



Rogers Cory Partnership



SITE NAME: Hook Lane, Westergate

REPORT NAME: Technical Note: Additional supporting information relating to the surface and foul water drainage strategies

DATE: 30/11/2016

REF: BSO/E4462/16363

Introduction

This technical note has been produced following a meeting held on the 9th November 2016, with the drainage engineers from both Arun District Council and West Sussex County Council relating to queries over the proposals for the implementation of a surface water pumping solution to support the development at the site at Hook Lane, Westergate (planning reference: AL/107/16).

This technical note should be read in conjunction with the previously submitted Drainage Strategy and SuDS Statement Report (dated 22nd August 2016).

It should be noted that matters relating to flood risk with respects to the site as well as offsite impacts have previously been addressed within the approved Flood Risk Assessment by Brookbanks (report ref: 1313/FRA/01, May 2013) as part of the outline scheme, and the following responses to the comments raised by the Parish Council are made only in relation to the planning conditions 7, 8 and 9.

Additional Supporting information

The additional information provided within this technical note is to provide further clarification on the points discussed at the meeting of the 9th November 2016 specifically in terms of the background an engineering constraints which have determined a need to use a surface water pumping on this site.

Civil, Structural and
Architectural Consultants

rogers-cory-partnership limited
the old school, old school road
hook, westergate, s27 9w



Registered in England & Wales no. 6307647.
Registered office and business premises at above.

The key reason for the need to use a pumping solution for the surface water discharge for this site is due to the very limited falls across the site as well as the shallow depth of the existing ditches along the southern boundary of the site.

In order to facilitate a discharge to the existing ditch at the low point in the south eastern corner whilst still accommodate the required volume of attenuation onsite, a pumping solution is required to avoid significant raising of throughout the site ranging from 1.0m to 2.0m.

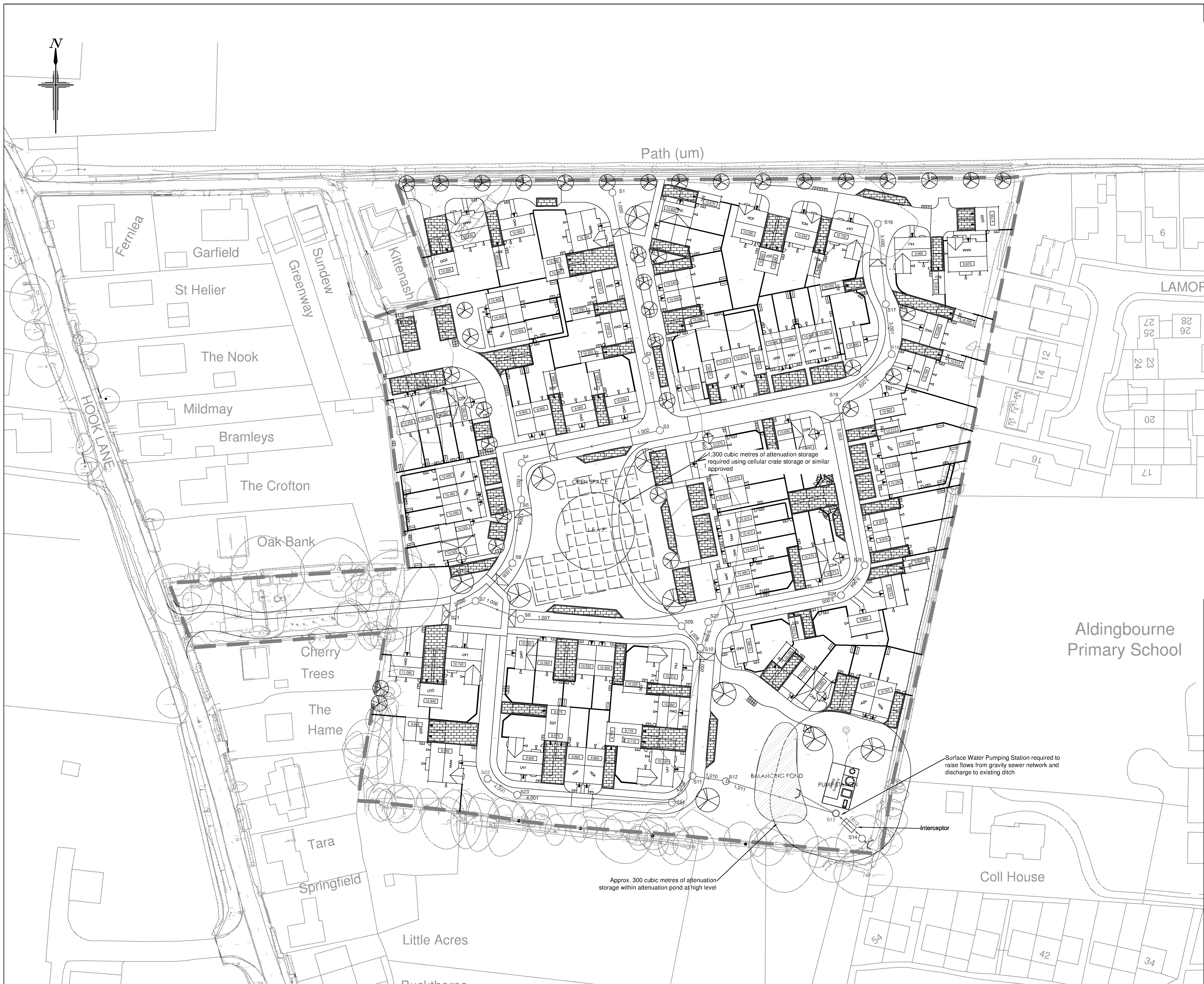
Opportunities to use shallow drainage systems, such as permeable paving and swales were explored during the design development stage and were discounted as these still not provide sufficient fall to the point of discharge and maintain the require onsite attenuation volumes without wholesale land raising.

