SCALE 1:500

0m 20m 40m 60m 80m

N

ASHFORD ROAD

GROOM WAY

OLD ASHFORD ROAD

Surgery

Northland

TCB (RAC)

110.2m

109.4m

109.4m

Lanrig

The Marvel

Wareho

War

KEY:

PHASE 1

PHASE 2

Notes:
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT MONSON DRAWINGS AND SPECIFICATIONS, ANY DISCREPANCIES TO BE REPORTED TO MONSON PRIOR TO ANY FABRICATION OR WORK COMMENCING ON SITE.

2. DO NOT SCALE THIS DRAWING, USE FIGURED DIMENSIONS ONLY.

3. ALL DIMENSIONS IN MILLIMETRES, ALL LEVELS IN METRES.

Issue	By	Date	Amendments
A	DT	14/11/17	Original issue

MONSON

Broadway Chambers, High Street, Crowborough, East Sussex TN6 1DF
Tel: (01892) 601370, Fax: (01892) 601379
E-mail: enquiries@monson.co.uk

Project:
Old Ashford Road
Lenham
Kent

Description:
Proposed Site Layout
Phase 1 & Phase 2

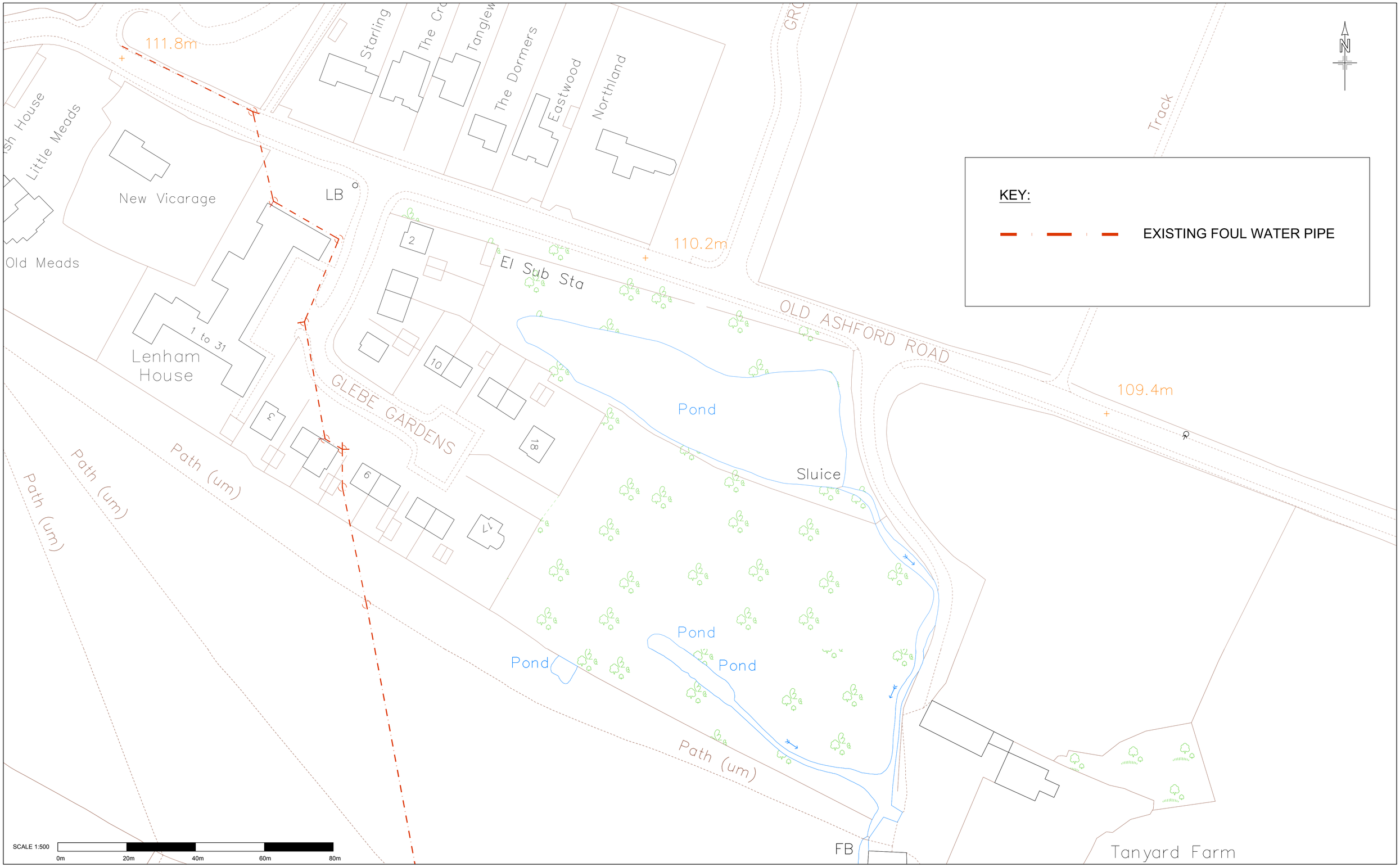
Original Drawing:	Prepared	DT	Approved	GL	
Origin: Crowborough			Size	A1	
Current Issue:	Approved	GL	Date	14/11/17	
Drawing Status:	PRELIMINARY				

Scale:	Dwg No:	Issue:
1:500	8472K / 311	A

ISSUE SHEET

MEL 84 APPROVED DEC 2012 ISSUE No. 6

Appendix B - Existing Drainage Assets



Notes:
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT MONSON DRAWINGS AND SPECIFICATIONS, ANY DISCREPANCIES TO BE REPORTED TO MONSON PRIOR TO ANY FABRICATION OR WORK COMMENCING ON SITE.

2. DO NOT SCALE THIS DRAWING, USE FIGURED DIMENSIONS ONLY.

3. ALL DIMENSIONS IN MILLIMETRES, ALL LEVELS IN METRES.

Issue	By	Date	Amendments
A	DT	14/11/17	Original issue

MONSON
Broadway Chambers, High Street, Crowborough, East Sussex TN6 1DF
Tel: (01892) 601370, Fax: (01892) 601379
E-mail: enquiries@monson.co.uk

Project:
Land North to Old Ashford Road
Lenham
Kent

Description:
Map Info Records

Original Drawing:	Prepared	DT	Approved	GL	
Origin: Crowborough			Size	A1	
Current Issue:	Approved	GL	Date	14/11/17	
Drawing Status:	PRELIMINARY				

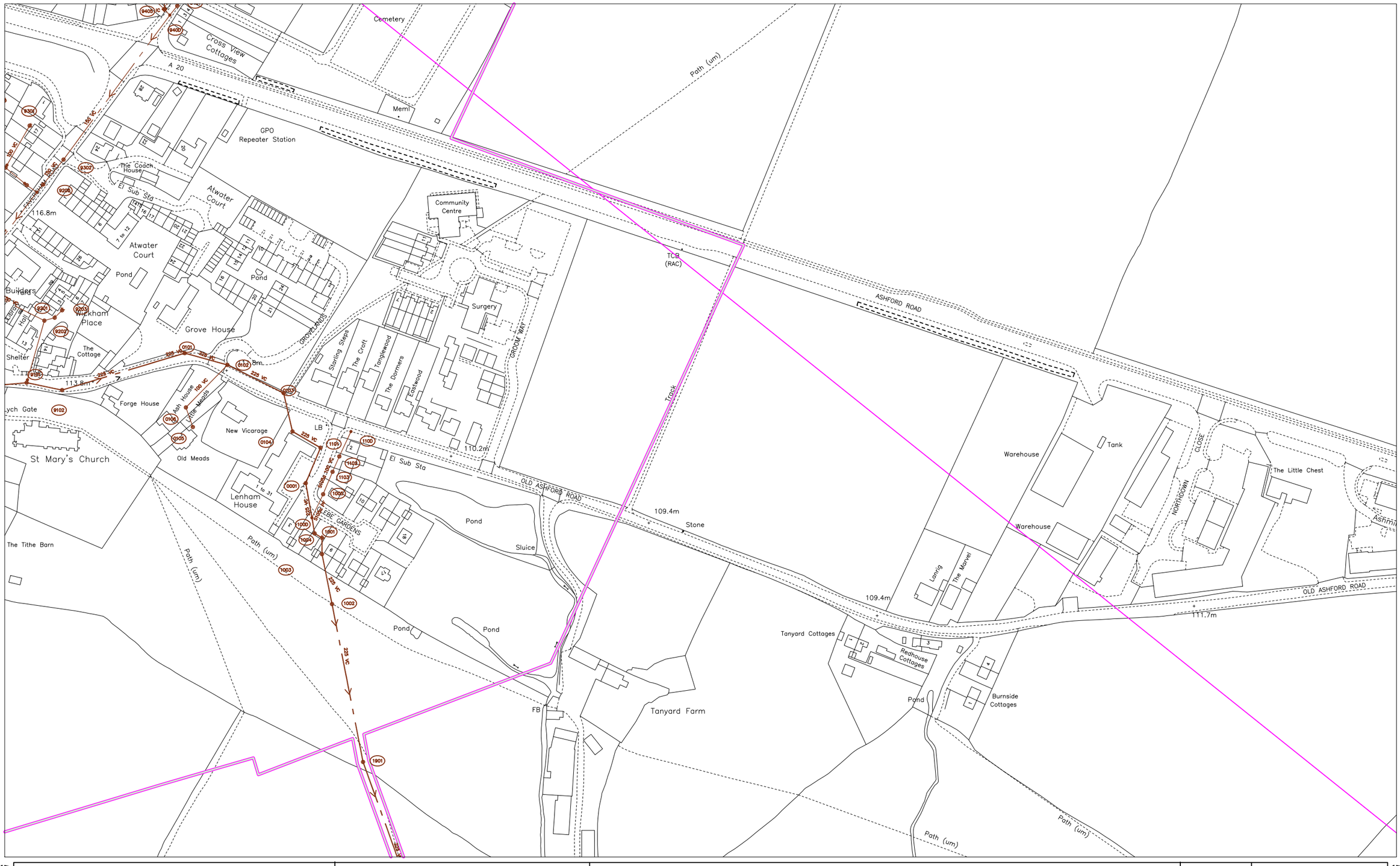
Scale:	Dwg No:	Issue:
1:500	8472K /901	A

ISSUE SHEET

MEL 84 APPROVED DEC 2012 ISSUE No. 6

SEWER RECORDS PAGE 1 OF 2

152420



151842

589890

590836

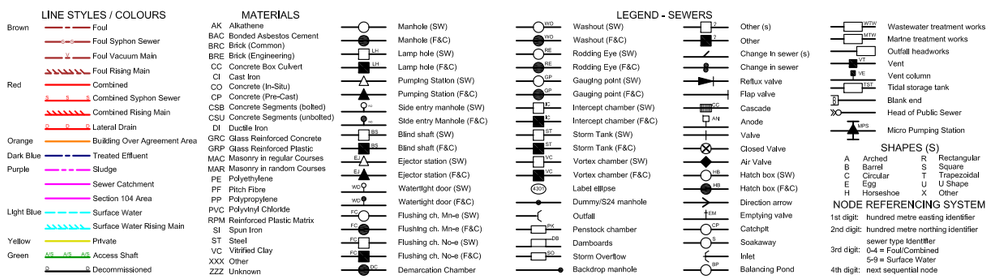
O.S. REF. TQ9052SW	Drawn by: kumaria	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may Include Bonded Asbestos Cement
	Scale: 1:2500	
Title: 205477_Land North to Old Ashfo	Date: 10/11/2015	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

N

Southern Water

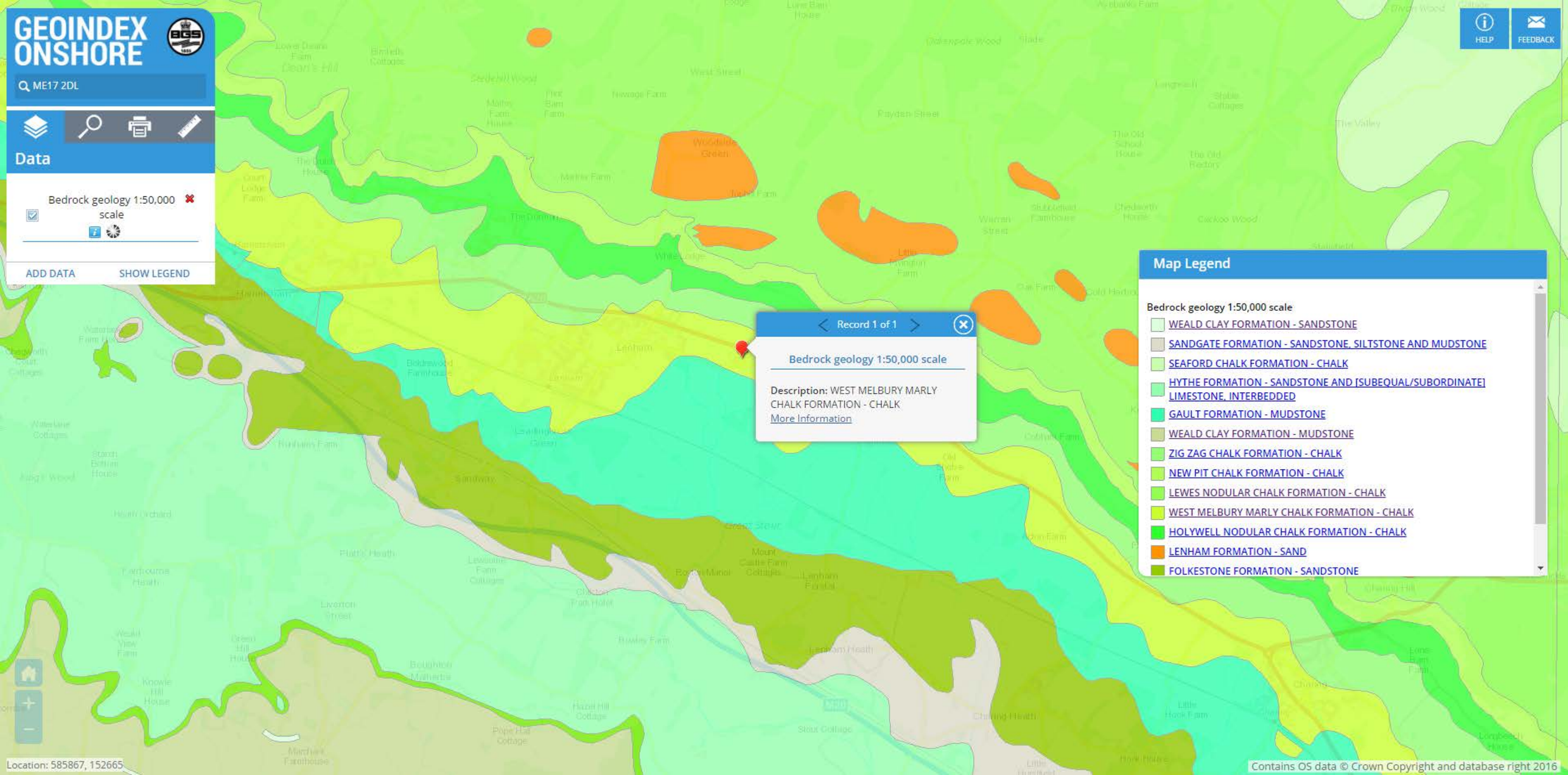
SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0001X	110.01		225	VC	CIRC																		
0101X	112.6		225	VC	CIRC																		
0102X	111.81		225	VC	CIRC																		
0103X	111.39		225	VC	CIRC																		
0104X	110.72		225	VC	CIRC																		
0105X			100	VC	CIRC																		
0106X			100	VC	CIRC																		
0401X	120.82	118.7	150	VC	CIRC																		
1001X	109.63		225	VC	CIRC																		
1002X	109.08		225	VC	CIRC																		
1003X	109.4		225	VC	CIRC																		
1004X	109.92		225	VC	CIRC																		
1005X			UNK	PF	CIRC																		
100DX			225	VC	CIRC																		
1101X	110.54		225	VC	CIRC																		
1102X			100	VC	CIRC																		
1103X			100	VC	CIRC																		
110DX			100	VC	CIRC																		
1901X	106.94		225	VC	CIRC																		
9101X	114.31		225	VC	CIRC																		
9102X	113.94		225	VC	CIRC																		
9201X	114.91	113.71	150	VC	CIRC																		
9202X	114.98	113.76	150	VC	CIRC																		
9203X	115	113.95	150	VC	CIRC																		
9205X	116.99	114.95	150	VC	CIRC																		
9206X	117.53	115.66	150	VC	CIRC																		
920DX			150	VC	CIRC																		
9301X	118.9	118.21	100	VC	CIRC																		
9302X	117.34	115.29	150	VC	CIRC																		
9405X			UNK	VC	CIRC																		
940DX			150	VC	CIRC																		



Drawn by: kumaria	Southern Water
Title: 205477_Land North to Old Ashfo	
Date: 10/11/2015	

Appendix C - Site Geology


GEOINDEX ONSHORE
ME17 2DL
Data
Bedrock geology 1:50,000 scale
ADD DATA
SHOW LEGEND
HELP
FEEDBACK
Record 1 of 1
Bedrock geology 1:50,000 scale
Description: WEST MELBURY MARLY CHALK FORMATION - CHALK
More Information
Map Legend
Bedrock geology 1:50,000 scale
WEALD CLAY FORMATION - SANDSTONE
SANDGATE FORMATION - SANDSTONE, SILTSTONE AND MUDSTONE
SEAFORD CHALK FORMATION - CHALK
HYTHE FORMATION - SANDSTONE AND [SUBEQUAL/SUBORDINATE] LIMESTONE, INTERBEDDED
GAULT FORMATION - MUDSTONE
WEALD CLAY FORMATION - MUDSTONE
ZIG ZAG CHALK FORMATION - CHALK
NEW PIT CHALK FORMATION - CHALK
LEWES NODULAR CHALK FORMATION - CHALK
WEST MELBURY MARLY CHALK FORMATION - CHALK
HOLYWELL NODULAR CHALK FORMATION - CHALK
LENHAM FORMATION - SAND
FOLKESTONE FORMATION - SANDSTONE
Location: 585867, 152665
Contains OS data © Crown Copyright and database right 2016

Appendix D - Soil Infiltration Test - Calculations and Results

Soil infiltration rate $f = \frac{V_{p75-25}}{ap50 \times tp75-25}$

Where

- V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth
- $ap50$ = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $tp75-25$ = the time for the water level to fall from 75% to 25% effective depth

According to the ''Soakaway design to BRE Digest 365'', if it is impossible to carry out a full-depth soakage test, soil infiltration rate calculation should be based on the time for fall of water level from 75% to 25% of the actual maximum water depth achieved in the test. The effective area of loss from the soakage pit is then calculated as the internal surface area of the pit to 50% maximum depth achieved plus the base area of the pit.

