REUBY & STAGG LTD.

Elmsbrook Exemplar Site Ph 3 & 4, Bicester

Highway Swale Design

Four highway swales have been proposed to receive runoff from carriageways which will not be surfaced in a permeable material, the runoff will be overland flow therefore the swales will be very shallow.

Infiltration testing has been undertaken by Wilson Bailey which has been targeted at permeable pavement design, the testing was undertaken at a very shallow depth and these results will also be applicable to the swale design, the results of this testing are attached to this note.

The Windes software has been used to model the four swales, the models have been simplified for a standard 10.0 length of swale, the catchment area for each 10.0m length of swale is the carriageway width of the road it serves multiplied by 10, the longitudinal gradient of the carriageway has been used for the slope of the swale.

The Windes results for the 1 in 100 yr + 40% climate change event have been attached to this note, it can be seen that no flooding occurs.

Drawing 3209 is also attached to this note which shows the swale locations and typical section through them.

MD/djp/10346
21/08/2018

WILSON BAILEY
GEOTECHNICAL & ENVIRONMENTAL

Carters Barn
Sherrington
Wiltshire
BA12 0SN
Tel: 01985 850882

30 May 2018

Your ref:
Planning ref:
Our ref: J17038dbc06

Chris Gardiner
Crest Nicholson Regeneration
Crest House
Pycroft Road
Chertsey
Surrey
KT16 9GN

Dear Mr Gardiner,

RE: ELMSBROOK DEVELOPMENT BICESTER PHASES 3 & 4

ADDITIONAL SOAKAGE TESTING REPORT

Further to your instruction we have carried out additional soakage testing in locations across this site that have been selected by the Civil Engineers. Soakage testing has been carried out in accordance with BRE365 where infiltration rates have been such that the test has been completed within a day. Where the first fill of the test has not emptied within a site working day, the testing has ceased and the results of a single test presented.

This letter report is provided in accordance with our standard terms, conditions and limitations.

Selected Photographic Records of the Works

The results of the soakage testing are enclosed and the table overleaf provides a summary of the results of testing at each of the locations indicated on the site plan that was provided by the Civil Engineers and set out on site by the Ground Workers. The trial pits were excavated using a mechanical excavator with breaker and ripper that was provided by the Ground Workers.

Shallow Test Locations indicated as being within areas of adoptable roads

Test Location Reference	Test result (m/s)
TP 1	1.1e-4m/s in fragmented Cornbrash
TP 2	>5e-4m/s in fragmented Cornbrash
TP 3	>5e-4m/s in fragmented Cornbrash
TP 4	>5e-4m/s in fragmented Cornbrash
TP 5	>5e-4m/s in fragmented Cornbrash
TP 6	5.7e-5m/s in fragmented Cornbrash and sand
TP 7	>5e-4m/s in fragmented Cornbrash
TP 8	Test not possible due to site stockpile of soil

Deeper Level Test Locations indicated as being within areas of garden and parking

Test Location Reference	Test result (m/s)
TP 1	4.1e-6m/s in limestone with clay
TP 2	3.0e-6m/s in limestone with clay
TP 3	No appreciable soakage below 0.80m in clay and limestone
TP 4	Any infiltration masked by groundwater seepage into test pit during test
TP 5	No appreciable soakage below 1.00m in clay and limestone
TP 6	8.6e-6m/s in limestone with clay
TP 7	Test not possible due to site materials storage
TP 8	1.7e-5m/s in limestone
TP 9	Test not possible due to site materials storage
TP 10	1.9e-4m/s in shallow fragmented Cornbrash to 0.80m, 8.7e-7m/s in clay and limestone below
TP 11	No appreciable soakage below 1.00m in clay and limestone
TP 12	No appreciable soakage below 1.00m in clay and limestone
TP 13	No appreciable soakage below 1.00m in clay and limestone
TP 14	Test not possible due to site stockpile of soil
TP 15	Test not possible due to site stockpile of soil
TP 16	Test not possible due to site stockpile of soil

We trust that this letter and enclosures provide sufficient information although please do not hesitate to contact me should you have any queries or questions.