At our meeting on the 9th November we noted the Council's concern over future maintenance and performance reliability over the surface water pumping station as this would not be an adoptable pump. As a result and to address their concerns we agreed to obtain a detailed maintenance contract proposal from the preferred pump supplier who would also be appointed for the future maintenance, including emergency attendance to this site. This maintenance proposal includes for inspections every six months as well as a provision of a telemetry alarm system to alert the contractors of a failure of which their turnaround will be within 24 hours. It should be noted that this maintenance and emergency response time is similar to that which would be encountered on an adoptable scheme.

It should also be noted that the onsite surface water drainage system has been designed with temporary storage below ground to accommodate all storm events up to an including the 1 in 30 year event in the event of a 24 hour pump failure.

The surface water drainage strategy and SuDS proposal remain as proposed in the Drainage Strategy and SuDS Statement (August 2016).

With regards to the foul drainage strategy, chapter 5 of the statement (August 2016) describes the strategy which will incorporate an adoptable foul water pumping station and the onsite network is proposed to be offered for adoption to Southern Water. The final connection to the existing Southern Water network is to be undertaken via a Section 98 Agreement. Since the submission of the drainage report, the initial proposals for the Section 98 works has been provided by Southern Water which includes the extent of works to be undertaken to accommodate the increase in foul water discharge from the site. A copy of this has been appended to this note.



1. All dimensions are in metres unless stated otherwise.
2. Do not scale this drawing.
3. Site layout shown in this drawing is based on Carlton Design Partnership Site Layout, drawing number 160104/SL Rev R dated 28/04/16.
4. Topographic Survey as per Siteline Provisional Survey, drawing number 36W2001A dated February 2016.
5. The current level strategy is indicative only and subject to further design development following receipt of the finalized site layout proposals.

The diagram illustrates a cross-section of a proposed headwall. From top to bottom, the layers are:

- Site Boundary**: Indicated by a dashed line at the top.
- Finished Floor Level**: A horizontal line below the site boundary.
- Surface Water Sewers**: A layer below the finished floor level.
- Lined permeable paving (Light Duty Construction)**: A layer below the surface water sewers, depicted with a brick pattern.
- Lined Cellular Storage**: A layer below the permeable paving, depicted with a cellular pattern.
- Proposed headwall**: The bottom-most layer, shown as a vertical wall on the right side of the diagram.

Additional features include:

- Hydrant**: A circular symbol with a cross inside, labeled "Hydrant", located to the left of the lined permeable paving layer.
- Manhole**: A circular symbol with a cross inside, labeled "M1", located to the right of the lined permeable paving layer.
- Dimensions**: A dimension line at the top right indicates a width of **40.90**.



A	30.11.16	Lined permeable paving added on all parking bays.	AC	TS	TS
Rev.	Date	Details	By	Chkd	Appd


BARRATT
 HOMES

Drawing Title:-
SURFACE WATER
DRAINAGE
STRATEGY

Date:	May 2016	Scales:	1:500 at A1
Drawn:	KJ	Checked:	TS
		Approved:	TS

Drawing No.

BSO/E4462/014 A

PRELIMINARY





Pump Design and Services Ltd (PDAS Ltd)
Lime Tree Gate
Crockford Lane
Chineham
Basingstoke
Hampshire
RG24 8WH



Our Reference: CR/PACK/Q10405a
Date: 21st November 2016

Barratt Homes Southampton
Tollbar House
Tollbar Way
Hedge End
Southampton
SO30 2UH

For the attention of Darren Kennett

Dear Sirs

Re: Hook Lane, Westergate – Private SW Pump Station Maintenance

Further to our on-going communications with Rogers Cory Partnership, we now enclose our Service Contract quotation for the privately maintained Surface Water Pumping Station on the above scheme.

For your information, the pumping station will be delivered and installed via our site delivery partners Willow Pumps who would also be responsible for the on-going maintenance contract.

On surface water application's we recommend a service contract which involves two standard routine maintenance visits per annum (once every six months). The activities carried out on these routine maintenance visits can be found on the accompanying Willow Pumps 6 monthly schedule.

In the event of emergency call outs for pump station breakdowns which are not covered under the standard warranty these would be chargeable at the rates as enclosed on the Call Out rates 2016.

For an Auto Response to pump station break down scenarios a Telemetry Unit will also be required. The Telemetry Unit will communicate selected pump trip and high level fault conditions back to the Service Centre via the GSM Mobile Network, i.e. a dedicated Telephone Line will not be required. Please note that we will carry out checks to ensure the most suitable GSM Mobile Network provider is needed for the site location.

We refer you to the enclosed quotation which we trust you will find of interest and remain at your service if you have any queries.

Yours Faithfully
Chris Richardson
Design Manager



General Specification for Dual Pump Package Pump Station and Accessories

CHAMBER: Vertical, cylindrical GRP watertight pump chamber with sewer inlet connection(s) of size(s) and location(s) to suit requirements, formed benching, moulded cable duct and delivery pipe projections, duckfoot bend and guiderail bolted connections, cable and chain suspensions hooks & access cover with frame (moulded on or separate as required), within which would be contained:-

PUMP: Single stage fully submersible pump of cast iron construction directly connected to watertight IP68 submersible motor having thermistor or thermostat overtemperature protection, (certain small frames excepted) and suitable length of multi core VRI PCP sheathed flexible cable. Oil buffer chamber with opposing seals incorporated between pump and motor.

DUCKFOOT: Cast iron duckfoot bend (or pedestal with elbow) incorporating guiderail socket and self locating boltless pump quick release coupling fixed to base of tank.

GUIDERAIL: Galvanised mild steel rail located at neck of tank and extending to duckfoot socket complete with necessary bracket. (Certain manufacturers utilise guidewires and these will be used where applicable.)

CHAIN: Mild steel galvanised lifting chain, attached to pump and of length to reach and be hooked at neck of tank.

REFLUX VALVE: Fullway pattern delivery non-return valve.

SLUICE VALVE: Fullway pattern isolating sluice valve with non rising spindle and hand wheel.

PIPES: From duckfoot through to defined point/level outside the tank, incorporating the above valves. All fitting connections appropriate to materials employed.