Based on that, infiltration rates for this site will be calculated as follows:

Trial Pit 1

Length = 2.40 m, Width = 0.75 m, Depth = 2.20 m

V_{p75-25} = 2.40 x 0.75 x (0.66-0.52) = 0.252 m^3
$ap50$ = (2.40 x 1.61 x 2) + (0.75 x 1.61 x 2) + (2.40 x 0.75) = 11.943 m^2
$tp75-25$ = 146.458 min

Therefore $f_1 = \frac{0.252}{11.943 \times 146.458 \times 60}$ = **2.4 x 10^{-6} m/s**

Trial Pit 2

Length = 2.30 m, Width = 0.75 m, Depth = 2.50 m

V_{p75-25} = 2.30 x 0.75 x (0.8975-0.6325) = 0.457125 m^3
$ap50$ = (2.30 x 1.735 x 2) + (0.75 x 1.735 x 2) + (2.30 x 0.75) = 12.3085 m^2
$tp75-25$ = 144.2077886 min

Therefore $f_2 = \frac{0.457125}{12.3085 \times 144.2077886 \times 60}$ = **4.29 x 10^{-6} m/s**

Trial Pit 3

Length = 2.50 m, Width = 0.75 m, Depth = 2.50 m

V_{p75-25} = 2.50 x 0.75 x (0.8675-0.5825) = 0.534375 m^3
$ap50$ = (2.50 x 1.775 x 2) + (0.75 x 1.775 x 2) + (2.50 x 0.75) = 13.4125 m^2
$tp75-25$ = 177.4 min

Therefore $f_3 = \frac{0.534375}{13.4125 \text{ x } 177.4 \text{ x } 60}$ **= 3.74 x 10^{-6} m/s**

We can either use the average soil infiltration rate or the worst figure to produce a more conservative design.

In this case the design will be based on the worst figure therefore soil infiltration rate

***f* = 0.24 x 10^{-5} m/s**

Soiltec Laboratories Limited
Soiltec House, Langley Park
Sutton Road, Langley,
Maidstone, Kent ME17 3NQ

Telephone: (01622) 862138
Fax: (01622) 862904
E-mail: info@soiltec.net
Web: www.soiltec.net

SOAKAGE TEST REPORT

Date : 6th June 2016

Report No : 07060/22

Client : Monson Engineering Ltd
Broadway Chambers
High Street
Crowborough
East Sussex
TN6 1DF

Client Ref : Jamie Finch

Site : Summerfields
Bohemia Road
Hastings

Soakage Test - Soakage tests were carried out using the BRE 365 Trial Pit method. In this test a mechanical excavated test pit is utilised.

The trial pit is excavated and filled with water to anticipated invert level or zone of required soakage. The test results are expressed as the time taken in minutes for the water level to drop through 75% full and 25% full depths of the test bore.

Anticipated geological deposit - From an examination of the online BGS geological map for the area the solid geological deposit appears as West Melbury Marly Chalk Formation. Superficial deposits of Head – clays and silts and sands may be present on the site but are not recorded.

Melbury Chalk consists of a buff, grey and off-white, soft, marly chalk and hard grey limestone arranged in couplets.

Within the time period for the tests it can be seen from the results that at no point did the water levels drop sufficiently to allow a soil infiltration rate to be calculated.

For and on behalf of
Soiltec Laboratories Limited

BRE Digest 365 Soakage Test (Trial Pit)

Client :	Monson Engineering Ltd	Date of Test :	03/06/2022
Site :	Land to north Old Ashford Road, Lenham	Report No:	07106/22
Trial Pit :	**01**		

Trial Pit

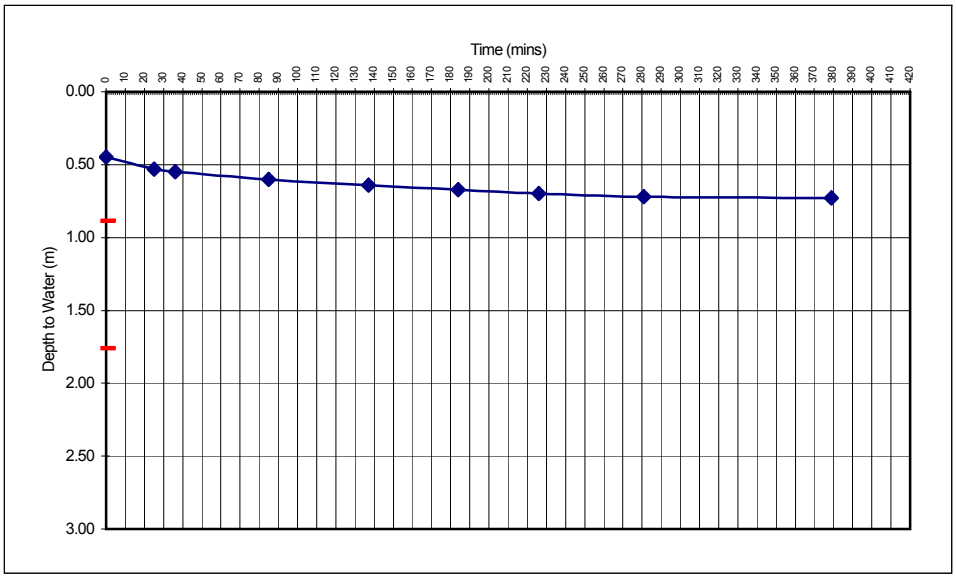
Length	**2.40**	m
Width	**0.75**	m
Depth	**2.20**	m
Assumed invert level*	**0.45**	m
Ground conditions	**Chalk Marl (weathered Lower Chalk)**	

Results

Effective storage depth		1.75	m
75% effective storage depth		1.31	m
depth below GL		1.76	m
25% effective storage depth		0.44	m
depth below GL		0.89	m
Effective volume of outflowing between 75% and 25%		1.5750	m^3
Effective storage depth 75%-25%		0.88	m
Mean surface area	(a_{p50})	7.3125	m^2
Out flow time to 75% effective depth from graph		**N/A**	mins
Out flow time to 25% effective depth from graph		**N/A**	mins
Outflow time	(Tp75%-Tp25%)	n/a	mins

Soil Infiltation Rate *(f)* = Unable to compute

Time mins	Depth to water
0	0.45
25	0.53
36	0.55
85	0.60
137	0.64
184	0.67
226	0.70
281	0.72
379	0.73



*or water level at start of test

Tested by	mk
Approved	mk

BRE Digest 365 Soakage Test (Trial Pit)

Client :	Monson Engineering Ltd	Date of Test :	03/06/2022
Site :	Land to north Old Ashford Road, Lenham	Report No:	07106/22
Trial Pit :	**02**		

Trial Pit

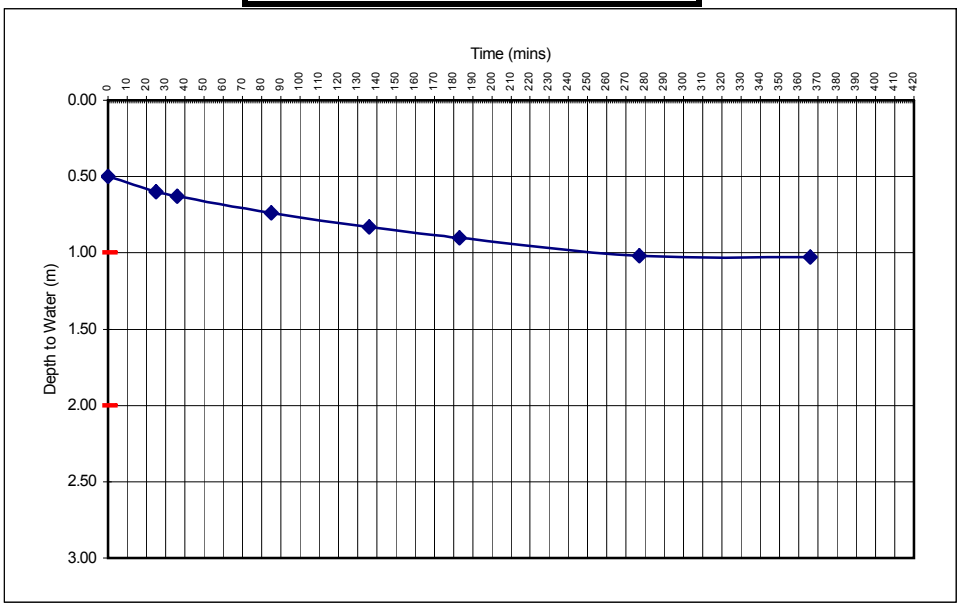
Length	**2.30**	m
Width	**0.75**	m
Depth	**2.50**	m
Assumed invert level*	**0.50**	m
Ground conditions	**Chalk Marl (weathered Lower Chalk)**	

Results

Effective storage depth		2.00	m
75% effective storage depth		1.50	m
depth below GL		2.00	m
25% effective storage depth		0.50	m
depth below GL		1.00	m
Effective volume of outflowing between 75% and 25%		1.7250	m^3
Effective storage depth 75%-25%		1.00	m
Mean surface area	(a_{p50})	7.8250	m^2
Out flow time to 75% effective depth from graph		**255.0**	mins
Out flow time to 25% effective depth from graph		**N/A**	mins
Outflow time	(Tp75%-Tp25%)	n/a	mins

Soil Infiltation Rate *(f)* = Unable to compute

Time mins	Depth to water
0	0.50
25	0.60
36	0.63
85	0.74
136	0.83
183	0.90
277	1.02
366	1.03



*or water level at start of test

Tested by	mk
Approved	mk

BRE Digest 365 Soakage Test (Trial Pit)

Client :	Monson Engineering Ltd	Date of Test :	03/06/2022
Site :	Land to north Old Ashford Road, Lenham	Report No:	07106/22
Trial Pit :	**03**		

Trial Pit

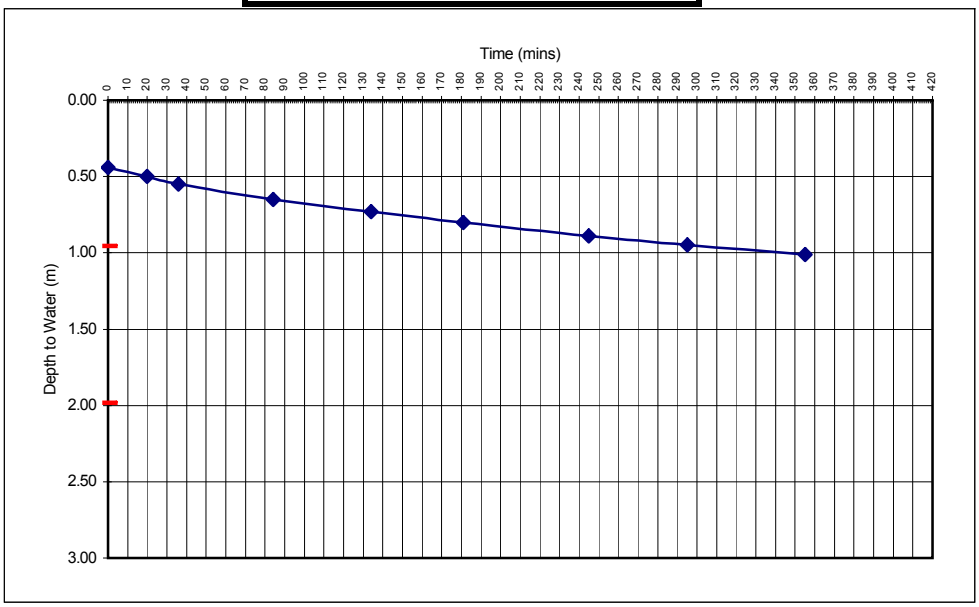
Length	**2.50**	m
Width	**0.75**	m
Depth	**2.50**	m
Assumed invert level*	**0.44**	m
Ground conditions	**Chalk Marl (weathered Lower Chalk)**	

Results

Effective storage depth		2.06	m
75% effective storage depth		1.55	m
depth below GL		1.99	m
25% effective storage depth		0.52	m
depth below GL		0.96	m
Effective volume of outflowing between 75% and 25%		1.9313	m^3
Effective storage depth 75%-25%		1.03	m
Mean surface area	(a_{p50})	8.5700	m^2
Out flow time to 75% effective depth from graph		**300.0**	mins
Out flow time to 25% effective depth from graph		**N/A**	mins
Outflow time	(Tp75%-Tp25%)	n/a	mins

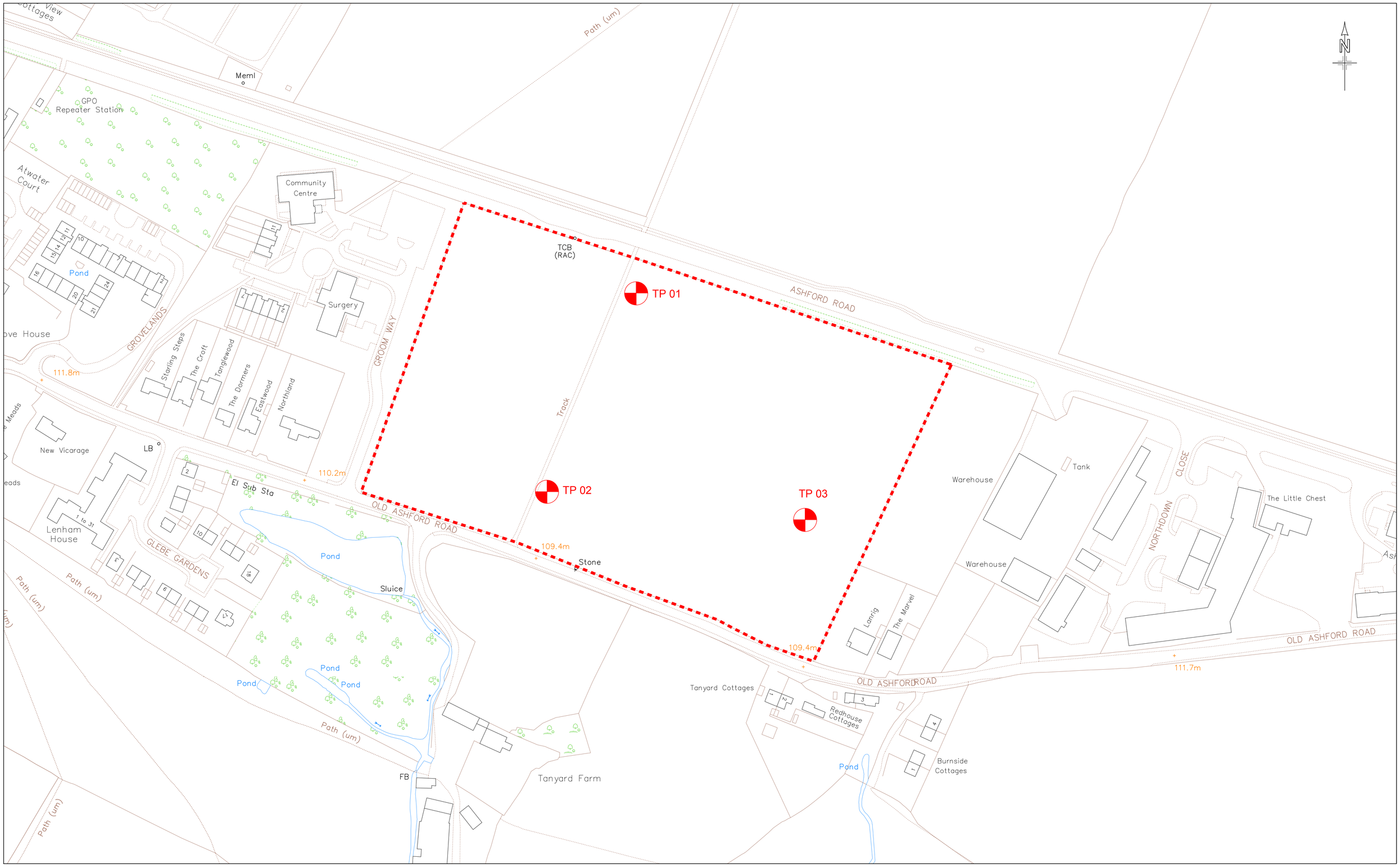
Soil Infiltation Rate *(f)* = Unable to compute

Time mins	Depth to water
0	0.44
20	0.50
36	0.55
84	0.65
134	0.73
181	0.80
245	0.89
295	0.95
355	1.01



*or water level at start of test

Tested by	mk
Approved	mk



Notes:
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT MONSON DRAWINGS AND SPECIFICATIONS, ANY DISCREPANCIES TO BE REPORTED TO MONSON PRIOR TO ANY FABRICATION OR WORK COMMENCING ON SITE.
2. DO NOT SCALE THIS DRAWING, USE FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS IN MILLIMETRES, ALL LEVELS IN METRES.

