Mayflower Way
Angmering

Site Investigations & Infiltration Testing

Prepared by:
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KNC2101/SI-A

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Appendix A

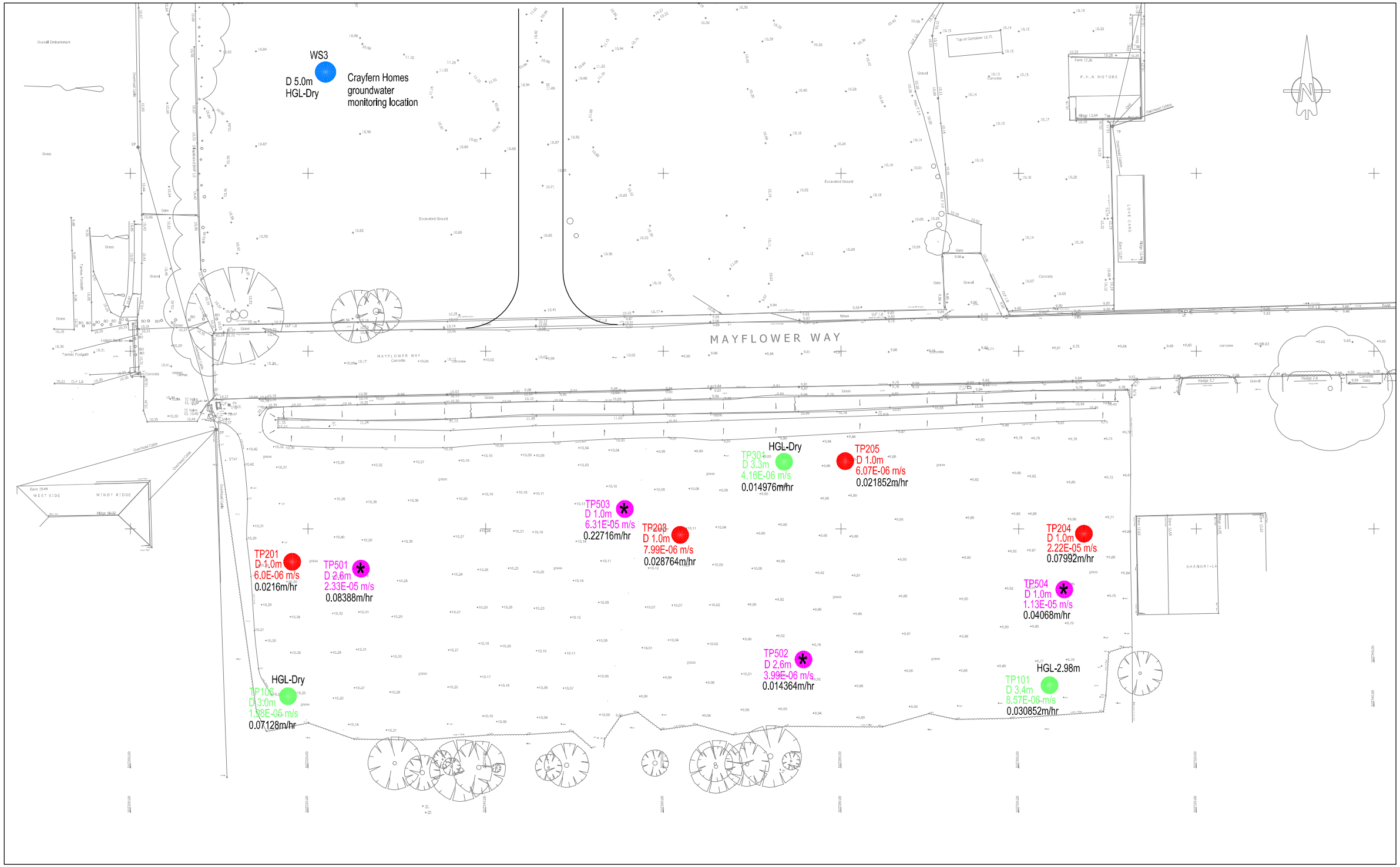
Test Locations & Groundwater Monitoring

ARUN DISTRICT COUNCIL A/55/21/DOC

Appendix B

April 2018 Infiltration Tests Report

ARUN DISTRICT COUNCIL A/55/21/DOC



0m 10m 20m 30m 40m 50m
1:500m

KEY

TP205 — Shallow Infiltration Tests Report: April 2018
-Results & Depth shown

TP101 — Infiltration Tests Report: June 2020
in accordance with BRE365
-Results & Depth shown
HGL-Highest recorded ground water depth

TP502 — Location of BRE365 Tests: Feb 2021
-Results & Depth shown

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Project
MAYFLOWER WAY, ANGMERING

Drawing Title
Infiltration Test Locations

Drawing Status
For Information

Client
Angmering Community Land Trust

Rev.	Date	Details	Initials
B	04.03.21	March 2021 results added	KN
A	22.01.21	First issue	KN

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Drawing No.: 500-01
Rev: B

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Dimensions should be checked and verified on site and any discrepancies should be reported to Kazys Narbutas Consulting as soon as possible.

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Table 2 - Summary of Groundwater and Soil-Gas Monitoring

Date of visit	Trial Hole	CH4 (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flow (l/h)	Dp	H2O (m bgl)	VOC (ppm)
30/11/2015	WS1	0.0	4.0	16.7	0	0	0.0	1014	0.0	0	Dry	0
	WS2	0.0	2.3	18.3	0	0	0.0	1014	0.0	0	Dry	0
	WS3	0.0	4.6	15.5	0	0	0.0	1014	0.0	0	Dry	0
17/12/2016	WS1	0.0	6.2	12.5	0	0	0.0	1016	0.01	0	3.84	0
	WS2	0.0	2.4	17.5	0	0	0.0	1016	0.81	2	Dry	0
	WS3	0.0	6.3	11.6	0	0	0.0	1016	1.21	2	Dry	0
08/01/2016	WS1	0.0	0.2	19.7	0	0	0.0	996	0.4	0	3.85	0
	WS2	0.0	0.2	20.0	0	0	0.0	996	0.4	0	Dry	0
	WS3	0.0	0.2	20.1	0	0	0.0	996	0.3	0	Dry	0
12/02/2016	WS1	0.0	7.2	11.2	0.0	0	0.0	989	0.0	0	Dry	0
	WS2	0.0	0.6	20.2	0.0	0	0.0	989	0.0	0	Dry	0
	WS3	0.0	1.6	18.3	0.0	0	0.0	989	0.0	0	Dry	0
14/03/2016	WS1	0.0	7.9	9.9	0	0	0.0	1035	0.0	0	Dry	0
	WS2	0.0	0.0	21.4	0	0	0.0	1035	0.0	0	Dry	0
	WS3	0.0	2.6	16.3	0	0	0.0	1035	0.0	0	Dry	0
12/04/2016	WS1	0.0	4.5	13.9	0.0	0.0	0.0	1009	0.01	0.0	Dry	0
	WS2	0.0	0.0	20.9	0.0	0.0	0.0	1009	0.01	0.0	Dry	0
	WS3	0.0	4.1	15.0	0.0	0.0	0.0	1009	0.01	0.0	Dry	0

Appendix B

April 2018 Infiltration Tests Report

ARUN DISTRICT COUNCIL A/55/21/DOC

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

Soakage Test Report

Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: Land South of Mayflower Way, Angmering

Client: Angmering Community Land Trust

Report Date: April 2018

Project Reference: J13227

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a signed order form from Bruce Howse of The Howse Wallis Partnership on behalf of their client, the Angmering Community Land Trust.

2 Location

The site, which comprises an existing field, is located to the south of Mayflower Way, approximately 500m north east of Angmering Railway Station, Littlehampton, BN16 4AY. The approximate National Grid Reference of the site is TQ 07262 03274.

3 Investigation Brief

In accordance with the Client's instructions, and our quotation, the following was included in our brief for this soakage investigation:

- 6 No. soakage tests were carried out across the site using the BRE365 method.
- 3 No Return groundwater monitoring visits were undertaken in January, February and at the end of March 2018.

The fieldwork was carried out on 29th November 2017 at which time the weather was generally dry. The rainfall in the South of England for the preceding three months was average, with approximately 42-123% of the normal.

4 Scope

This report presents our exploratory hole logs and test results only. 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.

Contamination issues are not considered in this report.

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The site investigation was conducted and this report has been prepared for the sole internal use and reliance of Angmering Community Land Trust 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 Limited. 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.

Morris Stevenson MICE
(Countersigned)

Darryl Kelly MGeol FGS
(Signed)

For and on behalf of Southern Testing Laboratories Limited

B FIELDWORK

5 General Site Description

The site comprises a broadly rectangular plot of land, which at the time of our investigation was predominantly overgrown grass.

The northern boundary of the site contains a soil bund approximately 1.2m in height, beyond which Mayflower Way is situated and to the north of this is an area of land, which is disused and is covered in piles of scrap metal, soil and demolition rubble. The western and eastern site boundaries comprise residential properties with associated garden areas while the southern site boundary comprises an overgrown section of woodland, with an old dirt BMX bike track.

6 Geology

The British Geological Survey Map indicates that the site geology consists of Brickearth over River Terrace deposits over New Pit Chalk Formation.

Brickearth

Brickearth (loess deposit) is a recent deposit which is so called as it is suited to brick manufacture. It is predominantly an Aeolian deposit; formed during cold, dry climatic conditions. There is evidence that Brickearth has been reworked as part of 'sheet flooding' which helped incorporate flint gravels into the deposit. Brickearth consists mainly of ferruginous silty clay, which is often sandy and may contain some finely divided chalk, scattered flints and gravely seams, or other locally derived material.

Terrace Gravels

Terrace gravels are sheets of irregular and sub-rounded gravel and sand, laid down as terraces alongside rivers. There is usually a covering of sandy silty clay, termed brickearth, and old backfilled gravel workings are sometimes found.

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Middle Chalk

Chalk is a well-known soft white friable limestone consisting of over 95% of calcium carbonate. It is of organic origin and is composed of shell debris embedded in a fine matrix of microscopic calcareous bodies produced by planktonic algae (coccoliths).

Flints are largely absent in the Middle Chalk, except in the upper beds, and there is a hard band of chalk, the Melbourne Rock, at the base of the division.

While Upper Chalk frequently has excellent soakage properties, this is not the case in the Middle Chalk, where soakage may be poor.

7 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 Made Ground/Topsoil over orange brown silty sandy Clay.

A summary is given below.

Depth	Thickness	Soil Type	Description
GL to 0.3m (TP105 Only)	0.3m	Topsoil	Grass over brown sandy clayey TOPSOIL with occasional roots and flint gravel.
GL to 0.4m/1.0m	0.4m to 1.0m	Made Ground	MADE GROUND comprising brown silty CLAY with frequent brick, concrete, metal, ash and flint gravel.
0.25m/0.5m to 1.0m	0.5m to 0.75m	Silty/Sandy Clay	Stiff, high strength pale orange brown gravelly sandy CLAY. Gravels comprise fine to coarse subrounded to subangular flint

8 Soakage Test Method

Soakage Tests after BRE365 (1991)

The BRE365 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.

The pit is considered full when the water level is the same as the proposed inlet invert. The time for the water level to fall from ¾ full to ¼ full is obtained and the soil infiltration rate is obtained from the following formula:

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$$f = \frac{V_{p75-25}}{a_{p50} \, x \, t_{p75-25}}$$

Where: f = soil infiltration rate (in this case expressed in l/m²/minute)

V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} = the internal surface area of the trial pit up to 50% effective depth and excluding the base area;

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth.

The soakage rate in this report in 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.

Because of time and cost constraints testing was restricted to one day only.

9 Soakage Test Results & Discussion

A total of six soakage tests were carried out across the site, at the locations shown on the attached site plan (Figure 1). Two of the trial pits (TP101 and TP106) were excavated during previous works in July 2017 and were gravel filled for soakage testing at the time. Both of these pits were retested during this additional investigation.

July 2017 Results

Results of BRE 365 Soakage tests				
Pit	**Depth (m)**	**f l/m²/min**	**BRE Units (m/sec)**	**Comments**
TP101 (test1)	3.4	4.14	6.9E-5	
TP101 (test2)	3.4	2.85	4.74E-5	
TP101 (test3)	3.4	1.62	2.69E-5	
TP106 (test1)	3.0	5.21	8.68E-5	
TP106 (test2)	3.0	3.31	5.57E-5	
TP106 (test3)	3.0	3.01	5.02E-5	

The full results of the soakage tests undertaken in November 2017 are appended and the soakage rate from each trial hole is summarised in the table below.

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November 2017 Results

Results of BRE 365 Soakage tests				
Pit	**Depth (m)**	**f l/m²/min**	**BRE Units (m/sec)**	**Comments**
TP101 (test1)	3.4	5.58	9.31E-5	
TP101 (test2)	3.4	2.66	4.43E-5	
TP106 (test1)	3.0	5.23	8.72E-5	
TP106 (test2)	3.0	4.18	6.96E-5	
TP201	1.0	0.36	6.00E-06	
TP203(Test 1)	1.0	1.88	3.13E-05	
TP203(Test 2)	1.0	0.48	7.99E-6	
TP204	1.0	1.33	2.22E-5	
TP205	1.0	0.364	6.07E-06	

The BRE Digest 365 indicates that 3 fillings must be carried out. Where 3 fillings have not been carried out, a reduction factor should be applied.

Based on the two sets of results carried out at the locations of TP101 and TP106, we would consider an overall design value of between 2l/m^2/min to 3 l/m^2/min to be appropriate for soakaways set into the underlying gravels (as per TP101 and TP106). Due to the variability in the soils encountered on site consideration should be given to undertaking soakage tests at the proposed depth and location of any soakaways to confirm the design rate.

Where shallow permeable paving type soakaways are to be considered at a depth of 1.0m bgl we would consider a design value of 0.3 l/m^2/min to be appropriate, however a further factor of safety may need to be considered by the designers as only one test was undertaken in most of the trial holes excavated on site.

Soakaways should be sited in natural soils only, and where made ground soils are encountered soakaways will require deepening down into natural soils for discharge.

Despite groundwater not being encountered during our investigation to a maximum depth of 3.9m bgl, our works were carried out in the drier summer months and the early winter months which were below average rainfall. Based on historical data from previous reports carried out in this area we would anticipate groundwater levels to rise within the wetter winter months which may have implications on the use of soakaways on the subject site.

Subsequent groundwater monitoring visits were undertaken on the 3rd January 2018 (the following day after Storm Eleanor) and on the 1st February 2018 after a period of rainfall. Both TP101 and TP106 were found to be dry on both occasions.

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An additional monitoring visit was undertaken on the 29th March 2018 after a period of sustained heavy rainfall. Both TP101 and TP106 were once again recorded to be dry.

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

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 (where applicable). 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.

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APPENDIX A – EXPLORATORY HOLE LOGS & SITE PLAN

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NB: Positions of Trial Pits are only indicative unless dimensioned

Site: Land off Mayflower Way, Angmering	STL: J13227	Fig No: 1
Date: 04 December 2017		

Southern Testing

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ST Consult

Southern Testing ST Consult

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Start - End Date:	Project ID:	Machine Type:	TP201
29/11/2017	J13227	JCB 3 CX	Sheet 1 of 1

Project Name:	Land Off Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					DK
Location:	Angmering	Dry on completion			
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.50)		0.50	Grass over MADE GROUND comprising brown gravelly CLAY with abundant brick and tile fragments, plastic, metal and occasional fine to coarse flint gravel.
				(0.50)		1.00	Firm, medium strength orange brown slightly fine sandy silty CLAY.
							Pit terminated at 1.00m.

1 2 3 4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Stable	
Length:	1.20		
Depth:	1.00		

Southern Testing ST Consult

www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020

Start - End Date:	Project ID:	Machine Type:	TP202
29/11/2017	J13227	JCB 3 CX	Sheet 1 of 1

Project Name:	Land Off Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					DK
Location:	Angmering	Dry on completion			
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(1.00)			Grass over MADE GROUND comprising brown gravelly CLAY with abundant brick and tile fragments, plastic, metal and occasional fine to coarse flint gravel.
						1.00	Pit terminated at 1.00m.

1 2 3 4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Stable	
Length:	1.20		
Depth:	1.00		

Southern Testing ST Consult

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Start - End Date:	Project ID:	Machine Type:	TP203
29/11/2017	J13227	JCB 3 CX	Sheet 1 of 1

Project Name:	Land Off Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					DK
Location:	Angmering	Dry on completion			
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.40)		0.40	Grass over MADE GROUND comprising dark brown silty CLAY with frequent brick and concrete rubble, polystyrene, ash and flint gravel.
				(0.60)		1.00	Firm, medium strength orange brown slightly fine sandy silty CLAY.
							Pit terminated at 1.00m.

1 2 3 4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Stable	
Length:	1.20		
Depth:	1.00		

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP204
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	29/11/2017	J13227	JCB 3 CX	Sheet 1 of 1

Project Name:	Land Off Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					DK
Location:	Angmering	Dry on completion			
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.40)		0.40	Grass over MADE GROUND comprising dark brown silty CLAY with frequent brick and concrete rubble, blacktop, ash and flint gravel.
				(0.60)		1.00	Firm, medium strength orange brown slightly fine sandy silty CLAY.
							Pit terminated at 1.00m.

1
2
3
4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Stable	
Length:	1.20		
Depth:	1.00		

Southern Testing ST Consult

www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020

Start - End Date:	Project ID:	Machine Type:	TP205
29/11/2017	J13227	JCB 3 CX	Sheet 1 of 1

Project Name:	Land Off Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					DK
Location:	Angmering	Dry on completion			
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.30)		0.30	Grass over brown silty clayey TOPSOIL with frequent fine to coarse flint gravel.
				(0.70)		1.00	Firm, high strength, orange brown silty, slightly sandy CLAY.
							Pit terminated at 1.00m.

1 2 3 4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Stable	
Length:	1.20		
Depth:	1.00		

APPENDIX B – SOAKAGE TEST RESULTS

Summary Sheet

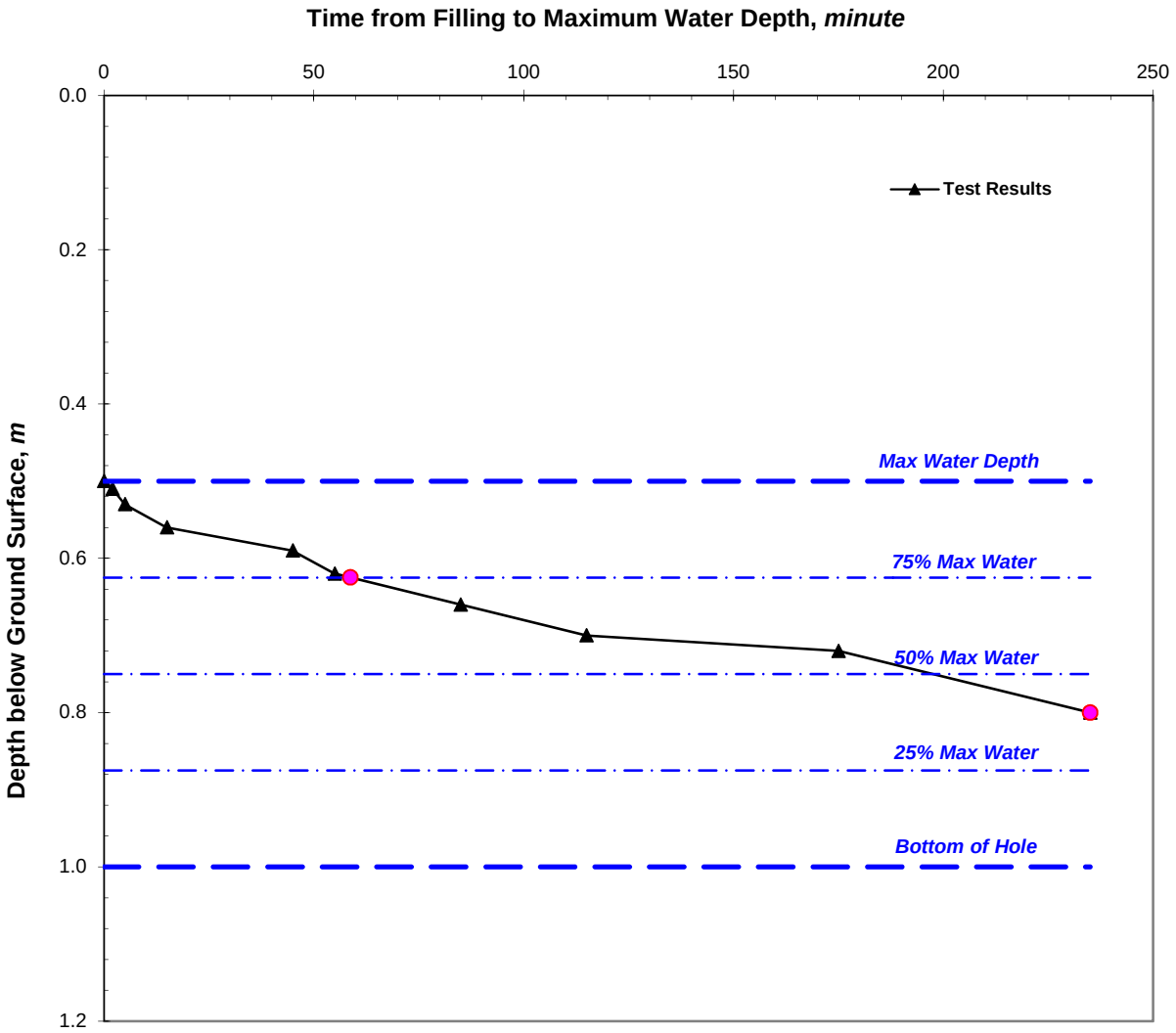
Results of BRE Digest 365 Soakage Tests

Site :	Mayflower Way, Angmering	**Job No :**	J13227
Client :	The Howse Wallis Partnership	**O S Reference :**	TQ 07262 03274
Tested By : OS	**Engineer:** DK	**Test Date :**	29/11/2017

Hole No	Test No	Hole Depth *m*	Soakage Rate for Each Test *litre/m² /min*	Soakage Rate for Each Hole *litre/m² /min*	Soakage Rate for Each Hole *m/sec*	Water Level at Finish of Test	Remarks
TP201	No 1	1.00	0.360	0.360	6.00E-6	Pit was not emptied; Non compliant value was calculated.	28 Seconds to fill, 400Litres used
TP203	No 1	1.00	1.88	0.480	7.99E-6	Empty pit.	350 litres used 38 seconds to fill
TP203	No 2	1.00	0.480			Pit was not emptied; Non compliant value was calculated.	400 litres used 59 seconds to fill
TP204	No 1	1.00	1.33	1.33	2.22E-5	Nearly empty pit.	
TP205	No 1	1.00	0.364	0.364	6.07E-6	Pit was not emptied; Non compliant value was calculated.	1 min 10 secs to fill, 300 litres used
TP101	No 1	3.40	5.58	2.66	4.43E-5	Nearly empty pit.	1 min 20 seconds to fill, 900 litres used Depth to top of permeable soils was 1.4m.
TP101	No 2	3.40	2.66			Nearly empty pit.	48 seconds to fill 700 litres used
TP106	No 1	3.00	5.23	4.18	6.96E-5	Nearly empty pit.	1 min 20 to fill, 800 litres used
TP106	No 2	3.00	4.18			Nearly empty pit.	56 seconds to fill 800 litres used
Mean Value of All Calculated Soakage Rates :				**1.56** *litre/m² /min*	**2.60E-5** *m/sec*		

BRE Digest 365 Soakage Test

Test Hole No: TP201
Test No: Test No 1 (Initial)



