

STEVENSON ASSOCIATES

REDBROOK ROAD, GAWBER, BARNSELEY

FLOOD RISK ASSESSMENT AND DRAINAGE STATEMENT

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HILLTOP FARM, REDBROOK ROAD, GAWBER BARNSELEY S75 2RA

2. INTRODUCTION

3. It is proposed to redevelop land at Redbrook Road, Gawber on the outskirts of Barnsley and this report has been commissioned to determine the effects of the proposals upon the sewer network and assess whether the site will be affected by flooding or cause others to flood.
4. This report should be read in conjunction with the architect's (Chris Carr Associates) details and the topographical survey prepared by 'Survey and Site Services'.

5. LOCATION AND SITE DESCRIPTION

6. Gawber is approximately 2 km west of Barnsley town centre and the site lies on the north side of Redbrook Road at approximate map reference SE 3275 0728.
7. The site currently has a mixture of farm buildings, a large house (No 32) and two small rows of terrace houses along an unmade road, Hill Top Lane. House number 32, adjacent to this site is also being considered for development but not as part of this scheme.
8. The general area is residential and there are properties to all sides although there is an open filed to the north-west of Hill Top Lane.

9. EXISTING TOPOGRAPHY

10. The site is irregular in shape: it is wide across the front, tapers into the site with a further prominent step towards the rear. It measuring approximately 50 metres across the frontage and is around 58 metres from front to back, covering an area of around 0.24 hectares in total. (Other supporting documents suggest an area of 0.37ha, which includes the adjacent house number 30).
11. The site is on a hillside served from Redbrook Road. The road itself falls steeply across the site frontage towards the west with a difference in level of around 4.4 metres (136.8m to 132.4 AOD) producing a nominal gradient in this location of around 8.8% (1/11). From the

road, the site falls towards the rear (northwards) to a level of 131.1m, which gives a gradient of 2.2% (1/45) along the western boundary.

12. EXISTING DRAINAGE

13. The site is drained via a combined foul / surface water drainage system, which connects to a 225mm combined public sewer in the field north of the site some 50m away. The manhole in the field forms the head of the public sewer. All of the existing buildings have rainwater down-pipes and are drained to sewer. Drives, paths, garden areas and Hill Top Lane itself do not have positive drainage and surface water is allowed to soak into the ground or run off onto surrounding areas.
14. Existing buildings cover an area of 555 square metres and calculation indicates that flows of around 9 litres per second drain from these to the public sewer during 'normal' (1 in 1-year) flows. This area represents approximately 23% of the total site area.

15. PROPOSALS

16. It is proposed to demolish one of the blocks of terrace housing along with one of the farm buildings and a lean-to on the barn; and then construct a new pair of houses and convert / upgrade the existing barn and terrace block. House No 32 will remain, minus its garage, and the whole develop including new parking areas will be served from a new access road.
17. A separate foul and surface water drainage system will be provided and foul sewerage will connect directly with the public combined sewer rear of the site.
18. Requirement H3 of the Building Regulations 2000 specifies a hierarchy for the disposal of surface water. In brief, this states that consideration should first be given to soakaways, infiltration systems and other Sustainable Drainage Systems (SUDS).
19. Initial investigation suggests that the ground is typically sandy clay soils over sandstones and mudstone with a shallow prominent coal seam beneath and it is therefore likely that some surface water could be drained to soakaways if the proposed layout and existing topography would permit.
20. In the main core of the site, the layout of the development provides little adequate space for major soakaways and there is a concern for neighbouring properties on the low side and consequently soakaways are not proposed in this area. There is possibility for further investigation to the Parking Court by the side of number 32, but regardless this area could

be constructed using permeable surfacing. Surface water falling onto garden and landscaped areas will be allowed to soak into the ground and will not be drained to sewer.

