STEVENSON ASSOCIATES

DARLEY HOUSE, PANTRY HILL, WORSBROUGH DALE, BARNSLEY

FLOOD RISK and DRAINAGE STATEMENT

Unit 2, Hillcrest, Monk Fryston, Leeds, LS25 5EX
Email LS255WZ@btinternet.com; stevensonassociates@hotmail.co.uk;
Telephone 01977 682824

CONTENTS

DARLEY HOUSE, PANTRY HILL, WORSBROUGH DALE, BARNSLEY S70 4RP

INTRODUCTION

1 Planning Permission is sought to develop land at Pantry Hill in Worsbrough Dale near Barnsley and this report has been commissioned to determine how the site 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 Darley House, outbuildings and gardens cover an area of approximately 0.34 hectares. The site is in a residential area on the east side of Pantry Hill close to its junction with Grove Street; generally there are houses on all three sides apart from the eastern boundary where there are allotment gardens extending to Thicket Lane / East Street – one of the main roads through this area (B6100). The centre of the site is approximately at OS Grid reference 436260e, 404060n.

4 The site proposed for development is irregular in shape probably brought about by numerous properties brought together into single ownership and other areas sold for earlier developments (the south side in particular). For rough guidance, through the centre of the site, it measures approximately 70m east/west and 45 metres north/south.

5 The site is on a hillside and falls from the north to the south. Along the northern boundary levels are in the order of 92.5m and typically around 86m in the south producing a natural fall of around 13.5% (1 in 7) but areas close to the existing buildings are terraced for ease of use. There is no significant cross-fall across the site (east/west) – natural contours run parallel to the notional southern boundary and of note, there is a small pond in the extreme southeast corner (the lowest area on site).

EXISTING DRAINAGE

6 The public sewer record map for the immediate area shows it to be served predominantly by combined foul/surface water sewers; there are a few surface water sewers but ultimately the majority connect to the combined system.

Surface Water

7 The ground beneath is clay over sandstone and there are numerous springs in the area where there are breaks in the clay layer. On the adjacent allotment, springs have been formalised as watering wells (protected with grills) and there are traces of surface water flowing overland through the grass. Ordnance Survey maps show a watercourse flowing through the allotments from a spring towards Thicket Lane, from where it is presumably culverted – possibly connecting to a larger watercourse crossing West Street. Surface water in this area drains to the River Dove a few hundred metres away to the south.

8 There is a herringbone land drainage system in a terraced garden at the front (south side) of Darley House to intercept emerging spring water and roof-water from the much of the house is drained into that herringbone system. There are two piped weep-holes in the wall to the south of the terrace allowing water to flow out across the site towards the southern boundary.

9 Roof-water from the eastern end of the building and from 'The Stables' and its courtyard drains south via a piped network. The drain outfalls into a small pond in the southeast corner and there is an overflow pipe from the pond to a small watercourse that flows south from site. It is not clear whether the watercourse once extended further into site, having now been filled, or to where it drains but most likely it connects to other similar drains in the area and eventually to the River Dove.

Foul Water

10 Foul water from Darley House drains from the back of the property to a combined public sewer in the unmade lane adjacent to the northern boundary.

11 Foul water from 'The Stables' drains south to public sewers via the gardens of properties on Kings Croft.

12 A drain connection to the public sewer in Pantry Hill was constructed a few years ago for possible development of this site (see Appendix 5)

PROPOSED DEVELOPMENT

13 It is proposed to develop the site for housing with a mixture of house types and sizes along with some conversion work to transform Darley House.

14 Darley House will continue to be served from its current access and an existing secondary access onto pantry Hill will be improved / widened to serve the other new properties.

DESIGN CONSIDERATIONS AND PROPOSALS

15 The site will be developed with separate foul and surface water drainage systems.

Foul water

16 Foul water from the conversion/refurbishment of Darley House will continue to drain to the public sewer in the adjacent lane.

17 Foul water from all the new dwellings apart from Plots 7 and 8, due to their levels, will drain to the public sewer in Pantry Hill via the new connection already installed.

18 Plots 7 and 8 will drain to the public sewerage via the garden of No 3 Kings Croft using the drain which currently serves 'The Stables'; permissive rights have already been established.

