

Richard Holmes

From: Richard Holmes
Sent: 07 October 2009 14:33
To: 'd.holman790@btinternet.com'
Cc: 'chrismobbs@cpldevelopments.com'; Brian Carr
Subject: FW: Crosb Row, Sutton Bridge

David

Please see below approval from AW. Could you please forward to the planners to clear the outstanding drainage conditions.

Kind Regards

Richard Holmes
Senior Engineer

WARD::COLE
Consulting Engineers
Fosse House
Roman Wharf
Lincoln
LN1 1SR

Tel: 01522 513032
Fax: 01522 513559
Mob: 07971 142841



From: Drake Chris [mailto:cDrake@anglianwater.co.uk]
Sent: 07 October 2009 09:40
To: Richard Holmes
Cc: Boddington Tracey
Subject: RE: Crosb Row, Sutton Bridge

Richard

Thank you for the additional information.

I can confirm that the Surface water overflow from the soakaway can discharge to the foul sewer in Crosby Row via the new manhole to be constructed downstream of MH 9706. However the overflow will be limited to 10 l/s

Please note that due to the number of connections in the proposed manhole it should be constructed with 1500mm rings

We look forward to receiving the sewer application form as soon as possible

Regards
Chris

From: Richard Holmes [mailto:RichardH@wardcole.co.uk]
Sent: 30 September 2009 14:56
To: Drake Chris
Subject: Crosb Row, Sutton Bridge

Chris,

Please find attached existing drainage drawing and soakaway test results as requested.

Kind Regards

Richard Holmes
Senior Engineer

WARD & COLE
Consulting Engineers
Fosse House
Roman Wharf
Lincoln
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Roman Wharf	Sutton Bridge
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Date August	Designed By RH
File stone fill crosby row.src	Checked By
Micro Drainage	Source Control W.11.2

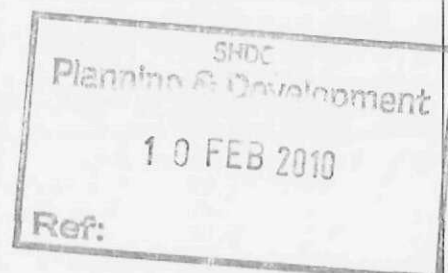


Summary of Results for 10 year Return Period

Half Drain Time : 1332 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	1.0	1.1	2.1502	0.3702	1.3	16.7	O K
30 Summer	0.1	5.0	5.1	2.2032	0.4232	6.0	19.0	O K
60 Summer	0.1	7.2	7.3	2.2307	0.4507	11.2	20.3	O K
120 Summer	0.1	8.2	8.3	2.2402	0.4602	16.5	20.7	O K
180 Summer	0.1	7.8	8.0	2.2367	0.4567	19.7	20.5	O K
240 Summer	0.1	7.2	7.4	2.2312	0.4512	22.0	20.3	O K
360 Summer	0.1	6.2	6.4	2.2192	0.4392	25.2	19.8	O K
480 Summer	0.1	5.4	5.6	2.2092	0.4292	27.4	19.3	O K
600 Summer	0.1	4.8	5.0	2.2012	0.4212	29.1	19.0	O K
720 Summer	0.1	4.3	4.5	2.1957	0.4157	30.4	18.7	O K
960 Summer	0.1	3.5	3.7	2.1882	0.4082	32.2	18.4	O K
1440 Summer	0.1	2.6	2.7	2.1782	0.3982	34.2	17.9	O K
2160 Summer	0.1	1.9	2.0	2.1667	0.3867	34.9	17.4	O K
2880 Summer	0.1	1.5	1.6	2.1602	0.3802	34.3	17.1	O K
4320 Summer	0.1	1.0	1.2	2.1522	0.3722	32.3	16.7	O K
5760 Summer	0.1	0.8	0.9	2.1467	0.3667	30.4	16.5	O K
7200 Summer	0.1	0.7	0.8	2.1432	0.3632	28.6	16.3	O K
8640 Summer	0.1	0.6	0.7	2.1407	0.3607	27.0	16.2	O K
10080 Summer	0.1	0.5	0.6	2.1382	0.3582	25.3	16.1	O K
15 Winter	0.1	3.0	3.2	2.1832	0.4032	3.2	18.1	O K
30 Winter	0.1	7.6	7.7	2.2347	0.4547	8.7	20.5	O K
60 Winter	0.1	9.7	9.9	2.2547	0.4747	14.4	21.4	O K
120 Winter	0.1	9.0	9.2	2.2482	0.4682	20.5	21.1	O K
180 Winter	0.1	7.8	7.9	2.2362	0.4562	24.2	20.5	O K
240 Winter	0.1	6.7	6.8	2.2247	0.4447	26.8	20.0	O K
360 Winter	0.1	5.3	5.4	2.2072	0.4272	30.5	19.2	O K
480 Winter	0.1	4.4	4.5	2.1962	0.4162	33.1	18.7	O K
600 Winter	0.1	3.7	3.8	2.1897	0.4097	35.0	18.4	O K
720 Winter	0.1	3.2	3.3	2.1847	0.4047	36.6	18.2	O K
960 Winter	0.1	2.5	2.7	2.1777	0.3977	38.9	17.9	O K
1440 Winter	0.1	1.8	2.0	2.1662	0.3862	41.5	17.4	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	56.87	22
30 Summer	36.74	30
60 Summer	22.79	44
120 Summer	13.79	74
180 Summer	10.20	106
240 Summer	8.21	136
360 Summer	6.03	194
480 Summer	4.84	254
600 Summer	4.09	312
720 Summer	3.55	370
960 Summer	2.85	492
1440 Summer	2.09	736
2160 Summer	1.53	1096
2880 Summer	1.22	1464
4320 Summer	0.89	2188
5760 Summer	0.72	2912
7200 Summer	0.60	3592
8640 Summer	0.52	4376
10080 Summer	0.46	5136
15 Winter	56.87	20
30 Winter	36.74	28
60 Winter	22.79	44
120 Winter	13.79	76
180 Winter	10.20	108
240 Winter	8.21	138
360 Winter	6.03	196
480 Winter	4.84	250
600 Winter	4.09	308
720 Winter	3.55	372
960 Winter	2.85	496
1440 Winter	2.09	736



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Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Design	
Date August	Designed By RH	
File stone fill crosby row.src	Checked By	
Micro Drainage	Source Control W.11.2	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	10	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+0
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from: to:		from: to:	
0 4	0.080	4 8	0.080