21. For this study the worst case is considered that being: surface water is attenuated and drained to sewer. The surface water drainage system should be designed not to surcharge during 1 in 30-year storms and in line with recommendations in PPS25 and Environment Agency guidelines allowances need to be made for climate changes and moreover the effects of larger less frequent storms also need to be assessed. Due to the elevated location of the site and adjacent lower properties, it is felt that there would not be a satisfactory route from this development for storm water above the 30-year return period, but whilst not causing flooding elsewhere it could become a nuisance and is to be avoided.
22. It is therefore proposed to control all water from storms of 1 in 100-years adjusted for climate change. Moreover in line with Local Authority and Drainage Authority guidance for redevelopment schemes flows to the existing public sewer will be reduced by 30%.
23. The converted barn and terrace to create plots 1 to 4 have a roof area of 250 square metres; new dwellings 5 and 6 will cover 108 m²; garage and parking area to the side of No 32 cover 288 m²; and the new road and parking court a further 620 square metres. House No 32 is reduced in size slightly to 105 m² and in total the drained area of the proposed development will be in the order of 1,351 square metres, which represents approximately 56% of the total site area.
24. Using a Hydro-brake flow control (100mm Type MD5) in conjunction with a 1200mm diameter storage pipe will restrict flows to maximum of around 6 litres per second, which would be seen as a 33% reduction in flow from the current use. Calculation shows that during a 1 in 100-year storm 28 cubic metres of water will need to be stored during the critical 60 minute winter storm. Rainfall during this storm is shown to be 38.41mm/hr.
25. For comparison purposes a 1 in 225-year storm is seen to have a 20% increase in rainfall intensity at 46.17mm/hr. During this storm 36 cubic metres will need to be stored and in this extreme situation flows from site will peak at 6.1 litres per second.
26. Subject to final design, surface water will be stored in a 35 metre length of 1200mm diameter pipe. This worst case volume may eventually be reduced if a suitable soakaway can be established in the Parking Court by the side of number 32.

27. FURTHER CONSIDERATIONS

28. The Environment Agency's Indicative Flood Zone Map shows that the site is not within a floodplain and is believed not to flood.

