

J ROBERTS DESIGN LTD

**15 New Road
Staincross
Barnsley**

Drainage Design

Client

Mr J Wade

2087 / Aug 2019 / REV A

 J ROBERTS DESIGN LTD	Project 15 New Road, Staincross				Job Ref. 2087	
	Section Drainage Design				Sheet no./rev. 1	
	Calc. by JR	Date 21/08/2019	Chk'd by	Date	App'd by	Date

Introduction

The following calculations are for the proposed surface and foul water drainage for a residential development to the rear of 15 New Road, Staincross. The development consists of two new dwellings and associated access drive / parking. An existing property at No 15 is present to the north west corner of the development which has its own surface and foul water drainage systems and is not considered further in this report. The new development will have its own separate drainage systems.

From BGS website the site is in an area of Middle Coal measures of Clays and Mudstones therefore it is unlikely that soakaways would be viable on the site.

Percolation testing was undertaken between 8th July 2019 in within the rear garden of the lower plot. The result of the test was 25mm in 9 hours therefore soakaways have been confirmed not to be viable.

As there are no watercourses within the vicinity of the site a connection to the public sewers for the surface water run-off is the only viable method of managing the surface water run-off. A maximum discharge limit of 5L/s is proposed for the discharge from site as recommended by CIRIA to minimise the risk of blockages. With the limited discharge rate attenuation will be required to be provided to store the excess surface water run-off. The design standard for the attenuation tank will be up to a 1 in 100 year return period plus 30% climate change.

Standards and References

BRE 365 – Soakaway Design
Building Regulations - Pt H Drainage and waste disposal

SURFACE WATER DESIGN

The total impermeable areas for the site consists of roofs (246m²) and drives / parking (196m²) totaling 442m².

For a 5L/s restricted discharge and 1 in 100yr + 30% climate change allowance the volume of storage required is 9.6m³. This is proposed to be provided using cellular storage crates 6.5m x 2m x 0.8m deep.

The flow restriction is to be provided using a 52mm diameter orifice plate within the flow control chamber.

Refer to Microdrainage calculations for the attenuation design calculations. The drainage plan is appended to this report for reference.

The outlet from the surface water system is to be combined with the foul water system and connected off site into an existing private combined drain within the neighbouring garden. Refer to annotated YW plan appended.

Permission will be required to enable this connection to be made from house No 123 to the south of the development.

Drainage into the public sewers within New Road is not feasible without the aid of a package pumping station to lift the surface and foul water up to the existing public sewer levels.

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Date 22/08/2019 12:04 File cellular storage.SRCX	Designed by JR Checked by	
XP Solutions	Source Control 2018.1.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 21 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	115.807	0.557	0.0	4.1	4.1	6.9	O K
30 min Summer	115.923	0.673	0.0	4.5	4.5	8.3	O K
60 min Summer	115.953	0.703	0.0	4.6	4.6	8.7	O K
120 min Summer	115.891	0.641	0.0	4.4	4.4	7.9	O K
180 min Summer	115.813	0.563	0.0	4.1	4.1	7.0	O K
240 min Summer	115.743	0.493	0.0	3.9	3.9	6.1	O K
360 min Summer	115.635	0.385	0.0	3.4	3.4	4.7	O K
480 min Summer	115.561	0.311	0.0	3.0	3.0	3.8	O K
600 min Summer	115.508	0.258	0.0	2.7	2.7	3.2	O K
720 min Summer	115.468	0.218	0.0	2.5	2.5	2.7	O K
960 min Summer	115.415	0.165	0.0	2.1	2.1	2.0	O K
1440 min Summer	115.359	0.109	0.0	1.6	1.6	1.3	O K
2160 min Summer	115.324	0.074	0.0	1.2	1.2	0.9	O K
2880 min Summer	115.313	0.063	0.0	1.0	1.0	0.8	O K
4320 min Summer	115.301	0.051	0.0	0.7	0.7	0.6	O K
5760 min Summer	115.295	0.045	0.0	0.6	0.6	0.6	O K
7200 min Summer	115.290	0.040	0.0	0.5	0.5	0.5	O K
8640 min Summer	115.286	0.036	0.0	0.4	0.4	0.4	O K
10080 min Summer	115.283	0.033	0.0	0.4	0.4	0.4	O K
15 min Winter	115.880	0.630	0.0	4.4	4.4	7.8	O K
30 min Winter	116.011	0.761	0.0	4.8	4.8	9.4	O K
60 min Winter	116.026	0.776	0.0	4.9	4.9	9.6	O K
120 min Winter	115.916	0.666	0.0	4.5	4.5	8.2	O K
180 min Winter	115.799	0.549	0.0	4.1	4.1	6.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	117.105	0.0	9.9	21
30 min Summer	78.278	0.0	13.2	30
60 min Summer	49.937	0.0	16.8	46
120 min Summer	30.781	0.0	20.8	80
180 min Summer	22.866	0.0	23.1	112
240 min Summer	18.394	0.0	24.8	142
360 min Summer	13.477	0.0	27.3	204
480 min Summer	10.808	0.0	29.2	264
600 min Summer	9.101	0.0	30.7	324
720 min Summer	7.904	0.0	32.0	382
960 min Summer	6.321	0.0	34.1	502
1440 min Summer	4.605	0.0	37.3	740
2160 min Summer	3.349	0.0	40.7	1100
2880 min Summer	2.668	0.0	43.2	1452
4320 min Summer	1.933	0.0	47.0	2160
5760 min Summer	1.536	0.0	49.8	2872
7200 min Summer	1.285	0.0	52.0	3664
8640 min Summer	1.110	0.0	53.9	4352
10080 min Summer	0.981	0.0	55.6	5024
15 min Winter	117.105	0.0	11.1	21
30 min Winter	78.278	0.0	14.8	31
60 min Winter	49.937	0.0	18.9	48
120 min Winter	30.781	0.0	23.3	84
180 min Winter	22.866	0.0	25.9	116