Yours sincerely
Wilson Bailey Partnership

Dominic Brightman
BSc MSc DIC FGS CGeol ARSM

Encs

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

Half Drain Time : 24 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.968	0.268	0.5	1.0	Flood Risk
30 min Summer	99.982	0.282	0.6	1.1	Flood Risk
60 min Summer	99.983	0.283	0.6	1.1	Flood Risk
120 min Summer	99.969	0.269	0.5	1.0	Flood Risk
180 min Summer	99.952	0.252	0.5	0.9	Flood Risk
240 min Summer	99.937	0.237	0.5	0.7	Flood Risk
360 min Summer	99.913	0.213	0.4	0.6	Flood Risk
480 min Summer	99.895	0.195	0.4	0.4	Flood Risk
600 min Summer	99.880	0.180	0.3	0.4	Flood Risk
720 min Summer	99.868	0.168	0.3	0.3	Flood Risk
960 min Summer	99.850	0.150	0.2	0.2	Flood Risk
1440 min Summer	99.828	0.128	0.2	0.2	Flood Risk
2160 min Summer	99.808	0.108	0.1	0.1	Flood Risk
2880 min Summer	99.794	0.094	0.1	0.1	Flood Risk
4320 min Summer	99.777	0.077	0.1	0.0	Flood Risk
5760 min Summer	99.767	0.067	0.1	0.0	Flood Risk
7200 min Summer	99.760	0.060	0.1	0.0	Flood Risk
8640 min Summer	99.754	0.054	0.0	0.0	Flood Risk
10080 min Summer	99.750	0.050	0.0	0.0	Flood Risk
15 min Winter	99.983	0.283	0.6	1.1	Flood Risk
30 min Winter	99.997	0.297	0.6	1.3	Flood Risk
60 min Winter	99.995	0.295	0.6	1.2	Flood Risk
120 min Winter	99.973	0.273	0.6	1.0	Flood Risk
180 min Winter	99.949	0.249	0.5	0.8	Flood Risk
240 min Winter	99.929	0.229	0.4	0.7	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	15
30 min Summer	90.986	0.0	24
60 min Summer	56.713	0.0	42
120 min Summer	34.148	0.0	74
180 min Summer	25.042	0.0	106
240 min Summer	19.977	0.0	138
360 min Summer	14.486	0.0	200
480 min Summer	11.532	0.0	260
600 min Summer	9.655	0.0	320
720 min Summer	8.347	0.0	378
960 min Summer	6.629	0.0	498
1440 min Summer	4.783	0.0	736
2160 min Summer	3.446	0.0	1100
2880 min Summer	2.728	0.0	1468
4320 min Summer	1.960	0.0	2200
5760 min Summer	1.549	0.0	2936
7200 min Summer	1.289	0.0	3672
8640 min Summer	1.110	0.0	4400
10080 min Summer	0.977	0.0	5024
15 min Winter	138.993	0.0	15
30 min Winter	90.986	0.0	25
60 min Winter	56.713	0.0	44
120 min Winter	34.148	0.0	80
180 min Winter	25.042	0.0	112
240 min Winter	19.977	0.0	144

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
360 min Winter	99.898	0.198	0.4	0.5	Flood Risk
480 min Winter	99.876	0.176	0.3	0.3	Flood Risk
600 min Winter	99.859	0.159	0.3	0.3	Flood Risk
720 min Winter	99.847	0.147	0.2	0.2	Flood Risk
960 min Winter	99.830	0.130	0.2	0.2	Flood Risk
1440 min Winter	99.808	0.108	0.1	0.1	Flood Risk
2160 min Winter	99.789	0.089	0.1	0.1	Flood Risk
2880 min Winter	99.778	0.078	0.1	0.0	Flood Risk
4320 min Winter	99.763	0.063	0.1	0.0	Flood Risk
5760 min Winter	99.755	0.055	0.0	0.0	Flood Risk
7200 min Winter	99.749	0.049	0.0	0.0	Flood Risk
8640 min Winter	99.745	0.045	0.0	0.0	Flood Risk
10080 min Winter	99.743	0.043	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Winter	14.486	0.0	204
480 min Winter	11.532	0.0	264
600 min Winter	9.655	0.0	322
720 min Winter	8.347	0.0	380
960 min Winter	6.629	0.0	500
1440 min Winter	4.783	0.0	736
2160 min Winter	3.446	0.0	1100
2880 min Winter	2.728	0.0	1444
4320 min Winter	1.960	0.0	2144
5760 min Winter	1.549	0.0	2920
7200 min Winter	1.289	0.0	3584
8640 min Winter	1.110	0.0	4336
10080 min Winter	0.977	0.0	5040

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	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins) From:	To:	Area (ha)
0	4	0.005

Model Details

Storage is Online Cover Level (m) 100.000

Swale Structure

Infiltration Coefficient Base (m/hr)	0.39600	Length (m)	10.0
Infiltration Coefficient Side (m/hr)	0.39600	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	68.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	99.700	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.1		