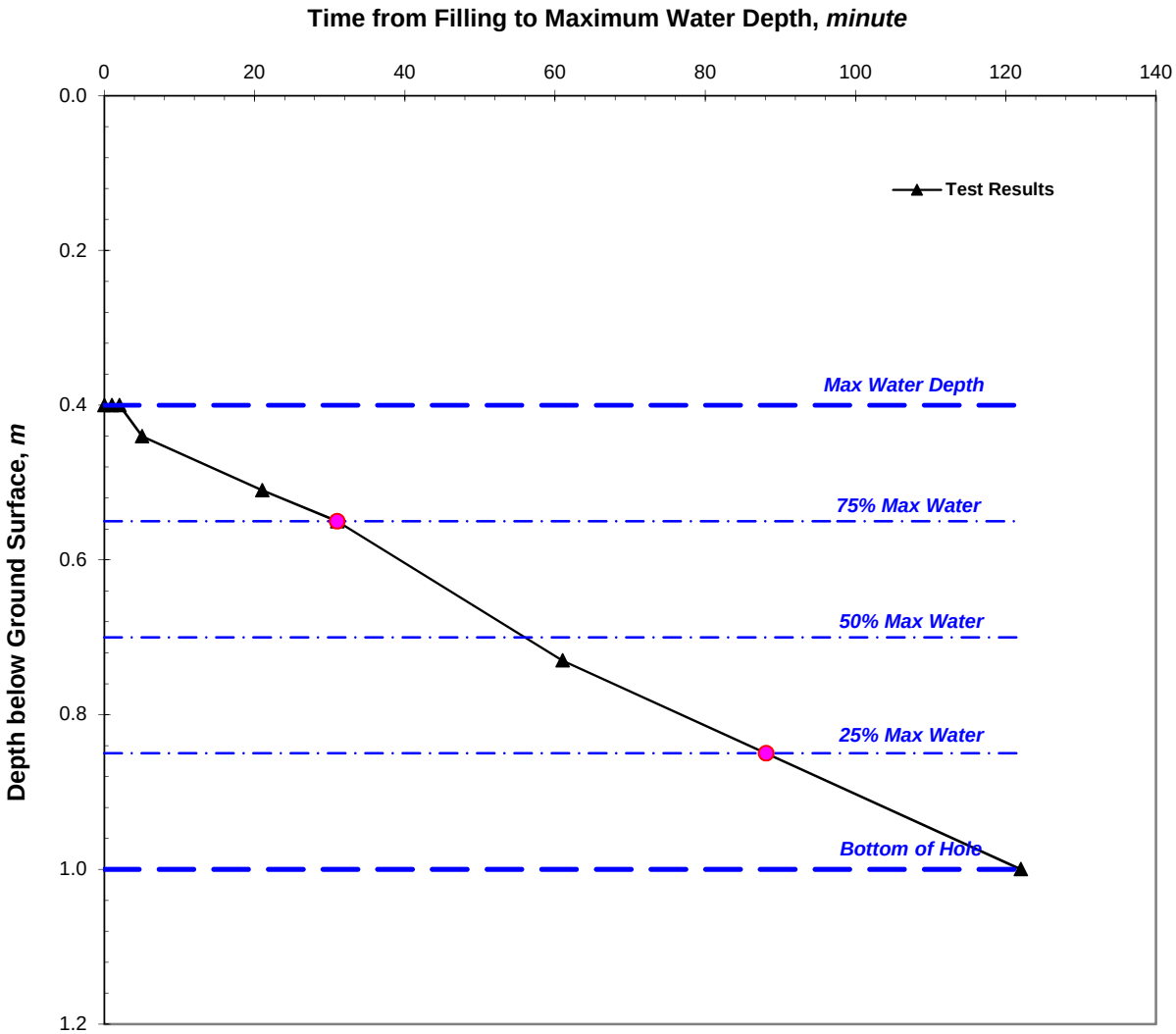
Pit Length, m	1.200	Depth to Water at Start of Test, ***m***	0.500
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	0.300
Depth to Pit Base, m	1.000	Total Soakage Test Time, ***min***	235.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	1.489
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	0.536
Depth to Top of Granular Fill, ***m***		Soakage Rate, ***litre/m²/min***	**0.360**
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, ***m/sec***	**6.00E-06**

Comments: ***28 Seconds to fill, 400Litres used***
Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S2**

BRE Digest 365 Soakage Test

Test Hole No: TP203
Test No: Test No 1 (Initial)



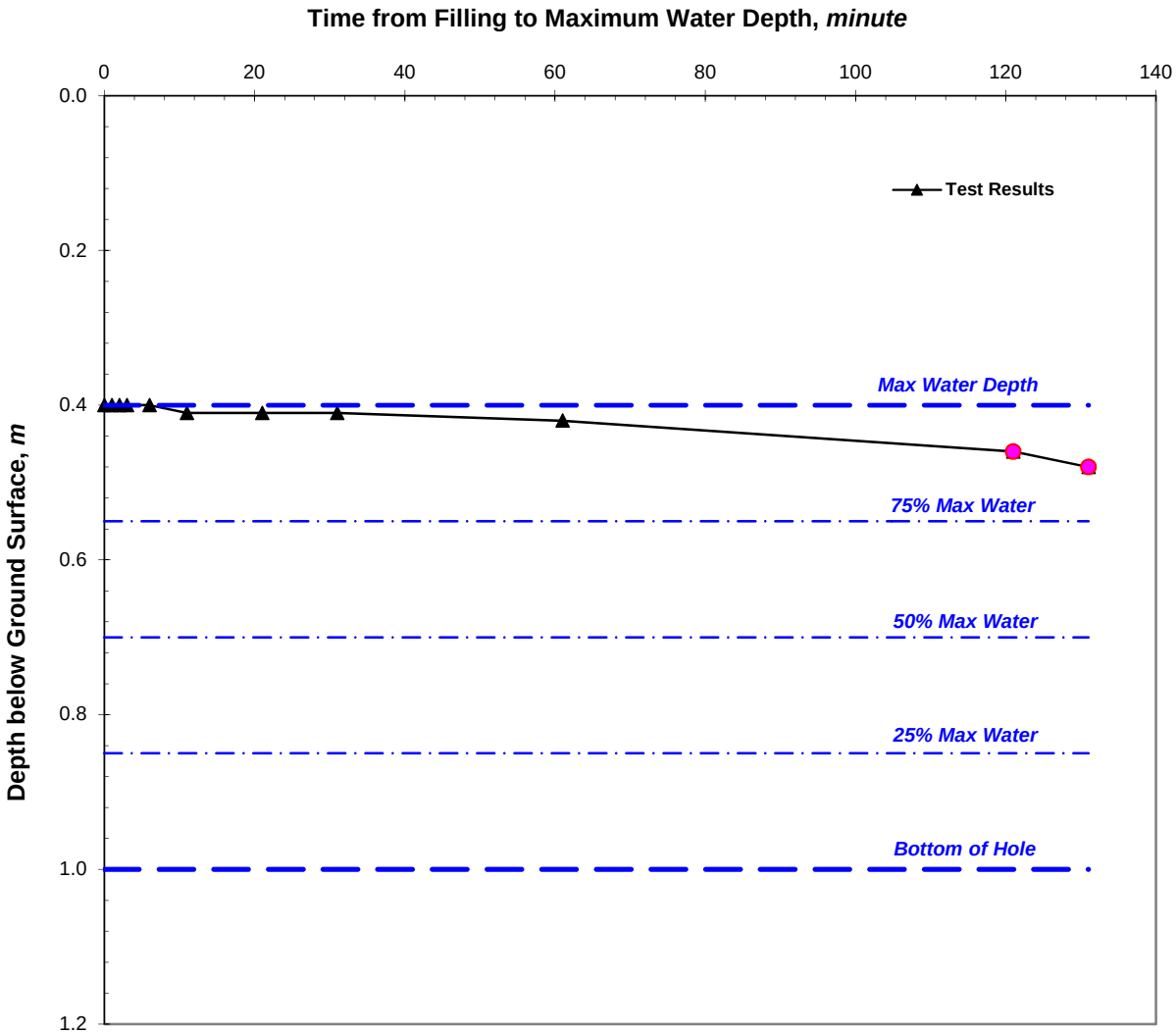
Pit Length, m	1.300	Depth to Water at Start of Test, ***m***	0.400
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	0.600
Depth to Pit Base, m	1.000	Total Soakage Test Time, ***min***	122.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	1.635
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	3.073
Depth to Top of Granular Fill, ***m***		Soakage Rate, ***litre/m²/min***	**1.88**
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, ***m/sec***	**3.13E-05**

Comments: ***350 litres used 38 seconds to fill***
Pit was emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S6**

BRE Digest 365 Soakage Test

Test Hole No: TP203
Test No: Test No 2 (Repeated)



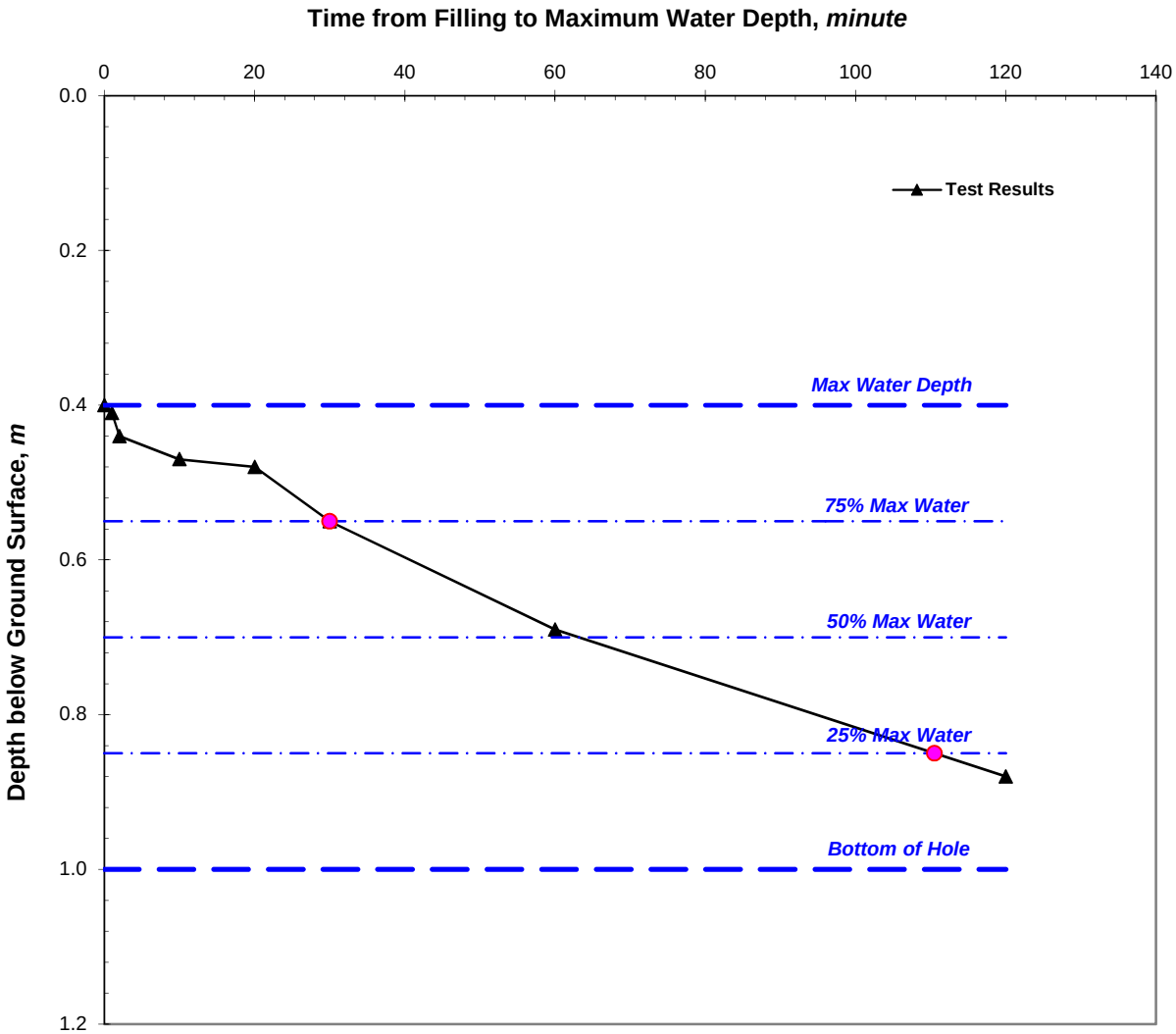
Pit Length, m	1.300	Depth to Water at Start of Test, ***m***	0.400
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	0.080
Depth to Pit Base, m	1.000	Total Soakage Test Time, ***min***	131.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	2.440
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	1.170
Depth to Top of Granular Fill, ***m***		Soakage Rate, ***litre/m²/min***	**0.480**
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, ***m/sec***	**7.99E-06**

Comments: ***400 litres used 59 seconds to fill***
Water level did not fall to 75% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S7**

BRE Digest 365 Soakage Test

Test Hole No: TP204
Test No: Test No 1 (Initial)



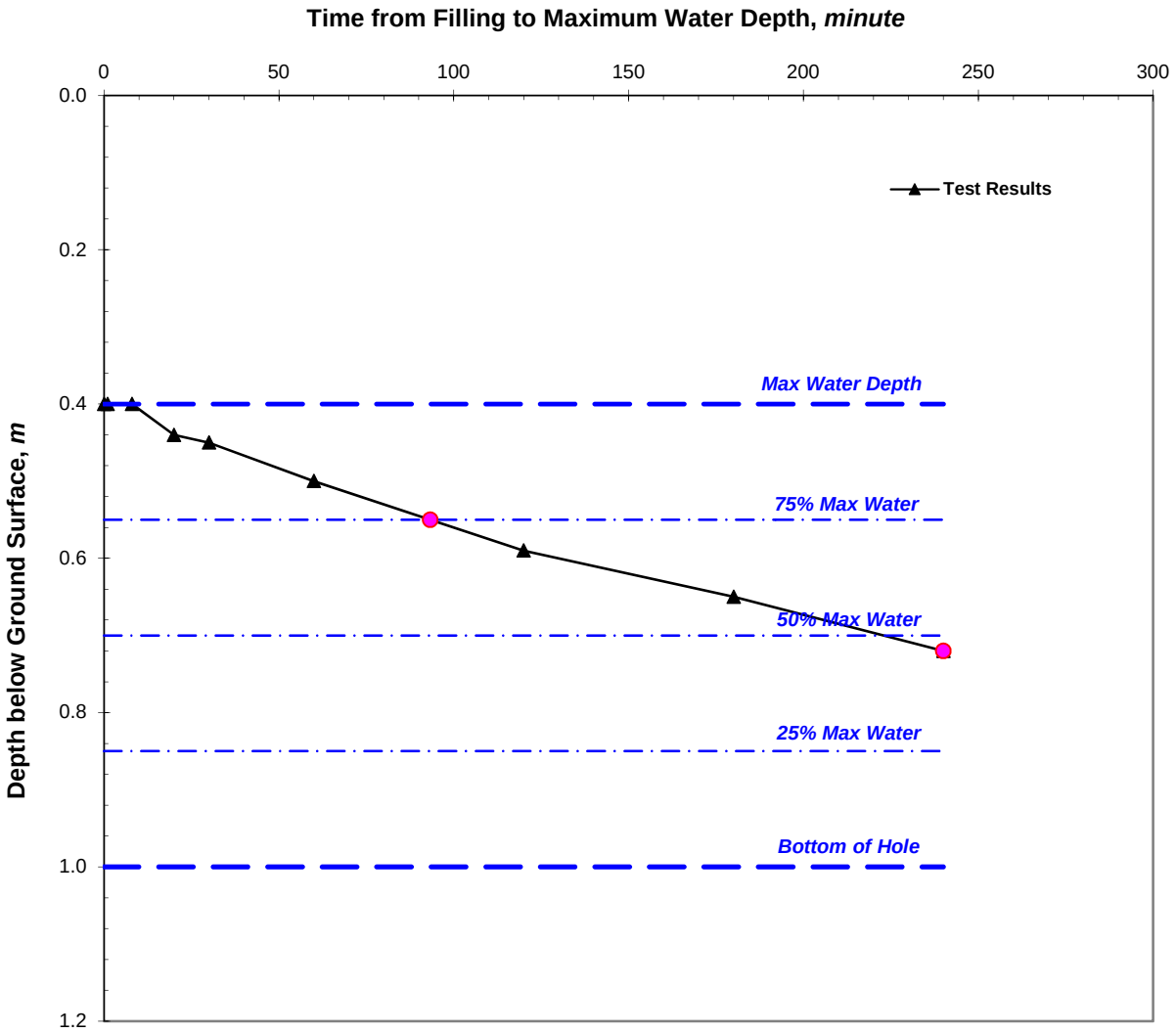
Pit Length, m	1.300	Depth to Water at Start of Test, ***m***	0.400
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	0.480
Depth to Pit Base, m	1.000	Total Soakage Test Time, ***min***	120.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	1.635
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	2.179
Depth to Top of Granular Fill, ***m***		Soakage Rate, ***litre/m²/min***	**1.33**
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, ***m/sec***	**2.22E-05**

Comments: ***38 Seconds to fill, 300Litres used***
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig. S1**	

BRE Digest 365 Soakage Test

Test Hole No: TP205
Test No: Test No 1 (Initial)



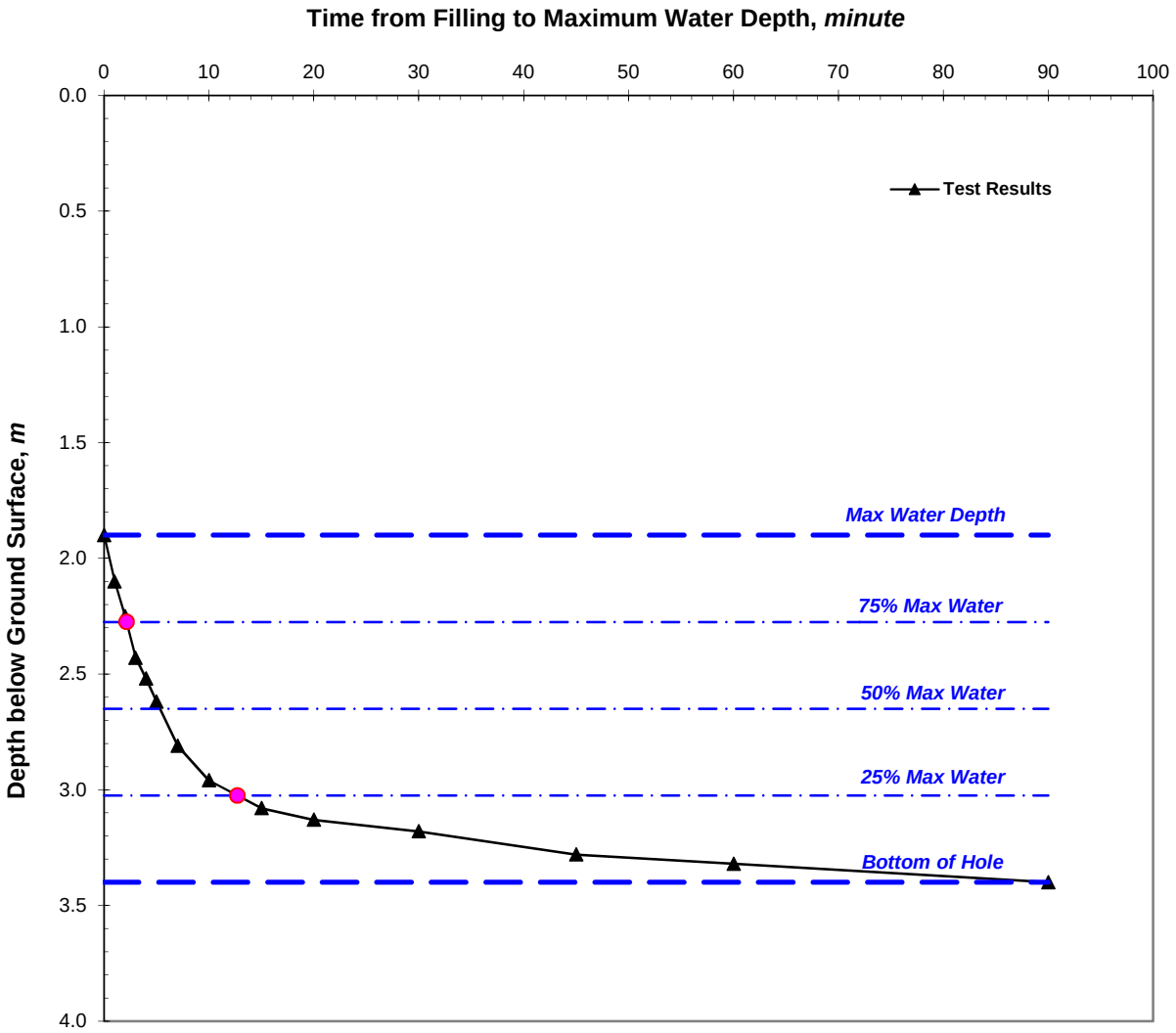
Pit Length, m	1.300	Depth to Water at Start of Test, ***m***	0.400
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	0.320
Depth to Pit Base, m	1.000	Total Soakage Test Time, ***min***	240.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	1.863
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	0.678
Depth to Top of Granular Fill, ***m***		Soakage Rate, ***litre/m²/min***	**0.364**
Voids Assumed for Granular Fill, %	100%	BRE Soil Infiltration Rate, ***m/sec***	**6.07E-06**

Comments: ***1 min 10 secs to fill, 300 litres used***
Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S3**

BRE Digest 365 Soakage Test

Test Hole No: TP101
Test No: Test No 1 (Initial)



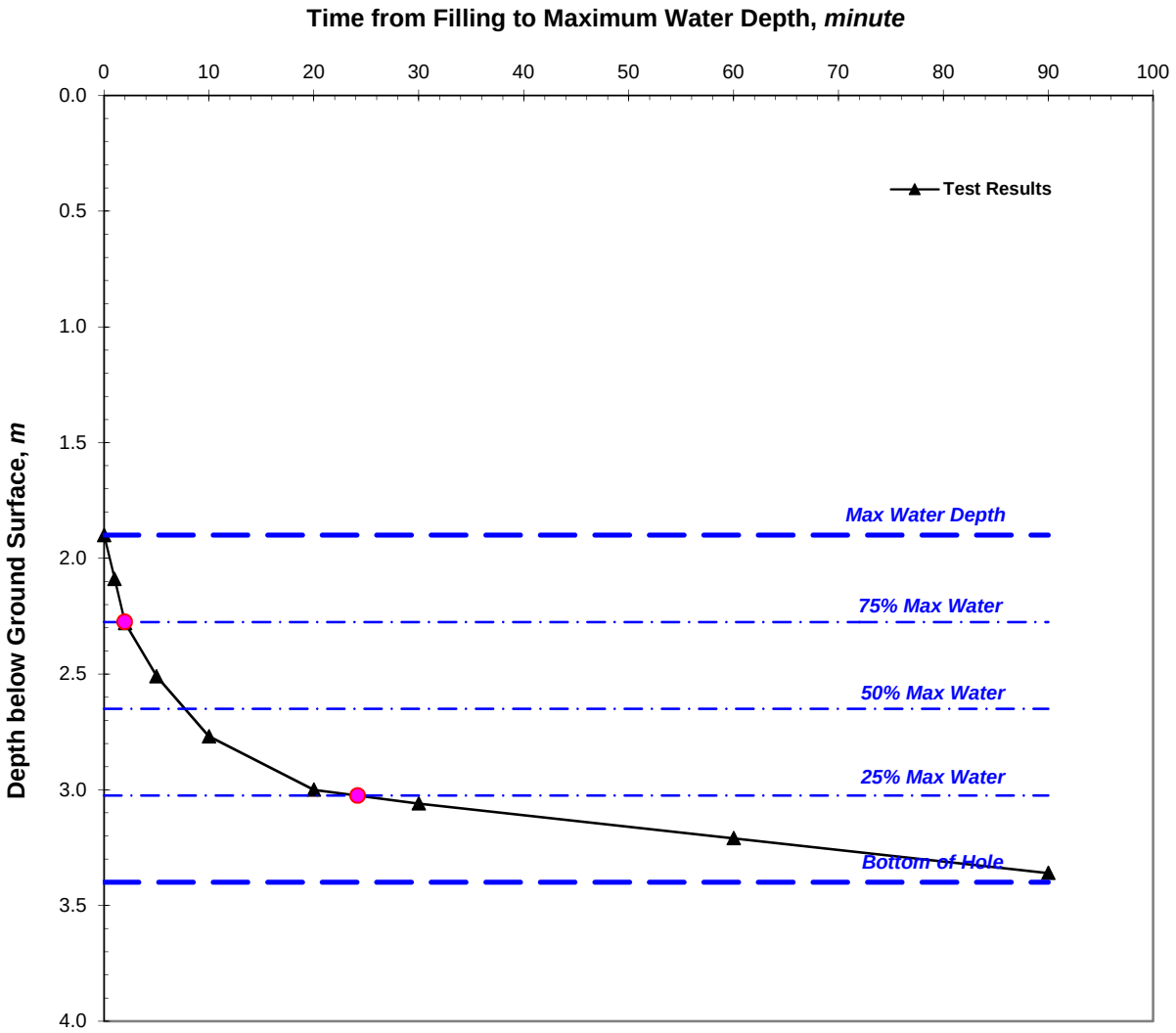
Pit Length, m	2.000	Depth to Water at Start of Test, ***m***	1.900
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.500
Depth to Pit Base, m	3.400	Total Soakage Test Time, ***min***	90.0
Depth to Top of Permeable Soils, ***m***	1.400	Mean Internal Discharge Area, m^2	4.575
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	25.545
Depth to Top of Granular Fill, ***m***	1.500	Soakage Rate, ***litre/m²/min***	**5.58**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**9.31E-05**

Comments: ***1 min 20 seconds to fill, 900 litres used***
Pit was emptied at finish of test.

