EXPEDITE

DRAINAGE STATEMENT

PROPOSED RESIDENTIAL DEVELOPMENT

LAND AT HEMPTON ROAD, DEDDINGTON

20/03660/REM

Proposed Residential Development

Drainage Statement

Issued by:	Expedite 35 Southernhay East Exeter EX1 1NX
Client:	Burrington Estates Ltd
Project Reference:	ES20.020-0060
Project Title:	Land at Hempton Road, Deddington
Revision:	D
Date:	1st September 2021
Prepared by:	Kevin Ritter
Checked by:	Kris Tovey
Approved by:	Simon Lancaster

1.0 Introduction

1.1 This Drainage Statement has been prepared on behalf of Burrington Estates Ltd by Expedite Engineering Services Ltd to describe the proposed drainage strategy for the proposed residential development at Hempton Road, Deddington.

2.0 Proposed Surface Water Drainage Strategy

The drainage layout is included within **Appendix A**.

Method of Discharge

2.1 The underlying soil of the development site has good infiltration characteristics and therefore infiltration is proposed to be the method of surface water discharge for the development.

2.2 Infiltration testing was carried out in June 2018 by M-EC within two trial pits in the south-eastern corner of the site, at the location of the proposed infiltration feature. Encountered rates were between $7.35x10^{-3}$m/s and $7.77x10^{-4}$m/s.

2.3 An infiltration rate of $7.77x10^{-4}$m/s was taken forward for design as this was the lowest tested infiltration rate.

Discharge Rates

2.4 Surface water drainage will be directed to the proposed infiltration basin and as such no restriction of discharge rates will be required. The modelled infiltration flow through the basin is shown in the MicroDrainage calculations in **Appendix B**.

Discharge Volume

2.5 The proposed infiltration basin will ensure that no additional volume of surface water leaves the site under any design storm event. All surface water drainage shall be conveyed to the infiltration basin and discharged directly to the underlying subsoil. Permeable paving is proposed for all private driveway and parking areas, which will discharge surface water at source rather than conveying to the basin.

Overland/Exceedance Flows

2.6 In the event of extremely short and intense storms, the surface water drainage system may become overwhelmed, resulting in small levels of temporary above-ground surface water flooding.

2.7 Site and road levels have been designed to be commensurate with existing ground levels whilst ensuring that overland flows are directed towards the infiltration basin, with any areas of flooding able to overflow into the basin. There is no proposed pathway for overland flows to exit the development site.

2.8 Due to the good infiltration characteristics of the site's subsoil, it is unlikely that overland surface water flow is able to occur across areas of permeable soft landscaping.

2.9 A plan showing the likely flow routes of overland surface water flows is shown in **Appendix C**.

Infiltration Basin Sizing

2.10 The basin has been sized using the MicroDrainage software package. The modelled basin uses the design infiltration rate of 7.77×10^{-4}m/s, a safety factor of 2.0, and assumes that there is no infiltration through the base of the basin (to account for a possible long-term reduction in infiltration performance due to sedimentation).

2.11 The design infiltration rate is based on testing carried out to BRE Digest 365 methodology by Mewies Engineering Consultants in June 2018, at the location of the proposed infiltration basin (south-east corner of the site). 7.77×10^{-4}m/s was the lowest encountered rate during the total of 10 tests carried out between two test pits.

2.12 A copy of the infiltration testing results are included with **Appendix D**.

2.13 A catchment area of 5740m^2 was used to account for the proposed development in addition to the possible future addition of 14 dwellings in the plot of land to the north of the development (Cherwell application 20/02083/OUT). The breakdown of areas is as follows:

This Development (21 dwellings)

Impermeable area	3540m^2

Potential Future Development (14 dwellings)

Impermeable area	2200m^2
Total impermeable area	5740m^2

2.14 The impermeable area was increased by 10% for the hydraulic modelling, to account for urban creep (a long-term increase in the site's impermeable catchment area due to additional paving, building extensions etc).

2.15 The above information gives a conservative infiltration basin design with capacity to safely store excess flows in the 1 in 100yr (+40% climate change) design storm, whilst retaining a minimum of 300mm of freeboard.

2.16 The proposed basin shall have a maximum water depth of 1.0 metres and maximum side slopes of 1:4.

2.17 Due to the favourable infiltration rates the modelled basin achieves a half-drain time of 34 minutes for the 1 in 100yr (+40%) design storm event, comfortably within the generally specified 24-hour half-drain time target.

2.18 MicroDrainage calculations are included within **Appendix B**, which show no surcharging of the surface water drainage system for the 1yr design storm event, and no flooding for the 30yr event.

3.0 Proposed Foul Water Drainage Strategy

3.1 Foul drainage shall be conveyed to the south-eastern corner of the site and connected to an existing foul sewer in Wimborn Close, manhole reference 0701.

3.2 A copy of the Thames Water asset records is shown in **Appendix E**.

4.0 Operation and Maintenance

4.1 Maintenance of SuDS features is essential to ensure that the surface water drainage system operates effectively and that flooding of the site and surrounding areas is prevented.

4.2 The responsibility of maintaining the drainage components would lie with the landowner unless responsibility has been delegated to an appointed external Management Company.

4.3 A full maintenance regime should be carried out to ensure that the drainage system remains operational over its lifetime. Table 1 summarises an initial maintenance plan for the drainage components proposed within this development. The SuDS Manual (CIRIA C753) and manufacturer's guidelines should be referred to for further information.

Drainage Component	Required Action	Typical Frequency
Pipework, manholes, chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Six monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Surface Water Infiltration Basin	Inspect for sediment and debris in pre-treatment components and remove. Note rate of sediment accumulation	As required
	Check basin to ensure emptying is occurring	Annually

Table 1 - Operation and Maintenance Summary

Appendix A – Drainage Layout

SPURS TO BE CONSTRUCTED FOR POTENTIAL FUTURE PHASE AND CAPPED PRIOR TO BACKFILLING

PLOT 1
PLOT 2
PLOT 3
PLOT 4
PLOT 5
PLOT 6
PLOT 7
PLOT 8
PLOT 9
PLOT 10
PLOT 11
PLOT 12
PLOT 13
PLOT 14
PLOT 15&16
PLOT 17
PLOT 18
PLOT 19
PLOT 20
PLOT 21

BINS 15 PLOTS 15&16

Hempton Rd

KEY

- ADOPTABLE FOUL SEWER AND MANHOLE
- ADOPTABLE SURFACE WATER SEWER AND MANHOLE
- EXISTING FOUL SEWER
- HIGHWAY GULLY AND CONNECTION
- PRIVATE FOUL INSPECTION CHAMBER <3.0m DEEP WITH RESTRICTED ACCESS DEPTHS OVER 1.2m, AND ADOPTED SEWER
- FOUL SHALLOW ACCESS CHAMBER <0.6m DEEP
- PRIVATE SURFACE WATER INSPECTION CHAMBER <3.0m DEEP WITH RESTRICTED ACCESS DEPTHS OVER 1.2m
- PRIVATE SURFACE WATER RODDING EYE
- RAINWATER DOWNPIPE AND 100Ø DRAIN
- INTERNAL FOUL CONNECTION POINT AND 100Ø DRAIN
- AREA OF PERMEABLE PAVING