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

Half Drain Time : 4 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.886	0.186	1.8	0.5	Flood Risk
30 min Summer	99.881	0.181	1.7	0.5	Flood Risk
60 min Summer	99.860	0.160	1.5	0.4	Flood Risk
120 min Summer	99.829	0.129	1.1	0.2	Flood Risk
180 min Summer	99.809	0.109	0.9	0.1	Flood Risk
240 min Summer	99.797	0.097	0.8	0.1	Flood Risk
360 min Summer	99.781	0.081	0.6	0.1	Flood Risk
480 min Summer	99.771	0.071	0.5	0.1	Flood Risk
600 min Summer	99.764	0.064	0.4	0.0	Flood Risk
720 min Summer	99.759	0.059	0.3	0.0	Flood Risk
960 min Summer	99.751	0.051	0.3	0.0	Flood Risk
1440 min Summer	99.743	0.043	0.2	0.0	Flood Risk
2160 min Summer	99.736	0.036	0.1	0.0	Flood Risk
2880 min Summer	99.732	0.032	0.1	0.0	Flood Risk
4320 min Summer	99.728	0.028	0.1	0.0	Flood Risk
5760 min Summer	99.725	0.025	0.1	0.0	Flood Risk
7200 min Summer	99.722	0.022	0.1	0.0	Flood Risk
8640 min Summer	99.721	0.021	0.0	0.0	Flood Risk
10080 min Summer	99.719	0.019	0.0	0.0	Flood Risk
15 min Winter	99.893	0.193	1.9	0.6	Flood Risk
30 min Winter	99.881	0.181	1.7	0.5	Flood Risk
60 min Winter	99.851	0.151	1.4	0.3	Flood Risk
120 min Winter	99.813	0.113	1.0	0.2	Flood Risk
180 min Winter	99.793	0.093	0.7	0.1	Flood Risk
240 min Winter	99.782	0.082	0.6	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	12
30 min Summer	90.986	0.0	20
60 min Summer	56.713	0.0	36
120 min Summer	34.148	0.0	66
180 min Summer	25.042	0.0	94
240 min Summer	19.977	0.0	124
360 min Summer	14.486	0.0	184
480 min Summer	11.532	0.0	244
600 min Summer	9.655	0.0	304
720 min Summer	8.347	0.0	366
960 min Summer	6.629	0.0	486
1440 min Summer	4.783	0.0	714
2160 min Summer	3.446	0.0	1104
2880 min Summer	2.728	0.0	1420
4320 min Summer	1.960	0.0	2188
5760 min Summer	1.549	0.0	2856
7200 min Summer	1.289	0.0	3672
8640 min Summer	1.110	0.0	4256
10080 min Summer	0.977	0.0	5144
15 min Winter	138.993	0.0	12
30 min Winter	90.986	0.0	21
60 min Winter	56.713	0.0	36
120 min Winter	34.148	0.0	66
180 min Winter	25.042	0.0	94
240 min Winter	19.977	0.0	124

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
360 min Winter	99.767	0.067	0.4	0.0	Flood Risk
480 min Winter	99.758	0.058	0.3	0.0	Flood Risk
600 min Winter	99.752	0.052	0.3	0.0	Flood Risk
720 min Winter	99.748	0.048	0.2	0.0	Flood Risk
960 min Winter	99.743	0.043	0.2	0.0	Flood Risk
1440 min Winter	99.737	0.037	0.1	0.0	Flood Risk
2160 min Winter	99.731	0.031	0.1	0.0	Flood Risk
2880 min Winter	99.728	0.028	0.1	0.0	Flood Risk
4320 min Winter	99.724	0.024	0.1	0.0	Flood Risk
5760 min Winter	99.721	0.021	0.0	0.0	Flood Risk
7200 min Winter	99.719	0.019	0.0	0.0	Flood Risk
8640 min Winter	99.718	0.018	0.0	0.0	Flood Risk
10080 min Winter	99.717	0.017	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Winter	14.486	0.0	186
480 min Winter	11.532	0.0	246
600 min Winter	9.655	0.0	306
720 min Winter	8.347	0.0	358
960 min Winter	6.629	0.0	472
1440 min Winter	4.783	0.0	726
2160 min Winter	3.446	0.0	1084
2880 min Winter	2.728	0.0	1428
4320 min Winter	1.960	0.0	2196
5760 min Winter	1.549	0.0	2848
7200 min Winter	1.289	0.0	3584
8640 min Winter	1.110	0.0	4248
10080 min Winter	0.977	0.0	5176

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	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins) From:	To:	Area (ha)
0	4	0.005

Model Details

Storage is Online Cover Level (m) 100.000

Swale Structure

Infiltration Coefficient Base (m/hr)	1.80000	Length (m)	10.0
Infiltration Coefficient Side (m/hr)	1.80000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	99.700	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.1		

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

Half Drain Time : 3 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.903	0.203	1.2	0.3	Flood Risk
30 min Summer	99.899	0.199	1.1	0.3	Flood Risk
60 min Summer	99.881	0.181	0.9	0.2	Flood Risk
120 min Summer	99.853	0.153	0.7	0.1	Flood Risk
180 min Summer	99.834	0.134	0.5	0.1	Flood Risk
240 min Summer	99.821	0.121	0.5	0.1	Flood Risk
360 min Summer	99.802	0.102	0.3	0.0	Flood Risk
480 min Summer	99.790	0.090	0.3	0.0	Flood Risk
600 min Summer	99.782	0.082	0.2	0.0	Flood Risk
720 min Summer	99.775	0.075	0.2	0.0	Flood Risk
960 min Summer	99.765	0.065	0.2	0.0	Flood Risk
1440 min Summer	99.753	0.053	0.1	0.0	Flood Risk
2160 min Summer	99.744	0.044	0.1	0.0	Flood Risk
2880 min Summer	99.740	0.040	0.1	0.0	Flood Risk
4320 min Summer	99.734	0.034	0.0	0.0	Flood Risk
5760 min Summer	99.730	0.030	0.0	0.0	Flood Risk
7200 min Summer	99.727	0.027	0.0	0.0	Flood Risk
8640 min Summer	99.725	0.025	0.0	0.0	Flood Risk
10080 min Summer	99.724	0.024	0.0	0.0	Flood Risk
15 min Winter	99.910	0.210	1.2	0.3	Flood Risk
30 min Winter	99.899	0.199	1.1	0.3	Flood Risk
60 min Winter	99.873	0.173	0.9	0.2	Flood Risk
120 min Winter	99.838	0.138	0.6	0.1	Flood Risk
180 min Winter	99.817	0.117	0.4	0.1	Flood Risk
240 min Winter	99.803	0.103	0.3	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	12
30 min Summer	90.986	0.0	20
60 min Summer	56.713	0.0	36
120 min Summer	34.148	0.0	66
180 min Summer	25.042	0.0	96
240 min Summer	19.977	0.0	124
360 min Summer	14.486	0.0	186
480 min Summer	11.532	0.0	246
600 min Summer	9.655	0.0	306
720 min Summer	8.347	0.0	366
960 min Summer	6.629	0.0	488
1440 min Summer	4.783	0.0	726
2160 min Summer	3.446	0.0	1068
2880 min Summer	2.728	0.0	1420
4320 min Summer	1.960	0.0	2192
5760 min Summer	1.549	0.0	2856
7200 min Summer	1.289	0.0	3616
8640 min Summer	1.110	0.0	4288
10080 min Summer	0.977	0.0	5024
15 min Winter	138.993	0.0	12
30 min Winter	90.986	0.0	20
60 min Winter	56.713	0.0	36
120 min Winter	34.148	0.0	66
180 min Winter	25.042	0.0	96
240 min Winter	19.977	0.0	124

