

STEVENSON ASSOCIATES

***LOW LAITHES VILLAGE,
WOMBWELL, BARNESLEY***

FLOOD RISK and DRAINAGE STATEMENT

Unit 2, Hillcrest, Monk Fryston, Leeds, LS25 5EX
E-mail: LS255WZ@btinternet.com; Telephone 01977 682824

CONTENTS

Introduction	3
The Site.....	3
Existing Drainage.....	3
Design Considerations and Proposals.....	6
Flood Zones and Flooding.	7
Summary and Effects of Proposals	7
Appendix 1 – Site Location and Flood Zones	8
Appendix 2 – Critical Storm Calculation	9
Appendix 3 – Existing Storage Simulation	12
Appendix 4 – Proposed 100-Year Simulation	18
Appendix 5 – Existing Pond (and Pipe Reference)	24
Appendix 6 – Proposed Drained Areas	25

LOW LAITHES VILLAGE, BARNSELEY

INTRODUCTION

- 1 Planning Permission is sought to extend a residential centre for young adults at Low Laithes, Wombwell and this report has been commissioned to determine how the proposed development will be drained and whether the site will be affected by flooding or if the development will cause others to flood.
- 2 This report should be read in conjunction with the design details prepared by M Booth Design and the topographical survey prepared by Haycock and Todd (for explanatory purposes some reduced scale drawings are appended to this report).

THE SITE

- 3 The site is served from a single track road, Old Farm Lane, off Wombwell Lane (A633) approximately one mile west of Wombwell town centre; the centre of the site at OS map reference 438915 404925. The development is a purpose built residential centre set in a rural area with open agricultural fields to all sides.
- 4 The overall site is approximately 2 hectares in size, regular in shape measuring approximately 130m north/south and 150m east/west. The natural fall of the site is from north to south at around 1 in 16 (6%) [47.0m to 39m AOD].

EXISTING DRAINAGE

Surface Water

- 5 As part of earlier works, a watercourse flowing through the eastern side of the site was culverted using a 600mm pipe, which now lies beneath an access road and gullies along that road are drained directly into the culvert. South of the site the watercourse remains open and drains towards the River Dove and then to the Dearne Valley.
- 6 Rainwater from the residential centre buildings and some hard-standing areas drains to the watercourse via an attenuation scheme controlled by a Hydro-brake flow control and

storage within a pond. For ecological reasons, the pond has been designed to remain wet with the base some 1m or so below the outfall.

- 7 The flow control is designed to discharge 14 litres per second with a 1m head of water and simple calculations show that around 42 cubic metres of water would need to be stored during a 1 in 30-year storm and 55 cubic metres during a 1 in 100-year event [1% chance of annual occurrence] – (with climate change corrections of 25% additional rainfall intensities added). The critical storm is shown to be 120 minutes during winter.
- 8 The pond is oversized and has a total storage capacity (above outfall) of around 700 cubic metres:

DEPTH	AREA	VOLUME
200mm	230 square metres	43 cubic metres
400mm	280 square metres	94 cubic metres
600mm	340 square metres	156 cubic metres
800mm	410 square metres	235 cubic metres
1000mm	460 square metres	318 cubic metres
1200mm	550 square metres	419 cubic metres
1400mm	650 square metres	539 cubic metres
1600mm	810 square metres	685 cubic metres

- 9 The results from a simulation calculation show that during the 1 in 100-year event with an additional 25% increase in rainfall intensity, the water level in the pond would rise 377mm and flows through the Hydro-brake to the watercourse would be 12.4 litres per second.
- 10 Some parking areas are currently lose-stoned and rainwater from these areas along from runoff from footpaths, grassed areas and the like is allowed to soakaway.