19 It will be necessary to divert the foul drain serving 'The Stables' either around the proposed Plots 7 and 8 or alternatively into the new system draining to the sewer in Pantry Hill.

Surface Water

20 The hierarchy for the disposal of surface water is acknowledged - which in brief states that consideration should first be given to soakaways and infiltration systems before draining to sewers. The ground in this location is unsuitable due to the rock beneath and overlying clay plus the topography of the site (steep gradient) and adjacent housing: existing ground water currently springs to the surface and excess surface water from this proposed development would do likewise causing nuisance for lower properties to the south.

21 It will be necessary to attenuate surface water from the site prior to discharging to the existing watercourse. There is currently some attenuation within the existing pond but this would not be large enough for the proposed development and it is to be removed, as the feature would not be suitable in the rear garden of Plot 8.

22 Due to level contours running across the site, the proposed Access Road will be moderately flat and as such lends itself to a storage pipe along its length. Flows will be restricted using a Hydro-brake flow control and the storage system will encompass both 'The Stables' and Darley House.

23 'The Stables' and the east end of Darley House covers an area of 190 square metres and is drained directly producing a flow of around 2.7 litres per second [50mm/hr].

24 The remainder of Darley House is drained indirectly via a herringbone land drainage system in a terraced garden, where it mixes with other ground water before weeping back out through the terrace retaining wall or a little further down the hill. As such it is difficult to say precisely what the run-off rate is but would most likely be between 2 and 5 litres per second per hectare producing a flow of between 0.64 and 1.6 litres per second.

25 In total, it is therefore estimated that rainwater flowing from this site would currently be around 4 litres per second although when assessed using the IH124 method (Institute of Hydrology) HR Wallingford indicate that 5 litres per second would be regarded as the minimum practical value.

26 To satisfy current standards, the proposed surface water drainage system must accommodate a 1 in 30-year storm with no surface flooding and no surface water run-off from the site during a 1 in 100-year storm (1% chance of annual occurrence). Furthermore in accordance with National Planning Policy Framework (NPPF) the design should allow for an additional 30% in rainfall intensities for climate change. Moreover, for adoption purposes Yorkshire Water stipulate 100mm as the minimum acceptable size for a flow control as they tend not to block with minor debris such as leaves etc. and are generally seen as maintenance free.

27 Therefore using a 100mm SXH Hydro-brake in conjunction with 900mm diameter storage pipes draft calculations show that around 40 cubic metres of water will need to be stored; the critical storm in this instance is shown to be that of 60 minutes during winter and flows from site would peak at 5.3 litres per second.

28 If planning permission is granted, the final drainage design should be assessed using a drainage simulation programme for a full range of winter and summer storm scenarios and allowances made for climate change plus 10% for 'urban creep' (extensions and garages etc.)

FLOOD ZONES

29 The site is not within Flood Zones 2 or 3 and is therefore identified as not being at risk to flooding from rivers or sea (less than a 0.1% risk of flooding annually – 1/1000). Due to the gradient, there is no standing water on site from rainfall or springs.

CONCLUSION

30 It is proposed to develop Darley House and gardens with residential properties.

31 Foul water will drain to the public combined sewer in Pantry Hill, either directly via a new connection (already installed) or indirectly via properties on Kings Croft.

32 Surface water will drain to an existing watercourse on site via an attenuation scheme designed for storms of 1 in 100-years (1% chance of annual occurrence) plus allowances for climate changes and 'urban creep'.