NOTES

1. ALL WORKS FOR ADOPTION UNDER A SECTION 38 AGREEMENT SHALL BE CARRIED OUT TO THE OXFORDSHIRE COUNTY COUNCIL SPECIFICATION FOR ROAD CONSTRUCTION IN RESIDENTIAL AREAS AND TO THE APPROVAL OF THE AREA HIGHWAY AUTHORITY.
2. ALL WORKS FOR ADOPTION UNDER A SECTION 104 AGREEMENT ALL SHALL BE IN ACCORDANCE WITH SEWERAGE SECTOR GUIDANCE - APPENDIX C, "DESIGN AND CONSTRUCTION GUIDANCE FOR FOUL AND SURFACE WATER SEWERS" VERSION 2 MARCH 2020.
3. STREETLIGHTING POSITIONS TO BE PEGGED ON SITE AND AGREED BY THE LOCAL AUTHORITY PRIOR TO ERECTION COMMENCING.
4. ALL PRIVATE DRAINAGE SHALL BE IN ACCORDANCE WITH BS8301 AND RELEVANT SECTIONS OF APPROVED DOCUMENT H OF THE BUILDING REGULATIONS.
5. THE CONTRACTOR IS TO CHECK THE LEVEL OF EXISTING SEWERS BEING USED AS OUTFALLS OR CROSSING PROPOSED DRAINAGE RUNS PRIOR TO LAYING ANY PIPES. ANY DISCREPENCIES ARE TO BE REPORTED TO THE ENGINEER
6. PRIVATE HOUSE DRAINAGE WILL BE FLEXIBLY JOINTED PLASTIC OR CLAY PIPEWORK. DIAMETER 100mm UNLESS SHOWN OTHERWISE.
7. ALL CONNECTIONS FOR HOUSE DRAINAGE SHALL BE 100mm DIA. FOUL & 150mm DIA. SURFACE WATER UNLESS NOTED OTHERWISE AND MUST EXTEND 500mm BEHIND THE BACK OF FOOTWAY/HOMEZONE ROAD. ALL CONNECTIONS WHEN LAID SHALL BE PLUGGED, PROTECTED AS NECESSARY AND MARKED WITH A STAKE FOR FUTURE USE.
8. FOR PRIVATE DRAINS WHERE COVER TO PIPES IS LESS THAN 900mm IN VEHICULAR AREAS OR 600mm IN OTHER AREAS PROTECTION IN THE FORM OF A 100mm THICK CONCRETE PAD SHALL BE PROVIDED OVER THE PIPE GRANULAR SURROUND.
9. WHERE PIPES PASS THROUGH SCREEN WALLS, FOOTINGS OR RETAINING WALLS LINTELS ARE TO BE PROVIDED OVER. UNDER BUILDINGS PIPES SHALL BE SURROUNDED WITH 150mm THICKNESS OF GRANULAR MATERIAL. WHERE DRAINS PASS WITHIN 1M OF BUILDINGS THE WALL FOUNDATION SHALL BE TAKEN DOWN BELOW THE INVERT OF THE PIPE.
10. WHERE DRAINS DO NOT EXCEED 600mm DEEP, PLASTIC OR CLAY ACCESS FITTINGS MINIMUM DIAMETER 225mm SHALL BE USED. ELSEWHERE PROPRIETARY PLASTIC OR PRECAST CONCRETE INSPECTION CHAMBERS SHALL BE USED. UNLESS SHOWN OTHERWISE FW INSPECTION CHAMBERS ARE TO BE 750mm BELOW DPC LEVEL AND SW CHAMBERS AND RODDING EYES TO BE 600mm BELOW DPC.
11. ALL GULLIES AND RAINWATER DOWNPIPES CONNECTED DIRECTLY TO DRAINS ARE TO BE RODDABLE.
12. DRAINAGE RUNS SHOULD BE LAID AT A MINIMUM OF 5.0M FORM THE REAR OF PROPERTIES WHERE PRACTICAL TO ALLOW FOR FUTURE EXTENSIONS.
13. ALL DRAINAGE SHALL BE LAID UPSTREAM AND EACH RUN BETWEEN MANHOLES SHALL BE LAID COMPLETE PRIOR TO BACKFILLING. WHERE THIS IS NOT PRACTICAL TRIAL HOLES OR OTHER MEANS OF IDENTIFYING THE LINE AND LEVEL OF SERVICES SHALL BE CARRIED OUT PRIOR TO WORKS COMMENCING.
14. ALL BRANCH DRAINS, OR CONNECTIONS, ARE TO DISCHARGE TO THE COLLECTORS OBLIQUELY, AND IN THE DIRECTION OF THE MAIN FLOW.

REV:	DESCRIPTION:	BY:	DATE:
P11	F10 relocated	PG	01.09.21
P10	Plots 13,14 & 19-21 Lowered	PG	26.08.21
P9	Levels lowered approx 300mm	PG	18.08.21

SURFACE WATER INFILTRATION BASIN	
BED LEVEL	134.850mAOD
BANK LEVEL	136.500mAOD
MAX. ATTENUATED WATER LEVEL	135.914mAOD
MAX. ATTENUATED VOLUME	155.409m³
MAX. VOL. AVAILABLE 300mm FREEBOARD	238.300m³
SIDE SLOPES	1:4
DESIGN INFILTRATION RATE	2.797m/hr
SAFETY FACTOR	2.0

3m EASEMENT SEWER EASEMENT

PROPOSED FOUL DRAINAGE TO CONNECT TO EXISTING FOUL PUBLIC SEWER (225mmØ)

STATUS: TENDER

EXPEDITE
Exeter
The Design Studio
Dean Clarke House
Southernhay East
Exeter
EX1 1AP
t: 01392 691 631
www.expediteps.com

CLIENT: BURRINGTON HOMES (MIDLANDS)

SITE: LAND AT HEMPTON ROAD DEDDINGTON

TITLE: DRAINAGE LAYOUT

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1:250	Feb 2021	DM	KSR

PROJECT NO:	DRAWING NO:	REVISION:
ES20.020	03.00	P11

Appendix B – MicroDrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW Network

Pipe Sizes CTP Manhole Sizes CTP

FSR Rainfall Model - England and Wales

Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	10
Ratio R	0.409	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for SW Network

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.372	4-8	0.199

Total Area Contributing (ha) = 0.571

Total Pipe Volume (m³) = 15.335

Network Design Table for SW Network

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	28.106	0.432	65.1	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	12.296	0.118	104.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	15.735	0.200	78.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	25.466	0.525	48.5	0.035	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	10.119	0.583	17.4	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	20.078	0.135	148.7	0.247	5.00	0.0	0.600	o	375	Pipe/Conduit	
2.001	42.445	0.283	150.0	0.082	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.002	20.985	0.140	149.9	0.077	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	23.673	0.118	200.6	0.013	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	10.680	0.053	201.5	0.052	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.38	137.350	0.052	0.0	0.0	0.7	1.25	22.1	7.7
1.001	50.00	5.58	136.918	0.052	0.0	0.0	0.7	0.98	17.4	7.7
1.002	50.00	5.81	136.800	0.052	0.0	0.0	0.7	1.13	20.0	7.7
1.003	50.00	6.11	136.600	0.087	0.0	0.0	1.2	1.45	25.6	13.0
1.004	50.00	6.16	136.000	0.100	0.0	0.0	1.4	3.16	125.5	14.9
2.000	50.00	5.23	135.825	0.247	0.0	0.0	3.3	1.48	163.8	36.8
2.001	50.00	5.70	135.690	0.329	0.0	0.0	4.5	1.48	163.2	49.0
2.002	50.00	5.94	135.407	0.406	0.0	0.0	5.5	1.48	163.2	60.5
1.005	50.00	6.47	135.267	0.519	0.0	0.0	7.0	1.28	140.9	77.3
1.006	50.00	6.61	135.149	0.571	0.0	0.0	7.7	1.27	140.6	85.1

Network Design Table for SW Network

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.007	4.287	0.043	100.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.007	50.00	6.65	134.900	0.571	0.0	0.0	7.7	1.81	200.1	85.1

