



Soakage Test Report

Project Name: Land off Dappers Lane,
Angmering, BN16 4EN

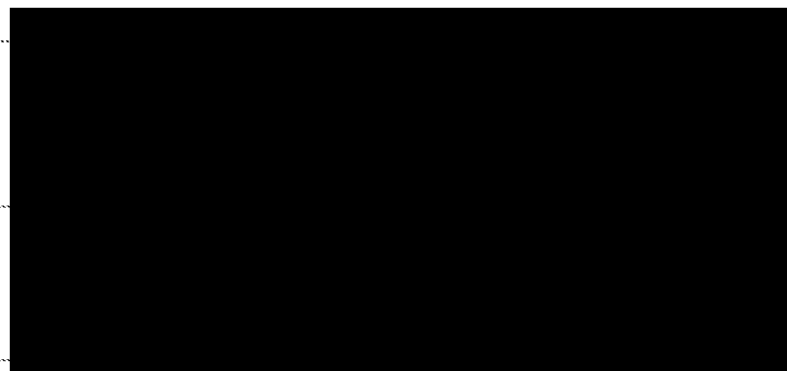
Client: Frontier Estates (Mering) Ltd.

Project ID: J14604

Report Date: 9 April 2021

Report Issue: 1

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Check / Review	C Lennard BEng (Hons)



For and on behalf of Southern Testing Laboratories Limited

DOCUMENT HISTORY AND STATUS

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in an email confirmation from Mr M Hayward, representing Fairhurst and on behalf of Frontier Estates (Mering) Ltd., dated 24th March 2021, in relation to our quotation ref. Q210542, also dated 24th March 2021.

2 Location

The site is located on the north eastern side of the junction of Water Lane and Dapper's Lane, to the east of the town of Angmering, West Sussex, as indicated on Figure 1 within Appendix A.

The approximate National Grid Reference of the site is TQ 07320, 04675.

3 Background & Objectives

It is proposed to construct a new care home, with its associated access road(s) and car parking areas. Information on the infiltration potential of underlying soils is required to facilitate surface-water drainage from the proposed development.

A soakage investigation has previously been conducted by STL and reported under a separate cover (ref. J14440 – dated 21st May 2020). Variable rates of infiltration were achieved during this investigation.

A series of groundwater monitoring wells were installed to facilitate a six month programme of groundwater monitoring. At the time of writing five months of the monitoring programme has been undertaken and will be reported under a separate cover once completed. It was requested by the client that an additional soakage investigation be carried out to ascertain the infiltration potential of soils at selected locations above the groundwater table, based on the shallowest depth to groundwater recorded during the monitoring programme.

4 Scope

This factual report presents our trial hole logs and soakage test results only. Contamination and other geotechnical issues are not considered in this report.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The site investigation has been completed with reference to BS 5930 [1].

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Frontier Estates (Mering) Ltd. and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

5 Geology

5.2.1 Head

S.1.2 London Clay

This formation is known to contain pyrite.

5.1.3 Lambeth Group

Clays within this group are known to contain pyrite.

5.1.4 Tarrant Chalk Member

5.2 UXO Risk Management

The CIRIA publication C681 Ref [3] has been developed to provide a consistent framework for the management of potential risks posed by UXO during site investigation and groundwork phases of construction. The process adopts a tiered approach, divided into four distinct stages; Preliminary risk assessment, Detailed risk assessment, Risk mitigation and Implementation.

6 General Site Description

The site, which is irregular in shape and extends to approximately 150m x 110m, currently comprises a series of areas of undeveloped land/ fields. The site boundaries on all four sides are defined by hedgerows/vegetation. The site is bounded to the west by Dapper's Lane, beyond which are residential properties. Water Lane is present to the south of the site, running approximately south west to north east. Similar fields/paddocks are present beyond the eastern site boundary. To the north of the site is a small industrial estate. The site is partially sub-divided by Herras fencing.

At the time of the investigation there were no structures present on site. Generally the site is split into three rough sections. The north western section of the site, where it is believed a residential house was previously present. The eastern section of the site, which comprises an open field and the southern section of the site, which comprises overgrown undeveloped land. The surrounding area is predominately residential, but includes some commercial/industrial structures.

On a regional scale, the topography of the local area generally slopes down gently towards the south. The overall topography of the site follows a similar trend to the regional topography. A number of landscaped bunds and depressions are present across the site, especially within the north eastern section of the site. An old excavation is present adjacent to part of the western site boundary.

Drainage ditches were noted along the southern boundary with Water Lane and along part of the western boundary with Dapper's Lane. A stream and a fishing pond are present to south of the site, on the opposite side of Water Lane.

The majority of the site is covered in grass/vegetation, with the southern section of the site overgrown with brambles. At the time of the investigation, a number of semi-mature to mature trees were present both on site and within the surrounding area, including Conifers, Oaks and Sycamores.

7 Strategy and Method

The strategy adopted for the intrusive investigation comprised the following:

Method	Purpose	Depth (bgl)	Installations / Notes
TP201 - TP204	Trial pits to investigate the shallow ground conditions and allow for assessment of soakage potential using the BRE365 method	0.8/ 1.8	BRE365 Soakage tests gravel filled.

The exploratory hole locations and depths were specified by the Clients engineer and were located adjacent to four of our existing groundwater monitoring wells set in the northern half of the site which were installed as part of an ongoing programme of groundwater monitoring (WLS101 to WLS104).

The exploratory hole locations are shown in Figure 2 in Appendix A.

In-situ test and sampling methods descriptions employed are given in Appendix B, together with the test results.

8 Weather Conditions

The fieldwork was carried out on Monday 29th and Tuesday 30th March 2021, at which time the weather was warm, with spells of sunshine.

Rainfall in the south/ south east of England during the Winter of 2020/21 was slightly higher than average when compared with long-term rainfall data for the period between 1981 and 2010.

Rainfall in south/ south east of England during March of 2021 was approximately 60% of the long-term average for the same period.

9 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), but in general comprised a covering of Topsoil over Head Gravel. Cohesive Head soils were encountered at one location. A summary is given below.

J14604 [Land off Dappers Lane, Angmering BN16 4EP]

ARUN DISTRICT COUNCIL A/21/021/DOC Page 6 of 6

Depth (m)	Thickness (m)	Soil Type	Description
GL to 0.2/ 0.4	0.2 to 0.4	Topsoil	Mid to dark brown gravelly slightly sandy silty CLAY, with occasional brick fragments.
0.4 to 0.7 (TP203 only)	0.3	Head	Firm mid to orange brown slightly gravelly sandy CLAY. Gravel comprises fine to medium angular flint.
0.2/ 0.7 to 1.8+	0.1 to 1.55+	Head Gravel	Mid to dark brown slightly sandy silty clayey GRAVEL, with medium cobble content. Gravel comprises fine to coarse angular to subangular flint. Cobble comprises flint.

10 Groundwater Observation

No groundwater was encountered within the soakage test pits excavated during this investigation.

The soakage test pits were sited adjacent to four previously installed groundwater monitoring wells. A programme of groundwater monitoring is ongoing within these wells and will be reported under a separate cover once completed. The shallowest depth to groundwater recorded within the wells during the monitoring is below the respective trial pit depth adjacent to each well location.

11 Soakaways

Soakage testing was carried out in four trial pits (TP201- TP204). Variable infiltration rates were achieved.

11.1 Soakage Test Results

The BRE paper DG365, Ref [4] describes a method for site testing to determine soil infiltration rates at the proposed site of a soakaway. The in-situ test method is described in Appendix B.

A total of 12 No. individual soakage tests were carried out within 4 No. trial pits excavated adjacent to existing groundwater monitoring wells, at the locations shown on the attached site plan Figure 2, Appendix A. The full results of the soakage tests are presented within Appendix B.

The DG365 Ref [4], states that each pit should be allowed to drain three times to near empty, with filling on the same or consecutive days.

The lowest recorded infiltration rate from each trial hole is summarised in the table below. The soakage rate in this report is expressed as l/m²/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m²/minute divided by 60,000.

Test ID	Test Depth (mbgl)	Design Infiltration Rate		Notes
		l/m ² /minute	m/sec	
TP201	1.78	8.31	1.38 x 10 ⁻⁴	Three tests carried out.
TP202	1.45	17.23	2.87 x 10 ⁻⁴	Three tests carried out.
TP203	0.80	4.74	7.90 x 10 ⁻⁵	Three tests carried out.
TP204	1.38	14.24	2.37 x 10 ⁻⁴	Three tests carried out.

Note: The Design Infiltration Rate is the lowest of the three tests

Water was discharged into the pits from a bowser via a 3" diameter pipe, with the raising of a head of water to 0.3m bgl attempted at each location. During all six tests in TP201 and TP202 it was not possible to discharge water into the pits at a sufficient rate to raise a head of water within the pits, given the relatively high rates of infiltration recorded at these locations.

11.2 General Guidance on Design of Soakaways

Any soakaway scheme may require the approval of the Environment Agency, Building Control and, where applicable, the adopting Highways Authority.

Soakaways are used to store the immediate surface water run-off from hard surfaced areas, such as roof or carparks, and allow for efficient infiltration into the adjacent soil. They should be designed to discharge their stored water sufficiently quickly to provide the necessary capacity to receive run-off from a subsequent storm. The time taken for discharge depends upon the soakaway shape and size, and the surrounding soil's infiltration characteristics.

Groundwater levels can vary considerably from season to season and year to year, often rising in wet or winter weather, and falling in periods of drought. As such, a high groundwater table may affect the storage capacity of soakaways. In addition, it should be noted that an unsaturated zone may be required between the base of soakaways and the groundwater table, by the Environment Agency. An ongoing programme of groundwater monitoring is ongoing. The findings of the monitoring programme will be reported under a separate cover upon completion.

The design of soakaways can be square, circular (conventional) or trench excavations, and may be rubble filled, perforated precast concrete ring units, plastic cells or any similar structure that collects rainwater and run-off and allow discharge directly into the ground. Depending on the geological conditions, and depth at which suitable infiltration is achieved, soakaways can also be deep bored.

Long-term maintenance and inspection must be considered during the design and construction process. Maintenance of silt traps, gully pots and interceptors will improve the long-term performance of soakaways. The use of wet well chambers within the soakaway system can further assist in pollutant trapping and extending the operating life of soakaways.