RISK ASSESSMENT

RESIDUAL RISKS IDENTIFIED

1. None identified, 09/03/15.

CONTRACTOR'S GENERAL RISK ITEMS
(List is not exhaustive but includes commonly raised issues)
1. Location of all buried services.
2. Existing drainage:
   i) Gases, confined spaces, diseases.
   ii) Maintain flow in drains during works.
3. Manual lifting of heavy objects:
   Manhole covers, drainage pipes, concrete rings, kerbs, etc.
4. Excavation for drainage trenches and manholes.
5. Security:
   Keep site secure from members of the public.
   Maintain public safety when accessing site

Issue	By	Date	Amendments
A	MW	13/05/16	Original issue

MONSON
Broadway Chambers, High Street, Crowborough, East Sussex TN6 1DF
Tel: (01892) 601370, Fax: (01892) 601379
E-mail: enquiries@monson.co.uk

Project:
Land North to Old Ashford Road
Lenham
Kent

Description:
Trial Pit Location Plan

Original Drawing:	Prepared	MW	Approved	GL	
Origin: Crowborough			Size	A1	
Current Issue:	Approved	GL	Date	13/05/16	

Drawing Status: PRELIMINARY

Scale: 1:1000

Dwg No: 5960Q/902

Issue: A

ISSUE SHEET

MEL 84 APPROVED DEC 2012 ISSUE No. 6

Appendix E - Surface Water Drainage Proposals

SCALE 1:500

0m 20m 40m 60m 80m

N

ASHFORD ROAD

OLD ASHFORD ROAD

GROOM WAY

TCB (RAC)

Surgery

Pond

Sluice

Warehous

Wareh

Lanrig

110.2m

109.4m

OIL INTERCEPTOR

HYDRO-BRAKE RESTRICT FLOW TO 10.4 l/s

1950m³ POND - 1.2m DEPTH (PLUS 0.4m STANDING WATER - NOT CALCULATED IN THE TOTAL VOLUME) - 10.4 l/s MAX DISCHARGE RATE

KEY:

- ROAD GULLY
- HIGHWAY DRAINAGE
- SURFACE WATER PIPE
- SURFACE WATER MANHOLE TYPE 4 PPIC
- SURFACE WATER MANHOLE TYPE 2
- OIL INTERCEPTOR
- SOAKAWAY OVERFLOW NETWORK
- GEO-CELLULAR CRATE SOAKAWAY
- ATTENUATION POND

Notes:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT MONSON DRAWINGS AND SPECIFICATIONS, ANY DISCREPANCIES TO BE REPORTED TO MONSON PRIOR TO ANY FABRICATION OR WORK COMMENCING ON SITE.
2. DO NOT SCALE THIS DRAWING, USE FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS IN MILLIMETRES, ALL LEVELS IN METRES.

Issue	By	Date	Amendments
B	DT	04/12/17	Size of the pond & the soakaways amended to suit KCC comments
A	DT	14/11/17	Original issue

MONSON

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71 High Street, Wallingford, Oxfordshire OX10 0BX
Tel: (01865) 689770
E-mail: enquiries@monson.co.uk

Project:
Old Ashford Road
Lenham
Kent

Description:
Surface Water
Drainage Proposals

Original Drawing:	Prepared	DT	Approved	GL	
Origin: Crowborough			Size	A1	
Current Issue:	Approved	GL	Date	04/12/17	

Drawing Status: PRELIMINARY

Scale:	Dwg No:	Issue:
1:500	8472K / 300	B

ISSUE SHEET

MEL 94 APPROVED DEC 2012 ISSUE No. 6

Appendix F - Groundwater Source Protection Zones

Environment Agency

Enter a postcode or place name: Go

Other topics for this area... Groundwater

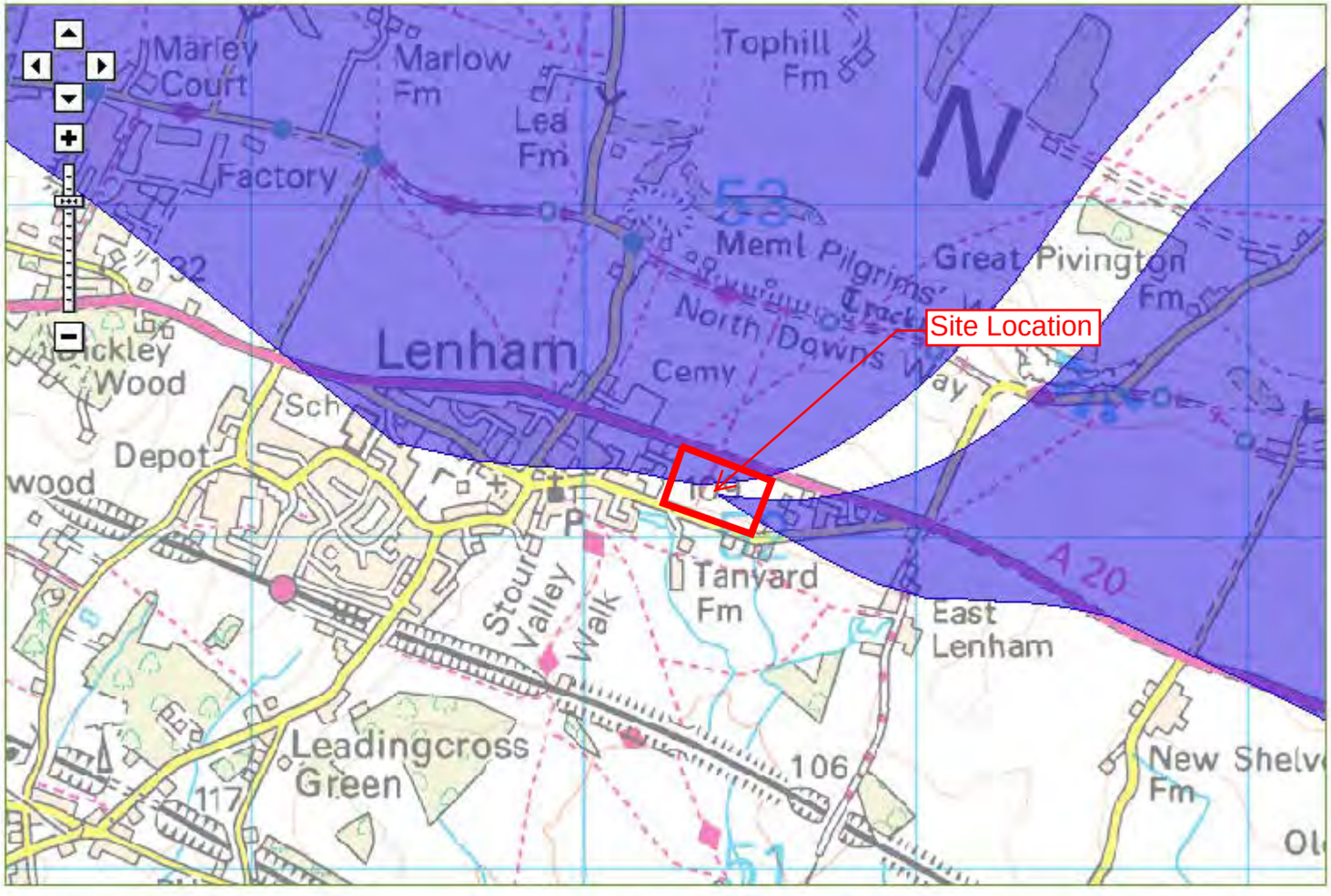
Groundwater

Map legend

- Groundwater source protection zones
  - Inner zone (Zone 1)
  - Inner zone - subsurface activity only (Zone 1c)
  - Outer zone (Zone 2)
  - Outer zone - subsurface activity only (Zone 2c)
  - Total catchment (Zone 3)
  - Total catchment - subsurface activity only (Zone 3c)
  - Special interest (Zone 4)
- BGS Aquifer Maps - Superficial Deposits Designation
  - Principal
  - Secondary A
  - Secondary B
  - Secondary (undifferentiated)
  - Unknown (lakes and landslip)
- BGS Aquifer Maps - Bedrock Designation
  - Principal
  - Secondary A
  - Secondary B
  - Secondary (undifferentiated)
- Groundwater Vulnerability Zones

X: 590,250;Y: 152,271 at scale 1:20,000

Other maps | Data search | Text only version



More about Groundwater

Groundwater Source Protection Zones:

Groundwater provides a third of our drinking water. We ensure that your water is safe to drink defining Source Protection Zones. These zones help to monitor the risk of contamination from any activities that might cause pollution in the area.

Appendix G - Calculations of the Attenuation Pond for the Critical Storm

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	107.717	0.417	10.4	702.5	O K
30 min Summer	107.847	0.547	10.4	931.7	O K
60 min Summer	107.973	0.673	10.4	1159.4	O K
120 min Summer	108.089	0.789	10.4	1373.3	O K
180 min Summer	108.157	0.857	10.4	1499.5	O K
240 min Summer	108.202	0.902	10.4	1585.9	Flood Risk
360 min Summer	108.262	0.962	10.4	1698.7	Flood Risk
480 min Summer	108.298	0.998	10.4	1767.9	Flood Risk
600 min Summer	108.321	1.021	10.4	1812.4	Flood Risk
720 min Summer	108.336	1.036	10.4	1840.6	Flood Risk
960 min Summer	108.349	1.049	10.4	1866.1	Flood Risk
1440 min Summer	108.340	1.040	10.4	1848.5	Flood Risk
2160 min Summer	108.306	1.006	10.4	1784.2	Flood Risk
2880 min Summer	108.273	0.973	10.4	1720.1	Flood Risk
4320 min Summer	108.206	0.906	10.4	1593.2	Flood Risk
5760 min Summer	108.139	0.839	10.4	1466.3	O K
7200 min Summer	108.066	0.766	10.4	1331.3	O K
8640 min Summer	107.991	0.691	10.4	1192.0	O K
10080 min Summer	107.924	0.624	10.4	1070.3	O K
15 min Winter	107.766	0.466	10.4	788.0	O K
30 min Winter	107.910	0.610	10.4	1045.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	631.5	27
30 min Summer	117.890	0.0	805.9	41
60 min Summer	73.889	0.0	1142.4	70
120 min Summer	44.346	0.0	1359.6	130
180 min Summer	32.713	0.0	1484.4	190
240 min Summer	26.296	0.0	1561.5	250
360 min Summer	19.274	0.0	1614.7	368
480 min Summer	15.433	0.0	1600.3	486
600 min Summer	12.976	0.0	1580.8	606
720 min Summer	11.256	0.0	1561.4	724
960 min Summer	8.984	0.0	1525.5	962
1440 min Summer	6.525	0.0	1461.3	1404
2160 min Summer	4.728	0.0	2680.4	1736
2880 min Summer	3.765	0.0	2811.3	2128
4320 min Summer	2.733	0.0	2712.2	2944
5760 min Summer	2.179	0.0	3351.3	3800
7200 min Summer	1.828	0.0	3513.7	4616
8640 min Summer	1.585	0.0	3652.2	5360
10080 min Summer	1.405	0.0	3766.4	6056
15 min Winter	177.327	0.0	701.8	26
30 min Winter	117.890	0.0	856.3	41

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	108.051	0.751	10.4	1302.4	O K
120 min Winter	108.180	0.880	10.4	1543.8	O K
180 min Winter	108.255	0.955	10.4	1686.7	Flood Risk
240 min Winter	108.307	1.007	10.4	1785.5	Flood Risk
360 min Winter	108.375	1.075	10.4	1916.7	Flood Risk
480 min Winter	108.417	1.117	10.4	1999.4	Flood Risk
600 min Winter	108.445	1.145	10.4	2054.3	Flood Risk
720 min Winter	108.464	1.164	10.4	2091.2	Flood Risk
960 min Winter	108.484	1.184	10.4	2130.4	Flood Risk
1440 min Winter	108.485	1.185	10.4	2132.8	Flood Risk
2160 min Winter	108.444	1.144	10.4	2053.1	Flood Risk
2880 min Winter	108.403	1.103	10.4	1972.0	Flood Risk
4320 min Winter	108.313	1.013	10.4	1797.7	Flood Risk
5760 min Winter	108.217	0.917	10.4	1614.4	Flood Risk
7200 min Winter	108.116	0.816	10.4	1423.2	O K
8640 min Winter	107.994	0.694	10.4	1197.4	O K
10080 min Winter	107.888	0.588	10.4	1006.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	73.889	0.0	1275.1	70
120 min Winter	44.346	0.0	1500.9	128
180 min Winter	32.713	0.0	1606.3	186
240 min Winter	26.296	0.0	1633.2	244
360 min Winter	19.274	0.0	1617.4	362
480 min Winter	15.433	0.0	1598.9	478
600 min Winter	12.976	0.0	1583.0	594
720 min Winter	11.256	0.0	1569.3	710
960 min Winter	8.984	0.0	1545.9	940
1440 min Winter	6.525	0.0	1512.4	1384
2160 min Winter	4.728	0.0	2972.9	1980
2880 min Winter	3.765	0.0	3042.0	2248
4320 min Winter	2.733	0.0	2810.2	3164
5760 min Winter	2.179	0.0	3753.5	4096
7200 min Winter	1.828	0.0	3934.9	5040
8640 min Winter	1.585	0.0	4091.2	5792
10080 min Winter	1.405	0.0	4223.4	6464

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 2.145

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.715	4	8	0.715	8	12	0.715

Model Details

Storage is Online Cover Level (m) 108.500

Tank or Pond Structure

Invert Level (m) 107.300

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1625.0	1.201	0.0	2.800	0.0	4.200	0.0
0.200	1682.6	1.600	0.0	3.000	0.0	4.400	0.0
0.400	1741.3	1.800	0.0	3.200	0.0	4.600	0.0
0.600	1801.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	1861.7	2.200	0.0	3.600	0.0	5.000	0.0
1.000	1923.3	2.400	0.0	3.800	0.0		
1.200	1986.0	2.600	0.0	4.000	0.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0145-1040-1200-1040
Design Head (m)	1.200
Design Flow (l/s)	10.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	145
Invert Level (m)	107.300
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	10.4
Flush-Flo™	0.355	10.4
Kick-Flo®	0.778	8.5
Mean Flow over Head Range	-	9.0

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	5.2	1.200	10.4	3.000	16.0	7.000	24.1
0.200	9.8	1.400	11.2	3.500	17.3	7.500	24.9
0.300	10.3	1.600	11.9	4.000	18.4	8.000	25.7
0.400	10.4	1.800	12.6	4.500	19.5	8.500	26.4
0.500	10.2	2.000	13.2	5.000	20.5	9.000	27.2
0.600	9.9	2.200	13.8	5.500	21.4	9.500	27.9
0.800	8.6	2.400	14.4	6.000	22.4		
1.000	9.5	2.600	15.0	6.500	23.2		