Ward & Cole		Page 1
Fosse House	Crosby Row	
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Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 10 year Return Period

Half Drain Time : 2374 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	0.0	0.1	2.0393	0.1093	0.0	16.9	O K
30 Summer	0.1	0.0	0.1	2.0713	0.1413	0.0	21.8	O K
60 Summer	0.1	0.0	0.1	2.1042	0.1742	0.0	27.0	O K
120 Summer	0.1	0.0	0.2	2.1387	0.2087	0.2	32.3	O K
180 Summer	0.1	0.4	0.5	2.1552	0.2252	2.2	34.9	O K
240 Summer	0.1	0.6	0.7	2.1617	0.2317	4.3	35.9	O K
360 Summer	0.1	0.7	0.9	2.1647	0.2347	7.5	36.3	O K
480 Summer	0.1	0.8	1.0	2.1672	0.2372	9.9	36.7	O K
600 Summer	0.1	0.9	1.1	2.1692	0.2392	11.7	37.0	O K
720 Summer	0.1	1.0	1.1	2.1707	0.2407	13.1	37.2	O K
960 Summer	0.1	1.0	1.2	2.1717	0.2417	15.2	37.4	O K
1440 Summer	0.1	1.0	1.1	2.1712	0.2412	17.7	37.3	O K
2160 Summer	0.1	0.9	1.0	2.1687	0.2387	19.1	36.9	O K
2880 Summer	0.1	0.8	0.9	2.1657	0.2357	19.2	36.5	O K
4320 Summer	0.1	0.6	0.7	2.1612	0.2312	18.0	35.8	O K
5760 Summer	0.1	0.5	0.6	2.1577	0.2277	16.4	35.2	O K
7200 Summer	0.1	0.4	0.5	2.1547	0.2247	14.7	34.8	O K
8640 Summer	0.1	0.3	0.4	2.1517	0.2217	13.1	34.4	O K
10080 Summer	0.1	0.2	0.4	2.1492	0.2192	11.4	34.0	O K
15 Winter	0.1	0.0	0.1	2.0528	0.1228	0.0	19.0	O K
30 Winter	0.1	0.0	0.1	2.0883	0.1582	0.0	24.5	O K
60 Winter	0.1	0.0	0.1	2.1252	0.1952	0.0	30.2	O K
120 Winter	0.1	0.5	0.7	2.1602	0.2302	2.8	35.6	O K
180 Winter	0.1	1.0	1.2	2.1717	0.2417	6.2	37.4	O K
240 Winter	0.1	1.1	1.3	2.1747	0.2447	8.8	37.9	O K
360 Winter	0.1	1.4	1.5	2.1792	0.2492	12.5	38.6	O K
480 Winter	0.1	1.6	1.7	2.1817	0.2517	15.3	38.9	O K
600 Winter	0.1	1.6	1.7	2.1817	0.2517	17.4	39.0	O K
720 Winter	0.1	1.6	1.7	2.1817	0.2517	19.1	39.0	O K
960 Winter	0.1	1.5	1.6	2.1802	0.2502	21.6	38.7	O K
1440 Winter	0.1	1.2	1.4	2.1762	0.2462	24.7	38.2	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	56.87	23
30 Summer	36.74	38
60 Summer	22.79	68
120 Summer	13.79	126
180 Summer	10.20	184
240 Summer	8.21	242
360 Summer	6.03	302
480 Summer	4.84	350
600 Summer	4.09	410
720 Summer	3.55	472
960 Summer	2.85	604
1440 Summer	2.09	866
2160 Summer	1.53	1256
2880 Summer	1.22	1644
4320 Summer	0.89	2424
5760 Summer	0.72	3224
7200 Summer	0.60	3968
8640 Summer	0.52	4840
10080 Summer	0.46	5640
15 Winter	56.87	23
30 Winter	36.74	37
60 Winter	22.79	68
120 Winter	13.79	122
180 Winter	10.20	176
240 Winter	8.21	224
360 Winter	6.03	270
480 Winter	4.84	338
600 Winter	4.09	410
720 Winter	3.55	476
960 Winter	2.85	610
1440 Winter	2.09	880

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Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 10 year Return Period

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
2160 Winter	0.1	1.0	1.1	2.1712	0.2412	26.8	37.3	O K
2880 Winter	0.1	0.8	1.0	2.1672	0.2372	27.2	36.7	O K
4320 Winter	0.1	0.6	0.7	2.1617	0.2317	26.1	35.9	O K
5760 Winter	0.1	0.5	0.6	2.1577	0.2277	23.9	35.2	O K
7200 Winter	0.1	0.4	0.5	2.1542	0.2242	21.6	34.8	O K
8640 Winter	0.1	0.3	0.4	2.1517	0.2217	19.1	34.3	O K
10080 Winter	0.1	0.2	0.4	2.1492	0.2192	16.6	33.9	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2160 Winter	1.53	1260
2880 Winter	1.22	1644
4320 Winter	0.89	2424
5760 Winter	0.72	3232
7200 Winter	0.60	4032
8640 Winter	0.52	4840
10080 Winter	0.46	5664

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Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	10	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+0
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time (mins)	Area (ha)	Time (mins)	Area (ha)
from: to:		from: to:	
0 4	0.080	4 8	0.080

Fosse House

Roman Wharf

Lincoln LN1 1SR

Date February 2010

File Stormbloc Crosby Row.SRC

Micro Drainage

Crosby Row

Sutton Bridge

Soakaway Stormbloc

Designed By RH

Checked By

Source Control W.11.4



Cellular Storage Details

Infil Coef - Base (m/hr) 0.005830 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.005830 Invert Level (m) 1.930
 Safety Factor 2.0 Ground Level (m) 3.500

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	163.0	163.0	0.70	163.0	198.7	1.40	163.0	234.5	2.10	163.0	270.2
0.10	163.0	168.1	0.80	163.0	203.9	1.50	163.0	239.6	2.20	163.0	275.4
0.20	163.0	173.2	0.90	163.0	209.0	1.60	163.0	244.7	2.30	163.0	280.5
0.30	163.0	178.3	1.00	163.0	214.1	1.70	163.0	249.8	2.40	163.0	285.6
0.40	163.0	183.4	1.10	163.0	219.2	1.80	163.0	254.9	2.50	163.0	290.7
0.50	163.0	188.5	1.20	163.0	224.3	1.90	163.0	260.0			
0.60	163.0	193.6	1.30	163.0	229.4	2.00	163.0	265.1			

