



Surface Water Drainage Scheme Details

Planning Application for the Development of Houghton Main Renewable Energy Park (REP) comprising a Timber Resource Recovery Centre and an Anaerobic Digestion Facility (AD) Including Associated Infrastructure

Land off Houghton Main Colliery Roundabout, Park Spring Road, Houghton Main, Barnsley

Peel Environmental Management (UK) Limited and Houghton Main Waste Limited

Surface Water Management Scheme details

The surface water management scheme details provided in this section of the planning application have been commissioned by Peel Environmental Management (UK) Limited. The details should be read in conjunction with Section 7.1 of Volume 3 of this application, the Flood Risk Assessment.

CELLULAR STORAGE SYSTEM

Attenuation crates indicated are based upon
AquaCell Core and Plus units by Osma Wavin.
Installation of crates to be in strict accordance with
manufacturers requirements/details.

Attenuation system to have three additional
Inspection Chambers and single layer spines of
AquaCell Plus (centrally and along each outer edge)
in order to assist with future inspection and
maintenance needs. Details in accordance with
manufacturers guidance.

Attenuation system to be wrapped in suitable
impermeable geomembrane and be surrounded in
100mm min of coarse sand or non-angular granular
material. Additional wrap of geo-textile fabric to be
introduced followed by a further 100mm min of
coarse sand or non-angular granular material.

All in accordance with manufacturers specification
and guidance.

P1	05.14	Minor amendments following initial Draft.	LPA	SL
Rev	Date	Description	Drawn	Checked

ABLE LETCHFORD PARTNERSHIP
Consulting Engineers
Avebury 2, Elcot Park, Elcot Lane
Marlborough, Wiltshire SN8 2BG
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Client