29. SUMMARY AND CONCLUSIONS

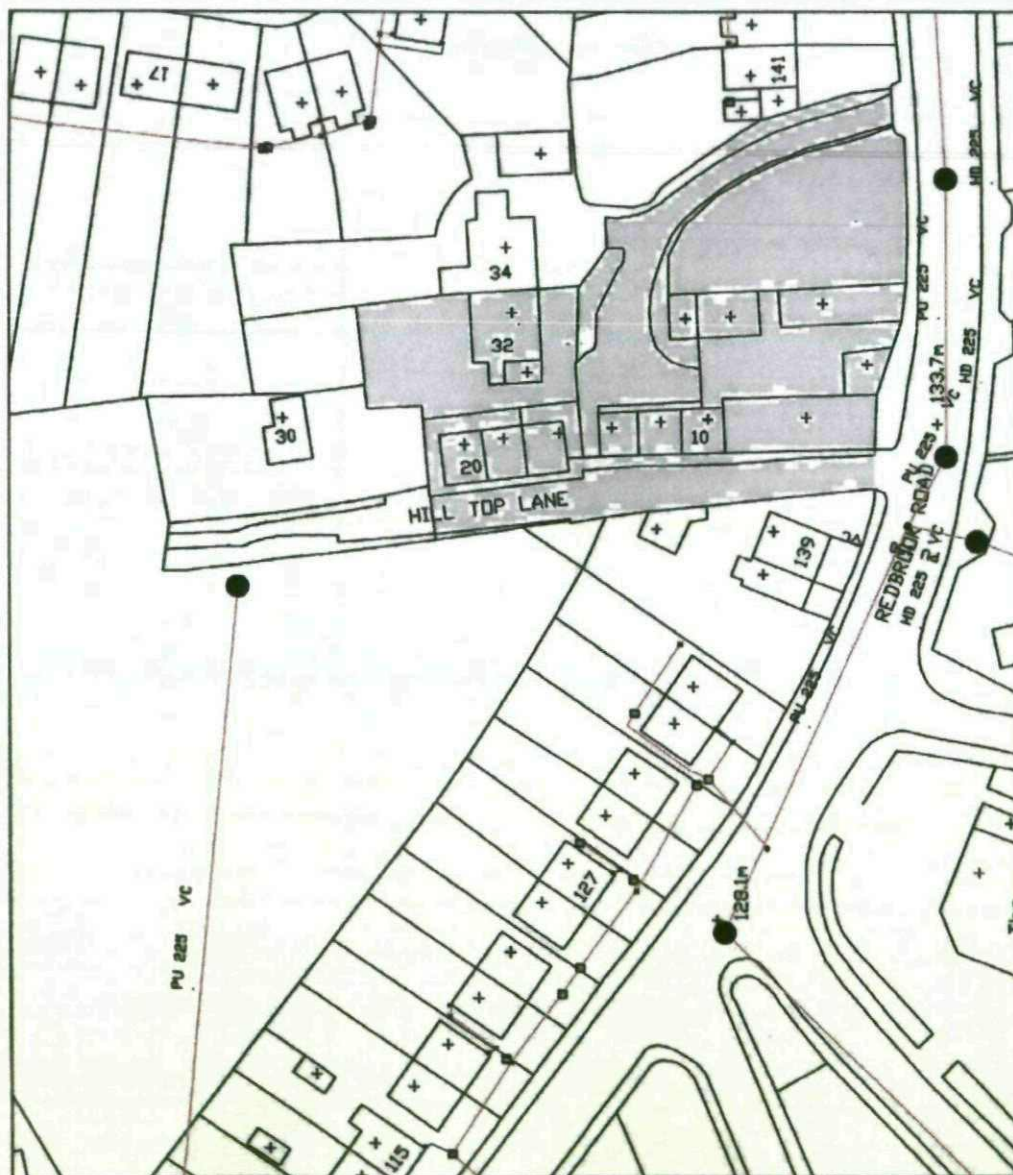
30. It is proposed to redevelop properties at Hilltop Farm / Hill Top Lane at Redbrook Road, Gawber. The works include some demolition of buildings along with new construction and a new access road.
31. The existing site is drained via a combined foul / surface water system to a combined public sewer. It will be necessary to modernise the system by separating foul water from surface water and attenuating the flow of surface water to the public sewer.
32. Flows to the public sewer will be reduced by 30% and all storms expected within a return period of 100-years with an additional 20% allowance for the unknowns of climate change will be attenuated.
33. The site is not within a floodplain or an area likely to flood.
34. If these measures are taken, the properties will be protected from flooding and the development will not cause other surrounding properties to flood.