Pipe Overflow Control

Pipe Diameter (m) 0.150 Roughness (mm) 0.600 Invert Level (m) 2.130
 Slope (1:x) 40.0 Entry Loss Coef 0.500
 Length (m) 5.000 Coef of Contraction 0.600

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Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 10 year Return Period (+20%)

Half Drain Time : 2538 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	0.0	0.1	2.0613	0.1313	0.0	20.3	O K
30 Summer	0.1	0.0	0.1	2.0993	0.1692	0.0	26.2	O K
60 Summer	0.1	0.1	0.2	2.1392	0.2092	0.2	32.4	O K
120 Summer	0.1	1.0	1.1	2.1707	0.2407	5.1	37.3	O K
180 Summer	0.1	1.3	1.5	2.1777	0.2477	9.0	38.4	O K
240 Summer	0.1	1.5	1.6	2.1807	0.2507	11.8	38.8	O K
360 Summer	0.1	1.8	1.9	2.1857	0.2557	15.9	39.6	O K
480 Summer	0.1	1.9	2.1	2.1882	0.2582	18.9	40.0	O K
600 Summer	0.1	2.0	2.2	2.1892	0.2592	21.2	40.2	O K
720 Summer	0.1	2.0	2.2	2.1897	0.2597	23.0	40.2	O K
960 Summer	0.1	2.0	2.1	2.1887	0.2587	25.8	40.0	O K
1440 Summer	0.1	1.8	1.9	2.1852	0.2552	29.2	39.5	O K
2160 Summer	0.1	1.5	1.6	2.1807	0.2507	31.6	38.8	O K
2880 Summer	0.1	1.3	1.4	2.1767	0.2467	32.2	38.2	O K
4320 Summer	0.1	1.0	1.1	2.1707	0.2407	31.4	37.3	O K
5760 Summer	0.1	0.8	0.9	2.1662	0.2362	29.8	36.6	O K
7200 Summer	0.1	0.7	0.8	2.1632	0.2332	28.1	36.1	O K
8640 Summer	0.1	0.5	0.7	2.1602	0.2302	26.3	35.6	O K
10080 Summer	0.1	0.5	0.6	2.1577	0.2277	24.6	35.2	O K
15 Winter	0.1	0.0	0.1	2.0773	0.1472	0.0	22.8	O K
30 Winter	0.1	0.0	0.1	2.1197	0.1897	0.0	29.4	O K
60 Winter	0.1	0.6	0.7	2.1622	0.2322	2.8	35.9	O K
120 Winter	0.1	1.9	2.1	2.1882	0.2582	9.7	40.0	O K
180 Winter	0.1	2.3	2.5	2.1942	0.2642	14.1	40.9	O K
240 Winter	0.1	2.6	2.7	2.1982	0.2682	17.4	41.6	O K
360 Winter	0.1	2.8	2.9	2.2007	0.2707	22.1	41.9	O K
480 Winter	0.1	2.7	2.9	2.2002	0.2702	25.5	41.9	O K
600 Winter	0.1	2.6	2.7	2.1987	0.2687	28.2	41.6	O K
720 Winter	0.1	2.5	2.6	2.1967	0.2667	30.3	41.3	O K
960 Winter	0.1	2.2	2.4	2.1927	0.2627	33.6	40.7	O K
1440 Winter	0.1	1.8	2.0	2.1862	0.2562	37.7	39.7	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	68.24	23
30 Summer	44.09	38
60 Summer	27.35	68
120 Summer	16.55	124
180 Summer	12.24	170
240 Summer	9.85	190
360 Summer	7.24	246
480 Summer	5.81	310
600 Summer	4.90	374
720 Summer	4.26	438
960 Summer	3.42	568
1440 Summer	2.50	814
2160 Summer	1.83	1188
2880 Summer	1.47	1560
4320 Summer	1.07	2296
5760 Summer	0.86	3056
7200 Summer	0.72	3816
8640 Summer	0.63	4576
10080 Summer	0.56	5336
15 Winter	68.24	23
30 Winter	44.09	38
60 Winter	27.35	66
120 Winter	16.55	118
180 Winter	12.24	144
240 Winter	9.85	180
360 Winter	7.24	248
480 Winter	5.81	318
600 Winter	4.90	384
720 Winter	4.26	450
960 Winter	3.42	578
1440 Winter	2.50	826

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Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 10 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
2160 Winter	0.1	1.4	1.5	2.1792	0.2492	40.9	38.6	O K
2880 Winter	0.1	1.1	1.3	2.1742	0.2442	42.2	37.9	O K
4320 Winter	0.1	0.8	1.0	2.1672	0.2372	41.9	36.7	O K
5760 Winter	0.1	0.7	0.8	2.1632	0.2332	40.0	36.1	O K
7200 Winter	0.1	0.5	0.7	2.1597	0.2297	37.6	35.5	O K
8640 Winter	0.1	0.4	0.6	2.1567	0.2267	35.2	35.1	O K
10080 Winter	0.1	0.4	0.5	2.1547	0.2247	32.7	34.8	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2160 Winter	1.83	1196
2880 Winter	1.47	1584
4320 Winter	1.07	2296
5760 Winter	0.86	3000
7200 Winter	0.72	3752
8640 Winter	0.63	4576
10080 Winter	0.56	5248

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Fosse House	Crosby Row	
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Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
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Micro Drainage	Source Control W.11.4	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	10	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+20
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.080	4	8	0.080

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Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Cellular Storage Details

Infil Coef - Base (m/hr) 0.005830 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.005830 Invert Level (m) 1.930
 Safety Factor 2.0 Ground Level (m) 3.500

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	163.0	163.0	0.70	163.0	198.7	1.40	163.0	234.5	2.10	163.0	270.2
0.10	163.0	168.1	0.80	163.0	203.9	1.50	163.0	239.6	2.20	163.0	275.4
0.20	163.0	173.2	0.90	163.0	209.0	1.60	163.0	244.7	2.30	163.0	280.5
0.30	163.0	178.3	1.00	163.0	214.1	1.70	163.0	249.8	2.40	163.0	285.6
0.40	163.0	183.4	1.10	163.0	219.2	1.80	163.0	254.9	2.50	163.0	290.7
0.50	163.0	188.5	1.20	163.0	224.3	1.90	163.0	260.0			
0.60	163.0	193.6	1.30	163.0	229.4	2.00	163.0	265.1			