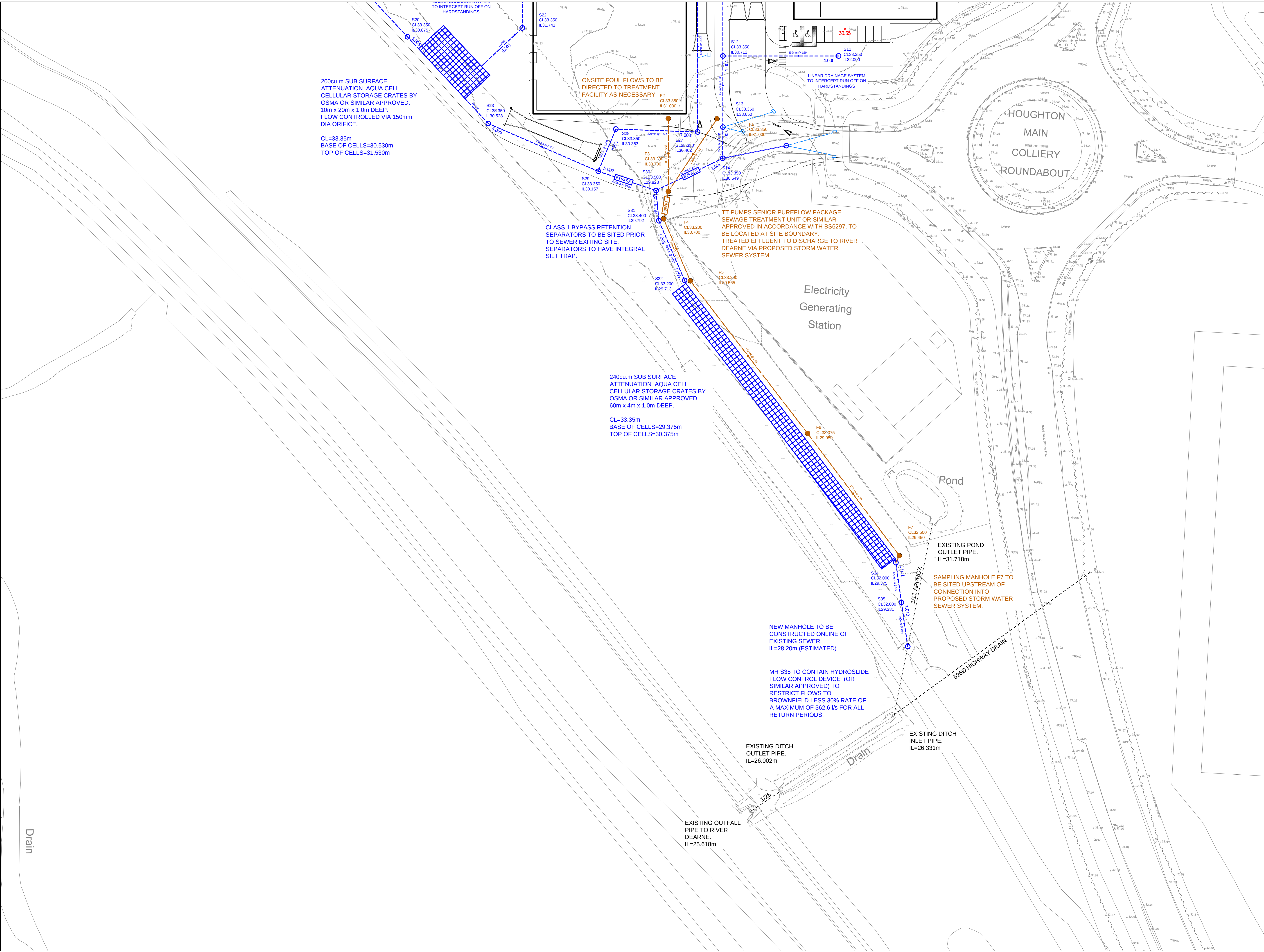
ENZYGO LIMITED

Project
**LAND OFF HOUGHTON
MAIN COLLIERY R'BOUT
PARK SPRINGS, BARNSELY**

Title
**DRAINAGE
GENERAL ARRANGEMENT
SHEET 1 OF 2**

Status
FOR PLANNING

Scale	Date	Drawn	Checked
1:500 @ A1	APRIL 14	LPA	SL
Drawing No	Revision		
A012-01	P1		



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LAND OFF HOUGHTON MAIN COLLIERY R'BOUT PARK SPRINGS, BARNSELY

Title

DRAINAGE GENERAL ARRANGEMENT SHEET 2 OF 2

Status

FOR PLANNING

Scale	Date	Drawn	Checked
1:500 @ A1	APRIL 14	LPA	SL

Drawing No	Revision
A012-02	P1

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Avebury 2, Elcot Park
Elcot Lane,
Marlborough SN8 2BG

Date 23/04/2014
File BROWNFIELD V1.MDX

Causeway

HOUGHTON MAIN, BARNSELEY
SURFACE WATER

Designed by SL
Checked by LA

Network 2013.1

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Micro Drainage.

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

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 4

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

Ratio R 0.355

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status ON

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 30

Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S1.000	15 Winter	30	0%	30/15 Summer				
S1.001	15 Winter	30	0%	30/15 Summer				
S1.002	15 Winter	30	0%	30/15 Summer				
S2.000	15 Winter	30	0%	30/15 Summer				
S2.001	15 Winter	30	0%	30/15 Summer				
S2.002	15 Winter	30	0%	30/15 Summer				
S2.003	15 Winter	30	0%	30/15 Summer				
S3.000	15 Winter	30	0%	30/15 Summer				
S2.004	15 Winter	30	0%	30/15 Summer				
S1.003	30 Winter	30	0%					
S4.000	15 Winter	30	0%	30/15 Summer				
S1.004	60 Winter	30	0%					
S1.005	60 Winter	30	0%					
S1.006	60 Winter	30	0%					
S5.000	15 Winter	30	0%	30/15 Summer				
S5.001	15 Winter	30	0%	30/15 Summer				
S5.002	15 Winter	30	0%	30/15 Summer				
S5.003	15 Winter	30	0%	30/15 Summer				
S5.004	15 Winter	30	0%	30/15 Summer				
S5.005	15 Winter	30	0%	30/15 Summer				
S6.000	15 Winter	30	0%	30/15 Summer				
S6.001	15 Winter	30	0%	30/15 Summer				

