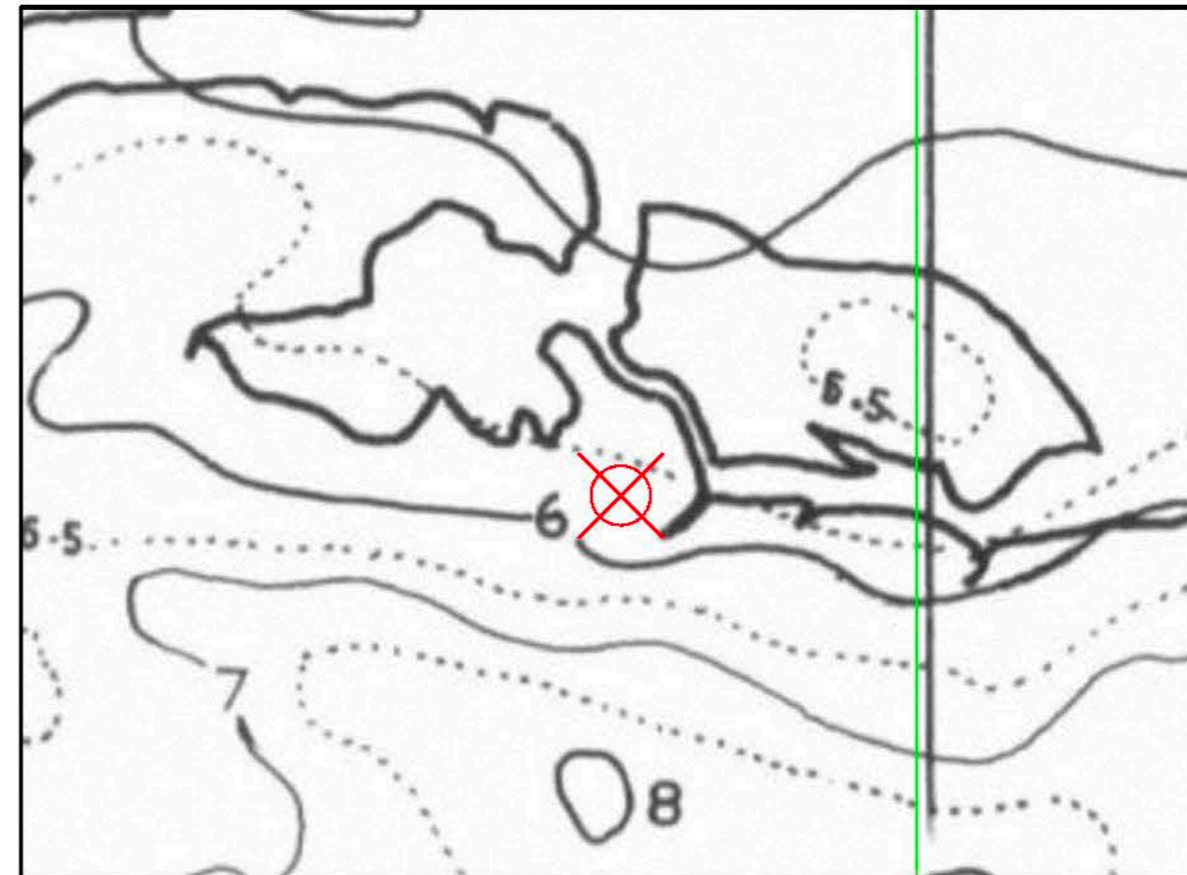






Location Plan



Standard Average Annual Rainfall (SAAR) (in hundreds of mm)



Winter Rain Acceptance Potential (WRAP)



Stratton Park House, Wanborough Road  
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Telephone

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admin@pfapl.com

Website

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Soil Classification			
Soil Class (WRAP)	Soil Index (Int)	SPR (TPO)	SI (ADAS)
1	0.15	10	0.1
2	0.30	30	0.5
3	0.40	37	0.8
4	0.45	47	1.0
5	0.50	53	1.3

**Note:**  
Standard Average Annual Rainfall (SAAR) and Winter Rain Acceptance Potential (WRAP) map extracts shown on this drawing are reproduced from the maps contained in Volume V of the Flood Studies Report – NERC: 1975.

Rev	Date	Description	Initials
TO BE READ IN CONJUNCTION WITH ALL WORKING DRAWINGS			
Client:			
<b>G H Dean &amp; Co Ltd</b>			
Project:			
<b>Great Grovehurst Farm, Sittingbourne</b>			
Drawing Title:			
<b>SAAR and WRAP Maps</b>			
Drawing No.:			
<b>D118/16</b>			
Date:	April 2016		
Scale:	Not to Scale		
Drawn By:	NG		
Checked By:	BF		
E-Mail:	bfox@pfapl.com		
File Ref.:	D118\Drawings\D118-15.dwg		

TO BE READ IN CONJUNCTION WITH ALL WORKING DRAWINGS

Client:

**G H Dean & Co Ltd**

Project:

**Great Grovehurst Farm, Sittingbourne**

Drawing Title:

**SAAR and WRAP Maps**

Drawing No.:

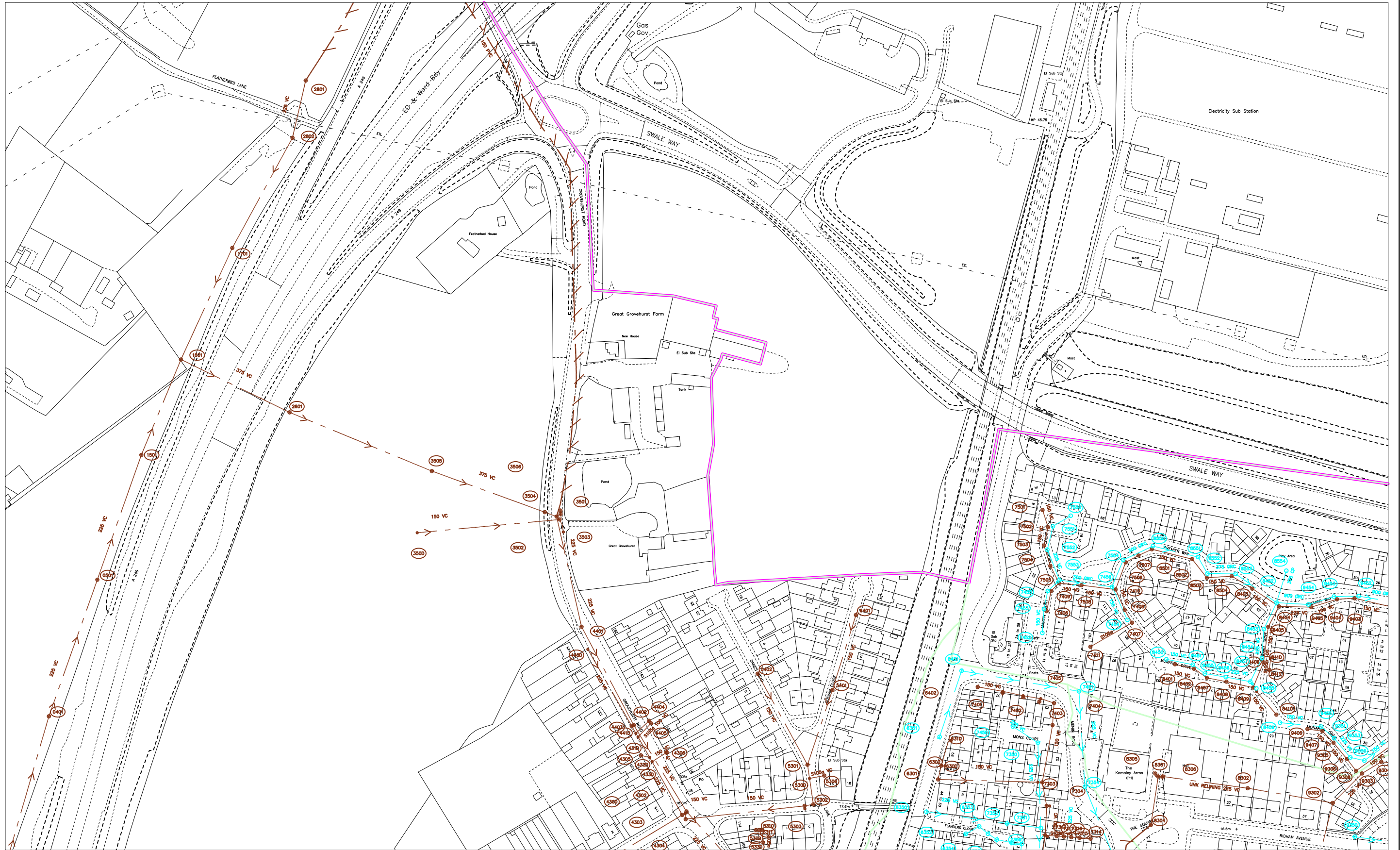
**D118/16**

Date:	April 2016		
Scale:	Not to Scale		
Drawn By:	NG		
Checked By:	BF		
E-Mail:	bfox@pfapl.com		
File Ref.:	D118\Drawings\D118-15.dwg		



# SEWER RECORDS PAGE 1 OF 2

166898



166321

O.S. REF. <b>TQ9066NW</b>	Drawn by: yadavs	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement		
	Scale: 1:2500			
Title: 269145_Great Grovehurst Farm,	Date: 23/11/2017	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.		

590020

590965





Stratton Park House  
Wanborough Road  
Swindon SN3 4HG

D118 - Great Govehurst  
Farm  
Greenfield Runodd

Date August 2012  
File

Designed by MWS  
Checked by



Causeway

Source Control W.12.6.1

ICP SUDS Mean Annual Flood

Input


Return Period (years) 2 SAAR (mm) 595 Urban 0.000  
Area (ha) 4.790 Soil 0.450 Region Number Region 7

**Results 1/s**

QBAR Rural 17.4  
QBAR Urban 17.4

Q2 years 15.3

Q1 year 14.8  
Q30 years 39.4  
Q100 years 55.5

PFA Consulting		Page 1
Stratton Park House Wanborough Road Swindon SN3 4HG	D118: Great Grovehurst Farm Pre Development Runoff	
Date 01/02/2018 File	Designed by BF Checked by GE	
Causeway	Source Control 2017.1.2	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.450
Area (ha)	4.790	Urban	0.130
SAAR (mm)	595	Region Number	Region 7

**Results    l/s**

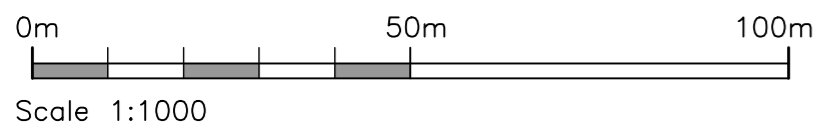
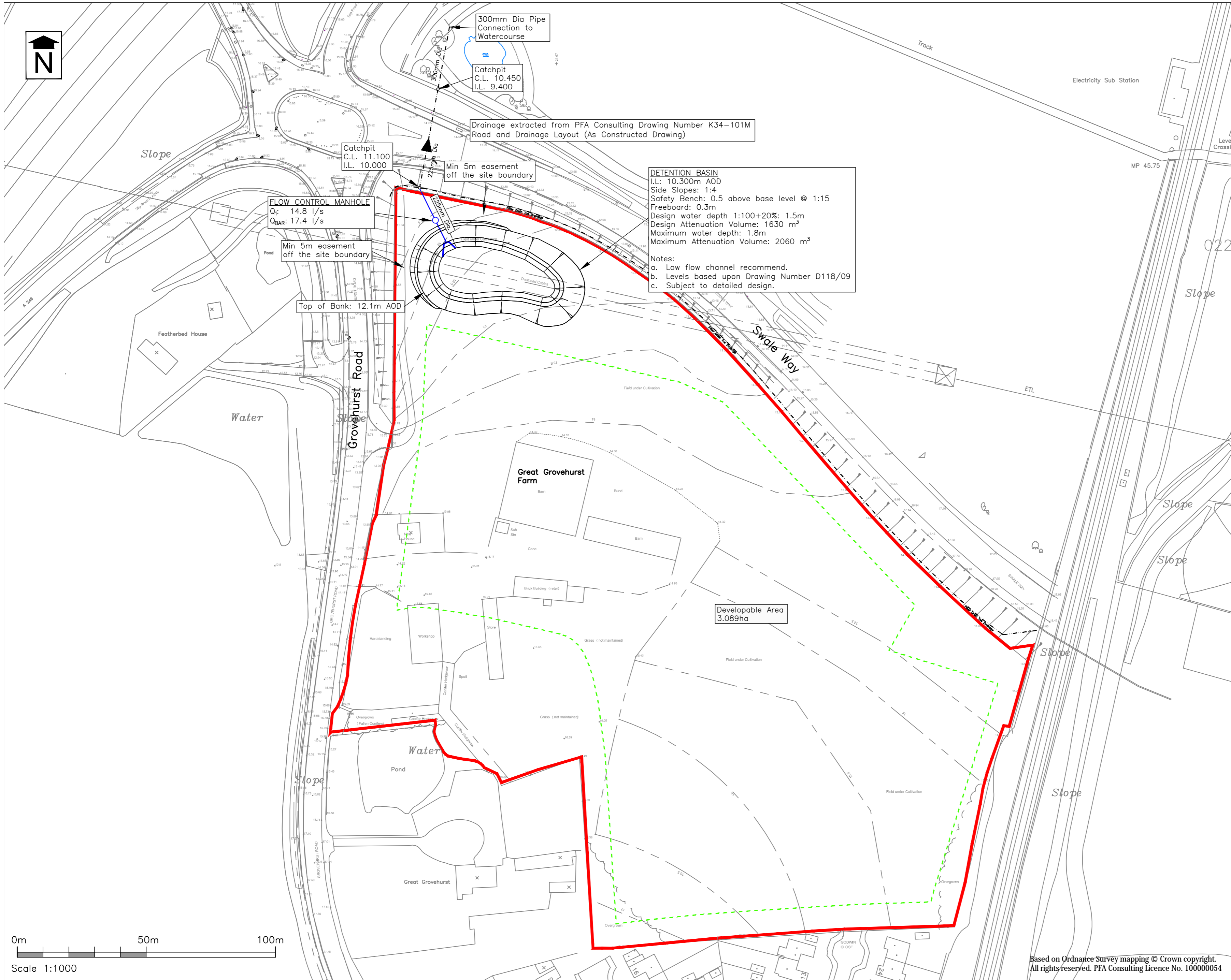
QBAR Rural 17.4  
QBAR Urban 21.9

Q2 years 19.8

Q1 year 18.6  
Q30 years 47.0  
Q100 years 63.1







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**For Planning**  
These drawings are produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