Appendix H - Calculations of the Crate Soakaways for the Critical Storm

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

Half Drain Time : 3942 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	112.421	0.201	0.2	25.7	O K
30 min Summer	112.486	0.266	0.2	34.2	O K
60 min Summer	112.553	0.333	0.2	42.6	O K
120 min Summer	112.616	0.396	0.2	50.8	O K
180 min Summer	112.655	0.435	0.2	55.7	O K
240 min Summer	112.682	0.462	0.2	59.3	O K
360 min Summer	112.721	0.501	0.2	64.3	O K
480 min Summer	112.748	0.528	0.2	67.7	O K
600 min Summer	112.767	0.547	0.2	70.2	O K
720 min Summer	112.782	0.562	0.2	72.1	O K
960 min Summer	112.803	0.583	0.2	74.8	O K
1440 min Summer	112.825	0.605	0.2	77.6	O K
2160 min Summer	112.832	0.612	0.2	78.5	O K
2880 min Summer	112.826	0.606	0.2	77.7	O K
4320 min Summer	112.805	0.585	0.2	75.1	O K
5760 min Summer	112.785	0.565	0.2	72.5	O K
7200 min Summer	112.766	0.546	0.2	70.0	O K
8640 min Summer	112.748	0.528	0.2	67.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1446
2160 min Summer	4.728	0.0	2164
2880 min Summer	3.765	0.0	2860
4320 min Summer	2.733	0.0	3512
5760 min Summer	2.179	0.0	4272
7200 min Summer	1.828	0.0	5048
8640 min Summer	1.585	0.0	5880

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
10080 min Summer	112.730	0.510	0.2	65.4	O K
15 min Winter	112.445	0.225	0.2	28.8	O K
30 min Winter	112.519	0.299	0.2	38.3	O K
60 min Winter	112.593	0.373	0.2	47.8	O K
120 min Winter	112.664	0.444	0.2	57.0	O K
180 min Winter	112.708	0.488	0.2	62.6	O K
240 min Winter	112.740	0.520	0.2	66.7	O K
360 min Winter	112.784	0.564	0.2	72.4	O K
480 min Winter	112.815	0.595	0.2	76.3	O K
600 min Winter	112.838	0.618	0.2	79.3	O K
720 min Winter	112.856	0.636	0.2	81.6	O K
960 min Winter	112.882	0.662	0.2	84.9	O K
1440 min Winter	112.911	0.691	0.2	88.6	O K
2160 min Winter	112.925	0.705	0.2	90.4	O K
2880 min Winter	112.925	0.705	0.2	90.4	O K
4320 min Winter	112.903	0.683	0.2	87.7	O K
5760 min Winter	112.877	0.657	0.2	84.2	O K
7200 min Winter	112.852	0.632	0.2	81.0	O K
8640 min Winter	112.826	0.606	0.2	77.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6752
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	718
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1416
2160 min Winter	4.728	0.0	2100
2880 min Winter	3.765	0.0	2772
4320 min Winter	2.733	0.0	4024
5760 min Winter	2.179	0.0	4552
7200 min Winter	1.828	0.0	5472
8640 min Winter	1.585	0.0	6400

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
10080 min Winter	112.800	0.580	0.2	74.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7272

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.078

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.026	4	8	0.026	8	12	0.026

Model Details

Storage is Online Cover Level (m) 113.470

Cellular Storage Structure

Invert Level (m) 112.220 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	135.0	135.0	0.801	0.0	173.4
0.800	135.0	173.4			

Summary of Results for 30 year Return Period

Half Drain Time : 2225 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	112.329	0.109	0.2	14.0	O K
30 min Summer	112.364	0.144	0.2	18.4	O K
60 min Summer	112.400	0.180	0.2	23.0	O K
120 min Summer	112.435	0.215	0.2	27.6	O K
180 min Summer	112.457	0.237	0.2	30.4	O K
240 min Summer	112.472	0.252	0.2	32.4	O K
360 min Summer	112.494	0.274	0.2	35.1	O K
480 min Summer	112.508	0.288	0.2	36.9	O K
600 min Summer	112.518	0.298	0.2	38.2	O K
720 min Summer	112.525	0.305	0.2	39.1	O K
960 min Summer	112.534	0.314	0.2	40.2	O K
1440 min Summer	112.540	0.320	0.2	41.0	O K
2160 min Summer	112.536	0.316	0.2	40.6	O K
2880 min Summer	112.531	0.311	0.2	39.9	O K
4320 min Summer	112.518	0.298	0.2	38.2	O K
5760 min Summer	112.503	0.283	0.2	36.3	O K
7200 min Summer	112.488	0.268	0.2	34.4	O K
8640 min Summer	112.474	0.254	0.2	32.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1442
2160 min Summer	2.778	0.0	1856
2880 min Summer	2.229	0.0	2224
4320 min Summer	1.635	0.0	3024
5760 min Summer	1.312	0.0	3856
7200 min Summer	1.107	0.0	4680
8640 min Summer	0.963	0.0	5456

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	112.459	0.239	0.2	30.7	O K
15 min Winter	112.342	0.122	0.2	15.7	O K
30 min Winter	112.381	0.161	0.2	20.7	O K
60 min Winter	112.422	0.202	0.2	25.9	O K
120 min Winter	112.462	0.242	0.2	31.0	O K
180 min Winter	112.487	0.267	0.2	34.2	O K
240 min Winter	112.504	0.284	0.2	36.5	O K
360 min Winter	112.529	0.309	0.2	39.6	O K
480 min Winter	112.545	0.325	0.2	41.7	O K
600 min Winter	112.557	0.337	0.2	43.3	O K
720 min Winter	112.566	0.346	0.2	44.4	O K
960 min Winter	112.578	0.358	0.2	46.0	O K
1440 min Winter	112.589	0.369	0.2	47.3	O K
2160 min Winter	112.588	0.368	0.2	47.2	O K
2880 min Winter	112.579	0.359	0.2	46.0	O K
4320 min Winter	112.561	0.341	0.2	43.8	O K
5760 min Winter	112.540	0.320	0.2	41.0	O K
7200 min Winter	112.517	0.297	0.2	38.1	O K
8640 min Winter	112.494	0.274	0.2	35.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6264
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	712
960 min Winter	5.166	0.0	944
1440 min Winter	3.791	0.0	1398
2160 min Winter	2.778	0.0	2052
2880 min Winter	2.229	0.0	2392
4320 min Winter	1.635	0.0	3252
5760 min Winter	1.312	0.0	4168
7200 min Winter	1.107	0.0	5056
8640 min Winter	0.963	0.0	5960

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	112.472	0.252	0.2	32.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6768

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.078

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.026	4	8	0.026	8	12	0.026

Model Details

Storage is Online Cover Level (m) 113.470

Cellular Storage Structure

Invert Level (m) 112.220 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	135.0	135.0	0.801	0.0	173.4
0.800	135.0	173.4			

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

Half Drain Time : 3309 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	113.410	0.190	0.1	11.5	O K
30 min Summer	113.472	0.252	0.1	15.3	O K
60 min Summer	113.534	0.314	0.1	19.1	O K
120 min Summer	113.594	0.374	0.1	22.7	O K
180 min Summer	113.630	0.410	0.1	24.9	O K
240 min Summer	113.656	0.436	0.1	26.5	O K
360 min Summer	113.691	0.471	0.1	28.7	O K
480 min Summer	113.715	0.495	0.1	30.1	O K
600 min Summer	113.733	0.513	0.1	31.2	O K
720 min Summer	113.746	0.526	0.1	32.0	O K
960 min Summer	113.764	0.544	0.1	33.1	O K
1440 min Summer	113.780	0.560	0.1	34.1	O K
2160 min Summer	113.780	0.560	0.1	34.1	O K
2880 min Summer	113.771	0.551	0.1	33.5	O K
4320 min Summer	113.751	0.531	0.1	32.3	O K
5760 min Summer	113.731	0.511	0.1	31.1	O K
7200 min Summer	113.712	0.492	0.1	29.9	O K
8640 min Summer	113.693	0.473	0.1	28.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	130
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	488
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2160
2880 min Summer	3.765	0.0	2568
4320 min Summer	2.733	0.0	3292
5760 min Summer	2.179	0.0	4088
7200 min Summer	1.828	0.0	4904
8640 min Summer	1.585	0.0	5712

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
10080 min Summer	113.675	0.455	0.1	27.7	O K
15 min Winter	113.433	0.213	0.1	12.9	O K
30 min Winter	113.502	0.282	0.1	17.2	O K
60 min Winter	113.573	0.353	0.1	21.4	O K
120 min Winter	113.640	0.420	0.1	25.5	O K
180 min Winter	113.681	0.461	0.1	28.0	O K
240 min Winter	113.710	0.490	0.1	29.8	O K
360 min Winter	113.751	0.531	0.1	32.3	O K
480 min Winter	113.779	0.559	0.1	34.0	O K
600 min Winter	113.800	0.580	0.1	35.2	O K
720 min Winter	113.815	0.595	0.1	36.2	O K
960 min Winter	113.837	0.617	0.1	37.5	O K
1440 min Winter	113.860	0.640	0.1	38.9	O K
2160 min Winter	113.867	0.647	0.1	39.4	O K
2880 min Winter	113.861	0.641	0.1	39.0	O K
4320 min Winter	113.835	0.615	0.1	37.4	O K
5760 min Winter	113.810	0.590	0.1	35.9	O K
7200 min Winter	113.783	0.563	0.1	34.2	O K
8640 min Winter	113.756	0.536	0.1	32.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6560
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	598
720 min Winter	11.256	0.0	716
960 min Winter	8.984	0.0	950
1440 min Winter	6.525	0.0	1412
2160 min Winter	4.728	0.0	2084
2880 min Winter	3.765	0.0	2740
4320 min Winter	2.733	0.0	3464
5760 min Winter	2.179	0.0	4384
7200 min Winter	1.828	0.0	5328
8640 min Winter	1.585	0.0	6224

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
10080 min Winter	113.729	0.509	0.1	30.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7072

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.035

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.012	4	8	0.012	8	12	0.012

Model Details

Storage is Online Cover Level (m) 114.470

Cellular Storage Structure

Invert Level (m) 113.220 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	64.0	64.0	0.801	0.0	96.0
0.800	64.0	96.0			

Summary of Results for 30 year Return Period

Half Drain Time : 1948 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	113.323	0.103	0.1	6.3	O K
30 min Summer	113.356	0.136	0.1	8.3	O K
60 min Summer	113.390	0.170	0.1	10.3	O K
120 min Summer	113.423	0.203	0.1	12.4	O K
180 min Summer	113.444	0.224	0.1	13.6	O K
240 min Summer	113.458	0.238	0.1	14.5	O K
360 min Summer	113.477	0.257	0.1	15.6	O K
480 min Summer	113.490	0.270	0.1	16.4	O K
600 min Summer	113.498	0.278	0.1	16.9	O K
720 min Summer	113.504	0.284	0.1	17.3	O K
960 min Summer	113.512	0.292	0.1	17.7	O K
1440 min Summer	113.514	0.294	0.1	17.9	O K
2160 min Summer	113.511	0.291	0.1	17.7	O K
2880 min Summer	113.505	0.285	0.1	17.3	O K
4320 min Summer	113.491	0.271	0.1	16.5	O K
5760 min Summer	113.476	0.256	0.1	15.6	O K
7200 min Summer	113.461	0.241	0.1	14.7	O K
8640 min Summer	113.447	0.227	0.1	13.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	70
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	248
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	486
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	724
960 min Summer	5.166	0.0	962
1440 min Summer	3.791	0.0	1426
2160 min Summer	2.778	0.0	1752
2880 min Summer	2.229	0.0	2132
4320 min Summer	1.635	0.0	2944
5760 min Summer	1.312	0.0	3752
7200 min Summer	1.107	0.0	4608
8640 min Summer	0.963	0.0	5368

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	113.433	0.213	0.1	12.9	O K
15 min Winter	113.336	0.116	0.1	7.0	O K
30 min Winter	113.373	0.153	0.1	9.3	O K
60 min Winter	113.411	0.191	0.1	11.6	O K
120 min Winter	113.449	0.229	0.1	13.9	O K
180 min Winter	113.472	0.252	0.1	15.3	O K
240 min Winter	113.488	0.268	0.1	16.3	O K
360 min Winter	113.510	0.290	0.1	17.7	O K
480 min Winter	113.525	0.305	0.1	18.6	O K
600 min Winter	113.536	0.316	0.1	19.2	O K
720 min Winter	113.544	0.324	0.1	19.7	O K
960 min Winter	113.553	0.333	0.1	20.3	O K
1440 min Winter	113.560	0.340	0.1	20.7	O K
2160 min Winter	113.556	0.336	0.1	20.4	O K
2880 min Winter	113.548	0.328	0.1	19.9	O K
4320 min Winter	113.528	0.308	0.1	18.8	O K
5760 min Winter	113.506	0.286	0.1	17.4	O K
7200 min Winter	113.483	0.263	0.1	16.0	O K
8640 min Winter	113.460	0.240	0.1	14.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6160
15 min Winter	96.830	0.0	26
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	244
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	478
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	710
960 min Winter	5.166	0.0	940
1440 min Winter	3.791	0.0	1388
2160 min Winter	2.778	0.0	2012
2880 min Winter	2.229	0.0	2276
4320 min Winter	1.635	0.0	3200
5760 min Winter	1.312	0.0	4096
7200 min Winter	1.107	0.0	4976
8640 min Winter	0.963	0.0	5808

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	113.438	0.218	0.1	13.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6656

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.035

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.012	4	8	0.012	8	12	0.012

Model Details

Storage is Online Cover Level (m) 114.470

Cellular Storage Structure

Invert Level (m) 113.220 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	64.0	64.0	0.801	0.0	96.0
0.800	64.0	96.0			

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

Half Drain Time : 3188 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	113.358	0.208	0.0	4.0	O K
30 min Summer	113.426	0.276	0.0	5.3	O K
60 min Summer	113.495	0.345	0.0	6.6	O K
120 min Summer	113.560	0.410	0.0	7.8	O K
180 min Summer	113.600	0.450	0.0	8.5	O K
240 min Summer	113.628	0.478	0.0	9.1	O K
360 min Summer	113.667	0.517	0.0	9.8	O K
480 min Summer	113.693	0.543	0.0	10.3	O K
600 min Summer	113.713	0.563	0.0	10.7	O K
720 min Summer	113.727	0.577	0.0	11.0	O K
960 min Summer	113.746	0.596	0.0	11.3	O K
1440 min Summer	113.763	0.613	0.0	11.6	O K
2160 min Summer	113.763	0.613	0.0	11.6	O K
2880 min Summer	113.753	0.603	0.0	11.5	O K
4320 min Summer	113.732	0.582	0.0	11.1	O K
5760 min Summer	113.711	0.561	0.0	10.7	O K
7200 min Summer	113.690	0.540	0.0	10.3	O K
8640 min Summer	113.671	0.521	0.0	9.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	130
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	488
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2160
2880 min Summer	3.765	0.0	2484
4320 min Summer	2.733	0.0	3244
5760 min Summer	2.179	0.0	4040
7200 min Summer	1.828	0.0	4840
8640 min Summer	1.585	0.0	5704

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
10080 min Summer	113.652	0.502	0.0	9.5	O K
15 min Winter	113.383	0.233	0.0	4.4	O K
30 min Winter	113.460	0.310	0.0	5.9	O K
60 min Winter	113.537	0.387	0.0	7.3	O K
120 min Winter	113.610	0.460	0.0	8.7	O K
180 min Winter	113.655	0.505	0.0	9.6	O K
240 min Winter	113.688	0.538	0.0	10.2	O K
360 min Winter	113.732	0.582	0.0	11.1	O K
480 min Winter	113.763	0.613	0.0	11.6	O K
600 min Winter	113.785	0.635	0.0	12.1	O K
720 min Winter	113.803	0.653	0.0	12.4	O K
960 min Winter	113.826	0.676	0.0	12.8	O K
1440 min Winter	113.850	0.700	0.0	13.3	O K
2160 min Winter	113.857	0.707	0.0	13.4	O K
2880 min Winter	113.849	0.699	0.0	13.3	O K
4320 min Winter	113.822	0.672	0.0	12.8	O K
5760 min Winter	113.795	0.645	0.0	12.3	O K
7200 min Winter	113.767	0.617	0.0	11.7	O K
8640 min Winter	113.738	0.588	0.0	11.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6472
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	598
720 min Winter	11.256	0.0	716
960 min Winter	8.984	0.0	948
1440 min Winter	6.525	0.0	1408
2160 min Winter	4.728	0.0	2080
2880 min Winter	3.765	0.0	2716
4320 min Winter	2.733	0.0	3416
5760 min Winter	2.179	0.0	4328
7200 min Winter	1.828	0.0	5264
8640 min Winter	1.585	0.0	6144

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
10080 min Winter	113.709	0.559	0.0	10.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7064

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.012

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.004	4	8	0.004	8	12	0.004

Model Details

Storage is Online Cover Level (m) 114.400

Cellular Storage Structure

Invert Level (m) 113.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	20.0	20.0	0.801	0.0	34.4
0.800	20.0	34.4			

