

Andrew Smithson
Taylor Wimpey South Thames
Gate House
Turnpike Road
High Wycombe
Buckinghamshire
HP12 3NR



4th November 2022

Our ref. IA/22/LP3089

Re: LP3089 Lollesworth Fields, East Horsley, Soakage Investigation

Dear Andrew,

1 Introduction

Leap Environmental Ltd (hereafter referred to as **LEAP**) has been appointed by Taylor Wimpey UK Limited to undertake a soakage investigation of a site referred to as Lollesworth Fields, East Horsley, Leatherhead, KT24 6PU (Figure 1, Appendix A). The instruction was given in an email dated 30th August 2022 and signed by Andrew Smithson of Taylor Wimpey UK Limited.

LEAP understands that the site is currently owned by Taylor Wimpey UK Limited and it is proposed to redevelop the site with residential dwellings with associated private gardens, accessways and public open space.

The work comprised soakage testing at two locations around the site, shown in Figure 2, Appendix A.

The machine excavated trial pits were carried out by Nicholls Plant Hire Ltd. and supervised by **LEAP**.

2 Site Setting

The site is located at Lollesworth Fields, East Horsley, Leatherhead, KT24 6PU. The site's approximate National Grid Reference is 509064, 154448. The site lies at an estimated elevation of 60m Above Ordnance Datum (mAOD) and the area of the site extends to c.13.18Ha.

The site is an irregular shaped piece of land that comprises an open field divided into two by a central hedge line running approximately east to west. To the west is woodland, to the south



the railway line running north east to south west, to the east Ockham Road and to the north residential properties with a small field at the end of Westonlea Drive.

The site is accessed from Ockham Road via a dirt track running east to west between two residential plots to the north and the railway line to the south. At the time of investigation the two residential properties were unoccupied with rectangular shaped back gardens extending towards the fields orientated approximately east to west. Along the eastern boundary of the site (between the site and existing properties along Ockham Road) runs a drainage ditch, which is crossed by a small bridge at the point where the dirt track meets the open field.

3 Geology

The geology of the site has been ascertained by reference to the 1:50,000 British Geological Survey Sheet 285 (Guildford) Solid and Drift Edition 2001. Superficial deposits indicated to be present onsite are Head deposits. The underlying solid bedrock geology is mapped as being the London Clay Formation.

3.1 Head Deposits

Head is poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes.

Head Deposits are a Polymict comprising gravel, sand and clay depending on upslope source and distance from source. Locally with lenses of silt, clay or peat and organic material.

3.2 London Clay Formation

London Clay is found extensively throughout the London Basin. The Formation mostly comprises thoroughly bioturbated, slightly calcareous silty clay to very silty clay. Beds of clayey silt and silty fine grained sand are found increasingly towards the west of its subcrop towards Reading.

At outcrop The London Clay Formation is weathered to brown and may contain secondary carbonate nodules. This weathered or oxidized zone varies from about 3-6m in depth and may be less than 1m thick where the clay is overlain by superficial deposits. Below this it is generally blue grey in colour and fissured. The top few metres of unweathered clay and bottom of the weathered zone often contain gypsum crystals a source of sulphates.

London Clay is classified by the Environment Agency as a non aquifer. It is generally quite plastic and its volume change potential varies from medium to very high depending on the clay content.

4 Fieldwork

Trial pit soakage testing was carried out between 10th and 11th October 2022, with the weather being predominantly dry and sunny.

The intrusive works comprised the excavation of a total of two trial pits (designated TP1 and TP2) by means of a mechanical excavator to depths of between 1.5m to 2.0m below ground level. A site plan for the location of each excavation is presented in Figure 2 of Appendix A.

The trial holes were logged in accordance with BS5930¹ and trial hole logs are presented in Appendix C.

Soakage testing was carried out at all exploratory hole locations. In general accordance with BRE DG365² each trial pit was measured, filled with washed 10mm gravel and then filled with water. Due to slow drainage, it was only possible to fill trial pit TP1 one time and TP2 two times. The soakage test results are included in appendix D.