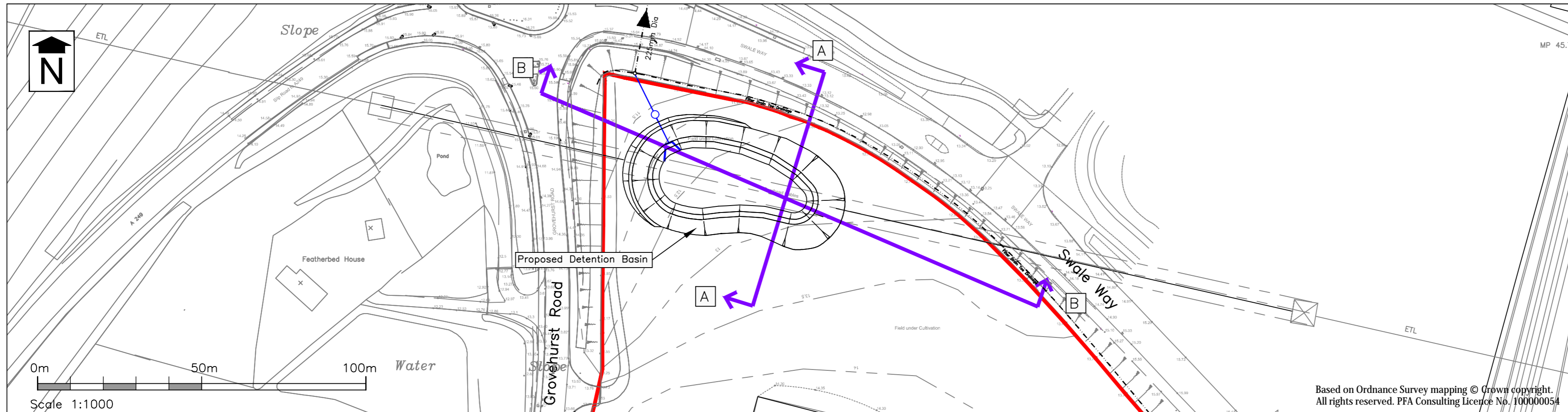
- KEY**
- Site Boundary (Indicative Only)
  - - - Developable Area Boundary
  - Surface Water Sewer (Proposed)
  - - - Land Drainage System (Existing)

- NOTES**
- Based upon Topographical Survey – MULTI-LIMN Land Surveyors, July 2014.
  - Based on Mitigation Option Plan revB DRAFT, Tibbalds – Drawing Number 5384/4.2/GCN.
  - Drainage strategy should be read in conjunction with Flood Risk Assessment (Ref: D118-DOC08, February 2018):
    - $Q_1 = 14.8$  l/s
    - $Q_{BAR} = 17.4$  l/s
    - Impermeable area estimated 65% of developable area (including 10% uplift for urban creep) = 2,209 Ha impermeable
    - GSE 20% Climate Change =  $\approx 1630$  m<sup>3</sup>
    - GSE 40% Climate Change =  $\approx 1990$  m<sup>3</sup>

Rev	Date	Description	Initials	Check
A	19/07/16	Detention basin redesigned. Moved west.	NG	BF
B	21/07/16	Red line updated to better reflect title deeds	BF	RCI
C	28/02/18	Greenfield runoff rate updated for consistency with FRA. Attenuation volumes added for clarity.	BF	GE

<b>FOR PLANNING</b>	
Client	
G H Dean & Co Ltd	
Project	
Great Grovehurst Farm Sittingbourne	
Drawing Title	
Outline Surface Water Drainage Strategy	
Drawing No.	D118/14 Rev C
Date	April 2016
Scale	1:1000 @ A2
Drawn By	NG
Checked By	BF
E-Mail	bfox@pfapl.com
File Ref.	D118\Drawings\D118_14.dwg





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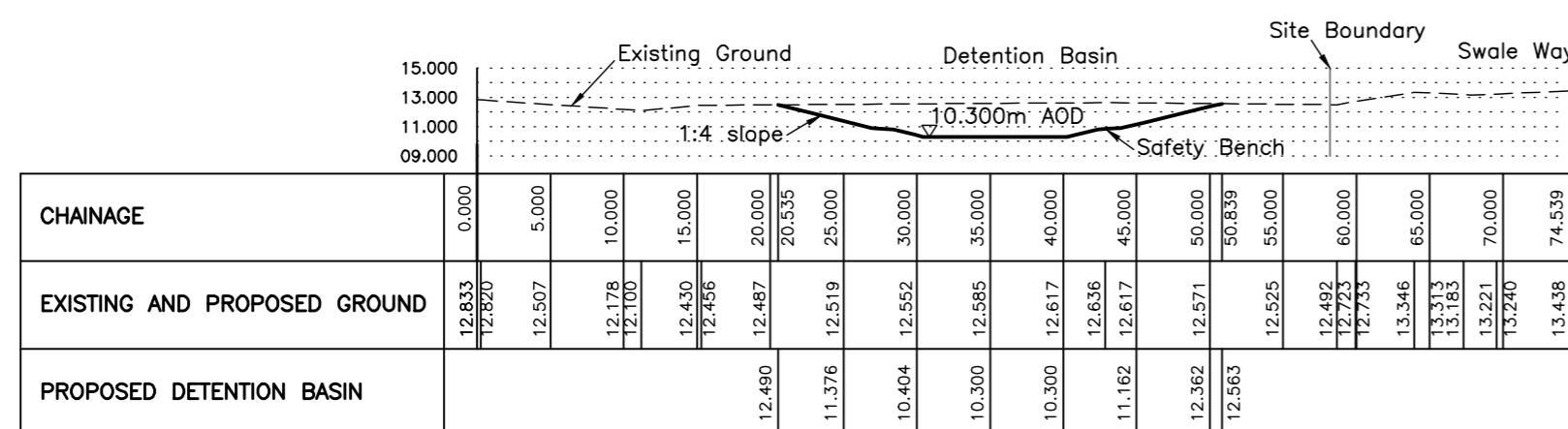
Website  
www.pfapl.com

**KEY**

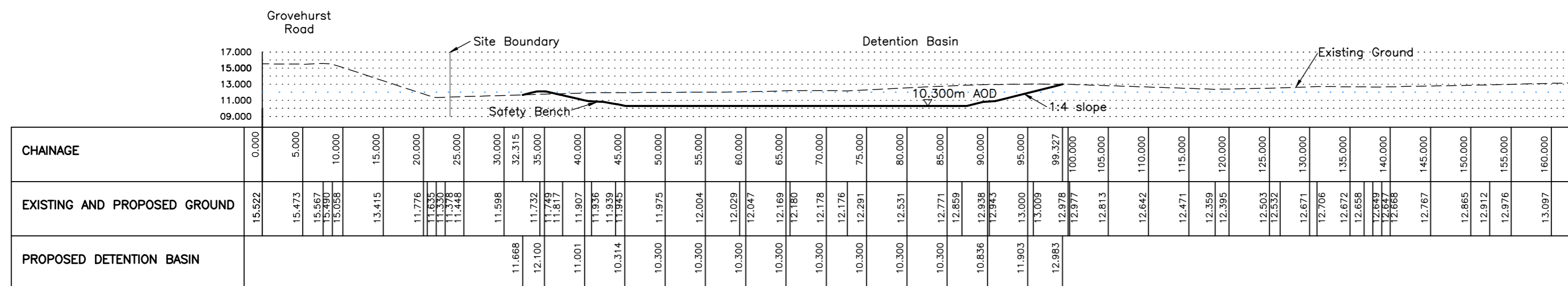
- Site Boundary (Indicative Only)

**NOTES**

- Based upon Topographical Survey – MULTI-LIMN Land Surveyors, July 2014.
- Based on Mitigation Option Plan revB DRAFT, Tibbalds – Drawing Number 5384/4.2/GCN.
- Drawing should be read in conjunction with Flood Risk Assessment (Ref: D118-DOC08, February 2018) and Drawing Number D118/14 Rev C:
  - $Q_1 = 14.8$  l/s
  - $Q_{BAR} = 17.4$  l/s
  - Impermeable area estimated 65% of developable area (including 10% uplift for urban creep) = 2.209 Ha impermeable
  - QSE 20% Climate Change =  $\approx 1630$  m<sup>3</sup>
  - QSE 40% Climate Change =  $\approx 1990$  m<sup>3</sup>
- All drainage subject to detailed design.



