



Former PACSO Site
Hook Lane
Aldingbourne

FLOOD RISK ASSESSMENT

On behalf of
Genesis Town Planning

ITR/MT/5399/FRA.3

July 2020

Experience and expertise working together



QUALITY MANAGEMENT

Report Issue No.	Status	Date	Author	Authorised
MT/5399/FRA.1	Draft	07.04.2020	MT	MT
MT/5399/FRA.2	Final	13.05.2020	MT	MT
MT/5399/FRA.3	Final	03.07.2020	MT	MT



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1.0 INTRODUCTION

1.1 Bellamy Roberts LLP has been instructed by Genesis Town Planning to prepare a Flood Risk Assessment (FRA) in support of a forthcoming planning application for a residential development of 10 dwellings on land to the west of Hook Lane, Aldingbourne.

1.2 The site has an approximate area of 0.4ha and is located in Flood Zone 1. Government guidance states that a Flood Risk Assessment is required for all developments of more than 1 hectare in Flood Zone 1. Government guidance states that a Flood Risk Assessment is required for developments of less than 1 hectare where a more vulnerable use class is proposed, as the case in this instance.

1.3 This Assessment has been prepared to accompany an indicative surface water drainage design, and has given due consideration to the expected greenfield run-off rates, soil types and Environment Agency (EA) flood mapping.

Site Location and Features

1.4 The Ordnance Survey National Grid Reference (NGR) for the centre of the site is 493389, 104597. For clarity, the location of the site has been shown in Figure 1, on the following page.

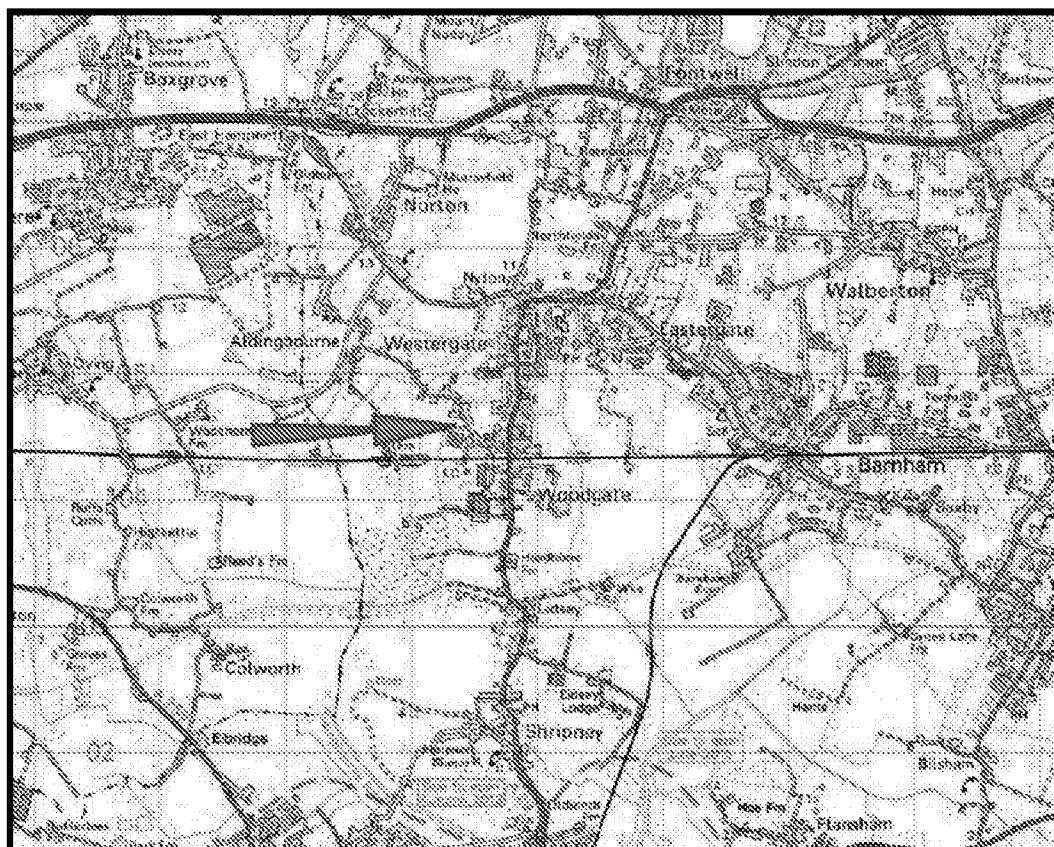


Figure 1: Site Location Plan

1.5 The topography of the site is generally flat and is currently open grassland, a copy of the topographical survey is attached at **Appendix 1**. Based upon the latest Flood Zone Mapping issued by the Environment Agency (EA), the site lies entirely within Flood Zone 1. Flood Zones are defined as follows:

- **Flood Zone 1 (FZ1)** - Land having a less than 1 in 1000 annual probability of river or sea flooding;
- **Flood Zone 2 (FZ2)** - Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding;
- **Flood Zone 3 (FZ3)** - Land having a 1 in 100 or greater annual probability of river flooding.

