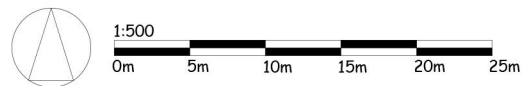




## **APPENDIX A**

### **SITE LAYOUT**



PROJECT: South Side, Steeple Aston	DEPARTMENT: Planning	DRAWN BY: GL	CHECKED BY:	RECTORY HOMES LTD RECTORY HOUSE THAME ROAD HADDENHAM, AYLESBURY, BUCKINGHAMSHIRE, HP17 8DA T: 01844 295100 F: 01844 295350 www.rectory.co.uk		
DRAWING: Proposed Site Plan	DRAWING No: P.224.SP.01	SCALE: 1:500	PAPER: A3			REV: H
	STATUS: PROPOSED	DATE: 28.07.17				

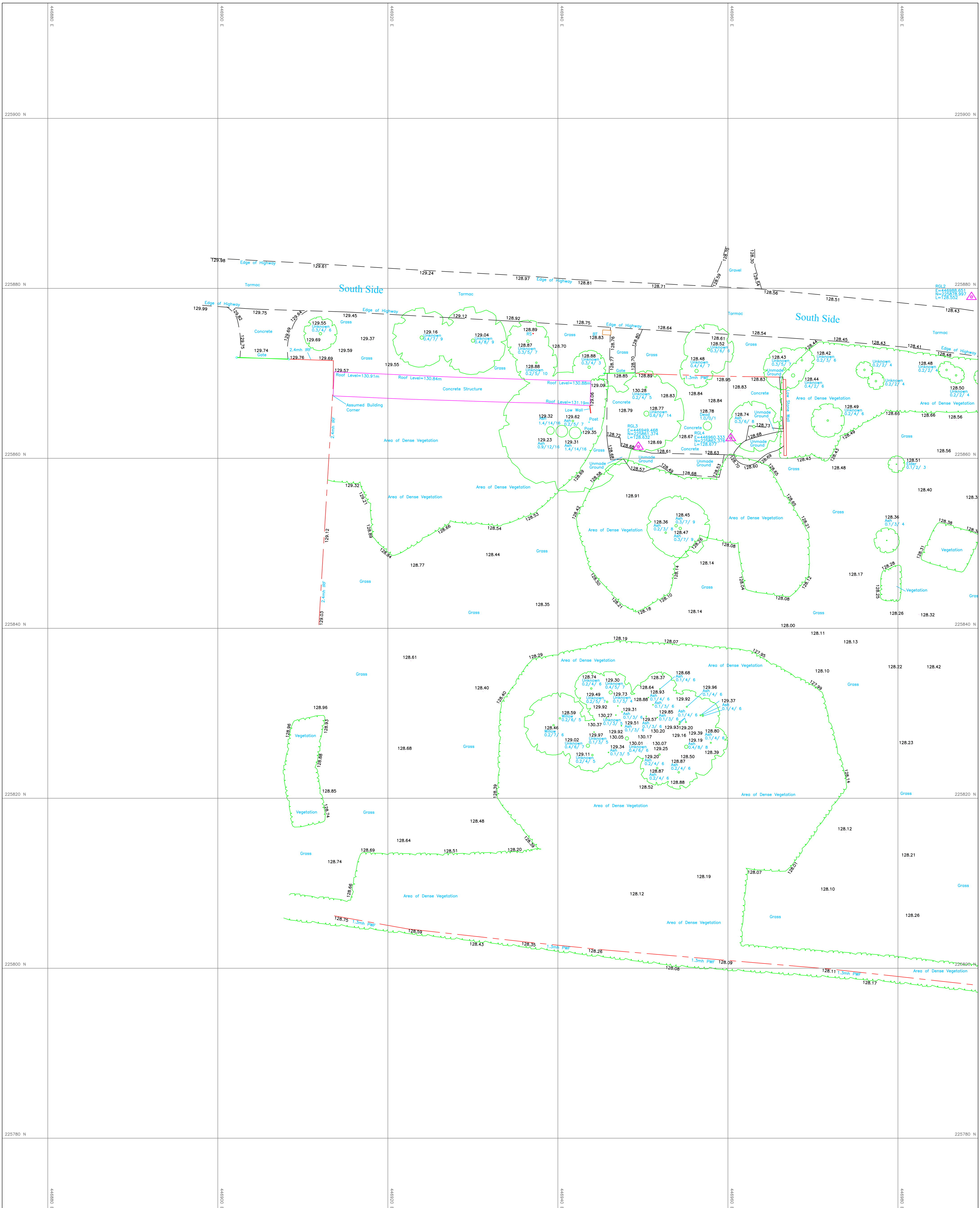
THIS DRAWING IS THE PROPERTY OF RECTORY HOMES LIMITED AND MAY NOT BE COPIED, LENT, REPRODUCED OR DISCLOSED WITHOUT THEIR WRITTEN PERMISSION



## **APPENDIX B**

### **SITE TOPOGRAPHICAL SURVEY**





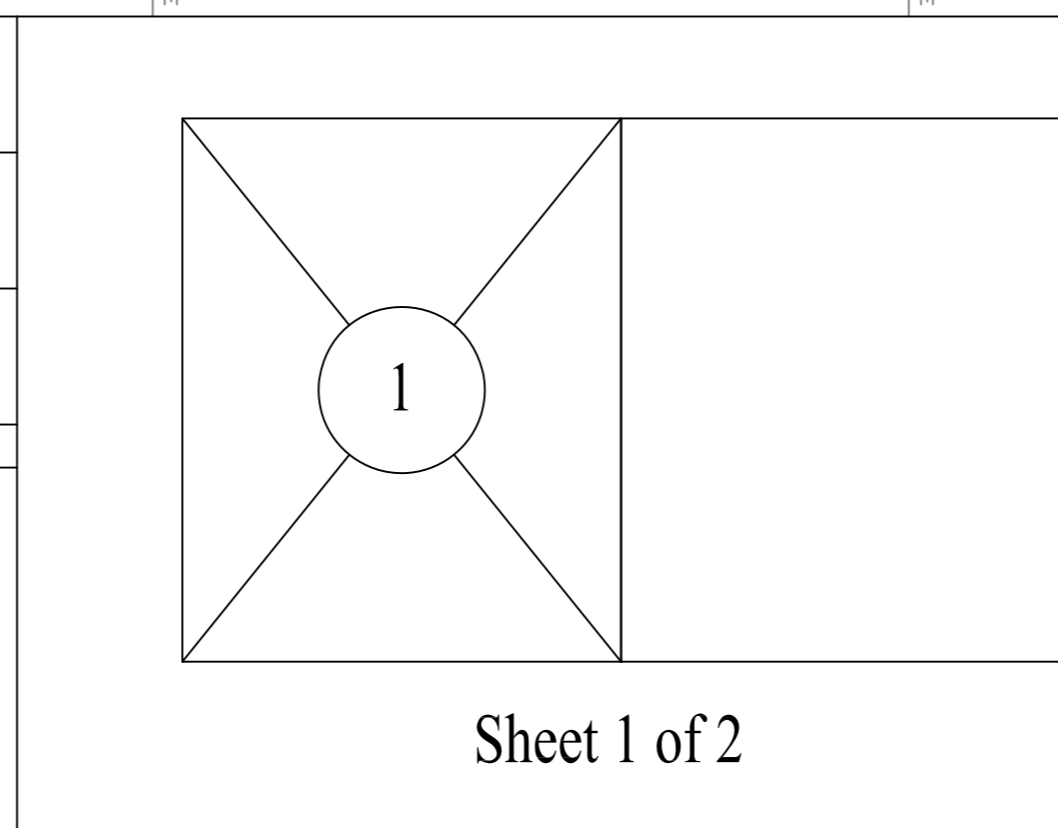
**RGL Surveys Ltd**  
 Land & Measured Building Surveyors  
 Building S8  
 Westcott Venture Park  
 Westcott  
 Bucks HP18 0XB  
 Tel: 01296 651833  
 Email: mail@rglsurveys.co.uk

