.0	3.14	55.5
7.002	3.575	0.200	0.0	1.06	42.3

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
9.000	19.220	0.669	28.7	0.017	4.00	0.0	0.600	o	150	Pipe/Conduit
10.000	10.220	0.475	21.5	0.018	4.00	0.0	0.600	o	150	Pipe/Conduit
11.000	6.720	0.450	14.9	0.000	4.00	0.0	0.600	o	150	Pipe/Conduit
9.001	35.830	0.239	149.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
12.000	2.900	0.450	6.4	0.056	4.00	0.0	0.600	o	150	Pipe/Conduit
9.002	25.700	0.171	150.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
9.003	16.450	0.149	110.4	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit
7.003	2.000	0.013	153.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
7.004	2.000	0.013	153.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
9.000	4.819	0.017	0.0	1.89	33.3
10.000	4.625	0.018	0.0	2.18	38.5
11.000	4.600	0.000	0.0	2.62	46.3
9.001	4.150	0.035	0.0	0.82	14.5
12.000	4.361	0.056	0.0	4.00	70.6
9.002	3.911	0.091	0.0	0.82	14.4
9.003	3.665	0.125	0.0	1.24	49.5
7.003	3.441	0.325	0.0	1.27	89.4
7.004	3.328	0.325	0.0	1.27	89.4

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
7.005	2.000	0.065	30.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
1.006	4.510	0.030	150.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
1.007	59.374	-1.130	-52.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
1.008	5.950	0.040	148.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
7.005	3.315	0.325	0.0	2.84	201.1
1.006	2.800	0.674	0.0	1.28	90.5
1.007	2.770	0.674	0.0	0.00	0.0
1.008	3.900	0.674	0.0	0.82	14.5

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S101	5.118	1.018	Open Manhole	1200	1.000	4.100	225				
S102	5.119	1.243	Open Manhole	1200	1.001	3.876	225	1.000	3.876	225	
S103	5.118	1.295	Open Manhole	1200	1.002	3.823	225	1.001	3.823	225	
S104	5.119	1.521	Open Manhole	1200	1.003	3.598	225	1.002	3.598	225	
S106	5.100	1.000	Open Manhole	450	2.000	4.100	150				
S107	5.106	1.736	Open Manhole	1200	1.004	3.370	300	1.003	3.445	225	
								2.000	3.520	150	
S109	5.253	1.127	Open Manhole	1200	3.000	4.126	150				
S110	5.128	1.860	Open Manhole	1200	1.005	3.268	300	1.004	3.268	300	
								3.000	3.418	150	
S111	5.619	1.019	Open Manhole	1200	4.000	4.600	150				
S112	5.627	1.123	Open Manhole	1200	4.001	4.504	150	4.000	4.504	150	
S113	5.525	1.160	Open Manhole	1200	4.002	4.365	150	4.001	4.365	150	
S117	5.525	1.205	Open Manhole	1200	5.000	4.320	150				
S118	5.391	1.266	Open Manhole	1200	4.003	4.125	225	4.002	4.200	150	
								5.000	4.200	150	
S119	5.636	1.036	Open Manhole	1200	6.000	4.600	150				
S120	5.488	1.684	Open Manhole	1200	4.004	3.804	225	4.003	3.804	225	
								6.000	3.879	150	
S121	5.270	1.774	Open Manhole	1200	4.005	3.496	225	4.004	3.496	225	
OB1	5.020	0.750	Open Manhole	600 x 600	7.000	4.270	150				
S122	5.050	1.200	Open Manhole	1200	7.001	3.850	150	7.000	3.850	150	
OB2	5.020	0.750	Open Manhole	600 x 600	8.000	4.270	150				
S123	5.050	1.475	Open Manhole	1200	7.002	3.575	225	7.001	3.650	150	
								8.000	3.650	150	
GU	5.269	0.450	Open Manhole	600 x 600	9.000	4.819	150				
OB3	5.375	0.750	Open Manhole	600 x 600	10.000	4.625	150				
GU	5.347	0.747	Open Manhole	600 x 600	11.000	4.600	150				
S124	5.333	1.183	Open Manhole	1200	9.001	4.150	150	9.000	4.150	150	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN Invert Level (m)	Diameter (mm)	Pipes In PN Invert Level (m)	Diameter (mm)	Backdrop (mm)
							10.000	4.150	150
							11.000	4.150	150
OB4	5.111	0.750	Open Manhole	600 x 600	12.000	4.361	150		
S125	5.184	1.273	Open Manhole	1200	9.002	3.911	150	9.001	3.911
							12.000	3.911	150
S126	5.361	1.696	Open Manhole	1200	9.003	3.665	225	9.002	3.740
S127	5.200	1.759	Open Manhole	1200	7.003	3.441	300	7.002	3.516
							9.003	3.516	225
PI	5.200	1.872	Junction		7.004	3.328	300	7.003	3.428
S128	5.200	1.885	Open Manhole	1200	7.005	3.315	300	7.004	3.315
TANK	5.072	2.272	Junction		1.006	2.800	300	1.005	3.250
							4.005	3.325	225
							7.005	3.250	300
PS	5.040	2.270	Open Manhole	1500	1.007	2.770	150	1.006	2.770
S129	4.900	1.000	Open Manhole	1200	1.008	3.900	150	1.007	3.900
	4.990	1.130	Open Manhole	0		OUTFALL		1.008	3.860
									150

No coordinates have been specified, layout information cannot be produced.

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	S101	5.118	4.100	0.793	Open Manhole	1200
1.001	o	225	S102	5.119	3.876	1.018	Open Manhole	1200
1.002	o	225	S103	5.118	3.823	1.070	Open Manhole	1200
1.003	o	225	S104	5.119	3.598	1.296	Open Manhole	1200
2.000	o	150	S106	5.100	4.100	0.850	Open Manhole	450
1.004	o	300	S107	5.106	3.370	1.436	Open Manhole	1200
3.000	o	150	S109	5.253	4.126	0.977	Open Manhole	1200
1.005	o	300	S110	5.128	3.268	1.560	Open Manhole	1200
4.000	o	150	S111	5.619	4.600	0.869	Open Manhole	1200
4.001	o	150	S112	5.627	4.504	0.973	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	33.580	149.9	S102	5.119	3.876	1.018	Open Manhole	1200
1.001	7.980	150.6	S103	5.118	3.823	1.070	Open Manhole	1200
1.002	33.750	150.0	S104	5.119	3.598	1.296	Open Manhole	1200
1.003	22.930	150.0	S107	5.106	3.445	1.436	Open Manhole	1200
2.000	1.470	2.5	S107	5.106	3.520	1.436	Open Manhole	1200
1.004	15.330	150.3	S110	5.128	3.268	1.560	Open Manhole	1200
3.000	25.380	35.8	S110	5.128	3.418	1.560	Open Manhole	1200
1.005	3.000	166.7	TANK	5.072	3.250	1.522	Junction	
4.000	14.360	149.6	S112	5.627	4.504	0.973	Open Manhole	1200
4.001	20.820	149.8	S113	5.525	4.365	1.010	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.002	o	150	S113	5.525	4.365	1.010	Open Manhole	1200
5.000	o	150	S117	5.525	4.320	1.055	Open Manhole	1200
4.003	o	225	S118	5.391	4.125	1.041	Open Manhole	1200
6.000	o	150	S119	5.636	4.600	0.886	Open Manhole	1200
4.004	o	225	S120	5.488	3.804	1.459	Open Manhole	1200
4.005	o	225	S121	5.270	3.496	1.549	Open Manhole	1200
7.000	o	150	OB1	5.020	4.270	0.600	Open Manhole	600 x 600
7.001	o	150	S122	5.050	3.850	1.050	Open Manhole	1200
8.000	o	150	OB2	5.020	4.270	0.600	Open Manhole	600 x 600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.002	24.680	149.6	S118	5.391	4.200	1.041	Open Manhole	1200
5.000	7.700	64.2	S118	5.391	4.200	1.041	Open Manhole	1200
4.003	48.480	151.0	S120	5.488	3.804	1.459	Open Manhole	1200
6.000	19.080	26.5	S120	5.488	3.879	1.459	Open Manhole	1200
4.004	7.730	25.1	S121	5.270	3.496	1.549	Open Manhole	1200
4.005	3.420	20.0	TANK	5.072	3.325	1.522	Junction	
7.000	2.980	7.1	S122	5.050	3.850	1.050	Open Manhole	1200
7.001	29.960	149.8	S123	5.050	3.650	1.250	Open Manhole	1200
8.000	6.450	10.4	S123	5.050	3.650	1.250	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.002	o	225	S123	5.050	3.575	1.250	Open Manhole	1200
9.000	o	150	GU	5.269	4.819	0.300	Open Manhole	600 x 600
10.000	o	150	OB3	5.375	4.625	0.600	Open Manhole	600 x 600
11.000	o	150	GU	5.347	4.600	0.597	Open Manhole	600 x 600
9.001	o	150	S124	5.333	4.150	1.033	Open Manhole	1200
12.000	o	150	OB4	5.111	4.361	0.600	Open Manhole	600 x 600
9.002	o	150	S125	5.184	3.911	1.123	Open Manhole	1200
9.003	o	225	S126	5.361	3.665	1.471	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.002	8.860	150.2	S127	5.200	3.516	1.459	Open Manhole	1200
9.000	19.220	28.7	S124	5.333	4.150	1.033	Open Manhole	1200
10.000	10.220	21.5	S124	5.333	4.150	1.033	Open Manhole	1200
11.000	6.720	14.9	S124	5.333	4.150	1.033	Open Manhole	1200
9.001	35.830	149.9	S125	5.184	3.911	1.123	Open Manhole	1200
12.000	2.900	6.4	S125	5.184	3.911	1.123	Open Manhole	1200
9.002	25.700	150.3	S126	5.361	3.740	1.471	Open Manhole	1200
9.003	16.450	110.4	S127	5.200	3.516	1.459	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.003	o	300	S127	5.200	3.441	1.459	Open Manhole	1200
7.004	o	300	PI	5.200	3.328	1.572	Junction	
7.005	o	300	S128	5.200	3.315	1.585	Open Manhole	1200
1.006	o	300	TANK	5.072	2.800	1.972	Junction	
1.007	o	150	PS	5.040	2.770	2.120	Open Manhole	1500
1.008	o	150	S129	4.900	3.900	0.850	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
7.003	2.000	153.8	PI	5.200	3.428	1.472	Junction	
7.004	2.000	153.8	S128	5.200	3.315	1.585	Open Manhole	1200
7.005	2.000	30.8	TANK	5.072	3.250	1.522	Junction	
1.006	4.510	150.3	PS	5.040	2.770	1.970	Open Manhole	1500
1.007	59.374	-52.5	S129	4.900	3.900	0.850	Open Manhole	1200
1.008	5.950	148.8		4.990	3.860	0.980	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		4.990	3.860	0.000	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coefficient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m ³ /ha Storage	2.000	Output Interval (mins)	1
Number of Input Hydrographs 0					
Number of Offline Controls 0					
Number of Time/Area Diagrams 2					
Number of Online Controls 1					
Number of Storage Structures 3					
Number of Real Time Controls 0					