Client: The Howse Wallis Partnership	**Job No:** J13227	**Test Date:** 29/Nov/2017	
Site: Mayflower Way, Angmering	**Tested By:** OS	**Engineer:** DK	**Fig. S8**

BRE Digest 365 Soakage Test

Test Hole No: TP101
Test No: Test No 2 (Repeated)



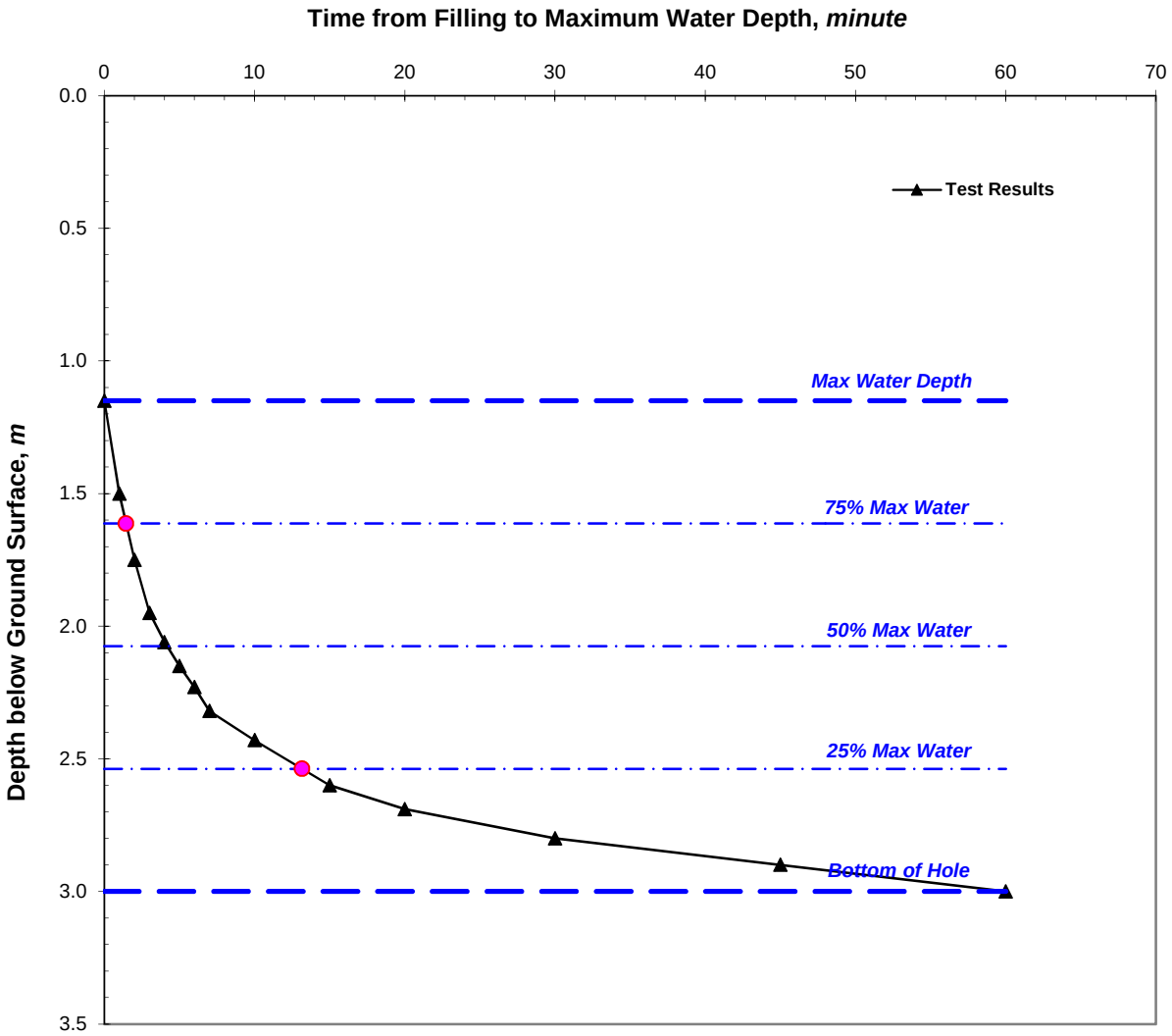
Pit Length, m	2.000	Depth to Water at Start of Test, ***m***	1.900
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.460
Depth to Pit Base, m	3.400	Total Soakage Test Time, ***min***	90.0
Depth to Top of Permeable Soils, ***m***	1.400	Mean Internal Discharge Area, m^2	4.575
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	12.166
Depth to Top of Granular Fill, ***m***	1.500	Soakage Rate, $litre/m^2/min$	**2.66**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**4.43E-05**

Comments: ***48 seconds to fill 700 litres used***
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S9**

BRE Digest 365 Soakage Test

Test Hole No: TP106
Test No: Test No 1 (Initial)



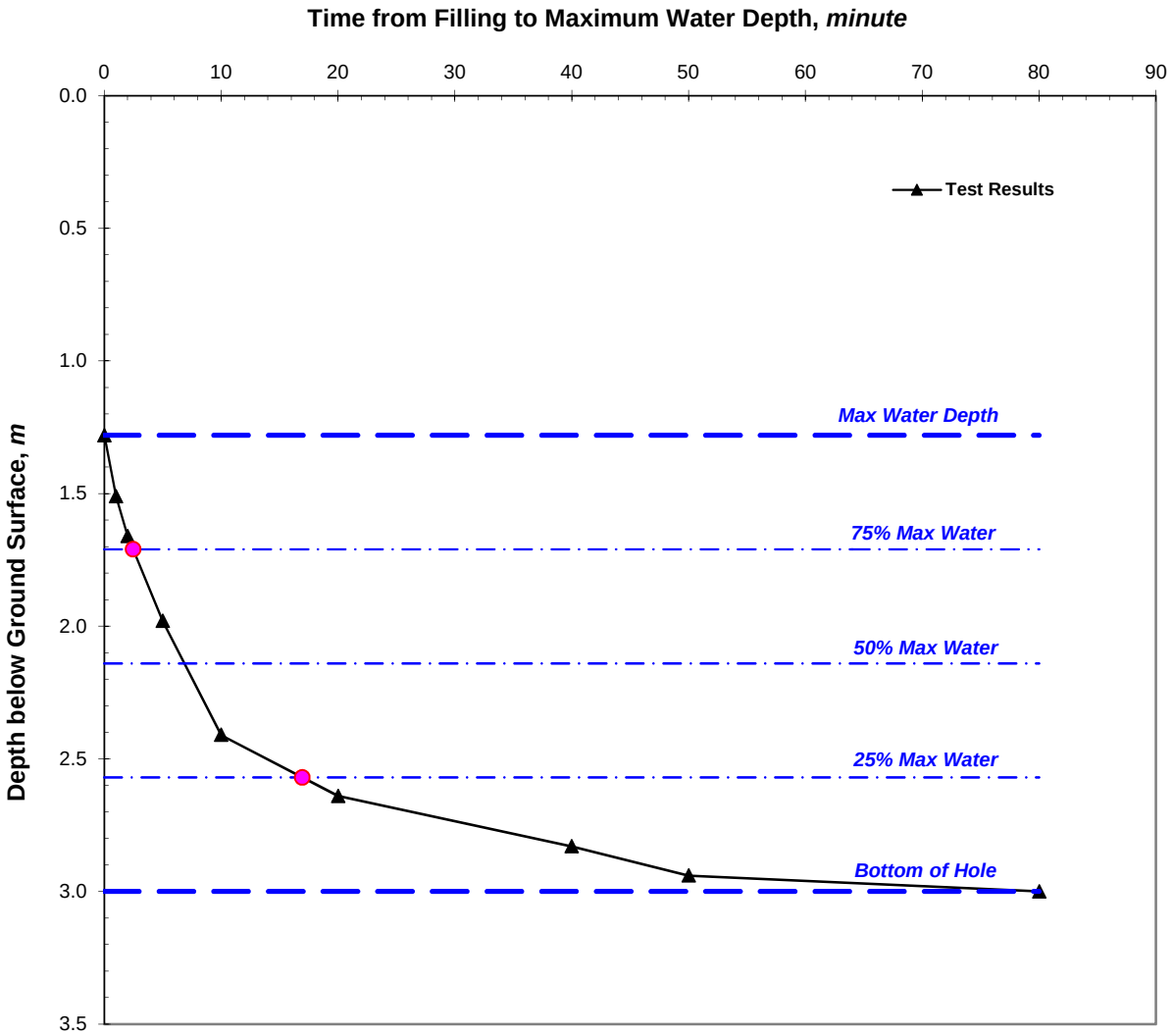
Pit Length, m	2.000	Depth to Water at Start of Test, ***m***	1.150
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.850
Depth to Pit Base, m	3.000	Total Soakage Test Time, ***min***	60.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	5.433
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	28.433
Depth to Top of Granular Fill, ***m***	1.100	Soakage Rate, ***litre/m²/min***	**5.23**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**8.72E-05**

Comments: ***1 min 20 to fill, 800 litres used***
Pit was emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S4**

BRE Digest 365 Soakage Test

Test Hole No: TP106
Test No: Test No 2 (Repeated)



Pit Length, m	2.000	Depth to Water at Start of Test, ***m***	1.280
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.720
Depth to Pit Base, m	3.000	Total Soakage Test Time, ***min***	80.0
Depth to Top of Permeable Soils, ***m***		Mean Internal Discharge Area, m^2	5.114
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	21.370
Depth to Top of Granular Fill, ***m***	1.100	Soakage Rate, ***litre/m²/min***	**4.18**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**6.96E-05**

Comments: ***56 seconds to fill 800 litres used***
Pit was emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J13227	**Test Date:**	29/Nov/2017		
Site:	Mayflower Way, Angmering	**Tested By:**	OS	**Engineer:**	DK	**Fig.**	**S5**

Appendix C

June 2020 Infiltration Tests Report

ARUN DISTRICT COUNCIL A/55/21/DOC

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

BRE365 Soakage Test Report

Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: Land South of Mayflower Way, Angmering, West Sussex

Client: Angmering Community Land Trust

Report Date: 4 June 2020

Project Reference: J14366 (v2)

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a confirmation of instructions written by Mr B Howse of The Howse Wallis Partnership, acting on behalf of their client; the Angmering Community Land Trust, accepting our quotation ref Q200327-2 (dated 17th February 2020).

2 Location

The site comprises an existing grass field, measuring approximately 100×40m situated on the southern side of Mayflower Way, Angmering (West Sussex). The site is located approximately 0.75km northeast of Angmering railway station, at approximate National Grid Reference TQ 07260 03280, as indicated on Figure 1 in Appendix A.

3 Investigation Brief

It is proposed to redevelop the site with residential properties, as per the attached layout (see Figure 2 in Appendix A). Further to our previous soakage investigation (report ref. J13227 – April 2018), in accordance with the Client's instructions, and our quotation, the following was included in our brief for this soakage investigation:

- 3 No. soakage tests were carried out across the site using the BRE365 method. As part of this, 2 No. existing gravel filled trial pits (TP101 and TP106 from our previous investigation, ref. J13227) were retested. A new gravel-filled trial soakage pit (TP301) was excavated within the proposed orchard area in the centre-north of the site. A fieldwork location plan is presented within Figure 2, Appendix A.
- 2 No. monitoring visits were subsequently undertaken to measure groundwater levels within the pipes installed in the above 3 No. soakage test pits.

The fieldwork was carried out on 10th-12th March 2020, at which time the weather was generally overcast with rain showers. Based on records available from Southern Water and the Met Office, the rainfall in the South East of England for the three months preceding the site work was generally wetter than normal, with approximately 125% of the normal monthly rainfall in December 2019, 105% in January 2020 and 240% in February 2020 (ref. records held by Southern Water and the Met Office). Subsequently, the rainfall for March and April were approximately average, with approximately 105% and 90% of the normal rainfall, respectively.

4 Scope

This report presents our exploratory hole logs and test results only. 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.

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Contamination issues are not considered in this report, but are addressed in our letter report dated 22nd May 2020 (ref. JD/SKT/BC/J14366).

The site investigation was conducted and this report has been prepared for the sole internal use and reliance of the Angmering Community Land Trust 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 Limited. 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.

J N Race BSc MSc CGeol FGS
(Countersigned)

J Dale MESci (Hons)
(Signed)

For and on behalf of Southern Testing Laboratories Limited

B FIELDWORK

5 General Site Description

The site comprises a rectangular plot of land, measuring approximately 100×40m, and is predominantly covered by grass with overgrown patches of vegetation. The surface of the site appears heavily rutted and undulating across the site area, remains of a bonfire were also noted in the eastern area of the site and some areas of the site were littered with rubbish.

The site is bound to the north by an earth bund (preventing vehicle access) approximately 1m in height, which runs parallel to Mayflower Way. The east and west of the site are bound by residential properties/gardens, the eastern boundary consists of a wooden fence and the western boundary consists of a hedge with trees and overgrown shrubs. The southern boundary is undefined with dense hedges, mature trees and Heras fencing. Just beyond the southern boundary (ie. off site) is an area of overgrown woodland with numerous piles of fly-tipped materials and earth mounds.

Contamination issues are not considered in this report, however, additional asbestos sampling and testing has been undertaken and will be reported separately.

6 Geology

The British Geological Survey Map of the area (No. 317/332 - Chichester and Bognor) indicates that the site geology consists of superficial Aeolian Deposits (Brickearth) over Middle Chalk. It is noted that Raised Beach Deposits are mapped outcropping approximately 2.5km west and may be present locally. The online BGS 'Geology Viewer' updates the chalk classification of the underlying bedrock to New Pit Chalk Formation. In addition, within this source the superficial deposits are termed 'River Terrace Deposits (undifferentiated)'.

6.1 Brickearth

Brickearth (loess deposit) is a recent deposit which is so called as it is suited to brick manufacture. It is predominantly an aeolian deposit; formed during cold, dry climatic conditions. There is evidence that brickearth has been reworked as part of 'sheet flooding' which helped incorporate flint gravels

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into the deposit. Brickearth consists mainly of ferruginous silty clay, which is often sandy and may contain some finely divided chalk, scattered flints and gravelly seams, or other locally derived material. It is usually poorly consolidated and may contain numerous hollow root tubes and worm burrows.

6.2 New Pit Chalk Formation

The New Pit Chalk Formation typically comprises a blocky creamy white, smooth textured chalk with well-developed marl seams. Small finger shaped flint occurs sporadically in the lower part of the sequence. Conjugate fractures are usually clay-coated and slickensided, reflecting the presence of many clay-rich marl seams.

The White Chalk outcrop in particular is frequently highly fractured and highly permeable, and usually has good infiltration characteristics. On the other hand, Chalk Head, highly weathered Chalk and Chalk under a low permeability superficial cover may have very poor infiltration characteristics.

Chalk is slightly soluble in water and, while it has excellent bearing properties when unweathered, this solubility can lead to deep weathering and softening, and the upper layers of chalk often have an irregular boundary with overlying strata

The Chalk may be softened by solution to a depth of 5 15 metres and bearing capacities and engineering properties improve with depth. Where there is an outcrop of impermeable soil overlying the chalk there may be a dramatically increased solution effect due to concentrated surface water flow to the Chalk close to the outcrop boundary.

Solution features are common in the Chalk, and these can present significant difficulties to development on affected sites.

Man has also worked the chalk for flints, and for other purposes, for thousands of years and any signs of old workings should be carefully investigated.

7 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 Made Ground over Brickearth comprising silty sandy clay over silty sandy gravelly clay or clayey sandy gravel, which are indicative of River Terrace Deposits.

A summary of TP101, TP106 (from the previous investigation) and TP301 is given below.

Depth	Soil Type	Description
GL– 0.45/0.5m	Made Ground	Variable material comprising grass over soft dark greyish brown gravelly SILT/CLAY. Gravel comprises fine to coarse brick fragments, tile, timber, plastic, chalk, ash and plastic fragments.
GL – 1.3m	Made Ground *(TP101 only)*	Variable material comprising grass over brown sandy gravelly CLAY with abundant fine to coarse brick, tile felt, concrete, barbed wire, timber, plastic fragments and whole reinforced concrete fence post. **Asbestos cement sheeting observed.**

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Depth	Soil Type	Description
0.45/0.5m - 1.4/1.5m	Silty sandy Clay *(TP106 and 301 only)*	Firm (friable) reddish brown slightly sandy silty CLAY. Sand is fine.
1.4/1.5m - 3.0/3.3m	Silty sandy gravelly Clay *(TP106 and 301)*	Firm to stiff yellowish/orangish brown silty sandy gravelly CLAY. Gravel comprises fine to medium subrounded flint and course angular to subangular flint (frost shattered flint). Gravel content increases with depth.
2.4m – 3.5m	Clayey sandy Gravel *(TP101 only)*	Medium dense orangish brown clayey sandy GRAVEL. Gravels comprise fine to course subrounded to subangular flint and fine to medium subrounded chalk.

8 Groundwater

During the fieldwork, groundwater was measured as a standing level in TP101 at 2.98m(bgl). All other exploratory locations were dry. Groundwater monitoring has subsequently been undertaken (see Section 11).

9 Soakage Test Method

Soakage Tests after BRE365 (2016)

The BRE365 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.

The pit is considered full when the water level is the same as the proposed inlet invert. The time for the water level to fall from ¾ full to ¼ full is obtained and the soil infiltration rate is obtained from the following formula:

$$f = \frac{V_{p75-25}}{a_{p50} \, x \, t_{p75-25}}$$

Where:

f = soil infiltration rate (in this case expressed in l/m²/minute)

V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} = the internal surface area of the trial pit up to 50% effective depth and excluding the base area;

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth.

The soakage rate in this report in expressed as ℓ/m²/minute, which is a convenient rate to use. The

ARUN DISTRICT COUNCIL A/55/21/DOC

BRE use a unit of m/sec, which is the value in ℓ/m²/minute divided by 60,000.

A total of three days of testing was conducted in order to complete three full fillings/tests of each trial pit.

The BRE Digest 365 indicates that 3 fillings should be carried out.

10 Soakage Test Results & Discussion

A total of 3 No. soakage tests were carried out across the site, at the locations shown on the attached site plan (Figure 2). Two of the trial pits (TP101 and TP106) were excavated during previous works in July 2017 and were gravel-filled for soakage testing at the time. The full results of the soakage tests are appended, however, the soakage rate from each trial hole is summarised in the table below.

Results of BRE 365 Soakage tests					
Hole ID	**Test No.**	**Depth**	**f (ℓ/m²/min)**	**BRE Units (m/sec)**	**Comments**
TP101	1	3.4m	0.514	8.57×10^{-6}	Depth to groundwater surface was 2.98m prior to testing. Infiltration was based on the actual fall of water level achieved.
	2		1.0	1.67×10^{-5}	
	3		0.722	1.20×10^{-5}	
TP106	1	3.0m	3.08	5.13×10^{-5}	
	2		1.23	2.05×10^{-5}	
	3		1.19	1.98×10^{-5}	
TP301	1	3.3m	0.25	4.16×10^{-6}	
	2		0.313	5.22×10^{-6}	
	3		0.257	4.28×10^{-6}	

For the design of soakaways in the areas tested, we would recommend the lowest infiltration rate for each test be used for design incorporating a suitable factor of safety. Due to the variability in the soils encountered across the site area, consideration should be given to undertaking soakage tests at the proposed depth and location of any soakaway to confirm the design rate.

Soakaways should be sited in natural soils only, and where made ground soils are encountered soakaways will require deepening down into natural soils for discharge.

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

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 (where applicable). 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.

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11 Groundwater Monitoring Results

Tabulated below are the groundwater monitoring results from two visits prior to the investigation (carried out in an attempt to locate the previous trial pits), together with the water levels measured during the site work (on 10th March 2020) and two subsequent monitoring visits.

Hole ID (Pipe Depth)	Standing Water Level (below ground level)				
	07 Feb 2020	28 Feb 2020	10 Mar 2020	14 Apr 2020	14 May 2020
TP101 (3.4m)	Dry	Dry	2.98m	Dry	Dry
TP106 (3.0m)	*Not Located*	Dry	Dry	Dry	Dry
TP301 (3.3m)	*Not Installed*		Dry	Dry	Dry

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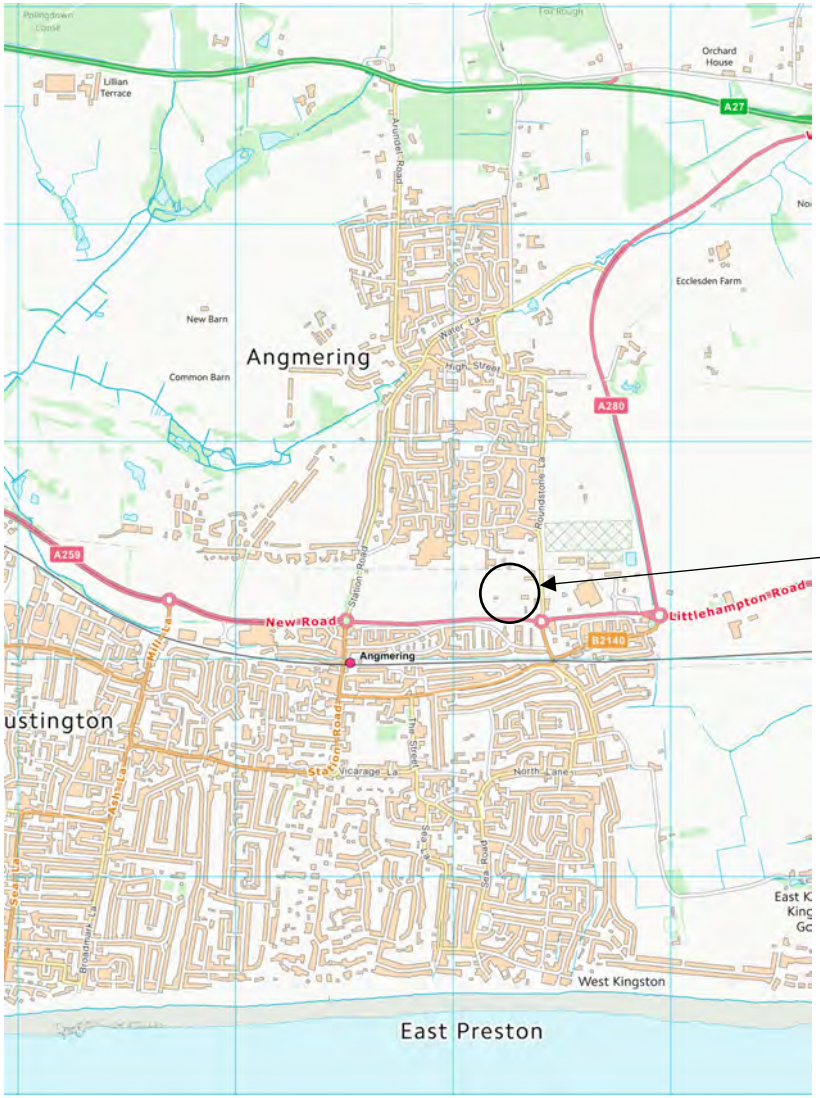
APPENDIX A – EXPLORATORY HOLE LOGS & SITE PLAN