Pipe Overflow Control

Pipe Diameter (m) 0.150 Roughness (mm) 0.600 Invert Level (m) 2.130
 Slope (1:x) 40.0 Entry Loss Coef 0.500
 Length (m) 5.000 Coef of Contraction 0.600

Ward & Cole		Page 1
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 30 year Return Period

Half Drain Time : 2583 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	0.0	0.1	2.0688	0.1388	0.0	21.5	O K
30 Summer	0.1	0.0	0.1	2.1103	0.1802	0.0	27.9	O K
60 Summer	0.1	0.3	0.4	2.1527	0.2227	1.5	34.5	O K
120 Summer	0.1	1.5	1.6	2.1802	0.2502	7.8	38.8	O K
180 Summer	0.1	1.8	1.9	2.1852	0.2552	11.9	39.5	O K
240 Summer	0.1	2.0	2.1	2.1887	0.2587	14.8	40.1	O K
360 Summer	0.1	2.3	2.4	2.1932	0.2632	19.0	40.8	O K
480 Summer	0.1	2.4	2.5	2.1952	0.2652	21.9	41.0	O K
600 Summer	0.1	2.4	2.5	2.1952	0.2652	24.2	41.1	O K
720 Summer	0.1	2.3	2.5	2.1947	0.2647	26.0	41.0	O K
960 Summer	0.1	2.2	2.4	2.1927	0.2627	28.7	40.7	O K
1440 Summer	0.1	1.9	2.1	2.1882	0.2582	31.9	40.0	O K
2160 Summer	0.1	1.6	1.8	2.1827	0.2527	34.0	39.1	O K
2880 Summer	0.1	1.3	1.5	2.1782	0.2482	34.4	38.5	O K
4320 Summer	0.1	1.0	1.2	2.1717	0.2417	33.1	37.4	O K
5760 Summer	0.1	0.8	0.9	2.1667	0.2367	31.0	36.7	O K
7200 Summer	0.1	0.7	0.8	2.1632	0.2332	28.9	36.1	O K
8640 Summer	0.1	0.5	0.7	2.1602	0.2302	26.8	35.7	O K
10080 Summer	0.1	0.5	0.6	2.1577	0.2277	24.8	35.3	O K
15 Winter	0.1	0.0	0.1	2.0853	0.1552	0.0	24.1	O K
30 Winter	0.1	0.0	0.1	2.1322	0.2022	0.0	31.3	O K
60 Winter	0.1	1.2	1.3	2.1752	0.2452	5.0	38.0	O K
120 Winter	0.1	2.5	2.6	2.1972	0.2672	12.7	41.4	O K
180 Winter	0.1	3.1	3.2	2.2037	0.2737	17.4	42.4	O K
240 Winter	0.1	3.3	3.5	2.2062	0.2762	20.8	42.8	O K
360 Winter	0.1	3.4	3.5	2.2067	0.2767	25.5	42.9	O K
480 Winter	0.1	3.2	3.4	2.2052	0.2752	28.9	42.6	O K
600 Winter	0.1	3.0	3.2	2.2032	0.2732	31.5	42.3	O K
720 Winter	0.1	2.8	2.9	2.2007	0.2707	33.7	41.9	O K
960 Winter	0.1	2.4	2.6	2.1962	0.2662	36.8	41.2	O K
1440 Winter	0.1	1.9	2.1	2.1882	0.2582	40.8	40.0	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	72.01	23
30 Summer	46.91	38
60 Summer	29.24	66
120 Summer	17.70	122
180 Summer	13.07	150
240 Summer	10.49	176
360 Summer	7.67	238
480 Summer	6.13	304
600 Summer	5.16	368
720 Summer	4.48	434
960 Summer	3.57	560
1440 Summer	2.60	810
2160 Summer	1.89	1172
2880 Summer	1.51	1556
4320 Summer	1.09	2292
5760 Summer	0.87	3048
7200 Summer	0.73	3816
8640 Summer	0.63	4576
10080 Summer	0.56	5344
15 Winter	72.01	23
30 Winter	46.91	38
60 Winter	29.24	64
120 Winter	17.70	114
180 Winter	13.07	138
240 Winter	10.49	174
360 Winter	7.67	242
480 Winter	6.13	310
600 Winter	5.16	374
720 Winter	4.48	442
960 Winter	3.57	570
1440 Winter	2.60	820

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Ward & Cole		Page 2
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 30 year Return Period

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
2160 Winter	0.1	1.5	1.6	2.1807	0.2507	43.7	38.8	O K
2880 Winter	0.1	1.2	1.3	2.1757	0.2457	44.7	38.0	O K
4320 Winter	0.1	0.8	1.0	2.1677	0.2377	43.9	36.8	O K
5760 Winter	0.1	0.7	0.8	2.1632	0.2332	41.4	36.1	O K
7200 Winter	0.1	0.5	0.7	2.1597	0.2297	38.6	35.6	O K
8640 Winter	0.1	0.4	0.6	2.1572	0.2272	35.8	35.2	O K
10080 Winter	0.1	0.4	0.5	2.1547	0.2247	33.0	34.8	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2160 Winter	1.89	1188
2880 Winter	1.51	1556
4320 Winter	1.09	2292
5760 Winter	0.87	3048
7200 Winter	0.73	3816
8640 Winter	0.63	4536
10080 Winter	0.56	5256

Fosse House

Roman Wharf

Lincoln LN1 1SR

Crosby Row

Sutton Bridge

Soakaway Stormbloc

Date February 2010

File Stormbloc Crosby Row.SRC

Designed By RH

Checked By

Micro Drainage

Source Control W.11.4

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	30	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+0
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time	(mins)	Area	Time	(mins)	Area
from:	to:	(ha)	from:	to:	(ha)
0	4	0.080	4	8	0.080

Ward & Cole		Page 4
Fosse House	Crosby Row	
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Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Cellular Storage Details

Infil Coef - Base (m/hr) 0.005830 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.005830 Invert Level (m) 1.930
 Safety Factor 2.0 Ground Level (m) 3.500

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	163.0	163.0	0.70	163.0	198.7	1.40	163.0	234.5	2.10	163.0	270.2
0.10	163.0	168.1	0.80	163.0	203.9	1.50	163.0	239.6	2.20	163.0	275.4
0.20	163.0	173.2	0.90	163.0	209.0	1.60	163.0	244.7	2.30	163.0	280.5
0.30	163.0	178.3	1.00	163.0	214.1	1.70	163.0	249.8	2.40	163.0	285.6
0.40	163.0	183.4	1.10	163.0	219.2	1.80	163.0	254.9	2.50	163.0	290.7
0.50	163.0	188.5	1.20	163.0	224.3	1.90	163.0	260.0			
0.60	163.0	193.6	1.30	163.0	229.4	2.00	163.0	265.1			