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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
240 min Winter	115.703	0.453	0.0	3.7	3.7	5.6	O K
360 min Winter	115.571	0.321	0.0	3.1	3.1	4.0	O K
480 min Winter	115.491	0.241	0.0	2.6	2.6	3.0	O K
600 min Winter	115.439	0.189	0.0	2.3	2.3	2.3	O K
720 min Winter	115.404	0.154	0.0	2.0	2.0	1.9	O K
960 min Winter	115.361	0.111	0.0	1.6	1.6	1.4	O K
1440 min Winter	115.324	0.074	0.0	1.2	1.2	0.9	O K
2160 min Winter	115.309	0.059	0.0	0.9	0.9	0.7	O K
2880 min Winter	115.301	0.051	0.0	0.7	0.7	0.6	O K
4320 min Winter	115.292	0.042	0.0	0.5	0.5	0.5	O K
5760 min Winter	115.286	0.036	0.0	0.4	0.4	0.4	O K
7200 min Winter	115.282	0.032	0.0	0.3	0.3	0.4	O K
8640 min Winter	115.279	0.029	0.0	0.3	0.3	0.4	O K
10080 min Winter	115.278	0.028	0.0	0.3	0.3	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
240 min Winter	18.394	0.0	27.8	148
360 min Winter	13.477	0.0	30.6	208
480 min Winter	10.808	0.0	32.7	268
600 min Winter	9.101	0.0	34.4	328
720 min Winter	7.904	0.0	35.8	386
960 min Winter	6.321	0.0	38.2	502
1440 min Winter	4.605	0.0	41.8	734
2160 min Winter	3.349	0.0	45.6	1084
2880 min Winter	2.668	0.0	48.4	1456
4320 min Winter	1.933	0.0	52.6	2204
5760 min Winter	1.536	0.0	55.7	2904
7200 min Winter	1.285	0.0	58.3	3600
8640 min Winter	1.110	0.0	60.4	4304
10080 min Winter	0.981	0.0	62.3	4984

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.362	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.045

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 0.015	4 8 0.015	8 12 0.015			

Model Details

Storage is Online Cover Level (m) 116.700

Cellular Storage Structure

Invert Level (m) 115.250 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	13.0	13.0	0.800	13.0	26.6	0.801	0.0	26.6

Orifice Outflow Control

Diameter (m) 0.052 Discharge Coefficient 0.600 Invert Level (m) 115.250

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	Calc. by	Date	Chk'd by	Date	App'd by	Date
	JR	21/08/2019				