Site Location

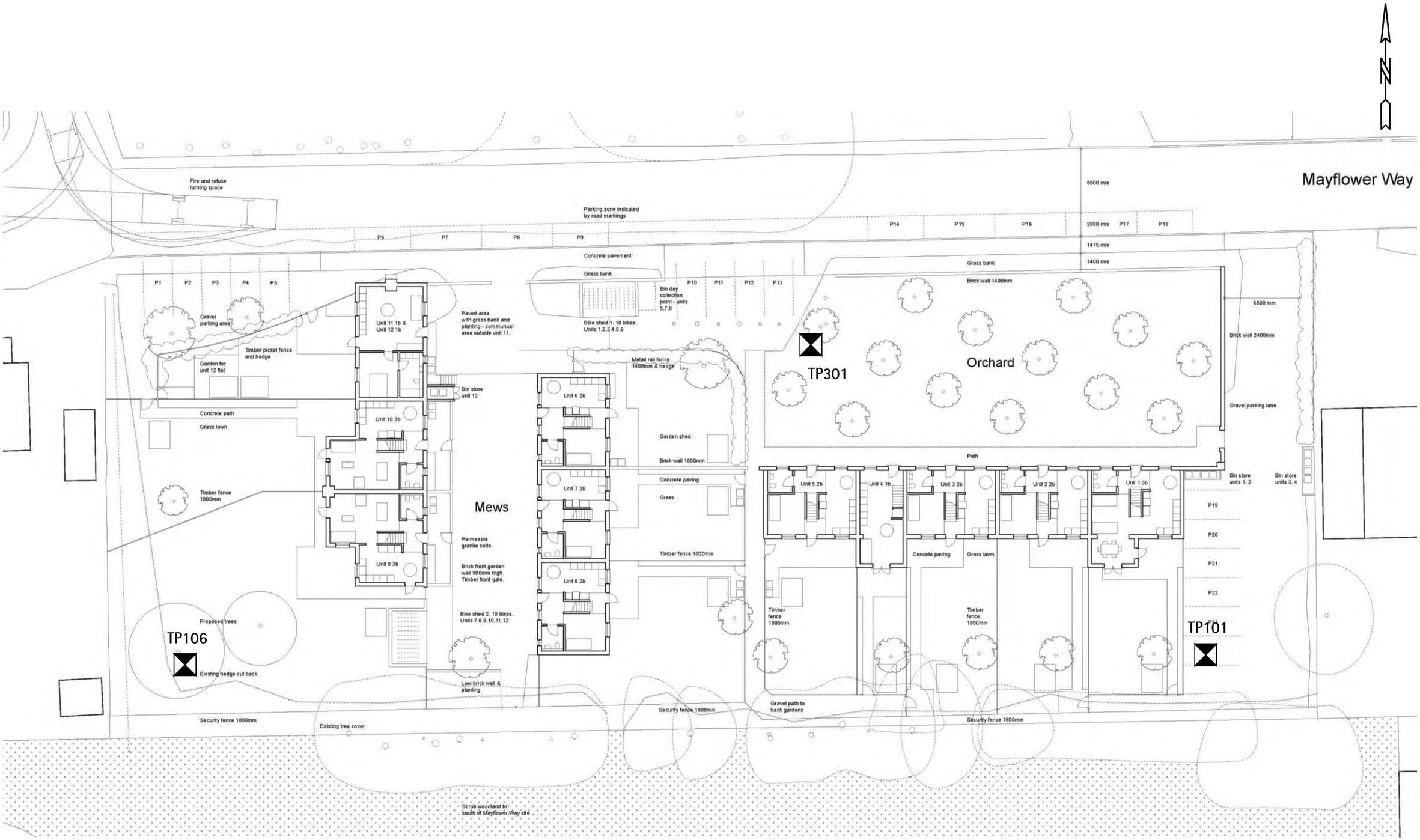
NB: Contains Ordnance Survey data © Crown copyright and database right 2020

Site: Land South of Mayflower Way, Angmering	STL: J14366	Fig No: 1
Date: 23 March 2020	Site Location Plan	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult



NB: Positions of Trial Pits are only indicative unless dimensioned

Site: Land South of Mayflower Way, Angmering, West Sussex	STL: J14366	Fig No: 2
Date: 23 March 2020	Site Plan – Soakage Test Locations (not to scale)	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult

Southern Testing ST Consult

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Start - End Date:	Project ID:	Machine Type:	TP301
10/03/2020	J14366	JCB 3X	Sheet 1 of 1

Project Name:	Land South of Mayflower Way	Remarks:	Co-ordinates:	Level (m AOD):	Logger:
Location:	Angmering, West Sussex				JD
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.15)		0.15	Soft greyish brown sandy gravelly CLAY. Gravel comprises fine to coarse angular flint, chalk and brick fragments. MADE GROUND
0.25	ES			(0.35)		0.50	Soft dark greyish brown gravelly SILT/CLAY. Gravel comprises fine to coarse brick fragments, chalk and ash. MADE GROUND
0.70	HP	UCS(kPa)=150		(1.00)		1.50	Firm (friable) reddish brown slightly sandy silty CLAY. Sand is fine.
1.45	D						Firm yellowish brown silty slightly sandy gravelly CLAY. Gravel comprises fine to medium subrounded flint and coarse angular to subangular flint (frost shattered flint). Sand is fine.
	HP	UCS(kPa)=130					
1.70	HP	UCS(kPa)=150					
2.40	HP	UCS(kPa)=130		(1.80)			
							2.8m -3.3m: Becoming very silty and slightly gravelly. Slightly damp.
2.90	D						
	HP	UCS(kPa)=100					
3.10	HP	UCS(kPa)=160				3.30	Pit terminated at 3.30m.

1 2 3 4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.55	Pit stable	Dry on completion.
Length:	1.90		
Depth:	3.30		

Southern Testing ST Consult

www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020

Start - End Date:	Project ID:	Machine Type:	TP101
24/07/2017	J13227	JCB 3CX	Sheet 1 of 1

Project Name:	Land South of Mayflower Way	Remarks:	Co-ordinates:	Level (m AOD):	Logger:
Location:	Angmering, West Sussex				DK
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
0.15	ES			(1.30)			Grass over MADE GROUND comprising brown sandy gravelly CLAY with abundant fine to coarse brick, tile, felt, concrete, barbed wire, timber, plastic fragments and whole re-inforced concrete fence posts. Fragments of asbestos containing materials in the form of cement sheeting were observed.	
1.00	ES							1
1.50	D HP	UCS(kPa)=270.00		(1.10)		1.30	Firm to stiff, high strength orange brown gravelly sandy CLAY. Gravels comprise fine to coarse subrounded to subangular flint.	
2.00	D PPT	N=12(450)					Becoming increasingly gravelly	2
2.50	PPT	N=13(450)		(0.50)		2.40	Medium dense orange brown clayey sandy GRAVEL. Gravels comprise fine to coarse subrounded to subangular flint.	
3.00	D			(0.60)		2.90	Medium dense, pale orange brown mottled white chalky fine to coarse sandy GRAVEL. Gravels comprise fine to coarse subrounded to subangular flint and fine to medium subrounded chalk.	3
3.50	D					3.50	Pit terminated at 3.50m.	4

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Unstable to 1.3m bgl due to the presence of made ground soils	Dry
Length:	2.20		
Depth:	3.50		

Southern Testing ST Consult

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Start - End Date:	Project ID:	Machine Type:	TP106
24/07/2017	J13227	JCB 3CX	Sheet 1 of 1

Project Name:	Land South of Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					DK
Location:	Angmering, West Sussex				
Client:	Angmering Community Land Trust				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
0.15	ES			(0.45)			Grass over MADE GROUND comprising brown sandy gravelly CLAY with abundant fine to coarse brick, tile, felt, concrete, timber, plastic fragments.
						0.45	
0.60	D HP	UCS(kPa)=360.00		(0.35)			Stiff, high strength, pale orange brown silty fine sandy CLAY.
						0.80	
1.00	D HP	UCS(kPa)=350.00		(0.60)			Stiff, high to very high strength orange brown sandy silty CLAY.
						1.40	
1.50	D PPT	N=17(450)					Stiff/Medium dense, orange brown silty CLAY/GRAVEL. Gravels comprise fine to coarse subrounded to subangular flint.
							Becoming increasingly gravelly
2.00	D PPT	N=14(450)		(1.60)			
2.50	D PPT	N=9(450)					
							Lenses of orange brown sandy CLAY
						3.00	Pit terminated at 3.00m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.45	Pit sides stable in the short term	Dry
Length:	2.10		
Depth:	3.00		

APPENDIX B – SOAKAGE TEST RESULTS

Summary Sheet

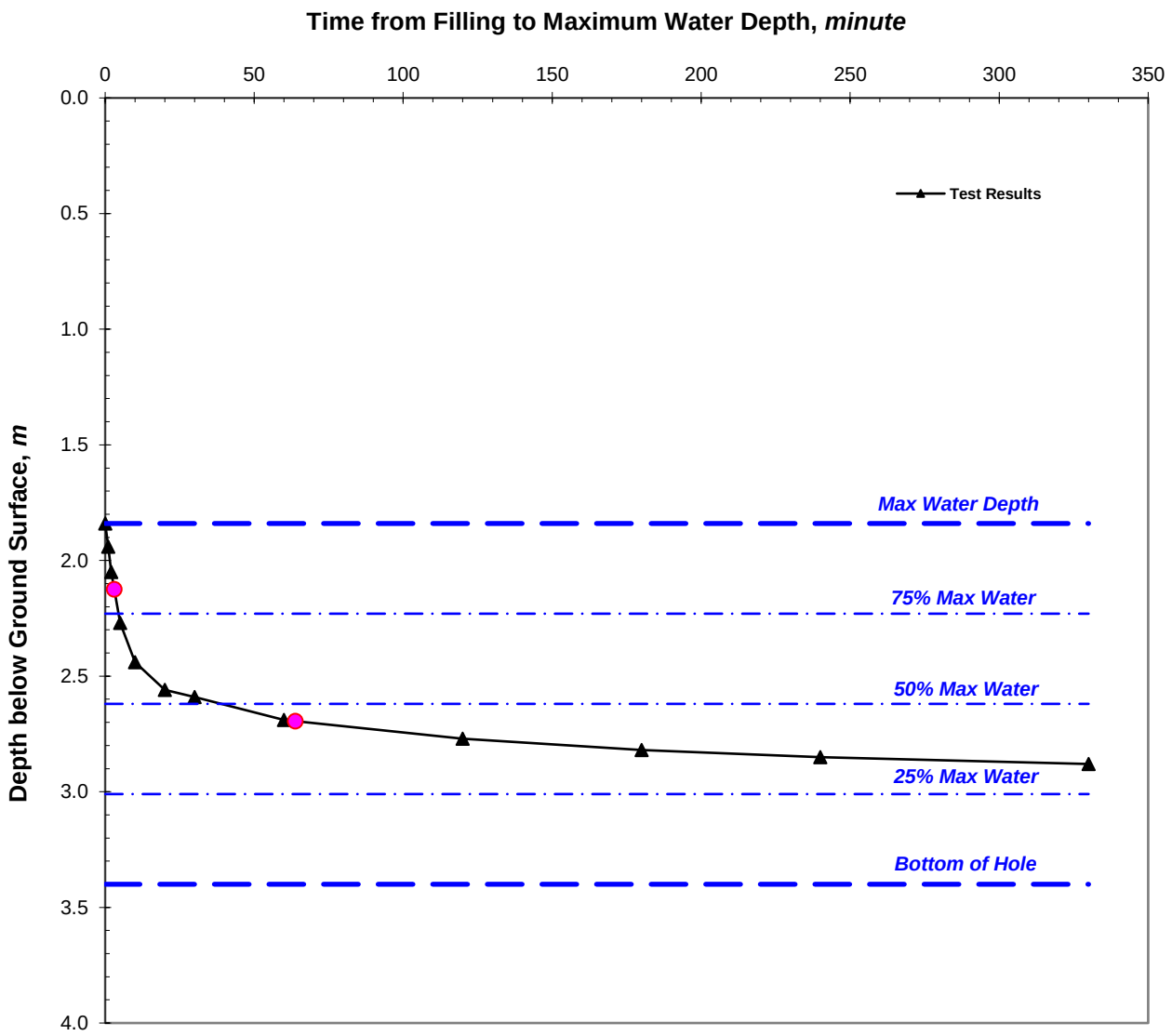
Results of BRE Digest DG365 Soakage Tests

Site :	Mayflower Way, Angmering	**Job No :**	J14366
Client :	Angmering Community Land Trust	**O S Reference :**	TQ 07262 03274
Tested By : RA	**Engineer:** CL	**Test Date :**	10/Mar/2020

Hole No	Test No	Hole Depth *m*	Soakage Rate for Each Test *litre/m² /min*	Soakage Rate for Each Hole *litre/m² /min*	Soakage Rate for Each Hole *m/sec*	Water Level at Finish of Test	Remarks
TP101	No 1	3.40	0.514	0.514	8.57E-6	Pit was not emptied; Non compliant value was calculated.	Depth to existing ground water level was 2.98m.
TP101	No 2	3.40	1.00			Pit was not emptied; Non compliant value was calculated.	
TP101	No 3	3.40	0.722			Pit was not emptied; Non compliant value was calculated.	
TP106	No 1	3.00	3.08	1.19	1.98E-5	Empty pit.	
TP106	No 2	3.00	1.23			Empty pit.	
TP106	No 3	3.00	1.19			Empty pit.	
TP301	No 1	3.30	0.250	0.250	4.16E-6	Nearly empty pit.	
TP301	No 2	3.30	0.313			Nearly empty pit.	
TP301	No 3	3.30	0.257			Nearly empty pit.	
Mean Value of All Calculated Soakage Rates :				**0.650** *litre/m² /min*	**1.08E-5** *m/sec*		

BRE Digest DG365 Soakage Test

Test Hole No: TP101
Test No: Test No 1 (Initial)



Pit Length, m	2.000	Depth to Water at Start of Test, *m*	1.840
Pit Width, m	0.450	Max Water Dropdown during Test, *m*	1.040
Depth to Pit Base, m	3.400	Total Soakage Test Time, *min*	330.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	5.751
Depth to Groundwater Surface, *m*	2.980	Discharge Rate, *litre/min*	2.957
Depth to Top of Granular Fill, *m*	1.500	Soakage Rate, *litre/m*^{2}*/min*	**0.514**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**8.57E-06**

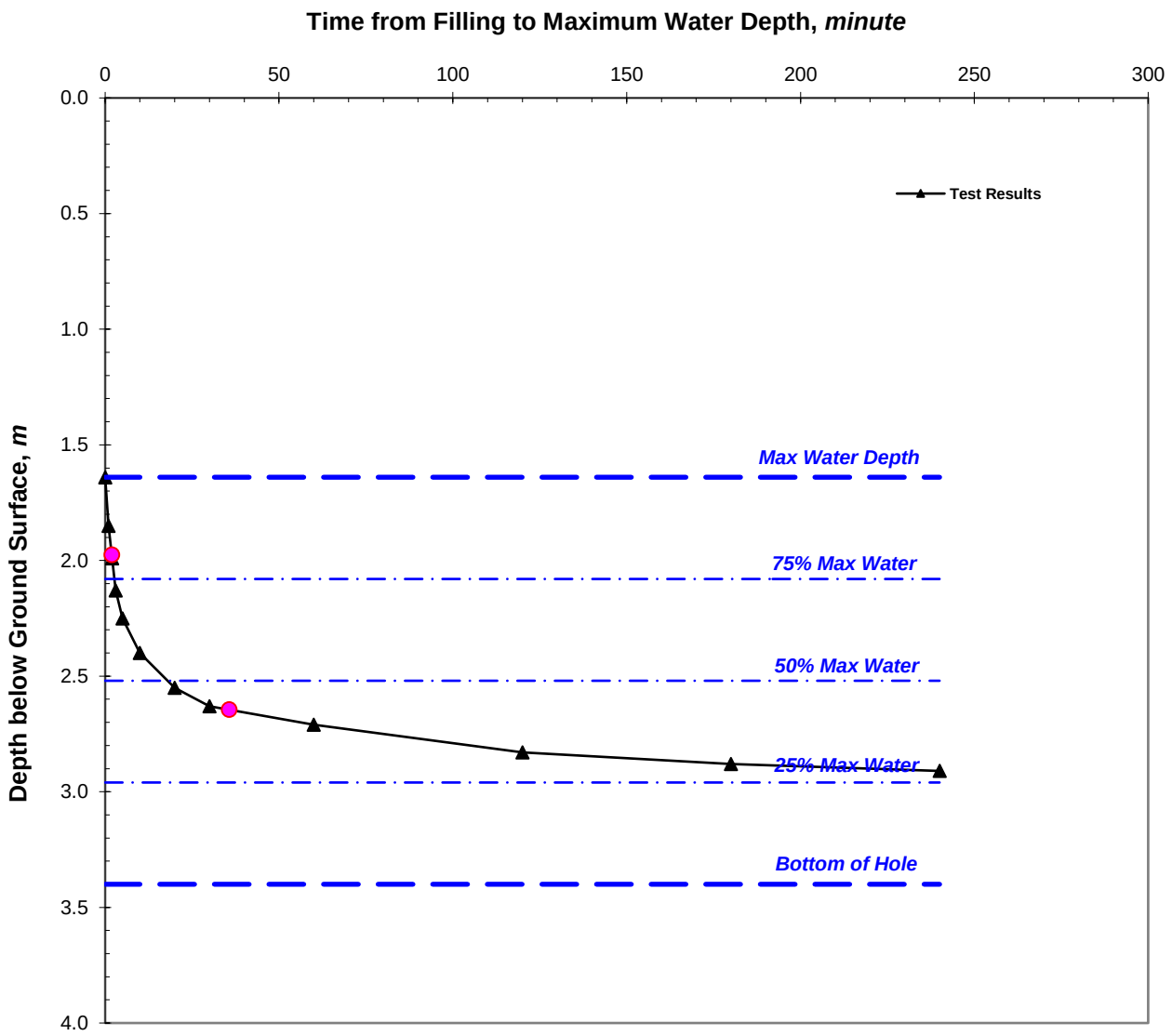
Comments:

Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	10/Mar/2020	
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig. S1**

BRE Digest DG365 Soakage Test

Test Hole No: TP101
Test No: Test No 2 (Repeated)



Pit Length, m	2.000	Depth to Water at Start of Test, *m*	1.640
Pit Width, m	0.450	Max Water Dropdown during Test, *m*	1.270
Depth to Pit Base, m	3.400	Total Soakage Test Time, *min*	240.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	6.241
Depth to Groundwater Surface, *m*	2.980	Discharge Rate, *litre/min*	6.257
Depth to Top of Granular Fill, *m*	1.500	Soakage Rate, *litre/m*^{2}*/min*	**1.00**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**1.67E-05**

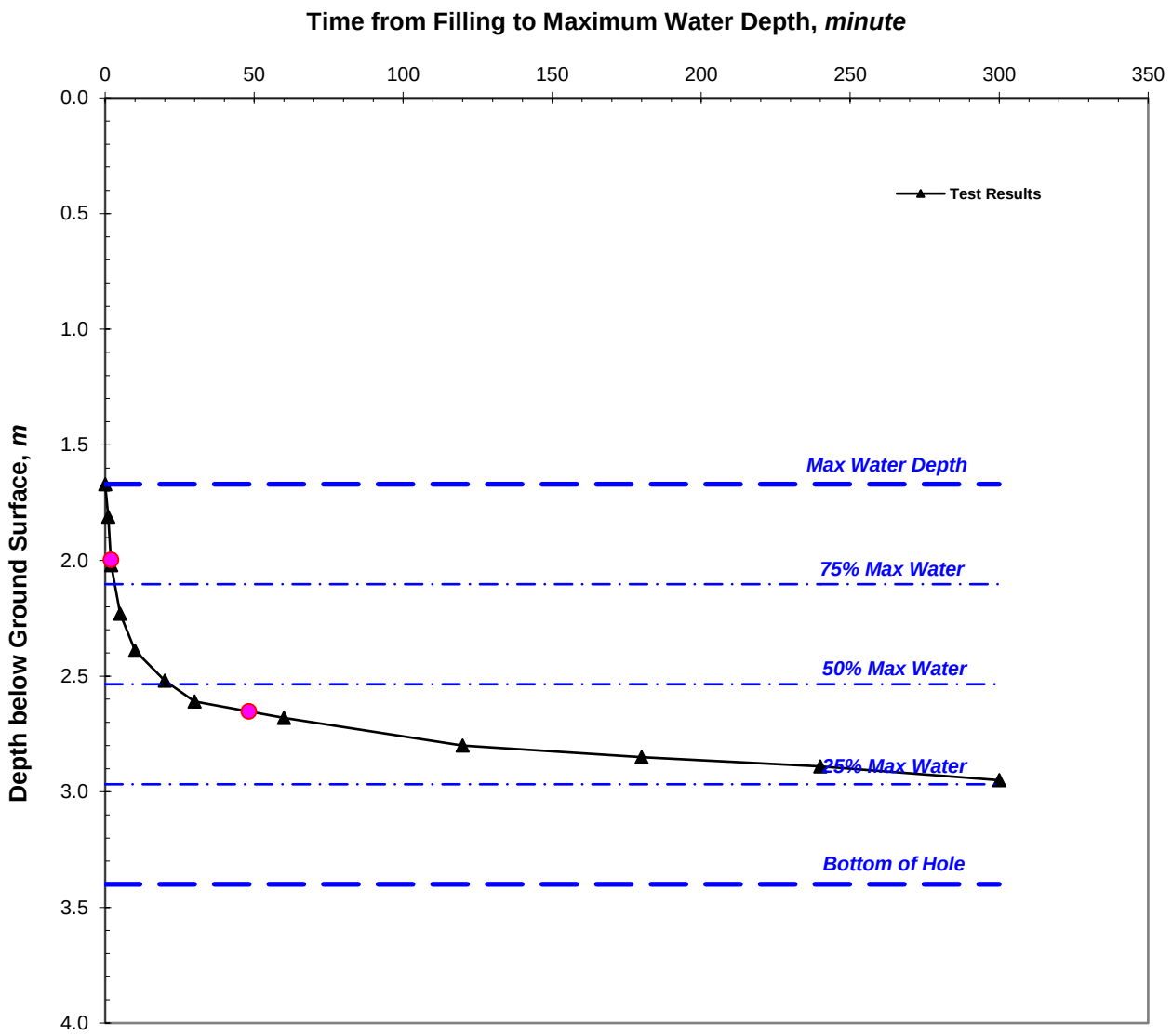
Comments:

Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	10/Mar/2020	
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig. S2**

BRE Digest DG365 Soakage Test

Test Hole No: TP101
Test No: Test No 3 (Repeated)



Pit Length, m	2.000	Depth to Water at Start of Test, *m*	1.670
Pit Width, m	0.450	Max Water Dropdown during Test, *m*	1.280
Depth to Pit Base, m	3.400	Total Soakage Test Time, *min*	300.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	6.168
Depth to Groundwater Surface, *m*	2.980	Discharge Rate, *litre/min*	4.454
Depth to Top of Granular Fill, *m*	1.500	Soakage Rate, *litre/m*^{2}*/min*	**0.722**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**1.20E-05**

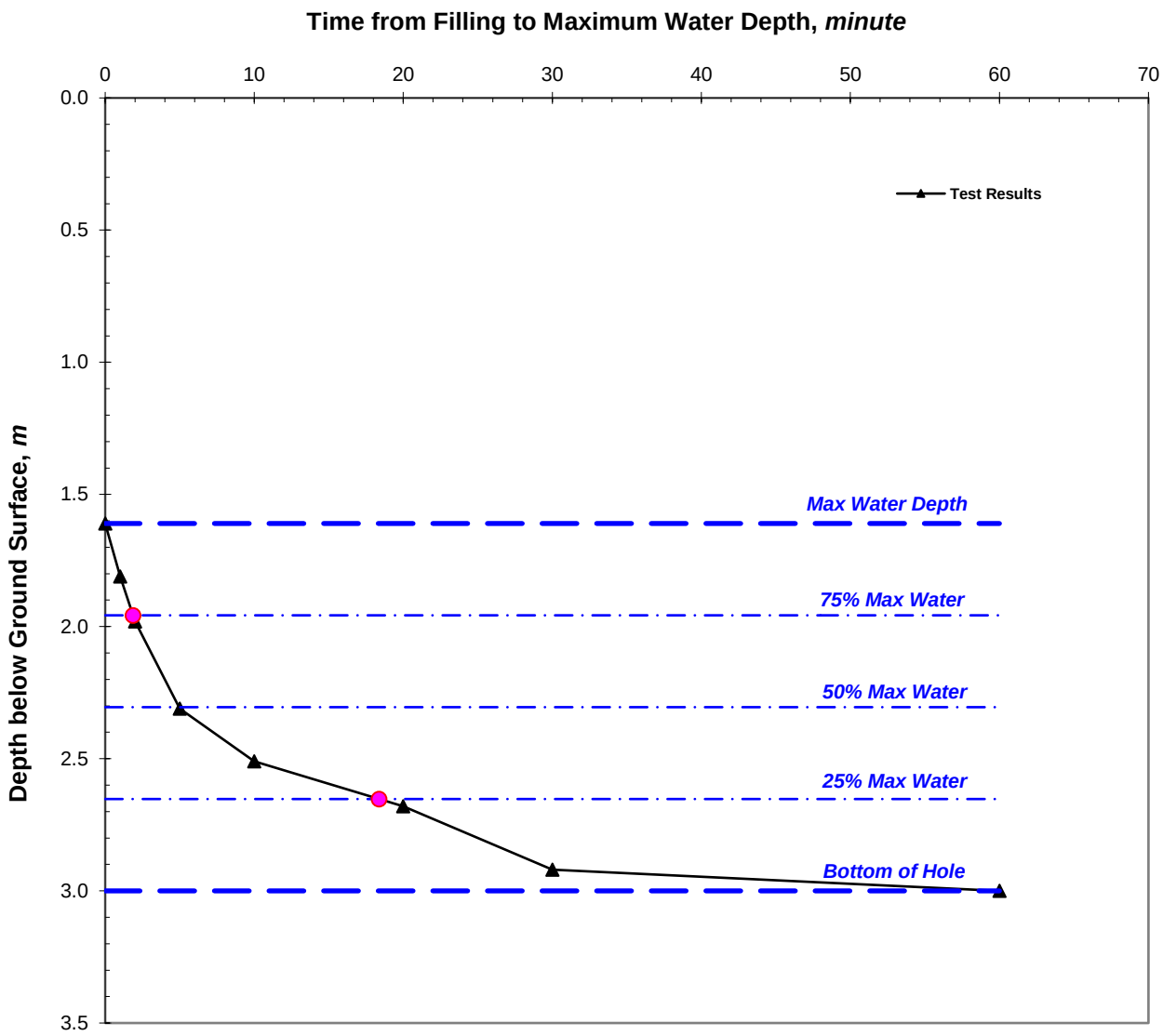
Comments:

Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	10/Mar/2020	
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig. S3**

BRE Digest DG365 Soakage Test

Test Hole No: TP106
Test No: Test No 1 (Initial)



Pit Length, m	2.000	Depth to Water at Start of Test, *m*	1.610
Pit Width, m	0.450	Max Water Dropdown during Test, *m*	1.390
Depth to Pit Base, m	3.000	Total Soakage Test Time, *min*	60.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.306
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	13.256
Depth to Top of Granular Fill, *m*	1.100	Soakage Rate, $litre/m^2/min$	**3.08**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**5.13E-05**

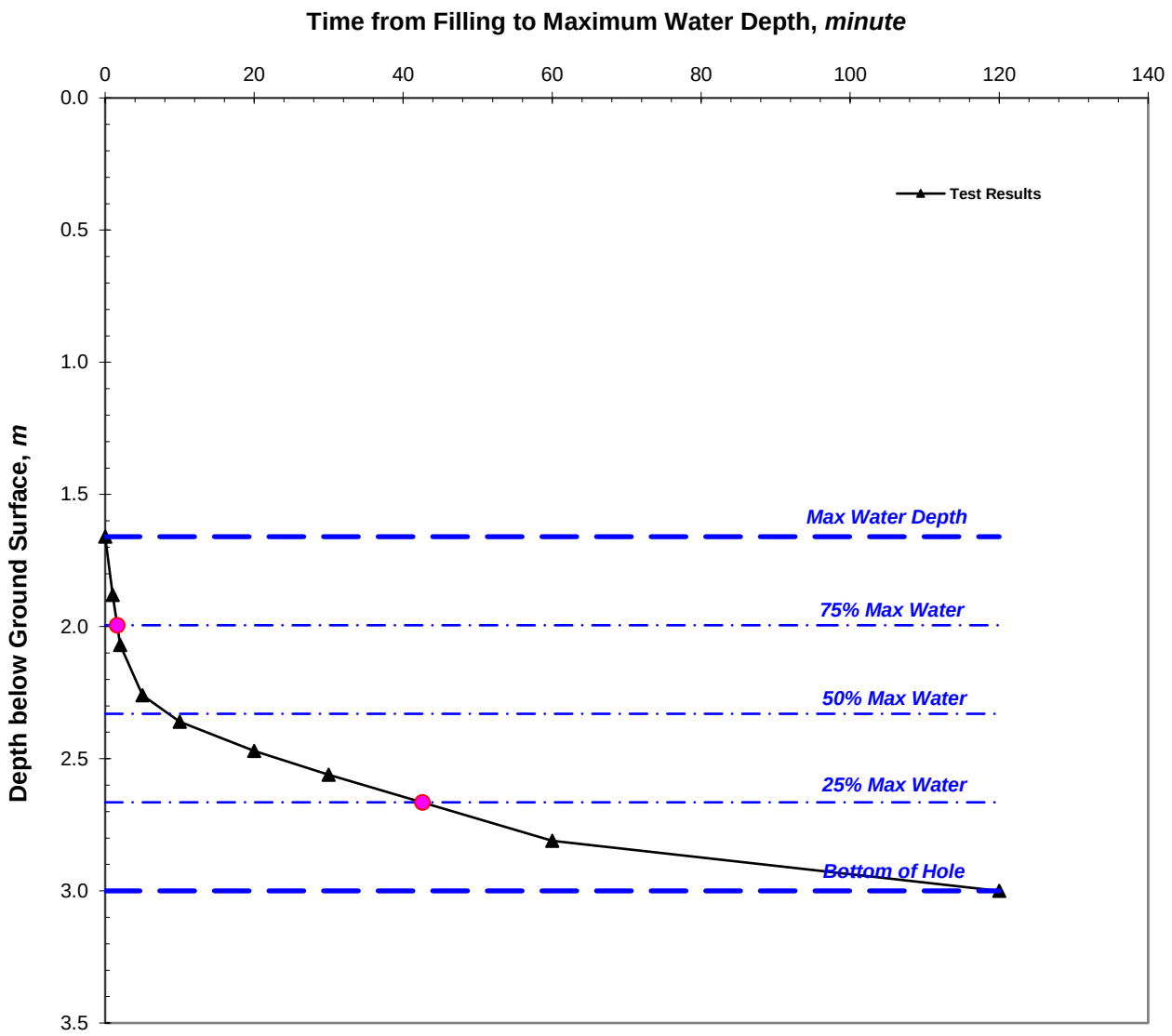
Comments:

Pit was emptied at finish of test.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	10/Mar/2020		
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig.**	**S4**

BRE Digest DG365 Soakage Test

Test Hole No: TP106
Test No: Test No 2 (Repeated)



Pit Length, m	2.000	Depth to Water at Start of Test, *m*	1.660
Pit Width, m	0.450	Max Water Dropdown during Test, *m*	1.340
Depth to Pit Base, m	3.000	Total Soakage Test Time, *min*	120.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.183
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	5.148
Depth to Top of Granular Fill, *m*	1.100	Soakage Rate, $litre/m^2/min$	**1.23**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**2.05E-05**

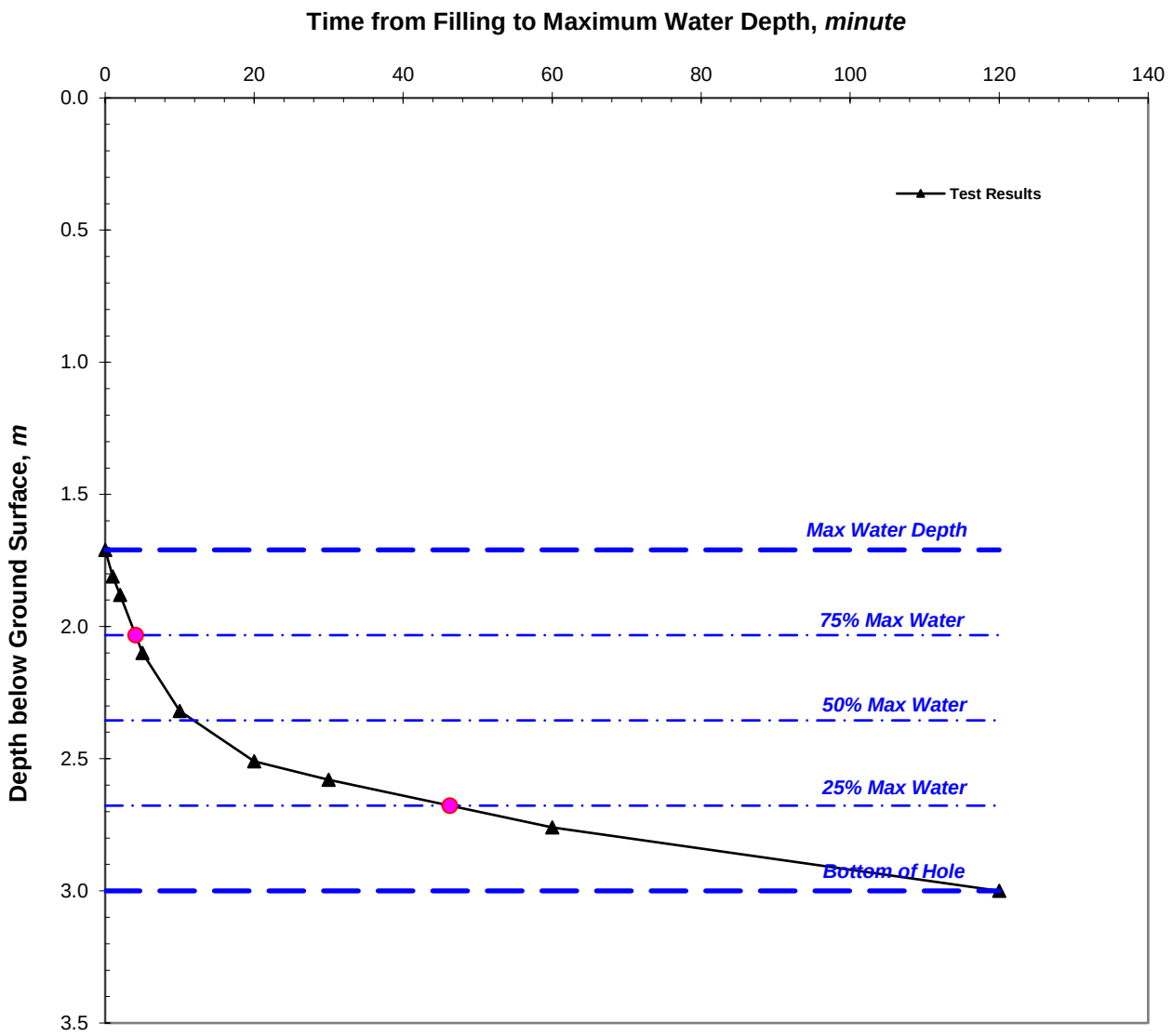
Comments:

Pit was emptied at finish of test.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	11/Mar/2020		
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig.**	**S5**

BRE Digest DG365 Soakage Test

Test Hole No: TP106
Test No: Test No 3 (Repeated)



Pit Length, m	2.000	Depth to Water at Start of Test, *m*	1.710
Pit Width, m	0.450	Max Water Dropdown during Test, *m*	1.290
Depth to Pit Base, m	3.000	Total Soakage Test Time, *min*	120.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.061
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	4.818
Depth to Top of Granular Fill, *m*	1.100	Soakage Rate, $litre/m^2/min$	**1.19**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**1.98E-05**

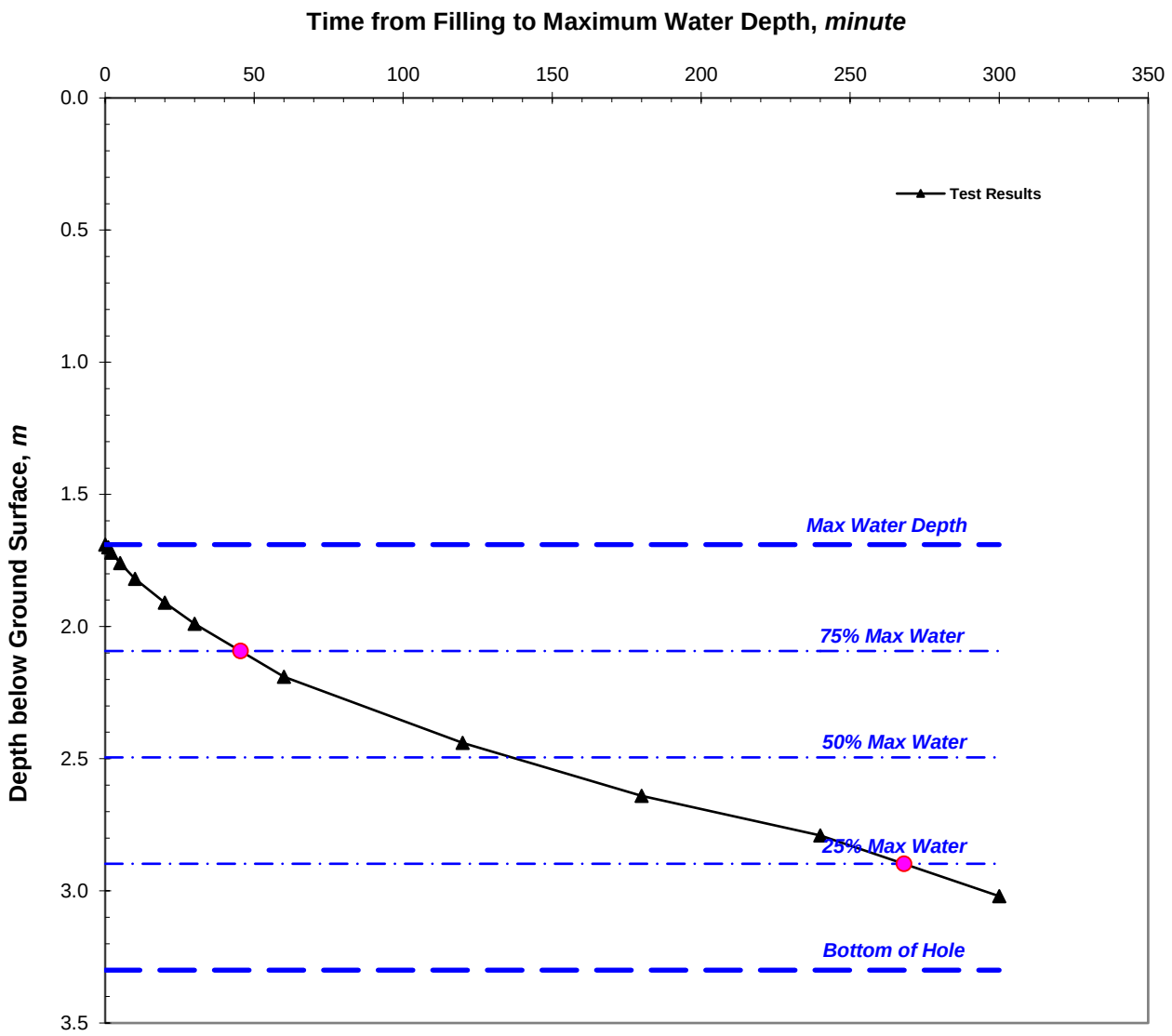
Comments:

Pit was emptied at finish of test.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	12/Mar/2020		
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig.**	**S6**

BRE Digest DG365 Soakage Test

Test Hole No: TP301
Test No: Test No 1 (Initial)



Pit Length, m	1.900	Depth to Water at Start of Test, *m*	1.690
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.330
Depth to Pit Base, m	3.300	Total Soakage Test Time, *min*	300.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.814
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.202
Depth to Top of Granular Fill, *m*	1.550	Soakage Rate, $litre/m^2/min$	**0.250**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**4.16E-06**

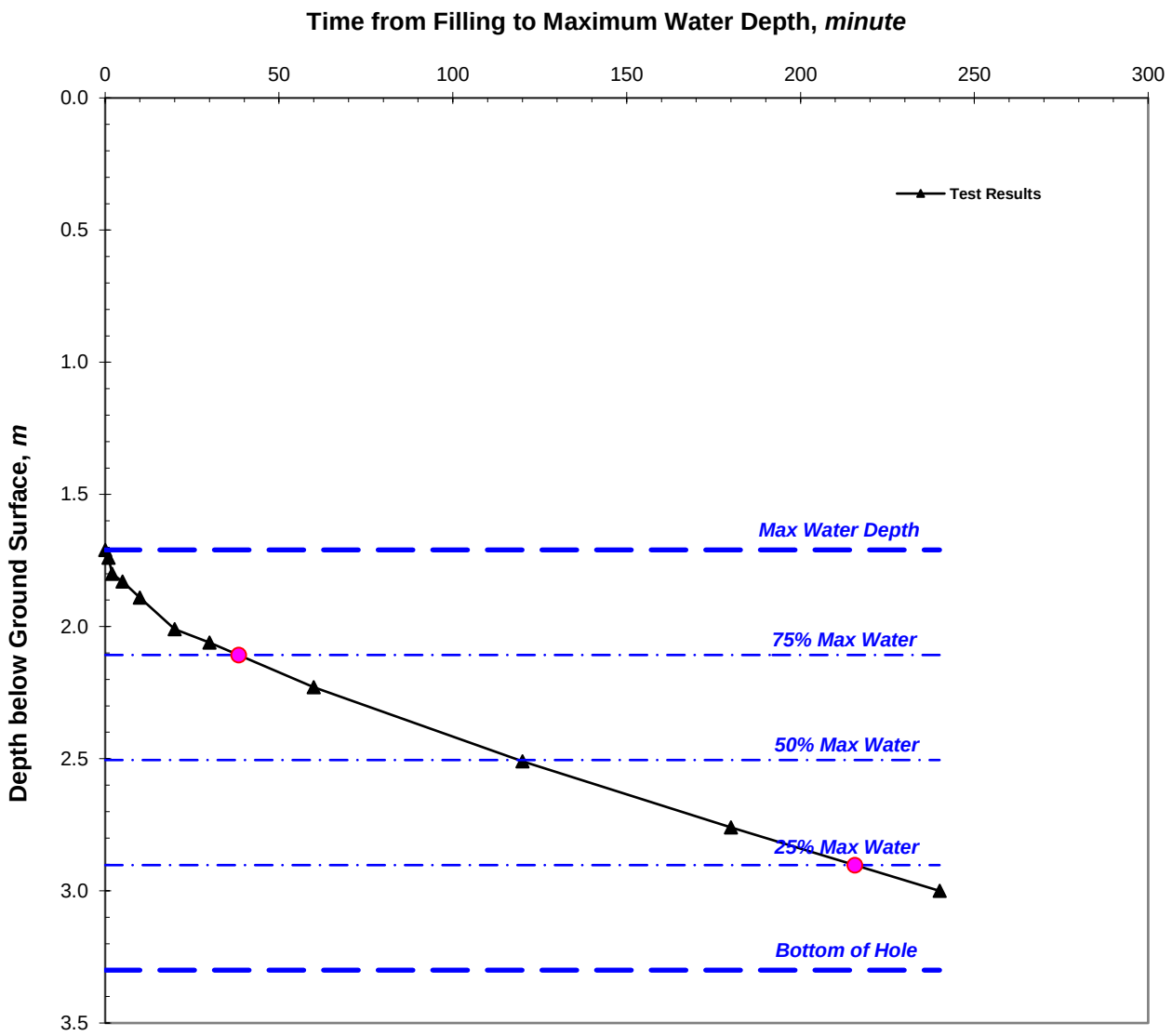
Comments:

Pit was nearly emptied at finish of test.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	10/Mar/2020		
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig.**	**S7**

BRE Digest DG365 Soakage Test

Test Hole No: TP301
Test No: Test No 2 (Repeated)



Pit Length, m	1.900	Depth to Water at Start of Test, *m*	1.710
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.290
Depth to Pit Base, m	3.300	Total Soakage Test Time, *min*	240.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.766
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.491
Depth to Top of Granular Fill, *m*	1.550	Soakage Rate, $litre/m^2/min$	**0.313**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**5.22E-06**

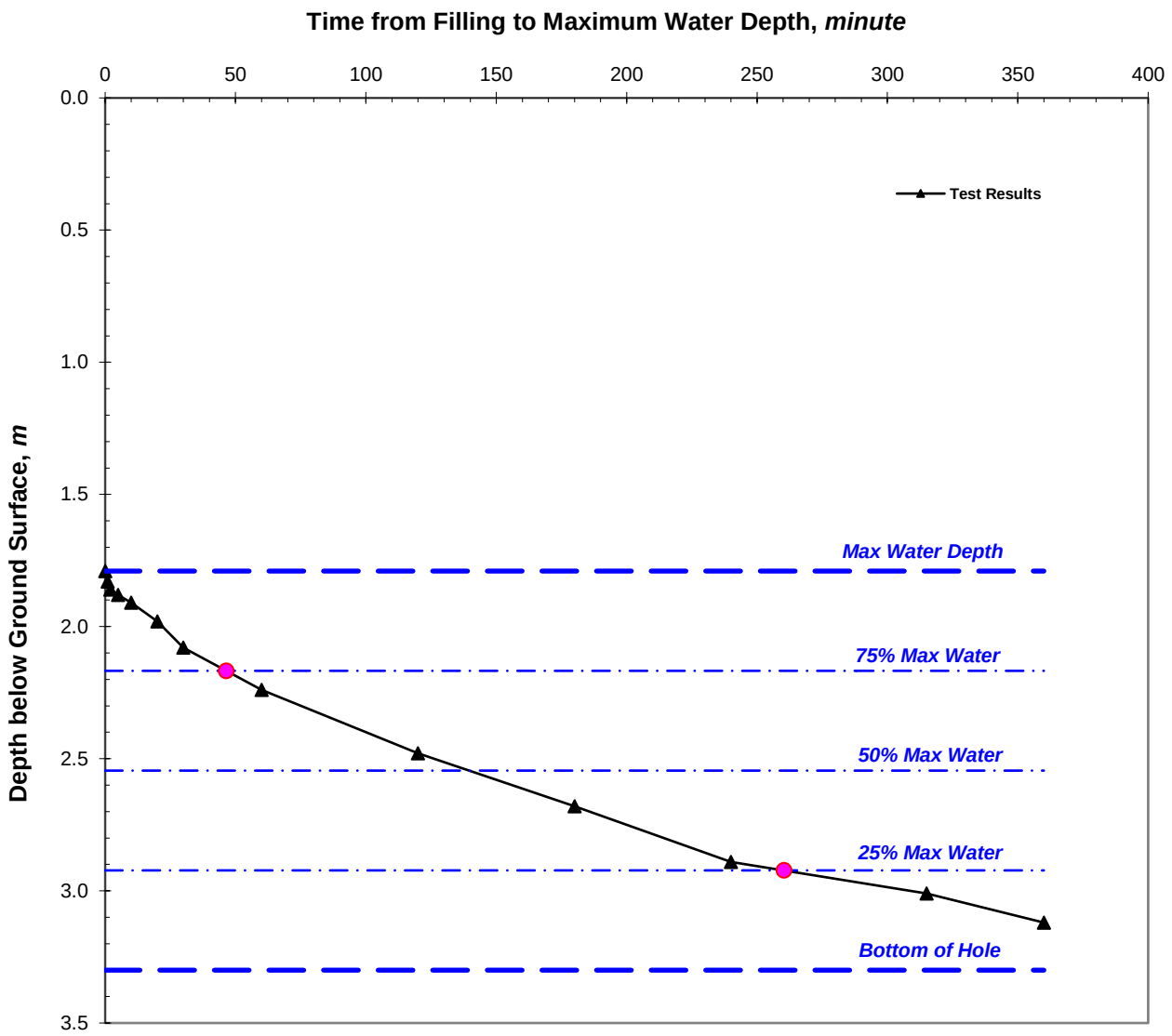
Comments:

Pit was nearly emptied at finish of test.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	11/Mar/2020	
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig. S8**

BRE Digest DG365 Soakage Test

Test Hole No: TP301
Test No: Test No 3 (Repeated)



Pit Length, m	1.900	Depth to Water at Start of Test, *m*	1.790
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.330
Depth to Pit Base, m	3.300	Total Soakage Test Time, *min*	360.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.574
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.174
Depth to Top of Granular Fill, *m*	1.550	Soakage Rate, $litre/m^2/min$	**0.257**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**4.28E-06**

Comments:

Pit was nearly emptied at finish of test.

Client:	Angmering Community Land Trust	**Job No:**	J14366	**Test Date:**	12/Mar/2020		
Site:	Land South of Mayflower Way, Angmering	**Tested By:**	RA	**Engineer:**	CL	**Fig.**	**S9**

Appendix D

March 2021 Infiltration Tests Report

ARUN DISTRICT COUNCIL A/55/21/DOC

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

Factual Soakage Report

Project Name: Land off of Mayflower Way, Angmering

Location: West Sussex, BN16 4AY

Client: Angmering Community Land Trust

Project ID: J14710

Report Date: 04 March 2021

Report Issue: 1

ARUN DISTRICT COUNCIL A/55/21/DOC

Author	S Marshall BSc (Hons) FGS	
Check / Review	C Lennard BEng (Hons)	

For and on behalf of Southern Testing Laboratories Limited

DOCUMENT HISTORY AND STATUS

Issue No.	Date	Purpose or Status	Author	Check / Review
1	04/03/21	Factual Soakage Report	SM	CL

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APPENDIX C
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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a Howse Wallis Partnership, Confirmation of Instruction, signed by Mr B Howse, dated 28th January 2021, on behalf of the Angmering Community Land Trust.

2 Location

The site is located approximately 0.5km north east of Angmering Railway Station (as indicated on Figure 1 within Appendix A). The approximate National Grid Reference of the site is TQ 07262 03274.