Simulation Criteria for SW Network

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.409		

Online Controls for SW Network

Weir Manhole: S12, DS/PN: 1.007, Volume (m³): 3.0

Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 136.600

Storage Structures for SW Network

Infiltration Basin Manhole: S12, DS/PN: 1.007

Invert Level (m) 134.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 2.79700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	66.0	0.400	126.0	0.800	205.0	1.200	309.0	1.600	444.0
0.100	80.0	0.500	144.0	0.900	229.0	1.300	340.0	1.700	560.0
0.200	94.0	0.600	166.0	1.000	254.0	1.400	373.0		
0.300	109.0	0.700	184.0	1.100	281.0	1.500	407.0		

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Network

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.410 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	S2	15 Winter	1	+0%	100/15 Summer				137.414	-0.086	0.000	0.37
1.001	S3	15 Winter	1	+0%	30/15 Summer				136.994	-0.074	0.000	0.50
1.002	S4	15 Winter	1	+0%	30/15 Summer				136.869	-0.081	0.000	0.43
1.003	S5	15 Winter	1	+0%	30/15 Summer				136.676	-0.074	0.000	0.51
1.004	S6	15 Winter	1	+0%	100/15 Summer				136.055	-0.170	0.000	0.13
2.000	S7	15 Winter	1	+0%	30/15 Summer				135.960	-0.240	0.000	0.28
2.001	S8	15 Winter	1	+0%	30/15 Summer				135.838	-0.227	0.000	0.32
2.002	S8A	15 Winter	1	+0%	30/15 Summer				135.576	-0.206	0.000	0.42
1.005	S9	15 Winter	1	+0%	30/15 Summer				135.479	-0.163	0.000	0.60
1.006	S11	15 Winter	1	+0%	30/15 Summer				135.393	-0.131	0.000	0.75
1.007	S12	30 Winter	1	+0%	30/15 Summer				135.263	-0.012	0.000	0.00

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S2			7.9	OK	
1.001	S3			8.0	OK	
1.002	S4			8.0	OK	
1.003	S5			12.4	OK	
1.004	S6			14.0	OK	
2.000	S7			38.0	OK	
2.001	S8			48.3	OK	
2.002	S8A			57.6	OK	
1.005	S9			73.2	OK	
1.006	S11			78.8	OK	
1.007	S12		24	0.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Network

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000
Region	England and Wales	Ratio R	0.410
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	S2	15 Winter	30	+0%	100/15 Summer				137.485	-0.015	0.000	0.91
1.001	S3	15 Winter	30	+0%	30/15 Summer				137.175	0.107	0.000	1.10
1.002	S4	15 Winter	30	+0%	30/15 Summer				137.032	0.082	0.000	0.97
1.003	S5	15 Winter	30	+0%	30/15 Summer				136.871	0.121	0.000	1.11
1.004	S6	15 Winter	30	+0%	100/15 Summer				136.085	-0.140	0.000	0.30
2.000	S7	15 Winter	30	+0%	30/15 Summer				136.272	0.072	0.000	0.65
2.001	S8	15 Winter	30	+0%	30/15 Summer				136.157	0.092	0.000	0.73
2.002	S8A	15 Winter	30	+0%	30/15 Summer				136.002	0.220	0.000	0.93
1.005	S9	15 Winter	30	+0%	30/15 Summer				135.878	0.236	0.000	1.34
1.006	S11	15 Winter	30	+0%	30/15 Summer				135.663	0.139	0.000	1.68
1.007	S12	30 Winter	30	+0%	30/15 Summer				135.562	0.287	0.000	0.00

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S2			19.1	OK	
1.001	S3			17.3	SURCHARGED	
1.002	S4			18.0	SURCHARGED	
1.003	S5			27.0	SURCHARGED	
1.004	S6			31.4	OK	
2.000	S7			89.1	SURCHARGED	
2.001	S8			108.4	SURCHARGED	
2.002	S8A			127.7	SURCHARGED	
1.005	S9			162.6	SURCHARGED	
1.006	S11			176.6	SURCHARGED	
1.007	S12		31	0.0	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Network

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000
Region	England and Wales	Ratio R	0.410
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	S2	15 Winter	100	+40%	100/15 Summer				138.701	1.201	0.000	1.17
1.001	S3	15 Winter	100	+40%	30/15 Summer				138.205	1.137	0.000	1.41
1.002	S4	15 Winter	100	+40%	30/15 Summer				137.970	1.020	0.000	1.35
1.003	S5	15 Winter	100	+40%	30/15 Summer				137.710	0.960	0.000	1.43
1.004	S6	15 Winter	100	+40%	100/15 Summer				136.802	0.577	0.000	0.42
2.000	S7	15 Winter	100	+40%	30/15 Summer				137.793	1.593	0.000	1.10
2.001	S8	15 Winter	100	+40%	30/15 Summer				137.628	1.563	0.000	1.30
2.002	S8A	15 Winter	100	+40%	30/15 Summer				137.130	1.348	0.000	1.69
1.005	S9	15 Winter	100	+40%	30/15 Summer				136.727	1.085	0.000	2.28
1.006	S11	15 Winter	100	+40%	30/15 Summer				136.141	0.617	0.000	2.84
1.007	S12	60 Winter	100	+40%	30/15 Summer				135.914	0.639	0.000	0.00

PN	US/MH Name	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S2			24.6	FLOOD RISK	
1.001	S3			22.3	FLOOD RISK	
1.002	S4			25.1	FLOOD RISK	
1.003	S5			34.9	FLOOD RISK	
1.004	S6			43.9	SURCHARGED	
2.000	S7			151.6	SURCHARGED	
2.001	S8			193.2	SURCHARGED	
2.002	S8A			233.2	SURCHARGED	
1.005	S9			275.6	SURCHARGED	
1.006	S11			298.8	SURCHARGED	
1.007	S12		37	0.0	SURCHARGED	

Appendix C – Overland Flow Route Plan

NOTES:

1. DO NOT SCALE FROM THIS DRAWING
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL OTHER DRAWINGS, ENGINEERING DETAILS, SPECIFICATION AND ANY STRUCTURAL, GEOTECHNICAL OR OTHER SPECIALIST DOCUMENT PROVIDED.

KEY

SURFACE WATER OVERLAND FLOW ROUTE

OVERLAND FLOWS TO OVERFLOW INTO INFILTRATION BASIN

REV:	DESCRIPTION:	BY:	DATE:
P3	Site Layout Updated	DM	11.08.21
P2	Site Layout Updated	DM	28.05.21
P1	Initial preliminary issue	DM	24.02.21

STATUS: INFORMATION

EXPEDITE

Exeter
The Design Studio
35 Southernhay East
Exeter
EX1 1NX
t: 01392 691 631

www.expediteps.com

CLIENT: BURRINGTON HOMES (MIDLANDS)

SITE: LAND AT HEMPTON ROAD DEDDINGTON

TITLE: EXCEEDANCE FLOW PLAN

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1:250	Jan 2021	DM	KSR

PROJECT NO:	DRAWING NO:	REVISION:
ES20.060	09.00	P3

Appendix D – Infiltration Testing Results

The proposed development area will be located wholly within Flood Zone 1 (less than 0.1% chance of flooding). In accordance with Table 3 of the Planning Practice Guidance the development is therefore "sequentially acceptable".

Geology & Ground Conditions

Geological mapping indicates that the site is underlain by two types of solid geology; the north of the site is underlain by Whitby Mudstone Formation while the south of the site is Marlstone Rock Formation – Ferruginous Limestone and Ironstone. No superficial deposits are present within the site's boundaries.

Soakage testing was undertaken in June 2018 with two trial pits in the site's south-east corner. Both pits were found to infiltrate very well (findings are summarised in Table 1). As a result of this the site's proposed drainage strategy has been revised to be based on infiltration.