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.400	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.350	Cv (Winter)	0.840
Region England and Wales Profile Type Summer Storm Duration (mins)					
30					

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Online Controls for Storm

Pump Manhole: PS, DS/PN: 1.007, Volume (m³): 4.3

Invert Level (m) 2.770

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	5.3000	1.200	5.3000	2.200	5.3000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	5.3000	1.400	5.3000	2.400	5.3000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	5.3000	1.600	5.3000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	5.3000	1.800	5.3000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	5.3000	2.000	5.3000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

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Storage Structures for Storm

Porous Car Park Manhole: S109, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	500.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	4.800	Depression Storage (mm)	5
Max Percolation (l/s)	234.7	Width (m)	48.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	17.6	Membrane Depth (mm)	0

Porous Car Park Manhole: S117, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	500.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	5.075	Depression Storage (mm)	5
Max Percolation (l/s)	208.9	Width (m)	32.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	23.5	Membrane Depth (mm)	0

Cellular Storage Manhole: TANK, DS/PN: 1.006

Invert Level (m)	2.800	Infiltration Coefficient Side (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	680.0	0.0	0.800	680.0	0.0	0.801	0.0	0.0

Time Area Diagram at Pipe Number 3.000 for Storm

Total Area (ha) 0.130

Time (mins)	Area
From:	To: (ha)

0	4	0.130
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Time Area Diagram at Pipe Number 5.000 for Storm

Total Area (ha) 0.156

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Time Area Diagram at Pipe Number 5.000 for Storm

Time (mins)		Area
From:	To:	(ha)
0	4	0.156

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 2
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.200 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 2.5 Second Increment (Extended) 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, 40

									Water	Surcharged	Flooded	Half Drain			Pipe		
PN	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
1.000	S101	15	Winter	1	+0%	100/15	Summer			4.158	-0.167	0.000	0.15			5.9	OK
1.001	S102	15	Winter	1	+0%	30/15	Summer			3.965	-0.136	0.000	0.33			10.6	OK
1.002	S103	15	Winter	1	+0%	30/15	Summer			3.920	-0.128	0.000	0.38			15.1	OK
1.003	S104	15	Winter	1	+0%	30/15	Summer			3.712	-0.111	0.000	0.50			19.4	OK
2.000	S106	15	Winter	1	+0%	100/180	Winter			4.137	-0.113	0.000	0.14			6.6	OK
1.004	S107	15	Winter	1	+0%	30/15	Summer			3.507	-0.163	0.000	0.35			26.3	OK
3.000	S109	15	Winter	1	+0%	30/15	Summer			4.216	-0.060	0.000	0.57		5	16.0	OK
1.005	S110	15	Winter	1	+0%	30/15	Summer			3.473	-0.095	0.000	0.79			40.3	OK
4.000	S111	15	Winter	1	+0%	30/15	Summer			4.651	-0.099	0.000	0.26			3.4	OK
4.001	S112	15	Winter	1	+0%	30/15	Summer			4.555	-0.099	0.000	0.24			3.3	OK
4.002	S113	15	Winter	1	+0%	30/15	Summer			4.428	-0.087	0.000	0.36			5.0	OK
5.000	S117	15	Winter	1	+0%	1/15	Winter			4.476	0.006	0.000	1.02		4	19.6	SURCHARGED
4.003	S118	15	Winter	1	+0%	30/15	Summer			4.266	-0.084	0.000	0.69			27.8	OK
6.000	S119	15	Winter	1	+0%	100/240	Winter			4.632	-0.118	0.000	0.11			3.4	OK

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

PN	US/MH Name	Level Exceeded
1.000	S101	
1.001	S102	
1.002	S103	
1.003	S104	
2.000	S106	
1.004	S107	
3.000	S109	
1.005	S110	
4.000	S111	
4.001	S112	
4.002	S113	
5.000	S117	
4.003	S118	
6.000	S119	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
4.004	S120	15	Winter	1	+0%	100/15	Summer		3.901	-0.128	0.000	0.39			30.2
4.005	S121	15	Winter	1	+0%	30/15	Winter		3.610	-0.111	0.000	0.52			30.1
7.000	OB1	15	Summer	1	+0%	30/15	Summer	100/15	Summer	4.330	-0.090	0.000	0.34		13.7
7.001	S122	15	Summer	1	+0%	30/15	Summer	100/600	Winter	3.969	-0.031	0.000	0.95		13.1
8.000	OB2	15	Summer	1	+0%	100/15	Summer	100/15	Summer	4.325	-0.095	0.000	0.29		13.7
7.002	S123	15	Winter	1	+0%	30/15	Summer		3.727	-0.073	0.000	0.77			26.5
9.000	GU	15	Summer	1	+0%	100/15	Summer		4.846	-0.123	0.000	0.07			2.3
10.000	OB3	15	Winter	1	+0%	100/15	Summer		4.651	-0.124	0.000	0.07			2.5
11.000	GU	15	Summer	1	+0%	100/15	Summer		4.600	-0.150	0.000	0.00			0.0
9.001	S124	15	Summer	1	+0%	30/15	Summer		4.211	-0.089	0.000	0.33			4.6
12.000	OB4	15	Winter	1	+0%	100/15	Summer	100/15	Summer	4.404	-0.107	0.000	0.18		7.7
9.002	S125	15	Winter	1	+0%	30/15	Summer		4.021	-0.040	0.000	0.87			12.0
9.003	S126	15	Winter	1	+0%	30/15	Summer		3.758	-0.132	0.000	0.36			15.6
7.003	S127	15	Winter	1	+0%	30/15	Summer		3.642	-0.099	0.000	0.78			42.4
7.004	PI	15	Winter	1	+0%	30/15	Summer		3.511	-0.117	0.000	0.69			42.3
7.005	S128	15	Winter	1	+0%	30/15	Summer		3.494	-0.121	0.000	0.66			41.9
1.006	TANK	480	Winter	1	+0%	30/60	Winter		2.979	-0.121	0.000	0.10		310	6.3
1.007	PS	480	Winter	1	+0%	1/60	Winter		2.987	0.067	0.000	0.99			5.3
1.008	S129	360	Winter	1	+0%				3.969	-0.081	0.000	0.44			5.3

PN	US/MH Name	Status	Level Exceeded
4.004	S120	OK	
4.005	S121	OK	
7.000	OB1	OK	10
7.001	S122	OK	
8.000	OB2	OK	6
7.002	S123	OK	
9.000	GU	OK	
10.000	OB3	OK	
11.000	GU	OK	
9.001	S124	OK	
12.000	OB4	OK	3
9.002	S125	OK	
9.003	S126	OK	