3 Object

This is a factual infiltration test report. The object of this supplementary investigation was to further assess the soakage potential of the underlying soils on site.

The site has been the subject of a number of previous investigations/reports as detailed below, to which the reader is referred.

- Desk Study, Site Investigation & Risk Assessment Report (ref. J13227, dated 25th August 2017)
- Soakage Test Report (ref. J13227, dated April 2018)
- Supplementary Contamination Letter Report (ref. JD/SKT/BC/J14366, dated 22nd May 2020)
- BRE365 Soakage Test Report (ref. J14366 v2, dated 4th June 2020)

4 Scope

This factual report presents our exploratory hole logs and soakage test results only.

A UXO risk assessment was not requested within our brief for the investigation.

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 ground/site investigation has been completed with reference to BS 5930 Ref [1] and BS 10175 Ref [2].

Contamination / Geotechnical issues are not considered in this report.

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 the Angmering Community Land Trust 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.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

ARUN DISTRICT COUNCIL A/55/21/DOC

B SITE SETTING AND DESCRIPTION

4.1 Geology

The British Geological Survey Map of the area (sheet No. 317/332 – Chichester & Bognor) indicates that the site geology consists of superficial deposits of Brickearth over superficial River Terrace Deposits over the New Pit Chalk Formation.

4.1.1 Brickearth

Brickearth (loess deposit) is a recent deposit which is so called as it is suited to brick manufacture. It is predominantly an aeolian deposit; formed during cold, dry climatic conditions. There is evidence that brickearth has been reworked as part of 'sheet flooding' which helped incorporate flint gravels into the deposit. Brickearth consists mainly of ferruginous silty clay, which is often sandy and may contain some finely divided chalk, scattered flints and gravelly seams, or other locally derived material. It is usually poorly consolidated and may contain numerous hollow root tubes and worm burrows.

4.1.2 River Terrace Deposits

The River Terrace Deposits are of fluviatile origin and were laid down by rivers when the climate was much wetter and cooler than at present. The terraces consist of sheets of gravel and sand with an overlying deposit of Brickearth (really an ancient alluvium). Some variability in soils is to be expected at junctions with the various terraces, as riverbanks existed there. The remains of these former riverbanks can be soft and silty or contain clay.

4.1.3 New Pit Chalk Formation

The New Pit Chalk Formation typically comprises a blocky creamy white, smooth textured chalk with well-developed marl seams. Small finger shaped flint occurs sporadically in the lower part of the sequence. Conjugate fractures are usually clay-coated and slickensided, reflecting the presence of many clay-rich marl seams.

The White Chalk outcrop in particular is frequently highly fractured and highly permeable, and usually has good infiltration characteristics. On the other hand, Chalk Head, highly weathered Chalk and Chalk under a low permeability superficial cover may have very poor infiltration characteristics.

Chalk is slightly soluble in water and, while it has excellent bearing properties when unweathered, this solubility can lead to deep weathering and softening, and the upper layers of chalk often have an irregular boundary with overlying strata

The Chalk may be softened by solution to a depth of 5 to 15 metres and bearing capacities and engineering properties improve with depth. Where there is an outcrop of impermeable soil overlying the chalk there may be a dramatically increased solution effect due to concentrated surface water flow to the Chalk close to the outcrop boundary.

Solution features are common in the Chalk, and these can present significant difficulties to development on affected sites.

Man has also worked the chalk for flints, and for other purposes, for thousands of years and any signs of old workings should be carefully investigated.

4.2 UXO Risk Management

The agreed scope of work did not allow for either a preliminary or detailed UXO risk assessment.

By way of comment, the possibility of unexploded ordnance (UXO) being encountered on a site falls within the category of a potentially significant risk and should be addressed as a legal duty under the Construction (Design and Management) Regulations by the Client as early as possible in a project.

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.

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5 Site Description

The site, which is roughly rectangular in shape and extends to a maximum of approximately 100m × 40m, currently comprises an area of vacant land. The northern site boundary is marked by an earth bund approximately 1.0-1.5m in height, beyond which is Mayflower Way. To the east and west of the site are residential properties. The southern site boundary is marked by a line of trees/a hedgerow and an area of similar undeveloped land, beyond which is Roundstone By-Pass Road (A259). At the time of the investigation a construction site was present to the north of the site on the opposite side of Mayflower Road.

On a regional scale the topography of the local area slopes down gently to the south and the coast. The topography of the site, although slightly uneven under foot is relatively flat and level. An earth bund approximately 1.0-1.5m high is present along the northern site boundary.

The site is generally covered in grass with occasional weeds and shrubs throughout. The southern site boundary is marked by a mixture of semi-mature to mature trees.

5.1 Site Photographs

A series of photographs showing the site and surrounding area at the time of our investigation is included in Appendix C.

C GROUND INVESTIGATION

6 Strategy and Method

The strategy adopted for the intrusive investigation comprised the following:

Activity / Method	Purpose	Max Depth Range (mbgl)	Installations / Notes
TP501-504 JCB 3CX	Trial pit to investigate the shallow ground conditions and allow for assessment of soakage potential using the BRE365 method.	1.0/2.6	BRE365 Soakage tests gravel filled

Exploratory hole locations were specified by the Clients Engineer and 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.

7 Weather Conditions

The fieldwork was carried out between 15th and 17th February 2021, at which time the weather was generally overcast with light rain in the morning and overcast but dry later on. Average rainfall records indicate that rainfall in the South East of England was less than average during the month of November 2020. However, December 2020 and January 2021 were generally wetter than average.

8 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 Made Ground over a silty Clay, over a silty, gravelly, Clay. A summary is given below.

Depth (m bgl)	Soil Type	Description
GL to 0.4/0.7m	Made Ground	Greyish brown to dark grey, silty, sandy, gravelly, CLAY. Gravel comprises fragments of brick, concrete, plastic, metal, blacktop and flint (MADE GROUND).
0.4/0.7m to 1.0/2.1m	Silty, slightly sandy Clay	Firm, brown to pale orange brown, silty, slightly sandy, CLAY.

ARUN DISTRICT COUNCIL A/55/21/DOC

Depth (m bgl)	Soil Type	Description
1.9/2.1m to 2.6m+	Silty, slightly sandy, gravelly Clay (TP501 & TP502 only)	Firm, brown to pale orange brown, silty, slightly sandy, gravelly, CLAY. Gravel comprises medium to coarse, sub-angular, flint.

8.1 Visual and Olfactory Evidence of Contamination

Whilst contamination issues are outside of the scope of this report, and have been reported under separate cover, by way of comment, made ground was noted in all of the exploratory holes. This comprises predominately silty, sandy, gravelly, Clay material, but included fragments of brick, concrete, plastic, metal, blacktop and flint gravel. No obvious contamination was encountered based on only a visual ad olfactory assessment. However, such soils can often contain elevated contaminant concentrations of heavy metals, Polyaromatic Hydrocarbons, asbestos, etc. which can only be detected through laboratory analysis, which was outside of the scope of this investigation.

9 Groundwater Levels

No groundwater was encountered during the course of this investigation.

By way of comment, groundwater levels vary considerably from season to season and year to year, often rising close to the ground surface in wet or winter weather, and falling in periods of drought. Long-term monitoring from boreholes or standpipes is required to assess the groundwater regime and this was not possible during the course of this site investigation.

10 Soakaways

10.1 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 twelve individual BRE365 soakage tests were carried out across the site, which comprises three tests in each of the four trial pits (TP501-504) 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 and the lowest rate from each trial pit is summarised in the table below.

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 infiltration rate from each trial hole is summarised in the table below. The soakage rate in this report in 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/m²/minute	m/sec	
TP501	2.6	1.40	2.33×10^{-5}	Three tests completed.
TP502	2.6	0.240	3.99×10^{-6}	Three tests completed.
TP503	1.0	3.79	6.31×10^{-5}	Three tests completed.
TP504	1.0	0.68	1.13×10^{-5}	Three tests completed.

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

Where three fillings have not been carried out, a reduction factor should be applied to the result to provide a design infiltration rate.

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10.2 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. Longer term monitoring may be required to establish actual groundwater levels as part of the planning approval process.

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.

Generally, roof and surface run-off should not significantly impact on groundwater quality and subject to appropriate approvals from the Environment Agency could be discharged directly to soakaways. However, although again subject to approvals from the Environment Agency, paved surface run-off for larger trafficked areas should generally be passed through a suitable form of oil interception device prior to discharge to the soakaway.

Care must be taken to ensure that the discharge of large volumes of surface run-off into the soil does not disrupt the existing sub-surface drainage patterns. Similarly in areas of sloping topography, consideration should be given to the siting of soakaways to avoid potential discharge and or flooding of down slope areas.

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REFERENCES

[1] BSI Standards, “BS 5930 Code of practice for ground investigations,” 2015.

[2] BSI Standards, “BS10175 Investigation of potentially contaminated sites – Code of practice,” 2013.

[3] CIRIA, “C681 Unexploded Ordnanace (UXO) A guide for the construction industry,” 2009.

[4] Building Research Establishment (BRE), “DG365 Soakaway Design,” 2016.

[5] BSI Standards, “BS 3882:2015 Specification for Topsoil,” 2015.

[6] CIRIA, “C574 Engineering in Chalk,” 2002.

[7] R. N. Mortimore, Logging the Chalk, 2014.

[8] 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 and Exploratory Hole Logs

A

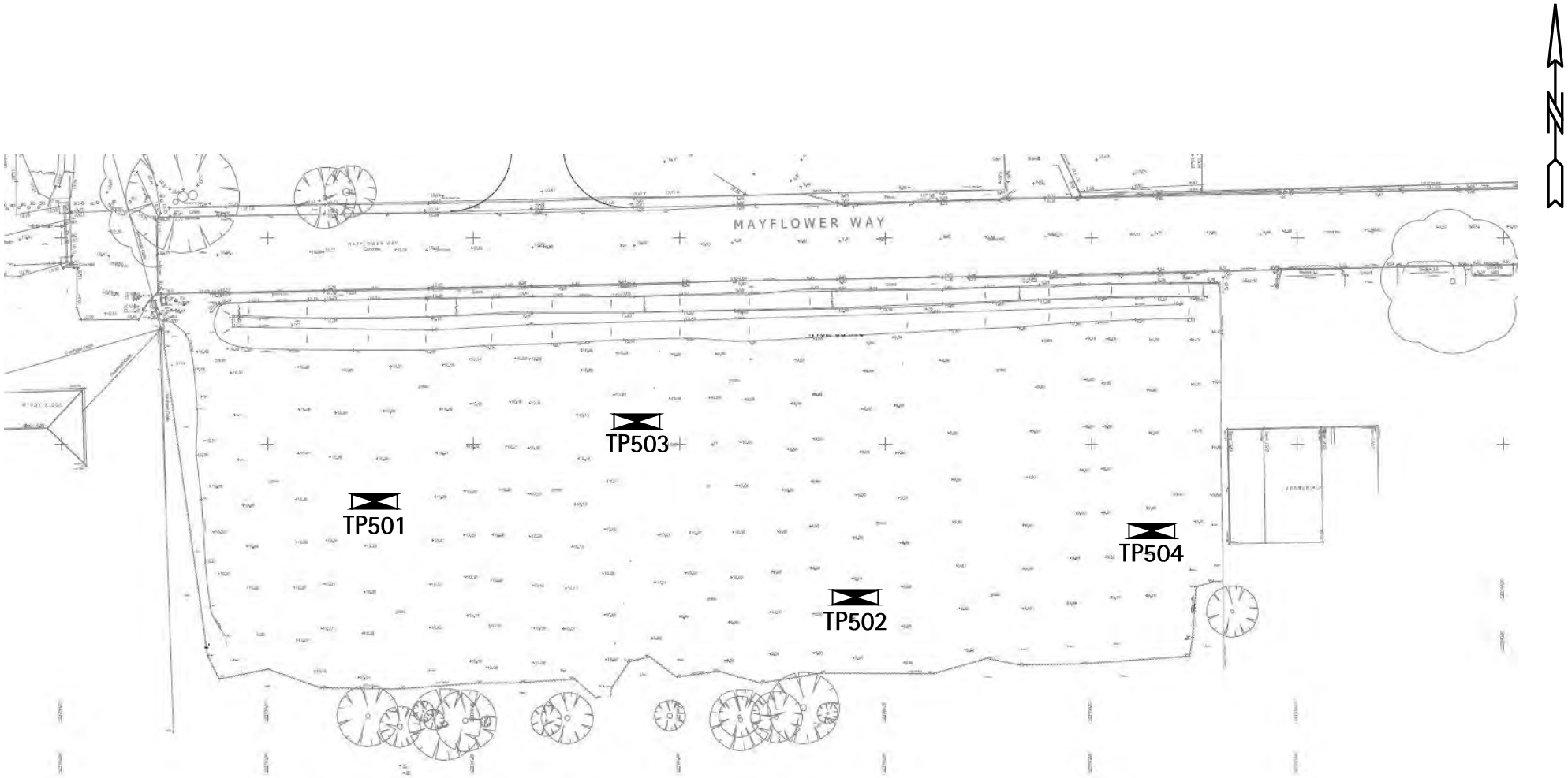
NB: Contains Ordnance Survey Data© Crown copyright and database right 2021

Site:	Land off of Mayflower Way, Angerming, BN16 4AY	STL: J14710	Fig No: 1
Date:	15th February 2021	Site location plan.	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult



NB: Positions of Trial Pits are only indicative unless dimensioned

Site: Land off of Mayflower Way, Angmering, BN16 4AY	STL: J14710	Fig No: 2
Date: 15th February 2021	Site plan showing approximate exploratory hole locations.	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP501
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	15/02/2021	J14710	JCB-3CX	Sheet 1 of 1

			Co-ordinates:	Level (m AOD):	Logger:
Project Name:	Land off of Mayflower Way	**Remarks:**			SM
Location:	Angmering, BN16 4AY				
Client:	The Howse Wallis Partnership				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.70)			Dark brown to greyish brown, sandy, gravelly, CLAY. Gravel comprises fragments of brick, concrete, plastic, metal and flint. MADE GROUND
						0.70	Firm, brown to pale orange brown, silty, slightly sandy, CLAY.
1.00	D HP	UCS(kPa)=50					
				(1.40)			
1.50	D HP	UCS(kPa)=170					
2.00	D HP	UCS(kPa)=130				2.10	Firm, brown to pale orange brown, slightly silty, gravelly, CLAY. Gravel comprises medium to coarse, sub-angular flint.
				(0.50)			
2.50	D						
2.60	HP	UCS(kPa)=100				2.60	Pit terminated at 2.60m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.50	1. Trial pit sides stable upon completion of excavation.	1. Trial pit dry upon completion of excavation.
Length:	1.80		
Depth:	2.60		

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP502
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	15/02/2021	J14710	JCB-3CX	Sheet 1 of 1

			Co-ordinates:	Level (m AOD):	Logger:
Project Name:	Land off of Mayflower Way	**Remarks:**			SM
Location:	Angmering, BN16 4AY				
Client:	The Howse Wallis Partnership				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
				(0.40)		0.40	Greyish brown to dark grey, silty, sandy, gravelly, CLAY. Gravel comprises fragments of brick, concrete and flint. MADE GROUND	
1.00	D HP	UCS(kPa)=70		(1.50)		1.90	Firm, brown to pale orange brown, silty, slightly sandy, CLAY.	1
2.00	D HP	UCS(kPa)=50		(0.70)		2.60	Firm brown to pale orange brown, silty, slightly sandy, CLAY, with occasional medium to coarse, sub-angular flint gravel.	2
							Pit terminated at 2.60m.	3

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.50	1. Trial pit sides stable upon completion of excavation.	1. Trial pit dry upon completion of excavation.
Length:	1.80		
Depth:	2.60		

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP503
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	15/02/2021	J14710	JCB-3CX	Sheet 1 of 1

			Co-ordinates:	Level (m AOD):	Logger:
Project Name:	Land off of Mayflower Way	**Remarks:**			SM
Location:	Angmering, BN16 4AY				
Client:	The Howse Wallis Partnership				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.60)			Greyish brown to dark grey, silty, sandy, gravelly, CLAY. Gravel comprises fragments of brick, concrete and flint. MADE GROUND
						0.60	
				(0.40)			Firm, pale orange brown, silty, slightly sandy, CLAY.
1.00	D					1.00	Pit terminated at 1.00m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.50	1. Trial pit sides stable upon completion of excavation.	1. Trial pit dry upon completion of excavation.
Length:	1.80		
Depth:	1.00		

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP504
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	15/02/2021	J14710	JCB-3CX	Sheet 1 of 1

Project Name:	Land off of Mayflower Way	**Remarks:**	**Co-ordinates:**	**Level (m AOD):**	**Logger:**
					SM
Location:	Angmering, BN16 4AY				
Client:	The Howse Wallis Partnership				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
Depth (m)	Type	Results						
				(0.40)			Greyish brown to dark grey, silty, sandy, gravelly, CLAY. Gravel comprises fragments of brick, blacktop and flint. MADE GROUND	
						0.40		
				(0.60)			Firm, brown to pale orange brown, silty, slightly sandy, CLAY.	
1.00	D					1.00	Pit terminated at 1.00m.	1
								2
								3

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:	0.50	1. Trial pit sides stable upon completion of excavation.	1. Trial pit dry upon completion of excavation.
Length:	1.20		
Depth:	1.00		

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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 (%) RQD]	
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	
BH	Borehole (undefined)
CP	Cable Percussive
RC	Rotary Core
RO	Rotary Open Hole
ODC	Rotary Odex/Symmetrix drilling cased
CP+RC	Cable Percussive to Rotary Core
SNC	Sonic
CFA	Continuous Flight Auger
FA	Flight Auger
VC	Vibro Core
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core
WLS	Windowless Sampler
WS	Window Sampler
HA	Hand Auger
C	Road / Pavement Core
IP	Inspection Pit (Hand Excavation)
TP	Trial Pit (Machine Excavated)
OP	Observation Pit (Supported Excavation Hand or Machine)

In-situ Test Location / Method	
DP	Dynamic Probe
CPT	Cone Penetration Test
CBR	In-situ CBR Test
DCP	CBR using Dynamic Cone Penetrometer
CBRT	CBR using TRL Probe
PB	Plate Bearing Test
SPT (S)	Standard Penetration Test (Split Barrel Sampler)
SPT (C)	Standard Penetration Test (Solid Cone)
N	SPT Result
-/-	Blows/Penetration (mm) after seating drive
-*/-	Total Blows / Penetration (mm)
( )	Extrapolated Value
PPT	Perth Penetration (In-House Method - Equivalent N Value)
HP / UCS	Strength from Hand Penetrometer (kN/m^2)
IVN	Strength from Hand Vane ((kN/m^2) P = peak, R = residual
PID	Photo Ionisation Detector (ppm)
MEXE	Mexi-Cone CBR (%)

Samples / Test Type	
B	Bulk Sample
BLK	Block Sample
C	Core Sample
CBRS	CBR Mould Sample
D	Small Disturbed Sample
ES	Environmental Sample (Soil)
EW	Environmental Sample (Water)
GS	Environmental Sample (Gas)

Samples / Test Type	
SPTLS	Standard Penetration Test Split Barrel Sample
TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
U	Undisturbed Open Drive Sample (blows to take)
UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
W	Water Sample (Geotechnical)
SP	Sample from Stockpile
P	Piston Sample
AMAL	Amalgamated Sample

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APPENDIX B

Field Sampling and In-Situ Test Methods and Results

B

Soil and Rock Descriptions

All soil and rock descriptions are in general accordance with BS5930 Ref [1].

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.

Hand Penetrometer Test

The handheld soil penetrometer consists of a spring loaded and calibrated plunger which is forced into cohesive soil. A reading of unconfined compression strength (equal to twice cohesion) is given on a calibrated scale. The average of a set of three readings shall be recorded.

In common with other hand methods of strength assessment it does not give an accurate indication of bearing capacity in stiff or fissured soils, because of the small test area.

Disturbed Samples

Disturbed samples were taken from exploratory holes in general accordance with BS 5930 [1] 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.

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.

Summary Sheet

Results of BRE Digest DG365 Soakage Tests

Site :	Mayflower Way, Angmering B16 4 AY	**Job No :**	J14770
Client :	The Howse Wallis Partnership	**O S Reference :**	
Tested By :	PG	**Engineer:** SM	**Test Date :** 15/Feb/2021

Hole No	Test No	Hole Depth *m*	Soakage Rate for Each Test *litre/m^2/min*	Soakage Rate for Each Hole *litre/m^2/min*	Soakage Rate for Each Hole *m/sec*	Water Level at Finish of Test	Remarks
TP501	No 1	2.60	1.40	1.40	2.33E-5	Nearly empty pit.	2m 14s to fill up
TP501	No 2	2.60	1.56			Nearly empty pit.	2m 20s to fill up
TP501	No 3	2.60	1.41			Nearly empty pit.	2m 20s to fill up
TP502	No 1	2.60	0.240	0.240	3.99E-6	Pit was not emptied; Non compliant value was calculated.	2m 30s to fill up
TP502	No 2	2.60	0.246			Nearly empty pit.	2m 30s to fill up
TP502	No 3	2.60	0.262			Nearly empty pit.	2m 30s to fill up
TP503	No 1	1.00	4.94	3.79	6.31E-5	Nearly empty pit.	1min 40s to fill up
TP503	No 2	1.00	3.79			Nearly empty pit.	1min 30s to fill up
TP503	No 3	1.00	4.33			Nearly empty pit.	1min 30s to fill up
TP504	No 1	1.00	1.28	0.680	1.13E-5	Nearly empty pit.	4m 30s to fill up
TP504	No 2	1.00	0.728			Nearly empty pit.	1m 30 s to filll up

Summary Sheet

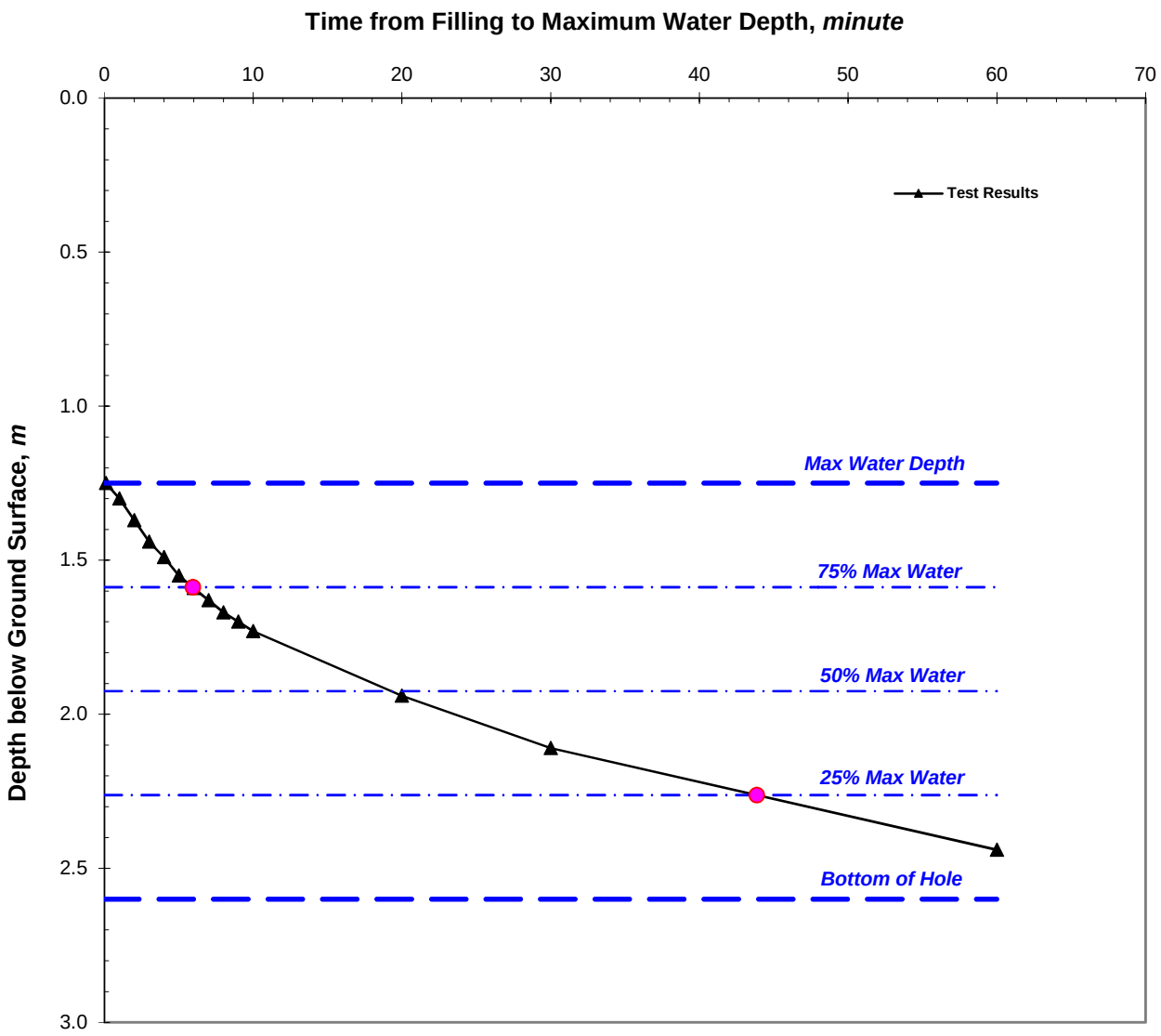
Results of BRE Digest DG365 Soakage Tests