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Marlborough SN8 2BG

Date 23/04/2014
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Causeway

HOUGHTON MAIN, BARNSELEY
SURFACE WATER

Designed by SL
Checked by LA

Network 2013.1

Micro Drainage®

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

PN	Storm	Return Climate Period Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
S5.006	30 Winter	30	0%				
S7.000	15 Winter	30	0%	30/15 Summer	30/15 Summer		2
S7.001	15 Winter	30	0%	30/15 Summer			
S7.002	15 Winter	30	0%	30/15 Summer			
S7.003	15 Winter	30	0%	30/15 Summer			
S7.004	15 Winter	30	0%	30/15 Summer			
S5.007	30 Winter	30	0%	30/30 Winter			
S1.007	30 Winter	30	0%	30/30 Winter			
S1.008	30 Winter	30	0%				
S1.009	30 Winter	30	0%				
S1.010	30 Winter	30	0%				
S1.011	30 Winter	30	0%				
S1.012	30 Summer	30	0%				

PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	33.083	0.933	0.000	1.08	0.0	41.5	FLOOD RISK
S1.001	S2	32.713	0.905	0.000	1.59	0.0	60.0	SURCHARGED
S1.002	S3	32.204	0.624	0.000	1.69	0.0	115.7	SURCHARGED
S2.000	S4	33.250	1.100	0.000	1.56	0.0	26.5	FLOOD RISK
S2.001	S5	32.769	0.854	0.000	1.48	0.0	56.3	SURCHARGED
S2.002	S6	32.174	0.521	0.000	1.91	0.0	67.9	SURCHARGED
S2.003	S7	31.913	0.331	0.000	1.29	0.0	81.7	SURCHARGED
S3.000	S8	32.275	0.125	0.000	1.14	0.0	19.6	SURCHARGED
S2.004	S9	31.736	0.258	0.000	1.94	0.0	122.1	SURCHARGED
S1.003	S10	31.233	-0.035	0.000	0.78	0.0	111.5	OK
S4.000	S11	32.524	0.374	0.000	1.44	0.0	24.8	SURCHARGED
S1.004	S12	31.162	0.000	0.000	0.83	0.0	118.2	OK
S1.005	S13	31.100	0.000	0.000	1.07	0.0	118.2	OK
S1.006	S14	30.896	-0.178	0.000	0.77	0.0	123.8	OK
S5.000	S15	32.942	0.792	0.000	1.36	0.0	10.1	SURCHARGED
S5.001	S16	32.726	0.761	0.000	1.29	0.0	22.1	SURCHARGED
S5.002	S17	32.361	0.715	0.000	1.27	0.0	46.0	SURCHARGED
S5.003	S18	32.164	0.642	0.000	1.15	0.0	76.8	SURCHARGED
S5.004	S19	31.885	0.566	0.000	1.58	0.0	103.2	SURCHARGED
S5.005	S20	31.510	0.335	0.000	1.79	0.0	118.4	SURCHARGED
S6.000	S21	32.870	0.720	0.000	1.26	0.0	46.9	SURCHARGED
S6.001	S22	32.579	0.613	0.000	2.00	0.0	79.5	SURCHARGED
S5.006	S23	30.936	-0.092	0.000	0.99	0.0	139.4	OK
S7.000	S24	33.351	1.201	1.047	1.41	0.0	26.6	FLOOD
S7.001	S25	32.024	0.707	0.000	1.42	0.0	54.8	SURCHARGED
S7.002	S26	31.308	0.341	0.000	1.25	0.0	84.0	SURCHARGED
S7.003	S27	30.964	0.201	0.000	1.42	0.0	90.1	SURCHARGED
S7.004	S28	30.759	0.096	0.000	1.70	0.0	99.5	SURCHARGED
S5.007	S29	30.609	0.002	0.000	0.93	0.0	222.6	SURCHARGED
S1.007	S30	30.453	0.024	0.000	1.29	0.0	341.7	SURCHARGED
S1.008	S31	30.392	0.000	0.000	1.05	0.0	341.8	OK
S1.009	S32	30.182	-0.130	0.000	0.97	0.0	340.0	OK
S1.010	S33	30.014	-0.111	0.000	0.93	0.0	317.8	OK