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
360 min Winter	99.786	0.086	0.3	0.0	Flood Risk
480 min Winter	99.775	0.075	0.2	0.0	Flood Risk
600 min Winter	99.767	0.067	0.2	0.0	Flood Risk
720 min Winter	99.761	0.061	0.1	0.0	Flood Risk
960 min Winter	99.753	0.053	0.1	0.0	Flood Risk
1440 min Winter	99.744	0.044	0.1	0.0	Flood Risk
2160 min Winter	99.738	0.038	0.1	0.0	Flood Risk
2880 min Winter	99.734	0.034	0.0	0.0	Flood Risk
4320 min Winter	99.728	0.028	0.0	0.0	Flood Risk
5760 min Winter	99.725	0.025	0.0	0.0	Flood Risk
7200 min Winter	99.723	0.023	0.0	0.0	Flood Risk
8640 min Winter	99.722	0.022	0.0	0.0	Flood Risk
10080 min Winter	99.720	0.020	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Winter	14.486	0.0	186
480 min Winter	11.532	0.0	244
600 min Winter	9.655	0.0	304
720 min Winter	8.347	0.0	366
960 min Winter	6.629	0.0	490
1440 min Winter	4.783	0.0	732
2160 min Winter	3.446	0.0	1092
2880 min Winter	2.728	0.0	1428
4320 min Winter	1.960	0.0	2168
5760 min Winter	1.549	0.0	2800
7200 min Winter	1.289	0.0	3424
8640 min Winter	1.110	0.0	4280
10080 min Winter	0.977	0.0	4992

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	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.003

Time (mins) From:	To:	Area (ha)
0	4	0.003

Model Details

Storage is Online Cover Level (m) 100.000

Swale Structure

Infiltration Coefficient Base (m/hr)	1.80000	Length (m)	10.0
Infiltration Coefficient Side (m/hr)	1.80000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	40.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	99.700	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.1		

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

Half Drain Time : 24 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	99.935	0.235	0.5	1.0	Flood Risk
30 min Summer	99.948	0.248	0.6	1.1	Flood Risk
60 min Summer	99.949	0.249	0.6	1.1	Flood Risk
120 min Summer	99.934	0.234	0.5	1.0	Flood Risk
180 min Summer	99.917	0.217	0.5	0.8	Flood Risk
240 min Summer	99.902	0.202	0.5	0.7	Flood Risk
360 min Summer	99.878	0.178	0.4	0.5	Flood Risk
480 min Summer	99.860	0.160	0.4	0.4	Flood Risk
600 min Summer	99.845	0.145	0.3	0.3	Flood Risk
720 min Summer	99.833	0.133	0.3	0.3	Flood Risk
960 min Summer	99.815	0.115	0.2	0.2	Flood Risk
1440 min Summer	99.792	0.092	0.2	0.1	Flood Risk
2160 min Summer	99.774	0.074	0.1	0.1	Flood Risk
2880 min Summer	99.764	0.064	0.1	0.0	Flood Risk
4320 min Summer	99.752	0.052	0.1	0.0	Flood Risk
5760 min Summer	99.746	0.046	0.1	0.0	Flood Risk
7200 min Summer	99.742	0.042	0.1	0.0	Flood Risk
8640 min Summer	99.739	0.039	0.0	0.0	Flood Risk
10080 min Summer	99.736	0.036	0.0	0.0	Flood Risk
15 min Winter	99.949	0.249	0.6	1.1	Flood Risk
30 min Winter	99.963	0.263	0.6	1.2	Flood Risk
60 min Winter	99.961	0.261	0.6	1.2	Flood Risk
120 min Winter	99.938	0.238	0.6	1.0	Flood Risk
180 min Winter	99.914	0.214	0.5	0.8	Flood Risk
240 min Winter	99.894	0.194	0.4	0.7	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.993	0.0	15
30 min Summer	90.986	0.0	24
60 min Summer	56.713	0.0	42
120 min Summer	34.148	0.0	74
180 min Summer	25.042	0.0	106
240 min Summer	19.977	0.0	138
360 min Summer	14.486	0.0	200
480 min Summer	11.532	0.0	260
600 min Summer	9.655	0.0	320
720 min Summer	8.347	0.0	378
960 min Summer	6.629	0.0	500
1440 min Summer	4.783	0.0	736
2160 min Summer	3.446	0.0	1100
2880 min Summer	2.728	0.0	1468
4320 min Summer	1.960	0.0	2156
5760 min Summer	1.549	0.0	2888
7200 min Summer	1.289	0.0	3664
8640 min Summer	1.110	0.0	4392
10080 min Summer	0.977	0.0	5032
15 min Winter	138.993	0.0	15
30 min Winter	90.986	0.0	25
60 min Winter	56.713	0.0	44
120 min Winter	34.148	0.0	80
180 min Winter	25.042	0.0	112
240 min Winter	19.977	0.0	144