Foul water

- 11 Foul water is drained south from the site via a 150mm sewer with a gradient of around 1/45 to a pumping station 200 metres away. From there it is pumped to a public sewer in Barnsley Road approximately 325m away; Barnsley Road being at a level 1.5m lower than the pumping station cover level.
- 12 It is estimated that the current facility produces around 15 cubic metres of effluent per day [30 residents @ 200 l/p/d and 150 staff @ 60 l/p/d]. The pumping station is 1800mm diameter and 2.5m deep; the high level switch is understood to be set at 1m giving an operating storage capacity of 2.5 cubic metres with similar in reserve. As such, it is expected that the pump on average would run 6 times per day for around 10 minutes [4 to 5 litres per second]
- 13 The pumping station has a 3-phase electricity supply and is fitted with twin 2.4kw pumps (operating one at a time) and effluent is pumped via a 65mm main. Each pump should be capable of pumping 10 litres per second with a 5m head (or 5 litres per second - 12m head) – twice what would normally be expected. It would appear that the existing pumps are oversized.

DESIGN CONSIDERATIONS AND PROPOSALS

- 14 The proposed development is to provide units for an additional 10 residents along with two visitor accommodation units, supporting infrastructure facilities and car parking. In doing so there will be an increase in both surface and foul water.

Surface Water

- 15 All rainwater from new buildings will be drained to the balancing pond. Gully connections from the existing car-park road along with a drain connection from a workshop will be removed from the culverted watercourse; the new road and workshop will then be drained to the pond. Rainwater from parking spaces, footpaths and grassed areas will be allowed to soak into the ground.
- 16 In total an additional area of around 1,366 square metres will be drained via the existing attenuation scheme.
- 17 Calculations show that during a 1 in 30-year storm the water level in the pond would rise 410mm and flows through the Hydro-brake to the watercourse would be 12.3 litres per second.
- 18 Similarly, the results from a simulation calculation show that during the 1 in 100-year event with an additional 25% increase in rainfall intensity, the water level in the pond would rise 547mm and flows through the Hydro-brake to the watercourse would remain at around 12.3 litres per second.

Foul Water

- 19 In addition to the existing 15 cubic metres of effluent per day there will be up to an additional 5.2 cubic metres [10 residents @ 200 l/p/d, 40 staff @ 60 l/p/d and up to 4 occasional overnight visitors]. As a result the pumping station would come into operation around 8 times per day compared with current 6 times per day (for around 10 minutes at 4 to 5 litres per second). These additional flows would appear to be well within the capacity of the pumping station.

FLOOD ZONES AND FLOODING.

20 The Environment Agency's Indicative Floodplain Map shows that the site is not within an area that floods but the River Dove and Dearne Valley a short distance downstream is an area greatly affected by flooding.

SUMMARY AND EFFECTS OF PROPOSALS

21 It is proposed to extend an existing residential centre for young adults at Low Laithes, Wombwell and in doing so there will be an increase in foul and surface water.

22 The existing foul water drainage system, which incorporates a pumping station to pump effluent to the public sewer, appears to be oversized, possibly with the foresight of possible future development. As a consequence, the existing foul sewerage is adequate for this proposed development.

23 Surface water from most of the development currently drains via an attenuation system – Hydrobrake flow control and storage pond. There are some minor areas which by-pass the attenuation and are drained directly into a culverted watercourse, but as part of the proposed development these unrestricted flows will be removed.

24 All surface water will drain via the pond and be controlled by the Hydro-brake. The pond is too large simply for balancing purposes and it is likely that it has been constructed with nature / ecology also in mind. As a result water levels in the pond are unlikely to rise more than 500mm and the flows through the Hydro-brake will remain at the same level.