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

PN	US/MH	Status	Level
	Name		Exceeded
7.003	S127	OK	
7.004	PI	OK*	
7.005	S128	OK	
1.006	TANK	OK*	
1.007	PS	SURCHARGED	
1.008	S129	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 2
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.200 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 2.5 Second Increment (Extended) 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, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH		Return Period	Climate Change	First (X)		First (Y)		First (Z)		Overflow		Water		Surcharged		Flooded		Half Drain		Pipe		Status
	Name	Storm			Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	Flow /	Overflow	Time	Flow			(mins)	(l/s)			
1.000	S101	15 Winter	30	+0%	100/15 Summer				4.194	-0.131	0.000	0.36							14.5				OK
1.001	S102	15 Winter	30	+0%	30/15 Summer				4.142	0.041	0.000	0.74							24.0				SURCHARGED
1.002	S103	15 Winter	30	+0%	30/15 Summer				4.117	0.069	0.000	0.87							34.8				SURCHARGED
1.003	S104	15 Winter	30	+0%	30/15 Summer				3.950	0.127	0.000	1.15							44.5				SURCHARGED
2.000	S106	15 Winter	30	+0%	100/180 Winter				4.160	-0.090	0.000	0.34							16.1				OK
1.004	S107	15 Winter	30	+0%	30/15 Summer				3.743	0.073	0.000	0.80							60.6				SURCHARGED
3.000	S109	15 Winter	30	+0%	30/15 Summer				4.753	0.477	0.000	1.22							4	34.6			SURCHARGED
1.005	S110	15 Winter	30	+0%	30/15 Summer				3.679	0.111	0.000	1.86							94.9				SURCHARGED
4.000	S111	15 Winter	30	+0%	30/15 Summer				4.772	0.022	0.000	0.58							7.7				SURCHARGED
4.001	S112	15 Winter	30	+0%	30/15 Summer				4.747	0.093	0.000	0.50							6.8				SURCHARGED
4.002	S113	15 Winter	30	+0%	30/15 Summer				4.721	0.206	0.000	0.80							11.0				SURCHARGED

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

	US/MH	Level
PN	Name	Exceeded
1.000	S101	
1.001	S102	
1.002	S103	
1.003	S104	
2.000	S106	
1.004	S107	
3.000	S109	
1.005	S110	
4.000	S111	
4.001	S112	
4.002	S113	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow Overflow	Overflow Act.	Water Surcharged Flooded				Half Drain Time (mins)	Pipe Flow (l/s)
									Level (m)	Depth (m)	Volume (m³)	Flow / Cap. (l/s)		
5.000	S117	15 Winter	30	+0%	1/15 Winter				5.094	0.624	0.000	1.98	3	37.9
4.003	S118	15 Winter	30	+0%	30/15 Summer				4.653	0.303	0.000	1.38		55.9
6.000	S119	15 Winter	30	+0%	100/240 Winter				4.651	-0.099	0.000	0.26		8.4
4.004	S120	15 Winter	30	+0%	100/15 Summer				3.957	-0.072	0.000	0.79		62.0
4.005	S121	15 Winter	30	+0%	30/15 Winter				3.734	0.013	0.000	1.07		62.1
7.000	OB1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			4.784	0.364	0.000	0.61		24.9
7.001	S122	15 Winter	30	+0%	30/15 Summer	100/600 Winter			4.619	0.619	0.000	1.77		24.6
8.000	OB2	15 Winter	30	+0%	100/15 Summer	100/15 Summer			4.364	-0.056	0.000	0.72		33.5
7.002	S123	15 Winter	30	+0%	30/15 Summer				4.008	0.208	0.000	1.56		53.2
9.000	GU	15 Winter	30	+0%	100/15 Summer				4.862	-0.107	0.000	0.18		5.7
10.000	OB3	15 Winter	30	+0%	100/15 Summer				4.667	-0.108	0.000	0.18		6.0
11.000	GU	15 Summer	30	+0%	100/15 Summer				4.600	-0.150	0.000	0.00		0.0
9.001	S124	15 Winter	30	+0%	30/15 Summer				4.537	0.237	0.000	0.68		9.4
12.000	OB4	15 Winter	30	+0%	100/15 Summer	100/15 Summer			4.494	-0.017	0.000	0.43		18.1
9.002	S125	15 Winter	30	+0%	30/15 Summer				4.436	0.375	0.000	1.68		23.1
9.003	S126	15 Winter	30	+0%	30/15 Summer				3.953	0.063	0.000	0.73		32.0
7.003	S127	15 Winter	30	+0%	30/15 Summer				3.870	0.129	0.000	1.54		83.5
7.004	PI	15 Summer	30	+0%	30/15 Summer				3.728	0.100	0.000	1.33		81.6
7.005	S128	15 Winter	30	+0%	30/15 Summer				3.647	0.032	0.000	1.31		83.6
1.006	TANK	480 Winter	30	+0%	30/60 Winter				3.280	0.180	0.000	0.19		11.4
1.007	PS	480 Winter	30	+0%	1/60 Winter				3.310	0.390	0.000	0.99		5.3
1.008	S129	2880 Summer	30	+0%					3.969	-0.081	0.000	0.44		5.3

PN	US/MH Name	Status	Level Exceeded
5.000	S117	SURCHARGED	
4.003	S118	SURCHARGED	
6.000	S119	OK	
4.004	S120	OK	
4.005	S121	SURCHARGED	
7.000	OB1	FLOOD RISK	10
7.001	S122	SURCHARGED	
8.000	OB2	OK	6
7.002	S123	SURCHARGED	
9.000	GU	OK	

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

PN	US/MH Name	Status	Level Exceeded
10.000	OB3	OK	
11.000	GU	OK	
9.001	S124	SURCHARGED	
12.000	OB4	OK	3
9.002	S125	SURCHARGED	
9.003	S126	SURCHARGED	
7.003	S127	SURCHARGED	
7.004	PI	SURCHARGED*	
7.005	S128	SURCHARGED	
1.006	TANK	SURCHARGED*	
1.007	PS	SURCHARGED	
1.008	S129	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 2
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.200 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 2.5 Second Increment (Extended) 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, 40

PN	US/MH		Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged Flooded			Half Drain Time (mins)	Pipe Flow (l/s)	Status
	Name									Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)		
1.000	S101	15	Winter	100	+40%	100/15	Summer			5.072	0.747	0.000	0.46	18.3	FLOOD RISK
1.001	S102	600	Winter	100	+40%	30/15	Summer			5.040	0.939	0.000	0.16	5.2	FLOOD RISK
1.002	S103	600	Winter	100	+40%	30/15	Summer			5.039	0.991	0.000	0.20	7.8	FLOOD RISK
1.003	S104	600	Winter	100	+40%	30/15	Summer			5.037	1.214	0.000	0.27	10.3	FLOOD RISK
2.000	S106	600	Winter	100	+40%	100/180	Winter			5.034	0.784	0.000	0.08	3.9	FLOOD RISK
1.004	S107	600	Winter	100	+40%	30/15	Summer			5.033	1.363	0.000	0.19	14.2	FLOOD RISK
3.000	S109	720	Winter	100	+40%	30/15	Summer			5.034	0.758	0.000	0.24	184	6.7 FLOOD RISK
1.005	S110	600	Winter	100	+40%	30/15	Summer			5.032	1.464	0.000	0.43	21.9	FLOOD RISK
4.000	S111	15	Winter	100	+40%	30/15	Summer			5.277	0.527	0.000	0.81	10.8	SURCHARGED
4.001	S112	15	Winter	100	+40%	30/15	Summer			5.211	0.557	0.000	0.79	10.8	SURCHARGED
4.002	S113	15	Winter	100	+40%	30/15	Summer			5.142	0.627	0.000	1.22	16.8	SURCHARGED
5.000	S117	15	Winter	100	+40%	1/15	Winter			5.165	0.695	0.000	2.27	7	43.6 SURCHARGED
4.003	S118	600	Winter	100	+40%	30/15	Summer			5.042	0.692	0.000	0.35	14.3	SURCHARGED
6.000	S119	600	Winter	100	+40%	100/240	Winter			5.035	0.285	0.000	0.05	1.5	SURCHARGED

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

PN	US/MH Name	Level Exceeded
1.000	S101	
1.001	S102	
1.002	S103	
1.003	S104	
2.000	S106	
1.004	S107	
3.000	S109	
1.005	S110	
4.000	S111	
4.001	S112	
4.002	S113	
5.000	S117	
4.003	S118	
6.000	S119	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
4.004	S120	600 Winter	100	+40%	100/15 Summer				5.035	1.006	0.000	0.20		15.8
4.005	S121	600 Winter	100	+40%	30/15 Winter				5.033	1.312	0.000	0.27		15.8
7.000	OB1	960 Winter	100	+40%	30/15 Summer	100/15 Summer			5.028	0.608	8.480	0.10		4.1
7.001	S122	720 Winter	100	+40%	30/15 Summer	100/600 Winter			5.031	1.031	0.006	0.37		5.2
8.000	OB2	720 Winter	100	+40%	100/15 Summer	100/15 Summer			5.028	0.608	7.966	0.11		5.2
7.002	S123	600 Winter	100	+40%	30/15 Summer				5.030	1.230	0.000	0.35		11.9
9.000	GU	15 Winter	100	+40%	100/15 Summer				5.261	0.292	0.000	0.31		9.7
10.000	OB3	15 Winter	100	+40%	100/15 Summer				5.255	0.480	0.000	0.26		8.8
11.000	GU	15 Winter	100	+40%	100/15 Summer				5.231	0.481	0.000	0.03		1.1
9.001	S124	15 Winter	100	+40%	30/15 Summer				5.232	0.932	0.000	0.93		13.0
12.000	OB4	15 Winter	100	+40%	100/15 Summer	100/15 Summer			5.112	0.601	1.101	0.56		23.6
9.002	S125	15 Winter	100	+40%	30/15 Summer				5.037	0.976	0.000	2.26		31.1
9.003	S126	600 Winter	100	+40%	30/15 Summer				5.033	1.143	0.000	0.17		7.4
7.003	S127	600 Winter	100	+40%	30/15 Summer				5.031	1.290	0.000	0.36		19.3
7.004	PI	15 Summer	100	+40%	30/15 Summer				3.728	0.100	0.000	1.84		112.6
7.005	S128	600 Winter	100	+40%	30/15 Summer				5.031	1.416	0.000	0.30		19.3
1.006	TANK	2160 Winter	100	+40%	30/60 Winter				3.601	0.501	0.000	0.19	1405	11.5
1.007	PS	600 Winter	100	+40%	1/60 Winter				5.030	2.110	0.000	0.99		5.3
1.008	S129	2160 Summer	100	+40%					3.969	-0.081	0.000	0.44		5.3

