

N. J. Caine Ltd Southend Cobnash Kingsland Leominster Herefordshire HR6 9QY

30th October 2019

E15241 – Letter report regarding the soakaway investigation at Land adjacent to B4360, Cobnash, Leominster HR6 9RA.

Background

Environmental Management Solutions Limited (EMS) have been commissioned by Mr Nick Caine (the Client) to undertake soakaway testing in two locations on site. This work was undertaken as part of a development proposal of three residential properties.

The main site comprises a grassed field currently used for grazing. The site is approximately 0.49 ha in size and rectangular in shape. The field slopes from south west to the north east. Ground water is expected to drain towards the road to the north and from anecdotal data the field to the north of the road is susceptible to flooding and it has a noticeably lower elevation than the site.

All boundaries are marked with post and wire fences. Hedges and trees line the western and southern boundaries.

Site walkover photos are included in Appendix C and a site plan is included in Appendix A.

BGS geological mapping for the site area indicates no superficial deposits are present on site. The Raglan Mudstone Formation - sandstone sedimentary bedrock is present below the site. It was deposited in a fluvial environment.

Scope of Works

On 18th October 2019, four trial pits were excavated at the site by EMS. Two soakaway pits SA01 and SA02 were tested at depths of 1.55 m and 1.30 m respectively targeting more



gravelly strata at least one metre above the water table. The other two trial pits were excavated for logging purposes and to identify the depth of the water table (TP01 and TP02). These four pits were positioned in the vicinity of two locations identified as potential sites for the soakaways on the Proposed Development Plan provided by Border Oak Design and Construction Ltd. (the Agent).

All trial pits were excavated using a hydraulic excavator and infilled with arisings on completion.

The locations of the trial pits are shown on the exploratory hole location plan included with the site plans in Appendix A. Details of the trial pits, including a description of the strata encountered, trial pit depths, and notes on any groundwater entries are included on the trial pit logs (Appendix B). Photographs of the trial pits are included in Appendix C. All soil was logged in accordance to BS 5930:2015

Soakaway tests, in broad accordance with BRE Digest 365: 2016 (Soakaway Design) were undertaken in the two trial pits as detailed above. Details of the soakaway tests, and the soakaway test results, are included as Appendix D.

Ground Conditions

MADE GROUND (Reworked Topsoil)

Grassed reworked topsoil generally comprising gravelly very silty clay becoming very gravelly clay was present in all soakaway pits on site. Pottery and plastic waste was found in the matrix. It is present from the surface to 0.3 m at the northern end of the site at TP02 and SA02. Deeper Made Ground is present at SA01 and TP01 at 1.50 m and 2.20 m respectively.

Alluvium

This was located beneath the MADE GROUND. This material largely comprised of soft sandy very gravelly CLAY occurs between 0.30 m and 2.60 m

Raglan Mudstone Formation

Firm friable gravelly CLAY representing the Raglan Mudstone Formation is present at TP02 between 2.60 m and the extent of the trial pit at 3.00 m.



Groundwater

Groundwater was encountered at TP01 at 2.55 m.

Soakaway Test Results

Soakaway percolation tests were undertaken at SA01 and SA02 and are summarised below. The complete data table and soakaway graphs are included in Appendix D. Only a single test was possible at each location.

Took Dura	Test Location (Results in m/s)							
Test Run	SA01	SA02						
1	2.76 x 10 ⁻⁶	2.03 x 10 ⁻⁵						
2	N/A	N/A						
3	N/A	N/A						

Red font indicates extrapolated data.

SA01 did not reach TP75 min value during the course of the test (5 hours 6 minutes).

Conclusions/Recommendations

The soft sandy very gravelly CLAY (alluvium) at SA02 has a reasonably high infiltration rate at 1.30~m depth of 2.03~x $10^{-5}~\text{m/s}$. The strata tested at SA01 at 1.55~m gives a far lower extrapolated infiltration rate of approximately 2.76~x $10^{-6}~\text{m/s}$. This strata although similar to that at SA02 is identified as Made Ground due to some ceramic fragments being found within the matrix. This 'remoulded' CLAY seems to have different permeability properties compared to the natural CLAY. This is also illustrated by the water table being found at 2.55~m (rising to 2.48~m after 5~hours 33~minutes) at TP01 although it was not encountered at TP02 to the extent of the trial pit at 3.0~m. BRE365 guidance recommends that soakaways should not be built within 1.0~m of the water table.