FOUL WATER DESIGN

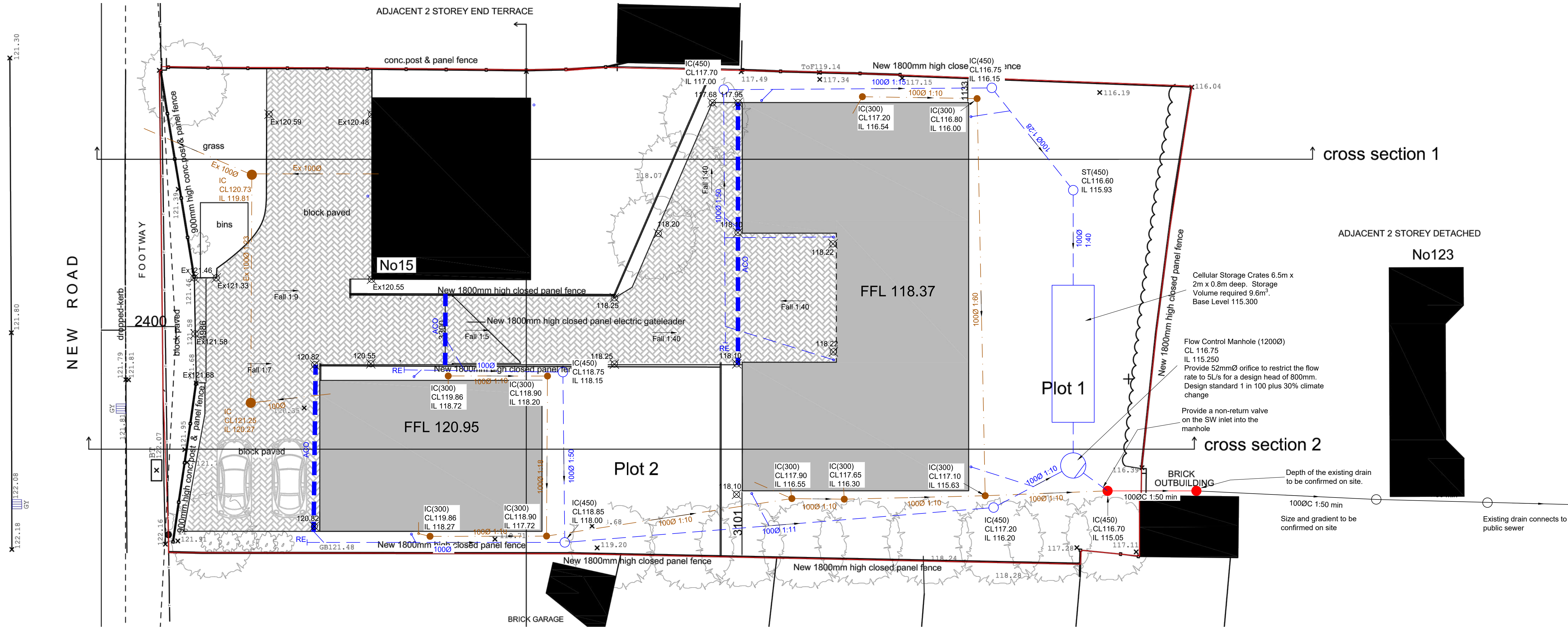
For each dwelling the typical discharge units is 9.7DU's.

Therefore for the two new dwellings the peak flow rate is ; $FI = 0.5 * \sqrt{(9.7*2)} = \mathbf{2.20}$; L/s