**RGL**  
 www.rglsurveys.co.uk

Client: **Rectory Homes**  
 Rectory House  
 Thame Road  
 Haddenham  
 HP17 8DA

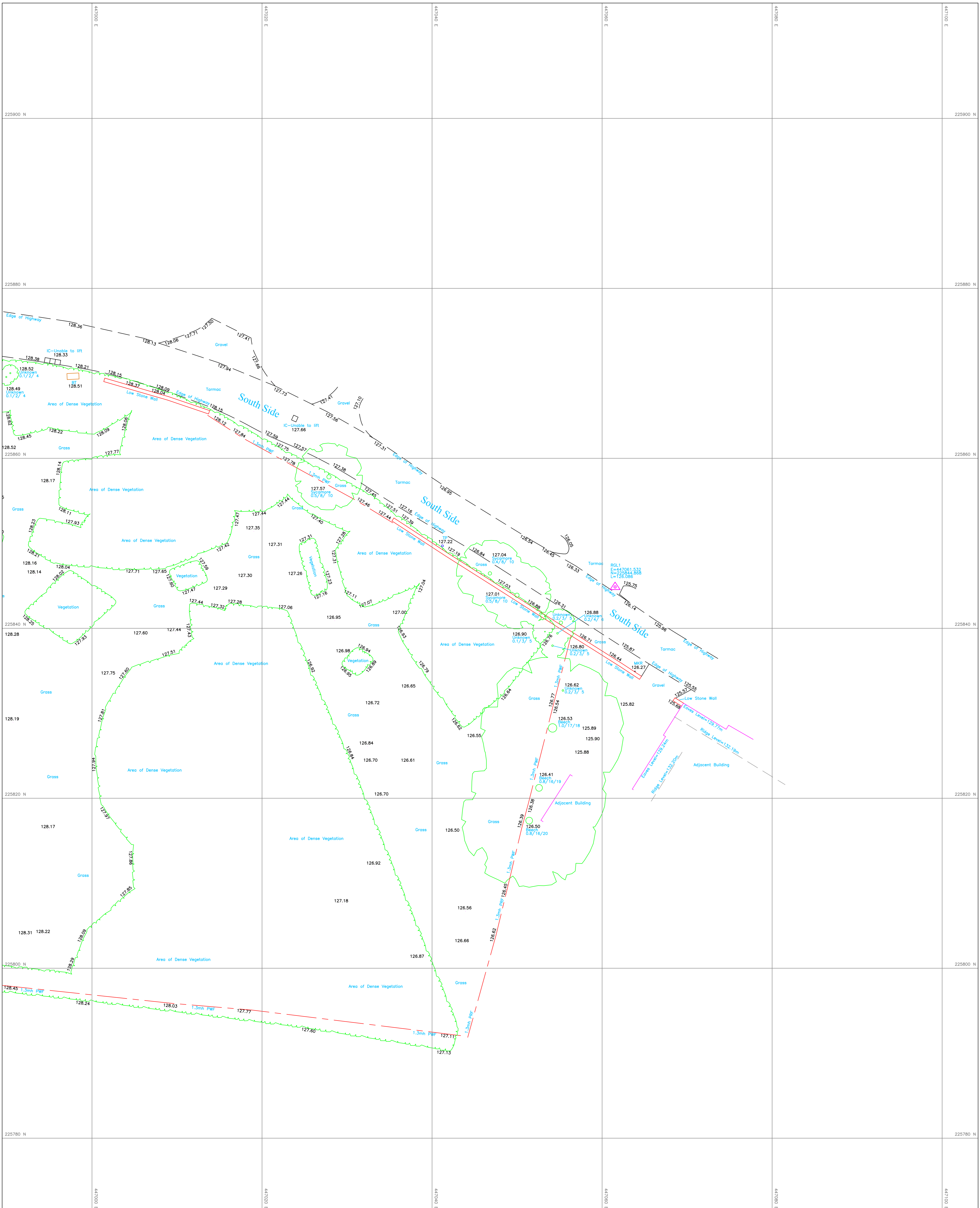
Drawn: OS, Checked: AL  
 Levelling: All levels relate to OS Active GPS Network.  
 Date of Survey: June 2017  
 Drawing Number: RGL-17-2679-01  
 Job Title: Land to South of Southside Steeple Aston  
 Site Survey

Scale: 1:200 @A1



**Legend**

B	Bollard	MH	Manhole
BT	British Telecom	MKR	Marker Post
CB	Cable Television	PRF	Post & Rail Fence
CBF	Control Box	PS	Pipe Size
CBP	Closed Board Fence	PWF	Post & Wire Fence
CL	Concrete Block Paving	RE	Rodding Eye
CLF	Cover Level	RN	Road Name
DC	Chain Link Fence	RS	Road Sign
DCP	Concrete Paving Slabs	SY	Stay Wire
DK	Drainage Channel	SYM	Sycamore MB
DKC	Drop Kerb	TL	Trunk(Road)/Sill/Road/Height(Approx)
DP	Down Pipe	TL	Traffic Light
ER	Earth Rod	TB	Top of Bank
FB	Flowerbed	TF	Tactile Paving
FP	Fire Hydrant	UTL	Unable to Lift
FP	Flag Pole	VP	Vent Pipe
G	Gully	WV	Water Valve
GV	Gas Valve	WL	Water Level
IC	Inspection Cover	(2.70)	Ceiling Height/Level (metres)
IRF	Iron Rolling Fence	(2.70)	False Ceiling Height/Level (metres)
(2.70)	Ceiling Height (metres)	(2.42)	Beam Height/Level (metres)
(2.70)	False Ceiling Height (metres)	f-s=1.50	Floor to Sill Height/Level (metres)
f-s=1.50	Floor to Sill Height (metres)	s-h=0.67	Sill to Head Height/Level (metres)
s-h=0.67	Sill to Head Height (metres)	+50.00	Finished Floor Level (metres)
+50.00m	Finished Floor Level (metres)	+52.00	Ceiling/Beam Level (metres)
Δ UP	All Arrows Indicate Direction Up	→	All Arrows Indicate Direction Up
Δ UP	All Arrows Indicate Direction Up	▽ (0.00/2.50)	Floor Level (Ceiling Height)
IL	Invert Level	▽	Soffit Level
KW	Kerb Weir	Δ 0.00	Sill Level
LP	Lamp Post	DIR 110.83	Lintel Level
		112.88	Door Width
		1.50	Door Height
		2.02	