Table 1: Soakage Test Summary

SA01		SA02	
m/s	m/hr	m/s	m/hr
1.27×10^{-3}	4.572	5.93×10^{-3}	21.348
9.55×10^{-4}	3.438	7.35×10^{-3}	26.460
7.77×10^{-4}	2.797	1.84×10^{-3}	6.624
		1.67×10^{-3}	6.012
		1.57×10^{-3}	5.652
		1.67×10^{-3}	6.012
		1.66×10^{-3}	5.976

Drainage Strategy

No ditches or significant drainage features are located within the site and therefore existing surface water runs off directly downhill towards Hempton Road along the southern boundary.

Given the confirmation of viable infiltration and the lack of nearby watercourses, surface water runoff from the site will be attenuated on-site and then discharged into the underlying ironstone bedrock. No existing public surface water sewers are present within the site's boundaries.

The proposed surface water strategy for the site will comprise of a single infiltration basin with a total storage capacity of 156m^3 based on an impermeable area of 0.74ha inclusive of 10% urban creep. This system will have sufficient capacity for the 1 in 100 year storm event (plus a 40% allowance of climate change).

The SUDS scheme will be offered to the Borough Council or other local bodies such as the Town or Parish Council for adoption and future maintenance. A proposed maintenance plan shown in Table 2 breaks down the maintenance responsibility of the various assets.

Mewies Engineering Consultants Ltd
The Old Chapel, Station Road, Hugglescote, Leicestershire, LE67 2GB
Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	1
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	1

Soil infiltration test

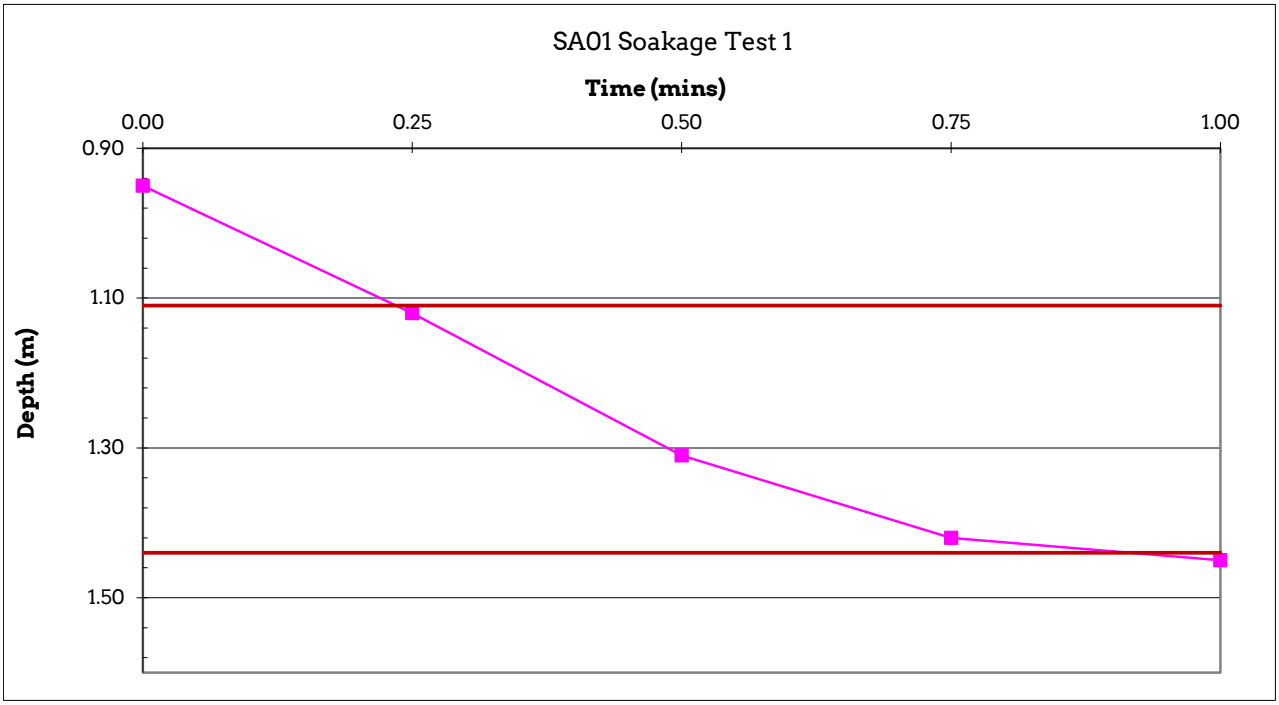
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA01**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**1.60**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.50	**Reddish brown, gravelly SAND with a low cobble content.**
	0.50 - 1.60	**Reddish brown, sandy, fine to coarse angular GRAVEL with high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.95
0.25	1.12
0.50	1.31
0.75	1.42
1.00	1.45

Effective storage depth =	0.65	m
75% effective storage depth =	0.49	m
(ie depth below GL) =	1.11	m
25% effective storage depth =	0.16	m
(ie depth below GL) =	1.44	m
effective storage depth 75%-25% =	0.33	m
Time to fall to 75% effective depth =	0.24	mins
Time to fall to 25% effective depth =	0.85	mins
Void Ratio =	40%	
V (75%-25%) =	0.1053	m3
a (50%) =	2.2725	m2
t (75%-25%) =	0.61	mins
SOIL INFILTRATION RATE =	**1.27E-03**	**m/s**



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Scheme	**Hempton Road, Deddington**	Page No.	2
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	2

Soil infiltration test

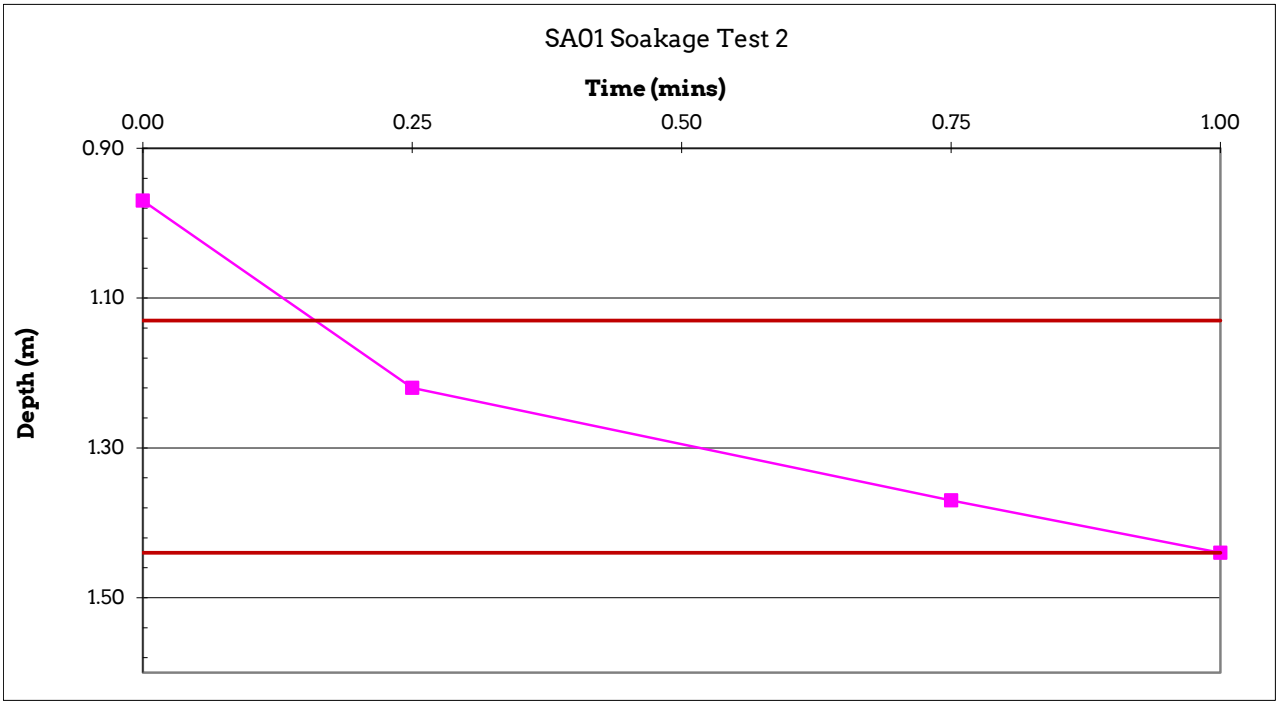
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA01**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**1.60**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.50	**Reddish brown, gravelly SAND with a low cobble content.**
	0.50 - 1.60	**Reddish brown, sandy, fine to coarse angular GRAVEL with high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.97
0.25	1.22
0.75	1.37
1.00	1.44