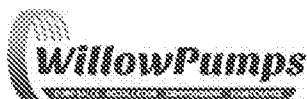
LEVEL CONTROLS: Encapsulated float switches with suspension cables and bracket for automatic sump emptying level controls (and high level if specified).

SEPARATELY: For above ground mounting:

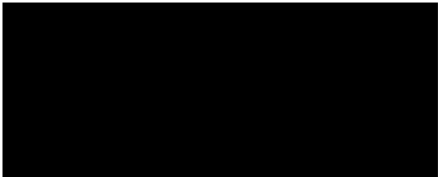
CONTROL PANEL & KIOSK

Dual pump, 415v control panel, housed in a mild steel kiosk- 1250mm(H) x 750mm(W) x 400mm(D). Includes:

- Door interlocked isolator
- Motor fuses
- DOL Contactor starters
- Hand/Off/Auto selector switches
- Supply on indication
- Individual pump run and trip lamps
- High-level alarm buzzer
- 3 x VFC (Common Pump Fail & HLA) – for building into BMS system by others
- Kiosk heater feed, heater and stat in the kiosk
- Alarm beacon and guard on top of kiosk



Pump Design and Services Ltd (PDAS Ltd)
 Lime Tree Gate
 Crockford Lane
 Chineham
 Basingstoke
 Hampshire
 RG24 8WH



Our Reference: CR/PACK/Q10405a

Date: 21st November 2016

Maintenance Quote

Site Name	Hook Lane, Westergate		
Station Type	Storm		
Number of Pumps	2		
Pump Type	Submersible		
Pump Rating	TBC following Detailed Design		
Chamber Dimensions	TBC following Detailed Design		
Visits Per Annum	One	Two	Four
Cost Per Annum			
Telemetry Rental Per Annum			

Service Scope

To carry out major / routine maintenance of the pump station in generally in accordance with the attached schedule of works at the above specified frequency and cost.

Terms and Conditions

- Quotation is valid for 30 days
- All prices quoted are exclusive of VAT
- Prices are based on single man attendance. Should 2 men be required due to on-site H&S requirements then we reserve the right to reappraise our offer.
- Payment due at commencement of contract
- Calls outs are chargeable
- Renewal of contract will be automatic subject to inflation
- The limit of chargeable replacements without order is £150
- PDAS Standard Terms and Conditions apply. See attachments
- Termination of contract subject to 3 months' notice
- Telemetry if ordered will be fitted at first service visit and would be subject to obtaining a suitable signal and the where control panel / kiosk is readily accessible

Authorisation (Please complete and return to above address)

Date	
Order Number	
Customer Name	
Customer Signature	
Customer Address	
Customer Telephone Number	

Rogers Cory Partnership		Page 0
The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 30/11/2016 15:26	Designed by Terry	
File SW1 - no discharge.MDX	Checked by	
Micro Drainage		Network 2015.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	1.000
Ratio R	0.350	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	0.75
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for SW1.SWS

- Indicates pipe length does not match coordinates

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	42.999	0.343	125.4	0.071	5.00	0.0	0.600	o	150	
1.001	7.459	0.065	114.8	0.040	0.00	0.0	0.600	o	150	
1.002	14.265	0.131	108.9	0.049	0.00	0.0	0.600	o	225	
1.003	8.200	0.047	174.5	0.215	0.00	0.0	0.600	o	300	
1.004	12.315	0.300	41.1	0.060	0.00	0.0	0.600	o	300	
2.000	23.289	0.141	165.2	0.018	5.00	0.0	0.600	o	150	
2.001	14.517	0.070	207.4	0.034	0.00	0.0	0.600	o	150	
2.002	20.735	0.053	391.2	0.042	0.00	0.0	0.600	o	225	
2.003	72.568	0.500	145.2	0.000	0.00	0.0	0.600	o	225	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL E (m)	I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.80	8.839	0.071	0.0	0.0	0.0	0.90	15.8	9.6
1.001	50.00	5.93	8.496	0.111	0.0	0.0	0.0	0.94	16.6	15.0
1.002	50.00	6.12	8.356	0.160	0.0	0.0	0.0	1.25	49.8	21.7
1.003	50.00	6.24	8.150	0.375	0.0	0.0	0.0	1.19	83.9	50.8
1.004	50.00	6.32	8.103	0.435	0.0	0.0	0.0	2.46	173.9	58.9
2.000	50.00	5.50	8.717	0.018	0.0	0.0	0.0	0.78	13.8	2.4
2.001	50.00	5.85	8.576	0.052	0.0	0.0	0.0	0.68	12.3	7.0
2.002	50.00	6.37	8.431	0.094	0.0	0.0	0.0	0.66	26.0	12.7
2.003	50.00	7.49	8.378	0.094	0.0	0.0	0.0	1.08	43.1	12.7