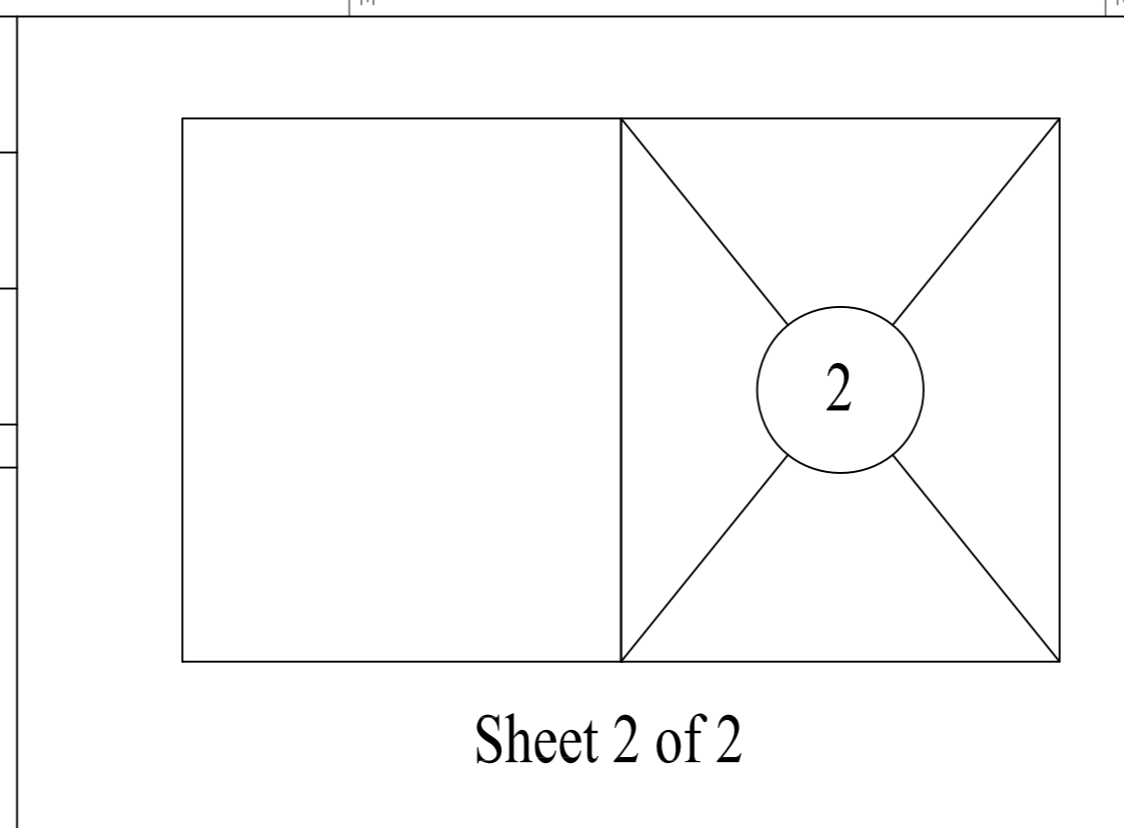
**RGL Surveys Ltd**  
 Land & Measured Building Surveyors  
 Building S8  
 Westcott Venture Park  
 Westcott  
 Bucks HP18 0XB  
 Tel: 01296 651833  
 Email: mail@rglsurveys.co.uk  
 www.rglsurveys.co.uk

**RGL**

Client: **Rectory Homes**  
 Rectory House  
 Thame Road  
 Haddenham  
 HP17 8DA

Drawn: OS, Checked: AL  
 Levelling: All levels relate to OS Active GPS Network.  
 Drawing Number: **RGL-17-2679-01**  
 Job Title: **Land to South of Southside Steeple Aston**

Scale: **1:200 @A1**  
 Date of Survey: **June 2017**  
 Notes: **Site Survey**



**Legend**

- Bollard
- British Telecom
- Cable Television
- Control Box
- Closed Board Fence
- Concrete Block Paving
- Cover Level
- Chain Link Fence
- Concrete Paving Slabs
- DC
- Drainage Channel
- Drop Kerb
- Down Pipe
- Earth Rod
- Flowerbed
- Fire Hydrant
- Flag Pole
- Gully
- Gas Valve
- Inspection Cover
- Iron Rolling Fence
- Ceiling Height (metres)
- Beam Height (metres)
- Faise Ceiling Height (metres)
- Beam Height (metres)
- Floor to Sill Height (metres)
- Sill to Head Height (metres)
- Finished Floor Level (metres)
- All Arrows Indicate Direction Up
- 50.00(2.50)
- +50.00m
- All Arrows Indicate Direction Up
- Invert Level
- Kerb Weir
- Lamp Post

OS ACTIVE  
GPS NETWORK


- MH
- MKR
- PRF
- PS
- PWF
- RE
- RN
- RS
- SY
- Sycamore MB
- TL
- TGB
- TP
- UTL
- VP
- WV
- WL
- (2.70)
- (2.70)
- (2.42)
- (2.70)
- (2.42)
- f-s=1.50
- s-h=0.67
- +50.00m
- All Arrows Indicate Direction Up
- DIR 110.83
- INF 112.88
- 1.50
- 2.00

- Manhole
- Marker Post
- Post & Rail Fence
- Pipe Size
- Post & Wire Fence
- Rodding Eye
- Road Name
- Road Sign
- Slay Wire
- Species Multi Bowl
- Trunk(Road)/Spread(Road)/Height(Approx)
- Traffic Light
- Top of Bank
- Tactile Paving
- Unable To Lift
- Vent Pipe
- Water Valve
- Water Level
- Ceiling Height/Level (metres)
- Faise Ceiling Height/Level (metres)
- Beam Height/Level (metres)
- Floor to Sill Height/Level (metres)
- Sill to Head Height/Level (metres)
- Finished Floor Level (metres)
- Ceiling/Beam Level (metres)
- All Arrows Indicate Direction Up
- Floor Level (Ceiling Height)
- Soffit Level
- Sill Level
- Lintel Level
- Door Width
- Door Height



## **APPENDIX C**

### **GREENFIELD / POST DEVELOPMENT RUNOFF CALCULATIONS**

MJA Consulting		Page 1
Monarch House Barton Lane OX14 3NB	Land to the south of Southside Greenfield Rates	
Date 10/05/2019 File Plots 1-9.CASX	Designed by S.Smith Checked by	
Innovyze	Source Control 2017.1.2	


ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.231	Urban	0.000
SAAR (mm)	691	Region Number	Region 6

**Results 1/s**

QBAR Rural	1.0
QBAR Urban	1.0
Q100 years	3.2
Q1 year	0.8
Q30 years	2.3
Q100 years	3.2

MJA Consulting		Page 1
Monarch House Barton Lane OX14 3NB	Land to the south of Southside Greenfield Volume	
Date 10/05/2019 File Plots 1-9.CASX	Designed by S.Smith Checked by	
Innovyze	Source Control 2017.1.2	

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.403
Areal Reduction Factor	1.00
Area (ha)	0.231
SAAR (mm)	696
CWI	104.280
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	45.78
Greenfield Runoff Volume (m <sup>3</sup> )	65.904



Cascade Summary of Results for Area 1.srcx

**Upstream    Outflow To    Overflow To  
Structures**

(None) Area 2.srcx                      (None)

Half Drain Time : 283 minutes.


Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	128.659	0.409	0.0	0.5	0.5	9.6	O K
30 min Summer	128.716	0.466	0.0	0.6	0.6	12.4	Flood Risk
60 min Summer	128.766	0.516	0.0	0.6	0.6	14.9	Flood Risk
120 min Summer	128.802	0.552	0.0	0.6	0.6	16.6	Flood Risk
180 min Summer	128.809	0.559	0.0	0.6	0.6	17.0	Flood Risk
240 min Summer	128.805	0.555	0.0	0.6	0.6	16.8	Flood Risk
360 min Summer	128.795	0.545	0.0	0.6	0.6	16.3	Flood Risk
480 min Summer	128.784	0.534	0.0	0.6	0.6	15.8	Flood Risk
600 min Summer	128.772	0.522	0.0	0.6	0.6	15.2	Flood Risk
720 min Summer	128.760	0.510	0.0	0.6	0.6	14.6	Flood Risk
960 min Summer	128.738	0.488	0.0	0.6	0.6	13.5	Flood Risk
1440 min Summer	128.698	0.448	0.0	0.6	0.6	11.6	O K
2160 min Summer	128.649	0.399	0.0	0.5	0.5	9.2	O K
2880 min Summer	128.606	0.356	0.0	0.5	0.5	7.3	O K
4320 min Summer	128.536	0.286	0.0	0.4	0.4	4.7	O K
5760 min Summer	128.483	0.233	0.0	0.4	0.4	3.1	O K
7200 min Summer	128.442	0.192	0.0	0.4	0.4	2.1	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	138.874	0.0	10.2	21
30 min Summer	90.946	0.0	13.3	34
60 min Summer	56.713	0.0	16.6	64
120 min Summer	34.162	0.0	20.0	122
180 min Summer	25.057	0.0	22.0	180
240 min Summer	19.992	0.0	23.4	214
360 min Summer	14.500	0.0	25.4	276
480 min Summer	11.545	0.0	27.0	340
600 min Summer	9.667	0.0	28.3	410
720 min Summer	8.358	0.0	29.3	478
960 min Summer	6.638	0.0	31.1	616
1440 min Summer	4.791	0.0	33.6	882
2160 min Summer	3.452	0.0	36.4	1272
2880 min Summer	2.733	0.0	38.4	1644
4320 min Summer	1.964	0.0	41.4	2340
5760 min Summer	1.552	0.0	43.6	3056
7200 min Summer	1.292	0.0	45.4	3752

Cascade Summary of Results for Area 1.srcx

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
8640 min Summer	128.409	0.159	0.0	0.3	0.3	1.5	O K
10080 min Summer	128.385	0.135	0.0	0.3	0.3	1.1	O K
15 min Winter	128.684	0.434	0.0	0.5	0.5	10.9	O K
30 min Winter	128.748	0.498	0.0	0.6	0.6	14.0	Flood Risk
60 min Winter	128.807	0.557	0.0	0.6	0.6	16.9	Flood Risk
120 min Winter	128.850	0.600	0.0	0.6	0.6	19.0	Flood Risk
180 min Winter	128.861	0.611	0.0	0.6	0.6	19.5	Flood Risk
240 min Winter	128.860	0.610	0.0	0.6	0.6	19.5	Flood Risk
360 min Winter	128.846	0.596	0.0	0.6	0.6	18.8	Flood Risk
480 min Winter	128.832	0.582	0.0	0.6	0.6	18.1	Flood Risk
600 min Winter	128.817	0.567	0.0	0.6	0.6	17.3	Flood Risk
720 min Winter	128.800	0.550	0.0	0.6	0.6	16.5	Flood Risk
960 min Winter	128.767	0.517	0.0	0.6	0.6	14.9	Flood Risk
1440 min Winter	128.709	0.459	0.0	0.6	0.6	12.1	Flood Risk
2160 min Winter	128.639	0.389	0.0	0.5	0.5	8.7	O K
2880 min Winter	128.580	0.330	0.0	0.5	0.5	6.3	O K
4320 min Winter	128.487	0.237	0.0	0.4	0.4	3.3	O K
5760 min Winter	128.424	0.174	0.0	0.3	0.3	1.7	O K
7200 min Winter	128.381	0.131	0.0	0.3	0.3	1.0	O K
8640 min Winter	128.352	0.102	0.0	0.3	0.3	0.6	O K
10080 min Winter	128.332	0.082	0.0	0.2	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.112	0.0	46.9	4488
10080 min Summer	0.980	0.0	48.1	5144
15 min Winter	138.874	0.0	11.4	21
30 min Winter	90.946	0.0	14.9	34
60 min Winter	56.713	0.0	18.6	62
120 min Winter	34.162	0.0	22.4	120
180 min Winter	25.057	0.0	24.6	176
240 min Winter	19.992	0.0	26.2	230
360 min Winter	14.500	0.0	28.5	290
480 min Winter	11.545	0.0	30.3	366
600 min Winter	9.667	0.0	31.7	442
720 min Winter	8.358	0.0	32.9	520
960 min Winter	6.638	0.0	34.8	666
1440 min Winter	4.791	0.0	37.7	950
2160 min Winter	3.452	0.0	40.7	1340
2880 min Winter	2.733	0.0	43.0	1704
4320 min Winter	1.964	0.0	46.3	2420
5760 min Winter	1.552	0.0	48.8	3064
7200 min Winter	1.292	0.0	50.8	3752
8640 min Winter	1.112	0.0	52.5	4416
10080 min Winter	0.980	0.0	53.9	5144

MJA Consulting		Page 3
Monarch House Barton Lane OX14 3NB		
Date 10/05/2019 16:09 File Plots 1-9.CASX	Designed by stewart Checked by	
Innovyze		Source Control 2017.1.2


Cascade Rainfall Details for Area 1.srcx

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.406	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.039