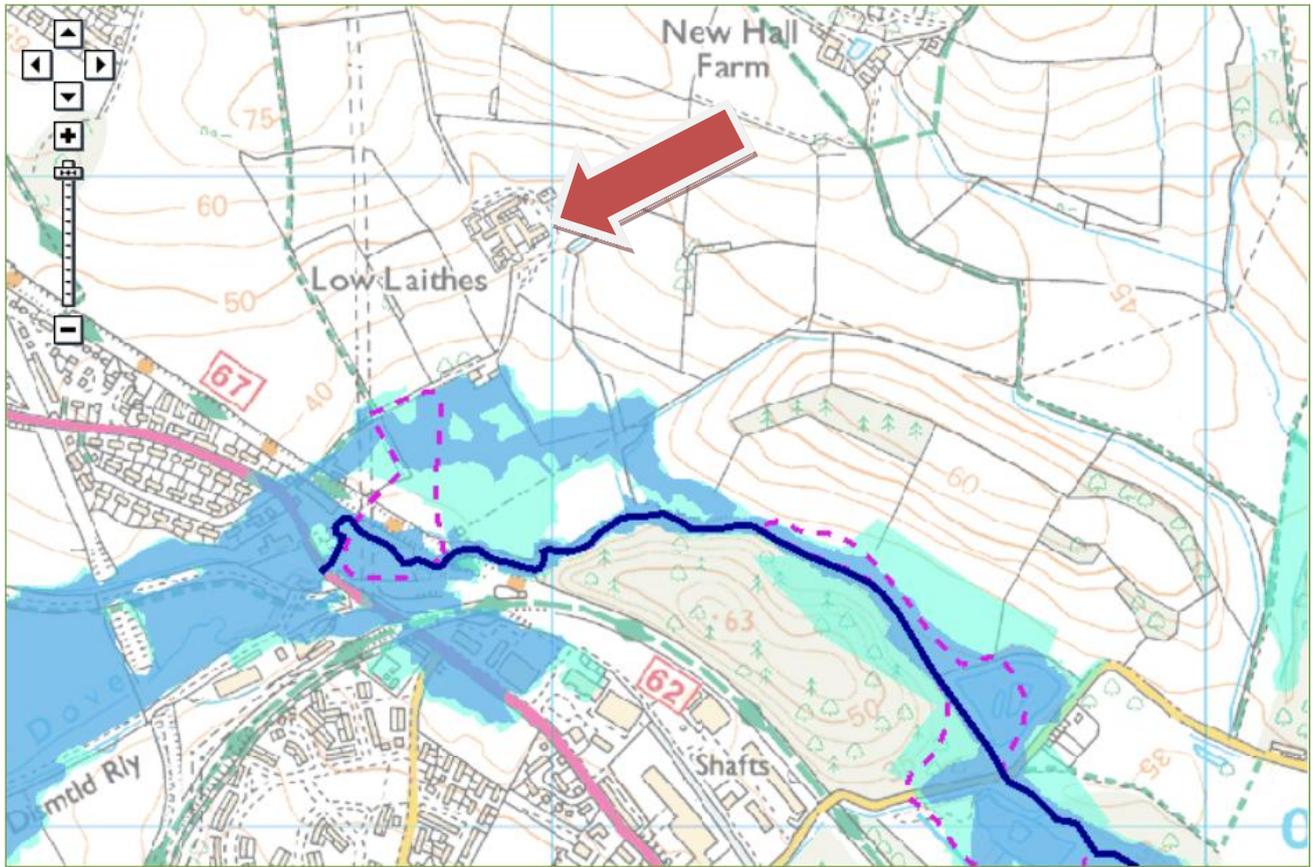
25 Although the site is not within an area known to flood, water from the site does drain to a susceptible area and it is therefore critical that flows from this development remain at their current level, as proposed.