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<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for Storm</u> Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>5</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>M5-60 (mm)</td><td>19.000</td><td>Minimum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Ratio R</td><td>0.355</td><td>Maximum Backdrop Height (m)</td><td>0.000</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Min Design Depth for Optimisation (m)</td><td>1.200</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Vel for Auto Design only (m/s)</td><td>1.00</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td></td><td></td></tr></table> Designed with Level Soffits			Return Period (years)	5	Add Flow / Climate Change (%)	0	M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.000	Ratio R	0.355	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)	1.00	Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500	Volumetric Runoff Coeff.	0.750																																																																																																																																																																																								
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<u>Network Design Table for Storm</u> <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th></tr><tr><td>S1.000</td><td>57.503</td><td>0.342</td><td>168.2</td><td>0.173</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td></tr><tr><td>S1.001</td><td>38.336</td><td>0.228</td><td>168.2</td><td>0.097</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td></tr><tr><td>S1.002</td><td>75.146</td><td>0.312</td><td>241.2</td><td>0.245</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td></tr><tr><td>S2.000</td><td>23.220</td><td>0.234</td><td>99.0</td><td>0.111</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td></tr><tr><td>S2.001</td><td>44.058</td><td>0.263</td><td>167.7</td><td>0.147</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td></tr><tr><td>S2.002</td><td>10.794</td><td>0.071</td><td>151.6</td><td>0.050</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td></tr><tr><td>S2.003</td><td>25.065</td><td>0.104</td><td>241.9</td><td>0.059</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td></tr><tr><td>S3.000</td><td>38.801</td><td>0.391</td><td>99.3</td><td>0.069</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td></tr><tr><td>S2.004</td><td>23.045</td><td>0.095</td><td>241.9</td><td>0.085</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</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>Σ I.Area (ha)</th><th>Σ 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>S1.000</td><td>50.00</td><td>5.95</td><td>31.925</td><td>0.173</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>40.0</td><td>23.4</td></tr><tr><td>S1.001</td><td>50.00</td><td>6.59</td><td>31.583</td><td>0.270</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>40.0</td><td>36.5</td></tr><tr><td>S1.002</td><td>50.00</td><td>7.83</td><td>31.280</td><td>0.514</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.2</td><td>69.6</td></tr><tr><td>S2.000</td><td>50.00</td><td>5.38</td><td>32.000</td><td>0.111</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>17.8</td><td>15.0</td></tr><tr><td>S2.001</td><td>50.00</td><td>6.11</td><td>31.691</td><td>0.258</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>40.0</td><td>35.0</td></tr><tr><td>S2.002</td><td>50.00</td><td>6.28</td><td>31.428</td><td>0.308</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.06</td><td>42.1</td><td>41.7</td></tr><tr><td>S2.003</td><td>50.00</td><td>6.70</td><td>31.282</td><td>0.367</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.1</td><td>49.7</td></tr><tr><td>S3.000</td><td>50.00</td><td>5.64</td><td>32.000</td><td>0.069</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>17.8</td><td>9.4</td></tr><tr><td>S2.004</td><td>50.00</td><td>7.08</td><td>31.178</td><td>0.521</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.01</td><td>71.1</td><td>70.6</td></tr></table>			PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	S1.000	57.503	0.342	168.2	0.173	5.00	0.0	0.600	o	225	S1.001	38.336	0.228	168.2	0.097	0.00	0.0	0.600	o	225	S1.002	75.146	0.312	241.2	0.245	0.00	0.0	0.600	o	300	S2.000	23.220	0.234	99.0	0.111	5.00	0.0	0.600	o	150	S2.001	44.058	0.263	167.7	0.147	0.00	0.0	0.600	o	225	S2.002	10.794	0.071	151.6	0.050	0.00	0.0	0.600	o	225	S2.003	25.065	0.104	241.9	0.059	0.00	0.0	0.600	o	300	S3.000	38.801	0.391	99.3	0.069	5.00	0.0	0.600	o	150	S2.004	23.045	0.095	241.9	0.085	0.00	0.0	0.600	o	300	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)	S1.000	50.00	5.95	31.925	0.173	0.0	0.0	0.0	1.01	40.0	23.4	S1.001	50.00	6.59	31.583	0.270	0.0	0.0	0.0	1.01	40.0	36.5	S1.002	50.00	7.83	31.280	0.514	0.0	0.0	0.0	1.01	71.2	69.6	S2.000	50.00	5.38	32.000	0.111	0.0	0.0	0.0	1.01	17.8	15.0	S2.001	50.00	6.11	31.691	0.258	0.0	0.0	0.0	1.01	40.0	35.0	S2.002	50.00	6.28	31.428	0.308	0.0	0.0	0.0	1.06	42.1	41.7	S2.003	50.00	6.70	31.282	0.367	0.0	0.0	0.0	1.01	71.1	49.7	S3.000	50.00	5.64	32.000	0.069	0.0	0.0	0.0	1.01	17.8	9.4	S2.004	50.00	7.08	31.178	0.521	0.0	0.0	0.0	1.01	71.1	70.6
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S3.000	38.801	0.391	99.3	0.069	5.00	0.0	0.600	o	150																																																																																																																																																																																																											
S2.004	23.045	0.095	241.9	0.085	0.00	0.0	0.600	o	300																																																																																																																																																																																																											
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)																																																																																																																																																																																																										
S1.000	50.00	5.95	31.925	0.173	0.0	0.0	0.0	1.01	40.0	23.4																																																																																																																																																																																																										
S1.001	50.00	6.59	31.583	0.270	0.0	0.0	0.0	1.01	40.0	36.5																																																																																																																																																																																																										
S1.002	50.00	7.83	31.280	0.514	0.0	0.0	0.0	1.01	71.2	69.6																																																																																																																																																																																																										
S2.000	50.00	5.38	32.000	0.111	0.0	0.0	0.0	1.01	17.8	15.0																																																																																																																																																																																																										
S2.001	50.00	6.11	31.691	0.258	0.0	0.0	0.0	1.01	40.0	35.0																																																																																																																																																																																																										
S2.002	50.00	6.28	31.428	0.308	0.0	0.0	0.0	1.06	42.1	41.7																																																																																																																																																																																																										