1.6 The following Figure 2 clearly demonstrates the location of the site in Flood Zone 1.

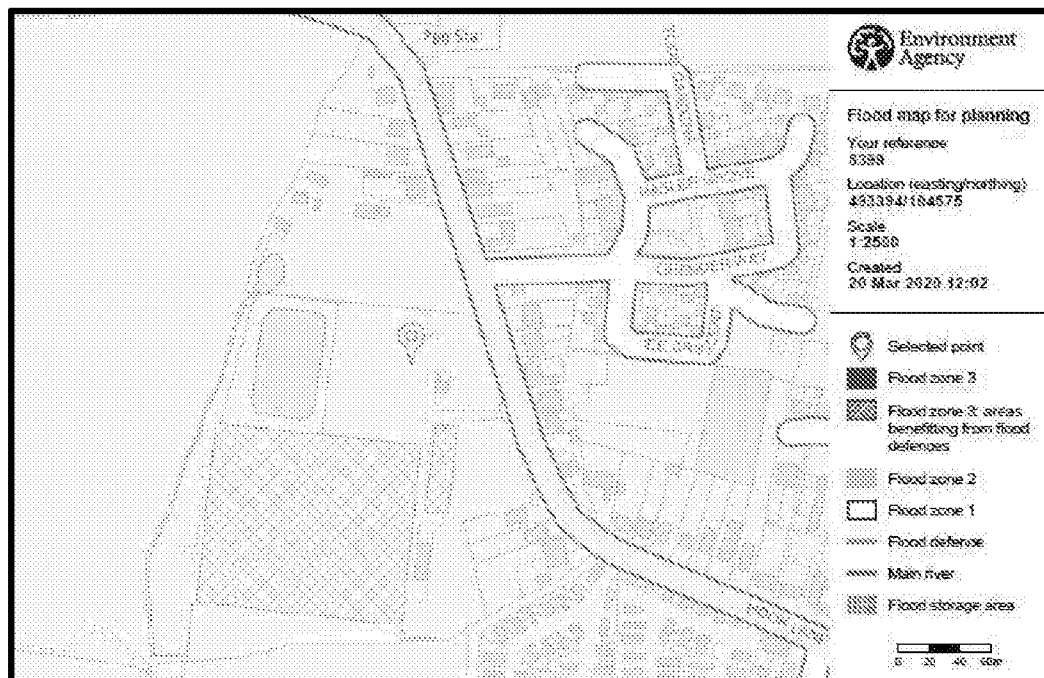


Figure 2: Flood Zone Map (Source: EA)

Surface Water Flood Risk

1.7 In addition to river flooding, other sources of flooding must be considered, such as surface water flood risk. This can be caused as a result of failure of sewer infrastructure, lack of infiltration into the ground, or natural topography routing the rainfall run-off.

1.8 An extract of the EA Surface Water Flood Risk Map is shown at Figure 3, indicating that no part of the site, or local highway network is susceptible to surface water flooding.

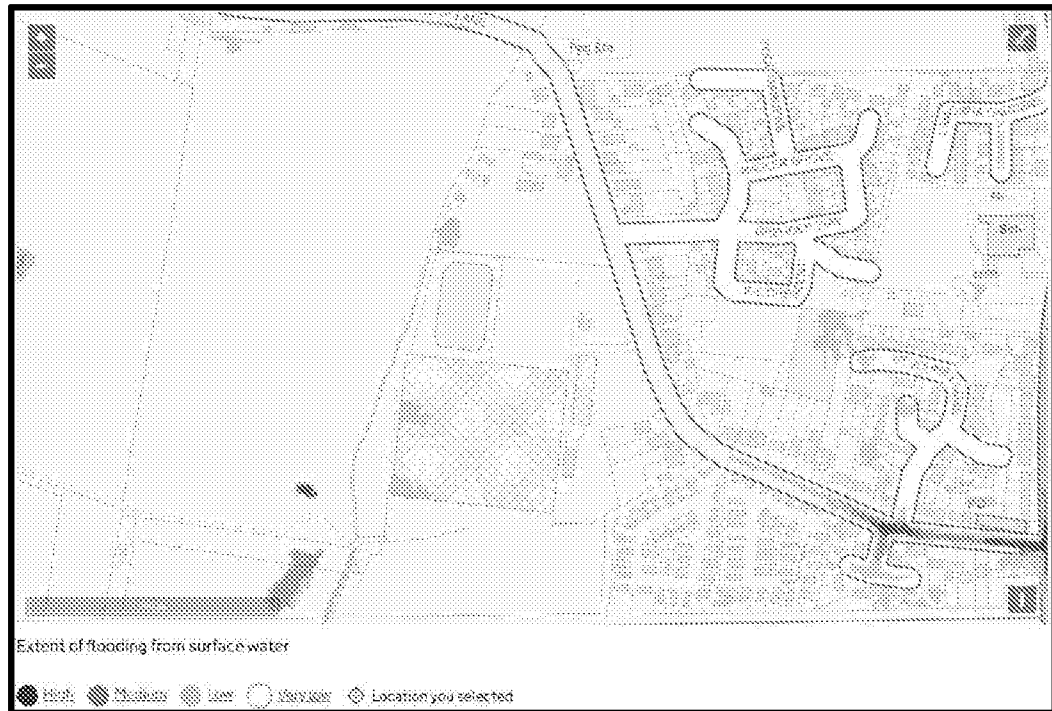


Figure 3: Surface Water Flood Risk Map (Source: EA)

Sequential Test

- 1.9 The Sequential Test gives preference to locating new development in Flood Zone 1. As no part of the site is located within either Flood Zone 2 or 3, the site does not need to pass the requirements of the Sequential Test.

Exception Test

- 1.10 In line with government guidance, the Exception Test does not need to be applied in this instance for the proposed residential development.

2.0 SOURCES OF INFORMATION

National Planning Policy Framework (2019)

- 2.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other developments can be produced.
- 2.2 Paragraph 155 states that "inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk".

Historic Flooding

- 2.3 Historical Flood Map data has been reviewed on the DEFRA website, demonstrating that there have been no recorded flood events at the site.