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(mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Auto Design</th></tr><tr><td>1.005</td><td>53.454</td><td>0.107</td><td>499.6</td><td>0.042</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>375</td><td></td></tr><tr><td>3.000</td><td>48.990</td><td>0.356</td><td>137.6</td><td>0.094</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td></td></tr><tr><td>3.001</td><td>11.128</td><td>1.133</td><td>9.8</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td></td></tr><tr><td>1.006</td><td>12.760</td><td>0.026</td><td>490.8</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>375</td><td></td></tr><tr><td>1.007</td><td>44.544</td><td>0.089</td><td>500.5</td><td>0.077</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>450</td><td></td></tr><tr><td>1.008</td><td>8.666</td><td>0.093</td><td>93.5</td><td>0.099</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>450</td><td></td></tr><tr><td>4.000</td><td>14.222</td><td>0.031</td><td>458.8</td><td>0.052</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td></td></tr><tr><td>4.001</td><td>1.000</td><td>0.026</td><td>39.1</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td></td></tr><tr><td>4.002</td><td>41.288</td><td>0.139</td><td>297.0</td><td>0.055</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td></td></tr><tr><td>4.003</td><td>5.944</td><td>0.609</td><td>9.8</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td></td></tr><tr><td>1.009</td><td>38.557</td><td>0.077</td><td>500.7</td><td>0.065</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>450</td><td></td></tr><tr><td>5.000</td><td>31.205</td><td>0.325</td><td>96.0</td><td>0.059</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td></td></tr><tr><td>5.001</td><td>23.677</td><td>0.080</td><td>295.1</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td></td></tr><tr><td>5.002</td><td>6.089</td><td>1.308</td><td>4.7</td><td>0.131</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td></td></tr><tr><td>1.010</td><td>9.754</td><td>0.020</td><td>487.7</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>450</td><td></td></tr></table> <u>Network Results Table</u> <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>I.Area (ha)</th><th>Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>1.005</td><td>48.81</td><td>8.60</td><td>7.728</td><td>0.571</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.80</td><td>88.8</td><td>75.5</td></tr><tr><td>3.000</td><td>50.00</td><td>5.96</td><td>8.335</td><td>0.094</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.85</td><td>15.1</td><td>12.7</td></tr><tr><td>3.001</td><td>50.00</td><td>6.01</td><td>8.979</td><td>0.094</td><td>0.0</td><td>0.0</td><td>0.0</td><td>3.23</td><td>57.1</td><td>12.7</td></tr><tr><td>1.006</td><td>48.09</td><td>8.86</td><td>7.621</td><td>0.665</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.81</td><td>89.6</td><td>86.6</td></tr><tr><td>1.007</td><td>45.97</td><td>9.68</td><td>7.520</td><td>0.742</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.90</td><td>143.4</td><td>92.4</td></tr><tr><td>1.008</td><td>45.80</td><td>9.75</td><td>7.431</td><td>0.841</td><td>0.0</td><td>0.0</td><td>0.0</td><td>2.10</td><td>334.5</td><td>104.3</td></tr><tr><td>4.000</td><td>50.00</td><td>5.51</td><td>8.444</td><td>0.052</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.46</td><td>8.2</td><td>7.0</td></tr><tr><td>4.001</td><td>50.00</td><td>5.52</td><td>8.413</td><td>0.052</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.61</td><td>28.5</td><td>7.0</td></tr><tr><td>4.002</td><td>50.00</td><td>6.44</td><td>8.312</td><td>0.107</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.75</td><td>30.0</td><td>14.5</td></tr><tr><td>4.003</td><td>50.00</td><td>6.46</td><td>8.173</td><td>0.107</td><td>0.0</td><td>0.0</td><td>0.0</td><td>4.21</td><td>167.6</td><td>14.5</td></tr><tr><td>1.009</td><td>44.16</td><td>10.47</td><td>7.339</td><td>1.013</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.90</td><td>143.4</td><td>121.1</td></tr><tr><td>5.000</td><td>50.00</td><td>5.39</td><td>8.290</td><td>0.059</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.33</td><td>53.1</td><td>8.0</td></tr><tr><td>5.001</td><td>50.00</td><td>5.91</td><td>8.875</td><td>0.059</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.76</td><td>30.1</td><td>8.0</td></tr><tr><td>5.002</td><td>50.00</td><td>5.93</td><td>8.795</td><td>0.190</td><td>0.0</td><td>0.0</td><td>0.0</td><td>6.11</td><td>242.8</td><td>25.7</td></tr><tr><td>1.010</td><td>43.77</td><td>10.64</td><td>7.262</td><td>1.203</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.91</td><td>145.3</td><td>142.6</td></tr></table> ©1982-2015 XP Solutions											PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design	1.005	53.454	0.107	499.6	0.042	0.00	0.0	0.600	o	375		3.000	48.990	0.356	137.6	0.094	5.00	0.0	0.600	o	150		3.001	11.128	1.133	9.8	0.000	0.00	0.0	0.600	o	150		1.006	12.760	0.026	490.8	0.000	0.00	0.0	0.600	o	375		1.007	44.544	0.089	500.5	0.077	0.00	0.0	0.600	o	450		1.008	8.666	0.093	93.5	0.099	0.00	0.0	0.600	o	450		4.000	14.222	0.031	458.8	0.052	5.00	0.0	0.600	o	150		4.001	1.000	0.026	39.1	0.000	0.00	0.0	0.600	o	150		4.002	41.288	0.139	297.0	0.055	0.00	0.0	0.600	o	225		4.003	5.944	0.609	9.8	0.000	0.00	0.0	0.600	o	225		1.009	38.557	0.077	500.7	0.065	0.00	0.0	0.600	o	450		5.000	31.205	0.325	96.0	0.059	5.00	0.0	0.600	o	225		5.001	23.677	0.080	295.1	0.000	0.00	0.0	0.600	o	225		5.002	6.089	1.308	4.7	0.131	0.00	0.0	0.600	o	225		1.010	9.754	0.020	487.7	0.000	0.00	0.0	0.600	o	450		PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	1.005	48.81	8.60	7.728	0.571	0.0	0.0	0.0	0.80	88.8	75.5	3.000	50.00	5.96	8.335	0.094	0.0	0.0	0.0	0.85	15.1	12.7	3.001	50.00	6.01	8.979	0.094	0.0	0.0	0.0	3.23	57.1	12.7	1.006	48.09	8.86	7.621	0.665	0.0	0.0	0.0	0.81	89.6	86.6	1.007	45.97	9.68	7.520	0.742	0.0	0.0	0.0	0.90	143.4	92.4	1.008	45.80	9.75	7.431	0.841	0.0	0.0	0.0	2.10	334.5	104.3	4.000	50.00	5.51	8.444	0.052	0.0	0.0	0.0	0.46	8.2	7.0	4.001	50.00	5.52	8.413	0.052	0.0	0.0	0.0	1.61	28.5	7.0	4.002	50.00	6.44	8.312	0.107	0.0	0.0	0.0	0.75	30.0	14.5	4.003	50.00	6.46	8.173	0.107	0.0	0.0	0.0	4.21	167.6	14.5	1.009	44.16	10.47	7.339	1.013	0.0	0.0	0.0	0.90	143.4	121.1	5.000	50.00	5.39	8.290	0.059	0.0	0.0	0.0	1.33	53.1	8.0	5.001	50.00	5.91	8.875	0.059	0.0	0.0	0.0	0.76	30.1	8.0	5.002	50.00	5.93	8.795	0.190	0.0	0.0	0.0	6.11	242.8	25.7	1.010	43.77	10.64	7.262	1.203	0.0	0.0	0.0	0.91	145.3	142.6
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design																																																																																																																																																																																																																																																																																																																																																																
1.005	53.454	0.107	499.6	0.042	0.00	0.0	0.600	o	375																																																																																																																																																																																																																																																																																																																																																																	
3.000	48.990	0.356	137.6	0.094	5.00	0.0	0.600	o	150																																																																																																																																																																																																																																																																																																																																																																	