The low permeability and close vicinity to the water table at SA01 means that we do not recommend a soakaway solution in that area. SA01 in comparison is deemed suitable for soakaway solutions.

Soakaway solutions at the northern boundary of the site are recommended. Consultation with a suitably qualified and experienced drainage engineer is recommended.



Written by

Dave Boswell MSc

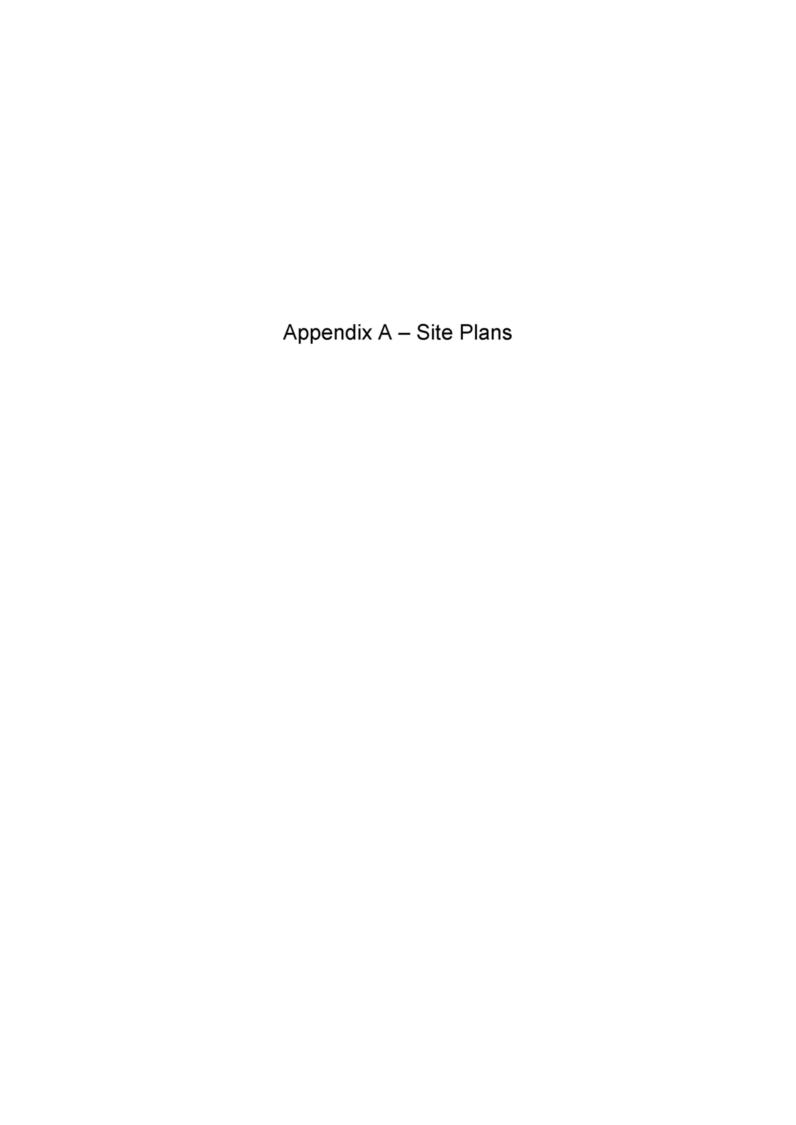


Appendix A - Site Plans

Appendix B - Trial Pit Logs

Appendix C - Photographic Record

Appendix D - Soakaway Test Results





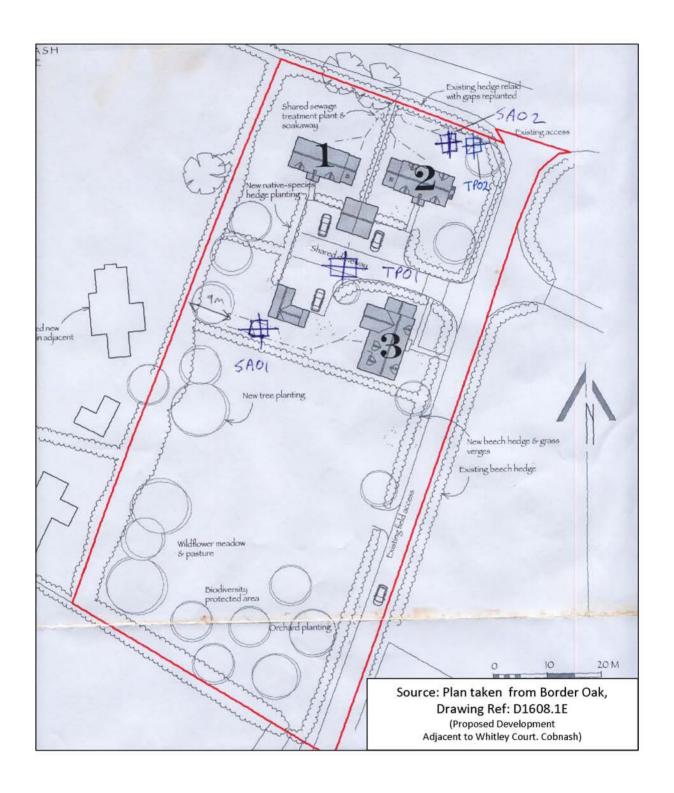
Map Courtesy of Leaflet | Powered by Esri | DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Map courtesy of Google Maps



Project Number:	E15194
Site:	Land adjacent to B4360, Cobnash, Leominster HR6 9RA
Drawing Title:	Site Location Plan



ENVIRONMENTAL MANAGEMENT SOLUTIONS
MANAGEMENT SOLUTIONS

Project Number:	E15194					
Site:	Land adjacent to B4360, Cobnash, Leominster HR6 9RA					
Drawing Title:	Exploratory Hole Location Plan					





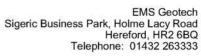




EXPLORATORY HOLF LOG

		EALLOI	AION	I HOLE LOG			
					HOL	E No	
ent B436	0, Cobnash	, Leominster, H	R6 9RA		64	04	
Job No Date Ground Level (m) Co-Ordinates () E15194 18-10-19 89.00 E 345.031.0 N 260.313						NO I	