33 The site is not within a flood risk area (Flood Zone 2 or 3) or believed to flood.

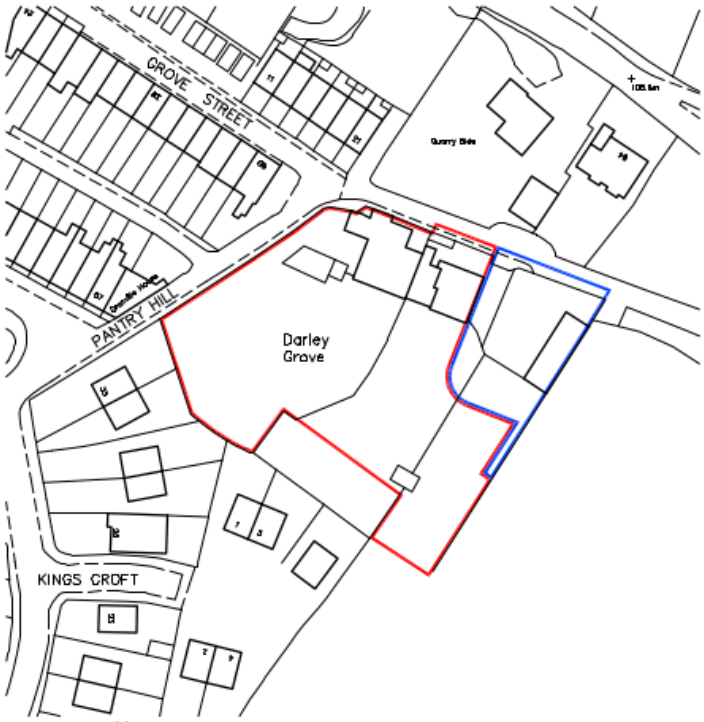
M. Stevenson

Michael Stevenson

31st August 2017

APPENDIX 1 – LOCATION PLAN

North



Rev A 12 Jan 2017

DARLEY HOUSE
DARLEY GROVE
WORSBROUGH DALE
BARNSLEY
S70 4RP

DEED PLAN

Scale 1:1250

Date Dec 2016

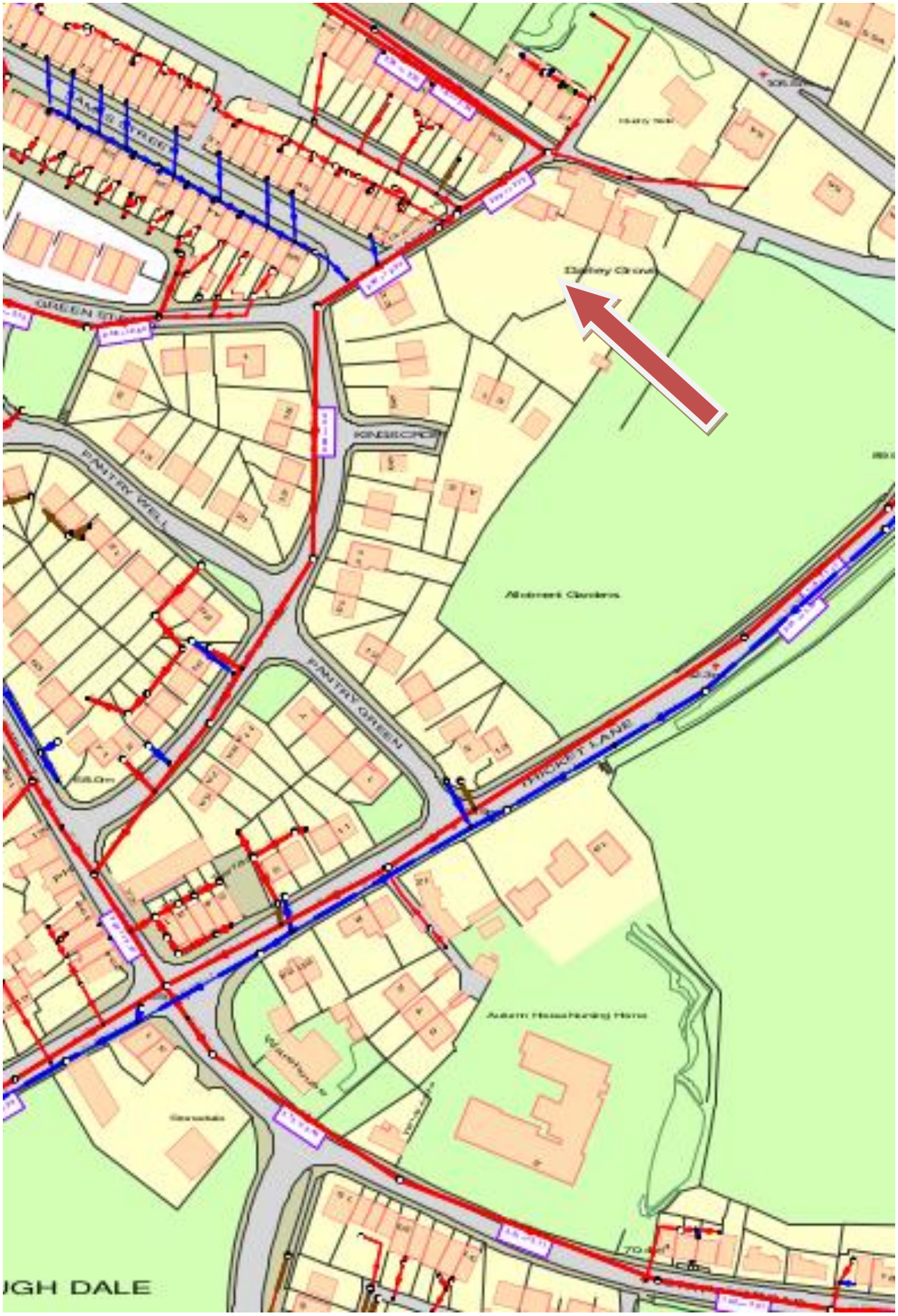
Ref 16.20

Drwg No DP02 Rev A

mboothdesign
architectural design and building consultants

Fairfield House
Berneslai Close Barnsley
S70 2FL
T: 01226 286256