Pipe Overflow Control

Pipe Diameter (m) 0.150 Roughness (mm) 0.600 Invert Level (m) 2.130
 Slope (1:x) 40.0 Entry Loss Coef 0.500
 Length (m) 5.000 Coef of Contraction 0.600

Ward & Cole		Page 1
Fosse House	Crosby Row	
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Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 30 year Return Period (+20%)

Half Drain Time : 2817 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	0.0	0.1	2.0968	0.1667	0.0	25.8	O K
30 Summer	0.1	0.2	0.3	2.1462	0.2162	0.7	33.5	O K
60 Summer	0.1	1.9	2.0	2.1872	0.2572	7.7	39.8	O K
120 Summer	0.1	3.1	3.3	2.2042	0.2742	16.0	42.5	O K
180 Summer	0.1	3.9	4.0	2.2112	0.2812	21.1	43.5	O K
240 Summer	0.1	4.2	4.4	2.2147	0.2847	24.8	44.1	O K
360 Summer	0.1	4.4	4.5	2.2162	0.2862	29.8	44.3	O K
480 Summer	0.1	4.3	4.5	2.2157	0.2857	33.5	44.2	O K
600 Summer	0.1	4.1	4.3	2.2137	0.2837	36.4	44.0	O K
720 Summer	0.1	4.0	4.1	2.2122	0.2822	38.6	43.7	O K
960 Summer	0.1	3.6	3.7	2.2087	0.2787	42.1	43.1	O K
1440 Summer	0.1	3.0	3.1	2.2027	0.2727	46.4	42.2	O K
2160 Summer	0.1	2.3	2.5	2.1942	0.2642	49.7	41.0	O K
2880 Summer	0.1	1.9	2.1	2.1882	0.2582	50.9	40.0	O K
4320 Summer	0.1	1.5	1.6	2.1802	0.2502	50.4	38.8	O K
5760 Summer	0.1	1.1	1.3	2.1747	0.2447	48.3	37.9	O K
7200 Summer	0.1	1.0	1.1	2.1702	0.2402	46.0	37.2	O K
8640 Summer	0.1	0.8	1.0	2.1672	0.2372	43.8	36.7	O K
10080 Summer	0.1	0.7	0.9	2.1647	0.2347	41.6	36.3	O K
15 Winter	0.1	0.0	0.1	2.1167	0.1867	0.0	28.9	O K
30 Winter	0.1	1.0	1.1	2.1702	0.2402	3.8	37.2	O K
60 Winter	0.1	3.6	3.7	2.2087	0.2787	12.6	43.1	O K
120 Winter	0.1	5.1	5.2	2.2247	0.2947	22.1	45.6	O K
180 Winter	0.1	5.5	5.6	2.2297	0.2997	27.9	46.5	O K
240 Winter	0.1	5.5	5.7	2.2302	0.3002	32.0	46.5	O K
360 Winter	0.1	5.2	5.3	2.2257	0.2957	37.7	45.8	O K
480 Winter	0.1	4.8	4.9	2.2207	0.2907	41.9	45.0	O K
600 Winter	0.1	4.4	4.6	2.2167	0.2867	45.2	44.4	O K
720 Winter	0.1	4.0	4.2	2.2127	0.2827	47.9	43.8	O K
960 Winter	0.1	3.4	3.5	2.2067	0.2767	51.9	42.9	O K
1440 Winter	0.1	2.6	2.7	2.1982	0.2682	57.2	41.5	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	86.42	23
30 Summer	56.29	38
60 Summer	35.09	64
120 Summer	21.25	100
180 Summer	15.68	126
240 Summer	12.59	158
360 Summer	9.20	222
480 Summer	7.36	286
600 Summer	6.19	350
720 Summer	5.37	410
960 Summer	4.29	532
1440 Summer	3.12	778
2160 Summer	2.27	1144
2880 Summer	1.81	1500
4320 Summer	1.31	2208
5760 Summer	1.04	2944
7200 Summer	0.88	3672
8640 Summer	0.76	4408
10080 Summer	0.67	5144
15 Winter	86.42	23
30 Winter	56.29	36
60 Winter	35.09	60
120 Winter	21.25	94
180 Winter	15.68	130
240 Winter	12.59	164
360 Winter	9.20	230
480 Winter	7.36	294
600 Winter	6.19	354
720 Winter	5.37	418
960 Winter	4.29	540
1440 Winter	3.12	792

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Fosse House	Crosby Row	
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Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 30 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m ³)	Maximum Volume (m ³)	Status
2160 Winter	0.1	1.9	2.1	2.1877	0.2577	61.4	39.9	O K
2880 Winter	0.1	1.5	1.7	2.1812	0.2512	63.4	38.9	O K
4320 Winter	0.1	1.1	1.2	2.1732	0.2432	63.9	37.7	O K
5760 Winter	0.1	0.8	1.0	2.1677	0.2377	62.1	36.8	O K
7200 Winter	0.1	0.7	0.8	2.1642	0.2342	59.3	36.2	O K
8640 Winter	0.1	0.6	0.7	2.1612	0.2312	56.3	35.8	O K
10080 Winter	0.1	0.5	0.6	2.1587	0.2287	53.4	35.4	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2160 Winter	2.27	1148
2880 Winter	1.81	1504
4320 Winter	1.31	2212
5760 Winter	1.04	2896
7200 Winter	0.88	3648
8640 Winter	0.76	4408
10080 Winter	0.67	5104

Ward & Cole		Page 3
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	30	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+20
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.080	4	8	0.080

Ward & Cole		Page 4
Fosse House	Crosby Row	
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Lincoln LNI 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Cellular Storage Details

Infil Coef - Base (m/hr) 0.005830 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.005830 Invert Level (m) 1.930
 Safety Factor 2.0 Ground Level (m) 3.500

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	163.0	163.0	0.70	163.0	198.7	1.40	163.0	234.5	2.10	163.0	270.2
0.10	163.0	168.1	0.80	163.0	203.9	1.50	163.0	239.6	2.20	163.0	275.4
0.20	163.0	173.2	0.90	163.0	209.0	1.60	163.0	244.7	2.30	163.0	280.5
0.30	163.0	178.3	1.00	163.0	214.1	1.70	163.0	249.8	2.40	163.0	285.6
0.40	163.0	183.4	1.10	163.0	219.2	1.80	163.0	254.9	2.50	163.0	290.7
0.50	163.0	188.5	1.20	163.0	224.3	1.90	163.0	260.0			
0.60	163.0	193.6	1.30	163.0	229.4	2.00	163.0	265.1			