	18-10-19	8	89.00	E 345,031.0 N 260,313.0			
		•			Sheet		
ntal Man	agement So	lutions Limited			1 c	of 1	
ESTS				STRATA			ent/
mple No.	Reduced Level	Legend (Thick- ness)		DESCRIPTION		Geology	Instrument Backfill
	Date	Date 18-10-19 Ital Management So ESTS The least of the second	ent B4360, Cobnash, Leominster, H. Date 18-10-19 September 18-10-19 Reduced Legend (Thickness)	ent B4360, Cobnash, Leominster, HR6 9RA Date	Date Ground Level (m) Co-Ordinates () E 345,031.0 N 260,313.0 Ital Management Solutions Limited STRATA STRATA STRATA Co-Ordinates () E 345,031.0 N 260,313.0 STRATA Depth Chick-ness Description Co-Ordinates () E 345,031.0 N 260,313.0 Co-Ordinates ()	HOLE and B4360, Cobnash, Leominster, HR6 9RA Date 18-10-19 89.00 Co-Ordinates () ESTS Table Sheet STRATA Depth Co-Ordinates () Sheet 1 co-Draw Stratal Management Solutions Limited STRATA Description Depth Co-Ordinates () Sheet Depth Co-Ordinates () Sheet Depth Depth Co-Ordinates () Sheet Depth Depth Co-Ordinates () Sheet Description	HOLE No sent B4360, Cobnash, Leominster, HR6 9RA Date 18-10-19 89.00 E 345,031.0 N 260,313.0 Sheet atal Management Solutions Limited Tof 1 ESTS mple No. Reduced Legend (Thick-ness) Depth (Thick-ness) DESCRIPTION