3.001	11.128	1.133	9.8	0.000	0.00	0.0	0.600	o	150																																																																																																																																																																																																																																																																																																																																																																	
1.006	12.760	0.026	490.8	0.000	0.00	0.0	0.600	o	375																																																																																																																																																																																																																																																																																																																																																																	
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4.002	41.288	0.139	297.0	0.055	0.00	0.0	0.600	o	225																																																																																																																																																																																																																																																																																																																																																																	
4.003	5.944	0.609	9.8	0.000	0.00	0.0	0.600	o	225																																																																																																																																																																																																																																																																																																																																																																	
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5.000	31.205	0.325	96.0	0.059	5.00	0.0	0.600	o	225																																																																																																																																																																																																																																																																																																																																																																	
5.001	23.677	0.080	295.1	0.000	0.00	0.0	0.600	o	225																																																																																																																																																																																																																																																																																																																																																																	
5.002	6.089	1.308	4.7	0.131	0.00	0.0	0.600	o	225																																																																																																																																																																																																																																																																																																																																																																	
1.010	9.754	0.020	487.7	0.000	0.00	0.0	0.600	o	450																																																																																																																																																																																																																																																																																																																																																																	
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1.005	48.81	8.60	7.728	0.571	0.0	0.0	0.0	0.80	88.8	75.5																																																																																																																																																																																																																																																																																																																																																																
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1.006	48.09	8.86	7.621	0.665	0.0	0.0	0.0	0.81	89.6	86.6																																																																																																																																																																																																																																																																																																																																																																
1.007	45.97	9.68	7.520	0.742	0.0	0.0	0.0	0.90	143.4	92.4																																																																																																																																																																																																																																																																																																																																																																
1.008	45.80	9.75	7.431	0.841	0.0	0.0	0.0	2.10	334.5	104.3																																																																																																																																																																																																																																																																																																																																																																
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4.001	50.00	5.52	8.413	0.052	0.0	0.0	0.0	1.61	28.5	7.0																																																																																																																																																																																																																																																																																																																																																																
4.002	50.00	6.44	8.312	0.107	0.0	0.0	0.0	0.75	30.0	14.5																																																																																																																																																																																																																																																																																																																																																																
4.003	50.00	6.46	8.173	0.107	0.0	0.0	0.0	4.21	167.6	14.5																																																																																																																																																																																																																																																																																																																																																																
1.009	44.16	10.47	7.339	1.013	0.0	0.0	0.0	0.90	143.4	121.1																																																																																																																																																																																																																																																																																																																																																																
5.000	50.00	5.39	8.290	0.059	0.0	0.0	0.0	1.33	53.1	8.0																																																																																																																																																																																																																																																																																																																																																																
5.001	50.00	5.91	8.875	0.059	0.0	0.0	0.0	0.76	30.1	8.0																																																																																																																																																																																																																																																																																																																																																																
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1.010	43.77	10.64	7.262	1.203	0.0	0.0	0.0	0.91	145.3	142.6																																																																																																																																																																																																																																																																																																																																																																