M. Stevenson

Michael Stevenson

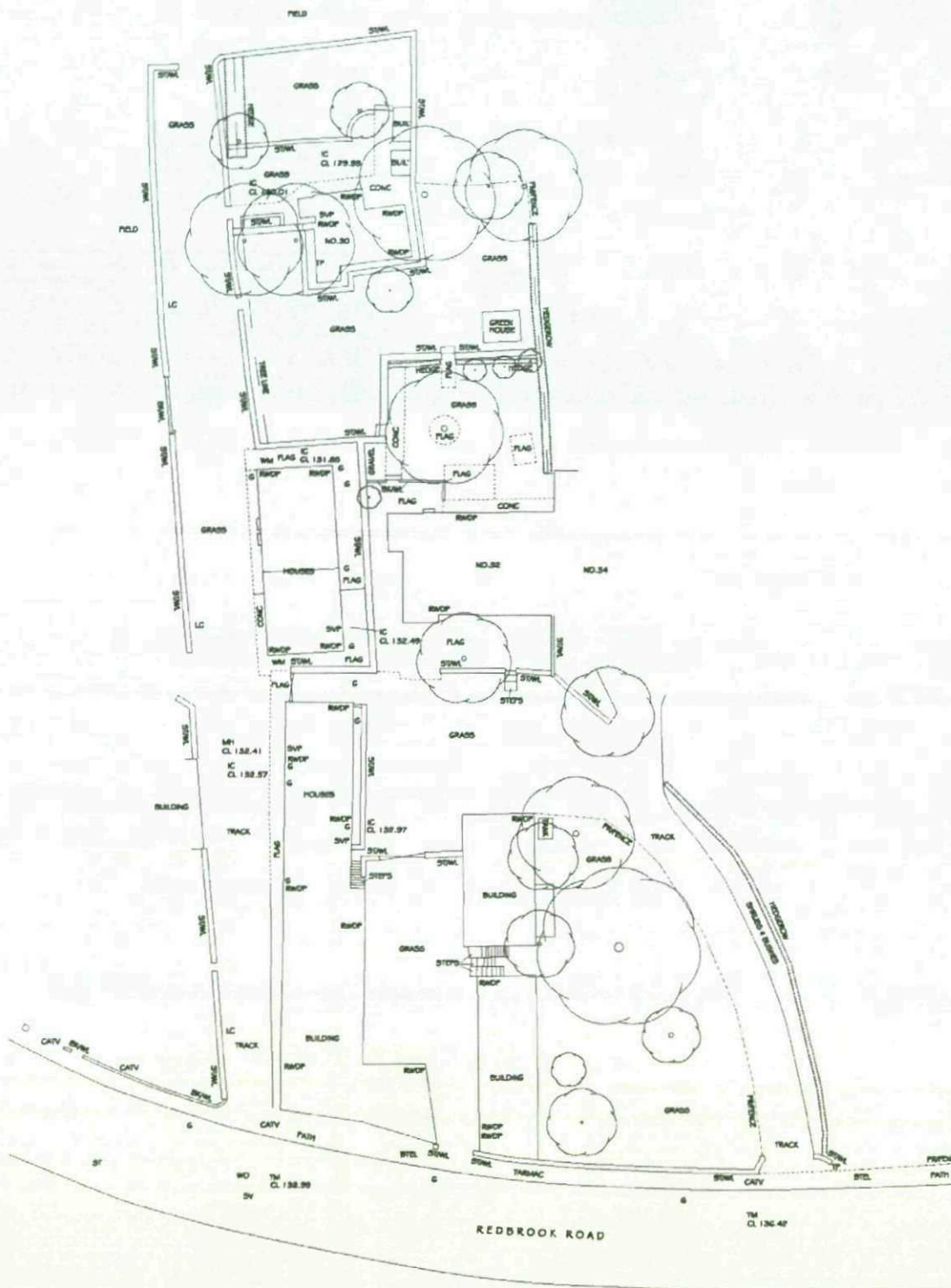
6th October 2008

APPENDIX 1 – SITE LOCATION / PUBLIC SEWERS

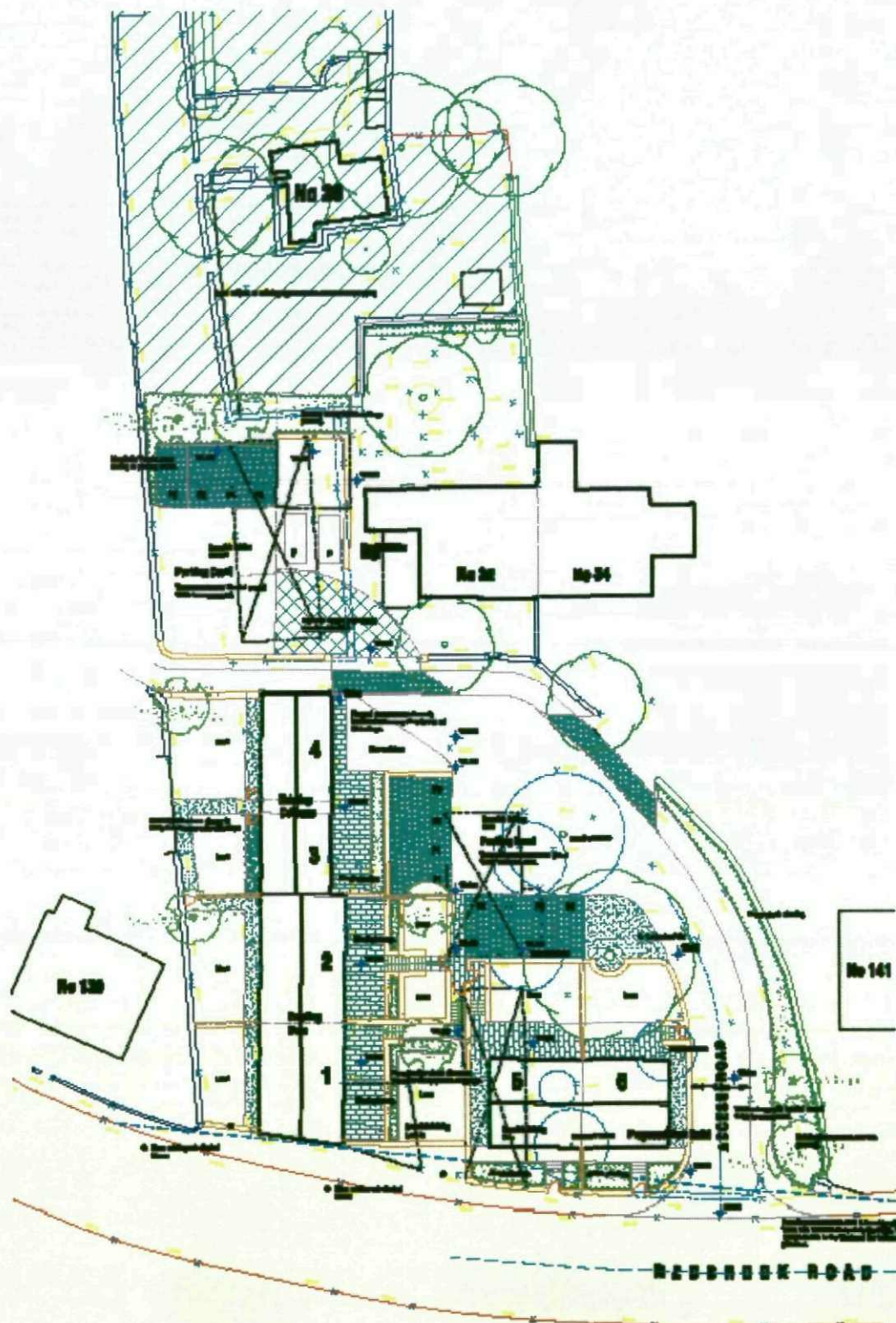


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APPENDIX 2 – SITE SURVEY



APPENDIX 3 – PROPOSED LAYOUT



APPENDIX 4 – EXISTING DRAINAGE CALCULATION

Stevenson Associates		Page 1
PO Box 58 Monk Fyston Leeds LS25 5WZ	Existing Buildings at Hilltop Farm Redbrook Rd Barnsley	
Date October 2008 File	Designed By Stevenson Checked By	
Micro Drainage		System1 W.11.3

STORM SEWER DESIGN by the Modified Rational Method

Global Variables

Pipe Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.PIP
 Manhole Size File C:\Program Files\Micro Drainage Ltd\WinDes\STANDARD.MHS