PN	US/MH Name	Status	Level Exceeded
4.004	S120	SURCHARGED	
4.005	S121	FLOOD RISK	
7.000	OB1	FLOOD	10
7.001	S122	FLOOD	
8.000	OB2	FLOOD	6
7.002	S123	FLOOD RISK	
9.000	GU	FLOOD RISK	
10.000	OB3	FLOOD RISK	
11.000	GU	FLOOD RISK	
9.001	S124	FLOOD RISK	
12.000	OB4	FLOOD	3
9.002	S125	FLOOD RISK	
9.003	S126	SURCHARGED	

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

PN	US/MH Name	Status	Level Exceeded
7.003	S127	FLOOD RISK	
7.004	PI	SURCHARGED*	
7.005	S128	FLOOD RISK	
1.006	TANK	SURCHARGED*	
1.007	PS	FLOOD RISK	
1.008	S129	OK	

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Surcharged Outfall Details for Storm

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

1.008	4.990	3.860	0.000	0	0
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Datum (m) 3.860 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.790	31	0.790	61	0.790	91	0.790	121	0.790	151	0.790	181	0.790	211	0.790	241	0.790
2	0.790	32	0.790	62	0.790	92	0.790	122	0.790	152	0.790	182	0.790	212	0.790	242	0.790
3	0.790	33	0.790	63	0.790	93	0.790	123	0.790	153	0.790	183	0.790	213	0.790	243	0.790
4	0.790	34	0.790	64	0.790	94	0.790	124	0.790	154	0.790	184	0.790	214	0.790	244	0.790
5	0.790	35	0.790	65	0.790	95	0.790	125	0.790	155	0.790	185	0.790	215	0.790	245	0.790
6	0.790	36	0.790	66	0.790	96	0.790	126	0.790	156	0.790	186	0.790	216	0.790	246	0.790
7	0.790	37	0.790	67	0.790	97	0.790	127	0.790	157	0.790	187	0.790	217	0.790	247	0.790
8	0.790	38	0.790	68	0.790	98	0.790	128	0.790	158	0.790	188	0.790	218	0.790	248	0.790
9	0.790	39	0.790	69	0.790	99	0.790	129	0.790	159	0.790	189	0.790	219	0.790	249	0.790
10	0.790	40	0.790	70	0.790	100	0.790	130	0.790	160	0.790	190	0.790	220	0.790	250	0.790
11	0.790	41	0.790	71	0.790	101	0.790	131	0.790	161	0.790	191	0.790	221	0.790	251	0.790
12	0.790	42	0.790	72	0.790	102	0.790	132	0.790	162	0.790	192	0.790	222	0.790	252	0.790
13	0.790	43	0.790	73	0.790	103	0.790	133	0.790	163	0.790	193	0.790	223	0.790	253	0.790
14	0.790	44	0.790	74	0.790	104	0.790	134	0.790	164	0.790	194	0.790	224	0.790	254	0.790
15	0.790	45	0.790	75	0.790	105	0.790	135	0.790	165	0.790	195	0.790	225	0.790	255	0.790
16	0.790	46	0.790	76	0.790	106	0.790	136	0.790	166	0.790	196	0.790	226	0.790	256	0.790
17	0.790	47	0.790	77	0.790	107	0.790	137	0.790	167	0.790	197	0.790	227	0.790	257	0.790
18	0.790	48	0.790	78	0.790	108	0.790	138	0.790	168	0.790	198	0.790	228	0.790	258	0.790
19	0.790	49	0.790	79	0.790	109	0.790	139	0.790	169	0.790	199	0.790	229	0.790	259	0.790
20	0.790	50	0.790	80	0.790	110	0.790	140	0.790	170	0.790	200	0.790	230	0.790	260	0.790
21	0.790	51	0.790	81	0.790	111	0.790	141	0.790	171	0.790	201	0.790	231	0.790	261	0.790
22	0.790	52	0.790	82	0.790	112	0.790	142	0.790	172	0.790	202	0.790	232	0.790	262	0.790
23	0.790	53	0.790	83	0.790	113	0.790	143	0.790	173	0.790	203	0.790	233	0.790	263	0.790
24	0.790	54	0.790	84	0.790	114	0.790	144	0.790	174	0.790	204	0.790	234	0.790	264	0.790
25	0.790	55	0.790	85	0.790	115	0.790	145	0.790	175	0.790	205	0.790	235	0.790	265	0.790
26	0.790	56	0.790	86	0.790	116	0.790	146	0.790	176	0.790	206	0.790	236	0.790	266	0.790
27	0.790	57	0.790	87	0.790	117	0.790	147	0.790	177	0.790	207	0.790	237	0.790	267	0.790
28	0.790	58	0.790	88	0.790	118	0.790	148	0.790	178	0.790	208	0.790	238	0.790	268	0.790
29	0.790	59	0.790	89	0.790	119	0.790	149	0.790	179	0.790	209	0.790	239	0.790	269	0.790
30	0.790	60	0.790	90	0.790	120	0.790	150	0.790	180	0.790	210	0.790	240	0.790	270	0.790

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Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
331	0.790	367	0.790	403	0.790	439	0.790	475	0.790	511	0.790	547	0.790	583	0.790	619	0.790
332	0.790	368	0.790	404	0.790	440	0.790	476	0.790	512	0.790	548	0.790	584	0.790	620	0.790
333	0.790	369	0.790	405	0.790	441	0.790	477	0.790	513	0.790	549	0.790	585	0.790	621	0.790
334	0.790	370	0.790	406	0.790	442	0.790	478	0.790	514	0.790	550	0.790	586	0.790	622	0.790
335	0.790	371	0.790	407	0.790	443	0.790	479	0.790	515	0.790	551	0.790	587	0.790	623	0.790
336	0.790	372	0.790	408	0.790	444	0.790	480	0.790	516	0.790	552	0.790	588	0.790	624	0.790
337	0.790	373	0.790	409	0.790	445	0.790	481	0.790	517	0.790	553	0.790	589	0.790	625	0.790
338	0.790	374	0.790	410	0.790	446	0.790	482	0.790	518	0.790	554	0.790	590	0.790	626	0.790
339	0.790	375	0.790	411	0.790	447	0.790	483	0.790	519	0.790	555	0.790	591	0.790	627	0.790
340	0.790	376	0.790	412	0.790	448	0.790	484	0.790	520	0.790	556	0.790	592	0.790	628	0.790
341	0.790	377	0.790	413	0.790	449	0.790	485	0.790	521	0.790	557	0.790	593	0.790	629	0.790
342	0.790	378	0.790	414	0.790	450	0.790	486	0.790	522	0.790	558	0.790	594	0.790	630	0.790
343	0.790	379	0.790	415	0.790	451	0.790	487	0.790	523	0.790	559	0.790	595	0.790	631	0.790
344	0.790	380	0.790	416	0.790	452	0.790	488	0.790	524	0.790	560	0.790	596	0.790	632	0.790
345	0.790	381	0.790	417	0.790	453	0.790	489	0.790	525	0.790	561	0.790	597	0.790	633	0.790
346	0.790	382	0.790	418	0.790	454	0.790	490	0.790	526	0.790	562	0.790	598	0.790	634	0.790
347	0.790	383	0.790	419	0.790	455	0.790	491	0.790	527	0.790	563	0.790	599	0.790	635	0.790
348	0.790	384	0.790	420	0.790	456	0.790	492	0.790	528	0.790	564	0.790	600	0.790	636	0.790
349	0.790	385	0.790	421	0.790	457	0.790	493	0.790	529	0.790	565	0.790	601	0.790	637	0.790
350	0.790	386	0.790	422	0.790	458	0.790	494	0.790	530	0.790	566	0.790	602	0.790	638	0.790
351	0.790	387	0.790	423	0.790	459	0.790	495	0.790	531	0.790	567	0.790	603	0.790	639	0.790
352	0.790	388	0.790	424	0.790	460	0.790	496	0.790	532	0.790	568	0.790	604	0.790	640	0.790
353	0.790	389	0.790	425	0.790	461	0.790	497	0.790	533	0.790	569	0.790	605	0.790	641	0.790
354	0.790	390	0.790	426	0.790	462	0.790	498	0.790	534	0.790	570	0.790	606	0.790	642	0.790
355	0.790	391	0.790	427	0.790	463	0.790	499	0.790	535	0.790	571	0.790	607	0.790	643	0.790
356	0.790	392	0.790	428	0.790	464	0.790	500	0.790	536	0.790	572	0.790	608	0.790	644	0.790
357	0.790	393	0.790	429	0.790	465	0.790	501	0.790	537	0.790	573	0.790	609	0.790	645	0.790
358	0.790	394	0.790	430	0.790	466	0.790	502	0.790	538	0.790	574	0.790	610	0.790	646	0.790
359	0.790	395	0.790	431	0.790	467	0.790	503	0.790	539	0.790	575	0.790	611	0.790	647	0.790
360	0.790	396	0.790	432	0.790	468	0.790	504	0.790	540	0.790	576	0.790	612	0.790	648	0.790
361	0.790	397	0.790	433	0.790	469	0.790	505	0.790	541	0.790	577	0.790	613	0.790	649	0.790
362	0.790	398	0.790	434	0.790	470	0.790	506	0.790	542	0.790	578	0.790	614	0.790	650	0.790
363	0.790	399	0.790	435	0.790	471	0.790	507	0.790	543	0.790	579	0.790	615	0.790	651	0.790
364	0.790	400	0.790	436	0.790	472	0.790	508	0.790	544	0.790	580	0.790	616	0.790	652	0.790
365	0.790	401	0.790	437	0.790	473	0.790	509	0.790	545	0.790	581	0.790	617	0.790	653	0.790
366	0.790	402	0.790	438	0.790	474	0.790	510	0.790	546	0.790	582	0.790	618	0.790	654	0.790