M. Stevenson

Michael Stevenson

13th August 2014

APPENDIX 1 – SITE LOCATION AND FLOOD ZONES



APPENDIX 2 – CRITICAL STORM CALCULATION

Stevenson Associates		Page 1				
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Existing					
Date August 2014 File 30ex.SRC	Designed By Stevenson Checked By					
Micro Drainage		Storage Design W.11.3				
Summary of Results for 30 year Return Period						
Storm Duration (mins)	Maximum Control (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m³)	Status
15 Summer	5.4	5.4	8.1238	0.1238	27.6	O K
30 Summer	7.1	7.1	8.1478	0.1477	33.6	O K
60 Summer	8.2	8.2	8.1618	0.1617	37.2	O K
120 Summer	8.6	8.6	8.1677	0.1677	38.8	O K
180 Summer	8.4	8.4	8.1658	0.1657	38.3	O K
240 Summer	8.1	8.1	8.1613	0.1612	37.1	O K
360 Summer	7.4	7.4	8.1513	0.1512	34.5	O K
480 Summer	6.7	6.7	8.1423	0.1423	32.3	O K
600 Summer	6.2	6.2	8.1348	0.1348	30.4	O K
720 Summer	5.7	5.7	8.1283	0.1283	28.7	O K
15 Winter	6.3	6.3	8.1368	0.1368	30.8	O K
30 Winter	8.3	8.3	8.1633	0.1632	37.6	O K
60 Winter	9.3	9.3	8.1778	0.1777	41.4	O K
120 Winter	9.5	9.5	8.1797	0.1797	42.1	O K
180 Winter	9.0	9.0	8.1738	0.1737	40.4	O K
240 Winter	8.4	8.4	8.1658	0.1657	38.3	O K
360 Winter	7.4	7.4	8.1513	0.1513	34.5	O K
480 Winter	6.5	6.5	8.1393	0.1393	31.5	O K
600 Winter	5.8	5.8	8.1298	0.1298	29.1	O K
720 Winter	5.3	5.3	8.1223	0.1223	27.2	O K
Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)				
15 Summer	72.43	20				
30 Summer	47.67	31				
60 Summer	30.03	48				
120 Summer	18.36	82				
180 Summer	13.62	116				
240 Summer	10.97	148				
360 Summer	8.06	214				
480 Summer	6.48	278				
600 Summer	5.47	340				
720 Summer	4.75	402				
15 Winter	72.43	20				
30 Winter	47.67	31				
60 Winter	30.03	50				
120 Winter	18.36	88				
180 Winter	13.62	122				
240 Winter	10.97	158				
360 Winter	8.06	224				
480 Winter	6.48	288				
600 Winter	5.47	352				
720 Winter	4.75	416				
©1982-2008 Micro Drainage						

Stevenson Associates		Page 2
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Existing	
Date August 2014 File 30ex.SRC	Designed By Stevenson Checked By	
Micro Drainage	Storage Design W.11.3	
<u>Rainfall Details</u>		
Region	ENG+WAL	Cv (Summer) 0.750 Summer Storms Yes
Return Period (years)	30	Cv (Winter) 0.840 Winter Storms Yes
M5-60 (mm)	19.500	Shortest Storm (mins) 15
Ratio-R	0.375	Longest Storm (mins) 720
<u>Time / Area Diagram</u>		
Total Area (ha) = 0.226		
Time (mins)	Area (ha)	Time (mins)
from: to:	from: to:	from: to:
0 4	0.110	4 8 0.116
©1982-2008 Micro Drainage		

Stevenson Associates		Page 3
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Existing	
Date August 2014 File 30ex.SRC	Designed By Stevenson Checked By	
Micro Drainage	Storage Design W.11.3	

Tank/Pond Details

Invert Level (m)		8.000		Ground Level (m)		9.800	
Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.00	200.0	0.40	350.0	0.80	450.0	1.20	550.0
						1.60	750.0
						2.00	850.0

Hydro-Brake Outflow Control

Design Head (m)		1.000		Hydro-Brake Type		MD4		Invert Level (m)		8.000	
Design Flow (l/s)		14.0		Diameter (mm)		134					
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.10	3.6	0.60	11.1	1.60	17.7	2.60	22.6	5.00	31.3	7.50	38.3
0.20	11.0	0.80	12.5	1.80	18.8	3.00	24.2	5.50	32.8	8.00	39.6
0.30	13.0	1.00	14.0	2.00	19.8	3.50	26.2	6.00	34.3	8.50	40.8
0.40	11.5	1.20	15.3	2.20	20.8	4.00	28.0	6.50	35.7	9.00	42.0
0.50	10.8	1.40	16.6	2.40	21.7	4.50	29.7	7.00	37.0	9.50	43.1