The dry weather flow would be; $DWF = FI / 6 = \mathbf{0.37}$; L/s

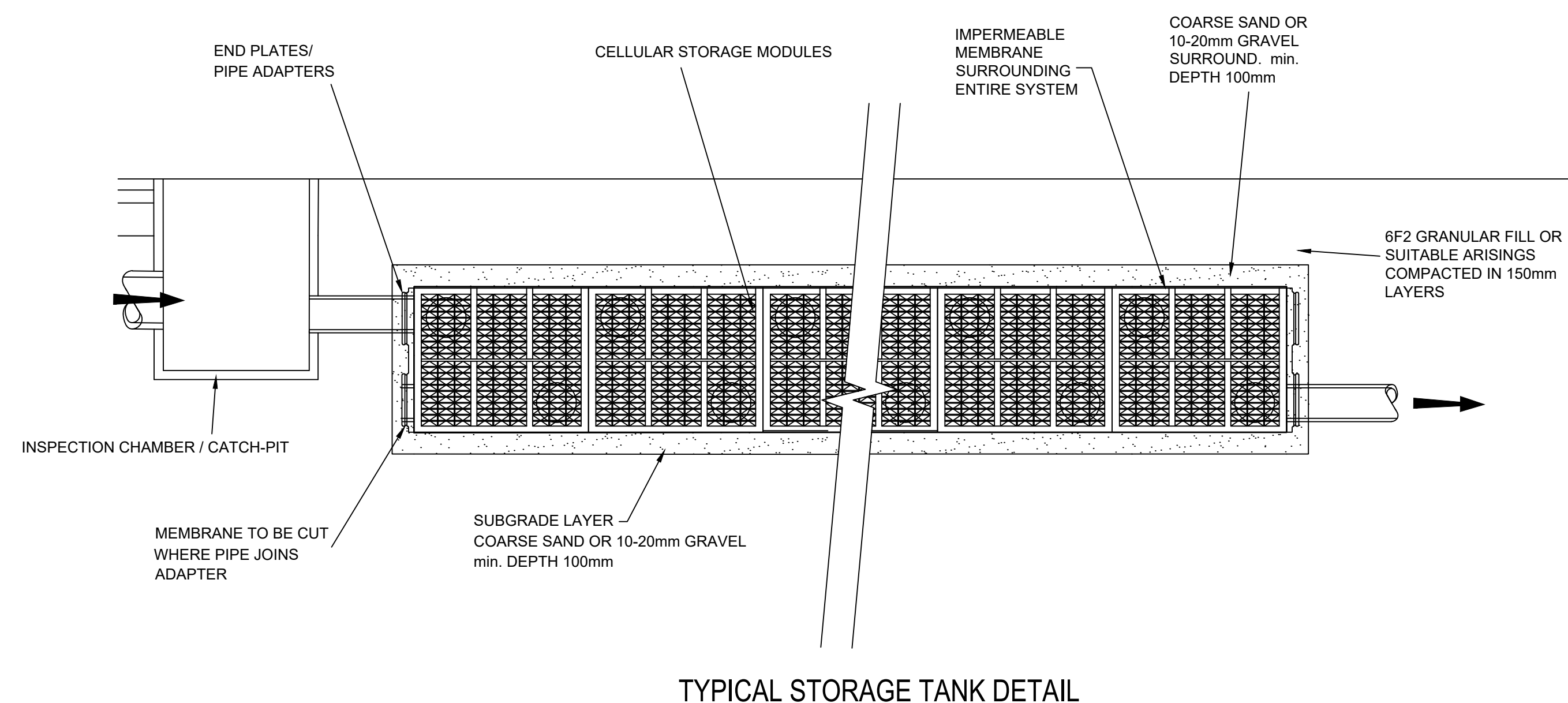
Therefore the combined drain off site into the existing system needs to be a minimum of a 100mm diameter drain at a minimum gradient of 1 in 50. Capacity = 8.6L/s