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
360 min Winter	99.863	0.163	0.4	0.4	Flood Risk
480 min Winter	99.841	0.141	0.3	0.3	Flood Risk
600 min Winter	99.824	0.124	0.3	0.2	Flood Risk
720 min Winter	99.812	0.112	0.2	0.2	Flood Risk
960 min Winter	99.794	0.094	0.2	0.1	Flood Risk
1440 min Winter	99.774	0.074	0.1	0.1	Flood Risk
2160 min Winter	99.760	0.060	0.1	0.0	Flood Risk
2880 min Winter	99.752	0.052	0.1	0.0	Flood Risk
4320 min Winter	99.744	0.044	0.1	0.0	Flood Risk
5760 min Winter	99.739	0.039	0.0	0.0	Flood Risk
7200 min Winter	99.736	0.036	0.0	0.0	Flood Risk
8640 min Winter	99.733	0.033	0.0	0.0	Flood Risk
10080 min Winter	99.731	0.031	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Winter	14.486	0.0	206
480 min Winter	11.532	0.0	264
600 min Winter	9.655	0.0	324
720 min Winter	8.347	0.0	382
960 min Winter	6.629	0.0	500
1440 min Winter	4.783	0.0	736
2160 min Winter	3.446	0.0	1088
2880 min Winter	2.728	0.0	1468
4320 min Winter	1.960	0.0	2192
5760 min Winter	1.549	0.0	2936
7200 min Winter	1.289	0.0	3592
8640 min Winter	1.110	0.0	4400
10080 min Winter	0.977	0.0	4976

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	0.407	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

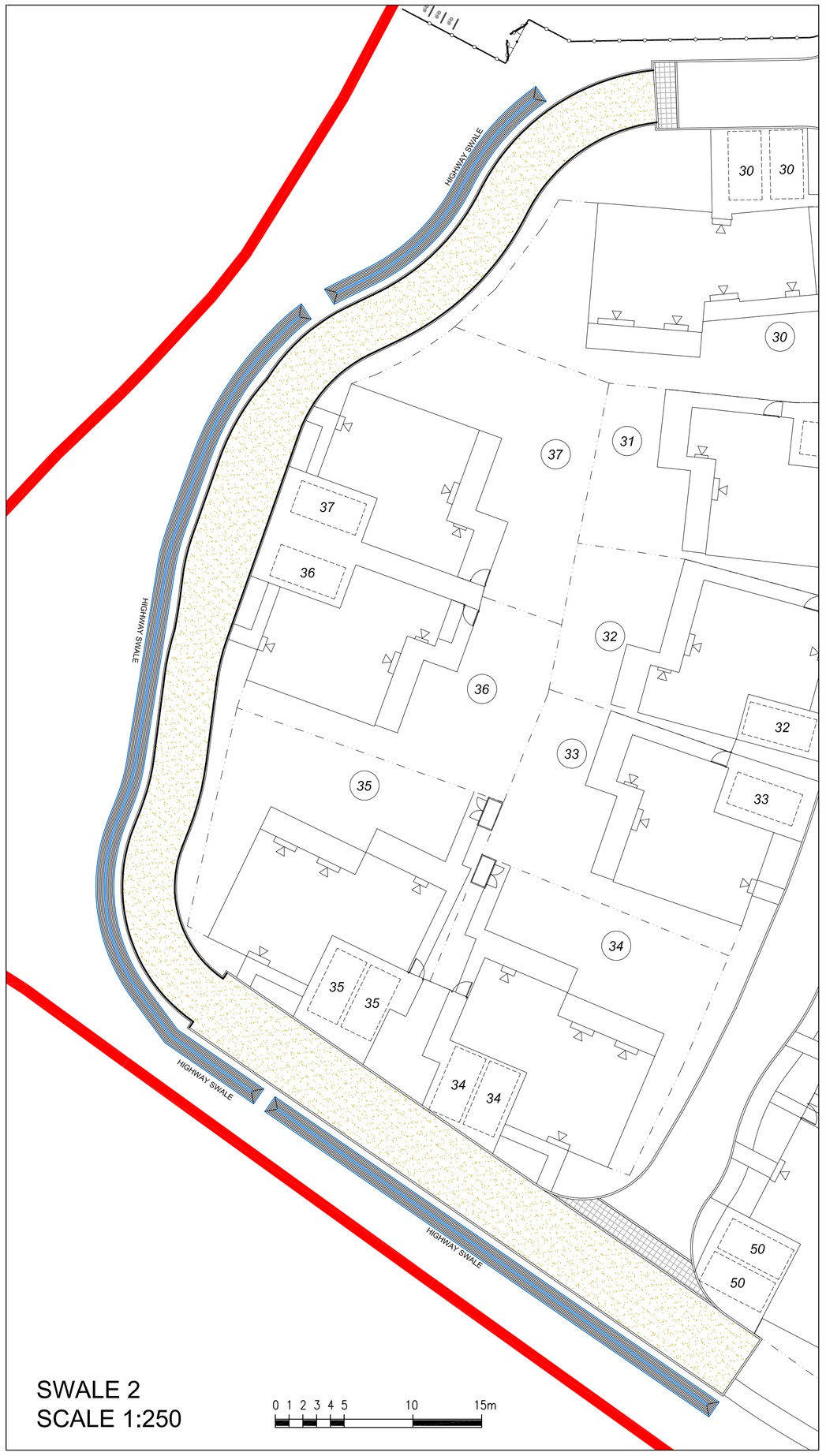
Time (mins) From:	To:	Area (ha)
0	4	0.005