- [1] BSI Standards, "BS 5930 Code of practice for ground investigations," 2015.
- [2] CIRIA, "C681 Unexploded Ordnance (UXO) A guide for the construction industry," 2009.
- [3] The Highways Agency, "INTERIM ADVICE NOTE 73/06," 2009.
- [4] Building Research Establishment (BRE), "DG365 Soakaway Design," 2016.
- [5] BSI Standards, "BS EN ISO 22282-2:2012 Geotechnical investigation and testing. Geohydraulic testing. Water permeability tests in a borehole using open systems," 2012.
- [6] E. & V. H. Klyen, "Proceedings of Annual Transportation Convention; Using DCP soundings to optimize pavement rehabilitation.," *Report LS/83 Materials Branch, South Africa: Transvaal Roads Department.*, 1983.
- [7] Transport and Road Research Laboratory, "A user's manual for a program to analyse dynamic cone penetrometer data.," *Road Note 8*, 1990.
- [8] BSI Standards, "BS 5930 Code of practice for ground investigations," 2015.
- [9] BSI Standards, "BS 3882:2015 Specification for Topsoil," 2015.
- [10] CIRIA, "C574 Engineering in Chalk," 2002.
- [11] R. N. Mortimore, *Logging the Chalk*, 2014.
- [12] BSI Standards, "BS EN ISO 22475-1:2006 Geotechnical investigation and testing. Sampling methods and groundwater measurements. Technical principles for execution.," 2006.

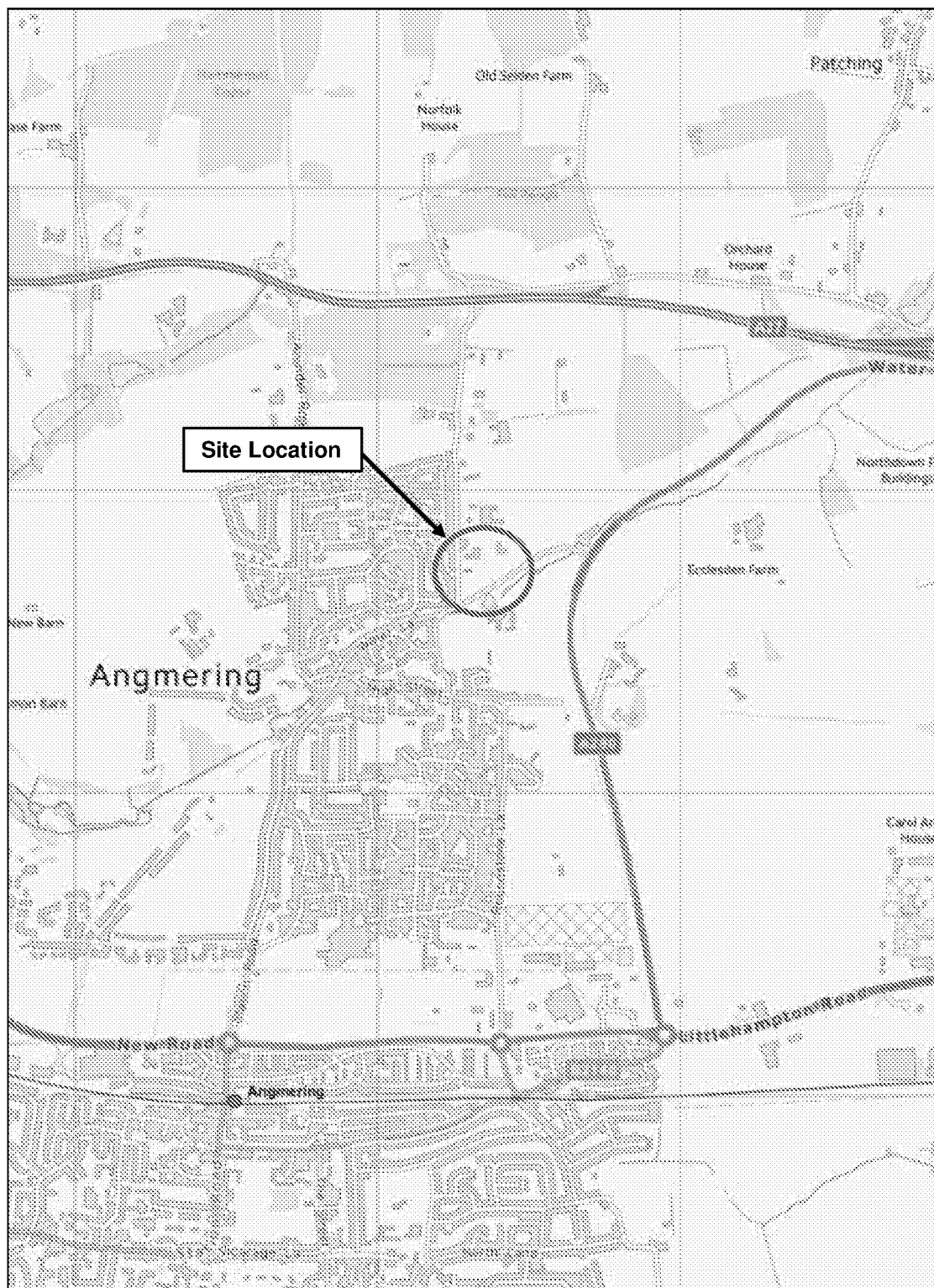


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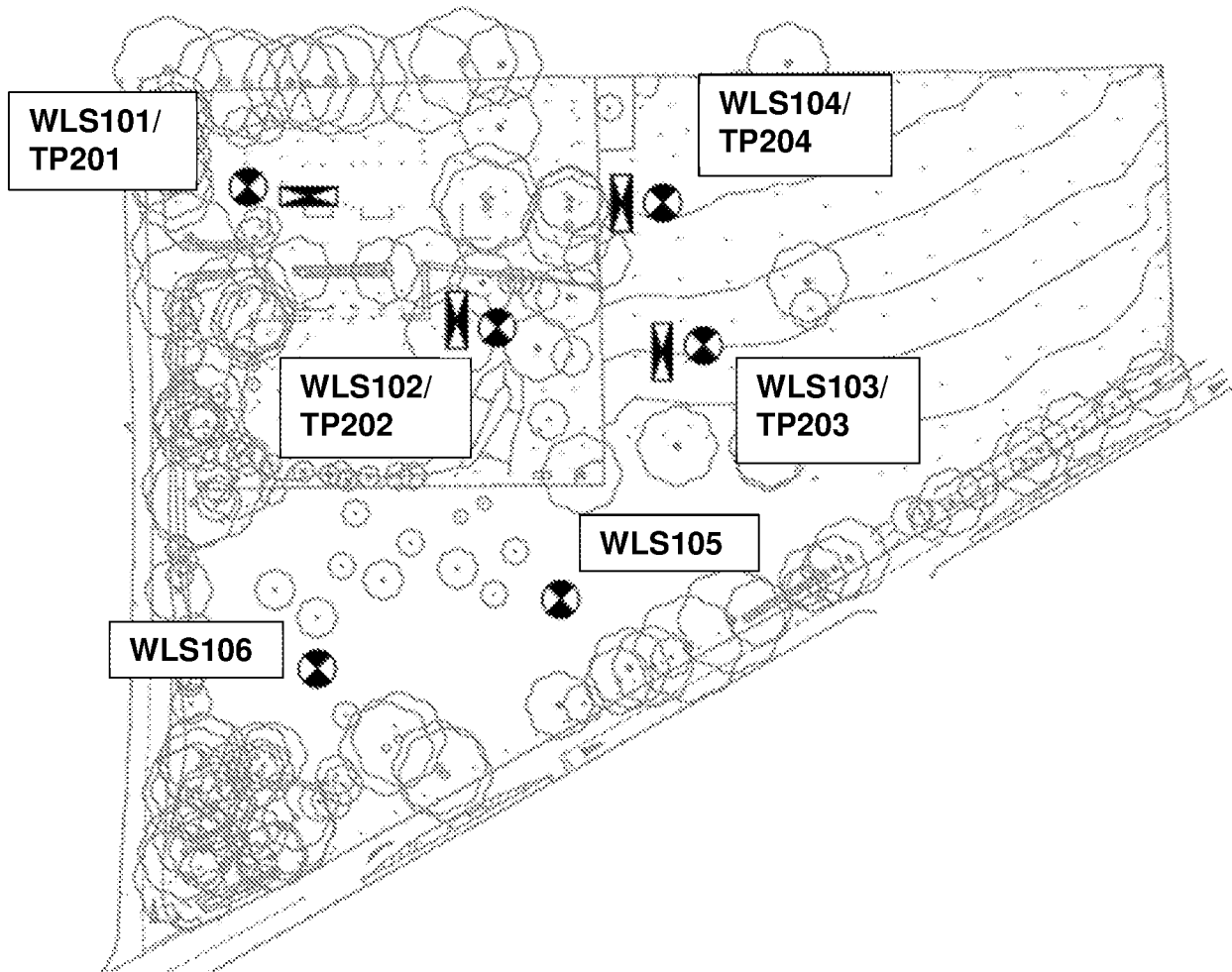
APPENDIX A

Site Plans & Exploratory Hole Logs



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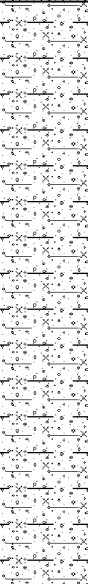
Site:	Land off Dappers Lane, Angmering, BN16 4EN	Project ID	J14604
Figure 1	Site Location Plan	Date:	08/04/2021



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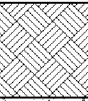
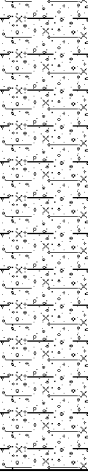
Site:	Land off Dappers Lane, Angmering, West Sussex, BN16 4EN	Project Id:	J14604
Figure 2	Site Location Plan	Date:	08/04/2020

				Start - End Date:		Project ID:	Machine Type:	TP201
				29/03/2021		J14604	5T	Sheet 1 of 1
Project Name:		Land off Dappers' Lane		Remarks:		Co-ordinates:		Level (m AOD):
Location:		Angmering, BN16 4EN		Soakage test conducted in pit in accordance with BRE 365. Pit filled with gravel prior to testing.		Logger:		JMW
Client:		Fairhurst						

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
1.20	B			(0.25)		0.25	Firm mid to dark brown slightly gravelly silty CLAY. Gravel comprises fine to medium subangular to angular flint. MADE GROUND	1
				(1.55)			Mid to dark brown slightly sandy silty clayey GRAVEL, with medium cobble content. Gravel comprises fine to coarse angular to subangular flint. Cobbles comprises angular flint. HEAD GRAVEL	
						1.80	Pit terminated at 1.80m.	
								2
								3
								4

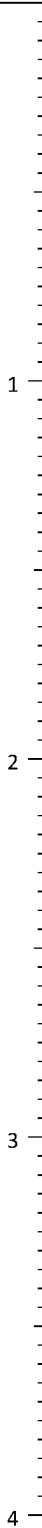
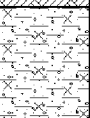
Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:	0.45	Side spalling 0.6m to 1.2m.			
Length:	1.80				
Depth:	1.80				

				Start - End Date:		Project ID:		Machine Type:		TP202	
				29/03/2021		J14604		5T		Sheet 1 of 1	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level (m AOD):		Logger:	
Location: Angmering, BN16 4EN				Soakage test conducted in pit in accordance with BRE 365. Pit filled with gravel prior to testing.							
Client: Fairhurst											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.90	B			(0.25)		0.25	Mid to dark brown slightly gravelly very sandy silty CLAY, with frequent fine to medium roots. Gravel comprises fine angular flint. MADE GROUND	1
				(1.25)		1.50	Mid to dark brown slightly sandy silty clayey GRAVEL, with medium cobble content. Gravel comprises fine to coarse angular to subangular flint. Cobbles comprises angular flint. HEAD GRAVEL	
				Pit terminated at 1.50m.			4	

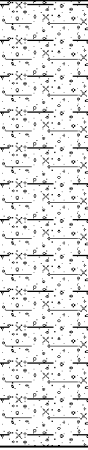
Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:	0.45	Side spalling 0.45m to 1.1m			
Length:	1.70				
Depth:	1.50				

 Southern Testing ST Consult				Start - End Date: 29/03/2021		Project ID: J14604		Machine Type: 5T		TP203 Sheet 1 of 1	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level (m AOD):		Logger: JMW	
Location: Angmering, BN16 4EN				Soakage test conducted in pit in accordance with BRE 365. Pit filled with gravel prior to testing.							
Client: Fairhurst											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.50	B			(0.40)		0.40	Mid brown gravelly slightly sandy slightly silty CLAY. Gravel comprises fine to medium angular flint and occasional red brick. MADE GROUND	
				(0.30)		0.70	Firm mid to orange brown slightly gravelly sandy CLAY. Gravel comprises fine to medium angular flint. HEAD	
0.75	BLK			(0.10)		0.80	Mid to dark brown and orange brown slightly sandy clayey GRAVEL. HEAD GRAVEL	
								Pit terminated at 0.80m.