Effective storage depth =	0.63	m
75% effective storage depth =	0.47	m
(ie depth below GL) =	1.13	m
25% effective storage depth =	0.16	m
(ie depth below GL) =	1.44	m
effective storage depth 75%-25% =	0.32	m
Time to fall to 75% effective depth =	0.20	mins
Time to fall to 25% effective depth =	1.00	mins
Void Ratio =	40%	
V (75%-25%) =	0.1021	m3
a (50%) =	2.2275	m2
t (75%-25%) =	0.80	mins
SOIL INFILTRATION RATE =	**9.55E-04**	**m/s**



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Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	3
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	3

Soil infiltration test

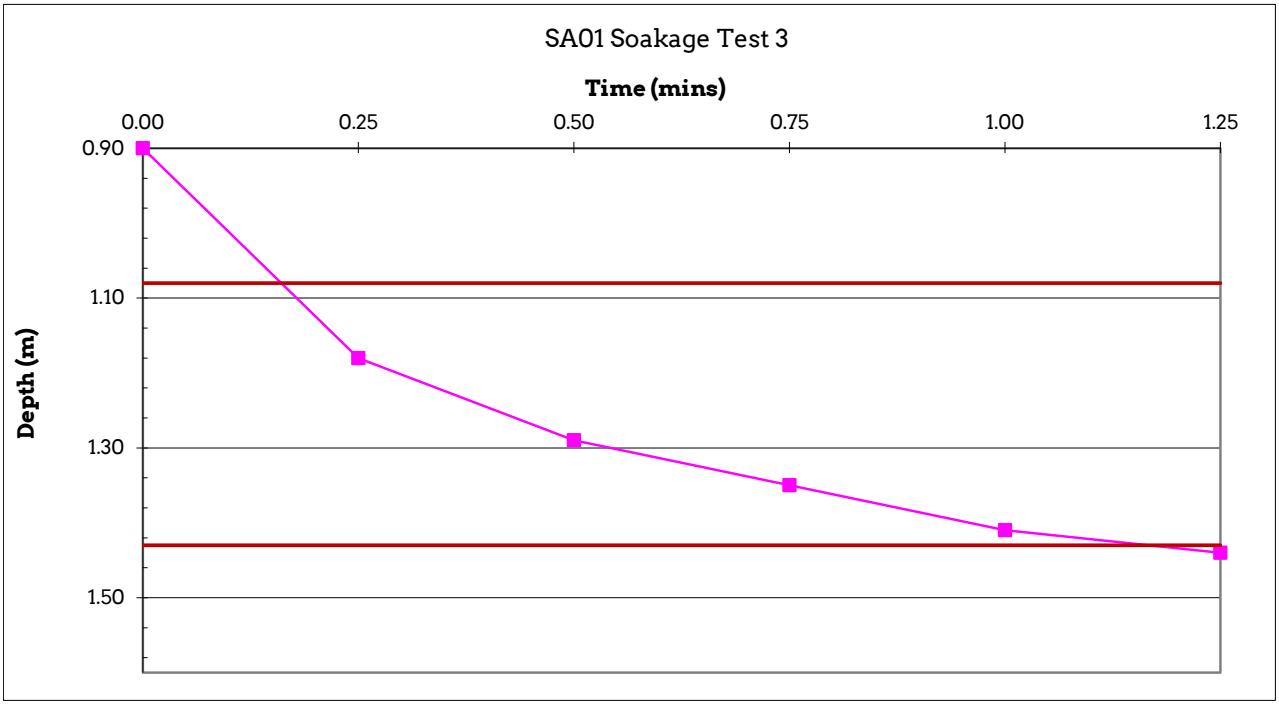
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA01**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**1.60**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.50	**Reddish brown, gravelly SAND with a low cobble content.**
	0.50 - 1.60	**Reddish brown, sandy, fine to coarse angular GRAVEL with high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.90
0.25	1.18
0.50	1.29
0.75	1.35
1.00	1.41
1.25	1.44

Effective storage depth =	0.70	m
75% effective storage depth =	0.53	m
(ie depth below GL) =	1.08	m
25% effective storage depth =	0.18	m
(ie depth below GL) =	1.43	m
effective storage depth 75%-25% =	0.35	m
Time to fall to 75% effective depth =	0.13	mins
Time to fall to 25% effective depth =	1.15	mins
Void Ratio =	40%	
V (75%-25%) =	0.1134	m3
a (50%) =	2.3850	m2
t (75%-25%) =	1.02	mins
SOIL INFILTRATION RATE =	**7.77E-04**	**m/s**



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Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	1
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	1

Soil infiltration test

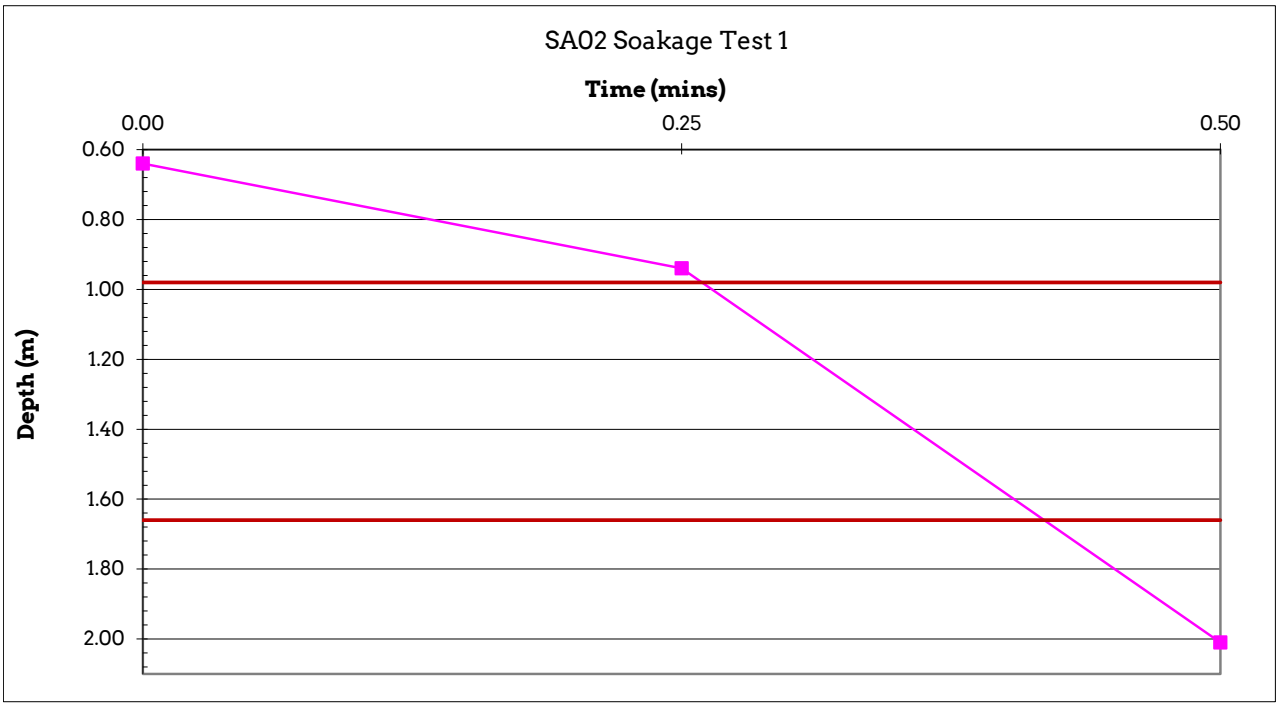
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA02**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**2.00**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.60	**Reddish brown, clayey, gravelly SAND with a low cobble content.**
	0.60 - 0.90	**Reddish brown, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**
	0.90 - 2.00	**Reddish brown, clayey, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.64
0.25	0.94
0.50	2.01