M: 07881898300
E: mark@mboothdesign.co.uk

APPENDIX 2 – PUBLIC SEWER RECORD MAP



Hydro International

100 SXH Hydro-Brake® Flow Control

Project Information

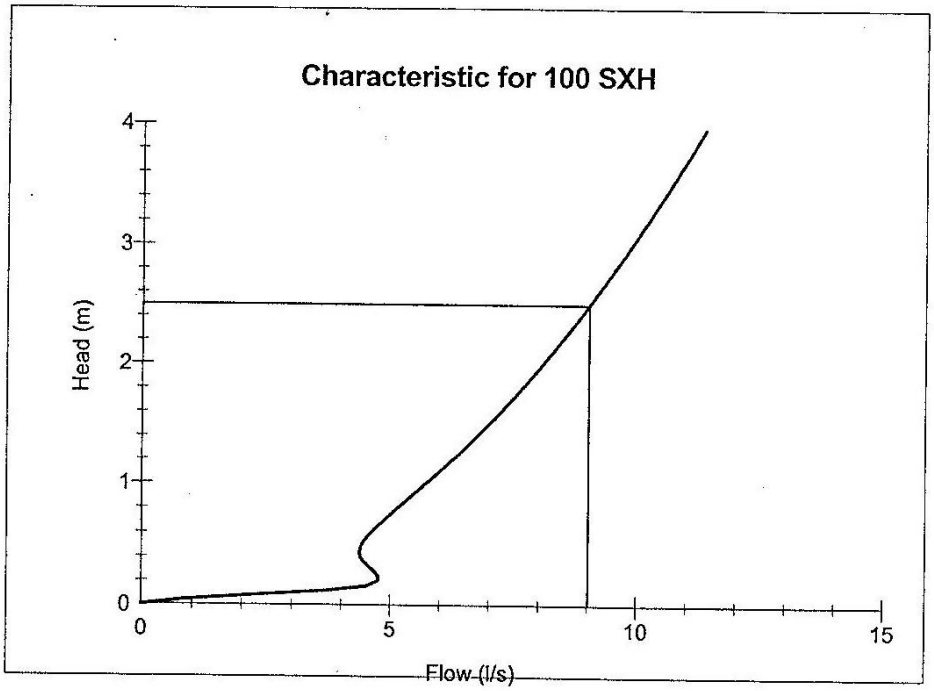
Our reference : 02-0000
Client : Stevenson Associates
Site : Unspecified Site

Design Criteria

Head = 2.500 m	Flush Flow = 4.767 l/s
Flow = 9.021 l/s	Kickback Flow = 4.381 l/s

Head (m)	Flow (l/s)
0.200	4.745
0.400	4.400
0.600	4.600
0.800	5.142
1.000	5.713
1.200	6.252
1.400	6.751
1.600	7.217
1.800	7.655
2.000	8.069