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:	0.45	Stable			
Length:	1.50				
Depth:	0.80				

				Start - End Date: 29/03/2021		Project ID: J14604		Machine Type: 5T		TP204 Sheet 1 of 1	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level (m AOD):		Logger: JMWW	
Location: Angmering, BN16 4EN				Soakage test conducted in pit in accordance with BRE 365. Pit filled with gravel prior to testing.							
Client: Fairhurst											

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
1.00	B			(0.20)		0.20	Dark brown sandy silty CLAY, with abundant rootlets. MADE GROUND	1
				(1.18)		1.38	Mid to dark brown slightly sandy silty clayey GRAVEL, with medium cobble content. Gravel comprises fine to coarse angular to subangular flint. Cobbles comprises angular flint. HEAD GRAVEL	
							Pit terminated at 1.30m.	
								2
								3
								4

Pit Dimension (m)		Pit Stability:		Water Strikes:	
Width:	0.45	Stabe			
Length:	1.50				
Depth:	1.38				

Key to Exploratory Hole Logs, Plans and Sections

Backfill Symbols	Pipe Symbols	Principal Soil Types	Principal Rock Types	Drilling Records
Arisings	Plain Pipe	Topsoil	Mudstone	Water Strike
Concrete	Slotted Pipe	Made Ground	Claystone	Depth Water Rose
Blacktop	Piezometer	Clay	Siltstone	Total Core Recovery (%) [TCR]
Bentonite	Piezometer Tip	Silt	Sandstone	Solid Core Recovery (%) [SCR]
Gravel Filter	Filter Tip	Sand	Limestone	Rock Quality Index (%) [RQI]
Sand Filter	Extensometer	Gravel	Chalk	Fracture Index (fractures / m) [FI]
	Inclinometers	Peat		

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

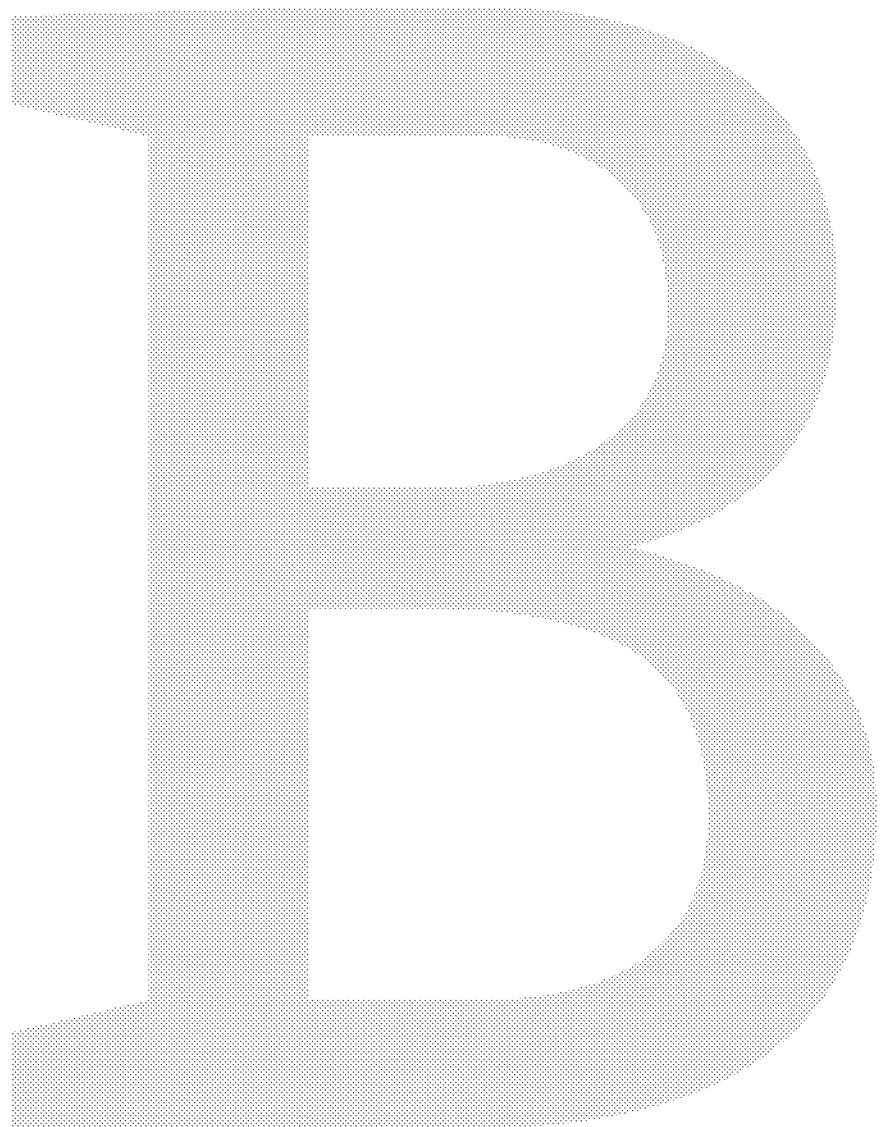
Location / Method Identifiers		In-situ Test Location / Method	
BH	Borehole (undefined)	DP	Dynamic Probe
CP	Cable Percussive	CPT	Cone Penetration Test
RC	Rotary Core	CBR	In-situ CBR Test
RO	Rotary Open Hole	DCP	CBR using Dynamic Cone Penetrometer
ODC	Rotary Odex/Symmetrix drilling cased	CBRT	CBR using TRL Probe
CP+RC	Cable Percussive to Rotary Core	PB	Plate Bearing Test
SNC	Sonic	SPT (S)	Standard Penetration Test (Split Barrel Sampler)
CFA	Continuous Flight Auger	SPT (C)	Standard Penetration Test (Solid Cone)
FA	Flight Auger	N	SPT Result
VC	Vibro Core	-/-	Blows/Penetration (mm) after seating drive
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core	-*/-	Total Blows / Penetration (mm)
WLS	Windowless Sampler	()	Extrapolated Value
WS	Window Sampler	PPT	Perth Penetration (In-House Method - Equivalent N Value)
HA	Hand Auger	HP / UCS	Strength from Hand Penetrometer (kN/m ²)
C	Road / Pavement Core	IVN	Strength from Hand Vane ((kN/m ²) P = peak, R = residual)
IP	Inspection Pit (Hand Excavation)	PID	Photo Ionisation Detector (ppm)
TP	Trial Pit (Machine Excavated)	MEXE	Mexi-Cone CBR (%)
OP	Observation Pit (Supported Excavation Hand or Machine)		

Samples / Test Type		Samples / Test Type	
B	Bulk Sample	SPTLS	Standard Penetration Test Split Barrel Sample
BLK	Block Sample	TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
C	Core Sample	U	Undisturbed Open Drive Sample (blows to take)
CBRS	CBR Mould Sample	UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
D	Small Disturbed Sample	W	Water Sample (Geotechnical)
ES	Environmental Sample (Soil)	SP	Sample from Stockpile
EW	Environmental Sample (Water)	P	Piston Sample
GS	Environmental Sample (Gas)	AMAL	Amalgamated Sample



APPENDIX B

In-Situ Test Methods and Results



Summary Sheet

Results of BRE Digest DG365 Soakage Tests

Site : Land off Dappers Lane, Angmering, BN16 4EN					Job No : J14604		
Client : Fairhurst					O S Reference :		
Tested By : DT				Engineer: JMW		Test Date :	
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>		Water Level at Finish of Test	Remarks
TP201	No 1	1.78	13.85	8.31	1.38E-4	Empty pit.	2200L used - 8 minutes 50 seconds to fill Depth to top of permeable soils was 0.2m.
TP201	No 2	1.78	10.96			Empty pit.	2200L used - 4 minutes 28 seconds to fill
TP201	No 3	1.78	8.31			Empty pit.	2200L used - 4 minutes 17 seconds to fill
TP202	No 1	1.45	27.75	17.23	2.87E-4	Empty pit.	1200L used - 2 minutes 57 seconds to fill Depth to top of permeable soils was 0.2m.
TP202	No 2	1.45	19.27			Empty pit.	1200L used - 4 minutes 20 seconds to fill
TP202	No 3	1.45	17.23			Empty pit.	1200L used - 4 minutes 20 seconds to fill
TP203	No 1	0.80	9.41	4.74	7.90E-5	Empty pit.	1000L used - 35 seconds to fill Depth to top of permeable soils was 0.2m.
TP203	No 2	0.80	7.16			Empty pit.	1000L used - 40 seconds to fill
TP203	No 3	0.80	4.74			Empty pit.	1000L used - 27 seconds to fill
TP204	No 1	1.38	21.73	14.24	2.37E-4	Empty pit.	500L used - 1 minute 2 seconds to fill Depth to top of permeable soils was 0.2m.