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The Old School Old School Road Hook Hampshire RG27 9NJ		
Date 30/11/2016 15:26	Designed by Terry	
File SW1 - no discharge.MDX	Checked by	
Micro Drainage		Network 2015.1

Network Design Table for SW1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.011	33.006	0.066	500.1	0.154	0.00	0.0	0.600	o	525	
1.012	10.459	0.025	418.4	0.108	0.00	0.0	0.600	o	525	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.011	42.61	11.20	7.167	1.357	0.0	0.0	0.0	0.99	215.3	156.6
1.012	42.30	11.36	7.101	1.465	0.0	0.0	0.0	1.09	235.7	167.8

Free Flowing Outfall Details for SW1.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012	15	9.488	7.076	0.000	0	0

Simulation Criteria for SW1.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

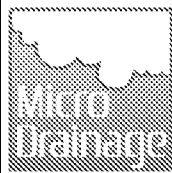
Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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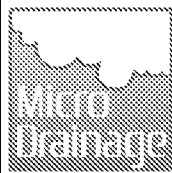
Rogers Cory Partnership		Page 3																																																																								
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<u>Online Controls for SW1.SWS</u> <u>Depth/Flow Relationship Manhole: 14, DS/PN: 1.012, Volume (m³): 11.4</u> Invert Level (m) 7.101 <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Flow (l/s)</th> <th>Depth (m)</th> <th>Flow (l/s)</th> <th>Depth (m)</th> <th>Flow (l/s)</th> <th>Depth (m)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>0.100</td><td>0.0000</td><td>0.900</td><td>0.0000</td><td>1.700</td><td>0.0000</td><td>2.500</td><td>0.0000</td></tr> <tr><td>0.200</td><td>0.0000</td><td>1.000</td><td>0.0000</td><td>1.800</td><td>0.0000</td><td>2.600</td><td>0.0000</td></tr> <tr><td>0.300</td><td>0.0000</td><td>1.100</td><td>0.0000</td><td>1.900</td><td>0.0000</td><td>2.700</td><td>0.0000</td></tr> <tr><td>0.400</td><td>0.0000</td><td>1.200</td><td>0.0000</td><td>2.000</td><td>0.0000</td><td>2.800</td><td>0.0000</td></tr> <tr><td>0.500</td><td>0.0000</td><td>1.300</td><td>0.0000</td><td>2.100</td><td>0.0000</td><td>2.900</td><td>0.0000</td></tr> <tr><td>0.600</td><td>0.0000</td><td>1.400</td><td>0.0000</td><td>2.200</td><td>0.0000</td><td>3.000</td><td>0.0000</td></tr> <tr><td>0.700</td><td>0.0000</td><td>1.500</td><td>0.0000</td><td>2.300</td><td>0.0000</td><td></td><td></td></tr> <tr><td>0.800</td><td>0.0000</td><td>1.600</td><td>0.0000</td><td>2.400</td><td>0.0000</td><td></td><td></td></tr> </tbody> </table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	0.0000	0.900	0.0000	1.700	0.0000	2.500	0.0000	0.200	0.0000	1.000	0.0000	1.800	0.0000	2.600	0.0000	0.300	0.0000	1.100	0.0000	1.900	0.0000	2.700	0.0000	0.400	0.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000	0.500	0.0000	1.300	0.0000	2.100	0.0000	2.900	0.0000	0.600	0.0000	1.400	0.0000	2.200	0.0000	3.000	0.0000	0.700	0.0000	1.500	0.0000	2.300	0.0000			0.800	0.0000	1.600	0.0000	2.400	0.0000		
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0.400	0.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000																																																																			
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<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for SW1.SWS</u>								
PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	2	-0.067	0.000	0.56		8.7	OK	
1.001	3	-0.010	0.000	0.06		0.9	OK	
1.002	4	0.090	0.000	0.03		1.3	SURCHARGED	
1.003	5	0.219	0.000	0.05		3.1	SURCHARGED	
1.004	6	0.275	0.000	0.03		3.6	SURCHARGED	
2.000	16	-0.108	0.000	0.17		2.2	OK	
2.001	17	-0.073	0.000	0.52		5.8	OK	
2.002	18	-0.001	0.000	0.03		0.8	OK	
2.003	19	0.073	0.000	0.02		0.8	SURCHARGED	
1.005	7	0.587	0.000	0.06		4.7	SURCHARGED	
3.000	20	-0.047	0.000	0.77		11.3	OK	
3.001	21	-0.102	0.000	0.22		11.2	OK	
1.006	8	0.737	0.000	0.10		5.2	SURCHARGED	
1.007	9	0.787	0.000	0.04		5.7	SURCHARGED	
1.008	10	0.893	0.000	0.03		6.0	SURCHARGED	
4.000	25	0.116	0.000	0.06		0.4	SURCHARGED	
4.001	26	0.147	0.000	0.07		0.8	SURCHARGED	
4.002	27	0.199	0.000	0.03		0.9	SURCHARGED	
4.003	28	0.364	0.000	0.01		1.3	SURCHARGED	
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PN	US/MH Name Storm	Return Period
		Climate Change
		First (X) Surchage
		First (Y) Flood
		First (Z) Overflow
		Overflow Act.
		Level (m)
1.000	2 15 Winter	30
		+0%
		30/15 Summer
1.001	3 1440 Winter	30
		+0%
		30/15 Summer
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		+0%
		1/1440 Winter
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		+0%
		1/1440 Summer
1.004	6 1440 Winter	30
		+0%
		1/1440 Summer
2.000	16 1440 Winter	30
		+0%
		30/1440 Summer
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		+0%
		30/15 Summer
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		+0%
		30/15 Summer
2.003	19 1440 Winter	30
		+0%
		1/1440 Winter
1.005	7 1440 Winter	30
		+0%
		1/360 Summer
3.000	20 15 Winter	30
		+0%
		30/15 Summer
3.001	21 1440 Winter	30
		+0%
		30/1440 Summer
1.006	8 1440 Winter	30
		+0%
		1/360 Summer
1.007	9 1440 Winter	30
		+0%
		1/360 Summer
1.008	10 1440 Winter	30
		+0%
		1/360 Summer
4.000	25 1440 Winter	30
		+0%
		1/1440 Winter
4.001	26 1440 Winter	30
		+0%
		1/1440 Winter
4.002	27 1440 Winter	30
		+0%
		1/1440 Winter
4.003	28 1440 Winter	30
		+0%
		1/1440 Summer