Summary of Results for 30 year Return Period

Half Drain Time : 1981 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	113.263	0.113	0.0	2.2	O K
30 min Summer	113.299	0.149	0.0	2.8	O K
60 min Summer	113.336	0.186	0.0	3.5	O K
120 min Summer	113.373	0.223	0.0	4.2	O K
180 min Summer	113.396	0.246	0.0	4.7	O K
240 min Summer	113.411	0.261	0.0	5.0	O K
360 min Summer	113.433	0.283	0.0	5.4	O K
480 min Summer	113.447	0.297	0.0	5.6	O K
600 min Summer	113.456	0.306	0.0	5.8	O K
720 min Summer	113.463	0.313	0.0	5.9	O K
960 min Summer	113.471	0.321	0.0	6.1	O K
1440 min Summer	113.475	0.325	0.0	6.2	O K
2160 min Summer	113.471	0.321	0.0	6.1	O K
2880 min Summer	113.465	0.315	0.0	6.0	O K
4320 min Summer	113.451	0.301	0.0	5.7	O K
5760 min Summer	113.436	0.286	0.0	5.4	O K
7200 min Summer	113.420	0.270	0.0	5.1	O K
8640 min Summer	113.405	0.255	0.0	4.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	70
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	248
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	486
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	724
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1428
2160 min Summer	2.778	0.0	1756
2880 min Summer	2.229	0.0	2136
4320 min Summer	1.635	0.0	2944
5760 min Summer	1.312	0.0	3760
7200 min Summer	1.107	0.0	4608
8640 min Summer	0.963	0.0	5440

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	113.390	0.240	0.0	4.6	O K
15 min Winter	113.277	0.127	0.0	2.4	O K
30 min Winter	113.317	0.167	0.0	3.2	O K
60 min Winter	113.359	0.209	0.0	4.0	O K
120 min Winter	113.401	0.251	0.0	4.8	O K
180 min Winter	113.426	0.276	0.0	5.2	O K
240 min Winter	113.444	0.294	0.0	5.6	O K
360 min Winter	113.469	0.319	0.0	6.1	O K
480 min Winter	113.486	0.336	0.0	6.4	O K
600 min Winter	113.497	0.347	0.0	6.6	O K
720 min Winter	113.506	0.356	0.0	6.8	O K
960 min Winter	113.517	0.367	0.0	7.0	O K
1440 min Winter	113.525	0.375	0.0	7.1	O K
2160 min Winter	113.521	0.371	0.0	7.0	O K
2880 min Winter	113.513	0.363	0.0	6.9	O K
4320 min Winter	113.493	0.343	0.0	6.5	O K
5760 min Winter	113.469	0.319	0.0	6.1	O K
7200 min Winter	113.445	0.295	0.0	5.6	O K
8640 min Winter	113.422	0.272	0.0	5.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6168
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	244
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	478
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	710
960 min Winter	5.166	0.0	940
1440 min Winter	3.791	0.0	1388
2160 min Winter	2.778	0.0	2008
2880 min Winter	2.229	0.0	2260
4320 min Winter	1.635	0.0	3200
5760 min Winter	1.312	0.0	4096
7200 min Winter	1.107	0.0	4976
8640 min Winter	0.963	0.0	5872

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	113.400	0.250	0.0	4.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6664

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.012

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.004	4	8	0.004	8	12	0.004

Model Details

Storage is Online Cover Level (m) 114.400

Cellular Storage Structure

Invert Level (m) 113.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	20.0	20.0	0.801	0.0	34.4
0.800	20.0	34.4			

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

Half Drain Time : 3817 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	112.580	0.210	0.1	12.5	O K
30 min Summer	112.648	0.278	0.1	16.6	O K
60 min Summer	112.717	0.347	0.1	20.8	O K
120 min Summer	112.783	0.413	0.1	24.7	O K
180 min Summer	112.824	0.454	0.1	27.1	O K
240 min Summer	112.852	0.482	0.1	28.9	O K
360 min Summer	112.893	0.523	0.1	31.3	O K
480 min Summer	112.920	0.550	0.1	32.9	O K
600 min Summer	112.941	0.571	0.1	34.2	O K
720 min Summer	112.956	0.586	0.1	35.1	O K
960 min Summer	112.978	0.608	0.1	36.4	O K
1440 min Summer	113.000	0.630	0.1	37.7	O K
2160 min Summer	113.007	0.637	0.1	38.1	O K
2880 min Summer	112.999	0.629	0.1	37.7	O K
4320 min Summer	112.979	0.609	0.1	36.4	O K
5760 min Summer	112.958	0.588	0.1	35.2	O K
7200 min Summer	112.938	0.568	0.1	34.0	O K
8640 min Summer	112.919	0.549	0.1	32.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2160
2880 min Summer	3.765	0.0	2800
4320 min Summer	2.733	0.0	3460
5760 min Summer	2.179	0.0	4216
7200 min Summer	1.828	0.0	5040
8640 min Summer	1.585	0.0	5872

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
10080 min Summer	112.901	0.531	0.1	31.8	O K
15 min Winter	112.605	0.235	0.1	14.1	O K
30 min Winter	112.682	0.312	0.1	18.7	O K
60 min Winter	112.759	0.389	0.1	23.3	O K
120 min Winter	112.834	0.464	0.1	27.8	O K
180 min Winter	112.880	0.510	0.1	30.5	O K
240 min Winter	112.912	0.542	0.1	32.5	O K
360 min Winter	112.959	0.589	0.1	35.2	O K
480 min Winter	112.991	0.621	0.1	37.1	O K
600 min Winter	113.015	0.645	0.1	38.6	O K
720 min Winter	113.033	0.663	0.1	39.7	O K
960 min Winter	113.060	0.690	0.1	41.3	O K
1440 min Winter	113.089	0.719	0.1	43.0	O K
2160 min Winter	113.103	0.733	0.1	43.9	O K
2880 min Winter	113.102	0.732	0.1	43.8	O K
4320 min Winter	113.078	0.708	0.1	42.4	O K
5760 min Winter	113.052	0.682	0.1	40.8	O K
7200 min Winter	113.026	0.656	0.1	39.3	O K
8640 min Winter	112.999	0.629	0.1	37.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6664
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	716
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1416
2160 min Winter	4.728	0.0	2100
2880 min Winter	3.765	0.0	2768
4320 min Winter	2.733	0.0	3980
5760 min Winter	2.179	0.0	4496
7200 min Winter	1.828	0.0	5408
8640 min Winter	1.585	0.0	6320

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
10080 min Winter	112.972	0.602	0.1	36.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7264

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.038

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.013	4	8	0.013	8	12	0.013

Model Details

Storage is Online Cover Level (m) 113.620

Cellular Storage Structure

Invert Level (m) 112.370 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	63.0	63.0	0.801	0.0	88.6
0.800	63.0	88.6			

Summary of Results for 30 year Return Period

Half Drain Time : 2220 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	112.484	0.114	0.1	6.8	O K
30 min Summer	112.520	0.150	0.1	9.0	O K
60 min Summer	112.558	0.188	0.1	11.2	O K
120 min Summer	112.595	0.225	0.1	13.5	O K
180 min Summer	112.618	0.248	0.1	14.8	O K
240 min Summer	112.634	0.264	0.1	15.8	O K
360 min Summer	112.656	0.286	0.1	17.1	O K
480 min Summer	112.670	0.300	0.1	18.0	O K
600 min Summer	112.681	0.311	0.1	18.6	O K
720 min Summer	112.688	0.318	0.1	19.1	O K
960 min Summer	112.698	0.328	0.1	19.6	O K
1440 min Summer	112.704	0.334	0.1	20.0	O K
2160 min Summer	112.701	0.331	0.1	19.8	O K
2880 min Summer	112.695	0.325	0.1	19.5	O K
4320 min Summer	112.682	0.312	0.1	18.7	O K
5760 min Summer	112.667	0.297	0.1	17.8	O K
7200 min Summer	112.652	0.282	0.1	16.9	O K
8640 min Summer	112.637	0.267	0.1	16.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1440
2160 min Summer	2.778	0.0	1848
2880 min Summer	2.229	0.0	2224
4320 min Summer	1.635	0.0	3024
5760 min Summer	1.312	0.0	3856
7200 min Summer	1.107	0.0	4680
8640 min Summer	0.963	0.0	5456

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	112.622	0.252	0.1	15.1	O K
15 min Winter	112.498	0.128	0.1	7.6	O K
30 min Winter	112.538	0.168	0.1	10.1	O K
60 min Winter	112.581	0.211	0.1	12.6	O K
120 min Winter	112.623	0.253	0.1	15.1	O K
180 min Winter	112.649	0.279	0.1	16.7	O K
240 min Winter	112.667	0.297	0.1	17.8	O K
360 min Winter	112.693	0.323	0.1	19.3	O K
480 min Winter	112.710	0.340	0.1	20.3	O K
600 min Winter	112.722	0.352	0.1	21.1	O K
720 min Winter	112.732	0.362	0.1	21.7	O K
960 min Winter	112.744	0.374	0.1	22.4	O K
1440 min Winter	112.755	0.385	0.1	23.0	O K
2160 min Winter	112.754	0.384	0.1	23.0	O K
2880 min Winter	112.745	0.375	0.1	22.5	O K
4320 min Winter	112.728	0.358	0.1	21.4	O K
5760 min Winter	112.706	0.336	0.1	20.1	O K
7200 min Winter	112.682	0.312	0.1	18.7	O K
8640 min Winter	112.659	0.289	0.1	17.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6264
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	712
960 min Winter	5.166	0.0	942
1440 min Winter	3.791	0.0	1396
2160 min Winter	2.778	0.0	2040
2880 min Winter	2.229	0.0	2368
4320 min Winter	1.635	0.0	3248
5760 min Winter	1.312	0.0	4160
7200 min Winter	1.107	0.0	5056
8640 min Winter	0.963	0.0	5960

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	112.637	0.267	0.1	16.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6768

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.038

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.013	4	8	0.013	8	12	0.013

Model Details

Storage is Online Cover Level (m) 113.620

Cellular Storage Structure

Invert Level (m) 112.370 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	63.0	63.0	0.801	0.0	88.6
0.800	63.0	88.6			

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

Half Drain Time : 3917 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	111.364	0.214	0.1	14.5	O K
30 min Summer	111.434	0.284	0.1	19.3	O K
60 min Summer	111.504	0.354	0.1	24.1	O K
120 min Summer	111.572	0.422	0.1	28.6	O K
180 min Summer	111.613	0.463	0.1	31.5	O K
240 min Summer	111.643	0.493	0.1	33.5	O K
360 min Summer	111.684	0.534	0.1	36.3	O K
480 min Summer	111.712	0.562	0.1	38.2	O K
600 min Summer	111.733	0.583	0.1	39.6	O K
720 min Summer	111.749	0.599	0.1	40.7	O K
960 min Summer	111.772	0.622	0.1	42.2	O K
1440 min Summer	111.795	0.645	0.1	43.8	O K
2160 min Summer	111.803	0.653	0.1	44.4	O K
2880 min Summer	111.797	0.647	0.1	43.9	O K
4320 min Summer	111.776	0.626	0.1	42.5	O K
5760 min Summer	111.755	0.605	0.1	41.1	O K
7200 min Summer	111.735	0.585	0.1	39.7	O K
8640 min Summer	111.716	0.566	0.1	38.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2164
2880 min Summer	3.765	0.0	2856
4320 min Summer	2.733	0.0	3504
5760 min Summer	2.179	0.0	4264
7200 min Summer	1.828	0.0	5048
8640 min Summer	1.585	0.0	5880

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
10080 min Summer	111.698	0.548	0.1	37.2	O K
15 min Winter	111.390	0.240	0.1	16.3	O K
30 min Winter	111.468	0.318	0.1	21.6	O K
60 min Winter	111.547	0.397	0.1	27.0	O K
120 min Winter	111.623	0.473	0.1	32.2	O K
180 min Winter	111.670	0.520	0.1	35.3	O K
240 min Winter	111.704	0.554	0.1	37.6	O K
360 min Winter	111.751	0.601	0.1	40.8	O K
480 min Winter	111.784	0.634	0.1	43.1	O K
600 min Winter	111.809	0.659	0.1	44.7	O K
720 min Winter	111.828	0.678	0.1	46.0	O K
960 min Winter	111.855	0.705	0.1	47.9	O K
1440 min Winter	111.886	0.736	0.1	50.0	O K
2160 min Winter	111.901	0.751	0.1	51.0	O K
2880 min Winter	111.901	0.751	0.1	51.0	O K
4320 min Winter	111.878	0.728	0.1	49.5	O K
5760 min Winter	111.852	0.702	0.1	47.7	O K
7200 min Winter	111.826	0.676	0.1	45.9	O K
8640 min Winter	111.799	0.649	0.1	44.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6672
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	718
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1416
2160 min Winter	4.728	0.0	2100
2880 min Winter	3.765	0.0	2768
4320 min Winter	2.733	0.0	3988
5760 min Winter	2.179	0.0	4504
7200 min Winter	1.828	0.0	5416
8640 min Winter	1.585	0.0	6392

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
10080 min Winter	111.773	0.623	0.1	42.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7264

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.044

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

Model Details

Storage is Online Cover Level (m) 112.400

Cellular Storage Structure

Invert Level (m) 111.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	71.5	71.5	0.801	0.0	99.5
0.800	71.5	99.5			

Summary of Results for 30 year Return Period

Half Drain Time : 2285 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	111.266	0.116	0.1	7.9	O K
30 min Summer	111.303	0.153	0.1	10.4	O K
60 min Summer	111.341	0.191	0.1	13.0	O K
120 min Summer	111.380	0.230	0.1	15.6	O K
180 min Summer	111.403	0.253	0.1	17.2	O K
240 min Summer	111.419	0.269	0.1	18.3	O K
360 min Summer	111.442	0.292	0.1	19.8	O K
480 min Summer	111.457	0.307	0.1	20.9	O K
600 min Summer	111.468	0.318	0.1	21.6	O K
720 min Summer	111.476	0.326	0.1	22.1	O K
960 min Summer	111.486	0.336	0.1	22.8	O K
1440 min Summer	111.493	0.343	0.1	23.3	O K
2160 min Summer	111.489	0.339	0.1	23.0	O K
2880 min Summer	111.484	0.334	0.1	22.7	O K
4320 min Summer	111.471	0.321	0.1	21.8	O K
5760 min Summer	111.456	0.306	0.1	20.8	O K
7200 min Summer	111.441	0.291	0.1	19.7	O K
8640 min Summer	111.426	0.276	0.1	18.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1442
2160 min Summer	2.778	0.0	1868
2880 min Summer	2.229	0.0	2248
4320 min Summer	1.635	0.0	3028
5760 min Summer	1.312	0.0	3864
7200 min Summer	1.107	0.0	4680
8640 min Summer	0.963	0.0	5464

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	111.411	0.261	0.1	17.7	O K
15 min Winter	111.280	0.130	0.1	8.8	O K
30 min Winter	111.322	0.172	0.1	11.7	O K
60 min Winter	111.365	0.215	0.1	14.6	O K
120 min Winter	111.408	0.258	0.1	17.5	O K
180 min Winter	111.434	0.284	0.1	19.3	O K
240 min Winter	111.453	0.303	0.1	20.6	O K
360 min Winter	111.480	0.330	0.1	22.4	O K
480 min Winter	111.497	0.347	0.1	23.6	O K
600 min Winter	111.510	0.360	0.1	24.5	O K
720 min Winter	111.520	0.370	0.1	25.1	O K
960 min Winter	111.533	0.383	0.1	26.0	O K
1440 min Winter	111.545	0.395	0.1	26.8	O K
2160 min Winter	111.545	0.395	0.1	26.8	O K
2880 min Winter	111.536	0.386	0.1	26.2	O K
4320 min Winter	111.518	0.368	0.1	25.0	O K
5760 min Winter	111.496	0.346	0.1	23.5	O K
7200 min Winter	111.473	0.323	0.1	22.0	O K
8640 min Winter	111.450	0.300	0.1	20.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6272
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	714
960 min Winter	5.166	0.0	944
1440 min Winter	3.791	0.0	1398
2160 min Winter	2.778	0.0	2052
2880 min Winter	2.229	0.0	2424
4320 min Winter	1.635	0.0	3284
5760 min Winter	1.312	0.0	4208
7200 min Winter	1.107	0.0	5112
8640 min Winter	0.963	0.0	5968

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	111.427	0.277	0.1	18.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6856

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.044

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

Model Details

Storage is Online Cover Level (m) 112.400

Cellular Storage Structure

Invert Level (m) 111.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	71.5	71.5	0.801	0.0	99.5
0.800	71.5	99.5			

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

Half Drain Time : 3807 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	110.423	0.223	0.1	8.9	O K
30 min Summer	110.497	0.297	0.1	11.8	O K
60 min Summer	110.570	0.370	0.1	14.8	O K
120 min Summer	110.641	0.441	0.1	17.6	O K
180 min Summer	110.684	0.484	0.1	19.3	O K
240 min Summer	110.715	0.515	0.1	20.5	O K
360 min Summer	110.758	0.558	0.1	22.3	O K
480 min Summer	110.787	0.587	0.1	23.4	O K
600 min Summer	110.809	0.609	0.1	24.3	O K
720 min Summer	110.826	0.626	0.1	25.0	O K
960 min Summer	110.849	0.649	0.1	25.9	O K
1440 min Summer	110.873	0.673	0.1	26.9	O K
2160 min Summer	110.881	0.681	0.1	27.2	O K
2880 min Summer	110.873	0.673	0.1	26.9	O K
4320 min Summer	110.853	0.653	0.1	26.0	O K
5760 min Summer	110.831	0.631	0.1	25.2	O K
7200 min Summer	110.811	0.611	0.1	24.4	O K
8640 min Summer	110.791	0.591	0.1	23.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2160
2880 min Summer	3.765	0.0	2796
4320 min Summer	2.733	0.0	3428
5760 min Summer	2.179	0.0	4208
7200 min Summer	1.828	0.0	5040
8640 min Summer	1.585	0.0	5872