Model Details

Storage is Online Cover Level (m) 100.000

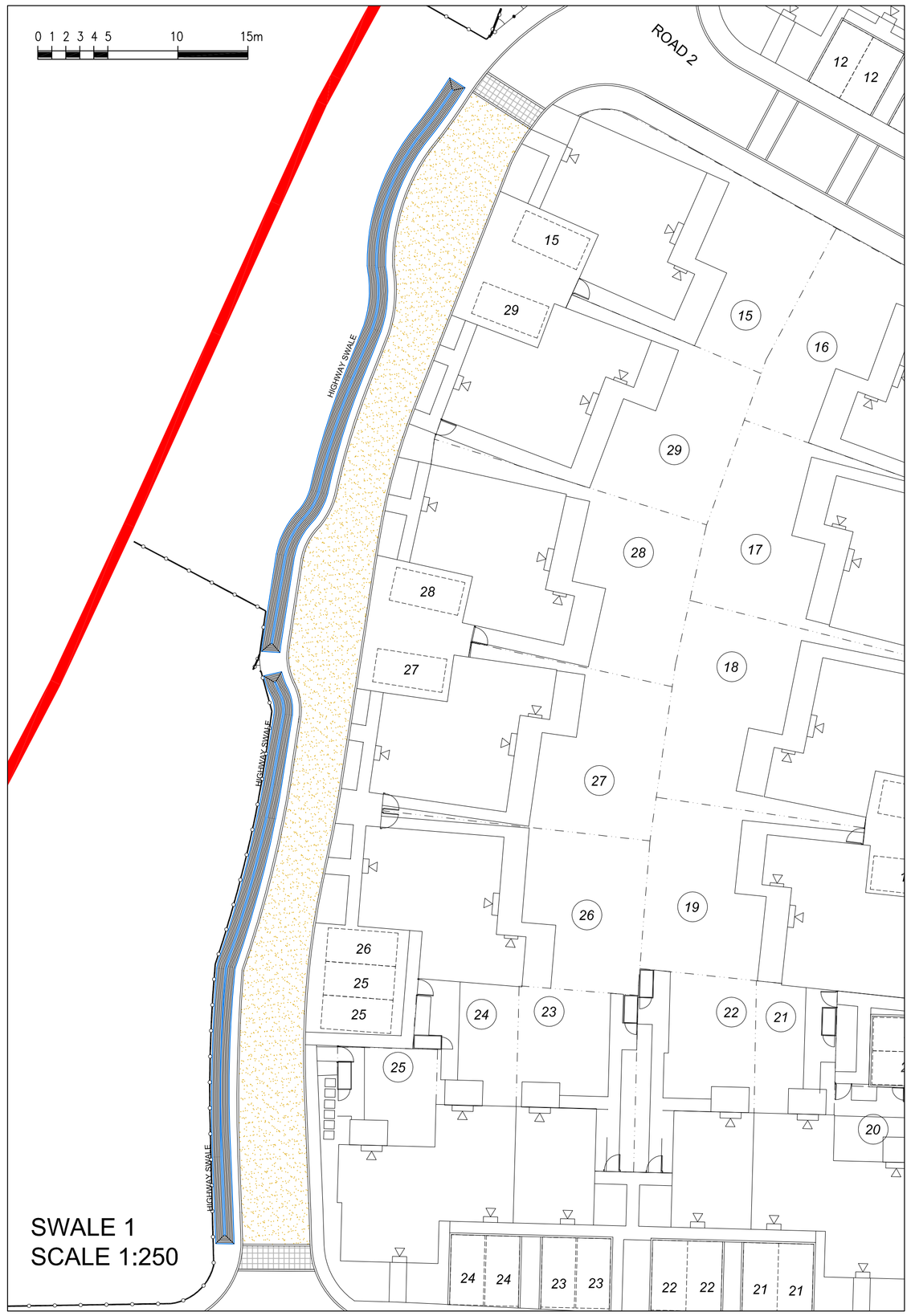
Swale Structure

Infiltration Coefficient Base (m/hr)	0.39600	Length (m)	10.0
Infiltration Coefficient Side (m/hr)	0.39600	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	130.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	99.700	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.1		