Existing Watercourses

- 2.4 An existing watercourse is located to the west of the application site and flows on a north-south alignment.

Ground Conditions

- 2.5 No soil investigation/infiltration testing has been undertaken at the site by the applicant at this stage, however should planning consent be granted, infiltration testing will be undertaken in accordance with BRE 365, to obtain site specific data to inform the detailed design stage.
- 2.6 Notwithstanding this, infiltration testing was undertaken in support of the consented scheme to the north of the application site. This testing recorded the London Clay Formation at a depth of 4.6m, groundwater seepage was encountered in all trial pits, at a depth of between 2m and 3m below ground level. Furthermore, a BGS borehole log (SU 90 NW 72) located approximately 0.5km north of the site, reveals 1.6m thick layer of clay overlaying 3.8m of gravel, with the London Clay below this (the BGS borehole record is provided at **Appendix 2**). This is reflected in the bedrock geology mapping available from the BGS which indicates that the bedrock geology at the site is the 'London Clay Formation comprising clay, silt and sand deposits. The BGS mapping indicates superficial river terrace deposits. See Figures 4 & 5 respectively.

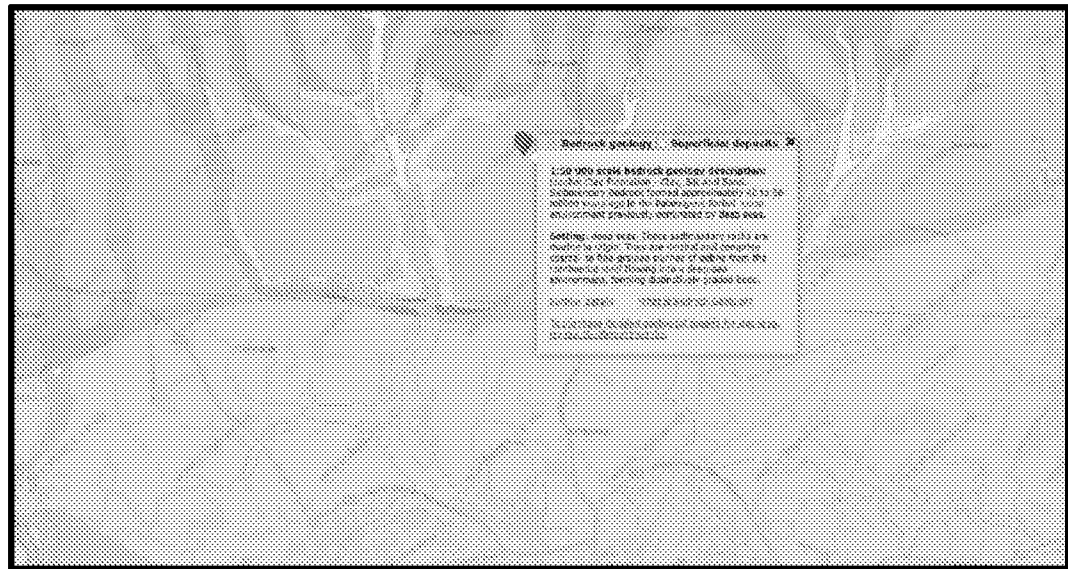


Figure 4: Bedrock Deposits (Source: BGS)

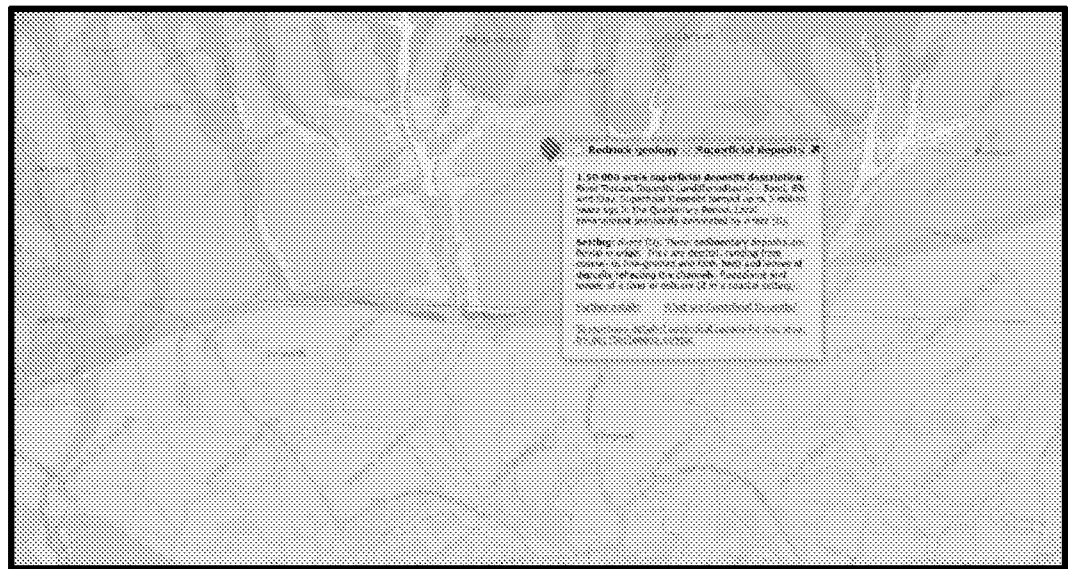


Figure 5: Superficial Deposits (Source: BGS)

Public Covers

- 2.7 Southern Water has been contacted, and the location of their foul water asset has been obtained. See **Appendix 3**. No surface water drainage assets exist in the area.