SAMPLE	S & TESTS	H					STRA	TA				>	ent
Depth	Sample No.	Water	Reduced Level	Legena	Depth (Thick- ness)			DESCI	RIPTION			Geology	Instrument
			88.70		(0.30)	gravelly ve some plast	ry silty cla ic waste. Fi	y. Gravel is requent root	subangular lets.	oil of brown coarse mud	stone with	-	
					(1.25)	gravelly cl- sandstone.	ay. Gravel Frequent c	is subangula obbles.	r to subrou	nded, fine to	o coarse		
			87.43		1.55								
Dowin	or Drogwood and	1 337	ator Oh	Compation of the Compat			Chicallin		Water	Added	GTN III		
	g Progress and				Water Dpt		Chisellin To	Ť	10.00		GENE REMA	RAL RKS	
Date '	Time Depth		Casin epth I	Ba. mm	Dpt	From	10	Hours	From	То	Backfilled with completion. No groundwate encountered. Side walls stab	arisin r	_
All dimensi	ons in metres C	lient	Mr N	Caine		Meth Plan	nod/		c excavat		Logged By DI	20	





EXPLORATORY HOLE LOG

Project				HOLE No
Land adjace	nt B4360, Cobnash, Le	ominster, HR6 9RA		6402
Job No	Date	Ground Level (m)	Co-Ordinates ()	SA02
E15194	18-10-19	89.00	E 345,061.0 N 260,349.0	
Contractor	.1.	*·	25%	Sheet
Environmen	tal Management Soluti	ons Limited		1 of 1

SAMPLE	S & TESTS	l H					STRA	TA				>	lent/
Depth	Sample No.	Water	Reduced Level	Legend	Depth (Thick- ness)				RIPTION			Geology	Instrument
			88.70		(0.30)	MADE GF gravelly ve some plast	ROUND. G ery silty clay ic waste. Fi	rassed remo y. Gravel is requent root	ulded topso subangular lets.	oil of brown coarse muc	n slightly Istone with		
			86.70	0	-	Soft reddis subangular Frequent of	obbles fron	ghtly sandy l, fine to coa 1 1.2 m.	gravelly C arse sandsto	LAY. Grav one and mud	el is dstone.		
				0	(1.00)								
			87.70		1.30							,	
					-								
					-								
					-								
					-								
					-								
Borin	g Progress an	d W	ater Ob	servatio	ons	11 (Chisellin	σ	Water	Added	GENE	DAI	
	Time Depth		Casin Depth L		Water Dpt	From	То	Hours	From	То	REMA	RKS	
			жриг т	Jia. Hun	Брс						Backfilled with completion. No groundwate encountered. Side walls stab	r	ıgs (







EXPLORATORY HOLE LOG E15194 COBNASH SOAKAWAYS, LEOMINSTER.GPJ GINT STD AGS 3_1.GDT 30/10/19

EXPLORATORY HOLE LOG

			EM LOMATO	MI HOLL LOG			
Project					HOI	LE No	,
Land adjace	ent B436	60, Cobnash, Le	ominster, HR6 9RA			204	
Job No	E15194 18-10-19 89.00 E 345,044.0 N 260,326.0 Environmental Management Solutions Limited 1 of 1						
E15194		18-10-19	89.00	E 345,044.0 N 260,326.0			
Contractor			*:	2 5 4:	Sheet		
Environmen	ntal Mar	nagement Soluti	ons Limited		1	of 1	
SAMPLES & T	ESTS		4500	STRATA		_	ent/
Depth Sar	mple No.	Reduced Les	Depth tend (Thick-	DESCRIPTION		cology	strument

Contractor				Sheet	
Environmental Management S	Solutions Limited			1 of 1	
SAMPLES & TESTS		STRATA		1/23	ent/
Depth Sample No. Sample No. Sample No. Reduce Level	Legend (Thick- ness)		DESCRIPTION	Geology	Instrument/ Backfill
88.7	(0.30)	gravelly very silty clay. Grav some plastic waste. Frequen	I remoulded topsoil of brown sli vel is subangular coarse mudsto at rootlets.	ightly	
88.7	(1.90)	MADE GROUND. Remould Gravel is subangular to subreceramic fragment. Frequent	ded soft reddish brown very granded, fine to coarse sandstor cobbles. ery sandy CLAY. Gravel is subandstone and miceous mudstone	angular to	
<u>↓</u> 86.4	(0.35)	(ALLUVIUM)	EL of angular to subrounded, fir	ne to coarse	_
96.5	(0.25)	sandstone and mudstone.	DE OF MISMAN TO SUPPOMINEUS, III	ic to coarse	
80.2	2.00	, ∙ ∞ - america a e a 17 /			
Boring Progress and Water O	bservations	Chiselling	Water Added	GENERAL	f _a
	ing Water Dia. mm Dpt	From To Ho		REMARK	Š
Depth	Dia. min Dpt		B c G G	Backfilled with arisi completion. Groundwater encour .55 m. ide walls stable.	ngs on
All dimensions in metres Scale 1:18.75 Client Mr	N Caine	Method/ Plant Used Hydr	raulic excavator	ogged By DB	