S2.003	50.00	6.70	31.282	0.367	0.0	0.0	0.0	1.01	71.1	49.7																																																																																																																																																																																																										
S3.000	50.00	5.64	32.000	0.069	0.0	0.0	0.0	1.01	17.8	9.4																																																																																																																																																																																																										
S2.004	50.00	7.08	31.178	0.521	0.0	0.0	0.0	1.01	71.1	70.6																																																																																																																																																																																																										
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Avebury 2, Elcot Park Elcot Lane, Marlborough SN8 2BG			HOUGHTON MAIN, BARNSELEY SURFACE WATER							
Date 23/04/2014 File BROWNFIELD V1.MDX			Designed by SL Checked by LA							
Causeway			Network 2013.1							
Network Design Table for Storm										
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	
S1.003	42.879	0.107	400.9	0.094	0.00	0.0	0.600	o	450	
S4.000	33.991	0.343	99.2	0.091	5.00	0.0	0.600	o	150	
S1.004	20.912	0.061	341.0	0.055	0.00	0.0	0.600	o	450	
S1.005	9.045	0.027	341.0	0.000	0.00	0.0	0.600	o	450	
S1.006	21.652	0.044	491.3	0.085	0.00	0.0	0.600	o	525	
S5.000	10.864	0.186	58.5	0.040	5.00	0.0	0.600	o	100	
S5.001	31.537	0.318	99.0	0.062	0.00	0.0	0.600	o	150	
S5.002	20.713	0.123	167.9	0.113	0.00	0.0	0.600	o	225	
S5.003	49.205	0.203	241.9	0.129	0.00	0.0	0.600	o	300	
S5.004	34.862	0.144	241.9	0.114	0.00	0.0	0.600	o	300	
S5.005	34.862	0.147	237.1	0.071	0.00	0.0	0.600	o	300	
S6.000	30.893	0.184	168.2	0.177	5.00	0.0	0.600	o	225	
S6.001	29.814	0.200	149.0	0.135	0.00	0.0	0.600	o	225	
S5.006	35.230	0.088	401.4	0.086	0.00	0.0	0.600	o	450	
S7.000	71.576	0.833	86.0	0.141	5.00	0.0	0.600	o	150	
S7.001	58.658	0.350	167.7	0.141	0.00	0.0	0.600	o	225	
Network Results Table										
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.003	50.00	8.54	30.819	1.129	0.0	0.0	0.0	1.01	160.5	152.9
S4.000	50.00	5.56	32.000	0.091	0.0	0.0	0.0	1.01	17.8	12.3
S1.004	50.00	8.86	30.712	1.276	0.0	0.0	0.0	1.10	174.2	172.7
S1.005	50.00	9.00	30.650	1.276	0.0	0.0	0.0	1.10	174.2	172.7
S1.006	50.00	9.35	30.549	1.361	0.0	0.0	0.0	1.00	217.3	184.2
S5.000	50.00	5.18	32.050	0.040	0.0	0.0	0.0	1.01	7.9	5.4
S5.001	50.00	5.70	31.814	0.102	0.0	0.0	0.0	1.01	17.8	13.8
S5.002	50.00	6.04	31.421	0.215	0.0	0.0	0.0	1.01	40.0	29.1
S5.003	50.00	6.86	31.222	0.344	0.0	0.0	0.0	1.01	71.1	46.6
S5.004	50.00	7.44	31.019	0.458	0.0	0.0	0.0	1.01	71.1	62.0
S5.005	50.00	8.01	30.875	0.529	0.0	0.0	0.0	1.02	71.9	71.6
S6.000	50.00	5.51	31.925	0.177	0.0	0.0	0.0	1.01	40.0	24.0
S6.001	50.00	5.98	31.741	0.312	0.0	0.0	0.0	1.07	42.5	42.2
S5.006	50.00	8.59	30.578	0.927	0.0	0.0	0.0	1.01	160.4	125.5
S7.000	50.00	6.10	32.000	0.141	0.0	0.0	0.0	1.08	19.2	19.1
S7.001	50.00	7.07	31.092	0.282	0.0	0.0	0.0	1.01	40.0	38.2
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Date 23/04/2014 File BROWNFIELD V1.MDX			Designed by SL Checked by LA							
Causeway			Network 2013.1							
Network Design Table for Storm										
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	
S7.002	49.548	0.205	241.6	0.137	0.00	0.0	0.600	o	300	
S7.003	24.058	0.100	241.6	0.035	0.00	0.0	0.600	o	300	
S7.004	13.442	0.056	241.6	0.053	0.00	0.0	0.600	o	300	
S5.007	17.878	0.179	100.0	0.031	0.00	0.0	0.600	o	450	
S1.007	9.065	0.036	250.0	0.000	0.00	0.0	0.600	o	600	
S1.008	19.827	0.079	250.0	0.000	0.00	0.0	0.600	o	600	
S1.009	56.497	0.188	300.0	0.000	0.00	0.0	0.600	o	600	
S1.010	44.910	0.150	300.0	0.000	0.00	0.0	0.600	o	600	
S1.011	13.030	0.043	300.0	0.000	0.00	0.0	0.600	o	600	