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 2
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.200 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 2.5 Second Increment (Extended) 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, 40

									Water	Surcharged	Flooded	Half Drain			Pipe		
PN	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
1.000	S101	15	Winter	1	+0%	100/15	Summer			4.158	-0.167	0.000	0.15			5.9	OK
1.001	S102	15	Winter	1	+0%	30/15	Summer			3.965	-0.136	0.000	0.33			10.6	OK
1.002	S103	15	Winter	1	+0%	30/15	Summer			3.920	-0.128	0.000	0.38			15.1	OK
1.003	S104	15	Winter	1	+0%	30/15	Summer			3.712	-0.111	0.000	0.50			19.4	OK
2.000	S106	15	Winter	1	+0%	100/180	Winter			4.137	-0.113	0.000	0.14			6.6	OK
1.004	S107	15	Winter	1	+0%	30/15	Summer			3.507	-0.163	0.000	0.35			26.3	OK
3.000	S109	15	Winter	1	+0%	30/15	Summer			4.216	-0.060	0.000	0.57		5	16.0	OK
1.005	S110	15	Winter	1	+0%	30/15	Summer			3.473	-0.095	0.000	0.79			40.3	OK
4.000	S111	15	Winter	1	+0%	30/15	Summer			4.651	-0.099	0.000	0.26			3.4	OK
4.001	S112	15	Winter	1	+0%	30/15	Summer			4.555	-0.099	0.000	0.24			3.3	OK
4.002	S113	15	Winter	1	+0%	30/15	Summer			4.428	-0.087	0.000	0.36			5.0	OK
5.000	S117	15	Winter	1	+0%	1/15	Winter			4.476	0.006	0.000	1.02		4	19.6	SURCHARGED
4.003	S118	15	Winter	1	+0%	30/15	Summer			4.266	-0.084	0.000	0.69			27.8	OK
6.000	S119	15	Winter	1	+0%	100/240	Winter			4.632	-0.118	0.000	0.11			3.4	OK

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

PN	US/MH Name	Level Exceeded
1.000	S101	
1.001	S102	
1.002	S103	
1.003	S104	
2.000	S106	
1.004	S107	
3.000	S109	
1.005	S110	
4.000	S111	
4.001	S112	
4.002	S113	
5.000	S117	
4.003	S118	
6.000	S119	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged Flooded			Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
									Level (m)	Depth (m)	Volume (m³)				
4.004	S120	15 Winter	1	+0%	100/15 Summer				3.901	-0.128	0.000	0.39			30.2
4.005	S121	15 Winter	1	+0%	30/15 Winter				3.610	-0.111	0.000	0.52			30.1
7.000	OB1	15 Summer	1	+0%	30/15 Summer	100/15 Summer			4.330	-0.090	0.000	0.34			13.7
7.001	S122	15 Summer	1	+0%	30/15 Summer				3.969	-0.031	0.000	0.95			13.1
8.000	OB2	15 Summer	1	+0%	100/15 Summer	100/15 Summer			4.325	-0.095	0.000	0.29			13.7
7.002	S123	15 Winter	1	+0%	30/15 Summer				3.727	-0.073	0.000	0.77			26.5
9.000	GU	15 Summer	1	+0%	100/15 Summer				4.846	-0.123	0.000	0.07			2.3
10.000	OB3	15 Winter	1	+0%	100/15 Summer				4.651	-0.124	0.000	0.07			2.5
11.000	GU	15 Summer	1	+0%	100/15 Summer				4.600	-0.150	0.000	0.00			0.0
9.001	S124	15 Summer	1	+0%	30/15 Summer				4.211	-0.089	0.000	0.33			4.6
12.000	OB4	15 Winter	1	+0%	100/15 Summer	100/15 Summer			4.404	-0.107	0.000	0.18			7.7
9.002	S125	15 Winter	1	+0%	30/15 Summer				4.021	-0.040	0.000	0.87			12.0
9.003	S126	15 Winter	1	+0%	30/15 Summer				3.758	-0.132	0.000	0.36			15.6
7.003	S127	15 Winter	1	+0%	30/15 Summer				3.642	-0.099	0.000	0.78			42.4
7.004	PI	15 Winter	1	+0%	30/15 Summer				3.511	-0.117	0.000	0.69			42.3
7.005	S128	15 Winter	1	+0%	30/15 Summer				3.494	-0.121	0.000	0.66			41.9
1.006	TANK	480 Winter	1	+0%	30/60 Winter				2.979	-0.121	0.000	0.10		307	6.2
1.007	PS	480 Winter	1	+0%	1/60 Winter				2.987	0.067	0.000	0.99			5.3
1.008	S129	480 Winter	1	+0%	1/15 Summer				4.662	0.612	0.000	1.38			16.7

PN	US/MH Name	Status	Level Exceeded
4.004	S120	OK	
4.005	S121	OK	
7.000	OB1	OK	10
7.001	S122	OK	
8.000	OB2	OK	6
7.002	S123	OK	
9.000	GU	OK	
10.000	OB3	OK	
11.000	GU	OK	
9.001	S124	OK	
12.000	OB4	OK	3
9.002	S125	OK	
9.003	S126	OK	

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

PN	US/MH Name	Status	Level Exceeded
7.003	S127	OK	
7.004	PI	OK*	
7.005	S128	OK	
1.006	TANK	OK*	
1.007	PS	SURCHARGED	
1.008	S129	FLOOD RISK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 2
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.200 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 2.5 Second Increment (Extended) 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, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH		Return Period	Climate Change	First (X)		First (Y)		First (Z)		Overflow		Water		Surcharged		Flooded		Half Drain		Pipe		Status
	Name	Storm			Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	Flow /	Overflow	Time	Flow			(mins)	(l/s)			
1.000	S101	15 Winter	30	+0%	100/15 Summer				4.194	-0.131	0.000	0.36							14.5				OK
1.001	S102	15 Winter	30	+0%	30/15 Summer				4.142	0.041	0.000	0.74							24.0				SURCHARGED
1.002	S103	15 Winter	30	+0%	30/15 Summer				4.117	0.069	0.000	0.87							34.8				SURCHARGED
1.003	S104	15 Winter	30	+0%	30/15 Summer				3.950	0.127	0.000	1.15							44.5				SURCHARGED
2.000	S106	15 Winter	30	+0%	100/180 Winter				4.160	-0.090	0.000	0.34							16.1				OK
1.004	S107	15 Winter	30	+0%	30/15 Summer				3.743	0.073	0.000	0.80							60.6				SURCHARGED
3.000	S109	15 Winter	30	+0%	30/15 Summer				4.753	0.477	0.000	1.22							4	34.6			SURCHARGED
1.005	S110	15 Winter	30	+0%	30/15 Summer				3.679	0.111	0.000	1.86							94.9				SURCHARGED
4.000	S111	15 Winter	30	+0%	30/15 Summer				4.772	0.022	0.000	0.58							7.7				SURCHARGED
4.001	S112	15 Winter	30	+0%	30/15 Summer				4.747	0.093	0.000	0.50							6.8				SURCHARGED
4.002	S113	15 Winter	30	+0%	30/15 Summer				4.721	0.206	0.000	0.80							11.0				SURCHARGED