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
10080 min Summer	110.772	0.572	0.1	22.8	O K
15 min Winter	110.450	0.250	0.1	10.0	O K
30 min Winter	110.532	0.332	0.1	13.3	O K
60 min Winter	110.615	0.415	0.1	16.6	O K
120 min Winter	110.694	0.494	0.1	19.7	O K
180 min Winter	110.743	0.543	0.1	21.7	O K
240 min Winter	110.778	0.578	0.1	23.1	O K
360 min Winter	110.828	0.628	0.1	25.1	O K
480 min Winter	110.862	0.662	0.1	26.4	O K
600 min Winter	110.888	0.688	0.1	27.4	O K
720 min Winter	110.907	0.707	0.1	28.2	O K
960 min Winter	110.936	0.736	0.1	29.4	O K
1440 min Winter	110.967	0.767	0.1	30.6	O K
2160 min Winter	110.983	0.783	0.1	31.2	O K
2880 min Winter	110.982	0.782	0.1	31.2	O K
4320 min Winter	110.957	0.757	0.1	30.2	O K
5760 min Winter	110.931	0.731	0.1	29.2	O K
7200 min Winter	110.904	0.704	0.1	28.1	O K
8640 min Winter	110.876	0.676	0.1	27.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6664
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	716
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1416
2160 min Winter	4.728	0.0	2100
2880 min Winter	3.765	0.0	2768
4320 min Winter	2.733	0.0	3944
5760 min Winter	2.179	0.0	4488
7200 min Winter	1.828	0.0	5408
8640 min Winter	1.585	0.0	6320

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
10080 min Winter	110.849	0.649	0.1	25.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7256

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.027

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.009	4	8	0.009	8	12	0.009

Model Details

Storage is Online Cover Level (m) 111.450

Cellular Storage Structure

Invert Level (m) 110.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	42.0	42.0	0.801	0.0	62.8
0.800	42.0	62.8			

Summary of Results for 30 year Return Period

Half Drain Time : 2292 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	110.321	0.121	0.1	4.8	O K
30 min Summer	110.360	0.160	0.1	6.4	O K
60 min Summer	110.400	0.200	0.1	8.0	O K
120 min Summer	110.440	0.240	0.1	9.6	O K
180 min Summer	110.464	0.264	0.1	10.5	O K
240 min Summer	110.482	0.282	0.1	11.2	O K
360 min Summer	110.505	0.305	0.1	12.2	O K
480 min Summer	110.521	0.321	0.1	12.8	O K
600 min Summer	110.532	0.332	0.1	13.3	O K
720 min Summer	110.541	0.341	0.1	13.6	O K
960 min Summer	110.551	0.351	0.1	14.0	O K
1440 min Summer	110.559	0.359	0.1	14.3	O K
2160 min Summer	110.555	0.355	0.1	14.2	O K
2880 min Summer	110.550	0.350	0.1	14.0	O K
4320 min Summer	110.537	0.337	0.1	13.4	O K
5760 min Summer	110.521	0.321	0.1	12.8	O K
7200 min Summer	110.506	0.306	0.1	12.2	O K
8640 min Summer	110.491	0.291	0.1	11.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1442
2160 min Summer	2.778	0.0	1864
2880 min Summer	2.229	0.0	2248
4320 min Summer	1.635	0.0	3028
5760 min Summer	1.312	0.0	3864
7200 min Summer	1.107	0.0	4688
8640 min Summer	0.963	0.0	5528

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	110.476	0.276	0.1	11.0	O K
15 min Winter	110.336	0.136	0.1	5.4	O K
30 min Winter	110.380	0.180	0.1	7.2	O K
60 min Winter	110.425	0.225	0.1	9.0	O K
120 min Winter	110.470	0.270	0.1	10.8	O K
180 min Winter	110.497	0.297	0.1	11.9	O K
240 min Winter	110.517	0.317	0.1	12.6	O K
360 min Winter	110.545	0.345	0.1	13.7	O K
480 min Winter	110.563	0.363	0.1	14.5	O K
600 min Winter	110.577	0.377	0.1	15.0	O K
720 min Winter	110.587	0.387	0.1	15.4	O K
960 min Winter	110.601	0.401	0.1	16.0	O K
1440 min Winter	110.613	0.413	0.1	16.5	O K
2160 min Winter	110.613	0.413	0.1	16.5	O K
2880 min Winter	110.604	0.404	0.1	16.1	O K
4320 min Winter	110.586	0.386	0.1	15.4	O K
5760 min Winter	110.564	0.364	0.1	14.5	O K
7200 min Winter	110.541	0.341	0.1	13.6	O K
8640 min Winter	110.517	0.317	0.1	12.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6344
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	712
960 min Winter	5.166	0.0	944
1440 min Winter	3.791	0.0	1398
2160 min Winter	2.778	0.0	2052
2880 min Winter	2.229	0.0	2400
4320 min Winter	1.635	0.0	3252
5760 min Winter	1.312	0.0	4200
7200 min Winter	1.107	0.0	5112
8640 min Winter	0.963	0.0	5968

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	110.494	0.294	0.1	11.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6856

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.027

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.009	4	8	0.009	8	12	0.009

Model Details

Storage is Online Cover Level (m) 111.450

Cellular Storage Structure

Invert Level (m) 110.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	42.0	42.0	0.801	0.0	62.8
0.800	42.0	62.8			

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

Half Drain Time : 3365 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	109.967	0.217	0.0	4.9	O K
30 min Summer	110.038	0.288	0.0	6.6	O K
60 min Summer	110.110	0.360	0.0	8.2	O K
120 min Summer	110.178	0.428	0.0	9.8	O K
180 min Summer	110.219	0.469	0.0	10.7	O K
240 min Summer	110.249	0.499	0.0	11.4	O K
360 min Summer	110.290	0.540	0.0	12.3	O K
480 min Summer	110.318	0.568	0.0	12.9	O K
600 min Summer	110.338	0.588	0.0	13.4	O K
720 min Summer	110.354	0.604	0.0	13.8	O K
960 min Summer	110.375	0.625	0.0	14.2	O K
1440 min Summer	110.394	0.644	0.0	14.7	O K
2160 min Summer	110.397	0.647	0.0	14.7	O K
2880 min Summer	110.387	0.637	0.0	14.5	O K
4320 min Summer	110.367	0.617	0.0	14.1	O K
5760 min Summer	110.345	0.595	0.0	13.6	O K
7200 min Summer	110.325	0.575	0.0	13.1	O K
8640 min Summer	110.304	0.554	0.0	12.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	130
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	488
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2160
2880 min Summer	3.765	0.0	2568
4320 min Summer	2.733	0.0	3296
5760 min Summer	2.179	0.0	4088
7200 min Summer	1.828	0.0	4904
8640 min Summer	1.585	0.0	5712

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
10080 min Summer	110.285	0.535	0.0	12.2	O K
15 min Winter	109.993	0.243	0.0	5.5	O K
30 min Winter	110.073	0.323	0.0	7.4	O K
60 min Winter	110.153	0.403	0.0	9.2	O K
120 min Winter	110.230	0.480	0.0	10.9	O K
180 min Winter	110.277	0.527	0.0	12.0	O K
240 min Winter	110.311	0.561	0.0	12.8	O K
360 min Winter	110.358	0.608	0.0	13.9	O K
480 min Winter	110.390	0.640	0.0	14.6	O K
600 min Winter	110.414	0.664	0.0	15.1	O K
720 min Winter	110.433	0.683	0.0	15.6	O K
960 min Winter	110.458	0.708	0.0	16.2	O K
1440 min Winter	110.485	0.735	0.0	16.8	O K
2160 min Winter	110.495	0.745	0.0	17.0	O K
2880 min Winter	110.489	0.739	0.0	16.9	O K
4320 min Winter	110.462	0.712	0.0	16.2	O K
5760 min Winter	110.436	0.686	0.0	15.6	O K
7200 min Winter	110.408	0.658	0.0	15.0	O K
8640 min Winter	110.379	0.629	0.0	14.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6560
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	598
720 min Winter	11.256	0.0	716
960 min Winter	8.984	0.0	950
1440 min Winter	6.525	0.0	1412
2160 min Winter	4.728	0.0	2084
2880 min Winter	3.765	0.0	2740
4320 min Winter	2.733	0.0	3464
5760 min Winter	2.179	0.0	4384
7200 min Winter	1.828	0.0	5328
8640 min Winter	1.585	0.0	6224

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
10080 min Winter	110.350	0.600	0.0	13.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7152

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.015

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005	4	8	0.005	8	12	0.005

Model Details

Storage is Online Cover Level (m) 111.000

Cellular Storage Structure

Invert Level (m) 109.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.0	24.0	0.801	0.0	40.0
0.800	24.0	40.0			

Summary of Results for 30 year Return Period

Half Drain Time : 2091 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	109.868	0.118	0.0	2.7	O K
30 min Summer	109.906	0.156	0.0	3.5	O K
60 min Summer	109.944	0.194	0.0	4.4	O K
120 min Summer	109.983	0.233	0.0	5.3	O K
180 min Summer	110.006	0.256	0.0	5.8	O K
240 min Summer	110.023	0.273	0.0	6.2	O K
360 min Summer	110.045	0.295	0.0	6.7	O K
480 min Summer	110.060	0.310	0.0	7.1	O K
600 min Summer	110.071	0.321	0.0	7.3	O K
720 min Summer	110.078	0.328	0.0	7.5	O K
960 min Summer	110.087	0.337	0.0	7.7	O K
1440 min Summer	110.092	0.342	0.0	7.8	O K
2160 min Summer	110.089	0.339	0.0	7.7	O K
2880 min Summer	110.083	0.333	0.0	7.6	O K
4320 min Summer	110.069	0.319	0.0	7.3	O K
5760 min Summer	110.054	0.304	0.0	6.9	O K
7200 min Summer	110.038	0.288	0.0	6.6	O K
8640 min Summer	110.023	0.273	0.0	6.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1440
2160 min Summer	2.778	0.0	1800
2880 min Summer	2.229	0.0	2168
4320 min Summer	1.635	0.0	2984
5760 min Summer	1.312	0.0	3808
7200 min Summer	1.107	0.0	4616
8640 min Summer	0.963	0.0	5448

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	110.008	0.258	0.0	5.9	O K
15 min Winter	109.882	0.132	0.0	3.0	O K
30 min Winter	109.925	0.175	0.0	4.0	O K
60 min Winter	109.968	0.218	0.0	5.0	O K
120 min Winter	110.012	0.262	0.0	6.0	O K
180 min Winter	110.038	0.288	0.0	6.6	O K
240 min Winter	110.057	0.307	0.0	7.0	O K
360 min Winter	110.083	0.333	0.0	7.6	O K
480 min Winter	110.101	0.351	0.0	8.0	O K
600 min Winter	110.114	0.364	0.0	8.3	O K
720 min Winter	110.123	0.373	0.0	8.5	O K
960 min Winter	110.135	0.385	0.0	8.8	O K
1440 min Winter	110.145	0.395	0.0	9.0	O K
2160 min Winter	110.142	0.392	0.0	8.9	O K
2880 min Winter	110.134	0.384	0.0	8.7	O K
4320 min Winter	110.115	0.365	0.0	8.3	O K
5760 min Winter	110.092	0.342	0.0	7.8	O K
7200 min Winter	110.068	0.318	0.0	7.2	O K
8640 min Winter	110.044	0.294	0.0	6.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6256
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	478
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	712
960 min Winter	5.166	0.0	942
1440 min Winter	3.791	0.0	1390
2160 min Winter	2.778	0.0	2024
2880 min Winter	2.229	0.0	2304
4320 min Winter	1.635	0.0	3208
5760 min Winter	1.312	0.0	4144
7200 min Winter	1.107	0.0	5040
8640 min Winter	0.963	0.0	5880

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	110.021	0.271	0.0	6.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6760

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.015

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005	4	8	0.005	8	12	0.005

Model Details

Storage is Online Cover Level (m) 111.000

Cellular Storage Structure

Invert Level (m) 109.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.0	24.0	0.801	0.0	40.0
0.800	24.0	40.0			

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

Half Drain Time : 3549 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	109.582	0.232	0.0	5.3	O K
30 min Summer	109.657	0.307	0.0	7.0	O K
60 min Summer	109.734	0.384	0.0	8.7	O K
120 min Summer	109.807	0.457	0.0	10.4	O K
180 min Summer	109.851	0.501	0.0	11.4	O K
240 min Summer	109.883	0.533	0.0	12.2	O K
360 min Summer	109.927	0.577	0.0	13.2	O K
480 min Summer	109.958	0.608	0.0	13.9	O K
600 min Summer	109.980	0.630	0.0	14.4	O K
720 min Summer	109.997	0.647	0.0	14.7	O K
960 min Summer	110.020	0.670	0.0	15.3	O K
1440 min Summer	110.043	0.693	0.0	15.8	O K
2160 min Summer	110.048	0.698	0.0	15.9	O K
2880 min Summer	110.039	0.689	0.0	15.7	O K
4320 min Summer	110.019	0.669	0.0	15.2	O K
5760 min Summer	109.997	0.647	0.0	14.7	O K
7200 min Summer	109.975	0.625	0.0	14.3	O K
8640 min Summer	109.955	0.605	0.0	13.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	488
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2160
2880 min Summer	3.765	0.0	2632
4320 min Summer	2.733	0.0	3336
5760 min Summer	2.179	0.0	4112
7200 min Summer	1.828	0.0	4968
8640 min Summer	1.585	0.0	5792

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
10080 min Summer	109.935	0.585	0.0	13.3	O K
15 min Winter	109.610	0.260	0.0	5.9	O K
30 min Winter	109.695	0.345	0.0	7.9	O K
60 min Winter	109.780	0.430	0.0	9.8	O K
120 min Winter	109.863	0.513	0.0	11.7	O K
180 min Winter	109.913	0.563	0.0	12.8	O K
240 min Winter	109.949	0.599	0.0	13.7	O K
360 min Winter	110.000	0.650	0.0	14.8	O K
480 min Winter	110.035	0.685	0.0	15.6	O K
600 min Winter	110.061	0.711	0.0	16.2	O K
720 min Winter	110.081	0.731	0.0	16.7	O K
960 min Winter	110.109	0.759	0.0	17.3	O K
1440 min Winter	110.140	0.790	0.0	18.0	O K
2160 min Winter	110.207	0.857	0.0	18.3	O K
2880 min Winter	110.149	0.799	0.0	18.2	O K
4320 min Winter	110.122	0.772	0.0	17.6	O K
5760 min Winter	110.096	0.746	0.0	17.0	O K
7200 min Winter	110.067	0.717	0.0	16.4	O K
8640 min Winter	110.038	0.688	0.0	15.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6568
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	716
960 min Winter	8.984	0.0	950
1440 min Winter	6.525	0.0	1412
2160 min Winter	4.728	0.0	2088
2880 min Winter	3.765	0.0	2744
4320 min Winter	2.733	0.0	3508
5760 min Winter	2.179	0.0	4392
7200 min Winter	1.828	0.0	5336
8640 min Winter	1.585	0.0	6232

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
10080 min Winter	110.009	0.659	0.0	15.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7160

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.016

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005	4	8	0.005	8	12	0.005

Model Details

Storage is Online Cover Level (m) 110.600

Cellular Storage Structure

Invert Level (m) 109.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.0	24.0	0.801	0.0	40.0
0.800	24.0	40.0			

Summary of Results for 30 year Return Period

Half Drain Time : 2231 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	109.476	0.126	0.0	2.9	O K
30 min Summer	109.516	0.166	0.0	3.8	O K
60 min Summer	109.558	0.208	0.0	4.7	O K
120 min Summer	109.599	0.249	0.0	5.7	O K
180 min Summer	109.624	0.274	0.0	6.2	O K
240 min Summer	109.642	0.292	0.0	6.7	O K
360 min Summer	109.666	0.316	0.0	7.2	O K
480 min Summer	109.683	0.333	0.0	7.6	O K
600 min Summer	109.694	0.344	0.0	7.8	O K
720 min Summer	109.702	0.352	0.0	8.0	O K
960 min Summer	109.713	0.363	0.0	8.3	O K
1440 min Summer	109.720	0.370	0.0	8.4	O K
2160 min Summer	109.717	0.367	0.0	8.4	O K
2880 min Summer	109.711	0.361	0.0	8.2	O K
4320 min Summer	109.697	0.347	0.0	7.9	O K
5760 min Summer	109.682	0.332	0.0	7.6	O K
7200 min Summer	109.666	0.316	0.0	7.2	O K
8640 min Summer	109.651	0.301	0.0	6.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1440
2160 min Summer	2.778	0.0	1840
2880 min Summer	2.229	0.0	2220
4320 min Summer	1.635	0.0	2992
5760 min Summer	1.312	0.0	3824
7200 min Summer	1.107	0.0	4680
8640 min Summer	0.963	0.0	5456