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.030	4	8	0.009

MJA Consulting		Page 4
Monarch House Barton Lane OX14 3NB		
Date 10/05/2019 16:09 File Plots 1-9.CASX	Designed by stewart Checked by	
Innovyze	Source Control 2017.1.2	

Cascade Model Details for Area 1.srcx

Storage is Online Cover Level (m) 129.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0
Membrane Percolation (mm/hr)	1000	Length (m)	14.8
Max Percolation (l/s)	45.2	Slope (1:X)	35.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	128.250	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 128.250

Cascade Summary of Results for Area 2.srcx

**Upstream    Outflow To    Overflow To**  
**Structures**

Area 1.srcx    Area 3.srcx            (None)

Half Drain Time : 1048 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	128.038	0.388	0.0	0.5	0.5	25.3	O K
30 min Summer	128.094	0.444	0.0	0.6	0.6	33.1	O K
60 min Summer	128.150	0.500	0.0	0.6	0.6	41.3	Flood Risk
120 min Summer	128.207	0.557	0.0	0.6	0.6	49.7	Flood Risk
180 min Summer	128.240	0.590	0.0	0.6	0.6	54.6	Flood Risk
240 min Summer	128.263	0.613	0.0	0.6	0.6	57.9	Flood Risk
360 min Summer	128.294	0.644	0.0	0.7	0.7	62.6	Flood Risk
480 min Summer	128.316	0.666	0.0	0.7	0.7	65.7	Flood Risk
600 min Summer	128.331	0.681	0.0	0.7	0.7	67.9	Flood Risk
720 min Summer	128.341	0.691	0.0	0.7	0.7	69.5	Flood Risk
960 min Summer	128.353	0.703	0.0	0.7	0.7	71.1	Flood Risk
1440 min Summer	128.350	0.700	0.0	0.7	0.7	70.7	Flood Risk
2160 min Summer	128.327	0.677	0.0	0.7	0.7	67.3	Flood Risk
2880 min Summer	128.305	0.655	0.0	0.7	0.7	64.1	Flood Risk
4320 min Summer	128.264	0.614	0.0	0.6	0.6	58.1	Flood Risk
5760 min Summer	128.224	0.574	0.0	0.6	0.6	52.2	Flood Risk
7200 min Summer	128.186	0.536	0.0	0.6	0.6	46.6	Flood Risk


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	138.874	0.0	35.3	52
30 min Summer	90.946	0.0	41.5	67
60 min Summer	56.713	0.0	57.8	88
120 min Summer	34.162	0.0	69.7	128
180 min Summer	25.057	0.0	76.7	188
240 min Summer	19.992	0.0	81.6	248
360 min Summer	14.500	0.0	88.4	368
480 min Summer	11.545	0.0	91.8	488
600 min Summer	9.667	0.0	93.8	606
720 min Summer	8.358	0.0	95.0	726
960 min Summer	6.638	0.0	96.2	964
1440 min Summer	4.791	0.0	95.8	1430
2160 min Summer	3.452	0.0	126.8	1748
2880 min Summer	2.733	0.0	133.8	2096
4320 min Summer	1.964	0.0	144.2	2848
5760 min Summer	1.552	0.0	152.0	3592
7200 min Summer	1.292	0.0	158.2	4328



Cascade Summary of Results for Area 2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
8640 min Summer	128.151	0.501	0.0	0.6	0.6	41.5	Flood Risk
10080 min Summer	128.120	0.470	0.0	0.6	0.6	37.0	Flood Risk
15 min Winter	128.061	0.411	0.0	0.5	0.5	28.3	O K
30 min Winter	128.121	0.471	0.0	0.6	0.6	37.1	Flood Risk
60 min Winter	128.184	0.534	0.0	0.6	0.6	46.3	Flood Risk
120 min Winter	128.248	0.598	0.0	0.6	0.6	55.7	Flood Risk
180 min Winter	128.285	0.635	0.0	0.7	0.7	61.2	Flood Risk
240 min Winter	128.311	0.661	0.0	0.7	0.7	65.0	Flood Risk
360 min Winter	128.347	0.697	0.0	0.7	0.7	70.3	Flood Risk
480 min Winter	128.372	0.722	0.0	0.7	0.7	74.0	Flood Risk
600 min Winter	128.390	0.740	0.0	0.7	0.7	76.6	Flood Risk
720 min Winter	128.400	0.750	0.0	0.7	0.7	78.6	FLOOD
960 min Winter	128.402	0.752	0.0	0.7	0.7	80.9	FLOOD
1440 min Winter	128.403	0.753	0.0	0.7	0.7	81.8	FLOOD
2160 min Winter	128.398	0.748	0.0	0.7	0.7	77.8	Flood Risk
2880 min Winter	128.370	0.720	0.0	0.7	0.7	73.7	Flood Risk
4320 min Winter	128.306	0.656	0.0	0.7	0.7	64.3	Flood Risk
5760 min Winter	128.242	0.592	0.0	0.6	0.6	54.9	Flood Risk
7200 min Winter	128.186	0.536	0.0	0.6	0.6	46.7	Flood Risk
8640 min Winter	128.138	0.488	0.0	0.6	0.6	39.5	Flood Risk
10080 min Winter	128.096	0.446	0.0	0.6	0.6	33.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
8640 min Summer	1.112	0.0	163.4	5104
10080 min Summer	0.980	0.0	167.9	5848
15 min Winter	138.874	0.0	38.2	56
30 min Winter	90.946	0.0	43.7	73
60 min Winter	56.713	0.0	64.8	94
120 min Winter	34.162	0.0	78.1	128
180 min Winter	25.057	0.0	85.9	188
240 min Winter	19.992	0.0	90.8	246
360 min Winter	14.500	0.0	95.5	364
480 min Winter	11.545	0.0	98.2	482
600 min Winter	9.667	0.0	99.9	600
720 min Winter	8.358	0.4	100.9	718
960 min Winter	6.638	2.5	101.8	950
1440 min Winter	4.791	3.2	101.0	1400
2160 min Winter	3.452	0.0	142.0	1844
2880 min Winter	2.733	0.0	149.9	2196
4320 min Winter	1.964	0.0	160.9	3024
5760 min Winter	1.552	0.0	170.2	3808
7200 min Winter	1.292	0.0	177.2	4608
8640 min Winter	1.112	0.0	183.0	5368
10080 min Winter	0.980	0.0	188.0	6144

MJA Consulting		Page 3
Monarch House Barton Lane OX14 3NB		
Date 10/05/2019 16:10 File Plots 1-9.CASX	Designed by stewart Checked by	
Innovyze	Source Control 2017.1.2	


Cascade Rainfall Details for Area 2.srcx

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.406	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.097

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.046	4	8	0.051

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Monarch House Barton Lane OX14 3NB		
Date 10/05/2019 16:10 File Plots 1-9.CASX	Designed by stewart Checked by	
Innovyze	Source Control 2017.1.2	

Cascade Model Details for Area 2.srcx

Storage is Online Cover Level (m) 128.400

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.0
Membrane Percolation (mm/hr)	1000	Length (m)	70.0
Max Percolation (l/s)	136.1	Slope (1:X)	160.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	127.650	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 127.650

Cascade Summary of Results for Area 3.srcx

**Upstream    Outflow To    Overflow To  
Structures**

Area 2.srcx            (None)            (None)  
Area 1.srcx

Half Drain Time : 81 minutes.