SWALE 2
SCALE 1:250

0 1 2 3 4 5 10 15m



SWALE 1
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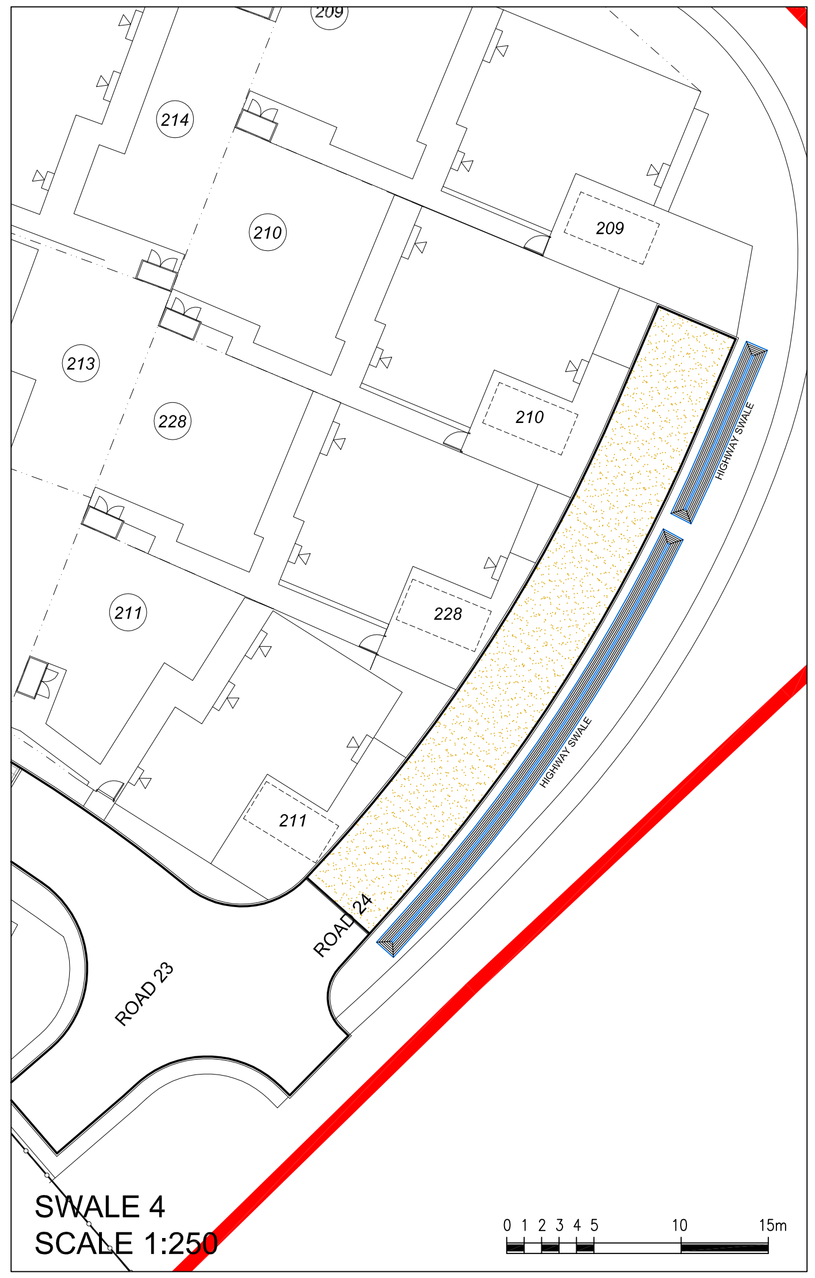