S1.012	13.030	0.931	14.0	0.000	0.00	0.0	0.600	o	600	
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)
S7.002	50.00	7.89	30.668	0.420	0.0	0.0	0.0	1.01	71.2	56.8
S7.003	50.00	8.29	30.462	0.454	0.0	0.0	0.0	1.01	71.2	61.5
S7.004	50.00	8.51	30.363	0.507	0.0	0.0	0.0	1.01	71.2	68.7
S5.007	50.00	8.74	30.157	1.465	0.0	0.0	0.0	2.03	323.4	198.4
S1.007	50.00	9.45	29.828	2.826	0.0	0.0	0.0	1.54	434.2	382.7
S1.008	50.00	9.67	29.792	2.826	0.0	0.0	0.0	1.54	434.2	382.7
S1.009	50.00	10.34	29.713	2.826	0.0	0.0	0.0	1.40	396.0	382.7
S1.010	50.00	10.87	29.525	2.826	0.0	0.0	0.0	1.40	396.0	382.7
S1.011	50.00	11.03	29.375	2.826	0.0	0.0	0.0	1.40	396.0	382.7
S1.012	50.00	11.06	29.331	2.826	0.0	0.0	0.0	6.53	1846.8	382.7
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Causeway						Network 2013.1					
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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	33.350	1.425	Open Manhole	1200	S1.000	31.925	225				
S2	33.350	1.767	Open Manhole	1200	S1.001	31.583	225	S1.000	31.583	225	
S3	33.350	2.070	Open Manhole	1200	S1.002	31.280	300	S1.001	31.355	225	
S4	33.350	1.350	Open Manhole	1200	S2.000	32.000	150				
S5	33.350	1.659	Open Manhole	1200	S2.001	31.691	225	S2.000	31.766	150	
S6	33.350	1.922	Open Manhole	1200	S2.002	31.428	225	S2.001	31.428	225	
S7	33.350	2.068	Open Manhole	1200	S2.003	31.282	300	S2.002	31.357	225	
S8	33.350	1.350	Open Manhole	1200	S3.000	32.000	150				
S9	33.350	2.172	Open Manhole	1200	S2.004	31.178	300	S2.003	31.178	300	
								S3.000	31.609	150	281
S10	33.350	2.531	Open Manhole	1350	S1.003	30.819	450	S1.002	30.969	300	
								S2.004	31.083	300	114
S11	33.350	1.350	Open Manhole	1200	S4.000	32.000	150				
S12	33.350	2.638	Open Manhole	1350	S1.004	30.712	450	S1.003	30.712	450	
								S4.000	31.657	150	646
S13	33.350	2.700	Open Manhole	1350	S1.005	30.650	450	S1.004	30.650	450	
S14	33.350	2.801	Open Manhole	1500	S1.006	30.549	525	S1.005	30.624	450	
S15	33.350	1.300	Open Manhole	1200	S5.000	32.050	100				
S16	33.350	1.536	Open Manhole	1200	S5.001	31.814	150	S5.000	31.864	100	
S17	33.350	1.929	Open Manhole	1200	S5.002	31.421	225	S5.001	31.496	150	
S18	33.350	2.128	Open Manhole	1200	S5.003	31.222	300	S5.002	31.297	225	
S19	33.350	2.331	Open Manhole	1200	S5.004	31.019	300	S5.003	31.019	300	
S20	33.350	2.475	Open Manhole	1200	S5.005	30.875	300	S5.004	30.875	300	
S21	33.350	1.425	Open Manhole	1200	S6.000	31.925	225				
S22	33.350	1.609	Open Manhole	1200	S6.001	31.741	225	S6.000	31.741	225	
S23	33.350	2.772	Open Manhole	1350	S5.006	30.578	450	S5.005	30.728	300	
								S6.001	31.541	225	738
S24	33.350	1.350	Open Manhole	1200	S7.000	32.000	150				
S25	33.350	2.258	Open Manhole	1200	S7.001	31.092	225	S7.000	31.167	150	
S26	33.350	2.682	Open Manhole	1200	S7.002	30.668	300	S7.001	30.743	225	
S27	33.350	2.888	Open Manhole	1200	S7.003	30.462	300	S7.002	30.462	300	
S28	33.350	2.987	Open Manhole	1200	S7.004	30.363	300	S7.003	30.363	300	
S29	33.350	3.193	Open Manhole	1350	S5.007	30.157	450	S5.006	30.490	450	333
								S7.004	30.307	300	
S30	33.500	3.672	Open Manhole	1500	S1.007	29.828	600	S1.006	30.505	525	601
								S5.007	29.978	450	
S31	33.400	3.608	Open Manhole	1500	S1.008	29.792	600	S1.007	29.792	600	
S32	33.200	3.487	Open Manhole	1500	S1.009	29.713	600	S1.008	29.713	600	
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Avebury 2, Elcot Park Elcot Lane, Marlborough SN8 2BG	HOUGHTON MAIN, BARNSELEY SURFACE WATER	
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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S33	32.500	2.975	Open Manhole	1500	S1.010	29.525	600	S1.009	29.525	600	
S34	32.000	2.625	Open Manhole	1500	S1.011	29.375	600	S1.010	29.375	600	
S35	32.000	2.669	Open Manhole	1500	S1.012	29.331	600	S1.011	29.331	600	
S	31.000	2.600	Open Manhole	1500		OUTFALL		S1.012	28.400	600	