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	109.635	0.285	0.0	6.5	O K
15 min Winter	109.491	0.141	0.0	3.2	O K
30 min Winter	109.536	0.186	0.0	4.2	O K
60 min Winter	109.583	0.233	0.0	5.3	O K
120 min Winter	109.630	0.280	0.0	6.4	O K
180 min Winter	109.658	0.308	0.0	7.0	O K
240 min Winter	109.679	0.329	0.0	7.5	O K
360 min Winter	109.707	0.357	0.0	8.1	O K
480 min Winter	109.726	0.376	0.0	8.6	O K
600 min Winter	109.740	0.390	0.0	8.9	O K
720 min Winter	109.750	0.400	0.0	9.1	O K
960 min Winter	109.764	0.414	0.0	9.4	O K
1440 min Winter	109.776	0.426	0.0	9.7	O K
2160 min Winter	109.775	0.425	0.0	9.7	O K
2880 min Winter	109.766	0.416	0.0	9.5	O K
4320 min Winter	109.748	0.398	0.0	9.1	O K
5760 min Winter	109.725	0.375	0.0	8.6	O K
7200 min Winter	109.701	0.351	0.0	8.0	O K
8640 min Winter	109.677	0.327	0.0	7.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6264
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	712
960 min Winter	5.166	0.0	942
1440 min Winter	3.791	0.0	1394
2160 min Winter	2.778	0.0	2036
2880 min Winter	2.229	0.0	2340
4320 min Winter	1.635	0.0	3244
5760 min Winter	1.312	0.0	4160
7200 min Winter	1.107	0.0	5048
8640 min Winter	0.963	0.0	5960

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	109.654	0.304	0.0	6.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6768

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.016

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005	4	8	0.005	8	12	0.005

Model Details

Storage is Online Cover Level (m) 110.600

Cellular Storage Structure

Invert Level (m) 109.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.0	24.0	0.801	0.0	40.0
0.800	24.0	40.0			

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

Half Drain Time : 3897 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	111.015	0.215	0.1	12.9	O K
30 min Summer	111.086	0.286	0.1	17.1	O K
60 min Summer	111.156	0.356	0.1	21.3	O K
120 min Summer	111.224	0.424	0.1	25.4	O K
180 min Summer	111.266	0.466	0.1	27.9	O K
240 min Summer	111.296	0.496	0.1	29.7	O K
360 min Summer	111.337	0.537	0.1	32.1	O K
480 min Summer	111.366	0.566	0.1	33.9	O K
600 min Summer	111.387	0.587	0.1	35.1	O K
720 min Summer	111.403	0.603	0.1	36.1	O K
960 min Summer	111.426	0.626	0.1	37.4	O K
1440 min Summer	111.449	0.649	0.1	38.8	O K
2160 min Summer	111.457	0.657	0.1	39.3	O K
2880 min Summer	111.450	0.650	0.1	38.9	O K
4320 min Summer	111.429	0.629	0.1	37.7	O K
5760 min Summer	111.408	0.608	0.1	36.4	O K
7200 min Summer	111.388	0.588	0.1	35.2	O K
8640 min Summer	111.369	0.569	0.1	34.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	966
1440 min Summer	6.525	0.0	1444
2160 min Summer	4.728	0.0	2164
2880 min Summer	3.765	0.0	2852
4320 min Summer	2.733	0.0	3500
5760 min Summer	2.179	0.0	4256
7200 min Summer	1.828	0.0	5048
8640 min Summer	1.585	0.0	5880

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
10080 min Summer	111.351	0.551	0.1	33.0	O K
15 min Winter	111.041	0.241	0.1	14.4	O K
30 min Winter	111.120	0.320	0.1	19.2	O K
60 min Winter	111.200	0.400	0.1	23.9	O K
120 min Winter	111.276	0.476	0.1	28.5	O K
180 min Winter	111.323	0.523	0.1	31.3	O K
240 min Winter	111.357	0.557	0.1	33.3	O K
360 min Winter	111.405	0.605	0.1	36.2	O K
480 min Winter	111.438	0.638	0.1	38.2	O K
600 min Winter	111.462	0.662	0.1	39.6	O K
720 min Winter	111.482	0.682	0.1	40.8	O K
960 min Winter	111.509	0.709	0.1	42.5	O K
1440 min Winter	111.540	0.740	0.1	44.3	O K
2160 min Winter	111.555	0.755	0.1	45.2	O K
2880 min Winter	111.555	0.755	0.1	45.2	O K
4320 min Winter	111.532	0.732	0.1	43.8	O K
5760 min Winter	111.506	0.706	0.1	42.2	O K
7200 min Winter	111.480	0.680	0.1	40.7	O K
8640 min Winter	111.453	0.653	0.1	39.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6664
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	246
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	718
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1416
2160 min Winter	4.728	0.0	2100
2880 min Winter	3.765	0.0	2768
4320 min Winter	2.733	0.0	3984
5760 min Winter	2.179	0.0	4504
7200 min Winter	1.828	0.0	5416
8640 min Winter	1.585	0.0	6328

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
10080 min Winter	111.426	0.626	0.1	37.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7264

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.039

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.013	4	8	0.013	8	12	0.013

Model Details

Storage is Online Cover Level (m) 112.350

Cellular Storage Structure

Invert Level (m) 110.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	63.0	63.0	0.801	0.0	88.6
0.800	63.0	88.6			

Summary of Results for 30 year Return Period

Half Drain Time : 2285 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	110.917	0.117	0.1	7.0	O K
30 min Summer	110.954	0.154	0.1	9.2	O K
60 min Summer	110.993	0.193	0.1	11.5	O K
120 min Summer	111.031	0.231	0.1	13.8	O K
180 min Summer	111.054	0.254	0.1	15.2	O K
240 min Summer	111.071	0.271	0.1	16.2	O K
360 min Summer	111.094	0.294	0.1	17.6	O K
480 min Summer	111.109	0.309	0.1	18.5	O K
600 min Summer	111.120	0.320	0.1	19.1	O K
720 min Summer	111.128	0.328	0.1	19.6	O K
960 min Summer	111.138	0.338	0.1	20.2	O K
1440 min Summer	111.145	0.345	0.1	20.6	O K
2160 min Summer	111.141	0.341	0.1	20.4	O K
2880 min Summer	111.136	0.336	0.1	20.1	O K
4320 min Summer	111.123	0.323	0.1	19.3	O K
5760 min Summer	111.108	0.308	0.1	18.4	O K
7200 min Summer	111.093	0.293	0.1	17.5	O K
8640 min Summer	111.078	0.278	0.1	16.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1442
2160 min Summer	2.778	0.0	1864
2880 min Summer	2.229	0.0	2248
4320 min Summer	1.635	0.0	3028
5760 min Summer	1.312	0.0	3864
7200 min Summer	1.107	0.0	4680
8640 min Summer	0.963	0.0	5464

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	111.063	0.263	0.1	15.7	O K
15 min Winter	110.931	0.131	0.1	7.8	O K
30 min Winter	110.973	0.173	0.1	10.4	O K
60 min Winter	111.016	0.216	0.1	12.9	O K
120 min Winter	111.060	0.260	0.1	15.5	O K
180 min Winter	111.086	0.286	0.1	17.1	O K
240 min Winter	111.105	0.305	0.1	18.3	O K
360 min Winter	111.132	0.332	0.1	19.8	O K
480 min Winter	111.150	0.350	0.1	20.9	O K
600 min Winter	111.163	0.363	0.1	21.7	O K
720 min Winter	111.172	0.372	0.1	22.3	O K
960 min Winter	111.185	0.385	0.1	23.1	O K
1440 min Winter	111.197	0.397	0.1	23.8	O K
2160 min Winter	111.197	0.397	0.1	23.8	O K
2880 min Winter	111.188	0.388	0.1	23.2	O K
4320 min Winter	111.171	0.371	0.1	22.2	O K
5760 min Winter	111.149	0.349	0.1	20.9	O K
7200 min Winter	111.126	0.326	0.1	19.5	O K
8640 min Winter	111.102	0.302	0.1	18.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6272
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	714
960 min Winter	5.166	0.0	944
1440 min Winter	3.791	0.0	1398
2160 min Winter	2.778	0.0	2052
2880 min Winter	2.229	0.0	2424
4320 min Winter	1.635	0.0	3280
5760 min Winter	1.312	0.0	4208
7200 min Winter	1.107	0.0	5112
8640 min Winter	0.963	0.0	5968

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	111.080	0.280	0.1	16.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6856

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.039

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.013	4	8	0.013	8	12	0.013

Model Details

Storage is Online Cover Level (m) 112.350

Cellular Storage Structure

Invert Level (m) 110.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	63.0	63.0	0.801	0.0	88.6
0.800	63.0	88.6			

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

Half Drain Time : 4198 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	111.017	0.217	0.2	26.4	O K
30 min Summer	111.088	0.288	0.2	35.1	O K
60 min Summer	111.160	0.360	0.2	43.8	O K
120 min Summer	111.229	0.429	0.2	52.1	O K
180 min Summer	111.271	0.471	0.2	57.2	O K
240 min Summer	111.301	0.501	0.2	60.9	O K
360 min Summer	111.343	0.543	0.2	66.1	O K
480 min Summer	111.373	0.573	0.2	69.6	O K
600 min Summer	111.395	0.595	0.2	72.3	O K
720 min Summer	111.411	0.611	0.2	74.3	O K
960 min Summer	111.435	0.635	0.2	77.2	O K
1440 min Summer	111.461	0.661	0.2	80.4	O K
2160 min Summer	111.472	0.672	0.2	81.7	O K
2880 min Summer	111.468	0.668	0.2	81.2	O K
4320 min Summer	111.447	0.647	0.2	78.6	O K
5760 min Summer	111.426	0.626	0.2	76.1	O K
7200 min Summer	111.406	0.606	0.2	73.7	O K
8640 min Summer	111.387	0.587	0.2	71.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	968
1440 min Summer	6.525	0.0	1446
2160 min Summer	4.728	0.0	2164
2880 min Summer	3.765	0.0	2880
4320 min Summer	2.733	0.0	3628
5760 min Summer	2.179	0.0	4336
7200 min Summer	1.828	0.0	5120
8640 min Summer	1.585	0.0	5960

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
10080 min Summer	111.369	0.569	0.2	69.2	O K
15 min Winter	111.043	0.243	0.2	29.6	O K
30 min Winter	111.123	0.323	0.2	39.3	O K
60 min Winter	111.204	0.404	0.2	49.1	O K
120 min Winter	111.281	0.481	0.2	58.5	O K
180 min Winter	111.329	0.529	0.2	64.3	O K
240 min Winter	111.363	0.563	0.2	68.5	O K
360 min Winter	111.412	0.612	0.2	74.4	O K
480 min Winter	111.446	0.646	0.2	78.5	O K
600 min Winter	111.471	0.671	0.2	81.6	O K
720 min Winter	111.491	0.691	0.2	84.0	O K
960 min Winter	111.520	0.720	0.2	87.6	O K
1440 min Winter	111.553	0.753	0.2	91.6	O K
2160 min Winter	111.572	0.772	0.2	93.9	O K
2880 min Winter	111.574	0.774	0.2	94.2	O K
4320 min Winter	111.556	0.756	0.2	91.9	O K
5760 min Winter	111.528	0.728	0.2	88.5	O K
7200 min Winter	111.503	0.703	0.2	85.4	O K
8640 min Winter	111.477	0.677	0.2	82.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6768
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	248
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	718
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1418
2160 min Winter	4.728	0.0	2104
2880 min Winter	3.765	0.0	2776
4320 min Winter	2.733	0.0	4064
5760 min Winter	2.179	0.0	4616
7200 min Winter	1.828	0.0	5488
8640 min Winter	1.585	0.0	6408

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
10080 min Winter	111.451	0.651	0.2	79.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7368

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.080

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.027	4	8	0.027	8	12	0.027

Model Details

Storage is Online Cover Level (m) 112.350

Cellular Storage Structure

Invert Level (m) 110.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	128.0	128.0	0.801	0.0	166.4
0.800	128.0	166.4			

Summary of Results for 30 year Return Period

Half Drain Time : 2419 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	110.918	0.118	0.2	14.4	O K
30 min Summer	110.956	0.156	0.2	18.9	O K
60 min Summer	110.995	0.195	0.2	23.7	O K
120 min Summer	111.033	0.233	0.2	28.4	O K
180 min Summer	111.057	0.257	0.2	31.3	O K
240 min Summer	111.074	0.274	0.2	33.3	O K
360 min Summer	111.097	0.297	0.2	36.2	O K
480 min Summer	111.113	0.313	0.2	38.1	O K
600 min Summer	111.124	0.324	0.2	39.4	O K
720 min Summer	111.132	0.332	0.2	40.4	O K
960 min Summer	111.143	0.343	0.2	41.7	O K
1440 min Summer	111.151	0.351	0.2	42.7	O K
2160 min Summer	111.149	0.349	0.2	42.4	O K
2880 min Summer	111.143	0.343	0.2	41.8	O K
4320 min Summer	111.130	0.330	0.2	40.2	O K
5760 min Summer	111.116	0.316	0.2	38.4	O K
7200 min Summer	111.101	0.301	0.2	36.5	O K
8640 min Summer	111.086	0.286	0.2	34.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1442
2160 min Summer	2.778	0.0	1928
2880 min Summer	2.229	0.0	2284
4320 min Summer	1.635	0.0	3068
5760 min Summer	1.312	0.0	3872
7200 min Summer	1.107	0.0	4688
8640 min Summer	0.963	0.0	5536

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	111.071	0.271	0.2	33.0	O K
15 min Winter	110.932	0.132	0.2	16.1	O K
30 min Winter	110.975	0.175	0.2	21.2	O K
60 min Winter	111.018	0.218	0.2	26.6	O K
120 min Winter	111.062	0.262	0.2	31.9	O K
180 min Winter	111.089	0.289	0.2	35.2	O K
240 min Winter	111.109	0.309	0.2	37.5	O K
360 min Winter	111.136	0.336	0.2	40.8	O K
480 min Winter	111.154	0.354	0.2	43.0	O K
600 min Winter	111.167	0.367	0.2	44.7	O K
720 min Winter	111.178	0.378	0.2	45.9	O K
960 min Winter	111.191	0.391	0.2	47.6	O K
1440 min Winter	111.204	0.404	0.2	49.2	O K
2160 min Winter	111.206	0.406	0.2	49.4	O K
2880 min Winter	111.198	0.398	0.2	48.4	O K
4320 min Winter	111.180	0.380	0.2	46.2	O K
5760 min Winter	111.159	0.359	0.2	43.6	O K
7200 min Winter	111.136	0.336	0.2	40.9	O K
8640 min Winter	111.113	0.313	0.2	38.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6352
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	186
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	714
960 min Winter	5.166	0.0	944
1440 min Winter	3.791	0.0	1400
2160 min Winter	2.778	0.0	2060
2880 min Winter	2.229	0.0	2652
4320 min Winter	1.635	0.0	3292
5760 min Winter	1.312	0.0	4216
7200 min Winter	1.107	0.0	5120
8640 min Winter	0.963	0.0	5984

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	111.090	0.290	0.2	35.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6864

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.080

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.027	4	8	0.027	8	12	0.027

Model Details

Storage is Online Cover Level (m) 112.350

Cellular Storage Structure

Invert Level (m) 110.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	128.0	128.0	0.801	0.0	166.4
0.800	128.0	166.4			

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

Half Drain Time : 4401 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	111.012	0.212	0.3	47.2	O K
30 min Summer	111.082	0.282	0.3	62.7	O K
60 min Summer	111.152	0.352	0.3	78.2	O K
120 min Summer	111.219	0.419	0.3	93.2	O K
180 min Summer	111.260	0.460	0.3	102.4	O K
240 min Summer	111.290	0.490	0.3	109.0	O K
360 min Summer	111.332	0.532	0.3	118.2	O K
480 min Summer	111.361	0.561	0.3	124.6	O K
600 min Summer	111.382	0.582	0.3	129.4	O K
720 min Summer	111.399	0.599	0.3	133.1	O K
960 min Summer	111.422	0.622	0.3	138.4	O K
1440 min Summer	111.448	0.648	0.3	144.1	O K
2160 min Summer	111.460	0.660	0.3	146.7	O K
2880 min Summer	111.457	0.657	0.3	146.1	O K
4320 min Summer	111.436	0.636	0.3	141.5	O K
5760 min Summer	111.415	0.615	0.3	136.8	O K
7200 min Summer	111.396	0.596	0.3	132.5	O K
8640 min Summer	111.377	0.577	0.3	128.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	177.327	0.0	27
30 min Summer	117.890	0.0	42
60 min Summer	73.889	0.0	72
120 min Summer	44.346	0.0	132
180 min Summer	32.713	0.0	190
240 min Summer	26.296	0.0	250
360 min Summer	19.274	0.0	370
480 min Summer	15.433	0.0	490
600 min Summer	12.976	0.0	608
720 min Summer	11.256	0.0	728
960 min Summer	8.984	0.0	968
1440 min Summer	6.525	0.0	1446
2160 min Summer	4.728	0.0	2164
2880 min Summer	3.765	0.0	2880
4320 min Summer	2.733	0.0	3680
5760 min Summer	2.179	0.0	4440
7200 min Summer	1.828	0.0	5192
8640 min Summer	1.585	0.0	5976