SWALE 4
SCALE 1:250

0 1 2 3 4 5 10 15m

NOTES

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2. DO NOT SCALE THIS DRAWING.
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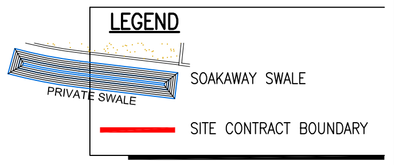
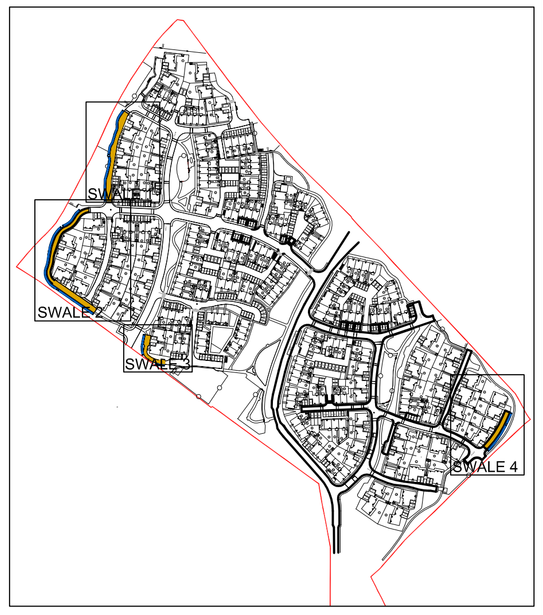
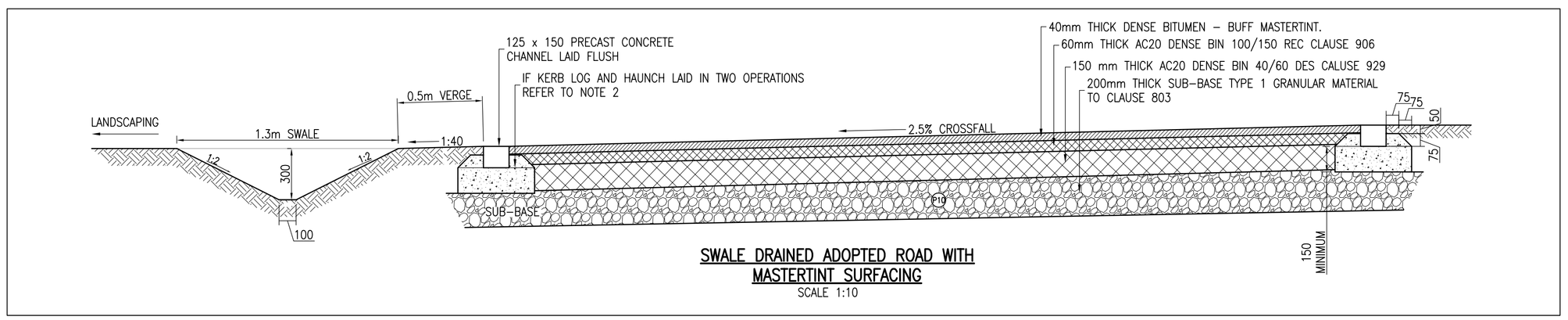
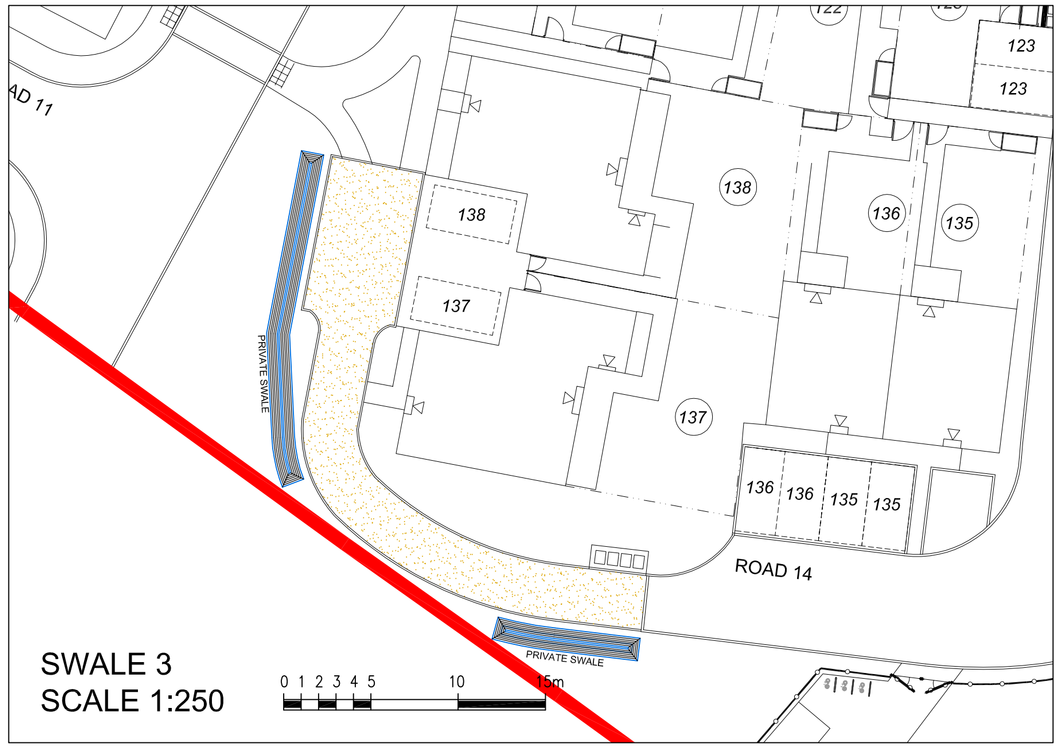






SWALE DRAINED ADOPTED ROAD WITH MASTERTINT SURFACING
SCALE 1:10



SWALE 3
SCALE 1:250

0 1 2 3 4 5 10 15m

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ALL WORKS TO BE CARRIED OUT BY A CONTRACTOR COMPETENT TO UNDERTAKE THE CONSTRUCTION OF WORKS AS INDICATED ON THIS DRAWING. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE JOB SPECIFIC RISK ASSESSMENT. THE HAZARDS NOTED ARE IN ADDITION TO THE NORMAL HAZARDS AND RISKS FACED BY A COMPETENT CONTRACTOR WHEN DEALING WITH THE TYPE OF WORKS DETAILED ON THIS DRAWING.

Rev.	Description.	Date.	Initial.
T2	AMENDED SWALE 1 (NOT PREVIOUSLY VISIBLE)	22/06/18	DRL
T1	INITIAL ISSUE	21/06/18	DRL

Drawing Status: TENDER

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Site:	ELMSBROOK, BICESTER
Address:	PHASE 3 & 4
Drg Title:	SWALE LAYOUT & TYPICAL CONSTRUCTION DETAIL
Scale:	AS SHOWN
Page Size:	A1
Drawn:	DRL
Date:	JUN 18
Checked:	MD

Drawing No: 14790TA-3209
Revision: T2

Reuby & Stagg Project No: 10346