Summary Sheet

Results of BRE Digest DG365 Soakage Tests

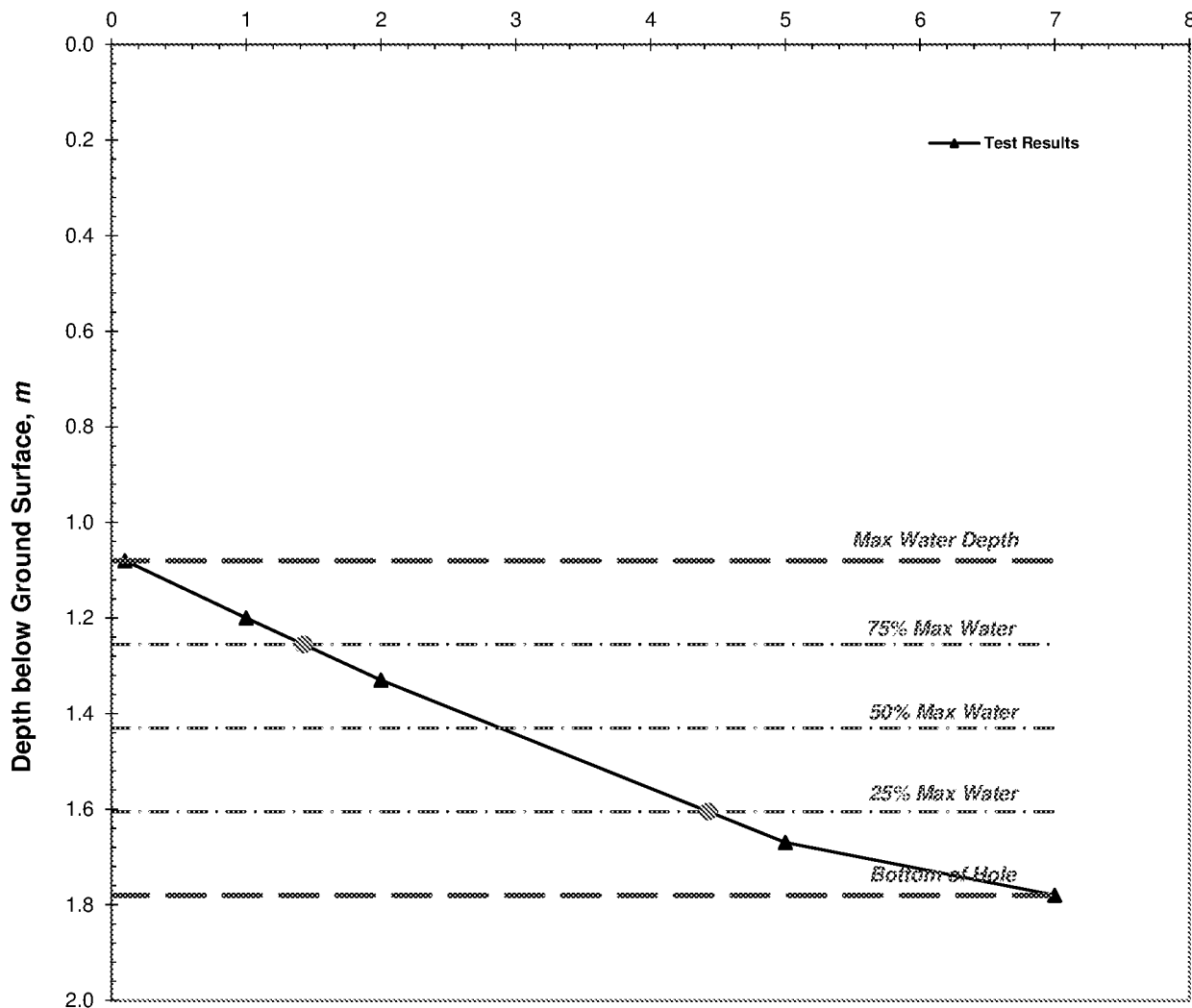
Site : Land off Dappers Lane, Angmering, BN16 4EN				Job No : J14604		
Client : Fairhurst				O S Reference :		
Tested By : DT			Engineer: JMW		Test Date :	
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>	Water Level at Finish of Test	Remarks
TP204	No 2	1.38	19.38		Empty pit.	400L used - 57 seconds to fill
TP204	No 3	1.38	14.24		Empty pit.	300L used - 50 seconds to fill
Mean Value of All Calculated Soakage Rates :				11.13 <i>litre/m²/min</i>	1.85E-4 <i>m/sec</i>	

BRE Digest DG365 Soakage Test

Test Hole No: TP201

Test No: Test No 1 (Initial)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.800	Depth to Water at Start of Test, m	1.080
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.700
Depth to Pit Base, m	1.780	Total Soakage Test Time, min	7.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	2.385
Depth to Groundwater Surface, m		Discharge Rate, litre/min	33.038
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	13.85
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	2.31E-04

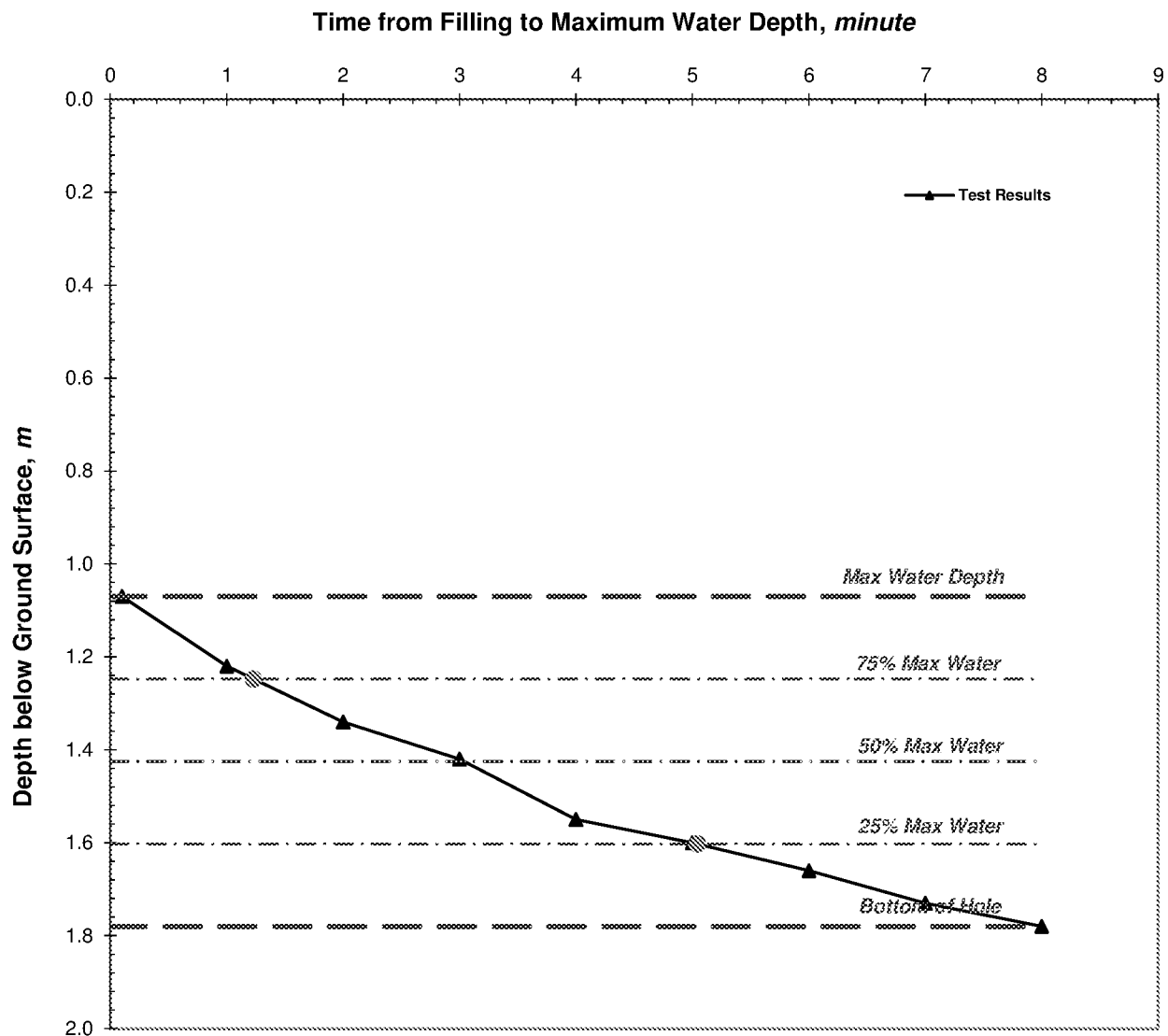
Comments: 2200L used - 8 minutes 50 seconds to fill
Pit was emptied at finish of test.

Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S1

BRE Digest DG365 Soakage Test

Test Hole No: TP201

Test No: Test No 2 (Repeated)



Pit Length, m	1.800	Depth to Water at Start of Test, m	1.070
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.710
Depth to Pit Base, m	1.780	Total Soakage Test Time, min	8.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	2.408
Depth to Groundwater Surface, m		Discharge Rate, litre/min	26.398
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	10.96
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	1.83E-04

Comments: 2200L used - 4 minutes 28 seconds to fill
Pit was emptied at finish of test.

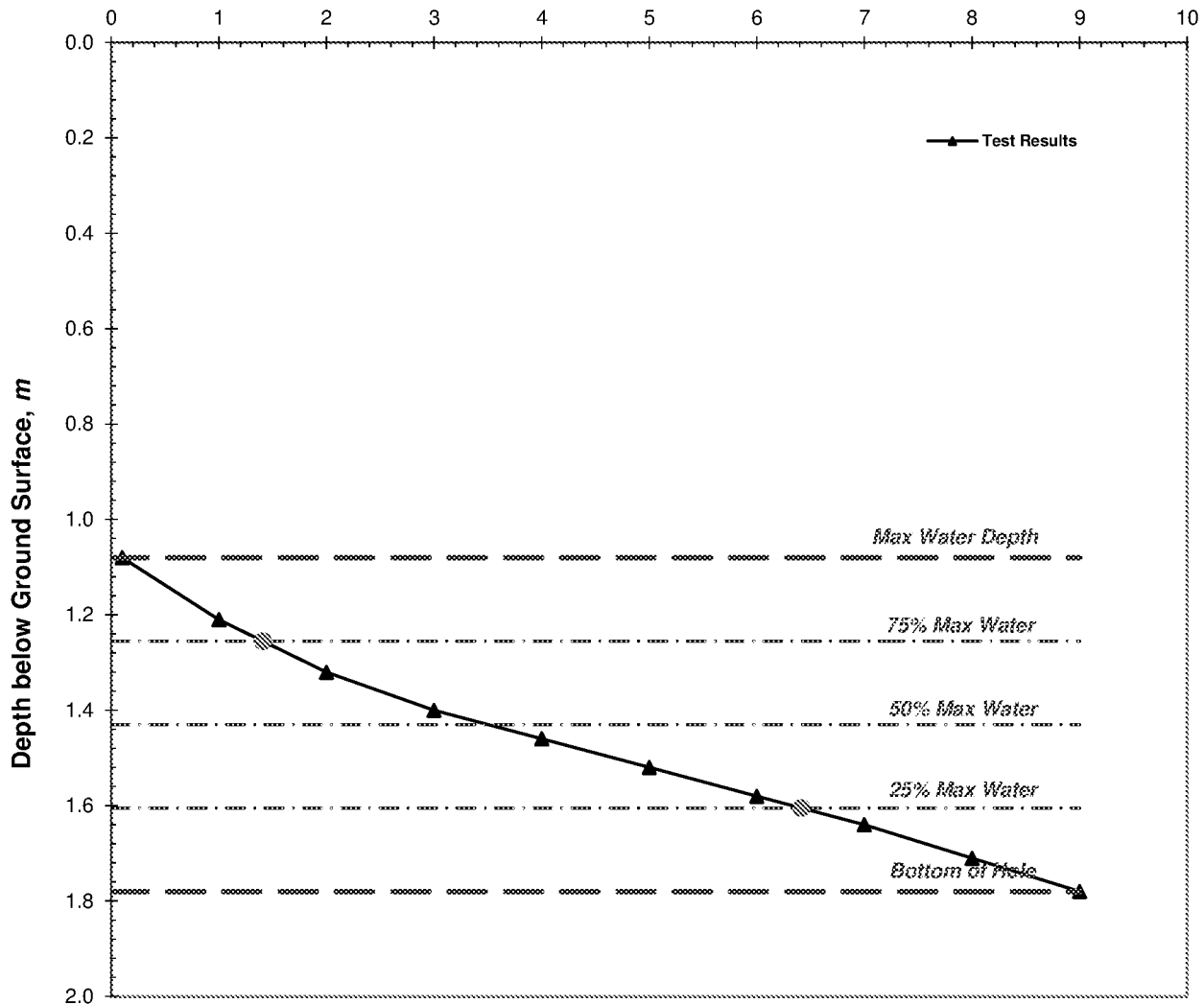
Client: Fairhurst	Job No: J14604	Test Date: 30/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S2