Pipe Overflow Control

Pipe Diameter (m) 0.150 Roughness (mm) 0.600 Invert Level (m) 2.130
 Slope (1:x) 40.0 Entry Loss Coef 0.500
 Length (m) 5.000 Coef of Contraction 0.600

Ward & Cole		Page 1
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 100 year Return Period

Half Drain Time : 3005 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	0.0	0.1	2.1097	0.1797	0.0	27.9	O K
30 Summer	0.1	0.7	0.8	2.1642	0.2342	2.9	36.2	O K
60 Summer	0.1	3.0	3.2	2.2032	0.2732	11.5	42.3	O K
120 Summer	0.1	4.6	4.7	2.2182	0.2882	20.9	44.6	O K
180 Summer	0.1	5.1	5.3	2.2252	0.2952	26.4	45.7	O K
240 Summer	0.1	5.3	5.5	2.2277	0.2977	30.2	46.1	O K
360 Summer	0.1	5.3	5.4	2.2272	0.2972	35.3	46.0	O K
480 Summer	0.1	5.1	5.2	2.2247	0.2947	39.1	45.6	O K
600 Summer	0.1	4.9	5.0	2.2217	0.2917	41.9	45.2	O K
720 Summer	0.1	4.6	4.8	2.2187	0.2887	44.2	44.7	O K
960 Summer	0.1	4.1	4.3	2.2137	0.2837	47.6	43.9	O K
1440 Summer	0.1	3.3	3.5	2.2062	0.2762	51.8	42.8	O K
2160 Summer	0.1	2.6	2.7	2.1982	0.2682	54.8	41.5	O K
2880 Summer	0.1	2.1	2.2	2.1907	0.2607	55.7	40.4	O K
4320 Summer	0.1	1.6	1.7	2.1817	0.2517	54.7	39.0	O K
5760 Summer	0.1	1.2	1.4	2.1762	0.2462	52.0	38.1	O K
7200 Summer	0.1	1.0	1.1	2.1712	0.2412	49.1	37.4	O K
8640 Summer	0.1	0.8	1.0	2.1677	0.2377	46.4	36.8	O K
10080 Summer	0.1	0.7	0.9	2.1652	0.2352	43.8	36.4	O K
15 Winter	0.1	0.0	0.1	2.1317	0.2017	0.0	31.2	O K
30 Winter	0.1	1.9	2.1	2.1882	0.2582	6.9	40.0	O K
60 Winter	0.1	5.1	5.2	2.2242	0.2942	17.0	45.5	O K
120 Winter	0.1	6.4	6.6	2.2417	0.3117	27.5	48.3	O K
180 Winter	0.1	6.7	6.8	2.2452	0.3152	33.7	48.8	O K
240 Winter	0.1	6.5	6.7	2.2432	0.3132	38.0	48.5	O K
360 Winter	0.1	6.0	6.1	2.2357	0.3057	43.9	47.3	O K
480 Winter	0.1	5.4	5.5	2.2287	0.2987	48.2	46.3	O K
600 Winter	0.1	4.9	5.0	2.2222	0.2922	51.5	45.3	O K
720 Winter	0.1	4.5	4.6	2.2172	0.2872	54.1	44.5	O K
960 Winter	0.1	3.8	3.9	2.2102	0.2802	58.1	43.4	O K
1440 Winter	0.1	2.8	3.0	2.2012	0.2712	63.2	42.0	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	93.28	23
30 Summer	61.30	37
60 Summer	38.41	62
120 Summer	23.28	90
180 Summer	17.15	122
240 Summer	13.73	154
360 Summer	9.97	220
480 Summer	7.95	282
600 Summer	6.66	344
720 Summer	5.76	404
960 Summer	4.58	524
1440 Summer	3.31	766
2160 Summer	2.39	1128
2880 Summer	1.90	1496
4320 Summer	1.37	2208
5760 Summer	1.08	2936
7200 Summer	0.90	3672
8640 Summer	0.78	4408
10080 Summer	0.68	5136
15 Winter	93.28	23
30 Winter	61.30	35
60 Winter	38.41	60
120 Winter	23.28	92
180 Winter	17.15	126
240 Winter	13.73	160
360 Winter	9.97	226
480 Winter	7.95	290
600 Winter	6.66	352
720 Winter	5.76	412
960 Winter	4.58	532
1440 Winter	3.31	770

15 FEB 2013

Fosse House

Crosby Row

Roman Wharf

Sutton Bridge

Lincoln LN1 1SR

Soakaway Stormbloc

Date February 2010

Designed By RH

File Stormbloc Crosby Row.SRC

Checked By

Micro Drainage

Source Control W.11.4



Summary of Results for 100 year Return Period

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
2160 Winter	0.1	2.0	2.2	2.1897	0.2597	67.2	40.2	O K
2880 Winter	0.1	1.6	1.8	2.1827	0.2527	68.9	39.2	O K
4320 Winter	0.1	1.1	1.3	2.1742	0.2442	68.8	37.8	O K
5760 Winter	0.1	0.9	1.0	2.1682	0.2382	66.4	36.9	O K
7200 Winter	0.1	0.7	0.9	2.1647	0.2347	63.0	36.3	O K
8640 Winter	0.1	0.6	0.7	2.1617	0.2317	59.4	35.9	O K
10080 Winter	0.1	0.5	0.7	2.1592	0.2292	56.0	35.5	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2160 Winter	2.39	1144
2880 Winter	1.90	1500
4320 Winter	1.37	2248
5760 Winter	1.08	2944
7200 Winter	0.90	3688
8640 Winter	0.78	4408
10080 Winter	0.68	5096

Ward & Cole		Page 3
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+0
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.080	4	8	0.080

Ward & Cole		Page 4
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Cellular Storage Details

Infil Coef - Base (m/hr) 0.005830 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.005830 Invert Level (m) 1.930
 Safety Factor 2.0 Ground Level (m) 3.500