APPENDIX 3 – EXISTING STORAGE SIMULATION

Stevenson Associates		Page 1												
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Exi 100 plus climate													
Date August 2014 File Ex100 plus 25.SIM	Designed By Stevenson Checked By													
Micro Drainage	Simulation W.11.3													
<u>Global Variables</u>														
<pre> Region FSR - England & Wales Return Period (yrs) 100 M5-60 (mm) 19.500 Ratio R 0.370 Volumetric Runoff Coef 0.840 Profile Type Winter PIMP (%) 100 Areal Reduction Factor 1.000 Storm Duration (mins) 120 Hot Start (mins) 0 Hot Start Level (mm) 0 Manhole Headloss Coefficient 0.500 MADD Factor * 10m³/ha Storage 2.000 Foul Sewage/Hectare (l/s) 0.00 Additional Flow - % of Total Flow 25 Number of Input Hydrographs 0 Number of Time/Area Diagrams 0 Number of Bifurcations 0 Number of Overflows 0 Number of Off-Line Controls 0 Number of On-Line Controls 1 </pre>														
Starting Storm file name														
C:\USERS\STEVENSON\DOCUMENTS\WINDES DATA\LOW LAITHES, WOMBWELL\EXISTING 1.SWS														
<u>Freely Discharging Outfalls</u>														
<table border="1"> <thead> <tr> <th>Outfall Pipe Number</th> <th>Outfall MH/No</th> <th>C.Level (m)</th> <th>I.Level (m)</th> <th>D,I (mm)</th> <th>B (mm)</th> </tr> </thead> <tbody> <tr> <td>1.006</td> <td>Outfall</td> <td>8.500</td> <td>7.775</td> <td>1200</td> <td>0</td> </tr> </tbody> </table>			Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,I (mm)	B (mm)	1.006	Outfall	8.500	7.775	1200	0
Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,I (mm)	B (mm)									
1.006	Outfall	8.500	7.775	1200	0									
©1982-2008 Micro Drainage														

Stevenson Associates		Page 2
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Exi 100 plus climate	
Date August 2014 File Ex100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

On-Line Controls (Hydro-Brake®)

US/PN	Volume (m ³)	Ctrl MH Name	Invert (m)	Type	Dia (m)	D.Head (m)	D.Flow (l/s)	Headloss (m)	Flow (l/s)
1.005	0.120	8	7.840	Md4	0.134	1.000	14.0	0.1	3.6
								0.2	11.0
								0.3	13.0
								0.4	11.5
								0.5	10.8
								0.6	11.1
								0.7	11.8
								0.8	12.5
								0.9	13.3
								1.0	14.0
								1.2	15.3
								1.4	16.6
								1.6	17.7
								1.8	18.8
								2.0	19.8

Stevenson Associates		Page 3
PO Box 58 Monk Fyston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Exi 100 plus climate	
Date August 2014 File Ex100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Storage Pond at pipe 1.005 USMH 7

Storage Pond Invert Level (m) 8.000

Depth (m)	Area (m ²)										
0.0	200.0	1.0	460.0	2.0	0.0	3.0	0.0	4.0	0.0	5.0	0.0
0.2	230.0	1.2	550.0	2.2	0.0	3.2	0.0	4.2	0.0		
0.4	280.0	1.4	650.0	2.4	0.0	3.4	0.0	4.4	0.0		
0.6	340.0	1.6	810.0	2.6	0.0	3.6	0.0	4.6	0.0		
0.8	410.0	1.8	900.0	2.8	0.0	3.8	0.0	4.8	0.0		

Stevenson Associates		Page 4
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Exi 100 plus climate	
Date August 2014 File Ex100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Network Details

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
1.000	9.30	0.120	77.5	0.115	8.00	1	0.600	o	300
1.001	16.90	0.210	80.5	0.000	0.00	1	0.600	o	300
2.000	30.20	1.290	23.4	0.111	8.00	1	0.600	o	225
1.002	22.00	0.270	81.5	0.000	0.00	1	0.600	o	300
1.003	20.00	0.090	222.2	0.043	0.00	1	0.600	o	300
1.004	10.00	0.250	40.0	0.000	0.00	1	0.600	o	300
1.005	8.00	0.160	50.0	0.000	0.00	1	0.600	o	150
1.006	6.50	0.065	100.0	0.000	0.00	1	0.600	o	150