BRE Digest DG365 Soakage Test

Test Hole No: TP201

Test No: Test No 3 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.800	Depth to Water at Start of Test, m	1.080
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.700
Depth to Pit Base, m	1.780	Total Soakage Test Time, min	9.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	2.385
Depth to Groundwater Surface, m		Discharge Rate, litre/min	19.815
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	8.31
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	1.38E-04

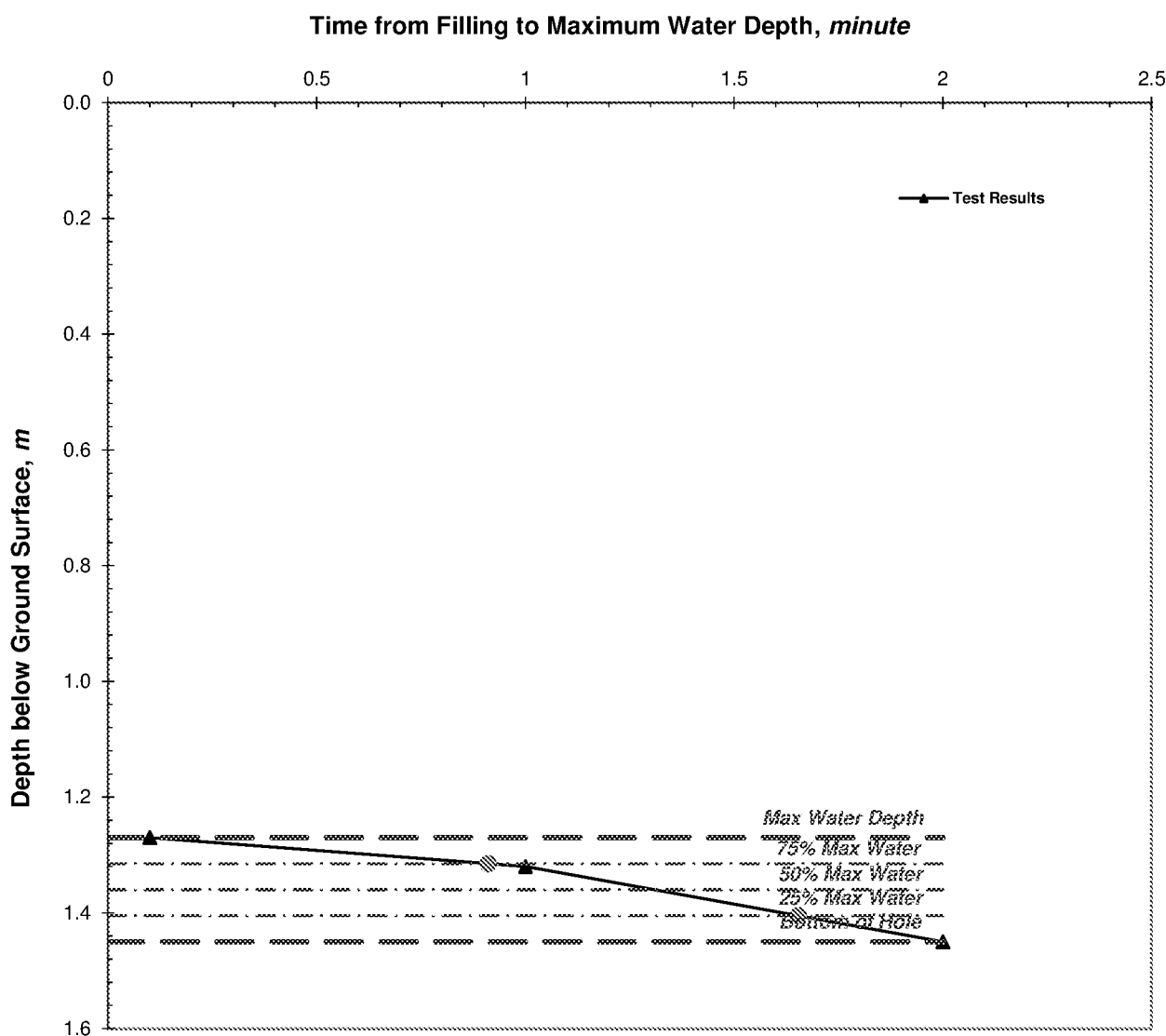
Comments: 2200L used - 4 minutes 17 seconds to fill
Pit was emptied at finish of test.

Client: Fairhurst	Job No: J14604	Test Date: 30/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S3

BRE Digest DG365 Soakage Test

Test Hole No: TP202

Test No: Test No 1 (Initial)



Pit Length, m	1.700	Depth to Water at Start of Test, m	1.270
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.180
Depth to Pit Base, m	1.450	Total Soakage Test Time, min	2.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	1.152
Depth to Groundwater Surface, m		Discharge Rate, litre/min	31.966
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	27.75
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	4.62E-04

Comments: 1200L used - 2 minutes 57 seconds to fill
Pit was emptied at finish of test.

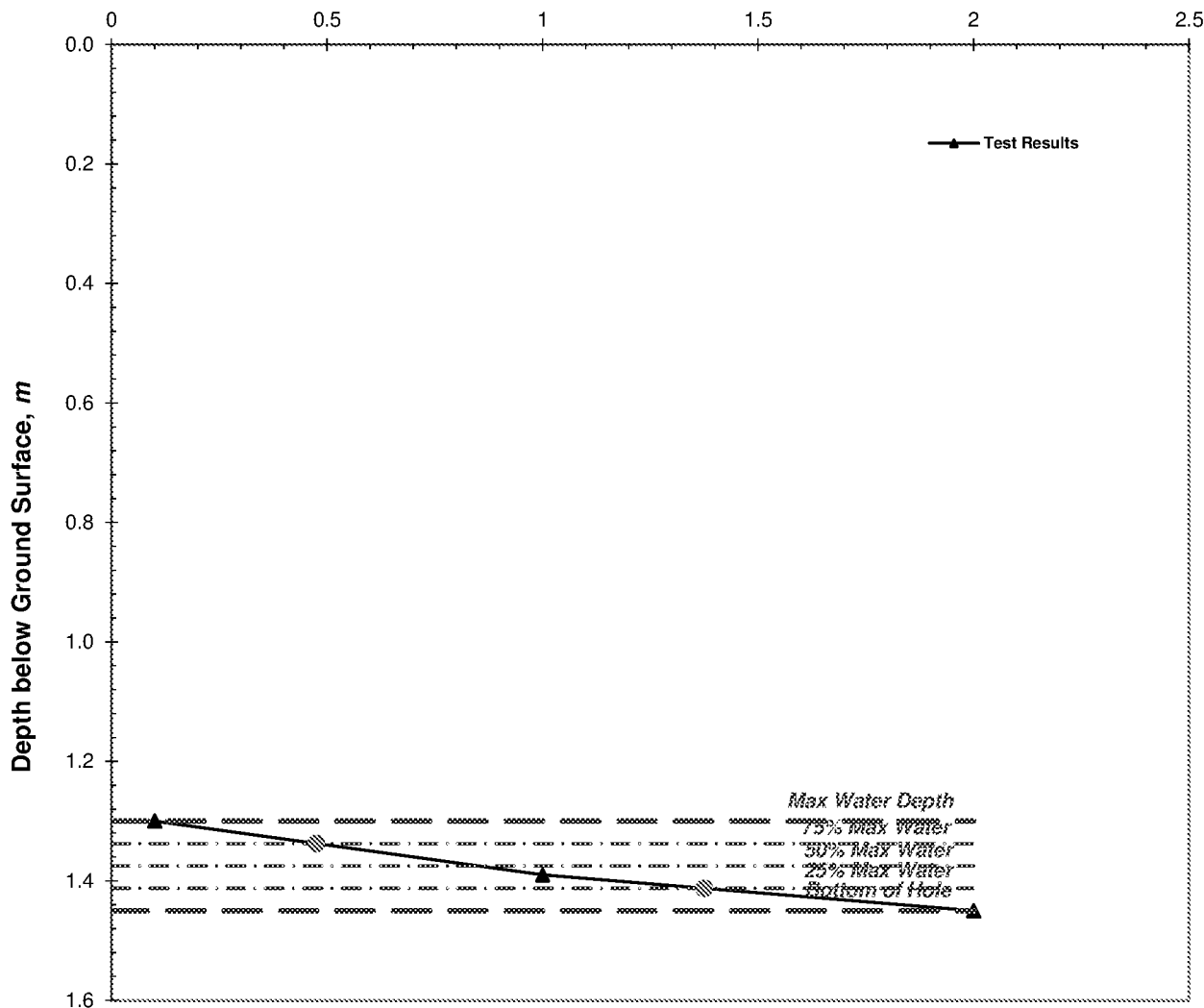
Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW Fig. S4

BRE Digest DG365 Soakage Test

Test Hole No: TP202

Test No: Test No 2 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.700	Depth to Water at Start of Test, m	1.300
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.150
Depth to Pit Base, m	1.450	Total Soakage Test Time, min	2.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	1.088
Depth to Groundwater Surface, m		Discharge Rate, litre/min	20.954
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	19.27
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	3.21E-04

Comments: 1200L used - 4 minutes 20 seconds to fill
Pit was emptied at finish of test.