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Avebury 2, Elcot Park Elcot Lane, Marlborough SN8 2BG	HOUGHTON MAIN, BARNSELEY SURFACE WATER																																																																									
Date 23/04/2014 File BROWNFIELD V1.MDX	Designed by SL Checked by LA																																																																									
Causeway	Network 2013.1																																																																									
<u>Online Controls for Storm</u> <u>Depth/Flow Relationship Manhole: S35, DS/PN: S1.012, Volume (m³): 8.0</u> Invert Level (m) 29.331 <table><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><tr><td>0.100</td><td>36.2600</td><td>0.900</td><td>362.6000</td><td>1.700</td><td>362.6000</td><td>2.500</td><td>362.6000</td></tr><tr><td>0.200</td><td>108.7800</td><td>1.000</td><td>362.6000</td><td>1.800</td><td>362.6000</td><td>2.600</td><td>362.6000</td></tr><tr><td>0.300</td><td>290.0800</td><td>1.100</td><td>362.6000</td><td>1.900</td><td>362.6000</td><td>2.700</td><td>362.6000</td></tr><tr><td>0.400</td><td>362.6000</td><td>1.200</td><td>362.6000</td><td>2.000</td><td>362.6000</td><td>2.800</td><td>362.6000</td></tr><tr><td>0.500</td><td>362.6000</td><td>1.300</td><td>362.6000</td><td>2.100</td><td>362.6000</td><td>2.900</td><td>362.6000</td></tr><tr><td>0.600</td><td>362.6000</td><td>1.400</td><td>362.6000</td><td>2.200</td><td>362.6000</td><td>3.000</td><td>362.6000</td></tr><tr><td>0.700</td><td>362.6000</td><td>1.500</td><td>362.6000</td><td>2.300</td><td>362.6000</td><td></td><td></td></tr><tr><td>0.800</td><td>362.6000</td><td>1.600</td><td>362.6000</td><td>2.400</td><td>362.6000</td><td></td><td></td></tr></table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	36.2600	0.900	362.6000	1.700	362.6000	2.500	362.6000	0.200	108.7800	1.000	362.6000	1.800	362.6000	2.600	362.6000	0.300	290.0800	1.100	362.6000	1.900	362.6000	2.700	362.6000	0.400	362.6000	1.200	362.6000	2.000	362.6000	2.800	362.6000	0.500	362.6000	1.300	362.6000	2.100	362.6000	2.900	362.6000	0.600	362.6000	1.400	362.6000	2.200	362.6000	3.000	362.6000	0.700	362.6000	1.500	362.6000	2.300	362.6000			0.800	362.6000	1.600	362.6000	2.400	362.6000		
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																			
0.100	36.2600	0.900	362.6000	1.700	362.6000	2.500	362.6000																																																																			
0.200	108.7800	1.000	362.6000	1.800	362.6000	2.600	362.6000																																																																			
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0.400	362.6000	1.200	362.6000	2.000	362.6000	2.800	362.6000																																																																			
0.500	362.6000	1.300	362.6000	2.100	362.6000	2.900	362.6000																																																																			
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Date 23/04/2014 File BROWNFIELD V1.MDX	Designed by SL Checked by LA																																																																									
Causeway	Network 2013.1																																																																									
Storage Structures for Storm Cellular Storage Manhole: S10, DS/PN: S1.003 Invert Level (m) 30.819 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>300.0</td><td>300.0</td><td>1.100</td><td>0.0</td><td>370.0</td></tr><tr><td>1.000</td><td>300.0</td><td>370.0</td><td></td><td></td><td></td></tr></table> Cellular Storage Manhole: S23, DS/PN: S5.006 Invert Level (m) 30.578 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>200.0</td><td>200.0</td><td>1.100</td><td>0.0</td><td>260.0</td></tr><tr><td>1.000</td><td>200.0</td><td>260.0</td><td></td><td></td><td></td></tr></table> Cellular Storage Manhole: S33, DS/PN: S1.010 Invert Level (m) 29.525 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>120.0</td><td>120.0</td><td>1.100</td><td>0.0</td><td>188.0</td></tr><tr><td>1.000</td><td>120.0</td><td>188.0</td><td></td><td></td><td></td></tr></table> Cellular Storage Manhole: S34, DS/PN: S1.011 Invert Level (m) 29.375 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>120.0</td><td>120.0</td><td>1.100</td><td>0.0</td><td>188.0</td></tr><tr><td>1.000</td><td>120.0</td><td>188.0</td><td></td><td></td><td></td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	300.0	300.0	1.100	0.0	370.0	1.000	300.0	370.0				Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	200.0	200.0	1.100	0.0	260.0	1.000	200.0	260.0				Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	120.0	120.0	1.100	0.0	188.0	1.000	120.0	188.0				Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	120.0	120.0	1.100	0.0	188.0	1.000	120.0	188.0			
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