Head (m)	Flow (l/s)
2.200	8.462
2.400	8.839
2.600	9.200
2.800	9.547
3.000	9.882
3.200	10.206
3.400	10.520
3.600	10.825
3.800	11.122
4.000	11.411



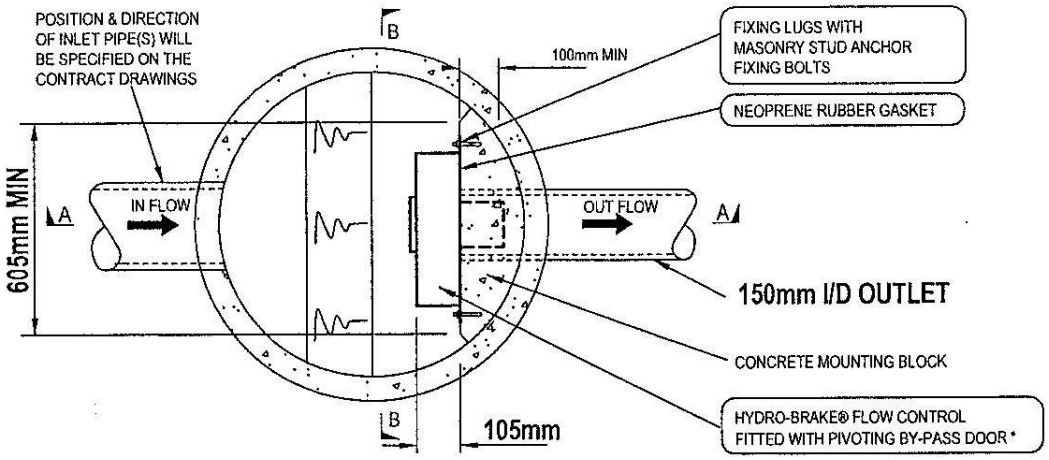
Alan.Best HBFCDesign Version 3.3.6

HYDRO INTERNATIONAL

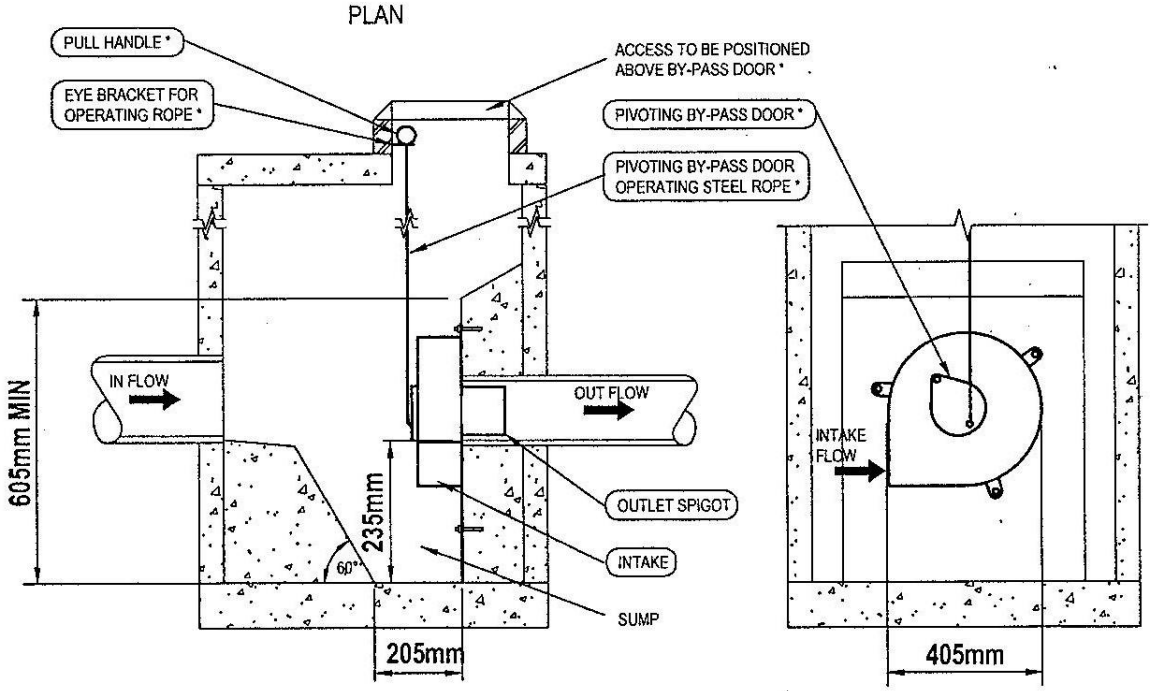
Design Layout with Approximate Dimensions of a
100 SXH Hydro-Brake® Flow Control