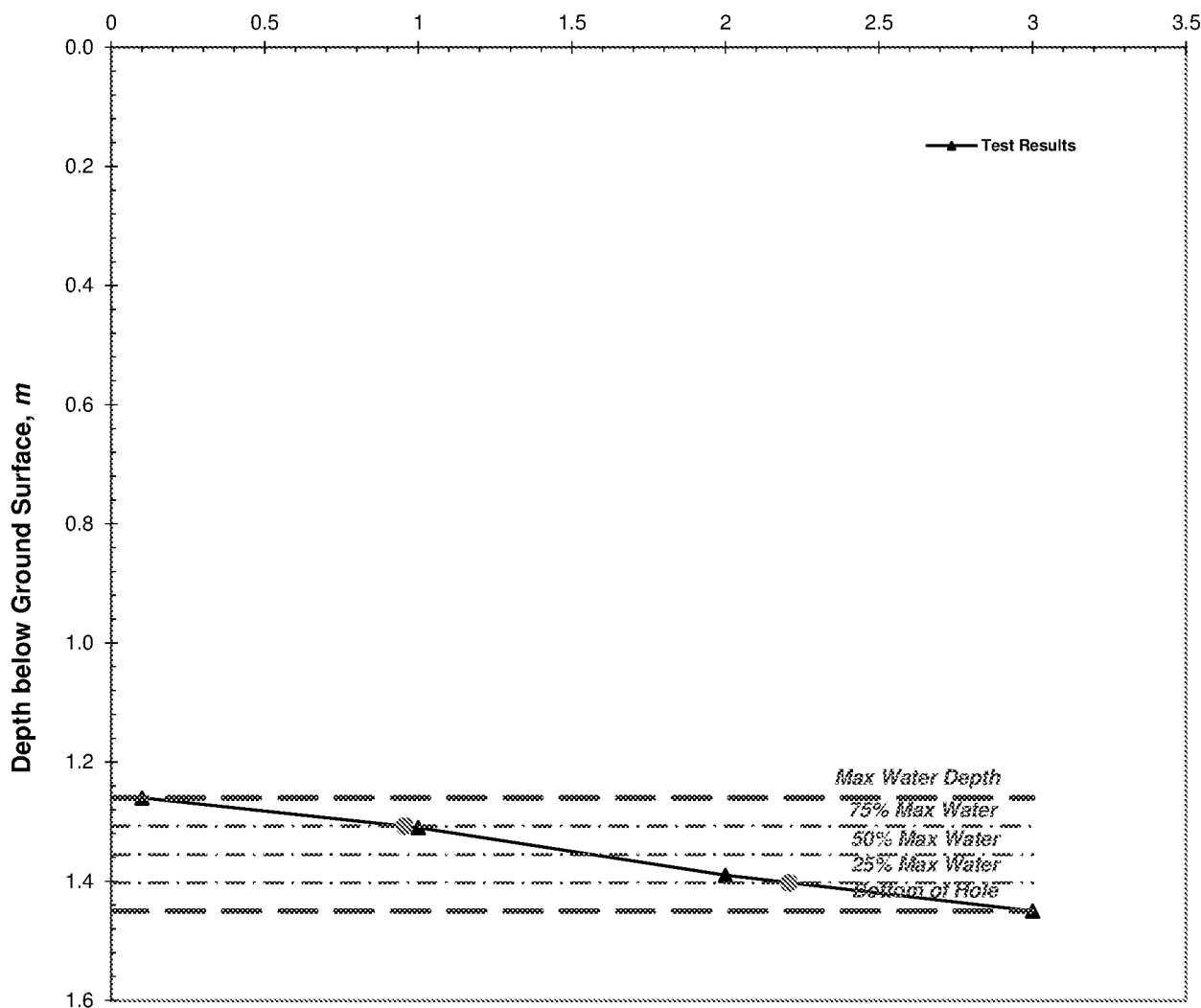
Client: Fairhurst	Job No: J14604	Test Date: 30/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S5

BRE Digest DG365 Soakage Test

Test Hole No: TP202

Test No: Test No 3 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.700	Depth to Water at Start of Test, m	1.260
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.190
Depth to Pit Base, m	1.450	Total Soakage Test Time, min	3.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	1.174
Depth to Groundwater Surface, m		Discharge Rate, litre/min	20.214
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	17.23
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	2.87E-04

Comments: 1200L used - 4 minutes 20 seconds to fill
Pit was emptied at finish of test.

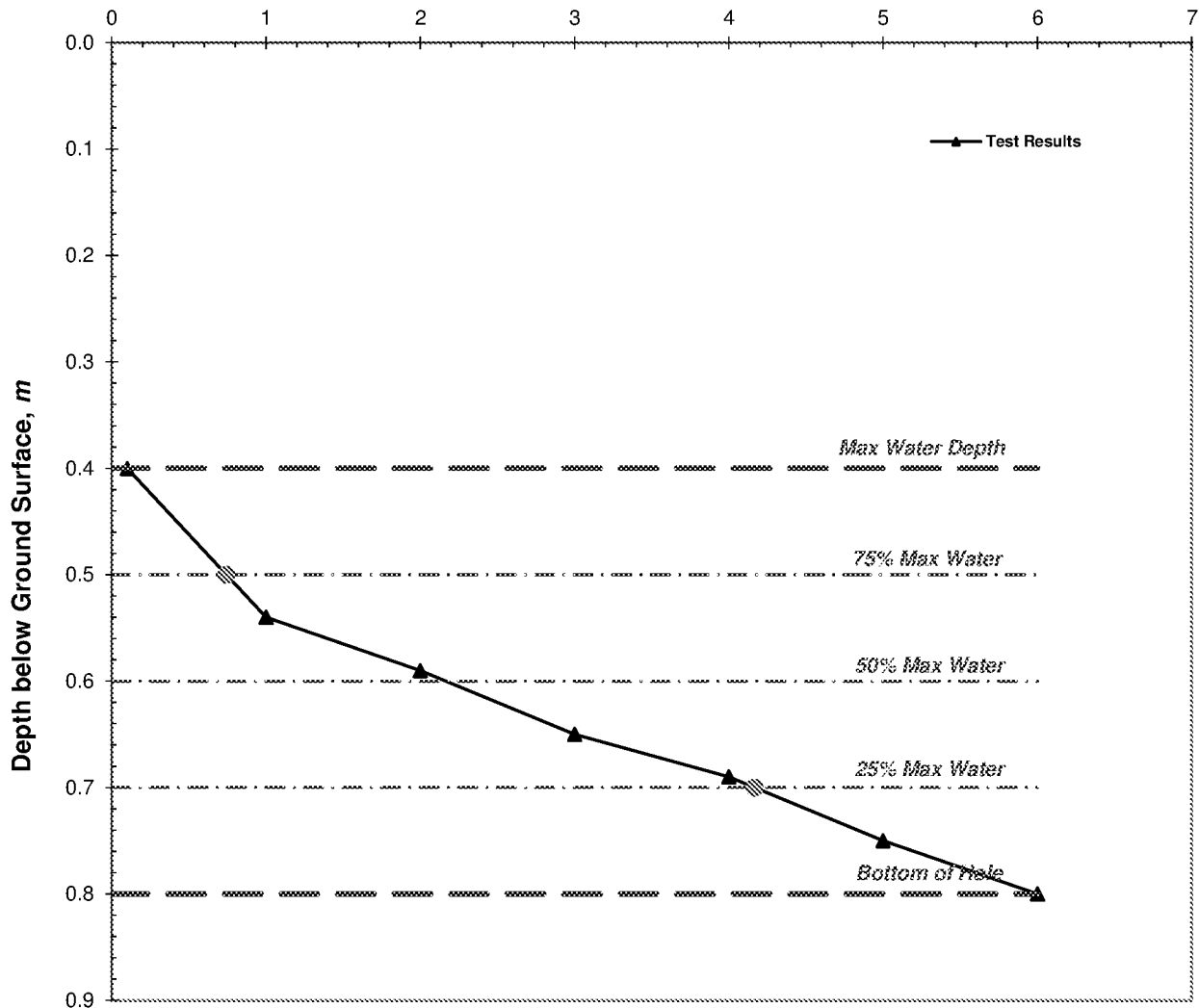
Client: Fairhurst	Job No: J14604	Test Date: 30/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S6

BRE Digest DG365 Soakage Test

Test Hole No: TP203

Test No: Test No 1 (Initial)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, <i>m</i>	1.500	Depth to Water at Start of Test, <i>m</i>	0.400
Pit Width, <i>m</i>	0.450	Max Water Dropdown during Test, <i>m</i>	0.400
Depth to Pit Base, <i>m</i>	0.800	Total Soakage Test Time, <i>min</i>	6.0
Depth to Top of Permeable Soils, <i>m</i>	0.200	Mean Internal Discharge Area, <i>m</i> ²	1.455
Depth to Groundwater Surface, <i>m</i>		Discharge Rate, <i>litre/min</i>	13.686
Depth to Top of Granular Fill, <i>m</i>	0.200	Soakage Rate, <i>litre/m</i> ² / <i>min</i>	9.41
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, <i>m/sec</i>	1.57E-04

Comments: 1000L used - 35 seconds to fill
Pit was emptied at finish of test.

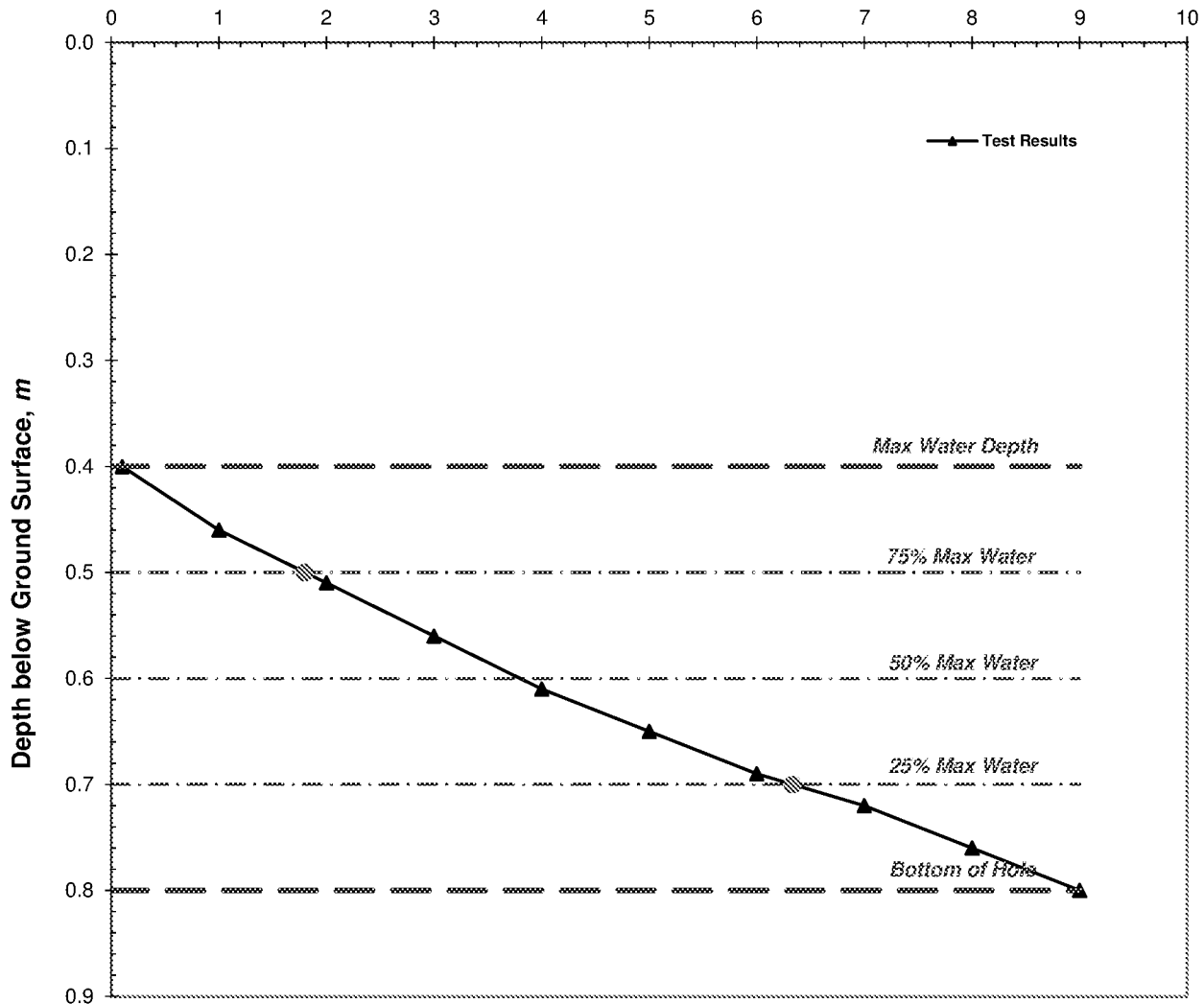
Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S7