Section A-A  
Horizontal Scale: 1:500, Vertical Scale: 1:500



Section B-B  
Horizontal Scale: 1:500, Vertical Scale: 1:500

Rev	Date	Description	Initials	Check
A	07/07/16	Detention basin redesigned.	NG	BF
B	21/07/16	Red line updated to better reflect title deeds	BF	RCI
C	28/02/18	Greenfield runoff rate /attenuation volumes updated for consistency with FRA.	BF	GE

**Status**

**FOR INFORMATION**

**Client**

G H Dean & Co Ltd

**Project**

Great Grovehurst Farm  
Sittingbourne

**Drawing Title**

Detention Basin  
Sections

**Drawing No.**

D118/15

Rev C

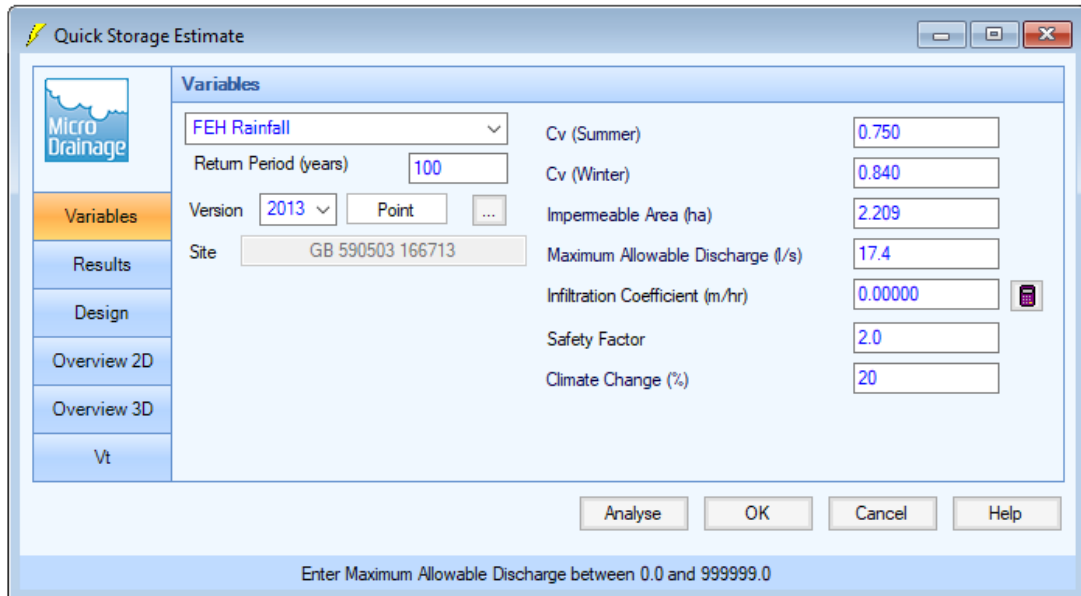
Date	April 2016
Scale	As Shown @ A2
Drawn By	NG
Checked By	BF
E-Mail	bfox@pfapl.com
File Ref.	D118\Drawings\D118_14-15.dwg



## GREAT GROVEHURST FARM

### QUICK STORAGE ESTIMATES

#### 1. 1 in 100 Year Storm + 20% Allowance for Climate Change



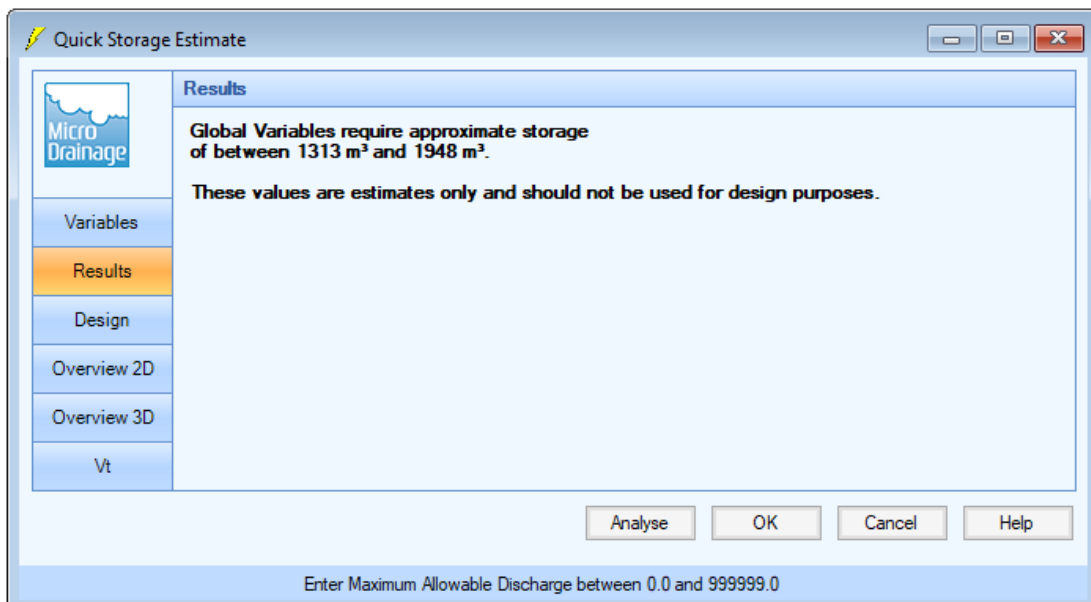
**Quick Storage Estimate**

**Variables**

FEH Rainfall	Cv (Summer)	0.750
Return Period (years): 100	Cv (Winter)	0.840
Version: 2013	Impemeable Area (ha)	2.209
Point	Maximum Allowable Discharge (l/s)	17.4
Site: GB 590503 166713	Infiltration Coefficient (m/hr)	0.00000
	Safety Factor	2.0
	Climate Change (%)	20