Project Information

Our Reference : 02-0000
Client : Stevenson Associates
Site : Unspecified Site



PLAN



SECTION A-A SECTION B-B

IMPORTANT:
- LIMIT OF HYDRO INTERNATIONAL SUPPLY
- THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
- FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
- ALL CIVIL AND INSTALLATION WORK BY OTHERS
- * WHERE SUPPLIED

FOR ILLUSTRATIVE PURPOSES ONLY

Alan.Best HBFCDesign Version 3.3.6 XH_D_SR_(1.0)_(3.0)

Tel : 01275 878371 **Fax : 01275 874979**

APPENDIX 4 – DRAFT STORAGE CALCULATIONS

Stevenson Associates		Page 1
PO Box 58 Monk Fryston Leeds LS25 5WZ		Micro Drainage
Date 30 August 2017 14:47 File Darley Grove 1.SRC	Designed By Stevenson Checked By	
Micro Drainage	Storage Design W.11.3	

Summary of Results for 100 year Return Period

Storm Duration (mins)	Maximum Control (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m^3)	Status
15 Summer	4.8	4.8	87.5658	0.5657	24.2	O K
30 Summer	4.8	4.8	87.6718	0.6718	30.3	O K
60 Summer	5.0	5.0	87.7308	0.7308	33.5	O K
120 Summer	5.0	5.0	87.7243	0.7243	33.1	O K
180 Summer	4.9	4.9	87.6923	0.6923	31.4	O K
240 Summer	4.8	4.8	87.6553	0.6553	29.4	O K
360 Summer	4.8	4.8	87.5818	0.5817	25.1	O K
480 Summer	4.8	4.8	87.5142	0.5142	21.1	O K
15 Winter	4.8	4.8	87.6238	0.6238	27.6	O K
30 Winter	5.1	5.1	87.7558	0.7558	34.8	O K
60 Winter	5.3	5.3	87.8503	0.8503	39.0	O K
120 Winter	5.3	5.3	87.8378	0.8378	38.5	O K
180 Winter	5.1	5.1	87.7808	0.7808	36.0	O K
240 Winter	5.0	5.0	87.7188	0.7188	32.8	O K
360 Winter	4.8	4.8	87.6033	0.6033	26.4	O K
480 Winter	4.8	4.8	87.4983	0.4982	20.2	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	90.77	19
30 Summer	60.45	33
60 Summer	38.41	58
120 Summer	23.59	90
180 Summer	17.49	126
240 Summer	14.06	160
360 Summer	10.28	228
480 Summer	8.23	294
15 Winter	90.77	20
30 Winter	60.45	33
60 Winter	38.41	60
120 Winter	23.59	96
180 Winter	17.49	134
240 Winter	14.06	172
360 Winter	10.28	246
480 Winter	8.23	314

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		
Ratio-R	0.370	Longest Storm (mins)	480		

Time / Area Diagram

Total Area (ha) = 0.170

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.100	4	8	0.070

Circular Pipe Details

Diameter (m) 0.900 Length (m) 65.000 Cover Level (m) 89.000
Slope (1:x) 500.0 Invert Level (m) 87.000