Effective storage depth =	1.36	m
75% effective storage depth =	1.02	m
(ie depth below GL) =	0.98	m
25% effective storage depth =	0.34	m
(ie depth below GL) =	1.66	m
effective storage depth 75%-25% =	0.68	m
Time to fall to 75% effective depth =	0.26	mins
Time to fall to 25% effective depth =	0.42	mins
Void Ratio =	40%	
V (75%-25%) =	0.2203	m3
a (50%) =	3.8700	m2
t (75%-25%) =	0.16	mins
SOIL INFILTRATION RATE =	**5.93E-03**	**m/s**



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The Old Chapel, Station Road, Hugglescote, Leicestershire, LE67 2GB
Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	2
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	2

Soil infiltration test

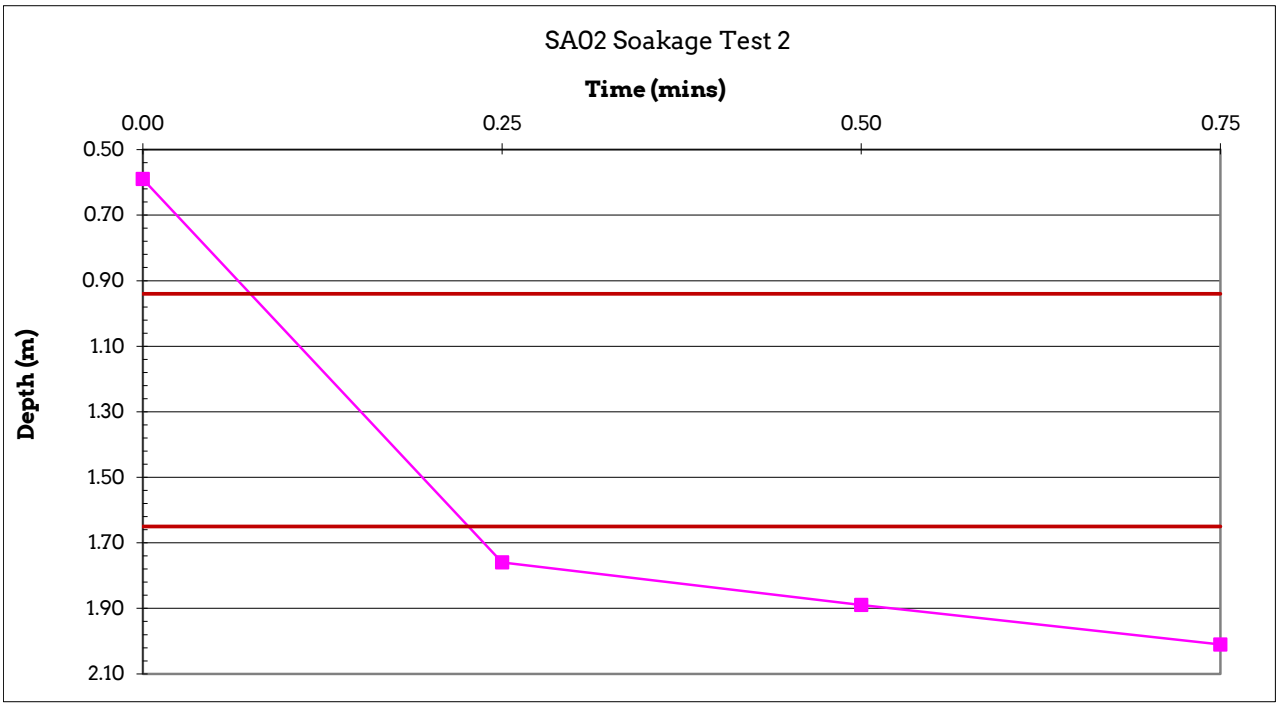
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA02**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**2.00**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.60	**Reddish brown, clayey, gravelly SAND with a low cobble content.**
	0.60 - 0.90	**Reddish brown, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**
	0.90 - 2.00	**Reddish brown, clayey, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.59
0.25	1.76
0.50	1.89
0.75	2.01

Effective storage depth =	1.41	m
75% effective storage depth =	1.06	m
(ie depth below GL) =	0.94	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.71	m
Time to fall to 75% effective depth =	0.08	mins
Time to fall to 25% effective depth =	0.21	mins
Void Ratio =	40%	
V (75%-25%) =	0.2284	m3
a (50%) =	3.9825	m2
t (75%-25%) =	0.13	mins
SOIL INFILTRATION RATE =	**7.35E-03**	**m/s**



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The Old Chapel, Station Road, Hugglescote, Leicestershire, LE67 2GB
Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	3
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	3

Soil infiltration test

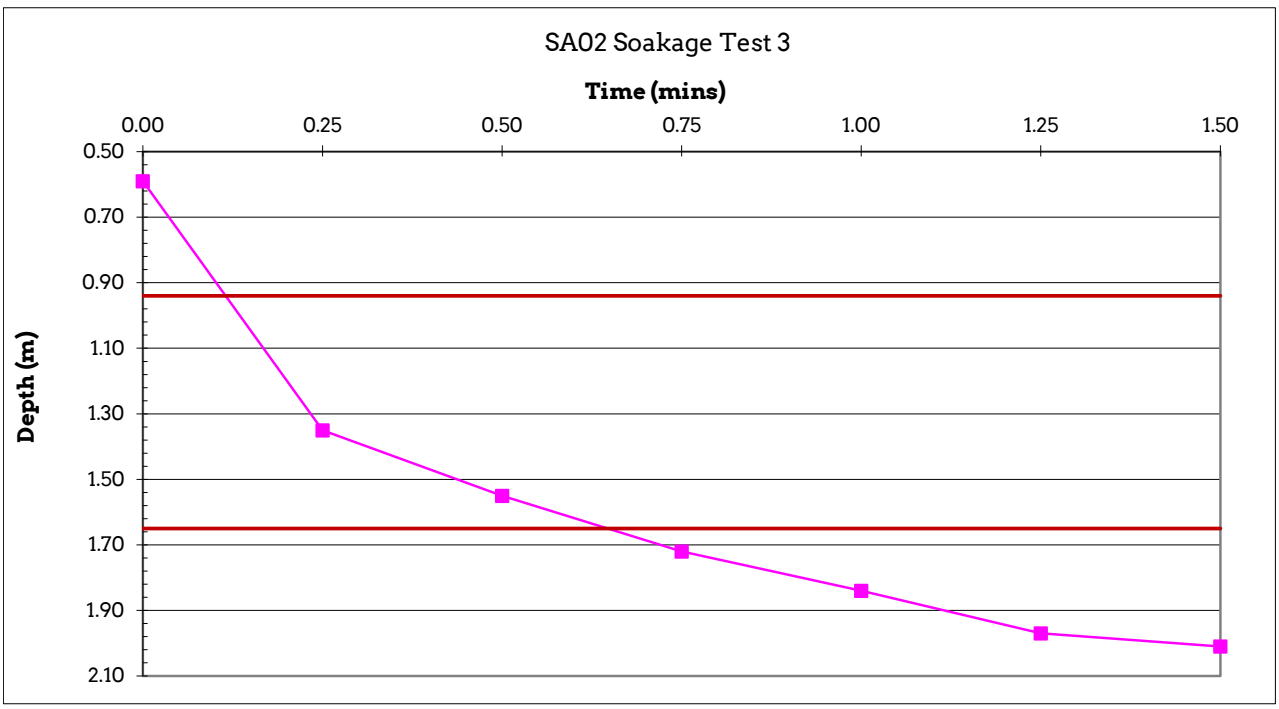
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA02**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**2.00**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.60	**Reddish brown, clayey, gravelly SAND with a low cobble content.**
	0.60 - 0.90	**Reddish brown, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**
	0.90 - 2.00	**Reddish brown, clayey, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.59
0.25	1.35
0.50	1.55
0.75	1.72
1.00	1.84
1.25	1.97
1.50	2.01