3.0 FLOOD RISK ASSESSMENT

Flood Risk Assessment Methodology and Objectives

3.1 It is recognised that developments that are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. Current guidance on development and flood risk identifies several key aims for a development to ensure that it is sustainable in flood risk terms. These aims are as follows:

- the development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, are threatened;
- the development should not be at a significant risk of flooding and should not be susceptible to damage due to flooding;
- safe access to and from the development should be possible during flood events;
- the development should not increase flood risk elsewhere;
- the development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- the development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- future users of the development should be made aware of any flood risk issues relating to the development;
- the development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues;
- the development should not lead to degradation of the environment, and;
- the development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change.

3.2 This Flood Risk Assessment is undertaken with due consideration of these sustainability aims.

Project Scope

- 3.3 In order to achieve the aims outlined above, this FRA has been undertaken in accordance with current best-practice guidance. A scoping study was initially undertaken to identify all potential sources of flooding at the site, which may warrant further consideration. Any potential flooding issues identified in the scoping study have subsequently been considered within this FRA. The aim of the scoping study is to review all available information and provide a qualitative assessment of the flood risk to the site and the impact of the site on flood risk elsewhere. The report has been undertaken with due regard to the Governments Planning Practice Guidance and the NPPF.

Existing Greenfield Run-off Rates

- 3.4 The estimated existing greenfield run-off rates have been calculated using MicroDrainage, using the ICP SUDS method. The MicroDrainage output is provided at **Appendix 4**, and a summary is provided below:

- Qbar: 0.1l/s
- Q1: 0.7l/s
- Q30: 2.0l/s
- Q100: 2.8l/s

4.0 DRAINAGE STRATEGY

- 4.1 The drainage strategy for the site will be based on SuDS principles and in this regard, the aim will be to discharge the surface water run-off as high up the following hierarchy of drainage options as possible:
- Infiltration into the ground;
 - To a surface water body;
 - To a surface water sewer;
 - To a combined sewer.
- 4.2 Despite no intrusive ground investigations being undertaken at the site, it is apparent from surveys undertaken nearby that infiltration drainage, via conventional soakaways, is unlikely to be successful given the presence of clay and a relatively high water table.

4.3 As such, an alternative approach is necessary, based on SuDS principle, to ensure that the proposed development does not increase surface water run-off from the site. In this regard, it is proposed that all surface water run-off be attenuated within an on-site storage tank, before being discharged into the existing watercourse to the west of the application site. The proposed surface water drainage strategy is shown at **Appendix 5**. MicroDrainage analysis of the scheme has determined the storage capacity required as being 72m³. This is based on a 1 in 100 year storm event, with a 40% allowance for climate change and MicroDrainage analysis reveals there to be no risk of flooding. The discharge rate into the watercourse will be controlled via a series of hydro-brakes, and will be limited to a rate no greater than the existing greenfield run-off rates (see paragraph 3.4). The MicroDrainage analysis is provided at **Appendix 6**.

4.4 With regards to foul drainage, it is proposed that the site will connect to the existing Southern Water asset located in Hook Lane. The proposed foul drainage connection is shown on the plan at Appendix 5.

Exceedance Flows

4.5 In the unlikely event that that the hydrobrakes become blocked, a plan showing the exceedance flows has been prepared (see **Appendix 7**).

Maintenance and Management

4.6 The continued management and maintenance of the new drainage system will be essential in ensuring the continued protection of the development from the surface water flooding and foul drainage system. Visual inspection of the drainage network and outfalls should be undertaken on a regular basis to identify any siltation/blockage/disrepair of the drainage network and attenuation facilities. A surface water and foul drainage management system therefore needs to be drawn up as part of any planning consent that is issued for the site.

5.0 SUMMARY AND CONCLUSIONS

5.1 Bellamy Roberts LLP has been instructed by Genesis Town Planning to prepare a Flood Risk Assessment (FRA) in support of a forthcoming planning application for a