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
1.000	1	10.900	8.940	1.660	10.700	8.820	1.580		1200
1.001	2	10.700	8.820	1.580	10.600	8.610	1.690		1200
2.000	3	11.190	9.900	1.065	10.600	8.610	1.765		1050
1.002	4	10.600	8.610	1.690	9.900	8.340	1.260		1200
1.003	5	9.900	8.340	1.260	9.700	8.250	1.150		1050
1.004	6	9.700	8.250	1.150	9.700	8.000	1.400		1050
1.005	7	9.700	8.000	1.550	9.700	7.840	1.710		1200
1.006	8	9.700	7.840	1.710	8.500	7.775	0.575	9	1200

Stevenson Associates		Page 5
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Exi 100 plus climate	
Date August 2014 File Ex100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	120	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m ³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	9.037	-0.203	0.000	0.23	0.0	20.1	O K
1.001	8.908	-0.212	0.000	0.19	0.0	20.0	O K
2.000	9.967	-0.158	0.000	0.19	0.0	19.4	O K
1.002	8.735	-0.175	0.000	0.36	0.0	39.3	O K
1.003	8.530	-0.110	0.000	0.72	0.0	46.5	O K
1.004	8.377	-0.173	0.000	0.37	0.0	46.4	O K
1.005	8.343	0.193	0.000	0.57	0.0	12.5	SURCH'ED
1.006	8.316	0.326	0.000	0.82	0.0	12.4	SURCH'ED

Stevenson Associates		Page 6
PO Box 58 Monk Fyston Leeds LS25 5WZ	Low Laithes Village Wombwell Barnsley Exi 100 plus climate	
Date August 2014 File Ex100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Rainfall Hyetograph

Region FSR - England & Wales Profile Type Winter
Return Period (yrs) 100 Storm Duration (mins) 120
M5-60 (mm) 19.500
Ratio R 0.370

Time (mins)	Rain (mm/hr)								
4	3.33	28	12.50	52	48.19	76	40.16	100	11.12
8	8.19	32	15.21	56	55.09	80	32.41	104	10.77
12	10.25	36	19.46	60	59.99	84	25.39	108	10.76
16	10.76	40	25.39	64	59.99	88	19.46	112	10.25
20	10.77	44	32.41	68	55.09	92	15.21	116	8.19
24	11.12	48	40.16	72	48.19	96	12.50	120	3.33