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

	US/MH	Level
PN	Name	Exceeded
1.000	S101	
1.001	S102	
1.002	S103	
1.003	S104	
2.000	S106	
1.004	S107	
3.000	S109	
1.005	S110	
4.000	S111	
4.001	S112	
4.002	S113	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
5.000	S117	15 Winter	30	+0%	1/15 Winter				5.094	0.624	0.000	1.98		3	37.9
4.003	S118	15 Winter	30	+0%	30/15 Summer				4.653	0.303	0.000	1.38			55.9
6.000	S119	15 Winter	30	+0%	100/240 Winter				4.651	-0.099	0.000	0.26			8.4
4.004	S120	15 Winter	30	+0%	100/15 Summer				3.957	-0.072	0.000	0.79			62.0
4.005	S121	15 Winter	30	+0%	30/15 Winter				3.734	0.013	0.000	1.07			62.1
7.000	OB1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			4.784	0.364	0.000	0.61			24.9
7.001	S122	15 Winter	30	+0%	30/15 Summer				4.619	0.619	0.000	1.77			24.6
8.000	OB2	15 Winter	30	+0%	100/15 Summer	100/15 Summer			4.364	-0.056	0.000	0.72			33.5
7.002	S123	15 Winter	30	+0%	30/15 Summer				4.008	0.208	0.000	1.56			53.2
9.000	GU	15 Winter	30	+0%	100/15 Summer				4.862	-0.107	0.000	0.18			5.7
10.000	OB3	15 Winter	30	+0%	100/15 Summer				4.667	-0.108	0.000	0.18			6.0
11.000	GU	15 Summer	30	+0%	100/15 Summer				4.600	-0.150	0.000	0.00			0.0
9.001	S124	15 Winter	30	+0%	30/15 Summer				4.537	0.237	0.000	0.68			9.4
12.000	OB4	15 Winter	30	+0%	100/15 Summer	100/15 Summer			4.494	-0.017	0.000	0.43			18.1
9.002	S125	15 Winter	30	+0%	30/15 Summer				4.436	0.375	0.000	1.68			23.1
9.003	S126	15 Winter	30	+0%	30/15 Summer				3.953	0.063	0.000	0.73			32.0
7.003	S127	15 Winter	30	+0%	30/15 Summer				3.870	0.129	0.000	1.54			83.5
7.004	PI	15 Summer	30	+0%	30/15 Summer				3.728	0.100	0.000	1.33			81.6
7.005	S128	15 Winter	30	+0%	30/15 Summer				3.647	0.032	0.000	1.31			83.6
1.006	TANK	480 Winter	30	+0%	30/60 Winter				3.280	0.180	0.000	0.19			11.6
1.007	PS	480 Winter	30	+0%	1/60 Winter				3.310	0.390	0.000	0.99			5.3
1.008	S129	15 Winter	30	+0%	1/15 Summer				4.663	0.613	0.000	0.44			5.3

PN	US/MH Name	Status	Level Exceeded
5.000	S117	SURCHARGED	
4.003	S118	SURCHARGED	
6.000	S119	OK	
4.004	S120	OK	
4.005	S121	SURCHARGED	
7.000	OB1	FLOOD RISK	10
7.001	S122	SURCHARGED	
8.000	OB2	OK	6
7.002	S123	SURCHARGED	
9.000	GU	OK	

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

PN	US/MH Name	Status	Level Exceeded
10.000	OB3	OK	
11.000	GU	OK	
9.001	S124	SURCHARGED	
12.000	OB4	OK	3
9.002	S125	SURCHARGED	
9.003	S126	SURCHARGED	
7.003	S127	SURCHARGED	
7.004	PI	SURCHARGED*	
7.005	S128	SURCHARGED	
1.006	TANK	SURCHARGED*	
1.007	PS	SURCHARGED	
1.008	S129	FLOOD RISK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 2
 Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.200 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 2.5 Second Increment (Extended) 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, 40

PN	US/MH		Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged Flooded			Flow / Overflow Cap.	Half Drain Time (mins)	Pipe Flow (l/s)	Status
	Name									Level (m)	Depth (m)	Volume (m³)				
1.000	S101	15	Winter	100	+40%	100/15	Summer			5.072	0.747	0.000	0.46		18.3	FLOOD RISK
1.001	S102	720	Winter	100	+40%	30/15	Summer			5.039	0.938	0.000	0.14		4.5	FLOOD RISK
1.002	S103	720	Winter	100	+40%	30/15	Summer			5.038	0.990	0.000	0.17		6.8	FLOOD RISK
1.003	S104	720	Winter	100	+40%	30/15	Summer			5.036	1.213	0.000	0.23		9.0	FLOOD RISK
2.000	S106	720	Winter	100	+40%	100/180	Winter			5.033	0.783	0.000	0.07		3.4	FLOOD RISK
1.004	S107	720	Winter	100	+40%	30/15	Summer			5.032	1.362	0.000	0.16		12.3	FLOOD RISK
3.000	S109	720	Winter	100	+40%	30/15	Summer			5.034	0.758	0.000	0.24	185	6.7	FLOOD RISK
1.005	S110	720	Winter	100	+40%	30/15	Summer			5.031	1.463	0.000	0.37		19.0	FLOOD RISK
4.000	S111	15	Winter	100	+40%	30/15	Summer			5.277	0.527	0.000	0.81		10.8	SURCHARGED
4.001	S112	15	Winter	100	+40%	30/15	Summer			5.211	0.557	0.000	0.79		10.8	SURCHARGED
4.002	S113	15	Winter	100	+40%	30/15	Summer			5.142	0.627	0.000	1.22		16.8	SURCHARGED
5.000	S117	15	Winter	100	+40%	1/15	Winter			5.165	0.695	0.000	2.27	7	43.6	SURCHARGED
4.003	S118	720	Winter	100	+40%	30/15	Summer			5.040	0.690	0.000	0.31		12.4	SURCHARGED
6.000	S119	720	Winter	100	+40%	100/240	Winter			5.034	0.284	0.000	0.04		1.3	SURCHARGED

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Innovyze	Network 2020.1.3	

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

PN	US/MH Name	Level Exceeded
1.000	S101	
1.001	S102	
1.002	S103	
1.003	S104	
2.000	S106	
1.004	S107	
3.000	S109	
1.005	S110	
4.000	S111	
4.001	S112	
4.002	S113	
5.000	S117	
4.003	S118	
6.000	S119	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
4.004	S120	720 Winter	100	+40%	100/15 Summer				5.034	1.005	0.000	0.18			13.7
4.005	S121	720 Winter	100	+40%	30/15 Winter				5.031	1.310	0.000	0.24			13.7
7.000	OB1	960 Winter	100	+40%	30/15 Summer	100/15 Summer			5.028	0.608	8.452	0.10			4.1
7.001	S122	720 Winter	100	+40%	30/15 Summer				5.032	1.032	0.000	0.37			5.2
8.000	OB2	720 Winter	100	+40%	100/15 Summer	100/15 Summer			5.028	0.608	7.958	0.11			5.2
7.002	S123	720 Winter	100	+40%	30/15 Summer				5.029	1.229	0.000	0.30			10.3
9.000	GU	15 Winter	100	+40%	100/15 Summer				5.261	0.292	0.000	0.31			9.7
10.000	OB3	15 Winter	100	+40%	100/15 Summer				5.255	0.480	0.000	0.26			8.8
11.000	GU	15 Winter	100	+40%	100/15 Summer				5.231	0.481	0.000	0.03			1.1
9.001	S124	15 Winter	100	+40%	30/15 Summer				5.232	0.932	0.000	0.93			13.0
12.000	OB4	15 Winter	100	+40%	100/15 Summer	100/15 Summer			5.112	0.601	1.101	0.56			23.6
9.002	S125	15 Winter	100	+40%	30/15 Summer				5.037	0.976	0.000	2.26			31.1
9.003	S126	720 Winter	100	+40%	30/15 Summer				5.032	1.142	0.000	0.15			6.4
7.003	S127	720 Winter	100	+40%	30/15 Summer				5.030	1.289	0.000	0.31			16.8
7.004	PI	15 Summer	100	+40%	30/15 Summer				3.728	0.100	0.000	1.84			112.6
7.005	S128	720 Winter	100	+40%	30/15 Summer				5.030	1.415	0.000	0.26			16.8
1.006	TANK	2160 Winter	100	+40%	30/60 Winter				3.601	0.501	0.000	0.19		1423	11.5
1.007	PS	720 Winter	100	+40%	1/60 Winter				5.029	2.109	0.000	0.99			5.3
1.008	S129	960 Summer	100	+40%	1/15 Summer				4.662	0.612	0.000	1.57			19.0

PN	US/MH Name	Status	Level Exceeded
4.004	S120	SURCHARGED	
4.005	S121	FLOOD RISK	
7.000	OB1	FLOOD	10
7.001	S122	FLOOD RISK	
8.000	OB2	FLOOD	6
7.002	S123	FLOOD RISK	
9.000	GU	FLOOD RISK	
10.000	OB3	FLOOD RISK	
11.000	GU	FLOOD RISK	
9.001	S124	FLOOD RISK	
12.000	OB4	FLOOD	3
9.002	S125	FLOOD RISK	
9.003	S126	SURCHARGED	

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

PN	US/MH Name	Status	Level Exceeded
7.003	S127	FLOOD RISK	
7.004	PI	SURCHARGED*	
7.005	S128	FLOOD RISK	
1.006	TANK	SURCHARGED*	
1.007	PS	FLOOD RISK	
1.008	S129	FLOOD RISK	

The site consists of self-storing facility with associated parking, soft landscaping and HGV turning areas.