<b>Storm Event</b>	<b>Max Level (m)</b>	<b>Max Depth (m)</b>	<b>Max Infiltration (l/s)</b>	<b>Max Volume (m<sup>3</sup>)</b>	<b>Status</b>
15 min Summer	127.723	0.473	2.7	16.6	Flood Risk
30 min Summer	127.780	0.530	3.0	20.9	Flood Risk
60 min Summer	127.815	0.565	3.2	23.7	Flood Risk
120 min Summer	127.826	0.576	3.3	24.6	Flood Risk
180 min Summer	127.823	0.573	3.3	24.4	Flood Risk
240 min Summer	127.815	0.565	3.2	23.7	Flood Risk
360 min Summer	127.796	0.546	3.1	22.2	Flood Risk
480 min Summer	127.778	0.528	3.0	20.7	Flood Risk
600 min Summer	127.760	0.510	2.9	19.3	Flood Risk
720 min Summer	127.743	0.493	2.8	18.0	Flood Risk
960 min Summer	127.713	0.463	2.6	15.9	Flood Risk
1440 min Summer	127.664	0.414	2.4	12.7	O K
2160 min Summer	127.612	0.362	2.1	9.7	O K
2880 min Summer	127.574	0.324	1.8	7.8	O K
4320 min Summer	127.523	0.273	1.6	5.5	O K
5760 min Summer	127.490	0.240	1.4	4.3	O K
7200 min Summer	127.467	0.217	1.2	3.5	O K


<b>Storm Event</b>	<b>Rain (mm/hr)</b>	<b>Flooded Volume (m<sup>3</sup>)</b>	<b>Time-Peak (mins)</b>
15 min Summer	138.874	0.0	18
30 min Summer	90.946	0.0	32
60 min Summer	56.713	0.0	60
120 min Summer	34.162	0.0	92
180 min Summer	25.057	0.0	126
240 min Summer	19.992	0.0	160
360 min Summer	14.500	0.0	230
480 min Summer	11.545	0.0	296
600 min Summer	9.667	0.0	362
720 min Summer	8.358	0.0	428
960 min Summer	6.638	0.0	556
1440 min Summer	4.791	0.0	806
2160 min Summer	3.452	0.0	1168
2880 min Summer	2.733	0.0	1528
4320 min Summer	1.964	0.0	2248
5760 min Summer	1.552	0.0	2992
7200 min Summer	1.292	0.0	3680

Cascade Summary of Results for Area 3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
8640 min Summer	127.450	0.200	1.1	3.0	O K
10080 min Summer	127.436	0.186	1.1	2.6	O K
15 min Winter	127.752	0.502	2.9	18.7	Flood Risk
30 min Winter	127.813	0.563	3.2	23.6	Flood Risk
60 min Winter	127.853	0.603	3.4	27.0	Flood Risk
120 min Winter	127.863	0.613	3.5	27.9	Flood Risk
180 min Winter	127.857	0.607	3.5	27.4	Flood Risk
240 min Winter	127.845	0.595	3.4	26.3	Flood Risk
360 min Winter	127.818	0.568	3.2	23.9	Flood Risk
480 min Winter	127.791	0.541	3.1	21.7	Flood Risk
600 min Winter	127.766	0.516	2.9	19.8	Flood Risk
720 min Winter	127.743	0.493	2.8	18.1	Flood Risk
960 min Winter	127.703	0.453	2.6	15.3	Flood Risk
1440 min Winter	127.642	0.392	2.2	11.4	O K
2160 min Winter	127.581	0.331	1.9	8.1	O K
2880 min Winter	127.540	0.290	1.7	6.3	O K
4320 min Winter	127.490	0.240	1.4	4.3	O K
5760 min Winter	127.459	0.209	1.2	3.3	O K
7200 min Winter	127.438	0.188	1.1	2.6	O K
8640 min Winter	127.423	0.173	1.0	2.2	O K
10080 min Winter	127.411	0.161	0.9	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
8640 min Summer	1.112	0.0	4408
10080 min Summer	0.980	0.0	5144
15 min Winter	138.874	0.0	18
30 min Winter	90.946	0.0	32
60 min Winter	56.713	0.0	60
120 min Winter	34.162	0.0	96
180 min Winter	25.057	0.0	136
240 min Winter	19.992	0.0	174
360 min Winter	14.500	0.0	246
480 min Winter	11.545	0.0	318
600 min Winter	9.667	0.0	386
720 min Winter	8.358	0.0	454
960 min Winter	6.638	0.0	586
1440 min Winter	4.791	0.0	838
2160 min Winter	3.452	0.0	1212
2880 min Winter	2.733	0.0	1584
4320 min Winter	1.964	0.0	2332
5760 min Winter	1.552	0.0	3056
7200 min Winter	1.292	0.0	3824
8640 min Winter	1.112	0.0	4584
10080 min Winter	0.980	0.0	5344



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Monarch House Barton Lane OX14 3NB		
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Innovyze		Source Control 2017.1.2


Cascade Rainfall Details for Area 3.srcx

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.406	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.070

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.060	4	8	0.010


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Monarch House Barton Lane OX14 3NB		
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Innovyze	Source Control 2017.1.2	

Cascade Model Details for Area 3.srcx

Storage is Online Cover Level (m) 128.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.08280	Width (m)	15.0
Membrane Percolation (mm/hr)	1000	Length (m)	44.0
Max Percolation (l/s)	183.3	Slope (1:X)	33.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	127.250	Membrane Depth (m)	0


MJA Consulting		Page 1
Monarch House Barton Lane OX14 3NB	Land to the south of Southside Plot 10 Permeable Drive area Includes some plot 9	
Date 10/05/2019 File AREA 4.SRCX	Designed by S.Smith Checked by	
Innovyze	Source Control 2017.1.2	