APPENDIX 4 – PROPOSED 100-YEAR SIMULATION

Stevenson Associates		Page 1																																																															
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Wombwell Barnsley Proposed																																																																
Date August 2014 File Proposed 100 plus 25.SIM	Designed By Stevenson Checked By																																																																
Micro Drainage	Simulation W.11.3																																																																
Global Variables																																																																	
<table> <tr> <td>Region</td> <td colspan="2">FSR - England & Wales</td> </tr> <tr> <td>Return Period (yrs)</td> <td colspan="2">100</td> </tr> <tr> <td>M5-60 (mm)</td> <td colspan="2">19.500</td> </tr> <tr> <td>Ratio R</td> <td colspan="2">0.370</td> </tr> <tr> <td>Volumetric Runoff Coef</td> <td colspan="2">0.840</td> </tr> <tr> <td>Profile Type</td> <td colspan="2">Winter</td> </tr> <tr> <td>PIMP (%)</td> <td colspan="2">100</td> </tr> <tr> <td>Areal Reduction Factor</td> <td colspan="2">1.000</td> </tr> <tr> <td>Storm Duration (mins)</td> <td colspan="2">120</td> </tr> <tr> <td>Hot Start (mins)</td> <td colspan="2">0</td> </tr> <tr> <td>Hot Start Level (mm)</td> <td colspan="2">0</td> </tr> <tr> <td>Manhole Headloss Coefficient</td> <td colspan="2">0.500</td> </tr> <tr> <td>MADD Factor * 10m³/ha Storage</td> <td colspan="2">2.000</td> </tr> <tr> <td>Foul Sewage/Hectare (l/s)</td> <td colspan="2">0.00</td> </tr> <tr> <td>Additional Flow - % of Total Flow</td> <td colspan="2">25</td> </tr> <tr> <td>Number of Input Hydrographs</td> <td colspan="2">0</td> </tr> <tr> <td>Number of Time/Area Diagrams</td> <td colspan="2">0</td> </tr> <tr> <td>Number of Bifurcations</td> <td colspan="2">0</td> </tr> <tr> <td>Number of Overflows</td> <td colspan="2">0</td> </tr> <tr> <td>Number of Off-Line Controls</td> <td colspan="2">0</td> </tr> <tr> <td>Number of On-Line Controls</td> <td colspan="2">1</td> </tr> </table>			Region	FSR - England & Wales		Return Period (yrs)	100		M5-60 (mm)	19.500		Ratio R	0.370		Volumetric Runoff Coef	0.840		Profile Type	Winter		PIMP (%)	100		Areal Reduction Factor	1.000		Storm Duration (mins)	120		Hot Start (mins)	0		Hot Start Level (mm)	0		Manhole Headloss Coefficient	0.500		MADD Factor * 10m ³ /ha Storage	2.000		Foul Sewage/Hectare (l/s)	0.00		Additional Flow - % of Total Flow	25		Number of Input Hydrographs	0		Number of Time/Area Diagrams	0		Number of Bifurcations	0		Number of Overflows	0		Number of Off-Line Controls	0		Number of On-Line Controls	1	
Region	FSR - England & Wales																																																																
Return Period (yrs)	100																																																																
M5-60 (mm)	19.500																																																																
Ratio R	0.370																																																																
Volumetric Runoff Coef	0.840																																																																
Profile Type	Winter																																																																
PIMP (%)	100																																																																
Areal Reduction Factor	1.000																																																																
Storm Duration (mins)	120																																																																
Hot Start (mins)	0																																																																
Hot Start Level (mm)	0																																																																
Manhole Headloss Coefficient	0.500																																																																
MADD Factor * 10m ³ /ha Storage	2.000																																																																
Foul Sewage/Hectare (l/s)	0.00																																																																
Additional Flow - % of Total Flow	25																																																																
Number of Input Hydrographs	0																																																																
Number of Time/Area Diagrams	0																																																																
Number of Bifurcations	0																																																																
Number of Overflows	0																																																																
Number of Off-Line Controls	0																																																																
Number of On-Line Controls	1																																																																
<p>Starting Storm file name</p> <p>C:\Users\Stevenson\Documents\WINDES DATA\Low Laithes, Wombwell\Proposed 1.SWS</p>																																																																	
Freely Discharging Outfalls																																																																	
<table> <thead> <tr> <th>Outfall Pipe Number</th> <th>Outfall MH/No</th> <th>C.Level (m)</th> <th>I.Level (m)</th> <th>D,L (mm)</th> <th>B (mm)</th> </tr> </thead> <tbody> <tr> <td>1.006</td> <td>Outfall</td> <td>8.500</td> <td>7.775</td> <td>1200</td> <td>0</td> </tr> </tbody> </table>			Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)	1.006	Outfall	8.500	7.775	1200	0																																																			
Outfall Pipe Number	Outfall MH/No	C.Level (m)	I.Level (m)	D,L (mm)	B (mm)																																																												
1.006	Outfall	8.500	7.775	1200	0																																																												
©1982-2008 Micro Drainage																																																																	

Stevenson Associates		Page 2
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Wombwell Barnsley Proposed	
Date August 2014 File Proposed 100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

On-Line Controls (Hydro-Brake®)

US/PN	Volume (m ³)	Ctrl MH Name	Invert (m)	Type	Dia (m)	D.Head (m)	D.Flow (l/s)	Headloss (m)	Flow (l/s)
1.005	0.120	8	7.840	Md4	0.134	1.000	14.0	0.1	3.6
								0.2	11.0
								0.3	13.0
								0.4	11.5
								0.5	10.8
								0.6	11.1
								0.7	11.8
								0.8	12.5
								0.9	13.3
								1.0	14.0
								1.2	15.3
								1.4	16.6
								1.6	17.7
								1.8	18.8
								2.0	19.8

Stevenson Associates		Page 3
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Wombwell Barnsley Proposed	
Date August 2014 File Proposed 100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Storage Pond at pipe 1.005 USMH 7