Effective storage depth =	1.41	m
75% effective storage depth =	1.06	m
(ie depth below GL) =	0.94	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.71	m
Time to fall to 75% effective depth =	0.12	mins
Time to fall to 25% effective depth =	0.64	mins
Void Ratio =	40%	
V (75%-25%) =	0.2284	m3
a (50%) =	3.9825	m2
t (75%-25%) =	0.52	mins
SOIL INFILTRATION RATE =	**1.84E-03**	**m/s**



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Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	4
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	4

Soil infiltration test

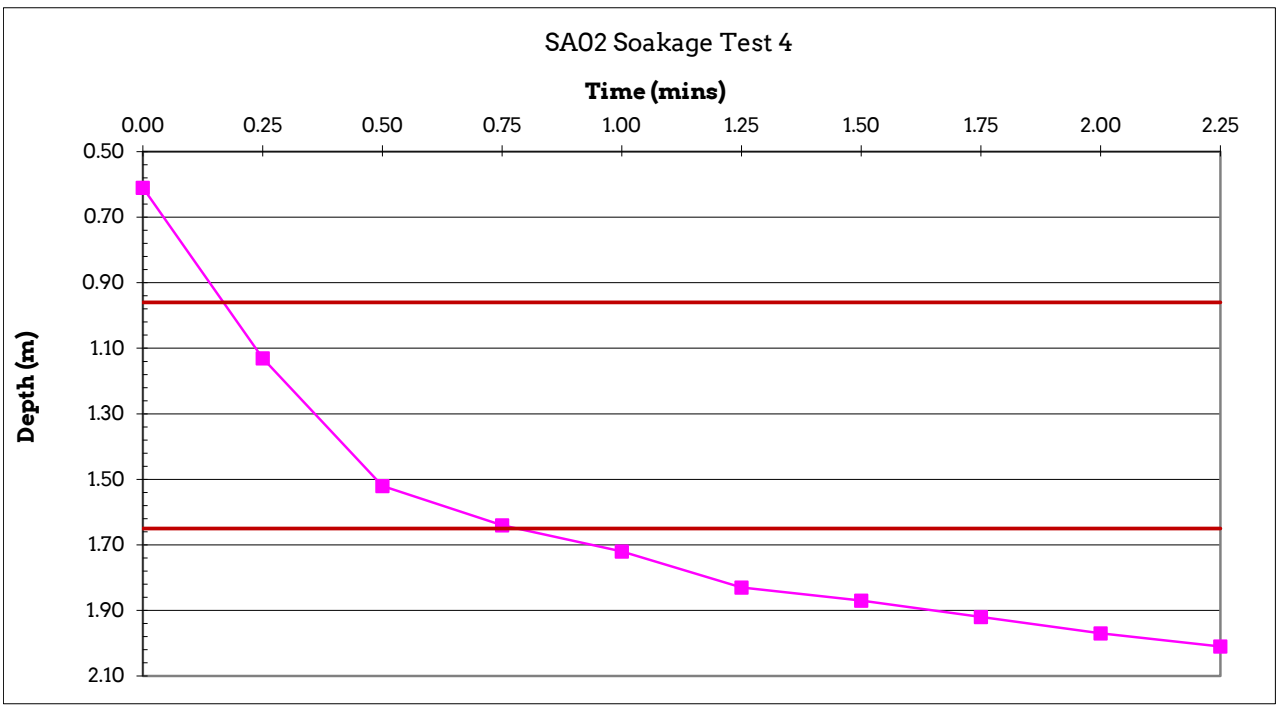
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA02**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**2.00**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.60	**Reddish brown, clayey, gravelly SAND with a low cobble content.**
	0.60 - 0.90	**Reddish brown, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**
	0.90 - 2.00	**Reddish brown, clayey, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**

Weather Conditions: Overcast

Time mins	Depth to water
0.00	0.61
0.25	1.13
0.50	1.52
0.75	1.64
1.00	1.72
1.25	1.83
1.50	1.87
1.75	1.92
2.00	1.97
2.25	2.01

Effective storage depth =	1.39	m
75% effective storage depth =	1.04	m
(ie depth below GL) =	0.96	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.70	m
Time to fall to 75% effective depth =	0.19	mins
Time to fall to 25% effective depth =	0.76	mins
Void Ratio =	40%	
V (75%-25%) =	0.2252	m3
a (50%) =	3.9375	m2
t (75%-25%) =	0.57	mins
SOIL INFILTRATION RATE =	**1.67E-03**	**m/s**



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Telephone 01530 264753 email group@m-ec.co.uk

Scheme	**Hempton Road, Deddington**	Page No.	5
Client	**Robert Webb**	Calcs by	CN
Job ref.	**23933**	Date	14/06/18
		Test Number	5

Soil infiltration test

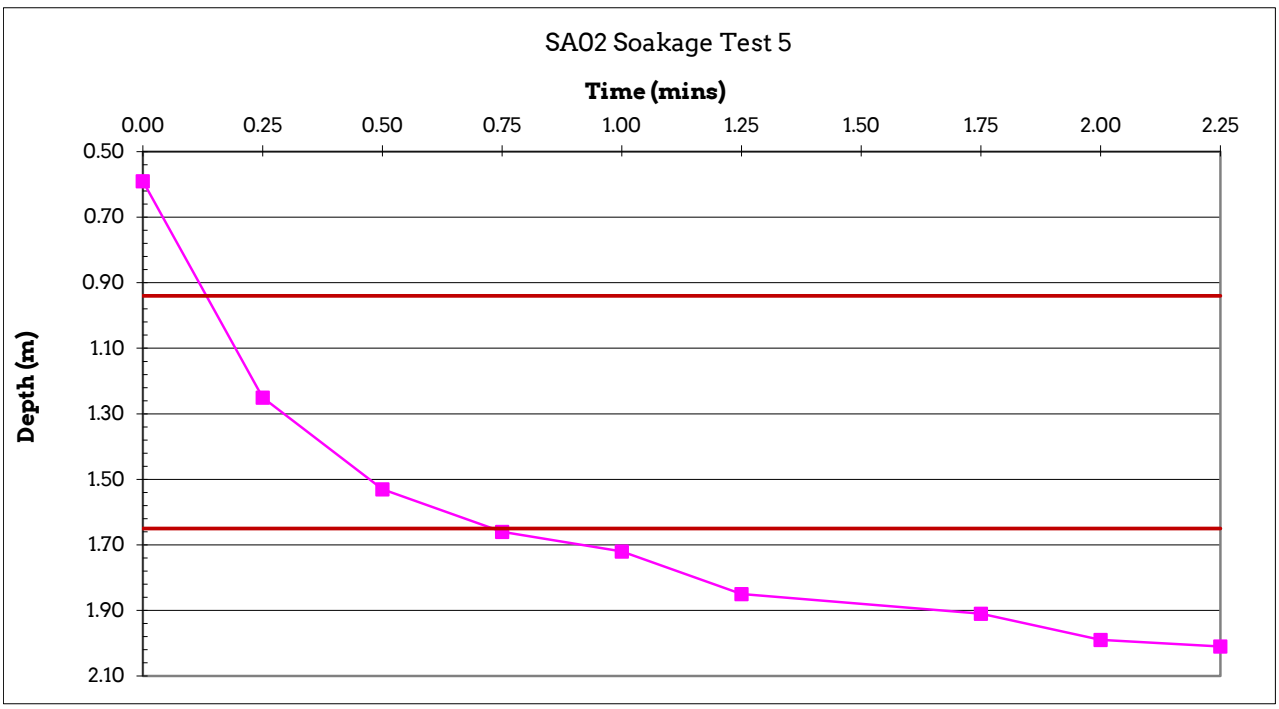
(In general accordance with BRE Digest 365, 2016, Soakaway Design)