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

Half Drain Time : 258 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	126.664	0.414	0.5	7.7	O K
30 min Summer	126.720	0.470	0.5	9.9	Flood Risk
60 min Summer	126.770	0.520	0.5	11.8	Flood Risk
120 min Summer	126.804	0.554	0.5	13.1	Flood Risk
180 min Summer	126.810	0.560	0.5	13.4	Flood Risk
240 min Summer	126.807	0.557	0.5	13.3	Flood Risk
360 min Summer	126.798	0.548	0.5	12.9	Flood Risk
480 min Summer	126.787	0.537	0.5	12.5	Flood Risk
600 min Summer	126.774	0.524	0.5	12.0	Flood Risk
720 min Summer	126.762	0.512	0.5	11.5	Flood Risk
960 min Summer	126.737	0.487	0.5	10.5	Flood Risk
1440 min Summer	126.693	0.443	0.5	8.8	O K
2160 min Summer	126.647	0.397	0.5	7.1	O K
2880 min Summer	126.610	0.360	0.4	5.8	O K
4320 min Summer	126.554	0.304	0.4	4.2	O K
5760 min Summer	126.513	0.263	0.3	3.1	O K
7200 min Summer	126.482	0.232	0.3	2.4	O K
8640 min Summer	126.457	0.207	0.3	1.9	O K
10080 min Summer	126.437	0.187	0.2	1.6	O K
15 min Winter	126.689	0.439	0.5	8.7	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	138.874	0.0	18
30 min Summer	90.946	0.0	33
60 min Summer	56.713	0.0	62
120 min Summer	34.162	0.0	122
180 min Summer	25.057	0.0	180
240 min Summer	19.992	0.0	204
360 min Summer	14.500	0.0	266
480 min Summer	11.545	0.0	332
600 min Summer	9.667	0.0	400
720 min Summer	8.358	0.0	468
960 min Summer	6.638	0.0	600
1440 min Summer	4.791	0.0	854
2160 min Summer	3.452	0.0	1232
2880 min Summer	2.733	0.0	1588
4320 min Summer	1.964	0.0	2332
5760 min Summer	1.552	0.0	3056
7200 min Summer	1.292	0.0	3752
8640 min Summer	1.112	0.0	4488
10080 min Summer	0.980	0.0	5152
15 min Winter	138.874	0.0	18

MJA Consulting		Page 2
Monarch House Barton Lane OX14 3NB	Land to the south of Southside Plot 10 Permeable Drive area Includes some plot 9	
Date 10/05/2019 File AREA 4.SRCX	Designed by S.Smith Checked by	
Innovyze	Source Control 2017.1.2	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	126.753	0.503	0.5	11.1	Flood Risk
60 min Winter	126.810	0.560	0.5	13.4	Flood Risk
120 min Winter	126.852	0.602	0.5	15.0	Flood Risk
180 min Winter	126.863	0.613	0.5	15.4	Flood Risk
240 min Winter	126.861	0.611	0.5	15.4	Flood Risk
360 min Winter	126.847	0.597	0.5	14.8	Flood Risk
480 min Winter	126.831	0.581	0.5	14.2	Flood Risk
600 min Winter	126.813	0.563	0.5	13.5	Flood Risk
720 min Winter	126.795	0.545	0.5	12.8	Flood Risk
960 min Winter	126.757	0.507	0.5	11.3	Flood Risk
1440 min Winter	126.693	0.443	0.5	8.8	O K
2160 min Winter	126.631	0.381	0.5	6.5	O K
2880 min Winter	126.583	0.333	0.4	5.0	O K
4320 min Winter	126.515	0.265	0.3	3.2	O K
5760 min Winter	126.469	0.219	0.3	2.2	O K
7200 min Winter	126.436	0.186	0.2	1.6	O K
8640 min Winter	126.412	0.162	0.2	1.2	O K
10080 min Winter	126.394	0.144	0.2	0.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	90.946	0.0	32
60 min Winter	56.713	0.0	62
120 min Winter	34.162	0.0	118
180 min Winter	25.057	0.0	174
240 min Winter	19.992	0.0	228
360 min Winter	14.500	0.0	286
480 min Winter	11.545	0.0	362
600 min Winter	9.667	0.0	436
720 min Winter	8.358	0.0	510
960 min Winter	6.638	0.0	652
1440 min Winter	4.791	0.0	910
2160 min Winter	3.452	0.0	1296
2880 min Winter	2.733	0.0	1648
4320 min Winter	1.964	0.0	2376
5760 min Winter	1.552	0.0	3064
7200 min Winter	1.292	0.0	3752
8640 min Winter	1.112	0.0	4496
10080 min Winter	0.980	0.0	5152

MJA Consulting		Page 3
Monarch House Barton Lane OX14 3NB	Land to the south of Southside Plot 10 Permeable Drive area Includes some plot 9	
Date 10/05/2019 File AREA 4.SRCX	Designed by S.Smith Checked by	
Innovyze Source Control 2017.1.2		

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.406	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.031

<b>Time (mins)</b>		<b>Area</b>
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.031



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Monarch House Barton Lane OX14 3NB	Land to the south of Southside Plot 10 Permeable Drive area Includes some plot 9	
Date 10/05/2019 File AREA 4.SRCX	Designed by S.Smith Checked by	
Innovyze	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 127.000

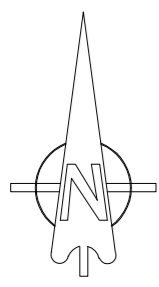
Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.02952	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.6
Max Percolation (l/s)	36.0	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	126.250	Membrane Depth (m)	0



## **APPENDIX D**

### **PROPOSED FOUL & SURFACE WATER DRAINAGE STRATEGY**



Permeable block paving with a minimum depth 650mm stone sub-base (4-20mm OGCR) to attenuate and convey flows to areas of the site with higher infiltration rates. Sized to store the 1:100yr +40% rainfall event + 10% urban creep.  
Sub-base's of driveways and access road to be joined to act as one 'tanked' unit.  
Sub-base to be laid to fall towards permavoid diffuser cells.

Black macadam with a minimum depth 750mm stone sub-base (4-20mm OGCR) to attenuate and convey flows to areas of the site with higher infiltration rates. Sized to store the 1:100yr +40% rainfall event + 10% urban creep.  
Sub-base's of driveways and access road to be joined to act as one 'tanked' unit.  
Sub-base to be laid to fall towards permavoid diffuser cells.

Permeable block paving with a minimum depth 650mm stone sub-base (4-20mm OGCR) to attenuate and convey flows to areas of the site with higher infiltration rates. Sized to store the 1:100yr +40% rainfall event + 10% urban creep.  
Sub-base's of driveways and access road to be joined to act as one 'tanked' unit.  
Sub-base to be laid to fall towards permavoid diffuser cells.

This section of permeable block paving with a minimum depth 750mm stone sub-base (4-20mm OGCR) to be separated from the rest of the sites drainage via full height and width baffle. Infiltration of run-off from plots 9/10 can take place here. Sized to store the 1:100yr +40% rainfall event + 10% urban creep.

Full width, full height concrete baffles to contain all storm water and direct it through flow control chamber.