Site :	Mayflower Way, Angmering B16 4 AY	**Job No :**	J14770
Client :	The Howse Wallis Partnership	**O S Reference :**	
Tested By : PG	**Engineer:** SM	**Test Date :**	15/Feb/2021

Hole No	Test No	Hole Depth *m*	Soakage Rate for Each Test *litre/m² /min*	Soakage Rate for Each Hole *litre/m² /min*	*m/sec*	Water Level at Finish of Test	Remarks
TP504	No 3	1.00	0.680			Nearly empty pit.	1m 20s to fill up
Mean Value of All Calculated Soakage Rates :				**1.53** *litre/m² /min*	**2.54E-5** *m/sec*		

BRE Digest DG365 Soakage Test

Test Hole No: TP501
Test No: Test No 1 (Initial)



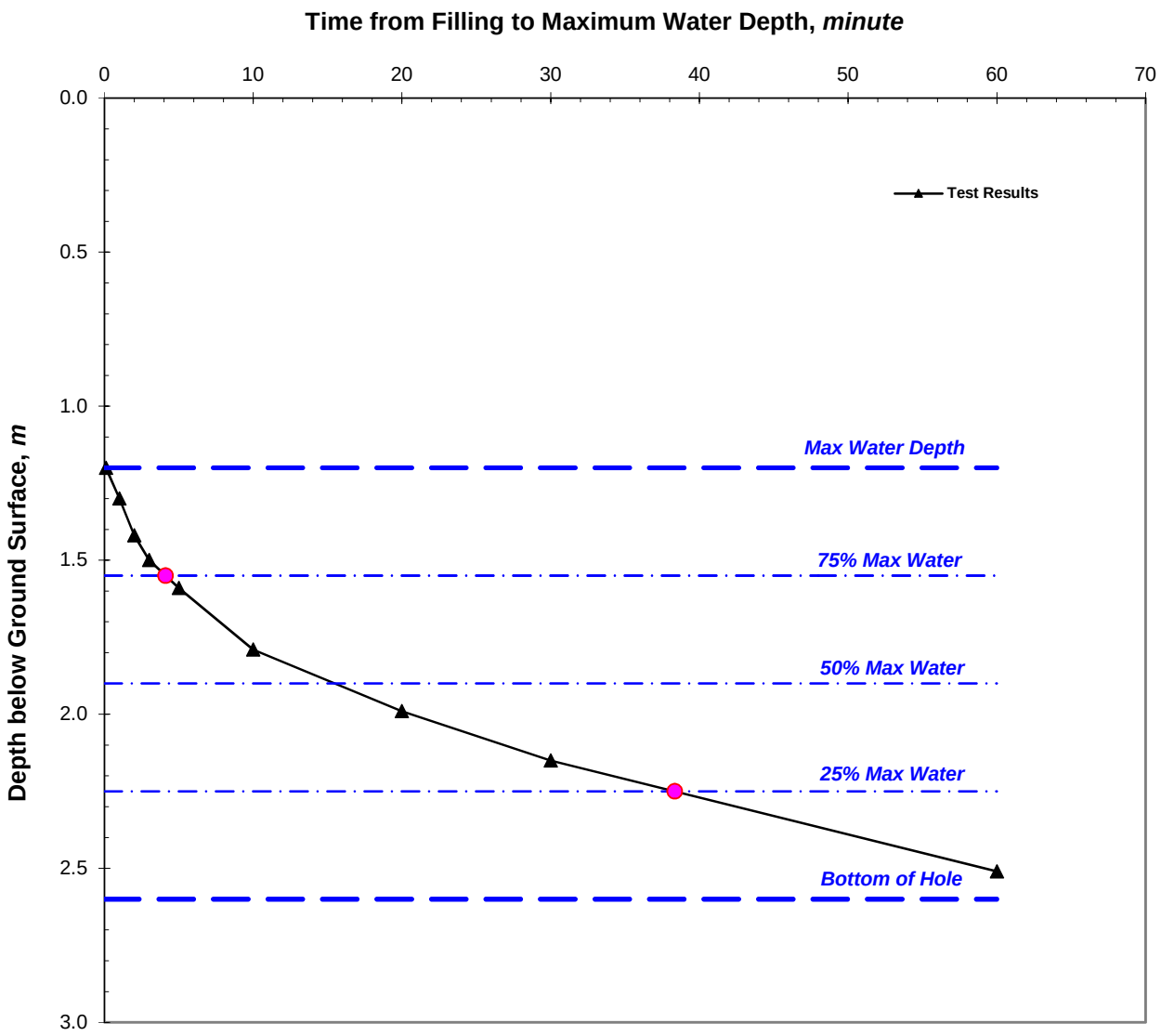
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	1.250
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.190
Depth to Pit Base, m	2.600	Total Soakage Test Time, *min*	60.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.005
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	5.606
Depth to Top of Granular Fill, *m*	1.200	Soakage Rate, *litre/m²/min*	**1.40**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**2.33E-05**

Comments: *2m 14s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	15/Feb/2021	
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig. S1**

BRE Digest DG365 Soakage Test

Test Hole No: TP501
Test No: Test No 2 (Repeated)



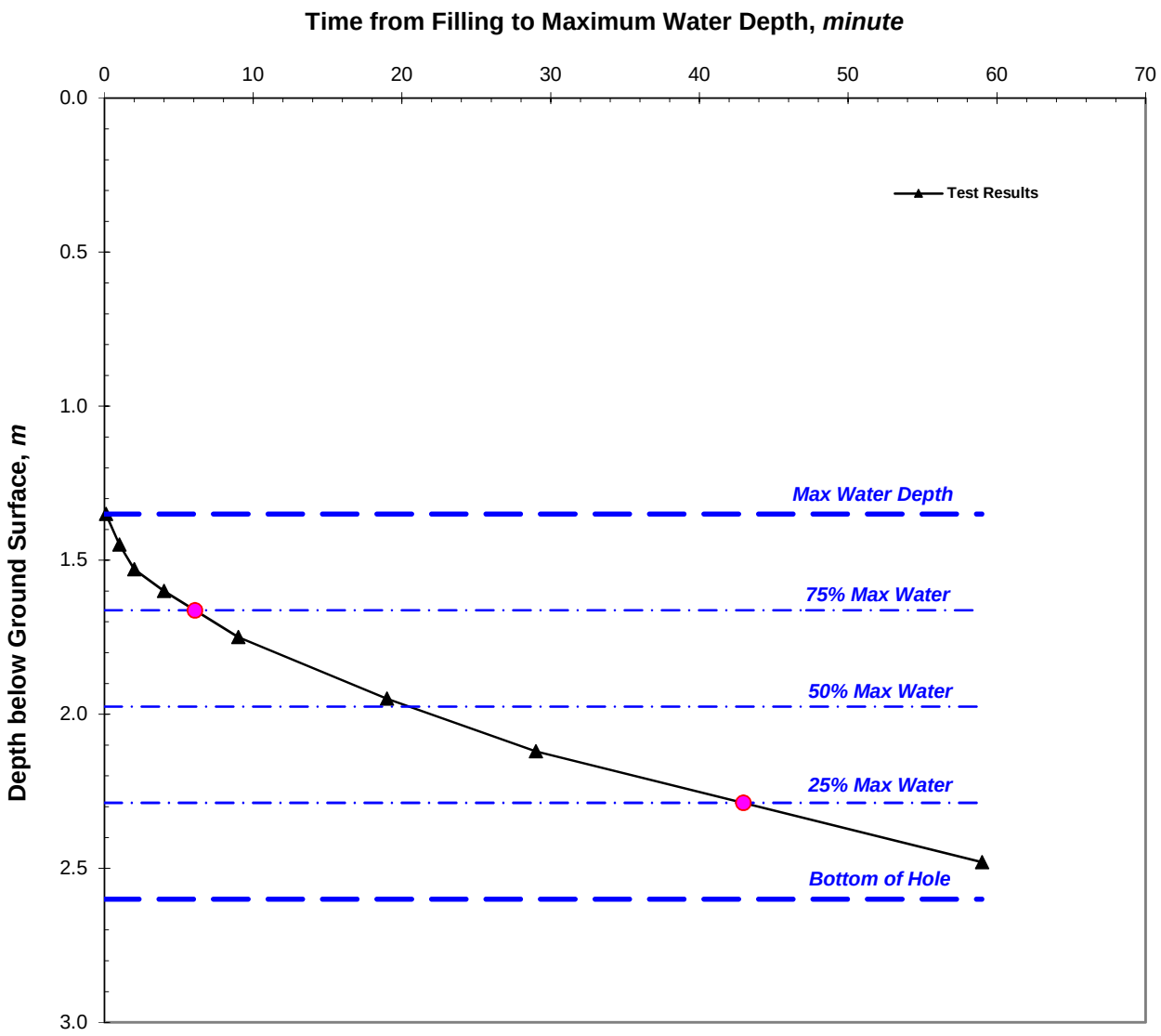
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	1.200
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.310
Depth to Pit Base, m	2.600	Total Soakage Test Time, *min*	60.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.120
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	6.443
Depth to Top of Granular Fill, *m*	1.200	Soakage Rate, *litre/m*^{2}*/min*	**1.56**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**2.61E-05**

Comments: *2m 20s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	16/Feb/2021	
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig. S2**

BRE Digest DG365 Soakage Test

Test Hole No: TP501
Test No: Test No 3 (Repeated)



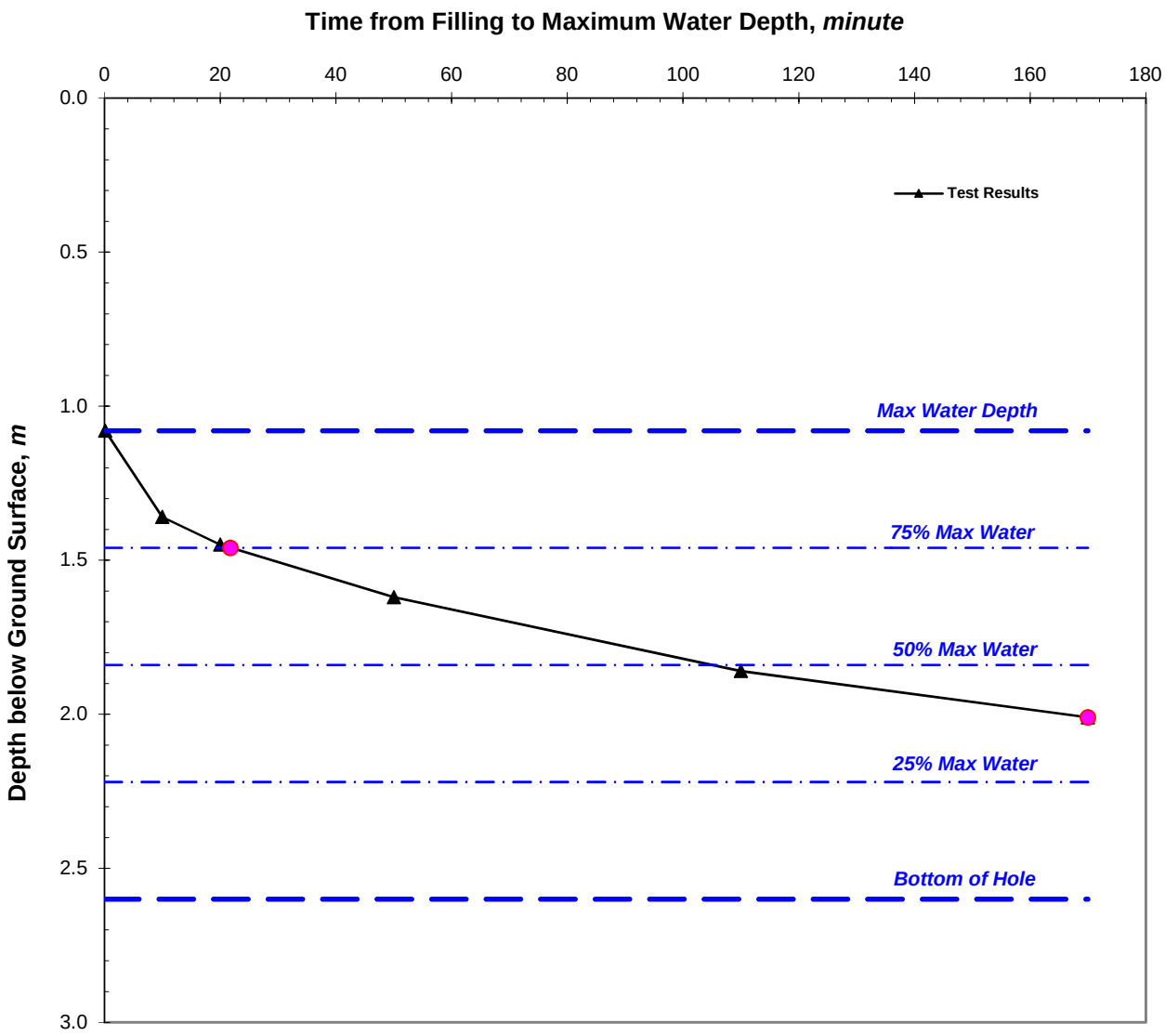
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	1.350
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.130
Depth to Pit Base, m	2.600	Total Soakage Test Time, *min*	59.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	3.775
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	5.339
Depth to Top of Granular Fill, *m*	1.200	Soakage Rate, $litre/m^2/min$	**1.41**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**2.36E-05**

Comments: *2m 20s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	16/Feb/2021		
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig.**	**S3**

BRE Digest DG365 Soakage Test

Test Hole No: TP502
Test No: Test No 1 (Initial)



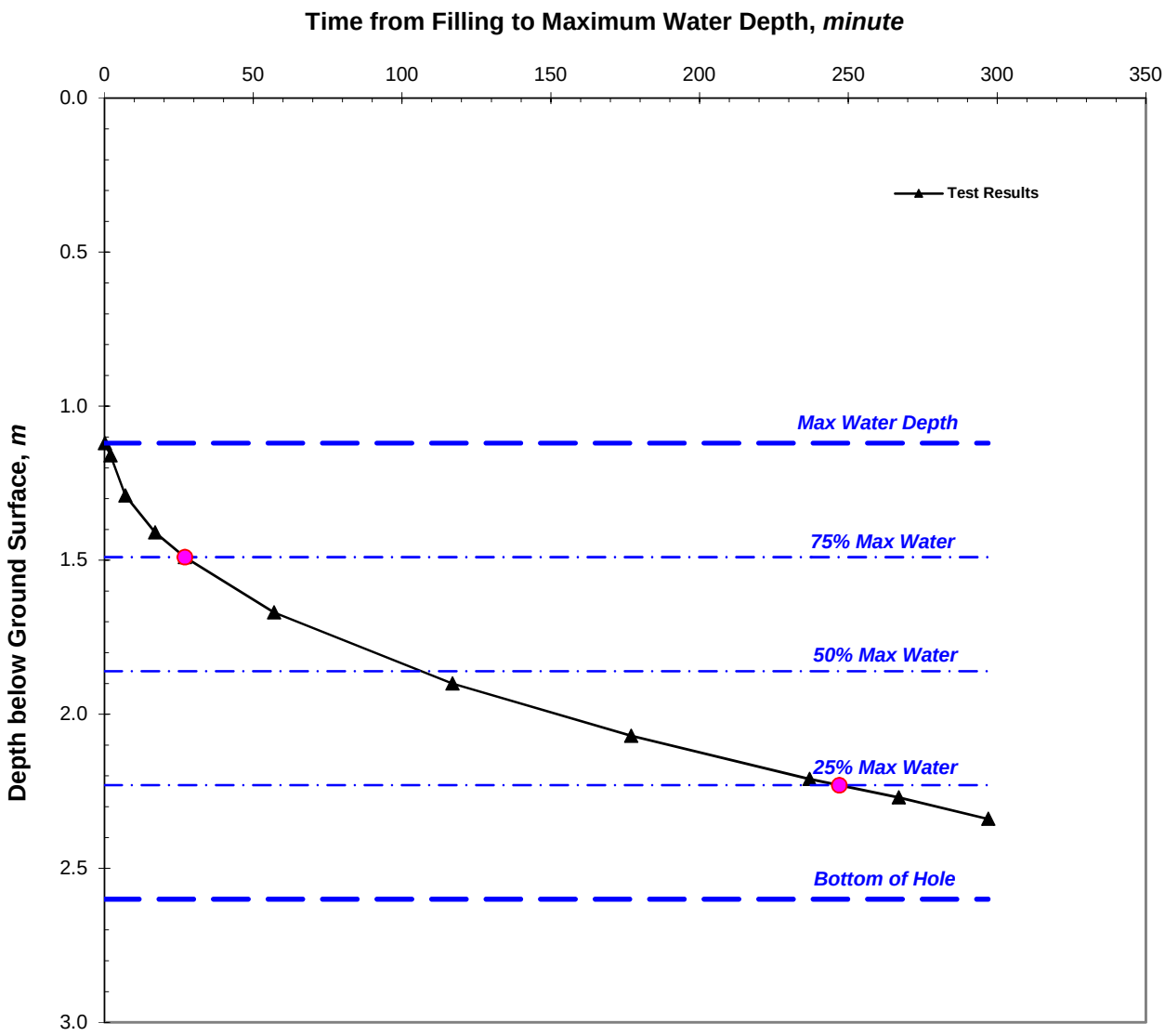
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	1.080
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.930
Depth to Pit Base, m	2.600	Total Soakage Test Time, *min*	170.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.879
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.169
Depth to Top of Granular Fill, *m*	1.100	Soakage Rate, *litre/m*^{2}*/min*	**0.240**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**3.99E-06**

Comments: *2m 30s to fill up*
Water level fell to 50% -- 25% max water depth, calculations were based on actual fall of water level achieved.
Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	15/Feb/2021	
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig. S4**

BRE Digest DG365 Soakage Test

Test Hole No: TP502
Test No: Test No 2 (Repeated)



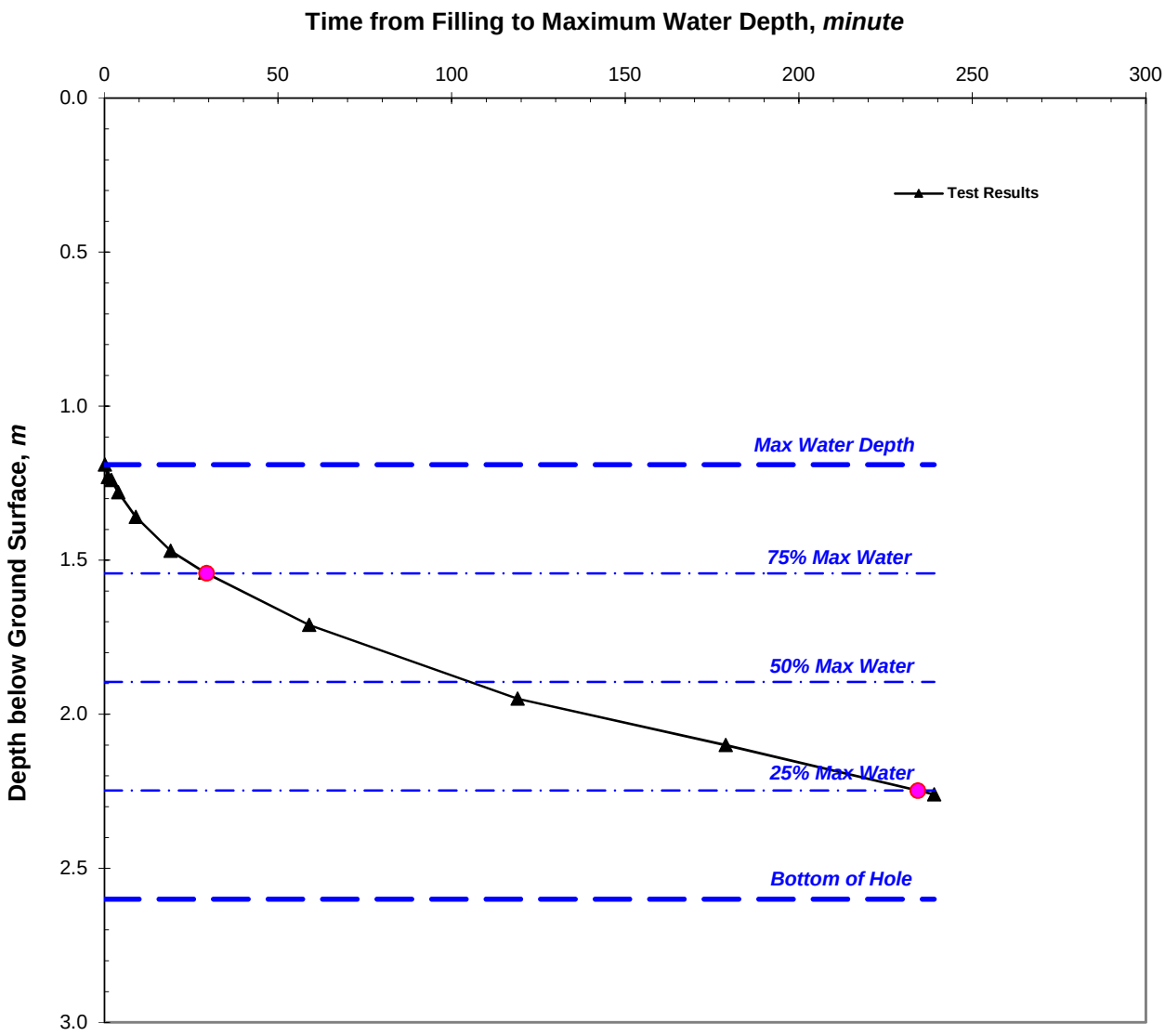
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	1.120
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.220
Depth to Pit Base, m	2.600	Total Soakage Test Time, *min*	297.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.304
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.060
Depth to Top of Granular Fill, *m*	1.100	Soakage Rate, *litre/m²/min*	**0.246**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**4.10E-06**

Comments: *2m 30s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	16/Feb/2021	
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig. S5**

BRE Digest DG365 Soakage Test

Test Hole No: TP502
Test No: Test No 3 (Repeated)