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	163.0	163.0	0.70	163.0	198.7	1.40	163.0	234.5	2.10	163.0	270.2
0.10	163.0	168.1	0.80	163.0	203.9	1.50	163.0	239.6	2.20	163.0	275.4
0.20	163.0	173.2	0.90	163.0	209.0	1.60	163.0	244.7	2.30	163.0	280.5
0.30	163.0	178.3	1.00	163.0	214.1	1.70	163.0	249.8	2.40	163.0	285.6
0.40	163.0	183.4	1.10	163.0	219.2	1.80	163.0	254.9	2.50	163.0	290.7
0.50	163.0	188.5	1.20	163.0	224.3	1.90	163.0	260.0			
0.60	163.0	193.6	1.30	163.0	229.4	2.00	163.0	265.1			

Pipe Overflow Control

Pipe Diameter (m) 0.150 Roughness (mm) 0.600 Invert Level (m) 2.130
 Slope (1:x) 40.0 Entry Loss Coef 0.500
 Length (m) 5.000 Coef of Contraction 0.600

Ward & Cole		Page 1
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 3312 minutes

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	0.1	0.2	0.3	2.1457	0.2157	0.6	33.4	O K
30 Summer	0.1	2.9	3.1	2.2022	0.2722	9.8	42.2	O K
60 Summer	0.1	5.8	6.0	2.2342	0.3042	20.6	47.1	O K
120 Summer	0.1	7.5	7.7	2.2542	0.3242	31.9	50.2	O K
180 Summer	0.1	8.2	8.3	2.2602	0.3302	38.6	51.1	O K
240 Summer	0.1	8.2	8.3	2.2602	0.3302	43.2	51.2	O K
360 Summer	0.1	7.7	7.9	2.2557	0.3257	49.5	50.5	O K
480 Summer	0.1	7.2	7.3	2.2507	0.3207	54.2	49.6	O K
600 Summer	0.1	6.7	6.8	2.2447	0.3147	57.7	48.8	O K
720 Summer	0.1	6.3	6.4	2.2397	0.3097	60.6	47.9	O K
960 Summer	0.1	5.6	5.7	2.2307	0.3007	64.9	46.5	O K
1440 Summer	0.1	4.5	4.7	2.2177	0.2877	70.5	44.5	O K
2160 Summer	0.1	3.4	3.6	2.2072	0.2772	74.9	42.9	O K
2880 Summer	0.1	2.7	2.9	2.2002	0.2702	76.9	41.8	O K
4320 Summer	0.1	1.9	2.1	2.1882	0.2582	77.0	40.0	O K
5760 Summer	0.1	1.5	1.7	2.1812	0.2512	74.8	38.9	O K
7200 Summer	0.1	1.3	1.4	2.1767	0.2467	71.7	38.2	O K
8640 Summer	0.1	1.1	1.2	2.1727	0.2427	68.6	37.6	O K
10080 Summer	0.1	0.9	1.1	2.1697	0.2397	65.8	37.1	O K
15 Winter	0.1	1.0	1.1	2.1702	0.2402	3.7	37.2	O K
30 Winter	0.1	5.3	5.5	2.2277	0.2977	14.9	46.1	O K
60 Winter	0.1	8.4	8.5	2.2617	0.3317	27.1	51.3	O K
120 Winter	0.1	10.1	10.2	2.2777	0.3477	39.9	53.8	O K
180 Winter	0.1	10.0	10.1	2.2767	0.3467	47.5	53.7	O K
240 Winter	0.1	9.4	9.5	2.2712	0.3412	52.7	52.9	O K
360 Winter	0.1	8.1	8.2	2.2592	0.3292	59.8	51.0	O K
480 Winter	0.1	7.0	7.2	2.2492	0.3192	65.1	49.4	O K
600 Winter	0.1	6.3	6.4	2.2397	0.3097	69.2	48.0	O K
720 Winter	0.1	5.7	5.8	2.2322	0.3022	72.5	46.8	O K
960 Winter	0.1	4.7	4.9	2.2202	0.2902	77.6	45.0	O K
1440 Winter	0.1	3.5	3.7	2.2082	0.2782	84.3	43.1	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	111.94	23
30 Summer	73.56	35
60 Summer	46.10	56
120 Summer	27.94	84
180 Summer	20.58	116
240 Summer	16.48	150
360 Summer	11.96	214
480 Summer	9.54	274
600 Summer	7.99	336
720 Summer	6.92	396
960 Summer	5.50	514
1440 Summer	3.98	750
2160 Summer	2.87	1104
2880 Summer	2.28	1472
4320 Summer	1.64	2204
5760 Summer	1.30	2936
7200 Summer	1.08	3672
8640 Summer	0.93	4408
10080 Summer	0.82	5096
15 Winter	111.94	22
30 Winter	73.56	33
60 Winter	46.10	52
120 Winter	27.94	88
180 Winter	20.58	122
240 Winter	16.48	154
360 Winter	11.96	220
480 Winter	9.54	284
600 Winter	7.99	344
720 Winter	6.92	402
960 Winter	5.50	520
1440 Winter	3.98	750

15 FEB 2010

Ward & Cole		Page 2
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Summary of Results for 100 year Return Period (+20%)

Storm Duration (mins)	Maximum Filtration (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
2160 Winter	0.1	2.5	2.7	2.1977	0.2677	89.8	41.4	O K
2880 Winter	0.1	2.0	2.1	2.1887	0.2587	92.7	40.1	O K
4320 Winter	0.1	1.4	1.5	2.1792	0.2492	94.2	38.6	O K
5760 Winter	0.1	1.1	1.2	2.1732	0.2432	92.8	37.6	O K
7200 Winter	0.1	0.9	1.0	2.1687	0.2387	89.9	36.9	O K
8640 Winter	0.1	0.7	0.9	2.1652	0.2352	86.3	36.4	O K
10080 Winter	0.1	0.6	0.8	2.1627	0.2327	82.5	36.0	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
2160 Winter	2.87	1124
2880 Winter	2.28	1476
4320 Winter	1.64	2204
5760 Winter	1.30	2992
7200 Winter	1.08	3664
8640 Winter	0.93	4440
10080 Winter	0.82	5144

Ward & Cole		Page 3
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

Rainfall Details

Region	ENG+WAL	Cv (Summer)	0.750	Summer Storms	Yes
Return Period (years)	100	Cv (Winter)	0.840	Winter Storms	Yes
M5-60 (mm)	19.000	Shortest Storm (mins)	15	Climate Change %	+20
Ratio-R	0.400	Longest Storm (mins)	10080		

Time / Area Diagram

Total Area (ha) = 0.160

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.080	4	8	0.080

Ward & Cole		Page 4
Fosse House	Crosby Row	
Roman Wharf	Sutton Bridge	
Lincoln LN1 1SR	Soakaway Stormbloc	
Date February 2010	Designed By RH	
File Stormbloc Crosby Row.SRC	Checked By	
Micro Drainage	Source Control W.11.4	