EXPLORATORY HOLE LOG

Project				HOLE No
Land adjacer	nt B4360, Cobnash, Le	ominster, HR6 9RA		TDOO
Job No	Date	Ground Level (m)	Co-Ordinates ()	TP02
E15194	18-10-19	87.00	E 345,065.0 N 260,346.0	
Contractor		*-		Sheet
Environment	tal Management Solution	ons Limited		1 of 1

Contractor			1000							Sheet	c 1	
Environmental Mar	nage	ment So	lutions	Limited		200220022000000	etigas tras			1 o	1 1	
SAMPLES & TESTS	. I					STRA	TA				55	Instrument
Depth Sample No.	Water	Reduced Level	Legend	Depth (Thick- ness)			DESCR	RIPTION			Geology	Instrument
				(0.30)	MADE GR gravelly ve Frequent ro	ry silty clay	rassed remo v. Gravel is	ulded topsc subangular	oil of brown coarse muds	slightly stone.		
		86.70	<u> </u>	0.30	Soft reddis	h brown sa	ndv CLAV	v11			-	ł
				-	(ALLUVIU		ndy CLAT.					
				(1.50)								
				- (1.50)								
		85.20		1.80	Daddish be	oven condu	olovov GP	AVEL of m	hangular ta	rounded, fine		
			0000	-	to coarse in frequent co	udstone an obbles from	d quartz ric	h sandstone	e. Red bands	of clay and		
			000	- (0.80)								
		84.40	0000	2.60								
			0	- (0.40)	Firm red ve subrounded green disco (RAGLAN	olouration.			Gravel is ang casional cob	gular to bles. Grey /		
		84.00		3.00	(ICIOLAIN		. IL I ORIVI					
Boring Progress and	d W					Chiselling	g	Water	Added	GENE	RAI	-
Date Time Depth		Casin Depth L		Water Dpt	From	To	Hours	From	То	REMA		
		Span I	m. mm	Σpt						Backfilled with completion. No groundwate encountered. Side walls stabl	er	gs (
All dimensions in metres Scale 1:18.75	lient	Mr N	Caine		Meth		Hydraulie	a avanuat	OF.	Logged By DE	2	

Appendix C – Photograhic Record Trial Pit Photos





TP01



TP01 Arisings







TP01 Extended

TP01 Extended Photo 2





TP02 Arisings





SA01



SA01 Arisings





SA02 Arisings

Appendix C – Photograhic Record Site Walkover Photos



Photographic Record



Eastern Boundary



E15194 - Land adjacent to B4360, Cobnash, Leominster HR6 9RA.