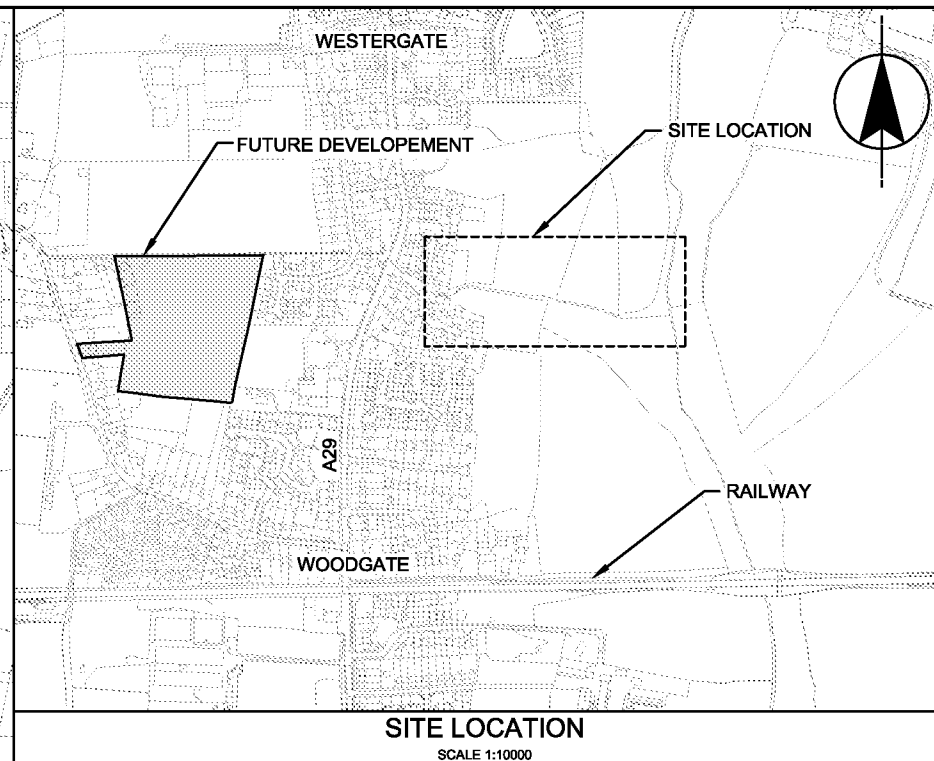
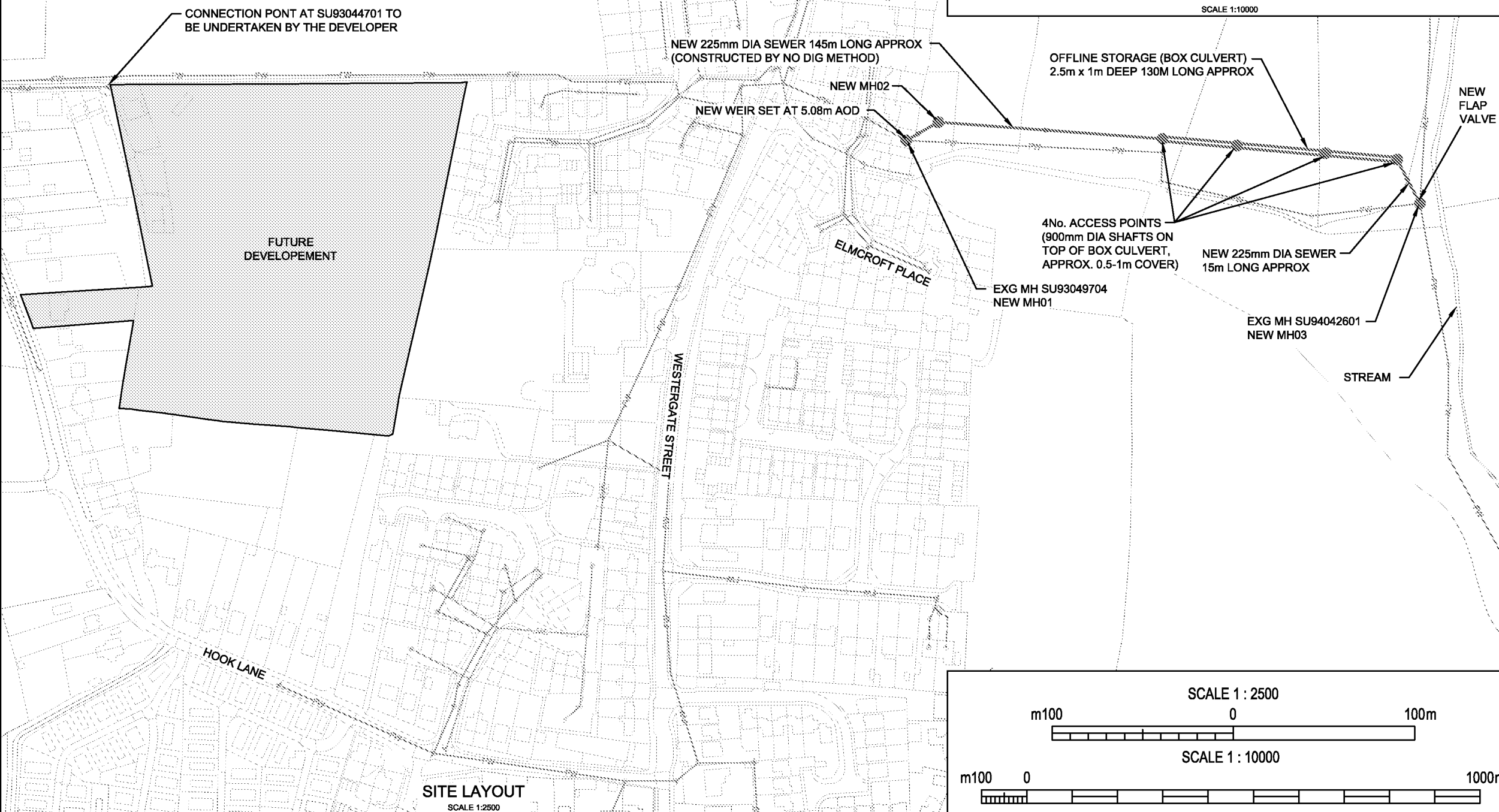
Rogers Cory Partnership						Page 9		
The Old School Old School Road Hook Hampshire RG27 9NJ				Designed by Terry Checked by				
Date 30/11/2016 15:26 File SW1 - no discharge.MDX								
Micro Drainage				Network 2015.1				
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW1.SWS</u>								
PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	2	0.597	0.000	1.07		16.4	SURCHARGED	
1.001	3	0.637	0.000	0.13		1.9	SURCHARGED	
1.002	4	0.702	0.000	0.06		2.7	SURCHARGED	
1.003	5	0.833	0.000	0.10		6.3	SURCHARGED	
1.004	6	0.880	0.000	0.05		7.3	SURCHARGED	
2.000	16	0.416	0.000	0.02		0.3	SURCHARGED	
2.001	17	0.557	0.000	0.08		0.9	SURCHARGED	
2.002	18	0.627	0.000	0.07		1.6	SURCHARGED	
2.003	19	0.680	0.000	0.04		1.6	SURCHARGED	
1.005	7	1.180	0.000	0.11		9.4	SURCHARGED	
3.000	20	0.576	0.000	1.58		23.3	SURCHARGED	
3.001	21	0.154	0.000	0.03		1.6	SURCHARGED	
1.006	8	1.287	0.000	0.20		10.9	SURCHARGED	
1.007	9	1.313	0.000	0.09		12.1	SURCHARGED	
1.008	10	1.402	0.000	0.08		13.7	SURCHARGED	
4.000	25	0.689	0.000	0.12		0.9	SURCHARGED	
4.001	26	0.720	0.000	0.08		0.9	SURCHARGED	
4.002	27	0.746	0.000	0.06		1.8	SURCHARGED	
4.003	28	0.885	0.000	0.02		1.8	SURCHARGED	
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The Old School Old School Road Hook Hampshire RG27 9NJ										
Date 30/11/2016 15:26 File SW1 - no discharge.MDX					Designed by Terry Checked by					
Micro Drainage					Network 2015.1					
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW1.SWS</u>										
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	(m)
1.009	11	1440	Winter	30	+0%	1/360	Summer			9.284
5.000	22	15	Winter	30	+0%					9.295
5.001	23	1440	Winter	30	+0%	30/1440	Summer			9.284
5.002	24	1440	Winter	30	+0%	30/1440	Summer			9.284
1.010	12	1440	Winter	30	+0%	1/360	Summer			9.284
1.011	13	1440	Winter	30	+0%	1/360	Summer			9.284
1.012	14	1440	Winter	30	+0%	1/120	Summer			9.284
	US/MH			Surcharged	Flooded		Pipe		Level	
PN	Name	Depth	Volume	Flow /	Overflow	Flow	Status	Exceeded		
		(m)	(m³)	Cap.	(l/s)	(l/s)				
1.009	11	1.495	0.000	0.13		16.6	SURCHARGED			
5.000	22	-0.130	0.000	0.36		17.9	OK			
5.001	23	0.184	0.000	0.04		1.0	SURCHARGED			
5.002	24	0.264	0.000	0.02		3.2	SURCHARGED			
1.010	12	1.572	0.000	0.25		19.7	SURCHARGED			
1.011	13	1.592	0.000	0.06		10.5	SURCHARGED			
1.012	14	1.658	0.000	0.00		0.0	SURCHARGED			
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BULLET POINT NOTES:

- THIS DRAWING IS BASED ON HISTORICAL AND O.S. DATA. INCONSISTENCY IN DATA SHOULD BE CHECKED AND VERIFIED BEFORE COMMENCING DETAIL DESIGN
- EXISTING AND INDICATIVE PIPE ROUTES BASED ON GIS DATA. SOUTHERN WATER SERVICES LTD. ACCEPT NO RESPONSIBILITY IN THE EVENT OF INACCURACY. THE ROUTES ARE TO BE CHECKED AND VERIFIED BEFORE DETAIL DESIGN AND ARE SHOWN PURELY FOR OUTLINE DESIGN.

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[illegible]

Proposed scope of works

1. Infrastructure Requirements

The scheme requirements are as follows:

Box Culvert

- A 2.5m wide x 1m deep x 130m long storage tank (box culvert) will be required in order to provide the required additional storage volume of 226m³.
- 4No access points have been allowed for the box culvert. These being assessed as 900mm diameter shafts on top of the box culvert depth up to cover level (estimated up to 900mm depth). This is to be confirmed after completion of the surveys.

Pipework

- Construct approximately 145m of new 225mm diameter gravity sewer along the field to the storage tank.
- Construct approximately 15m of new 225mm diameter gravity sewer from the outlet of the storage tank back to the existing network.
- A flap valve is required at the downstream to stop the storage tank filling prematurely.

U/S MH	D/S MH	Proposed Diameter (mm)	Approx. Depth (m)	Total Length (m)	Cover	METHOD
SU93049704/ MH01	New MH02	225	1.5-2.5	15	Field	No dig method
New MH02	New storage tank inlet	225	1.5-2.5	130	Field	No dig method
New Storage Tank Outlet	SU94042601/ MH03	225	1.5-2.5	15	Field	Open Cut

Manholes

- Construct 1No new 1200mm diameter PCC manhole in the field.
- Completely reconstruct 2No existing manholes (SU93049704 & SU94042601) in the field.
- A weir is required at SU93049704

Manhole	MH type	Proposed Diameter (mm)	Cover	depth (m)
SU93049704/	2	1200	Field	1.5-2.5

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MH01				
New MH02	2	1200	Field	1.5-2.5
SU94042601/ MH03	2	1350	Field	1.5-2.5

2. Required Survey(s) for worksNon-intrusive

- Land and easement search
- MH Survey & CCTV survey
- Service/Utilities Trace
- Topographical Survey
- Geotechnical Interpretive Report
- Impermeable Area Survey (IAS)
- Short term flow survey
- Preliminary Environmental Appraisal (PEA)
- Archaeological written scheme of investigation

Intrusive

- 4No Geotechnical window sampling
- 2No trial pits

3. Planning and consent

- Southern Water's Land and Estates is required to confirm land ownership and potential compensation required at SL2 design stage. Land access and any compensation must be agreed with associated landowners.
- There are properties along the route (MH SU93049704/ MH01) that may be affected temporarily during the construction phase. It is advised that early communications are made with the local community to inform of impending works.
- Notice will need to be given to Southern Water Services to enable them to arrange for the connections ahead of these works
- Any public rights of way will require approval and consent from the local council and will require approximately six weeks' notice before any closures. Any

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temporary closures of a public rights of way will require an alternative route to be made.

4. Environmental issues

For the purpose of this investigation Southern Water has carried out a Desktop Environmental, Third Party and Planning Appraisal (DE3PPA) which identified the area of the proposed works as complex. The focus was to assess environmental constraints in the proposed area of works, as stated in section 2.1.

Summary of key points from the environmental report:

Works Required:

- A Preliminary Ecological Assessment (PEA)
- An archaeological written scheme of investigation will be required.
- Hedgerow removal consent may be required.
- Depending on the final extent and location of the proposed works and access routes consultation may be required with:
 - The Environment Agency to ascertain any requirements for flood risk activity permits.
 - West Sussex County Council to seek a diversion of PROW.
 - Arun District Council Tree Officer to ascertain if consent for works is needed

Advisory:

- If ground levels over the tank are to be appreciably modified (in excess of 100mm) planning permission will be required.
- Where ecological constraints are identified, further work may be required such as protected species surveys and licenses and mitigation
- Should items of potential archaeological interest be uncovered unexpectedly during excavation, the works must stop and a photograph of the find emailed to an archaeological specialist to recommend appropriate action
- It is considered that the site is likely to have a low Unexploded Ordnance (UXO) hazard level and no further assessment is required

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