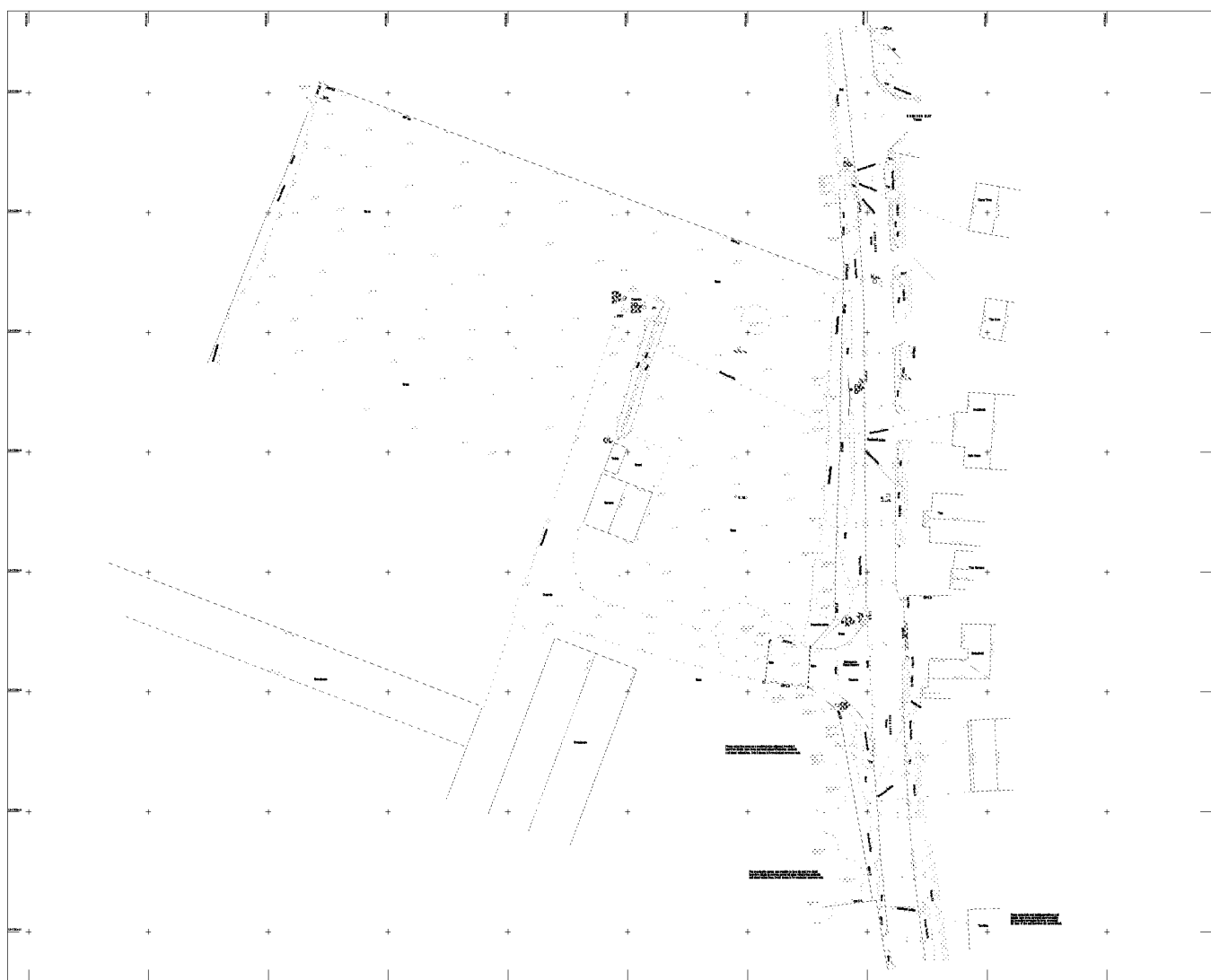


residential development of 10 dwellings on land west of Hook Lane, Aldingbourne. The site has an approximate area of 0.39ha and is located in Flood Zone 1. The site does not have to pass the Sequential and Exception Test before planning consent can be issued.

- 5.2 Surface water run-off will be attenuated within an on-site storage tank, before being discharged into the existing watercourse to the west of the application site. Foul water will be discharged to the existing Southern Water asset located in Hook Lane
- 5.3 The development proposal as presented are stainable in terms of flood risk and in line with Planning Practice Guidance.

APPENDICES

APPENDIX 1



NOTE: This form is to be used for all surveys. It is to be filled out by the surveyor and the client. The surveyor is responsible for the accuracy of the data and the client is responsible for the accuracy of the information provided. The surveyor is not responsible for the accuracy of the information provided by the client. The surveyor is not responsible for the accuracy of the information provided by the client.

PROJECT INFORMATION:

Project Name: _____

Client: _____

Surveyor: _____

Date: _____

LEGEND:

Symbol	Description
[Symbol]	Point
[Symbol]	Line
[Symbol]	Area
[Symbol]	Water
[Symbol]	Vegetation
[Symbol]	Structure
[Symbol]	Other

MEASUREMENTS:

Measurement	Value
Distance	_____
Angle	_____
Area	_____
Volume	_____
Other	_____

ADJUSTMENTS:

Adjustment	Value
Distance	_____
Angle	_____
Area	_____
Volume	_____
Other	_____

REMARKS:

CONCLUSIONS:

RECOMMENDATIONS:

APPENDICES:

REFERENCES:

NOTES:

REVISIONS:

APPROVALS:

SIGNATURES:

DATE:

PROJECT:

CLIENT:

SURVEYOR:

DATE:

PROJECT:

CLIENT:

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APPENDIX 2

Surface level +10.8 m
Water struck at +7.8 m
September 1981

Overburden 2.2 m
Mineral 3.8 m
Bedrock 0.8 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Brickearth	Silt, brown	0.4	0.7
	Clay, silty, brown, with a few pebbles near base	1.5	2.2
Head Gravel	a 'Very clayey' gravel Gravel: fine with coarse, angular to subrounded; flint, some white and porous Sand: coarse with fine and medium Fines: clay	0.8	3.0
Raised Beach Deposits (younger)	b 'Clayey' pebbly sand Gravel: coarse and fine, angular to subrounded; flint, some white and porous Sand: fine with traces of medium and coarse; quartz Fines: silt, brown	2.0	5.0
	c Sandy gravel Gravel: fine and coarse, angular to well rounded; flint (some white and porous), chalk and other rock fragments Sand: fine with coarse and medium; quartz	1.0	6.0
London Clay	Clay, stiff, dark olive grey with a few rounded flint pebbles	0.8+	6.8

GRADING

	Mean for deposit percentages			Depth below surface (m)	Percentages						
	Fines	Sand	Gravel		Fines	Sand			Gravel		
						-4	+4 -1	+1 -4	+4 -16	+16 -64	+64 mm
a	37	17	46	2.2-3.0	37	5	4	8	29	17	0
b	15	79	6	3.0-4.0	15	70	1	1	6	7	0
				4.0-5.0	15	84	1	0	0	0	0
				Mean	15	77	1	1	3	3	0
c	3	56	41	5.0-6.0	3	41	7	8	19	22	0
b+c	11	72	17	3.0-6.0	11	66	3	3	8	9	0
a+b+c	16	60	24	2.2-6.0	16	53	3	4	13	11	0