BRE Digest DG365 Soakage Test

Test Hole No: TP203

Test No: Test No 2 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.500	Depth to Water at Start of Test, m	0.400
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.400
Depth to Pit Base, m	0.800	Total Soakage Test Time, min	9.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	1.455
Depth to Groundwater Surface, m		Discharge Rate, litre/min	10.423
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	7.16
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	1.19E-04

Comments: 1000L used - 40 seconds to fill
Pit was emptied at finish of test.

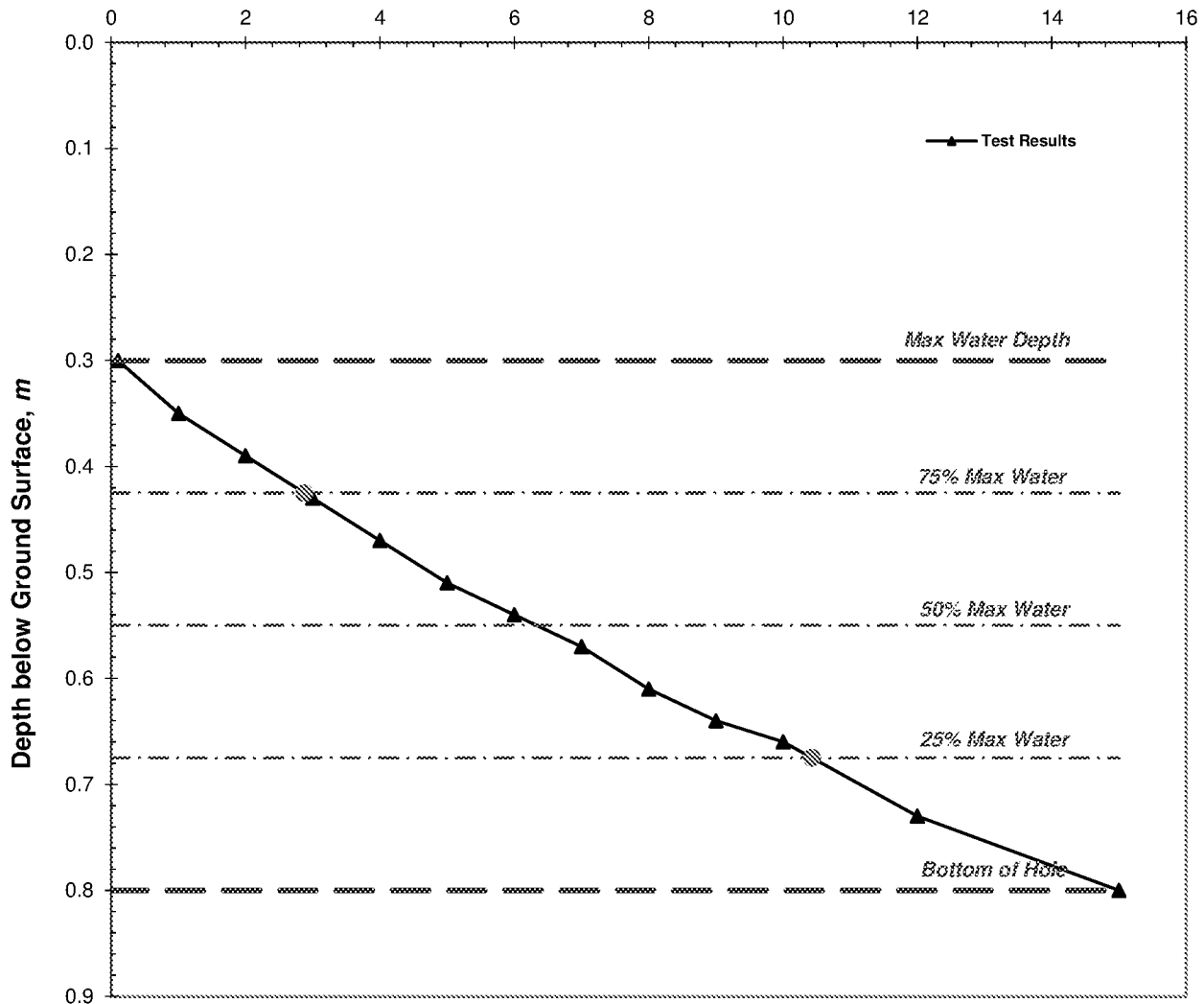
Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S8

BRE Digest DG365 Soakage Test

Test Hole No: TP203

Test No: Test No 3 (Repeated)

Time from Filling to Maximum Water Depth, minute



Pit Length, m	1.500	Depth to Water at Start of Test, m	0.300
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.500
Depth to Pit Base, m	0.800	Total Soakage Test Time, min	15.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	1.650
Depth to Groundwater Surface, m		Discharge Rate, litre/min	7.819
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	4.74
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	7.90E-05

Comments: 1000L used - 27 seconds to fill
Pit was emptied at finish of test.

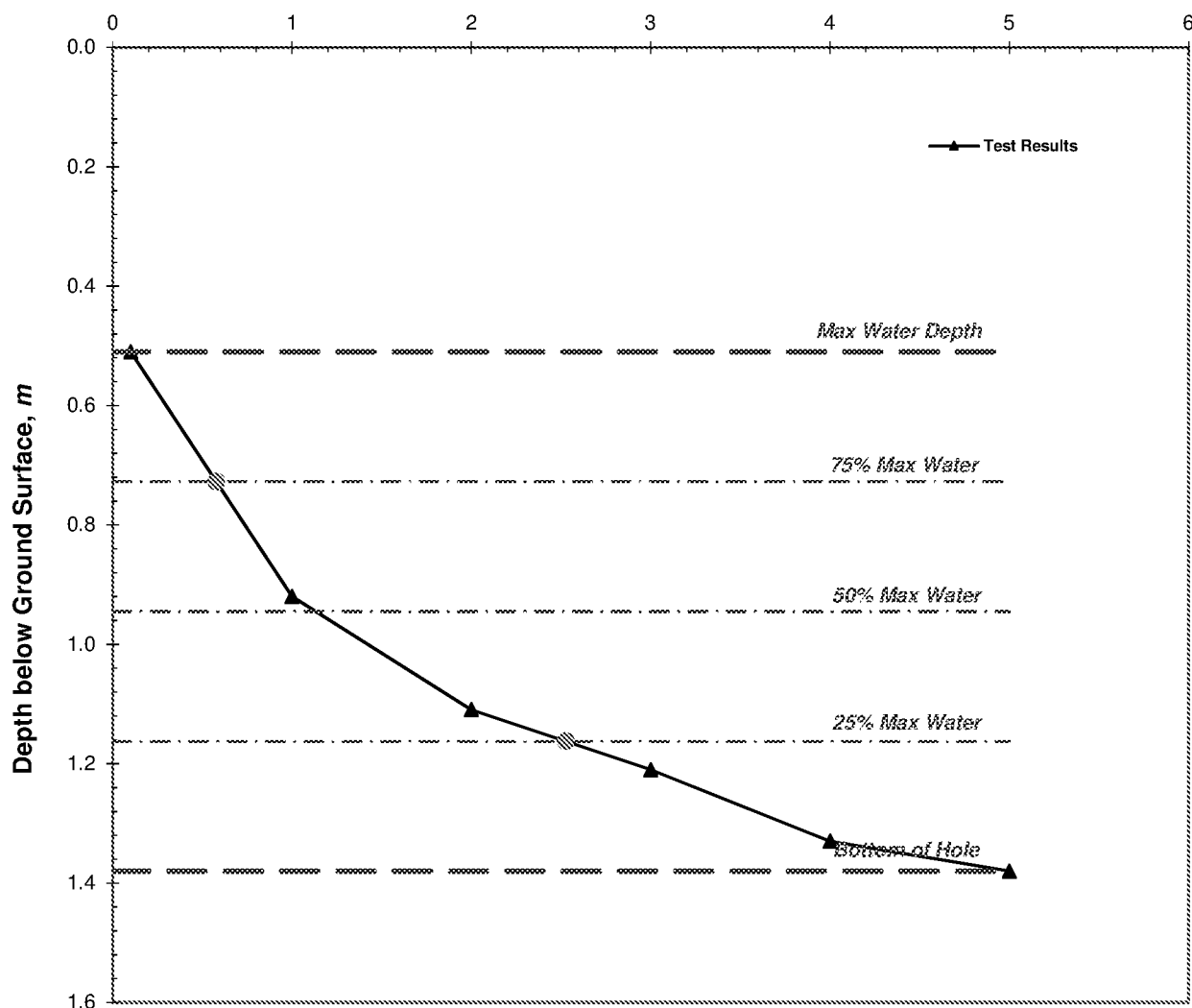
Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW Fig. S9

BRE Digest DG365 Soakage Test

Test Hole No: TP204

Test No: Test No 1 (Initial)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.500	Depth to Water at Start of Test, m	0.510
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.870
Depth to Pit Base, m	1.380	Total Soakage Test Time, min	5.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	2.372
Depth to Groundwater Surface, m		Discharge Rate, litre/min	51.526
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	21.73
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	3.62E-04

Comments: 500L used - 1 minute 2 seconds to fill
Pit was emptied at finish of test.