Buttons: Analyse, OK, Cancel, Help

Enter Maximum Allowable Discharge between 0.0 and 999999.0



**Quick Storage Estimate**

**Results**

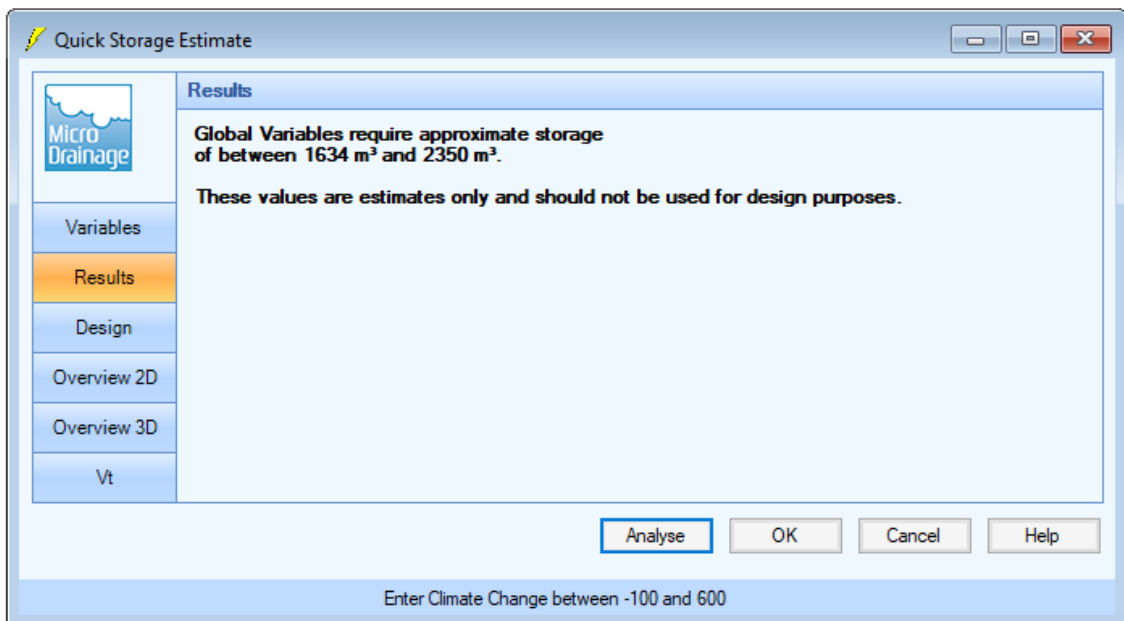
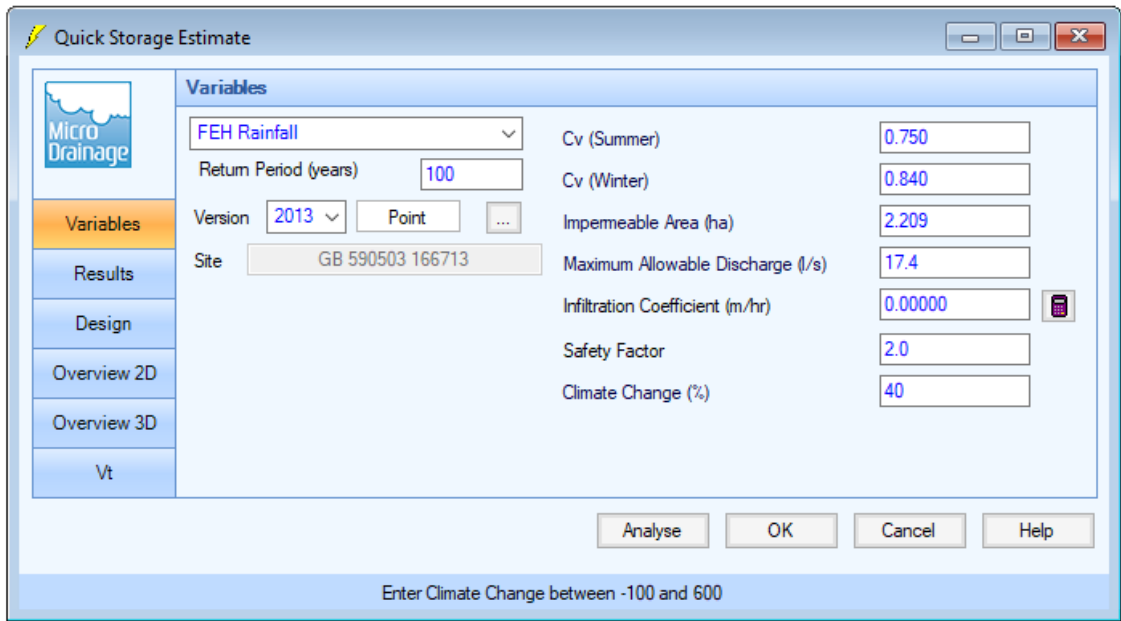
**Global Variables require approximate storage of between 1313 m<sup>3</sup> and 1948 m<sup>3</sup>.**

**These values are estimates only and should not be used for design purposes.**

Buttons: Analyse, OK, Cancel, Help


Enter Maximum Allowable Discharge between 0.0 and 999999.0

2. 1 in 100 Year Storm + 40% Allowance for Climate Change







PFA Consulting Limited		Page 1
Stratton Park House Wanborough Road Swindon SN3 4HG	D118: Great Grovehurst Farm Sittingbourne Planning - Basin	
Date 01/11/2017 File D118-Basin.srcx	Designed by PS Checked by BF	
XP Solutions	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 12.060

Tank or Pond Structure

Invert Level (m) 10.300

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	632.0	0.450	837.0	0.900	1209.0	1.350	1467.0
0.050	655.0	0.500	862.0	0.950	1237.0	1.400	1497.0
0.100	677.0	0.550	954.0	1.000	1265.0	1.450	1527.0
0.150	699.0	0.600	1049.0	1.050	1292.0	1.500	1557.0
0.200	721.0	0.650	1075.0	1.100	1321.0	1.550	1587.0
0.250	744.0	0.700	1101.0	1.150	1350.0	1.600	1619.0
0.300	767.0	0.750	1128.0	1.200	1379.0	1.650	1650.0
0.350	790.0	0.800	1155.0	1.250	1408.0	1.760	1718.0
0.400	814.0	0.850	1182.0	1.300	1437.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SFF-0170-1740-1760-1480
Design Head (m)	1.760
Design Flow (l/s)	17.4
Flush-Flo™	User Defined
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	170
Invert Level (m)	10.300
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.760	17.4
Flush-Flo™	0.375	14.8
Kick-Flo®	0.828	12.2
Mean Flow over Head Range	-	13.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	0.800	12.7	2.000	18.5	4.000	25.8
0.200	13.9	1.000	13.3	2.200	19.4	4.500	27.3
0.300	14.7	1.200	14.5	2.400	20.2	5.000	28.7
0.400	14.8	1.400	15.6	2.600	21.0	5.500	30.0
0.500	14.6	1.600	16.6	3.000	22.4	6.000	31.3
0.600	14.3	1.800	17.6	3.500	24.2	6.500	32.6

Stratton Park House  
Wanborough Road  
Swindon SN3 4HG

D118: Great Grovehurst Farm  
Sittingbourne  
Planning - Basin



Date 01/11/2017  
File D118-Basin.srcx


Designed by PS  
Checked by BF

XP Solutions

Source Control 2017.1.2

Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
7.000	33.7	8.000	36.0	9.000	38.1		
7.500	34.9	8.500	37.1	9.500	39.1		

PFA Consulting Limited		Page 1
Stratton Park House Wanborough Road Swindon SN3 4HG	D118: Great Grovehurst Farm Sittingbourne Planning - Basin	
Date 01/11/2017 File D118-Basin.srcx	Designed by PS Checked by BF	
XP Solutions	Source Control 2017.1.2	


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 2.209

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)	From:	To:
0	4	0.736	4	8	0.736	8	12
						12	16
							0.001

PFA Consulting Limited		Page 1
Stratton Park House Wanborough Road Swindon SN3 4HG	D118: Great Grovehurst Farm Sittingbourne Planning - Basin	
Date 01/11/2017 File D118-Basin.srcx	Designed by PS Checked by BF	
XP Solutions	Source Control 2017.1.2	

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	10.475	0.175	13.0	117.6	O K
30 min Summer	10.518	0.218	14.1	148.3	O K
60 min Summer	10.558	0.258	14.5	177.6	O K
120 min Summer	10.585	0.285	14.6	198.5	O K
180 min Summer	10.597	0.297	14.7	207.3	O K
240 min Summer	10.602	0.302	14.7	211.6	O K
360 min Summer	10.603	0.303	14.7	212.1	O K
480 min Summer	10.597	0.297	14.7	207.2	O K
600 min Summer	10.588	0.288	14.6	200.3	O K
720 min Summer	10.577	0.277	14.6	192.5	O K
960 min Summer	10.556	0.256	14.4	176.4	O K
1440 min Summer	10.518	0.218	14.1	148.4	O K
2160 min Summer	10.480	0.180	13.3	121.2	O K
2880 min Summer	10.459	0.159	11.7	106.3	O K
4320 min Summer	10.434	0.134	9.5	88.6	O K
5760 min Summer	10.419	0.119	8.0	78.3	O K
7200 min Summer	10.409	0.109	6.9	71.4	O K
8640 min Summer	10.401	0.101	6.1	66.1	O K
10080 min Summer	10.395	0.095	5.6	62.1	O K
15 min Winter	10.495	0.195	13.8	131.8	O K
30 min Winter	10.544	0.244	14.3	167.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	30.507	0.0	120.0	24
30 min Summer	19.881	0.0	158.1	37
60 min Summer	12.584	0.0	205.3	64
120 min Summer	7.806	0.0	255.3	108
180 min Summer	5.875	0.0	288.6	140
240 min Summer	4.797	0.0	314.4	174
360 min Summer	3.586	0.0	352.9	244
480 min Summer	2.907	0.0	381.6	312
600 min Summer	2.470	0.0	405.4	378
720 min Summer	2.162	0.0	425.8	444
960 min Summer	1.752	0.0	460.2	572
1440 min Summer	1.304	0.0	513.0	814
2160 min Summer	0.971	0.0	576.8	1168
2880 min Summer	0.787	0.0	623.0	1528
4320 min Summer	0.585	0.0	693.0	2248
5760 min Summer	0.474	0.0	753.2	2952
7200 min Summer	0.403	0.0	800.1	3680
8640 min Summer	0.353	0.0	840.3	4416
10080 min Summer	0.316	0.0	874.9	5144
15 min Winter	30.507	0.0	135.1	24
30 min Winter	19.881	0.0	177.8	37