APPENDIX 3

APPENDIX 4

Bellamy Roberts		Page 1
Clover House Western Lane Odiham Hants RG29 1TU		
Date 26/02/2020 12:39 File	Designed by jasonbrown Checked by	
XP Solutions Source Control 2015.1		

ICP SUDS Mean Annual Flood

Input

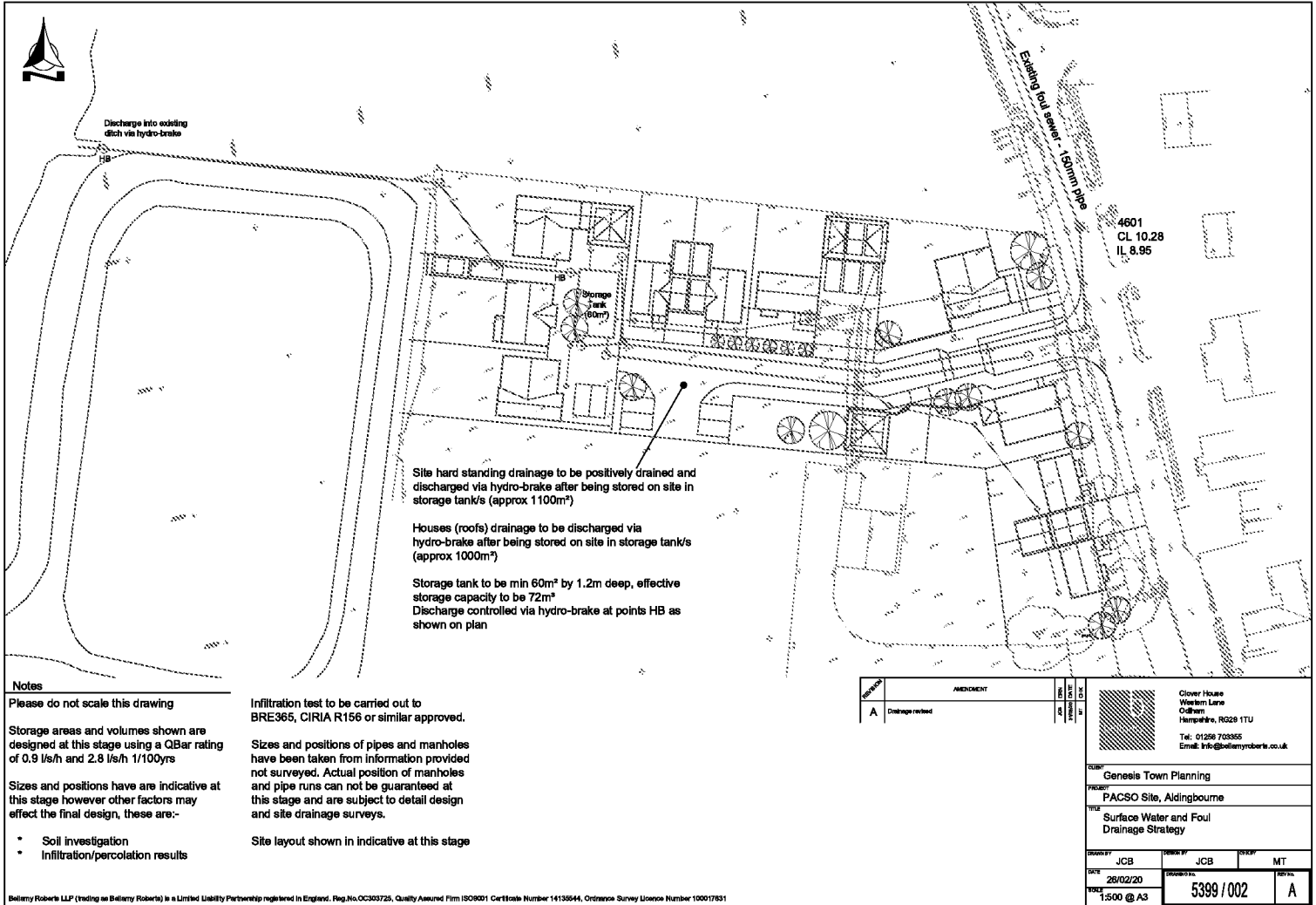
Return Period (years)	100	Soil	0.300
Area (ha)	0.410	Urban	0.000
SAAR (mm)	797	Region Number	Region 7

Results l/s

QBAR Rural	0.9
QBAR Urban	0.9
Q100 years	2.8
Q1 year	0.7
Q30 years	2.0
Q100 years	2.8

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APPENDIX 5



Notes

Please do not scale this drawing

Storage areas and volumes shown are designed at this stage using a QBar rating of 0.9 l/s/h and 2.8 l/s/h 1/100yrs

Sizes and positions have are indicative at this stage however other factors may effect the final design, these are:-

- Soil investigation
- Infiltration/percolation results

Infiltration test to be carried out to BRE365, CIRIA R156 or similar approved.

Sizes and positions of pipes and manholes have been taken from information provided not surveyed. Actual position of manholes and pipe runs can not be guaranteed at this stage and are subject to detail design and site drainage surveys.