Maximum design flow is 5.0L/s (SW) + 2.2L/s (FW) = 7.7L/s

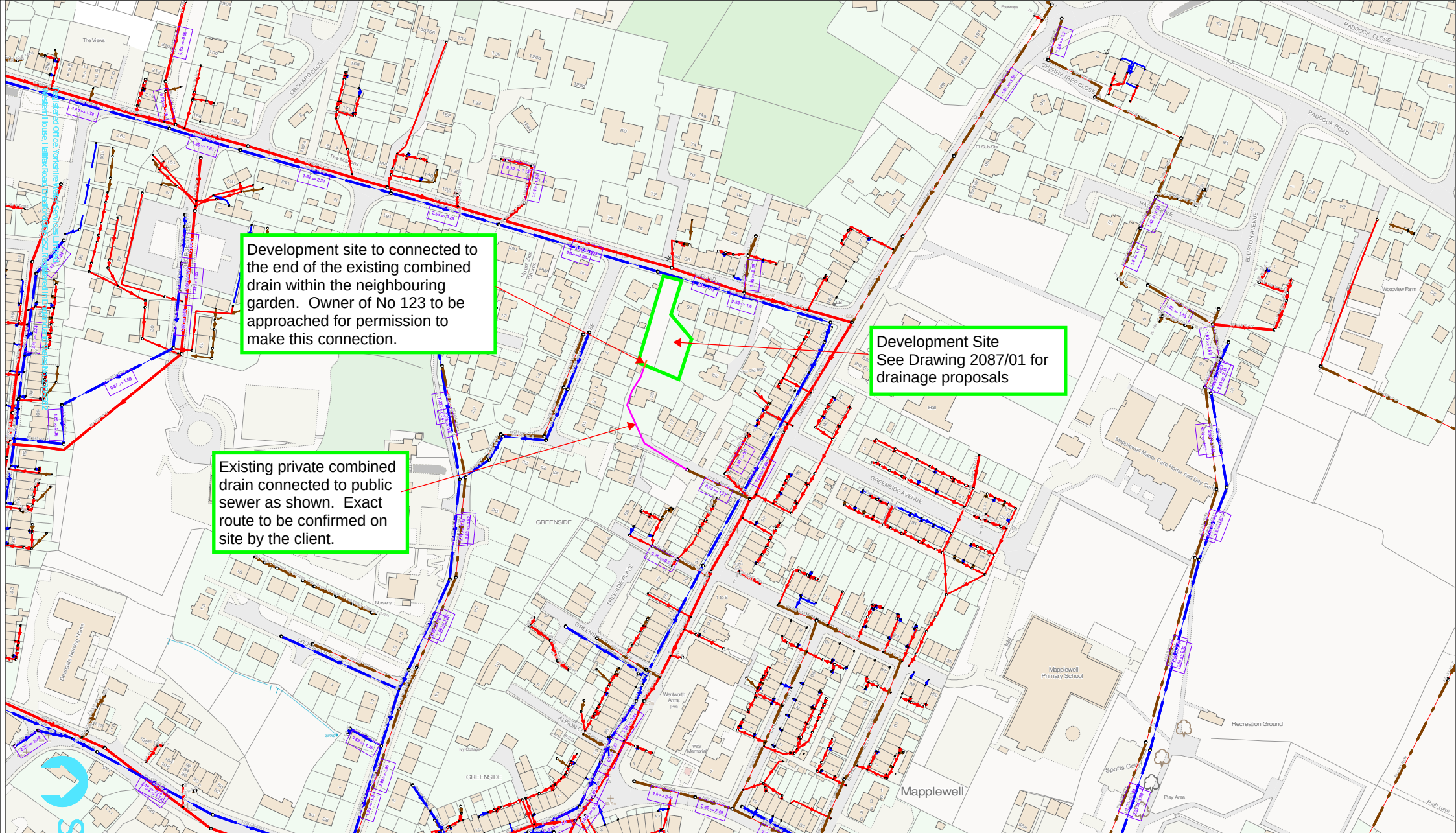


P2	Drainage layout amended to client comments	JR	22.08.2019		
P1	Preliminary issue.	JR	21.08.2019		
Rev	Description	Dr	Ch	Date	
Client					
Mr J Wade					
Project					
15 NEW ROAD, STAINCROSS BANSLEY					
Title					
DRAINAGE PLAN AND INDICATIVE LEVELS					
J ROBERTS DESIGN LTD Tel: 01709 917154 www.jrobertsdesignltd.com		Sheet Size	A1	Scale	1:100
		Drawn	JR	Drawing Number	2087/01
		Checked	JR	Rev	P2
		Approved	JR		

1. DO NOT SCALE - Use figured dimensions only.
2. All dimensions shown are in millimetres unless otherwise stated.
3. The Contractor is to verify all dimension on site before commencing work or preparing shop drawings.
4. This drawing is to be read in conjunction with all Engineers and Architects drawings and specifications.



P1	Preliminary issue.	JR		21.08.2019
Rev	Description	Dr	Ch	Date
Client Mr J Wade				
Project 15 NEW ROAD, STAINCROSS BANSLEY				
Title DRAINAGE DETAILS				
J ROBERTS DESIGN LTD Tel: 01709 917154 www.jrobertsdesignltd.com		Sheet Size	A1	
		Drawn	JR	
		Checked	JR	
		Approved	JR	
		Scale	AS NOTED	
		Drawing Number	2087/02	Rev P1



Development site to connected to the end of the existing combined drain within the neighbouring garden. Owner of No 123 to be approached for permission to make this connection.

Existing private combined drain connected to public sewer as shown. Exact route to be confirmed on site by the client.

Development Site
See Drawing 2087/01 for drainage proposals