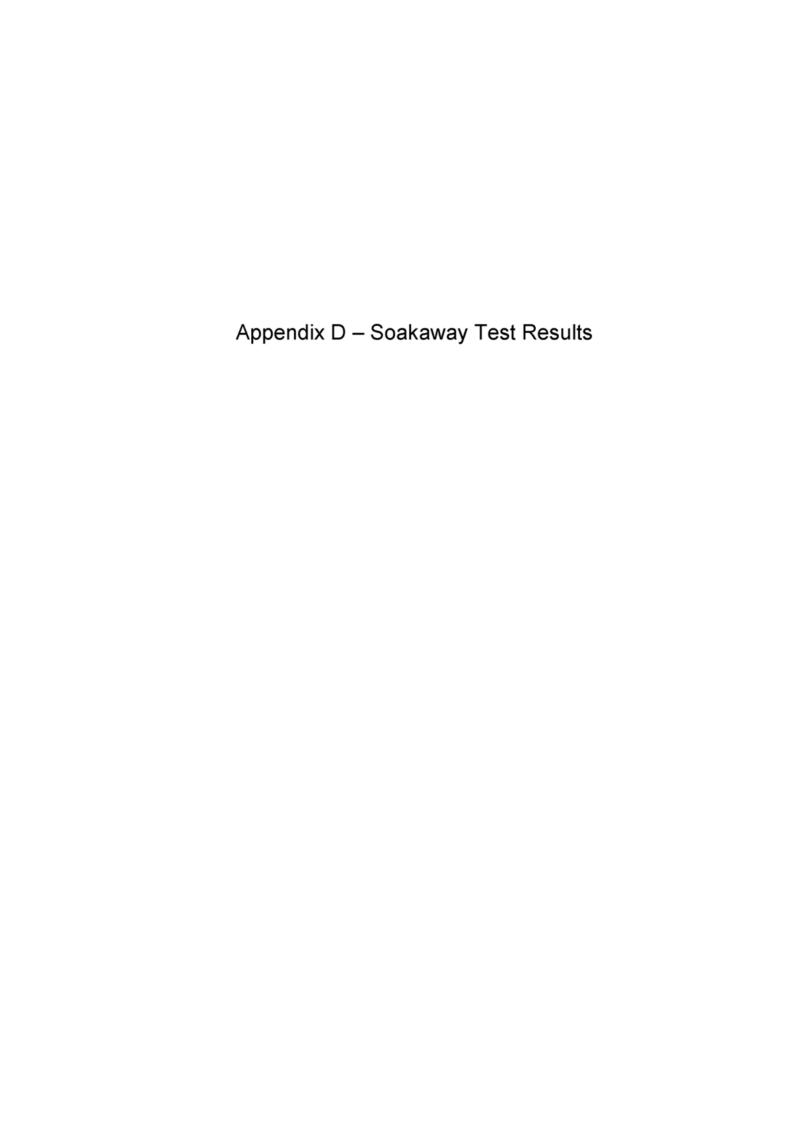




Southern Boundary

Western Boundary

E15194 - Land adjacent to B4360, Cobnash, Leominster HR6 9RA.





Percolation Test Result Sheet

Water level (mm below ground level)

> Project Name: Land adjacent B4360, Cobnash Soakaways Project Number: E15194

seconds) elapsed Time

Date of Test: 18/10/2019

210 8

1020 1320 2640 4020 5370

Test Location: SA01 Test 1

1.55 Depth of pit (m): Width of pit (m):

7440 10050 12030 13650 16050

> 0.35 Length of pit (m):

Depth 75% full

362 mm 25% full

Time 75% full to

131000 seconds 25% full 362 seconds/mm

 V_p = Time 75% full to 25% full / Depth 75% full to 25% full

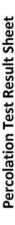
2.75954E-06 m/s

		000000	
		000521	
	-	0000SI	
	est	125000 (6	
	SA01 Test 1	Elapsed Time (second 1200000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 12000000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 120000 120000 120000 120000 120000 120000 1200000 120000 120000 1200000 1200000 1200000 1200000 1200000 1200000000	
	SA	000SZ	
		00005	
		000SZ	
		o [
		800	Water level (mm bgl)
			u i /i -i
827 828 833 840 841 847 853 859 869	878 884 886 886	100	

18330

520000 552000

Based on extrapolated data. The test did not reach the TP75 point during the duration of the test (5 hours 6 minutes).





Project Name: Land adjacent B4360, Cobnash Soakaways

Project Number: E15194

802

60

480 690 1680 3060 4440 6480

360

Water level (mm below

Time elapsed (seconds)

ground level)

824

842

887

933

963

Date of Test: 18/10/2019 Test Location: SA02 Test 1 Depth of pit (m): 1.30 Width of pit (m): 0.35 Length of pit (m): 1.30 Depth 75% full to 25% full 251 mm Time 75% full to 25% full 12350 seconds

49 seconds/mm

 V_p = Time 75% full to 25% full / Depth 75% full to 25% full

2.03E-05

m/s

 8970
 1,048

 11040
 1,090

 12540
 1,128

 15120
 1,177

 17550
 1,228

 18900
 1,258

SA02 Test 1