Site layout shown in indicative at this stage

AMENDMENT		REV	DATE
A	Drawings revised	1	28/02/20



Bellamy Roberts LLP
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Tel: 01296 703955
Email: info@bellamyroberts.co.uk

Client: Genesis Town Planning			
Project: PACSO Site, Aldingbourne			
Title: Surface Water and Foul Drainage Strategy			
Drawn by: JCB	Check by: JCB	Drawn by: MT	Check by: MT
Date: 28/02/20	Scale: 1:500 @ A3	Project No: 5399 / 002	Rev: A

APPENDIX 6

Bellamy Roberts				Page 1	
Clover House		PACSO Site			
Western Lane		Aldingbourne			
Odiham Hants RG29 1TU		Storage tank			
Date Feb 2020		Designed by JCB			
File DBS 1IN100YRS +40% EVEN...		Checked by MT			
XP Solutions		Source Control 2015.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	8.548	0.548	2.7	32.9	O K
30 min Summer	8.732	0.732	2.7	43.9	O K
60 min Summer	8.893	0.893	2.7	53.6	O K
120 min Summer	8.992	0.992	2.7	59.5	O K
180 min Summer	9.012	1.012	2.7	60.7	O K
240 min Summer	9.009	1.009	2.7	60.5	O K
360 min Summer	8.986	0.986	2.7	59.2	O K
480 min Summer	8.955	0.955	2.7	57.3	O K
600 min Summer	8.920	0.920	2.7	55.2	O K
720 min Summer	8.884	0.884	2.7	53.1	O K
960 min Summer	8.811	0.811	2.7	48.6	O K
1440 min Summer	8.640	0.640	2.7	38.4	O K
2160 min Summer	8.424	0.424	2.7	25.4	O K
2880 min Summer	8.288	0.288	2.7	17.3	O K
4320 min Summer	8.154	0.154	2.4	9.3	O K
5760 min Summer	8.102	0.102	2.2	6.1	O K
7200 min Summer	8.085	0.085	1.9	5.1	O K
8640 min Summer	8.075	0.075	1.6	4.5	O K
10080 min Summer	8.067	0.067	1.5	4.0	O K
15 min Winter	8.618	0.618	2.7	37.1	O K
30 min Winter	8.825	0.825	2.7	49.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	169.307	0.0	34.8	18	
30 min Summer	115.237	0.0	47.4	33	
60 min Summer	73.889	0.0	60.9	62	
120 min Summer	45.241	0.0	74.6	120	
180 min Summer	33.752	0.0	83.5	176	
240 min Summer	27.344	0.0	90.2	204	
360 min Summer	20.255	0.0	100.2	268	
480 min Summer	16.336	0.0	107.8	336	
600 min Summer	13.810	0.0	113.9	406	
720 min Summer	12.031	0.0	119.1	476	
960 min Summer	9.666	0.0	127.5	616	
1440 min Summer	7.082	0.0	140.1	880	
2160 min Summer	5.195	0.0	154.3	1232	
2880 min Summer	4.172	0.0	165.2	1560	
4320 min Summer	3.067	0.0	182.1	2248	
5760 min Summer	2.469	0.0	195.5	2936	
7200 min Summer	2.090	0.0	206.9	3672	
8640 min Summer	1.827	0.0	217.0	4392	
10080 min Summer	1.632	0.0	226.2	5136	
15 min Winter	169.307	0.0	39.0	18	
30 min Winter	115.237	0.0	53.1	32	
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Bellamy Roberts					Page 2
Clover House			PACSO Site		
Western Lane			Aldingbourne		
Odiham Hants RG29 1TU			Storage tank		
Date Feb 2020			Designed by JCB		
File DBS 1IN100YRS +40% EVEN...			Checked by MT		
XP Solutions			Source Control 2015.1		
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.011	1.011	2.7	60.7	O K
120 min Winter	9.136	1.136	2.7	68.1	O K
180 min Winter	9.170	1.170	2.8	70.2	O K
240 min Winter	9.169	1.169	2.8	70.1	O K
360 min Winter	9.136	1.136	2.7	68.2	O K
480 min Winter	9.093	1.093	2.7	65.6	O K
600 min Winter	9.041	1.041	2.7	62.5	O K
720 min Winter	8.986	0.986	2.7	59.2	O K
960 min Winter	8.873	0.873	2.7	52.4	O K
1440 min Winter	8.600	0.600	2.7	36.0	O K
2160 min Winter	8.307	0.307	2.7	18.4	O K
2880 min Winter	8.171	0.171	2.5	10.3	O K
4320 min Winter	8.091	0.091	2.0	5.5	O K
5760 min Winter	8.073	0.073	1.6	4.4	O K
7200 min Winter	8.063	0.063	1.4	3.8	O K
8640 min Winter	8.058	0.058	1.2	3.5	O K
10080 min Winter	8.053	0.053	1.1	3.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	73.889	0.0	68.2	62	
120 min Winter	45.241	0.0	83.6	118	
180 min Winter	33.752	0.0	93.5	174	
240 min Winter	27.344	0.0	101.0	226	
360 min Winter	20.255	0.0	112.2	282	
480 min Winter	16.336	0.0	120.7	360	
600 min Winter	13.810	0.0	127.6	440	
720 min Winter	12.031	0.0	133.3	514	
960 min Winter	9.666	0.0	142.8	666	
1440 min Winter	7.082	0.0	157.0	938	
2160 min Winter	5.195	0.0	172.8	1256	
2880 min Winter	4.172	0.0	185.0	1560	
4320 min Winter	3.067	0.0	204.0	2204	
5760 min Winter	2.469	0.0	219.0	2936	
7200 min Winter	2.090	0.0	231.8	3672	
8640 min Winter	1.827	0.0	243.1	4392	
10080 min Winter	1.632	0.0	253.3	5080	
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Bellamy Roberts		Page 4
Clover House	PACSO Site	
Western Lane	Aldingbourne	
Odiham Hants RG29 1TU	Storage tank	
Date Feb 2020	Designed by JCB	
File DBS 1IN100YRS +40% EVEN...	Checked by MT	
XP Solutions	Source Control 2015.1	