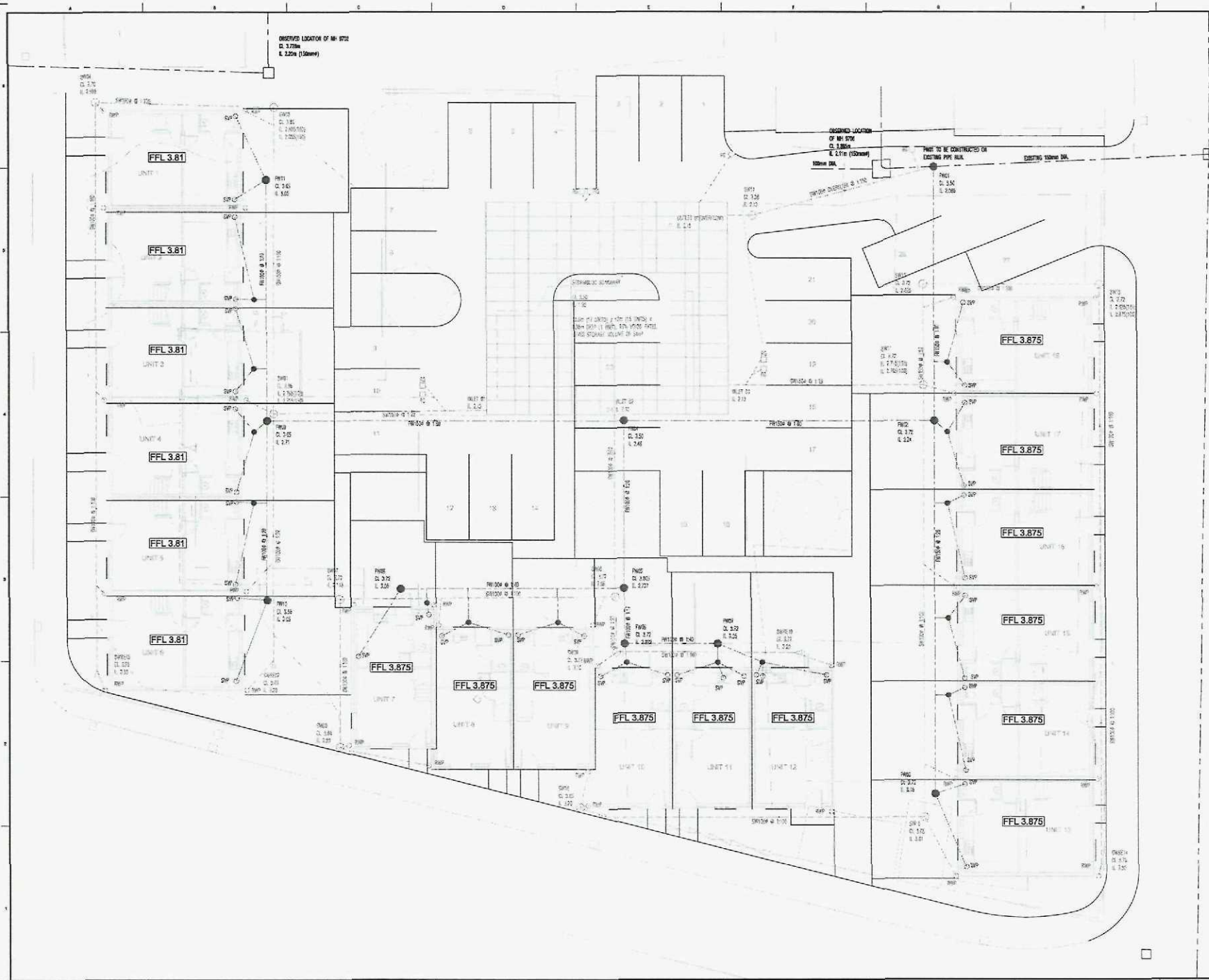
Cellular Storage Details

Infil Coef - Base (m/hr) 0.005830 Porosity 0.95
 Infil Coef - Sides (m/hr) 0.005830 Invert Level (m) 1.930
 Safety Factor 2.0 Ground Level (m) 3.500

Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)	Depth (m)	Area (m ²)	Infil. Area (m ²)
0.00	163.0	163.0	0.70	163.0	198.7	1.40	163.0	234.5	2.10	163.0	270.2
0.10	163.0	168.1	0.80	163.0	203.9	1.50	163.0	239.6	2.20	163.0	275.4
0.20	163.0	173.2	0.90	163.0	209.0	1.60	163.0	244.7	2.30	163.0	280.5
0.30	163.0	178.3	1.00	163.0	214.1	1.70	163.0	249.8	2.40	163.0	285.6
0.40	163.0	183.4	1.10	163.0	219.2	1.80	163.0	254.9	2.50	163.0	290.7
0.50	163.0	188.5	1.20	163.0	224.3	1.90	163.0	260.0			
0.60	163.0	193.6	1.30	163.0	229.4	2.00	163.0	265.1			

Pipe Overflow Control

Pipe Diameter (m) 0.150 Roughness (mm) 0.600 Invert Level (m) 2.130
 Slope (1:x) 40.0 Entry Loss Coef 0.500
 Length (m) 5.000 Coef of Contraction 0.600



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KEY
 --- PROPOSED SURFACE WATER SEWER
 --- PROPOSED Foul WATER SEWER

THE ON-SITE LAYOUT IS BASED ON DAVID HOLMAN DRAWING 0971/101. ALL SETTING OUT FOR THE BUILDINGS & ALL ON-SITE WORKS IS TO BE CONFIRMED BY THE ARCHITECT.

15 FEB 2010

E	15/02/10	Customer altered to information type.	LM	PH
D	14/02/10	Issued for Construction.	LM	PH
C	02/02/10	Issued to suit latest Architect's layout.	LM	PH
B	06/07/09	Position of MH 8752 revised following site visit.	LM	PH
A	17/06/09	Position of MH 8752 revised following site visit.	LM	PH
	15/02/09	First issue.	LM	PH

Rev	Date	Description	Drawn	CHK
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client:
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project:
 Plots 1 - 18 Crosby Row
 Sutton Bridge

drawing title:
 Proposed Drainage Layout

scale:
 1:100 Construction

job number: 19/462	drawing number: 500	revision: E
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