Location - England & Wales

Return Period (years)	1	Maximum Backdrop Height (m)	1.500
MS-60 (mm)	19.000	Min Cover Depth for Optimisation (m)	1.200
Ratio R	0.350	Min Vel for Auto Design Only (m/s)	1.00
Maximum Rainfall (mm/hr)	100	Min Slope for Optimisation (1:X)	500
Foul Sewage (l/s/ha)	0.00	Minimum Outfall Invert (m)	0.000
O'flow Setting (*Foul only)	0	Ground Level at Outfall (m)	0.000
Volumetric Runoff Coeff.	0.75	Outfall Manhole Name	
Add Flow / Climate Change (%)	0	Outfall Manhole Dia/Length (mm)	0
Minimum Backdrop Height (m)	0.200	Outfall Manhole Width (mm)	0

Designed with Level Soffits

Network Design Table

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	50.00	0.833	60.0	0.055	2.00	0.0	0.600	o	150

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E.Area (ha)	E.DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	CAP (l/s)	Flow (l/s)
1.000	61.0	2.6	132.000	0.055	0.0	0.0	0.0	1.30	23.0	9.1

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APPENDIX 5 – PROPOSED 100-YEAR STORAGE CALCULATION

Stevenson Associates		Page 1									
PO Box 58	Hilltop Farm										
Monk Fryston	Proposed										
Leeds LS25 5WZ	30 year										
Date October 2008	Designed By Stevenson										
File 30.SRC	Checked By										
Micro Drainage		Storage Design W.11.3									
<u>Circular Pipe Details</u>											
Diameter (m) 1.200 Length (m) 35.000 Cover Level (m) 132.000 Slope (1:x) 500.0 Invert Level (m) 130.000											
<u>Hydro-Brake Outflow Control</u>											
Design Head (m) 1.000 Hydro-Brake Type MD5 Invert Level (m) 130.000 Design Flow (l/s) 6.0 Diameter (mm) 100											
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	2.9	0.60	4.7	1.60	7.7	2.60	9.8	5.00	13.6	7.50	16.6
0.20	4.0	0.80	5.4	1.80	8.1	3.00	10.5	5.50	14.2	8.00	17.1
0.30	3.9	1.00	6.1	2.00	8.6	3.50	11.3	6.00	14.8	8.50	17.7
0.40	4.1	1.20	6.6	2.20	9.0	4.00	12.1	6.50	15.5	9.00	18.2
0.50	4.4	1.40	7.2	2.40	9.4	4.50	12.9	7.00	16.0	9.50	18.7
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PO Box 58	Hilltop Farm		
Monk Fryston	Proposed		
Leeds LS25 5WZ	30 year		
Date October 2008	Designed By Stevenson		
File 30.SRC	Checked By		
Micro Drainage		Storage Design W.11.3	
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
Ratio-R	0.350	Longest Storm (mins)	600
Time / Area Diagram			
Total Area (ha) = 0.135			
Time (mins)	Area (ha)	Time (mins)	Area (ha)
from: to:		from: to:	
0 4	0.065	4 8	0.070
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PO Box 58 Monk Fryston Leeds LS25 5WZ		Hilltop Farm Proposed 100 year				
Date October 2008 File 100.src		Designed By Stevenson Checked By				
Micro Drainage				Storage Design W.11.3		
<u>Summary of Results for 100 year Return Period</u>						
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	4.7	4.7	130.5842	0.5842	18.2	O K
30 Summer	5.0	5.0	130.6878	0.6878	22.7	O K
60 Summer	5.2	5.2	130.7373	0.7373	24.8	O K
120 Summer	5.2	5.2	130.7303	0.7303	24.5	O K
180 Summer	5.1	5.1	130.6963	0.6963	23.1	O K
240 Summer	4.9	4.9	130.6563	0.6563	21.3	O K
360 Summer	4.6	4.6	130.5788	0.5787	18.0	O K
480 Summer	4.4	4.4	130.5092	0.5092	15.1	O K
600 Summer	4.2	4.2	130.4457	0.4457	12.4	O K
15 Winter	4.9	4.9	130.6438	0.6438	20.8	O K
30 Winter	5.3	5.3	130.7673	0.7673	26.1	O K
60 Winter	5.5	5.5	130.8318	0.8318	28.7	O K
120 Winter	5.5	5.5	130.8158	0.8158	28.1	O K
180 Winter	5.3	5.3	130.7593	0.7593	25.7	O K
240 Winter	5.1	5.1	130.6963	0.6963	23.1	O K
360 Winter	4.7	4.7	130.5802	0.5802	18.1	O K
480 Winter	4.3	4.3	130.4782	0.4782	13.8	O K
600 Winter	4.1	4.1	130.3832	0.3832	9.9	O K
Storm Duration (mins)	Rain (mm/hr)		Time-Peak (mins)			
15 Summer	89.02		19			
30 Summer	59.85		32			
60 Summer	38.41		52			
120 Summer	23.81		86			
180 Summer	17.74		120			
240 Summer	14.29		154			
360 Summer	10.50		220			
480 Summer	8.44		286			
600 Summer	7.12		348			
15 Winter	89.02		20			
30 Winter	59.85		32			
60 Winter	38.41		54			
120 Winter	23.81		92			
180 Winter	17.74		130			
240 Winter	14.29		166			
360 Winter	10.50		236			
480 Winter	8.44		302			
600 Winter	7.12		366			
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APPENDIX 6 – PROPOSED 100-YEAR + CLIMATE CHANGE CALCULATION