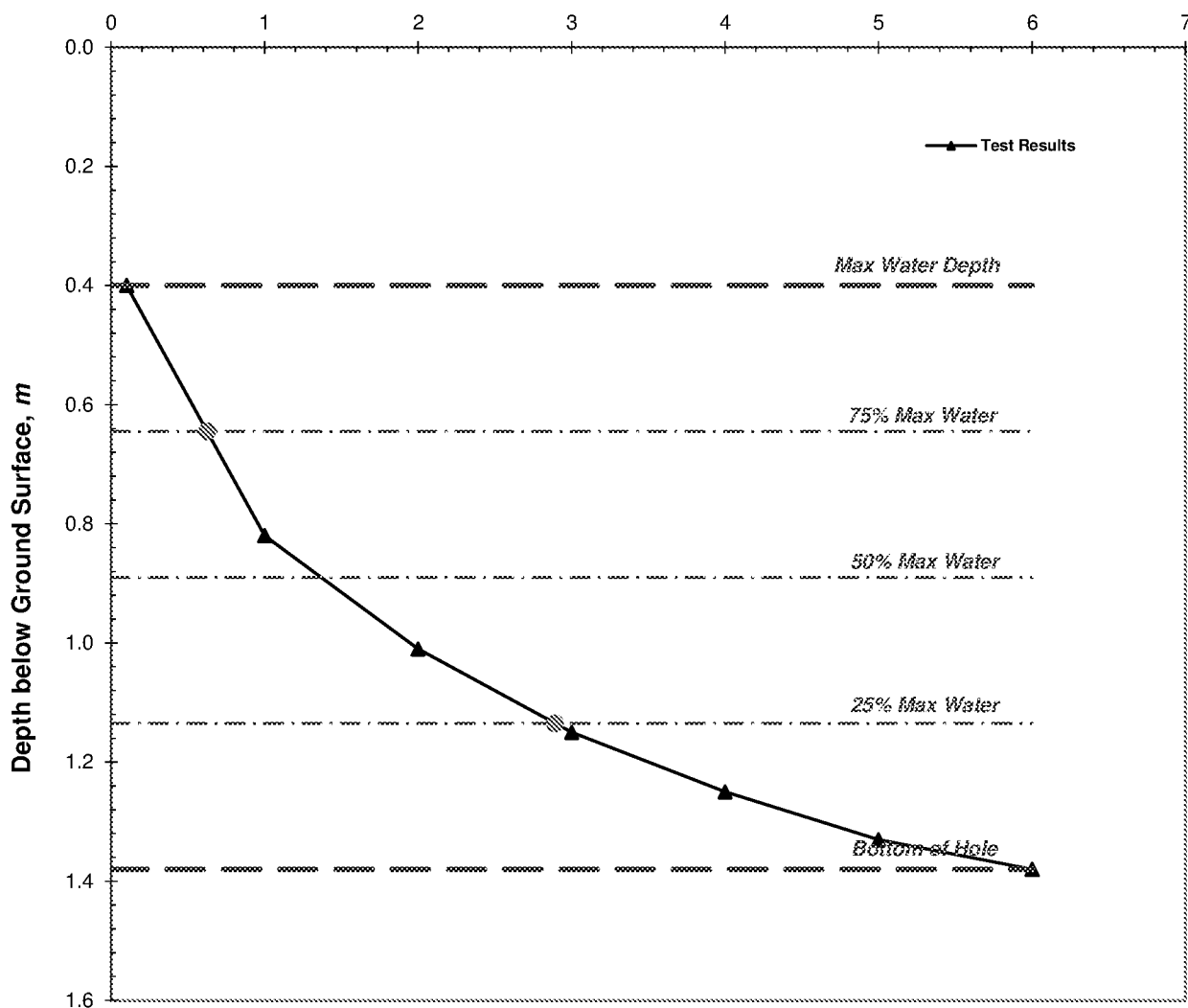
Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S10

BRE Digest DG365 Soakage Test

Test Hole No: TP204

Test No: Test No 2 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.500	Depth to Water at Start of Test, m	0.400
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.980
Depth to Pit Base, m	1.380	Total Soakage Test Time, min	6.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	2.586
Depth to Groundwater Surface, m		Discharge Rate, litre/min	50.124
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	19.38
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	3.23E-04

Comments: 400L used - 57 seconds to fill
Pit was emptied at finish of test.

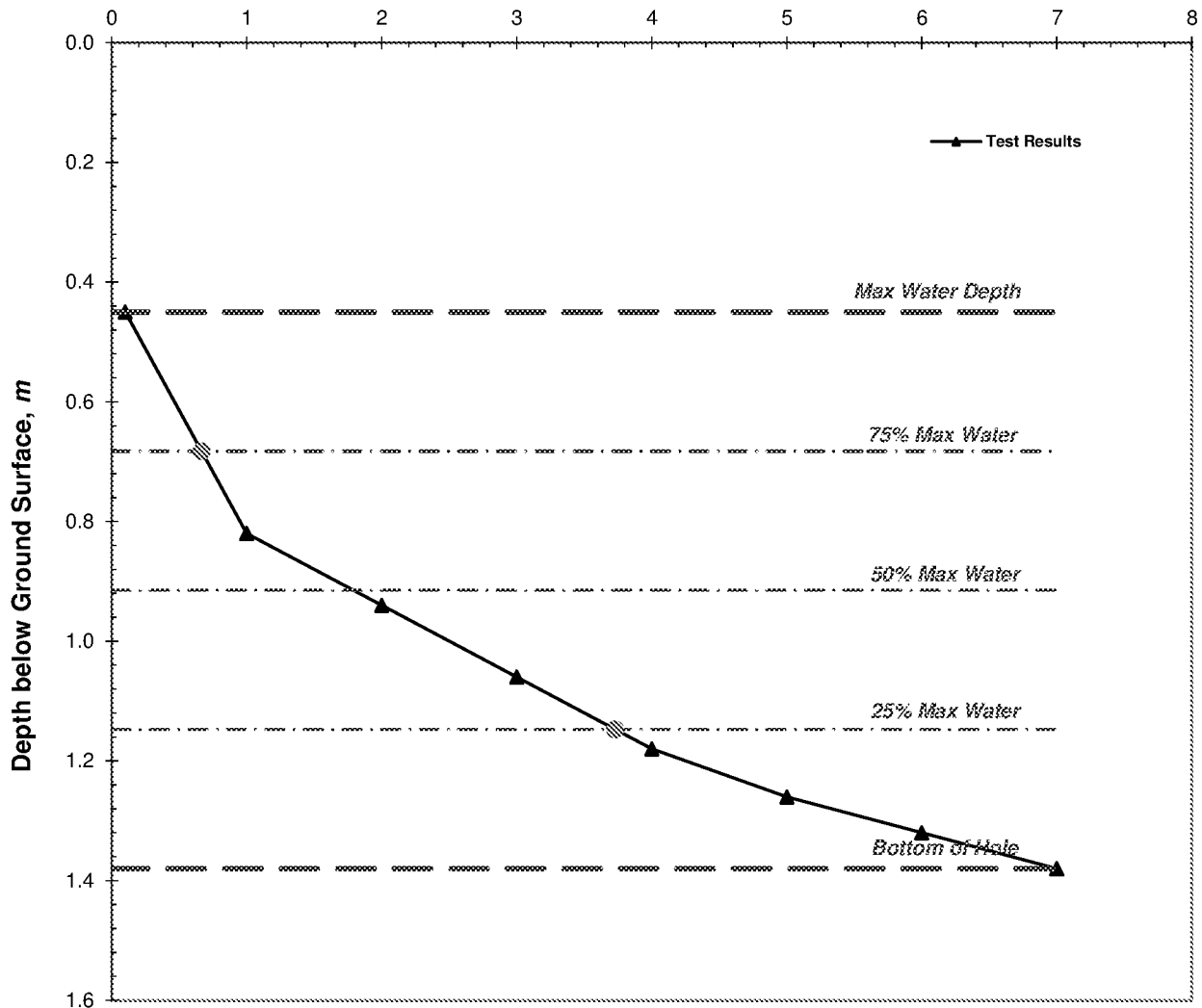
Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S11

BRE Digest DG365 Soakage Test

Test Hole No: TP204

Test No: Test No 3 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.500	Depth to Water at Start of Test, m	0.450
Pit Width, m	0.450	Max Water Dropdown during Test, m	0.930
Depth to Pit Base, m	1.380	Total Soakage Test Time, min	7.0
Depth to Top of Permeable Soils, m	0.200	Mean Internal Discharge Area, m ²	2.489
Depth to Groundwater Surface, m		Discharge Rate, litre/min	35.428
Depth to Top of Granular Fill, m	0.200	Soakage Rate, litre/m ² /min	14.24
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, m/sec	2.37E-04

Comments: 300L used - 50 seconds to fill
Pit was emptied at finish of test.

Client: Fairhurst	Job No: J14604	Test Date: 29/Mar/2021
Site: Land off Dappers Lane, Angmering, BN16 4	Tested By: DT	Engineer: JMW
		Fig. S12

Soil and Rock Descriptions

All soil and rock descriptions are in general accordance with BS5930 Ref [8].

Anthropogenic soils ('made ground' or 'fill') describe materials which have been placed by man and can be divided into those composed of reworked natural soils and those composed of or containing man-made materials. 'Fill' is used to describe material placed in a controlled manner and 'made ground' is used to describe materials placed without strict engineering control.

The classification of materials such as topsoil is based on visual description only and should not be interpreted to mean that the material complies with criteria used in BS 3882 Ref [5].

Chalk descriptions are based on CIRIA C574 Ref [6] and Mortimore Ref [7].

The geology code is only provided on logs where a positive identification of the sample strata has been made.

Trial Pits and Trenches

Trial pits and trenches are unsupported excavations, mechanically excavated by machine to the required depth to enable visual examination, in situ testing and sampling as required from outside the excavation.

Disturbed Samples

Disturbed samples were taken from exploratory holes in general accordance with BS 5930 [8] and BS EN ISO 22475-1 Ref [8] as required and stored in appropriately labelled containers. Details of the type, size and depth of sample will be recorded within the exploratory hole record. Such samples can be regarded as being between Class 5 up to Class 3 quality depending upon their method of sampling.

Groundwater Monitoring – Dip Meter

The dip meter is used to measure standing water levels within boreholes. The probe is lowered into the borehole until the meter detects the groundwater with an audible 'beep'. The level is then read from the tape.

Soakage Tests (after BRE DG365 2016)

The BRE DG365 Ref [4] paper on soakaway design allows for the design of trench soakaways as well as traditional square and circular soakaways.

The test to measure the soil infiltration rate is carried out in pits which are excavated to the full depth of the proposed soakaway. The trial pits are filled and allowed to drain to empty or near empty, three times, on the same day or on consecutive days. Water levels are recorded against time. Where the sides are unstable the pit should be filled with granular material to provide stability during the test.

Calculated soakage rates are expressed as l/m²/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m²/minute divided by 60,000.



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Environmental & Geotechnical

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