Trial pit ref.	**SA02**	
Length	**1.80**	m
Width	**0.45**	m
Depth	**2.00**	m
Ground water level	**N/A**	
Ground conditions	**0.00 - 0.20**	**TOPSOIL comprising reddish brown, clayey, gravelly, SAND.**
	0.20 - 0.60	**Reddish brown, clayey, gravelly SAND with a low cobble content.**
	0.60 - 0.90	**Reddish brown, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**
	0.90 - 2.00	**Reddish brown, clayey, sandy, fine to coarse angular GRAVEL with a high cobble and low boulder content.**

Weather Conditions: Overcast

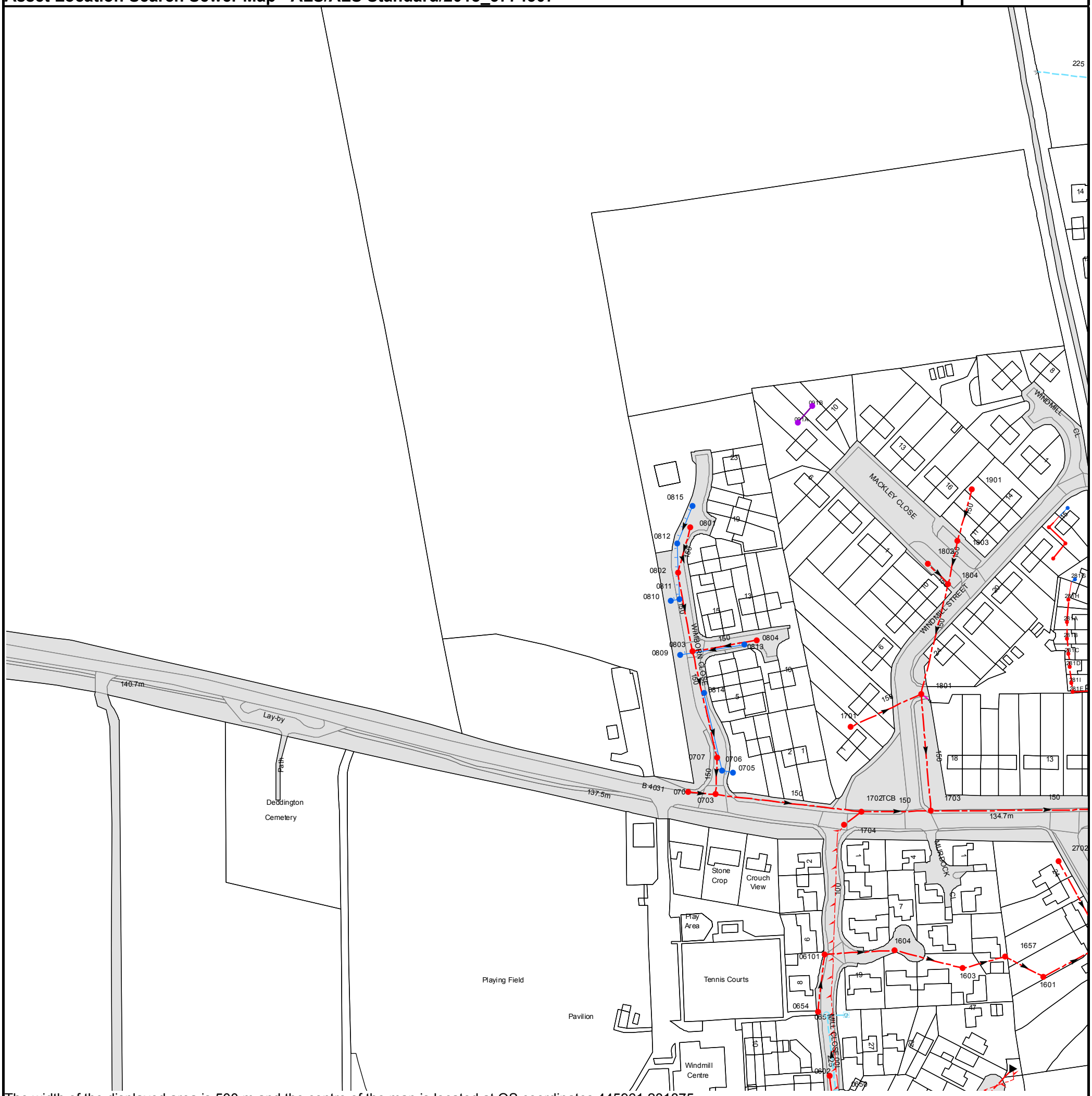
Time mins	Depth to water
0.00	0.59
0.25	1.25
0.50	1.53
0.75	1.66
1.00	1.72
1.25	1.85
1.75	1.91
2.00	1.99
2.25	2.01

Effective storage depth =	1.41	m
75% effective storage depth =	1.06	m
(ie depth below GL) =	0.94	m
25% effective storage depth =	0.35	m
(ie depth below GL) =	1.65	m
effective storage depth 75%-25% =	0.71	m
Time to fall to 75% effective depth =	0.13	mins
Time to fall to 25% effective depth =	0.74	mins
Void Ratio =	40%	
V (75%-25%) =	0.2284	m3
a (50%) =	3.9825	m2
t (75%-25%) =	0.61	mins
SOIL INFILTRATION RATE =	**1.57E-03**	**m/s**



Appendix E – Thames Water Asset Records

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3774307



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 445961,231875

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
281H	n/a	n/a
281G	n/a	n/a
281K	n/a	n/a
281A	n/a	n/a
281C	n/a	n/a
281D	n/a	n/a
281I	n/a	n/a
281E	n/a	n/a
0810	n/a	n/a
0812	n/a	n/a
0802	137.22	135.98
0811	n/a	n/a
0809	n/a	n/a
0701	n/a	n/a
0801	137.37	136.47
0803	n/a	n/a
0815	n/a	n/a
0814	n/a	n/a
0703	n/a	n/a
0707	136.45	135.05
0706	n/a	n/a
0705	n/a	n/a
0813	n/a	n/a
0804	136.79	135.87
091A	n/a	n/a
091B	n/a	n/a
1701	135.86	134.66
1801	135.68	133.97
1802	136.23	134.66
1804	136.13	134.47
1803	136.03	134.67
1901	136.31	134.94
181A	n/a	n/a
181B	n/a	n/a
281L	n/a	n/a
281B	n/a	n/a
0654	134.88	133.97
06101	134.65	n/a
0651	134.84	132.52
0602	134.5	132.69
1704	135.89	134.06
1653	n/a	132.81
1702	135.88	133.95
1604	134.17	n/a
1703	135.41	133.36
1603	133.87	n/a
1657	133.82	132.94
1601	n/a	n/a
2702	134.08	132.84