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 8.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	60.0	1.200	60.0	1.210	0.0

Hydro-Brake Optimum® Outflow Control

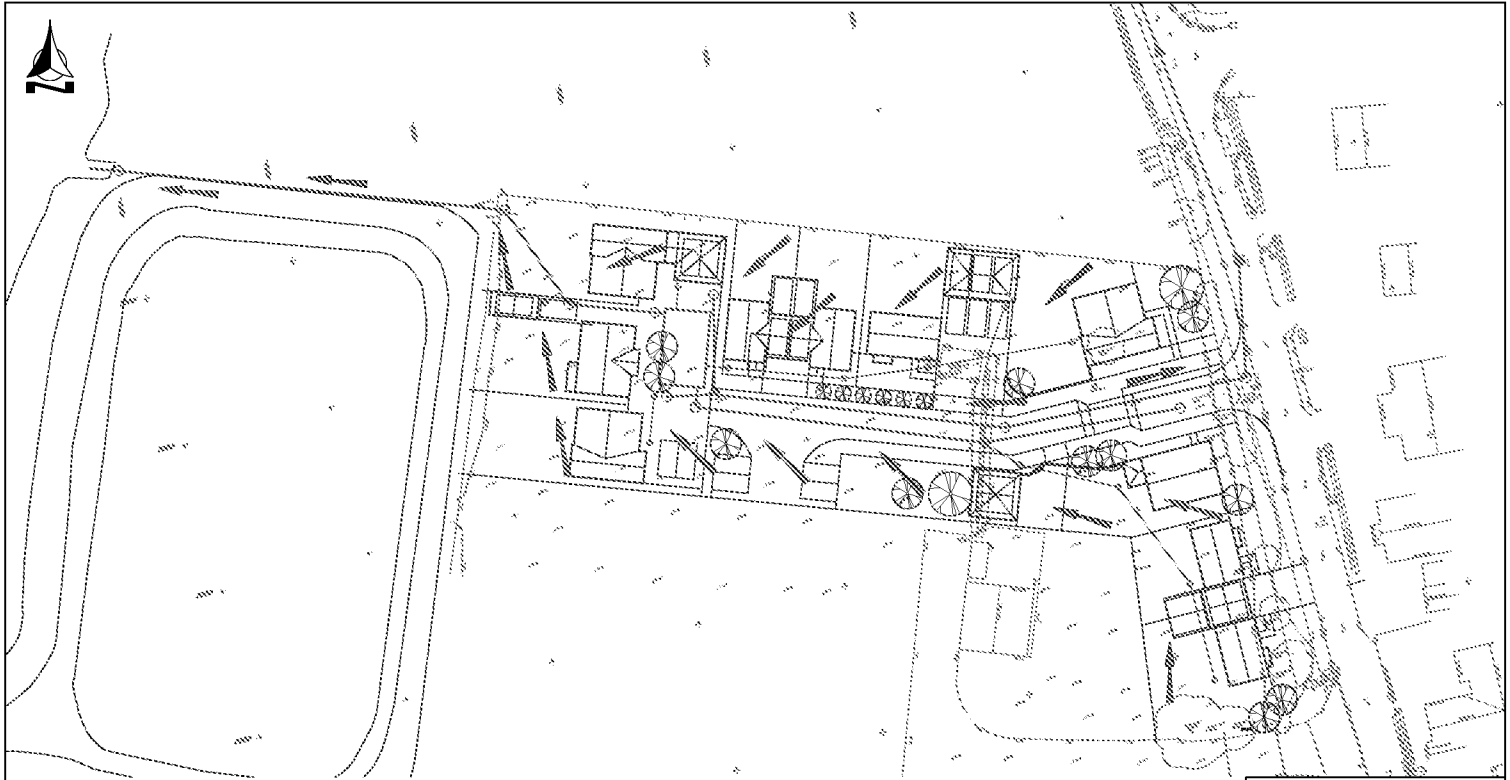
Unit Reference	MD-SHE-0077-2800-1200-2800
Design Head (m)	1.200
Design Flow (l/s)	2.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	77
Invert Level (m)	8.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.8
Flush-Flo™	0.336	2.7
Kick-Flo®	0.683	2.2
Mean Flow over Head Range	-	2.4

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	2.1	1.200	2.8	3.000	4.3	7.000	6.4
0.200	2.6	1.400	3.0	3.500	4.6	7.500	6.6
0.300	2.7	1.600	3.2	4.000	4.9	8.000	6.8
0.400	2.7	1.800	3.4	4.500	5.2	8.500	7.0
0.500	2.6	2.000	3.5	5.000	5.4	9.000	7.2
0.600	2.4	2.200	3.7	5.500	5.7	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

APPENDIX 7



Notes

Please do not scale this drawing

This drawing should be read in conjunction
with drawing 5399/002



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Hampshire, RG29 1TU
Tel: 01256 703955
Email: info@bellamyroberts.co.uk

Client Genesis Town Planning			
Project PACSO Site, Aidingbourne			
Title Indicative Suds Drainage Layout Surface Water Flow Routes			
Drawn by JCB	Check by JCB	Drawn by MT	Check by MT
Date 02/07/20	Scale 1:500 @ A3	Drawing No. 5399 / 003	

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