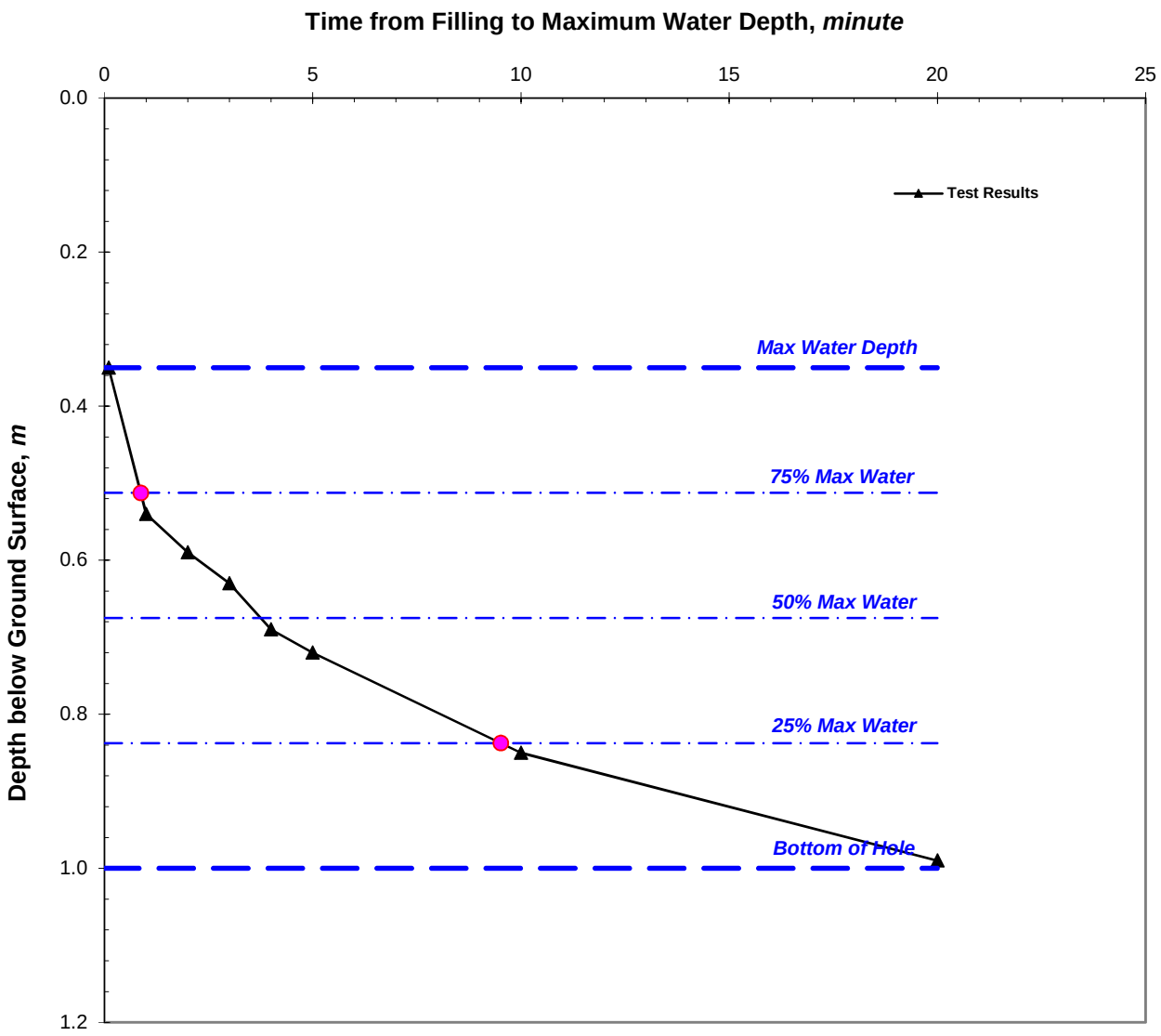
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	1.190
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	1.070
Depth to Pit Base, m	2.600	Total Soakage Test Time, *min*	239.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	4.143
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.084
Depth to Top of Granular Fill, *m*	1.100	Soakage Rate, *litre/m²/min*	**0.262**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**4.36E-06**

Comments: *2m 30s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	17/Feb/2021	
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig. S6**

BRE Digest DG365 Soakage Test

Test Hole No: TP503
Test No: Test No 1 (Initial)



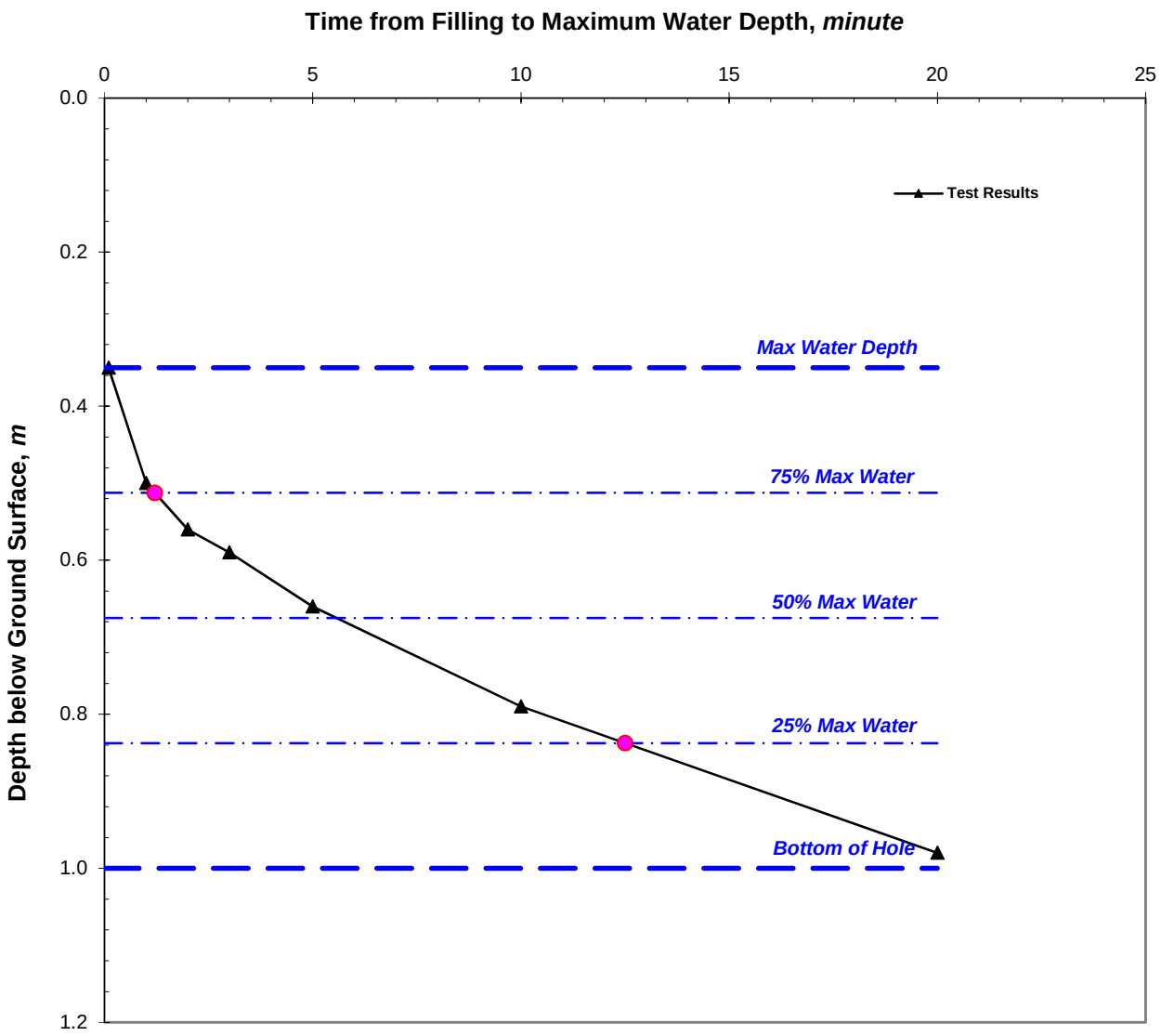
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	0.350
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.640
Depth to Pit Base, m	1.000	Total Soakage Test Time, *min*	20.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	2.395
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	11.836
Depth to Top of Granular Fill, *m*	0.200	Soakage Rate, *litre/m*^{2}*/min*	**4.94**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**8.24E-05**

Comments: *1min 40s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	15/Feb/2021		
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig.**	**S7**

BRE Digest DG365 Soakage Test

Test Hole No: TP503
Test No: Test No 2 (Repeated)



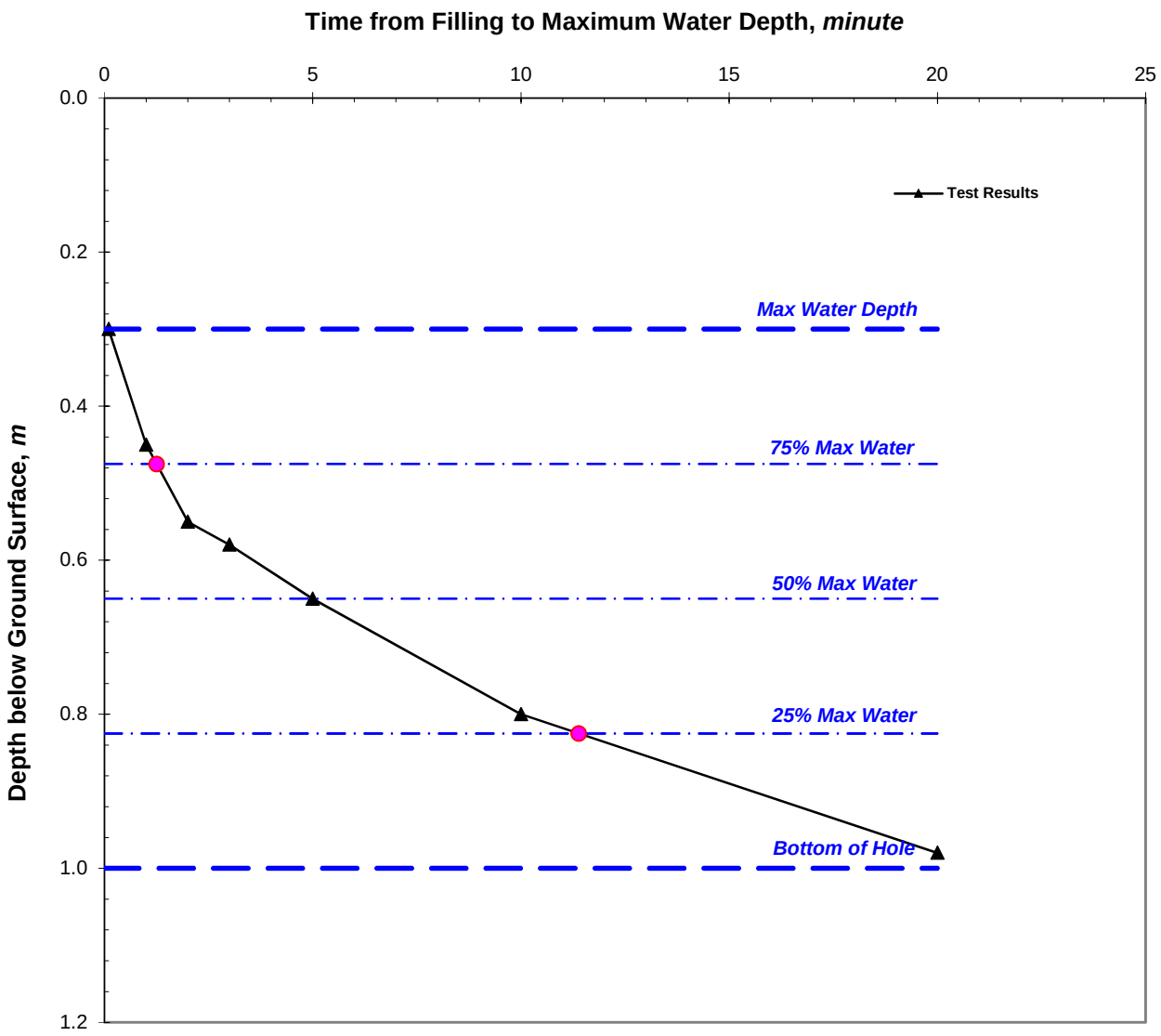
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	0.350
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.630
Depth to Pit Base, m	1.000	Total Soakage Test Time, *min*	20.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	2.395
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	9.066
Depth to Top of Granular Fill, *m*	0.200	Soakage Rate, *litre/m²/min*	**3.79**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**6.31E-05**

Comments: *1min 30s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	15/Feb/2021
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:** SM	**Fig. S8**

BRE Digest DG365 Soakage Test

Test Hole No: TP503
Test No: Test No 3 (Repeated)



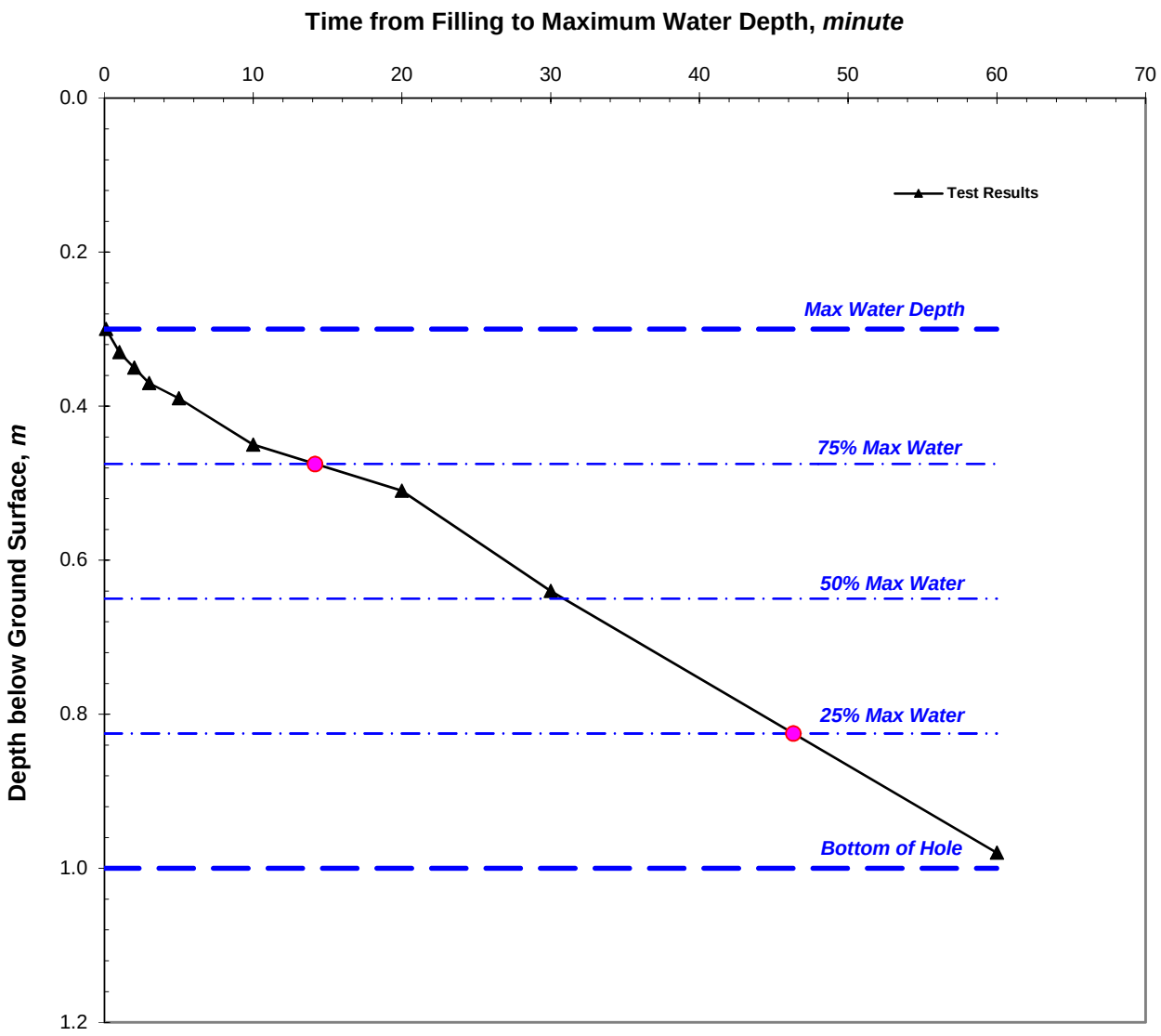
Pit Length, m	1.800	Depth to Water at Start of Test, *m*	0.300
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.680
Depth to Pit Base, m	1.000	Total Soakage Test Time, *min*	20.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	2.510
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	10.874
Depth to Top of Granular Fill, *m*	0.200	Soakage Rate, *litre/m²/min*	**4.33**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**7.22E-05**

Comments: *1min 30s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	16/Feb/2021		
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig.**	**S9**

BRE Digest DG365 Soakage Test

Test Hole No: TP504
Test No: Test No 1 (Initial)



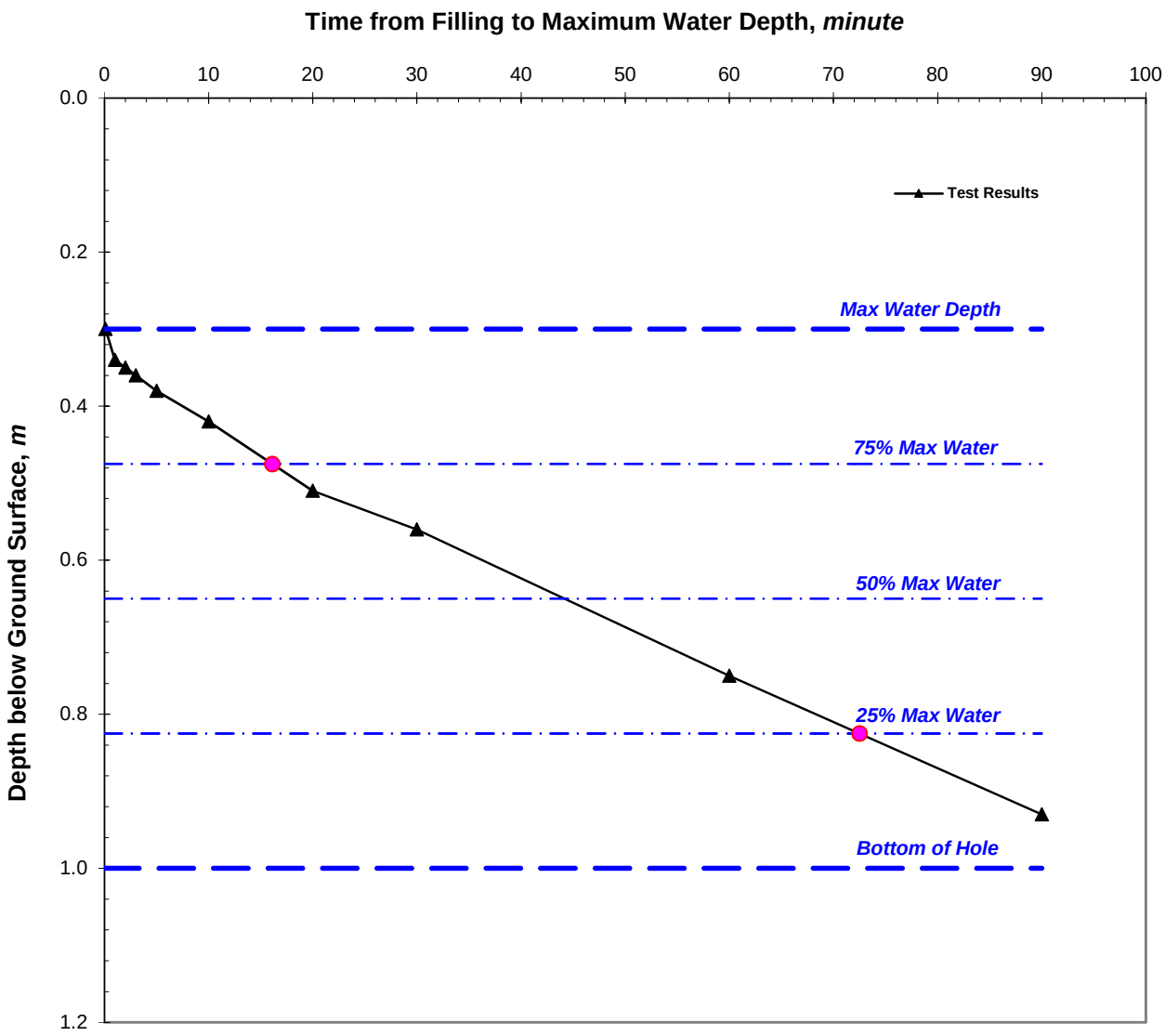
Pit Length, m	1.200	Depth to Water at Start of Test, *m*	0.300
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.680
Depth to Pit Base, m	1.000	Total Soakage Test Time, *min*	60.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	1.790
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	2.286
Depth to Top of Granular Fill, *m*	0.100	Soakage Rate, *litre/m*^{2}*/min*	**1.28**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**2.13E-05**

Comments: *4m 30s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	15/Feb/2021	
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig. S10**

BRE Digest DG365 Soakage Test

Test Hole No: TP504
Test No: Test No 2 (Repeated)



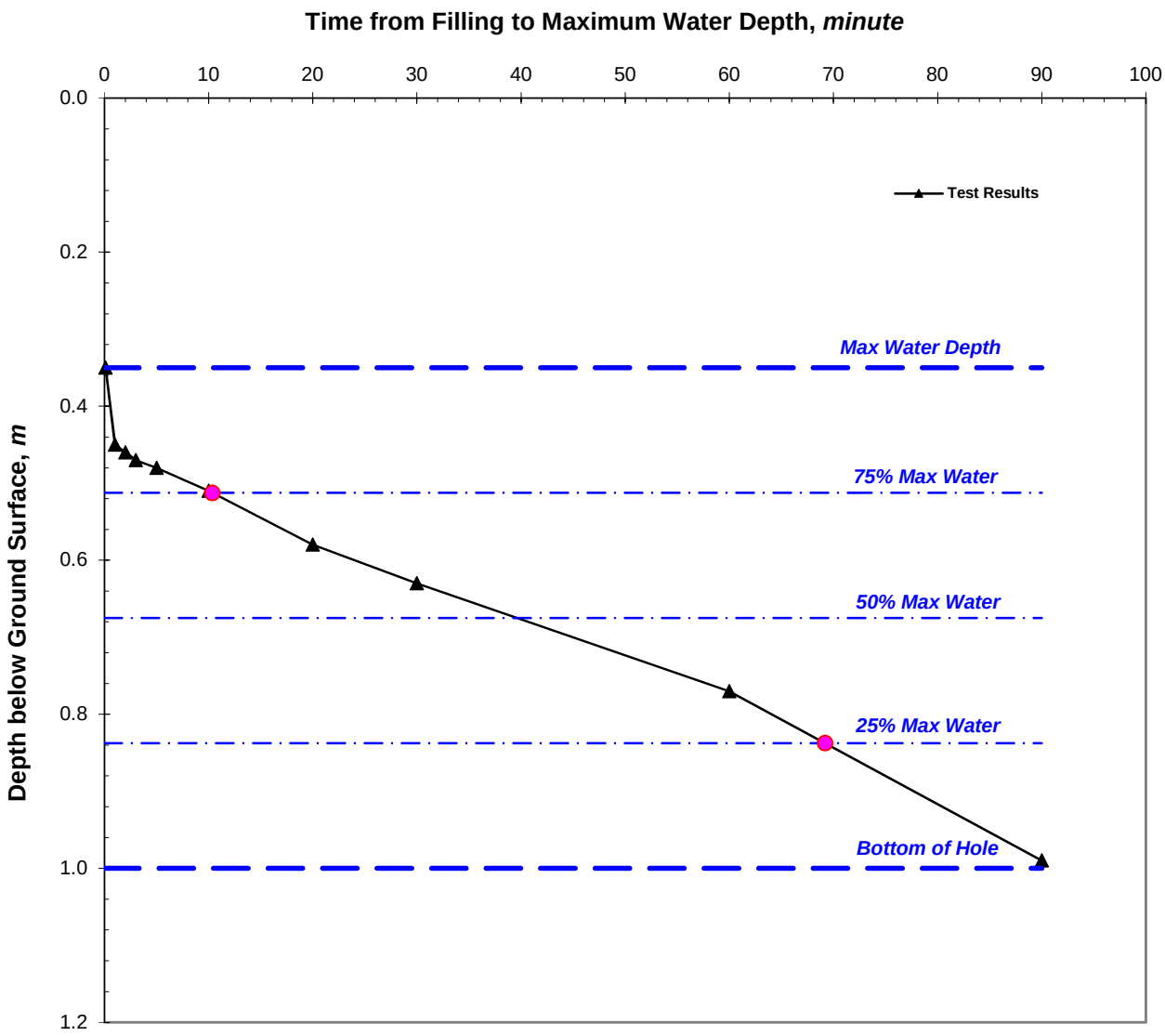
Pit Length, m	1.200	Depth to Water at Start of Test, *m*	0.300
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.630
Depth to Pit Base, m	1.000	Total Soakage Test Time, *min*	90.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	1.790
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.303
Depth to Top of Granular Fill, *m*	0.100	Soakage Rate, *litre/m*^{2}*/min*	**0.728**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**1.21E-05**

Comments: *1m 30 s to filll up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	15/Feb/2021		
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig.**	**S11**

BRE Digest DG365 Soakage Test

Test Hole No: TP504
Test No: Test No 3 (Repeated)



Pit Length, m	1.200	Depth to Water at Start of Test, *m*	0.350
Pit Width, m	0.500	Max Water Dropdown during Test, *m*	0.640
Depth to Pit Base, m	1.000	Total Soakage Test Time, *min*	90.0
Depth to Top of Permeable Soils, *m*		Mean Internal Discharge Area, m^2	1.705
Depth to Groundwater Surface, *m*		Discharge Rate, *litre/min*	1.160
Depth to Top of Granular Fill, *m*	0.100	Soakage Rate, *litre/m*^{2}*/min*	**0.680**
Voids Assumed for Granular Fill, %	35%	BRE Soil Infiltration Rate, *m/sec*	**1.13E-05**

Comments: *1m 20s to fill up*
Pit was nearly emptied at finish of test.

Client:	The Howse Wallis Partnership	**Job No:**	J14770	**Test Date:**	16/Feb/2021		
Site:	Mayflower Way, Angmering B16 4 AY	**Tested By:**	PG	**Engineer:**	SM	**Fig.**	**S12**