Stratton Park House  
 Wanborough Road  
 Swindon SN3 4HG

D118: Great Grovehurst Farm  
 Sittingbourne  
 Planning - Basin



Date 01/11/2017  
 File D118-Basin.srcx

Designed by PS  
 Checked by BF


XP Solutions

Source Control 2017.1.2

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	10.589	0.289	14.6	201.3	O K
120 min Winter	10.621	0.321	14.7	226.3	O K
180 min Winter	10.631	0.331	14.8	233.7	O K
240 min Winter	10.635	0.335	14.8	236.8	O K
360 min Winter	10.630	0.330	14.8	232.8	O K
480 min Winter	10.616	0.316	14.7	222.2	O K
600 min Winter	10.600	0.300	14.7	209.5	O K
720 min Winter	10.582	0.282	14.6	196.2	O K
960 min Winter	10.548	0.248	14.4	170.7	O K
1440 min Winter	10.494	0.194	13.8	131.3	O K
2160 min Winter	10.457	0.157	11.6	104.8	O K
2880 min Winter	10.436	0.136	9.7	90.3	O K
4320 min Winter	10.414	0.114	7.5	74.7	O K
5760 min Winter	10.400	0.100	6.1	65.7	O K
7200 min Winter	10.391	0.091	5.2	59.7	O K
8640 min Winter	10.385	0.085	4.6	55.2	O K
10080 min Winter	10.380	0.080	4.1	51.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	12.584	0.0	230.3	64
120 min Winter	7.806	0.0	286.3	118
180 min Winter	5.875	0.0	323.6	150
240 min Winter	4.797	0.0	352.5	188
360 min Winter	3.586	0.0	395.6	264
480 min Winter	2.907	0.0	427.8	338
600 min Winter	2.470	0.0	454.4	408
720 min Winter	2.162	0.0	477.4	476
960 min Winter	1.752	0.0	515.9	606
1440 min Winter	1.304	0.0	575.2	838
2160 min Winter	0.971	0.0	646.2	1188
2880 min Winter	0.787	0.0	698.1	1536
4320 min Winter	0.585	0.0	776.9	2252
5760 min Winter	0.474	0.0	843.7	3000
7200 min Winter	0.403	0.0	896.3	3744
8640 min Winter	0.353	0.0	941.6	4416
10080 min Winter	0.316	0.0	980.8	5144

PFA Consulting Limited		Page 1
Stratton Park House Wanborough Road Swindon SN3 4HG	D118: Great Grovehurst Farm Sittingbourne Planning - Basin	
Date 01/11/2017 File D118-Basin.srcx	Designed by PS Checked by BF	
XP Solutions	Source Control 2017.1.2	


Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 590503 166713	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 2.209


Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:	From:	To:
0	4	4	8	8	12	12	16
	0.736		0.736		0.736		0.001

PFA Consulting Limited		Page 1
Stratton Park House Wanborough Road Swindon SN3 4HG	D118: Great Grovehurst Farm Sittingbourne Planning - Basin	
Date 01/11/2017 File D118-Basin.srcx	Designed by PS Checked by BF	
XP Solutions	Source Control 2017.1.2	

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	10.827	0.527	14.8	396.4	O K
30 min Summer	10.944	0.644	14.8	514.5	O K
60 min Summer	11.050	0.750	14.8	631.2	O K
120 min Summer	11.163	0.863	14.8	761.8	O K
180 min Summer	11.229	0.929	14.8	841.7	O K
240 min Summer	11.274	0.974	14.8	897.0	O K
360 min Summer	11.329	1.029	14.8	966.9	O K
480 min Summer	11.357	1.057	14.8	1003.0	O K
600 min Summer	11.367	1.067	14.8	1016.3	O K
720 min Summer	11.370	1.070	14.8	1019.8	O K
960 min Summer	11.361	1.061	14.8	1008.3	O K
1440 min Summer	11.319	1.019	14.8	954.3	O K
2160 min Summer	11.238	0.938	14.8	852.7	O K
2880 min Summer	11.151	0.851	14.8	748.1	O K
4320 min Summer	10.959	0.659	14.8	531.0	O K
5760 min Summer	10.804	0.504	14.8	376.3	O K
7200 min Summer	10.681	0.381	14.8	273.3	O K
8640 min Summer	10.597	0.297	14.7	207.3	O K
10080 min Summer	10.541	0.241	14.3	165.6	O K
15 min Winter	10.878	0.578	14.8	445.7	O K
30 min Winter	11.003	0.703	14.8	579.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	99.402	0.0	403.5	26
30 min Summer	64.981	0.0	528.8	40
60 min Summer	40.630	0.0	669.1	70
120 min Summer	25.350	0.0	835.5	128
180 min Summer	19.299	0.0	954.3	186
240 min Summer	15.925	0.0	1050.1	246
360 min Summer	12.162	0.0	1202.9	364
480 min Summer	10.030	0.0	1322.5	482
600 min Summer	8.603	0.0	1417.8	574
720 min Summer	7.567	0.0	1495.9	626
960 min Summer	6.128	0.0	1614.2	754
1440 min Summer	4.481	0.0	1765.9	1016
2160 min Summer	3.227	0.0	1921.6	1432
2880 min Summer	2.543	0.0	2018.9	1848
4320 min Summer	1.805	0.0	2147.4	2592
5760 min Summer	1.420	0.0	2256.7	3288
7200 min Summer	1.189	0.0	2362.0	3960
8640 min Summer	1.035	0.0	2466.0	4592
10080 min Summer	0.925	0.0	2570.2	5248
15 min Winter	99.402	0.0	452.5	26
30 min Winter	64.981	0.0	592.5	40


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XP Solutions	Source Control 2017.1.2	

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	11.121	0.821	14.8	712.4	O K
120 min Winter	11.245	0.945	14.8	861.5	O K
180 min Winter	11.319	1.019	14.8	954.4	O K
240 min Winter	11.370	1.070	14.8	1020.4	O K
360 min Winter	11.436	1.136	14.8	1107.3	O K
480 min Winter	11.472	1.172	14.8	1156.5	O K
600 min Winter	11.489	1.189	14.8	1179.6	O K
720 min Winter	11.493	1.193	14.8	1185.4	O K
960 min Winter	11.479	1.179	14.8	1165.0	O K
1440 min Winter	11.426	1.126	14.8	1094.2	O K
2160 min Winter	11.315	1.015	14.8	949.7	O K
2880 min Winter	11.193	0.893	14.8	797.8	O K
4320 min Winter	10.904	0.604	14.8	471.7	O K
5760 min Winter	10.669	0.369	14.8	263.9	O K
7200 min Winter	10.534	0.234	14.3	160.3	O K
8640 min Winter	10.480	0.180	13.3	120.9	O K
10080 min Winter	10.462	0.162	11.9	108.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	40.630	0.0	749.7	68
120 min Winter	25.350	0.0	936.0	126
180 min Winter	19.299	0.0	1069.0	184
240 min Winter	15.925	0.0	1176.2	240
360 min Winter	12.162	0.0	1347.2	356
480 min Winter	10.030	0.0	1481.0	468
600 min Winter	8.603	0.0	1587.4	578
720 min Winter	7.567	0.0	1674.6	684
960 min Winter	6.128	0.0	1806.2	794
1440 min Winter	4.481	0.0	1971.7	1090
2160 min Winter	3.227	0.0	2152.3	1556
2880 min Winter	2.543	0.0	2261.3	2000
4320 min Winter	1.805	0.0	2405.9	2728
5760 min Winter	1.420	0.0	2527.7	3344
7200 min Winter	1.189	0.0	2645.7	3904
8640 min Winter	1.035	0.0	2762.3	4488
10080 min Winter	0.925	0.0	2879.6	5152