Pollution hazard indices are listed below for proposed land use.

Reference is made to **Table 26.2 from CIRIA SuDS manual** to ascertain the pollution hazard indices for the site.

Table 5.2 Extract of Table 26.2 from CIRIA SuDS manual

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydro-carbons
Industrial roof	Low	0.3	0.2	0.05
Commercial yard and delivery areas, non-residential car parking	Medium	0.7	0.6	0.7

SuDS solutions used site is listed below.

Reference is made to **Table 26.3 from CIRIA SuDS manual** to obtain the SuDS mitigation indices for proposed SuDS incorporated in the design, reference point 5.5 above and **Appendix F**.

Table 5.3 Pollution Mitigation Indices

Type of SuDS component	Total suspended solids (TSS)	Metals	Hydro-carbons
Industrial roof			
Filter chamber	0.3*	0.2*	0.1*
Greater than pollution hazard level for these areas – ok!			
Commercial yard and delivery areas, non-residential car parking			
Petrol Interceptor	0.8	0.6	0.9
Greater than pollution hazard level for these areas – ok!			

*Assumed pollution control values

The totals for the proposed SuDS solutions are higher than the pollution hazard, therefore the SuDS proposed meet the requirements to act as satisfactory pollution control.

1.0 PREAMBLE

Regular inspections and maintenance of both the foul and surface water drainage systems is important to ensure the effective and efficient operation of the system and to reduce the likelihood of blockages and flooding on and off site.

Responsibility for maintaining and managing the drainage system on completion of the 12-month maintenance period will be by the landowner, through their site management company and/or tenants occupying the units. Principle contact is the landowner:

Chancerygate
12A Upper Berkeley Street,
London W1H 7QE
020 7657 1880

This plan should be read in conjunction with the drainage design drawings and an up-to-date CCTV survey report.

The Operation and Maintenance (O&M) manuals and/or Health & Safety (H&S) files must contain copies of:

- This Drainage Maintenance Plan
- Record Copy of drainage design drawings
- Manufacturers information for ancillary items
- Pump supplier contact and service agreements
- Post construction CCTV survey report

The post construction CCTV report acts as a physical record of the drainage system at handover, as installed running at full efficiency. Any further CCTV surveys should be inserted and replace previous where appropriate.

Sewers, manholes and drainage channels are unlikely to require maintenance other than periodic inspections, unless a blockage occurs.

2.0 DESIGN

Below ground drainpipes for both the surface and foul water networks have been designed to achieve self-cleansing velocity and in accordance with:

Approved Document H: Drainage and waste disposal
BS 8301: 1985 Code of practice for Building Drainage

3.0 GUIDANCE

If **sudden failure** occurs inspections should be carried out at the earliest opportunity by a specialist. Blockages must be cleared, and remediation works undertaken to ensure the effective operation of the drainage system.

The following should be carried out on an annual basis:

- Inspection chambers, manhole chambers and drainage channel outlets noted as **silt traps, sump pits, downstream defenders** or **filter units** must be inspected and cleared.
- **Drainage channels** and **gully's** must be inspected and cleared.

The following should be carried out every two years:

- The gully traps should be plunged and thoroughly flushed out with clean water.
- Covers of inspection chambers and manholes should be removed and the sides, benching and channels cleaned.
- Main and branch drains should be rodded, jetted, and then flushed with clean water.
- Note that correct ends of rods should be used to avoid damage to pipes and them becoming detached.

Reference should be made to the manufacturer's information and maintenance requirements for recommended intervals and safe methods of cleaning for the following proprietary systems which are located on the record drawings:

- storm water storage system
- drainage channels
- petrol interceptors
- flow controls such as hydrobrakes, orifices
- downstream defenders

A full CCTV survey will also be carried out at 10 yearly intervals to assess the condition of the drainage system.

Jetting should be carried out downstream to suit the flow of effluent but should not be attempted to push through an attenuation tank, interceptor, or flow control. A vacuum tanker should be used upstream of each inlet into the tank or other ancillary item noted.

4.0 PUMPS

A service contract agreement will be in place with the supplier of the package pump. Routine maintenance will form part of the agreement with provision for emergency situations. General inspections will generally include the following:

- The plant is visually checked, working tests are undertaken to ensure correct functioning of each item of equipment and minor adjustments made, as necessary.
- The level control equipment is cleaned as far as is practicable from ground level, chamber de-sludged by hand control of the pumps.

5.0 SAFETY

Petrol interceptors are designed to trap and store hydrocarbon contamination which may emanate from the yards and as such, should only be cleaned out by a suitable qualified and licensed specialist Contractors.

In all instances, inspection and cleaning is to be carried out by a suitable Specialist Contractor, following the guidelines given in BE EN 752 Part 7 1998 "Maintenance and Operations" and "Safe Working in Sewers and at Sewage Works", published by the National Joint Health and Safety Committee for the Water Services.

All underground and under-floor drains and manholes (including oil interceptors) represent confined spaces. Appropriate precautions will be taken before entering drains and manholes. Access will only be undertaken by appropriately trained personnel.

PROPRIETARY SYSTEMS		
Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

PERVIOUS PAVEMENTS		
Schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

APPENDIX B (PORTSMOUTH WATER LETTER, CONDITION 2)

SOUTHERN WATER CORRESPONDENCE



Ismail Laher

Your ref

Our ref
DS_DOS-118128
(002596)

Date
19 November 2020

Contact

Tel
0330 303 0119

Email
Developer.Services@southernwater.co.uk

F.A.O. Ismail Laher

Dear Sir,

Diversion of Sewers – Section 185, Water Industry Act 1991
Development: Land off Solent Road, Land Adjacent to, 826 Brockhampton Lane, Havant,
Hampshire, PO9 1DQ.

I refer to the proposed public sewer diversion at the above site and I thank you for your email dated 12th October 2020. I am pleased to confirm that your proposals shown on drawing number 20-071 / 350 P4 is acceptable.

The application has been processed and a total fee of £23,529.00 is required.

In accordance with clause 1 of the agreement, a refundable performance deposit of £22,550.00 is included in the above fee to cover the cost of the works.

The above offer remains open for a period of three months from the date of this letter. If the offer is not accepted within three months Southern Water Services reserves the right to recalculate the cost of the works.

Please complete the Solicitors/Landowners form and return it with your cheque and the remittance slip to the address provided on the slip. Please make cheques payable to **Southern Water Services Ltd**. The drawings requested at point O to Q on this form below are required for preparation of the legal agreement

Legal Agreement

The amount of time that it will take to complete the standard Diversion Agreement is dependent upon how quickly the document can be approved by your legal representative and executed. However, please note that if an easement is required to protect the diverted sewer, the registration of the Deed of Grant at the Land Registry may cause further delay,

as will any requests from your solicitor to amend the standard documents. **Southern Water will not permit connection to the existing sewer until all monies have been paid and the legal agreement has been signed.** You may start work on site and lay the diversion dry, but this will be at your own risk and Southern Water will not adopt the work if it does not comply with sewers for adoption 6th edition. Legal fees will be separately invoiced by Southern Water's solicitor and must be paid before the agreement is engrossed.

A copy of a typical legal agreement for information purposes only can be obtained from this office.

Refund of the Performance Deposit

The refund will be issued in two staged payments.

Stage 1. (80%) released when

- The Legal Agreement and Deed of Grant of Easement (if required) have been signed.
- We have received in this office 3 sets of 'As constructed Drawings' of the works in accordance with the attached requirements.
- A pre maintenance inspection of the works has satisfactorily been completed by our clerk of works. A copy of the above drawings will be required before the inspection.

A Provisional Certificate will be issued by this office signifying that the works will go into a maintenance period for one year from the date of the above inspection. At the same time Southern Water's finance team will be instructed to issue the 1st stage payment.

Stage 2. (20% plus accrued interest) released when

- A final inspection has satisfactorily been completed by our clerk of works.
- A Final Certificate will be issued by this office.

At both stages it will take up to 28 days from the date of either the provisional or the final certificate to receive the refund.

I refer you to Southern Water Health and Safety Advisory which can be viewed in the Developer and Builders section of the Southern Water website as the link below:
<https://www.southernwater.co.uk/health-safety-advisory>

This approval is given on the basis that you will review this Advisory and take the necessary actions with regards to Health and Safety.

Please do not hesitate to contact me if you require any further information.

Yours sincerely,



Ashley Marshman
Head of Business Channels
Business Channels

APPENDIX C (PORTSMOUTH WATER LETTER, CONDITION 3)

TYPICAL WATCHING BRIEF

DISCOVERY STRATEGY CONSTRUCTION PHASE CONTAMINATED MATERIALS

LAND NORTH OF SOLENT ROAD (ADJACENT TO BOSMERE MEDICAL CENTRE),
HAVANT.