Storage Pond Invert Level (m) 8.000

Depth (m)	Area (m ²)										
0.0	200.0	1.0	460.0	2.0	0.0	3.0	0.0	4.0	0.0	5.0	0.0
0.2	230.0	1.2	550.0	2.2	0.0	3.2	0.0	4.2	0.0		
0.4	280.0	1.4	650.0	2.4	0.0	3.4	0.0	4.4	0.0		
0.6	340.0	1.6	810.0	2.6	0.0	3.6	0.0	4.6	0.0		
0.8	410.0	1.8	900.0	2.8	0.0	3.8	0.0	4.8	0.0		

Stevenson Associates		Page 4
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Wombwell Barnsley Proposed	
Date August 2014 File Proposed 100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Network Details

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
1.000	9.30	0.120	77.5	0.115	8.00	1	0.600	o	300
1.001	16.90	0.210	80.5	0.000	0.00	1	0.600	o	300
2.000	30.20	1.290	23.4	0.111	8.00	1	0.600	o	225
1.002	22.00	0.270	81.5	0.000	0.00	1	0.600	o	300
1.003	20.00	0.090	222.2	0.043	0.00	1	0.600	o	300
1.004	10.00	0.250	40.0	0.137	0.00	1	0.600	o	300
1.005	8.00	0.160	50.0	0.000	0.00	1	0.600	o	150
1.006	6.50	0.065	100.0	0.000	0.00	1	0.600	o	150

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
1.000	1	10.900	8.940	1.660	10.700	8.820	1.580		1200
1.001	2	10.700	8.820	1.580	10.600	8.610	1.690		1200
2.000	3	11.190	9.900	1.065	10.600	8.610	1.765		1050
1.002	4	10.600	8.610	1.690	9.900	8.340	1.260		1200
1.003	5	9.900	8.340	1.260	9.700	8.250	1.150		1050
1.004	6	9.700	8.250	1.150	9.700	8.000	1.400		1050
1.005	7	9.700	8.000	1.550	9.700	7.840	1.710		1200
1.006	8	9.700	7.840	1.710	8.500	7.775	0.575	9	1200

Stevenson Associates		Page 5
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Wombwell Barnsley Proposed	
Date August 2014 File Proposed 100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Summary of Results

Return Period (years)	100	Analysis Time Step	Fine
Storm Duration (mins)	120	DTS Status	ON
Profile Type	Winter	DVD Status	OFF
Margin for Flood Risk warning (mm)	300	Inertia Status	OFF

PN	Water Lev. (m)	Surcharged Depth (m)	Flooded Vol (m ³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	9.037	-0.203	0.000	0.23	0.0	20.1	O K
1.001	8.908	-0.212	0.000	0.19	0.0	20.0	O K
2.000	9.967	-0.158	0.000	0.19	0.0	19.4	O K
1.002	8.735	-0.175	0.000	0.36	0.0	39.3	O K
1.003	8.557	-0.083	0.000	0.72	0.0	46.5	O K
1.004	8.547	-0.003	0.000	0.56	0.0	69.9	O K
1.005	8.539	0.389	0.000	0.71	0.0	15.6	SURCH'ED
1.006	8.501	0.511	0.000	0.82	0.0	12.3	SURCH'ED

Stevenson Associates		Page 6
PO Box 58 Monk Fryston Leeds LS25 5WZ	Low Laithes Wombwell Barnsley Proposed	
Date August 2014 File Proposed 100 plus 25.SIM	Designed By Stevenson Checked By	
Micro Drainage	Simulation W.11.3	

Rainfall Hyetograph

Region FSR - England & Wales Profile Type Winter
 Return Period (yrs) 100 Storm Duration (mins) 120
 M5-60 (mm) 19.500
 Ratio R 0.370

Time (mins)	Rain (mm/hr)								
4	3.33	28	12.50	52	48.19	76	40.16	100	11.12
8	8.19	32	15.21	56	55.09	80	32.41	104	10.77
12	10.25	36	19.46	60	59.99	84	25.39	108	10.76
16	10.76	40	25.39	64	59.99	88	19.46	112	10.25
20	10.77	44	32.41	68	55.09	92	15.21	116	8.19
24	11.12	48	40.16	72	48.19	96	12.50	120	3.33

APPENDIX 5 – EXISTING POND (AND PIPE REFERENCE)