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XP Solutions	Source Control 2017.1.2	


Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 590503 166713	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+20

Time Area Diagram

Total Area (ha) 2.209


Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:	From:	To:
0	4	4	8	8	12	12	16
	0.736		0.736		0.736		0.001

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XP Solutions	Source Control 2017.1.2	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	10.910	0.610	14.8	478.4	O K
30 min Summer	11.042	0.742	14.8	621.8	O K
60 min Summer	11.166	0.866	14.8	766.1	O K
120 min Summer	11.297	0.997	14.8	925.9	O K
180 min Summer	11.375	1.075	14.8	1026.0	O K
240 min Summer	11.428	1.128	14.8	1097.3	O K
360 min Summer	11.498	1.198	14.8	1191.4	O K
480 min Summer	11.536	1.236	14.8	1244.9	O K
600 min Summer	11.554	1.254	14.8	1269.7	O K
720 min Summer	11.559	1.259	14.8	1276.9	O K
960 min Summer	11.553	1.253	14.8	1268.8	O K
1440 min Summer	11.514	1.214	14.8	1213.5	O K
2160 min Summer	11.436	1.136	14.8	1107.9	O K
2880 min Summer	11.358	1.058	14.8	1004.0	O K
4320 min Summer	11.198	0.898	14.8	803.7	O K
5760 min Summer	11.022	0.722	14.8	599.7	O K
7200 min Summer	10.885	0.585	14.8	453.0	O K
8640 min Summer	10.770	0.470	14.8	346.6	O K
10080 min Summer	10.679	0.379	14.8	271.7	O K
15 min Winter	10.965	0.665	14.8	537.5	O K
30 min Winter	11.110	0.810	14.8	699.6	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	119.283	0.0	485.1	26
30 min Summer	77.977	0.0	634.9	41
60 min Summer	48.756	0.0	803.4	70
120 min Summer	30.420	0.0	1002.9	128
180 min Summer	23.159	0.0	1145.4	188
240 min Summer	19.110	0.0	1260.2	246
360 min Summer	14.594	0.0	1443.3	364
480 min Summer	12.035	0.0	1586.5	482
600 min Summer	10.324	0.0	1700.3	600
720 min Summer	9.080	0.0	1793.4	676
960 min Summer	7.354	0.0	1933.2	790
1440 min Summer	5.377	0.0	2101.7	1046
2160 min Summer	3.872	0.0	2306.1	1456
2880 min Summer	3.051	0.0	2422.8	1876
4320 min Summer	2.166	0.0	2577.7	2688
5760 min Summer	1.704	0.0	2708.3	3408
7200 min Summer	1.427	0.0	2834.8	4112
8640 min Summer	1.242	0.0	2959.7	4760
10080 min Summer	1.110	0.0	3085.1	5448
15 min Winter	119.283	0.0	543.7	26
30 min Winter	77.977	0.0	710.9	40

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	11.246	0.946	14.8	862.1	O K
120 min Winter	11.389	1.089	14.8	1045.3	O K
180 min Winter	11.477	1.177	14.8	1162.3	O K
240 min Winter	11.538	1.238	14.8	1246.9	O K
360 min Winter	11.619	1.319	15.2	1362.4	O K
480 min Winter	11.667	1.367	15.4	1432.4	O K
600 min Winter	11.692	1.392	15.6	1470.4	O K
<b>720 min Winter</b>	<b>11.703</b>	<b>1.403</b>	<b>15.6</b>	<b>1486.9</b>	<b>O K</b>
960 min Winter	11.696	1.396	15.6	1475.9	O K
1440 min Winter	11.647	1.347	15.3	1403.6	O K
2160 min Winter	11.545	1.245	14.8	1257.4	O K
2880 min Winter	11.436	1.136	14.8	1106.7	O K
4320 min Winter	11.203	0.903	14.8	810.3	O K
5760 min Winter	10.930	0.630	14.8	499.5	O K
7200 min Winter	10.719	0.419	14.8	304.0	O K
8640 min Winter	10.579	0.279	14.6	193.6	O K
10080 min Winter	10.504	0.204	13.9	138.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	48.756	0.0	900.0	68
120 min Winter	30.420	0.0	1123.4	126
180 min Winter	23.159	0.0	1282.9	184
240 min Winter	19.110	0.0	1411.4	242
360 min Winter	14.594	0.0	1616.1	356
480 min Winter	12.035	0.0	1775.8	470
600 min Winter	10.324	0.0	1902.4	582
<b>720 min Winter</b>	<b>9.080</b>	<b>0.0</b>	<b>2005.4</b>	<b>692</b>
960 min Winter	7.354	0.0	2156.8	894
1440 min Winter	5.377	0.0	2270.2	1114
2160 min Winter	3.872	0.0	2582.9	1580
2880 min Winter	3.051	0.0	2713.5	2024
4320 min Winter	2.166	0.0	2887.1	2904
5760 min Winter	1.704	0.0	3033.5	3584
7200 min Winter	1.427	0.0	3175.2	4184
8640 min Winter	1.242	0.0	3315.3	4760
10080 min Winter	1.110	0.0	3456.4	5344

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 590503 166713	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 2.209


Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:	From:	To:
0	4	4	8	8	12	12	16
	0.736		0.736		0.736		0.001

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	10.986	0.686	14.8	560.5	O K
30 min Summer	11.136	0.836	14.8	729.8	O K
60 min Summer	11.275	0.975	14.8	899.1	O K
120 min Summer	11.423	1.123	14.8	1089.3	O K
180 min Summer	11.512	1.212	14.8	1210.8	O K
240 min Summer	11.574	1.274	14.9	1298.6	O K
360 min Summer	11.657	1.357	15.4	1418.1	O K
480 min Summer	11.705	1.405	15.6	1490.1	O K
600 min Summer	11.731	1.431	15.8	1528.2	O K
720 min Summer	11.741	1.441	15.8	1543.3	O K
960 min Summer	11.737	1.437	15.8	1538.4	O K
1440 min Summer	11.699	1.399	15.6	1481.0	O K
2160 min Summer	11.623	1.323	15.2	1368.0	O K
2880 min Summer	11.545	1.245	14.8	1257.6	O K
4320 min Summer	11.394	1.094	14.8	1051.2	O K
5760 min Summer	11.256	0.956	14.8	874.4	O K
7200 min Summer	11.118	0.818	14.8	709.6	O K
8640 min Summer	10.979	0.679	14.8	552.4	O K
10080 min Summer	10.876	0.576	14.8	443.1	O K
15 min Winter	11.049	0.749	14.8	629.7	O K
30 min Winter	11.211	0.911	14.8	820.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	139.163	0.0	566.4	26
30 min Summer	90.973	0.0	740.3	41
60 min Summer	56.882	0.0	937.6	70
120 min Summer	35.491	0.0	1170.3	128
180 min Summer	27.019	0.0	1336.4	188
240 min Summer	22.295	0.0	1470.1	246
360 min Summer	17.027	0.0	1683.2	364
480 min Summer	14.041	0.0	1849.3	484
600 min Summer	12.045	0.0	1980.7	602
720 min Summer	10.593	0.0	2087.1	720
960 min Summer	8.580	0.0	2240.7	826
1440 min Summer	6.274	0.0	2296.7	1078
2160 min Summer	4.517	0.0	2690.5	1480
2880 min Summer	3.560	0.0	2826.5	1900
4320 min Summer	2.527	0.0	3006.5	2724
5760 min Summer	1.988	0.0	3159.9	3520
7200 min Summer	1.665	0.0	3307.5	4328
8640 min Summer	1.449	0.0	3453.4	4944
10080 min Summer	1.295	0.0	3600.1	5648
15 min Winter	139.163	0.0	634.6	26
30 min Winter	90.973	0.0	827.9	40