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
10080 min Summer	111.360	0.560	0.3	124.4	O K
15 min Winter	111.038	0.238	0.3	52.9	O K
30 min Winter	111.116	0.316	0.3	70.3	O K
60 min Winter	111.195	0.395	0.3	87.7	O K
120 min Winter	111.271	0.471	0.3	104.6	O K
180 min Winter	111.317	0.517	0.3	115.0	O K
240 min Winter	111.351	0.551	0.3	122.5	O K
360 min Winter	111.399	0.599	0.3	133.1	O K
480 min Winter	111.432	0.632	0.3	140.5	O K
600 min Winter	111.457	0.657	0.3	146.1	O K
720 min Winter	111.477	0.677	0.3	150.4	O K
960 min Winter	111.506	0.706	0.3	156.8	O K
1440 min Winter	111.539	0.739	0.3	164.2	O K
2160 min Winter	111.558	0.758	0.3	168.6	O K
2880 min Winter	111.562	0.762	0.3	169.4	O K
4320 min Winter	111.546	0.746	0.3	165.8	O K
5760 min Winter	111.517	0.717	0.3	159.4	O K
7200 min Winter	111.493	0.693	0.3	154.0	O K
8640 min Winter	111.468	0.668	0.3	148.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	1.405	0.0	6856
15 min Winter	177.327	0.0	27
30 min Winter	117.890	0.0	41
60 min Winter	73.889	0.0	70
120 min Winter	44.346	0.0	130
180 min Winter	32.713	0.0	188
240 min Winter	26.296	0.0	248
360 min Winter	19.274	0.0	364
480 min Winter	15.433	0.0	482
600 min Winter	12.976	0.0	600
720 min Winter	11.256	0.0	718
960 min Winter	8.984	0.0	952
1440 min Winter	6.525	0.0	1420
2160 min Winter	4.728	0.0	2108
2880 min Winter	3.765	0.0	2792
4320 min Winter	2.733	0.0	4072
5760 min Winter	2.179	0.0	4720
7200 min Winter	1.828	0.0	5552
8640 min Winter	1.585	0.0	6488

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
10080 min Winter	111.442	0.642	0.3	142.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	1.405	0.0	7376

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)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.143

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.048	4	8	0.048	8	12	0.048

Model Details

Storage is Online Cover Level (m) 112.050

Cellular Storage Structure

Invert Level (m) 110.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	234.0	234.0	0.801	0.0	283.6
0.800	234.0	283.6			

Summary of Results for 30 year Return Period

Half Drain Time : 2457 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	110.915	0.115	0.3	25.7	O K
30 min Summer	110.952	0.152	0.3	33.8	O K
60 min Summer	110.990	0.190	0.3	42.3	O K
120 min Summer	111.028	0.228	0.3	50.7	O K
180 min Summer	111.051	0.251	0.3	55.9	O K
240 min Summer	111.068	0.268	0.3	59.6	O K
360 min Summer	111.091	0.291	0.3	64.6	O K
480 min Summer	111.106	0.306	0.3	68.0	O K
600 min Summer	111.117	0.317	0.3	70.5	O K
720 min Summer	111.125	0.325	0.3	72.3	O K
960 min Summer	111.136	0.336	0.3	74.6	O K
1440 min Summer	111.144	0.344	0.3	76.5	O K
2160 min Summer	111.141	0.341	0.3	75.9	O K
2880 min Summer	111.136	0.336	0.3	74.7	O K
4320 min Summer	111.123	0.323	0.3	71.8	O K
5760 min Summer	111.109	0.309	0.3	68.6	O K
7200 min Summer	111.094	0.294	0.3	65.3	O K
8640 min Summer	111.079	0.279	0.3	62.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	96.830	0.0	27
30 min Summer	64.026	0.0	41
60 min Summer	40.257	0.0	72
120 min Summer	24.450	0.0	130
180 min Summer	18.162	0.0	190
240 min Summer	14.676	0.0	250
360 min Summer	10.843	0.0	368
480 min Summer	8.734	0.0	488
600 min Summer	7.380	0.0	606
720 min Summer	6.428	0.0	726
960 min Summer	5.166	0.0	964
1440 min Summer	3.791	0.0	1442
2160 min Summer	2.778	0.0	1936
2880 min Summer	2.229	0.0	2288
4320 min Summer	1.635	0.0	3072
5760 min Summer	1.312	0.0	3912
7200 min Summer	1.107	0.0	4696
8640 min Summer	0.963	0.0	5536

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	111.065	0.265	0.3	58.9	O K
15 min Winter	110.929	0.129	0.3	28.8	O K
30 min Winter	110.971	0.171	0.3	38.0	O K
60 min Winter	111.014	0.214	0.3	47.5	O K
120 min Winter	111.056	0.256	0.3	57.0	O K
180 min Winter	111.083	0.283	0.3	62.9	O K
240 min Winter	111.102	0.302	0.3	67.1	O K
360 min Winter	111.128	0.328	0.3	73.0	O K
480 min Winter	111.146	0.346	0.3	77.0	O K
600 min Winter	111.159	0.359	0.3	79.9	O K
720 min Winter	111.169	0.369	0.3	82.1	O K
960 min Winter	111.183	0.383	0.3	85.2	O K
1440 min Winter	111.196	0.396	0.3	88.1	O K
2160 min Winter	111.198	0.398	0.3	88.4	O K
2880 min Winter	111.190	0.390	0.3	86.8	O K
4320 min Winter	111.172	0.372	0.3	82.8	O K
5760 min Winter	111.151	0.351	0.3	78.1	O K
7200 min Winter	111.129	0.329	0.3	73.1	O K
8640 min Winter	111.106	0.306	0.3	68.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Summer	0.857	0.0	6352
15 min Winter	96.830	0.0	27
30 min Winter	64.026	0.0	41
60 min Winter	40.257	0.0	70
120 min Winter	24.450	0.0	128
180 min Winter	18.162	0.0	188
240 min Winter	14.676	0.0	246
360 min Winter	10.843	0.0	362
480 min Winter	8.734	0.0	480
600 min Winter	7.380	0.0	596
720 min Winter	6.428	0.0	714
960 min Winter	5.166	0.0	946
1440 min Winter	3.791	0.0	1402
2160 min Winter	2.778	0.0	2060
2880 min Winter	2.229	0.0	2660
4320 min Winter	1.635	0.0	3324
5760 min Winter	1.312	0.0	4224
7200 min Winter	1.107	0.0	5120
8640 min Winter	0.963	0.0	6048

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	111.084	0.284	0.3	63.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.857	0.0	6864

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	26.250	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.143

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.048	4	8	0.048	8	12	0.048

Model Details

Storage is Online Cover Level (m) 112.050

Cellular Storage Structure

Invert Level (m) 110.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00864 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00864

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	234.0	234.0	0.801	0.0	283.6
0.800	234.0	283.6			

Appendix I - Kent County Council - Lead Local Flood Authority Consultation

PRE-APPLICATION MEETING
Meeting Minutes

Date/Time :	23rd August 2017
Location :	On site at Old Ashford Road, Lenham
Attendees:	M. Wojcieszak, Monson Engineering D. Tsakiliotis, Monson Engineering Alex Brauninger, Kent County Council Andrew Longman, Kent County Council Various Representatives from Rogate
Site Location:	Land North of Old Ashford Road, Lenham, Kent, ME17 2DL
LPA District reference:	17/500357/HYBRID
KCC reference:	NON/2017/062207

Development Background
Proposed residential Development of agricultural land. The proposed site will be accommodating 151 new residential houses which will be served by access roads, driveways and parking areas.

KCC had previously objected to the development on the grounds of:

- Inadequate assessment of groundwater flood risk to the development, in particular along the southern boundary of the site. Old Ashford Road, adjacent residential properties and commercial property at Northdown Close were all affected by surfacing groundwater flow in early 2014. This has an impact on the ability to use soakaways. Appendix A contains some photographs illustrating the problems experienced at that time.
- Existing drainage features on or adjacent to the site such as ditches and piped drainage will need to be protected within the layout.
- Infiltration rates were not appropriately calculated. The results of the testing show very poor infiltration rates that would result in excessive half drain times.
- Latest climate change allowances had not been referred to within the drainage strategy.

Discussion Items

1. <u>Groundwater flooding:</u>
   The site was inspected and the areas suffering from previous groundwater emergence were highlighted. This was predominantly along the southern boundary of the site and within the south-eastern corner of the site. Groundwater flows continued between February and April 2014. Whilst this is acknowledged to have occurred in extreme rainfall conditions, it is important that the development is protected against this source of flooding.

   KCC require that: Consideration is given to mitigation measures such as ensuring finished floor levels prevent internal flooding and that the buildings are

designed to be suitably resilient against flooding from rising groundwater, in particular those along the southern and southeast parts of the site. Other mitigation measures, such as the installation of a cut-off drain to intercept high groundwater were also discussed on site. It would be preferred that any proposed groundwater drainage flows to a separate outfall so that groundwater flow does not fill attenuation systems.

2. Impact of groundwater upon soakaways:
There is a risk of rising groundwater affecting soakaways on the site, causing their discharge and attenuation capacity to be compromised. For this reason, the revised drainage strategy shall consider the use of an off-site outfall. The developer has considered the use of land within their control to the south of Old Ashford Road to site an attenuation basin.

Such a feature would be outside of the redline boundary and therefore we recommend that the redline boundary for the planning application is amended or other arrangements are made, such as the use of a Grampian condition, agreed with the LPA.

KCC require that: The planning constraints around using 'off-site' attenuation are discussed with the LPA and a written agreement reached

3. Use of soakaways within the development:
It may be possible to continue to use infiltration systems within the northern parts of the development, subject to infiltration systems being located a minimum of 1m above the highest known groundwater level for the site.

Anecdotal evidence of groundwater emergence suggests this was at approximately 109.4mAOD (based upon the site topographical survey), which is around 3 to 4m above the interface between the Grey Chalk and Gault Formation. Reference should be made to any ground investigations undertaken which encounter present groundwater levels for information.

The ground investigations undertaken to date indicate that deeper soakaways are unviable as the half drain time will be excessive and an infiltration rate cannot calculated in accordance with the BRE365:2016 test procedure. We would strongly recommend that additional infiltration tests are undertaken to assess shallow soakage rates for features such as permeable paving, which may still be able to be incorporated into the development.

It was discussed that soakaways may be able to have an overflow to a piped system as part of their design. It should be noted that this would comprise the potential for adoption of surface water pipework, as the undertaker will not accept overflows from soakaways.

KCC require that: Additional infiltration tests are undertaken at the proposed invert level of any infiltration feature and monitored for a sufficient period to enable calculation in accordance with the BRE365:2016 test procedure.
KCC require that: The base of any infiltration device is located a absolute minimum of 1m above the highest known groundwater level, i.e. ground level at the south-eastern corner of the site of approximately 109.4mAOD.

KCC require that: All infiltration devices half drain within 24 hours for the critical 1 in 30 year event. The 1 in 100 year event may exceed 24 hours half drain time but nevertheless should be stated.
KCC recommend that: Issues around the adoption of surface water pipework be considered as part of the drainage strategy, to ensure future management and maintenance requires are met.

4. Discharges of surface water off-site and attenuation design considerations:
In accordance with our drainage and planning policy statement, in areas of intermediate permeability soils infiltration should still be maximised, with any residual discharge to watercourses or sewers requiring the provision of long-term storage; offsite discharge should be limited to QBAR, (the mean annual flood flow rate, equivalent to an approximate return interval of 2.3 years).

A review of greenfield run-off rates for the site using both IH124 and FEH methods suggests the greenfield run-off rates for the site will be below 2 l/s/ha. We would therefore recommend 2 l/s/ha is utilised as the limiting discharge rate. This rate shall be applied to the total catchment contributing to the sites drainage system. It is beneficial if the documents clearly show the impermeable and permeable areas of the site and those areas which would contribute to the positive drainage system. The pre-development and post-development discharge volumes should also be stated for the 1in100 year 360 minute events.

At the detailed design stage, we would expect to see the drainage system modelled using FeH rainfall data in any appropriate modelling or simulation software. Where FeH data is not available, 26.25mm should be manually input for the M5-60 value, as per the requirements of our latest drainage and planning policy statement (June 2017); the FSR dataset should not be used.

KCC will require that the design accommodates the 1 in 100 year storm with a 20% allowance for climate change and an additional analysis undertaken to understand the flooding implication for a greater climate change allowance of 40%.

KCC require that: Any surface water discharge to watercourse is limited to 2 l/s/ha.
KCC require that: Designs are based upon FeH rainfall data, or a manually input M5-60 value of 26.25mm.
KCC require that: The drainage strategy assesses the central (20%) and upper end (40%) climate change allowances for peak rainfall intensity.

5. Pollution controls:
Discharges from on-site accesses and highways are likely to be via the proposed drainage basin. The need for a petrol interceptor or other pollution controls was discussed.

The detailed design of an attenuation pond / basin could consider whether this feature could incorporate pollution controls, such as an appropriately detailed and planted fore-bay, as an alternative to engineered solutions.

KCC require that: The guidance in the CIRIA SuDs Manual is followed to

determine the appropriate level of pollution control necessary for the site. This should be described within the drainage strategy report and note any appropriate pollution controls that may be necessary.

6. Existing drainage assets on or adjacent to the site:
The locations of existing surface water drainage ditches along the northern boundary were discussed including the route of existing culverts on the site. The manholes for these features are indicated on the site topographical survey and the details of pipework shown on CCTV investigations by KCC in 2014 following the flooding problems within this area. Extracts from these details are shown in Appendix B.

The site layout is unlikely to impact this pipework but localised diversion may be required. The ownership of the pipework is unknown. Ordinary watercourses, including ditches and culverts, are generally the landowner's responsibility for maintenance; however we recommend this is investigated further.

KCC recommend that: The ownership of the existing pipework within and adjacent to the site is determined, for example, by searches for deeds of easement on the site.
KCC require that: The FRA considers the risk of flooding from these sources (for example, in the event of a hydraulic overload or blockage) to ensure safe routing of exceedance.
KCC require that: All existing surface water collection and discharge features on or adjacent to the site are incorporated into plans to ensure that there is no detriment to the operation of these systems.

Follow-up Items
[1] Rogate Homes to liaise with the LPA in terms of planning matters around the use of attenuation features located outside of the redline boundary with a view to confirming a suitable position with the LPA in writing.
[2] Monson Engineering to liaise with KCC during revisions to their FRA and surface water drainage strategy.

Appendix A: Photographs of Groundwater Flooding Issues

Water issuing from field boundary and from beneath road surface causing damage to road surface. Taken on 20th March 2014. (Source: KCC Highways)

View of lifted road surface at south east boundary of site once groundwater flow had ceased. Photo taken 22nd April 2014 (Source: KCC Highways)

Application Reference: 17/500357/hybrid

Address: Land North of Old Ashford Road, Lenham, Kent.

Attached are photographs showing the effect of flooding adjoining our property at Lanrig, Old Ashford Road, Lenham and on the Old Ashford Road during the winter of 2013/2014.

1. This is taken through our boundary fence into the development field showing the accumulation of water. It is from here that the water came into our garden causing our sewerage treatment works to flood and become inoperable.
2. This is our garden showing some of the surface water in our garden and the attempts to pump it out. (Yes we had to purchase pumps). You will also see the sandbags which are about a metre away from the rear of our property.
3. This shows a section of the Old Ashford Road when the water finally drained away. It clearly shows damage to the road surface. The road broke up over a distance of about 10-12metres and the repairs can be clearly evidenced as can the remedial work that was necessary to the sunken drain covers.

Photographs from neighbouring property south eastern boundary (Source: Maidstone Borough Council Planning Portal Public Representations)

Groundwater flows issuing from overflowing soakaway at Northdown Close. Taken on 7th March 2014 (Source: A. Brauninger, KCC)

Flooding at end of Northdown Close due to groundwater flows filling drainage systems. Taken on 7th March 2014. (Source: A. Brauninger, KCC)

Groundwater flooding of commercial property at Northdown Close. Water unable to discharge through soakaways due to groundwater level. Photo taken on 7th March 2014. (Source: A. Brauninger, KCC)

Excess groundwater flows from soakaway being pumped into nearby culvert by landowner to reduce flooding impact. Taken on 20th March 2014. (Source: A Brauninger, KCC)

Appendix B: Existing Drainage – Old Ashford Road