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PO Box 58	Hilltop Farm					
Monk Fryston	Proposed					
Leeds LS25 5WZ	100 year + Climate					
Date October 2008	Designed By Stevenson					
File 225.src	Checked By					
Micro Drainage	Storage Design W.11.3					
<u>Summary of Results for 225 year Return Period</u>						
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	5.0	5.0	130.6768	0.6768	22.2	O K
30 Summer	5.5	5.5	130.8148	0.8148	28.0	O K
60 Summer	5.7	5.7	130.8938	0.8938	31.2	O K
120 Summer	5.7	5.7	130.8973	0.8973	31.3	O K
180 Summer	5.6	5.6	130.8578	0.8578	29.8	O K
240 Summer	5.5	5.5	130.8098	0.8098	27.8	O K
360 Summer	5.1	5.1	130.7203	0.7203	24.1	O K
480 Summer	4.9	4.9	130.6427	0.6428	20.8	O K
600 Summer	4.6	4.6	130.5737	0.5737	17.8	O K
15 Winter	5.2	5.2	130.7488	0.7488	25.3	O K
30 Winter	5.8	5.8	130.9178	0.9178	32.1	O K
60 Winter	6.1	6.1	131.0303	1.0303	36.1	O K
120 Winter	6.1	6.1	131.0278	1.0278	36.0	O K
180 Winter	5.9	5.9	130.9563	0.9563	33.5	O K
240 Winter	5.7	5.7	130.8778	0.8778	30.6	O K
360 Winter	5.2	5.2	130.7418	0.7418	25.0	O K
480 Winter	4.8	4.8	130.6302	0.6303	20.2	O K
600 Winter	4.5	4.5	130.5327	0.5327	16.0	O K
Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)				
15 Summer	105.86	20				
30 Summer	71.64	32				
60 Summer	46.17	54				
120 Summer	28.63	86				
180 Summer	21.28	122				
240 Summer	17.09	156				
360 Summer	12.51	224				
480 Summer	10.02	290				
600 Summer	8.43	354				
15 Winter	105.86	20				
30 Winter	71.64	33				
60 Winter	46.17	58				
120 Winter	28.63	92				
180 Winter	21.28	132				
240 Winter	17.09	168				
360 Winter	12.51	238				
480 Winter	10.02	306				
600 Winter	8.43	372				
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APPENDIX 7 – ENVIRONMENT AGENCY'S INDICATIVE FLOOD ZONE MAP