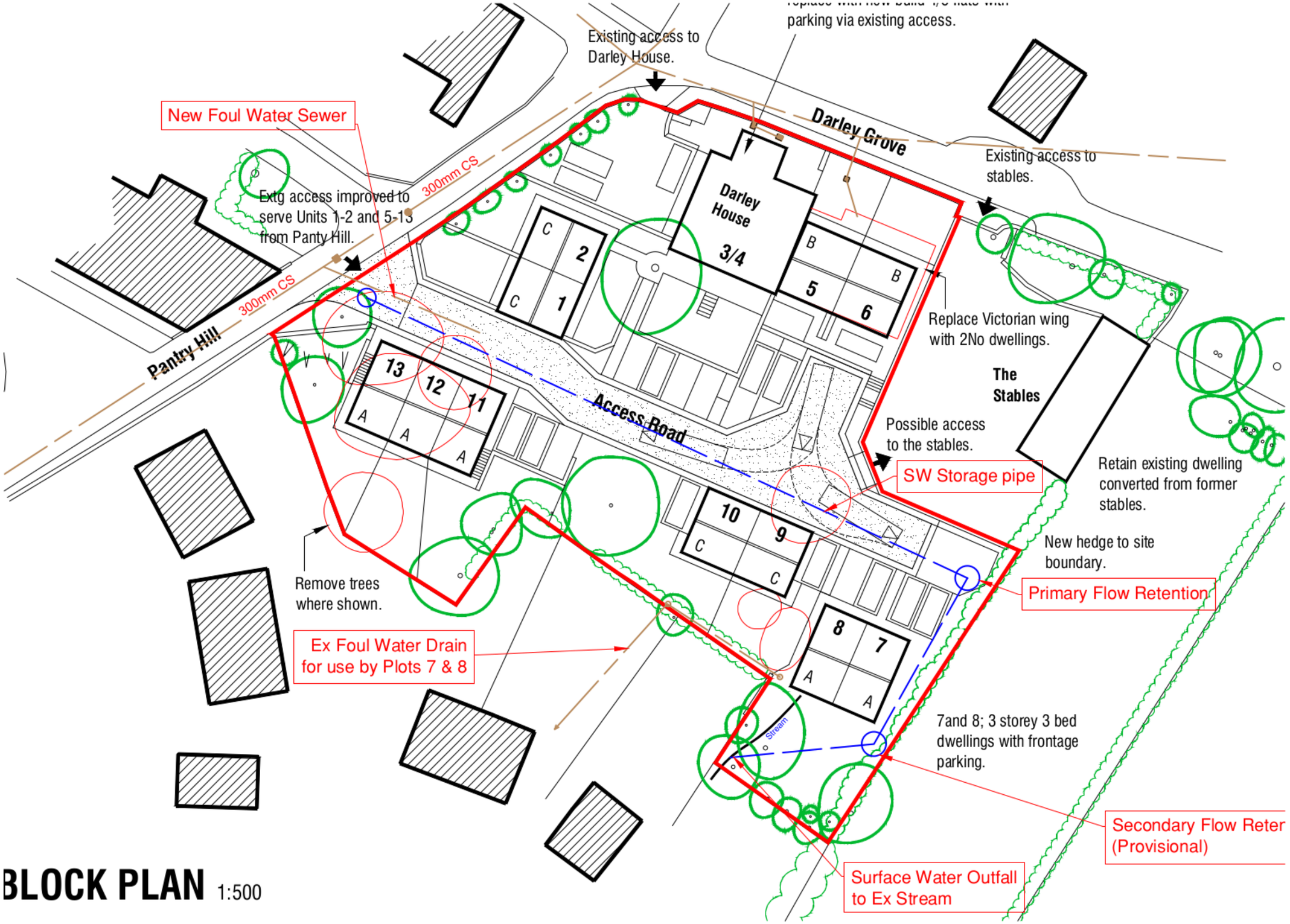
Hydro-Brake Outflow Control

Design Head (m) 0.900 Hydro-Brake Type MD6 Invert Level (m) 87.000
Design Flow (l/s) 5.4 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	3.1	0.60	4.6	1.60	7.3	2.60	9.3	5.00	12.9	7.50	15.7
0.20	4.8	0.80	5.2	1.80	7.7	3.00	10.0	5.50	13.5	8.00	16.3
0.30	4.7	1.00	5.8	2.00	8.1	3.50	10.8	6.00	14.1	8.50	16.8
0.40	4.4	1.20	6.3	2.20	8.5	4.00	11.5	6.50	14.7	9.00	17.2
0.50	4.5	1.40	6.8	2.40	8.9	4.50	12.2	7.00	15.2	9.50	17.7

APPENDIX 5 – EXISTING DRAINAGE / CONTOURED SITE SURVEY

APPENDIX 6 – INDICATIVE LAYOUT



BLOCK PLAN 1:500