Introduction

The development site is being developed as an office, industrial and warehouse estate by Chancerygate. I&L Consulting require the Main Contractor to allow for a Discovery Strategy during the construction phase of the programme. Its purpose is to define the process to be undertaken on site in the event that previously unidentified pockets of contamination or suspicious objects are discovered during the development of the site. It is intended to be understood and followed by all on-site workers and for all new site workers to be made aware of the procedure.

How to Identify Potential Contaminated Material

- Looks oily and has an oily odour
 - Solvent type of odour
 - Man made materials in fill such as paint cans, car parts, glass fragments,
 - Contains fragments of white asbestos sheeting, coal/coke clinker
 - Sand bags, and or/ subsurface concrete structures
- (Examples only – This list is not exhaustive. If in any doubt, ask)

Procedure

On the discovery of any suspicious pockets of material during the redevelopment the following procedure should be followed:

- Site Personnel to immediately inform the site manager.
Do not investigate it yourself.
- The Site Manager will decide if material is potentially contaminated and will inform I&L Consulting. The area will be cordoned off and work will cease in the vicinity.
- I&L Consulting and the nominated geo-environmental engineers will attend site to sample material for laboratory testing and will attempt to quantify the volume. The Council will then be notified that potential contaminated material has been discovered and will be forwarded laboratory data and a remedial strategy for their approval in the event that the material is to be classified as contaminated.

APPENDIX D (PORTSMOUTH WATER LETTER, CONDITION 4)

TRC FOUNDATION RISK ASSESSMENT

Technical Note – Foundation Design Statement for Solent Road, Havant

1.0 Introduction

This technical note has been prepared by TRC Companies Limited (TRC) for Chancerygate (Erdington) Limited (the 'Client') to support the discharge of the proposed planning Condition 4 of the planning permission (planning application ref. APP/21/00601) relating to their development at Solent Road, Havant (hereafter referred to as the 'Site'). Condition 4 is as follows:

'Piling or deep foundation using penetrative methods shall not be carried out other than with the written consent of the local planning authority in consultation with the Environment Agency and Portsmouth Water. The development shall be carried out in accordance with the approved details.'

This technical note presents an assessment of the potential environmental risks and hazards associated with the proposed foundation design for the Site to satisfy the above requirements of Condition 4. The assessment has been prepared with due regard to the Environment Agency (EA) guidance:

- Piling into contaminated sites, Environment Agency and National Groundwater and Contaminated Land Centre, dated February 2002; and,
- Piling in layered ground: risks to groundwater and archaeology, Environment Agency, Science Report SC020074/SR, dated October 2006.

2.0 Background

Previous geo-environmental and geotechnical assessments had been undertaken on the Site. This report should be read in conjunction with the following reports:

- Soils Limited, Phase I Desk Study at Land to the north of Solent Road, Havant, Hampshire, PO9 1DQ, report ref. 14252/DS, dated June 2014;
- Delta-Simons, Phase I/II Geo-Environmental Assessment for Land at Solent Road, Havant, PO9 1DQ, report ref. 19-1058.01, dated December 2019.

The Phase I report identified the Site as a vacant parcel of undeveloped overgrown grassland with a disused tennis court in the north-eastern corner of the Site. Site history indicates that with the exception of the tennis courts which appeared on the mapping in the late 1980s, the Site has not had any significant development. Historically, the surrounding areas had various works including a tannery, brewery, a washing factory, an engine house, leather works, water works and unspecified works within 250m of the Site. Other historical features include tanks and a boat building works, electricity substations and warehouses.

The Phase I by Soils Limited considered that there were no on-Site sources with the exception of the Alluvium underlying the Site presenting a potential ground gas risk. However, the Delta Simons report identified the potential for Made Ground being on Site and therefore a potential source of contamination.

Off-Site sources identified by both Soils Limited and Delta Simons included the various works historically around the Site and the potential for Made Ground from off-Site development.

The risks to Site were considered low to moderate and a Phase II intrusive investigation was recommended.

The Phase II undertaken by Delta Simons comprised the following:

- Excavation of five shallow trial pits for California Bearing Ration (CBR) testing;
- Excavation of eight trial pits to a maximum depth of 1.90m below ground level (bgl);
- Excavation of three hand pits to a maximum depth of 0.60mbgl;
- Drilling of four cable percussive boreholes to a maximum depth of 10.0mbgl; and
- Four rounds of groundwater level and ground gas monitoring.

The ground conditions identified comprised Topsoil or Made Ground to a maximum depth of 0.60mbgl followed by Alluvium to a maximum depth of 3.50mbgl. Head Deposits were encountered only in three of the cable percussive boreholes, which was then followed by River Terrace Deposits at one location. The Chalk was encountered at 10.0m and its thickness was not proven.

No visual or olfactory evidence of contamination was identified during the investigation.

Groundwater was encountered during the investigation at depths ranging from 0.80mbgl to 7.00mbgl and during subsequent monitoring, groundwater depths ranged from 0.22mbgl to 0.74mbgl.

Although low levels of contamination concentrations were identified in soil samples, when screened against the Generic Assessment Criteria (GAC) for a commercial end use, no exceedances were identified. No asbestos fibres were identified in any of the shallow soils tested.

Groundwater sampling and testing identified low levels of contamination with exceedances of copper and nickel when screened against the Water Framework Directive (WFD) standards. The exceedances were considered to be marginal and are considered likely to be representative of background concentrations as there are no plausible source of these contaminants on Site.

Ground gas monitoring undertaken at the Site classified the Site as Characteristic Situation 2 (low risk) and therefore it was recommended that ground gas mitigation measures are installed at the proposed development.

3.0 Proposed Foundation Design Hazard Assessment

3.1 Development Proposal

It is understood that the Site is to be redeveloped for a light industrial / commercial use. No proposed development plans have been provided.

3.2 Foundation Proposal

The development is to be founded on Controlled Modulus Columns (CMC). The methodology is a ground improvement solution designed to improve soils with weak load bearing capacities and high deformation. The methodology uses a grid of concrete or grout filled columns covered in a load bearing platform.

The columns are constructed by boring to the desired depth using a 240-450mm diameter tool and then pumping cement or grout from the bottom to top at low pressure to form each column. The boring method is designed as such to distribute materials laterally as the pile is bored to increase surrounding soil densities and to not generate waste spoil.

The final pile design length is unknown at this stage and would be subject to final design confirmation. For the purposes of this assessment, TRC has assumed that extend beyond the base of the superficial soils and will terminate within the underlying chalk bedrock.

3.3 Hazard Assessment

The Environment Agency (EA) guidance 'Piling into Contaminated Sites' identifies six possible generic pollution scenarios that require consideration during foundation design. These are summarised as:

1. Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an underlying aquifer;
2. Creation of preferential pathways through a low permeability surface layer to allow upward migration of land gas, soil gas or contaminant vapours to the surface;
3. Direct contact of site workers and others with contaminated soil arisings which have been brought to the surface;
4. Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration);
5. The driving of solid contaminants down into an aquifer during pile driving; and,
6. Contamination of groundwater and subsequently surface waters by concrete, cement paste or grout.

The hazards for the proposed CMC methodology at the Site have been assessed further within Table 1 below:

Table 1: Hazard Assessment for Proposed Piling Methodology – Controlled Modulus Columns

Hazard	Probability of Hazard	Risk Classification	Risk Management Action
Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an underlying aquifer.	Low No significant sources of contamination were identified at the Site. The proposed CMC methodology will involve columns being filled with a cement or grout; therefore no preferential pathways will be formed.	Very Low	No action required
Creation of preferential pathways through a low permeability surface layer to allow upward migration of land gas, soil gas or contaminant vapours to the surface.	Low Piles unlikely to form a permeability pathway. Site Investigation data does not indicate that there is deeper ground gas or contamination that may present a risk.	Very Low	No action required
Direct contact of site workers and others with contaminated soil arisings which have been brought to the surface.	Low The CMC methodology is designed to not generate soil arisings.	Very Low	No action required
Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	Low No significant concentrations of contaminants were identified at the Site.	Low	Structural engineer and/or designer to consider ground conditions and design pile construction materials accordingly. Delta-Simons recommend Design Sulphate Class of DS-1 and ACEC of AC-1.
The driving of solid contaminants down into an aquifer during pile driving.	Low No significant concentrations of contaminants were identified at the Site. The selected methodology (CMC) is a displacement method which would push material laterally and should	Very Low	No action required

Hazard	Probability of Hazard	Risk Classification	Risk Management Action
	not cause material to be driven down.		
Contamination of groundwater and subsequently surface waters by concrete, cement paste or grout.	Low Potential localised impact from use of cement grout in column construction. The cement grout will be pumped in as the auger is being withdrawn and will be monitored, therefore loss of cement grout in the groundwater is considered unlikely.	Low - Medium	Structural engineer and/or designer to consider pile materials accordingly.

4.0 Summary

In summary, it is considered that the Site represents a low risk with respect to contamination. It is considered that any proposed ground improvement design methodology would be unlikely to create an environmental risk.

TRC recommend that a contractor implement a Construction Phase Environmental Management Plan to ensure the risk management actions are undertaken to reduce environmental risk. The designer should ensure that construction materials are compatible with the ground conditions encountered.