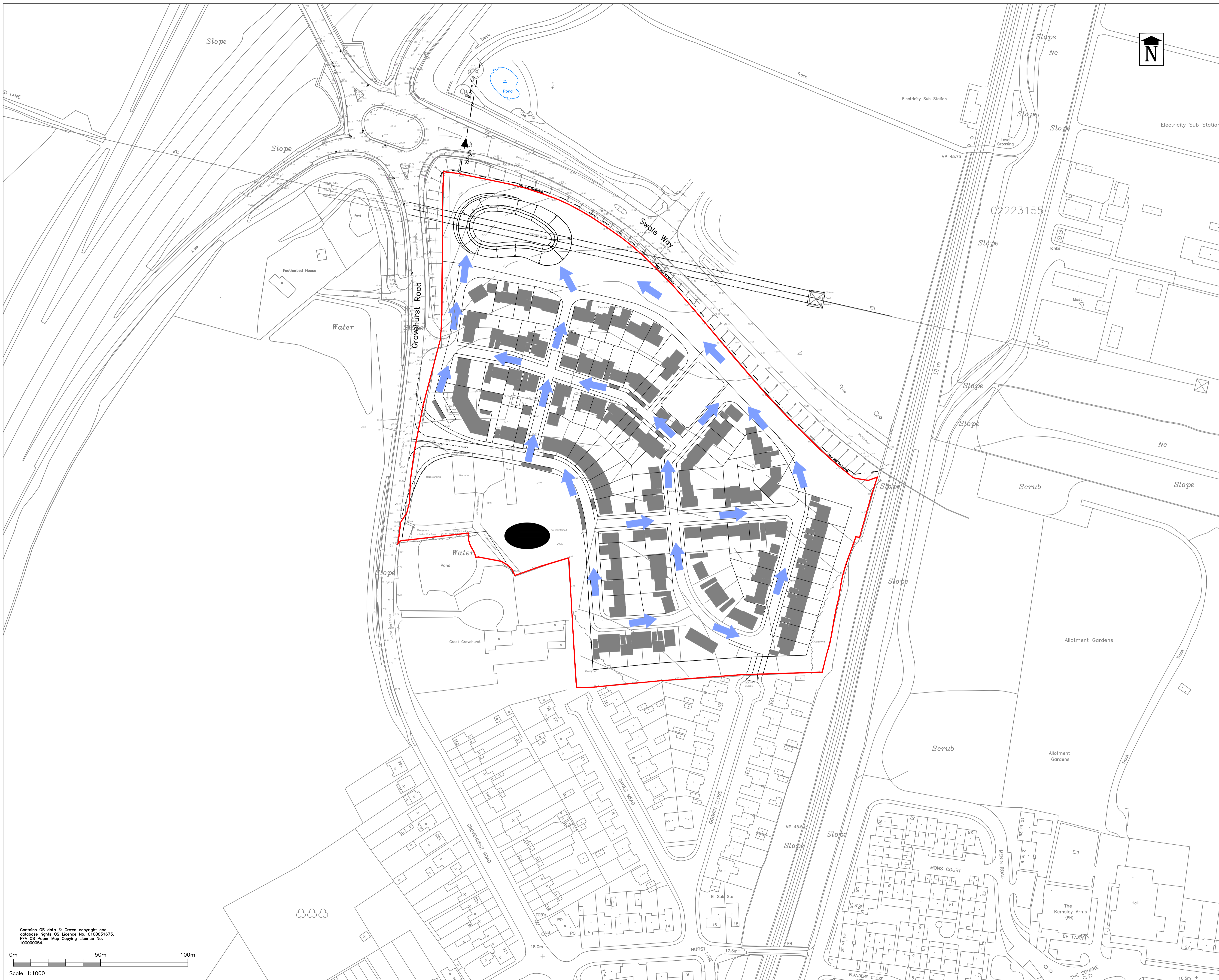
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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	11.363	1.063	14.8	1011.1	O K
120 min Winter	11.525	1.225	14.8	1229.3	O K
180 min Winter	11.625	1.325	15.2	1370.6	O K
240 min Winter	11.695	1.395	15.6	1474.5	O K
360 min Winter	11.790	1.490	16.1	1619.4	Flood Risk
480 min Winter	11.849	1.549	16.4	1711.1	Flood Risk
600 min Winter	11.882	1.582	16.5	1765.1	Flood Risk
720 min Winter	11.900	1.600	16.6	1793.3	Flood Risk
960 min Winter	11.902	1.602	16.6	1796.0	Flood Risk
1440 min Winter	11.855	1.555	16.4	1720.4	Flood Risk
2160 min Winter	11.758	1.458	15.9	1570.2	O K
2880 min Winter	11.654	1.354	15.4	1413.2	O K
4320 min Winter	11.440	1.140	14.8	1112.6	O K
5760 min Winter	11.233	0.933	14.8	846.9	O K
7200 min Winter	10.986	0.686	14.8	560.2	O K
8640 min Winter	10.790	0.490	14.8	363.9	O K
10080 min Winter	10.641	0.341	14.8	241.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	56.882	0.0	1050.3	70
120 min Winter	35.491	0.0	1310.7	126
180 min Winter	27.019	0.0	1496.5	184
240 min Winter	22.295	0.0	1646.0	242
360 min Winter	17.027	0.0	1883.7	358
480 min Winter	14.041	0.0	2067.8	472
600 min Winter	12.045	0.0	2211.3	586
720 min Winter	10.593	0.0	2322.3	696
960 min Winter	8.580	0.0	2422.6	908
1440 min Winter	6.274	0.0	2361.4	1138
2160 min Winter	4.517	0.0	3013.4	1600
2880 min Winter	3.560	0.0	3165.6	2052
4320 min Winter	2.527	0.0	3366.1	2940
5760 min Winter	1.988	0.0	3539.3	3808
7200 min Winter	1.665	0.0	3704.7	4472
8640 min Winter	1.449	0.0	3868.3	5096
10080 min Winter	1.295	0.0	4033.2	5648





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**For Planning**  
These drawings are produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

**NOTES**

1. Based upon Topographical Survey – MULTI-LIMN Land Surveyors, July 2014.
2. Based on Mitigation Option Plan revB DRAFT, Tibbalds – Drawing Number 5384/4.2/GCN.
3. Proposed drainage subject to detailed design.

**KEY**

- Indicative Exceedance Flow Route**
- Flows that exceed the capacity of the drainage system i.e. those above the 1:100 year + 40% climate change design event, or as a result of malfunction / blockage.
  - Site Boundary (Indicative Only)
  - Land Drainage System (Existing)

Rev	Date	Description	Drawn	Check
#	28/02/18	First Issue.	PS	BF

Status **FOR PLANNING**

Client  
**G H Dean & Co Ltd**

Project  
**Great Grovehurst Farm  
Swillingbourne**

Drawing Title  
**Indicative  
Exceedance Flow Routes**

Drawing No. **D118/26**

Date: February 2018 Scale: 1:1000 @ A1  
E-Mail: pschilbach@pfapl.com

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0m 50m 100m  
Scale 1:1000