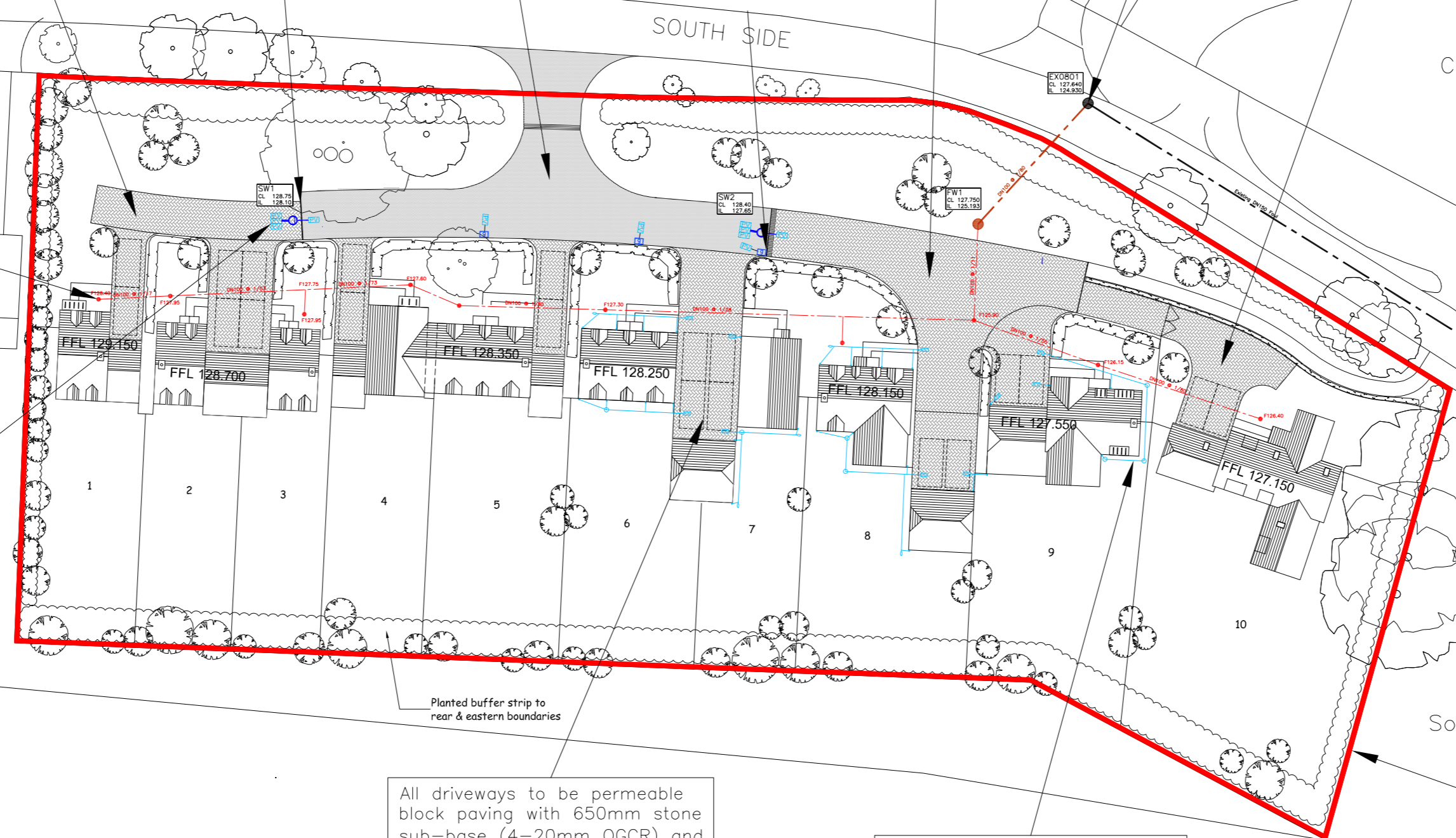
Both flow Control Orifices 20mm to maximize storage on site.

Development foul drainage to connect to existing foul manhole.

Typical foul water drainage.

Existing foul drainage system on South Side road. (PH)

Diffuser Cells  
Cellular polypropylene unit, Charcon 'Permavoid' or similar wrapped in a permeable geotextile membrane laid within stone sub-base of permeable block paving.



All driveways to be permeable block paving with 650mm stone sub-base (4-20mm OGCR) and to connect to the sub-base within their access road.









Typical surface water drainage.

REV. No.	DATE	DESCRIPTION	INITIALS
B	10.05.19	Site layout amended, drainage updated to suit.	SS
A	20.12.17	Site layout amended, drainage updated to suit.	CP

Client Rectory Homes		<b>MJA CONSULTING</b> CIVIL AND STRUCTURAL ENGINEERS Monarch House, Barton Lane, Abingdon, Oxon, OX14 3NB Tel: 01235 555173 Fax: 01235 523226	
Project Land to the South of Southside			
Title Drainage Layout	Scale 1:500 @A2	Date 09.05.19	Drawing No. 5634:P01
Checked CP	Drawn SS	Rev B	

## APPENDIX E

### SUDS COMPATIBILITY MATRIX

SuDS Type	Description	Suitable for this site	Comments
<b>Green Roofs</b>	Green roofs comprise a multi-layered system that covers the roof of a building with vegetation cover over a drainage layer. They are designed to intercept and retain rainfall, reducing the volume of runoff and attenuating		Living Roofs would not be technically feasible at this development due to factors such as loadings, steep roof pitch of proposed dwellings, visual impact and high maintenance burden to homeowners.
<b>Rainwater Harvesting</b>	Re-using rainwater for non-potable purposes such as irrigation and toilet flushing.		Rainwater harvesting cannot be relied upon to guarantee a reduction in the volume of water leaving the site as it relies upon tanks having available capacity. During intense/prolonged periods of rainfall it is likely that the tanks will be full and will overflow into the system. These systems can also be a high maintenance burden for residential home owners. Cost benefit of system is not recovered until 10-15 years.
<b>Soakaways</b>	Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge.		Initial site desk study shows that this site is likely suitable for onsite infiltration via soakaways. This will be confirmed with infiltration testing to BRE265 and groundwater monitoring.
<b>Filter Strip / Trenches / Swales</b>	Filter strips are linear grassed or vegetated strips of land / channels designed to accept runoff as overland sheet flow from impermeable surfaces usually located adjacent road or parking areas and used to treat infiltrated or convey runoff.		Potentially for conveyance only, may be insufficient open space to incorporate effectively on this development.
<b>Permeable Paving</b>	Pervious pavements provide a pavement suitable for pedestrian and vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system.		Potentially on private drives / parking areas/ roads . This would improve water quality into the receiving waterbody.
<b>Bio Retention</b>	Bioretention areas are shallow landscaped depressions which are typically under-drained and rely on engineered soils and enhanced vegetation and filtration to remove pollution and reduce runoff downstream. They are aimed at managing and treating runoff from frequent rainfall events.		A bio retention pond could be utilised at this development if the receiving waterbody is considered sensitive and additional treatment is required. May be insufficient open space to incorporate effectively on this development as POS is limited.
<b>Ponds / Basins</b>	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.		A pond / basin can be utilised at this development to provide attenuation and improvements in water quality. May be insufficient open space to incorporate effectively on this development as POS is limited.
<b>Underground Storage</b>	Underground large diameter Concrete pipes or Geocellular Tanks to reduce and attenuate peak flows		Underground storage tanks can be utilised at this development if required.

**MJA CONSULTING**

Civil & Structural Engineers

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