5 Ground Conditions

The ground conditions are described in detail in the logs attached in Appendix C. In summary the soil conditions were as follows:

Table 1: Summary of soils encountered

Depth From (m)	Depth To (m)	Soil Type	Description
GL	0.45	TOPSOIL	Dark brown gravelly clayey medium sand TOPSOIL. Gravel is fine to coarse angular to subrounded with flint.
0.45	1.5	Gravelly SAND	Dark brown silty gravelly medium SAND. Gravel is fine to coarse with occasional cobbles angular to subrounded of flint. *ONLY in TP2
0.45	0.9	Gravelly sandy CLAY	Orangish brown gravelly medium sandy CLAY. Gravel is fine to coarse angular to subrounded of flint with occasional cobbles. *ONLY in TP1
0.9	2.0	Slightly sandy CLAY	Orangish brown with grey mottling slightly medium sandy CLAY with fine white crystals (selenite). Closely fissured with rare shells and black organics. *ONLY in TP1

¹ BS5930:2015+A1:2020 Code of Practice for Ground Investigation

² Building Research Establishment DG365: 2016. Digest Soakaway Design

Trial pit TP2 was situated much closer to the drainage ditch than Trial Pit TP1 and ground conditions were found to vary between the two investigation locations. Trial pit TP1 encountered sandy gravelly clay Head deposits over London Clay at 0.9m bgl, whilst trial pit TP2 encountered a silty gravelly sand to 1.5m bgl which is considered likely to be an Alluvial deposit associated with the drain.

Groundwater was not encountered during this investigation.

6 Trial Pit Soakage Results

Two soakage tests were undertaken on site in general accordance with BRE DG365 between depths of 1.5m and 2.0m below ground level.

It was not possible to test either location three times in accordance with the guidance, due to the slow soakage which was achieved. In TP1 it was only possible to fill and test the trial pit once and in trial TP2 only twice. The full results are attached in Appendix D and are summarised below:

Table 2: Summary of soakage tests

Test Location	Soakage Rate (m/s)	Comments
TP1	$\ll 1 \times 10^{-8}$	Water level did not fall over test duration. Test run for 29 hours.
TP2 Test 1	4.96×10^{-7}	Water level fell to 75% to 50% max water depth, calculation based on actual fall. Test run for 20 hours 25 minutes.
TP2 Test 2	4.21×10^{-7}	Water level fell <75%, calculations based on actual fall. Test run for 6.5 hours.

The soakage rates have been calculated in general accordance with BRE DG365 methodology, but as the water level fall during the tests did not reach 75% they have been based on the actual fall.

7 Conclusions and Recommendations

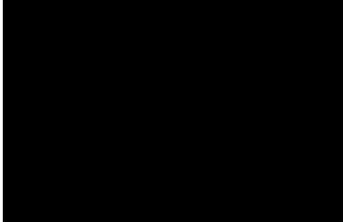
Infiltration rates of between $\ll 1 \times 10^{-8} \text{m/s}$ and $5 \times 10^{-7} \text{m/s}$ have been recorded during this testing, with the slightly higher values recorded in the more granular soils which were found adjacent to the drainage ditch running along the eastern boundary of the site. These more granular soils are not anticipated to have a wide distribution across the site. Based on these

results the site is not considered suitable for conventional soakaway drainage, and allowance should be made for a SUDS system to be included within the planned development and for surface water to be piped offsite at this stage.

It is understood from previous investigations in the local area that clay extends to significant depth and therefore borehole soakaways are not likely to be an option for this site.

Please do not hesitate to contact the undersigned if you require any further information.

Yours faithfully,



Imogen Adshead Msci FGS

Enc.

APPENDIX A – Figures and Drawings

APPENDIX B – Site Photographs

APPENDIX C – Exploratory Hole Logs

APPENDIX D – Soakage Test Results

This letter report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

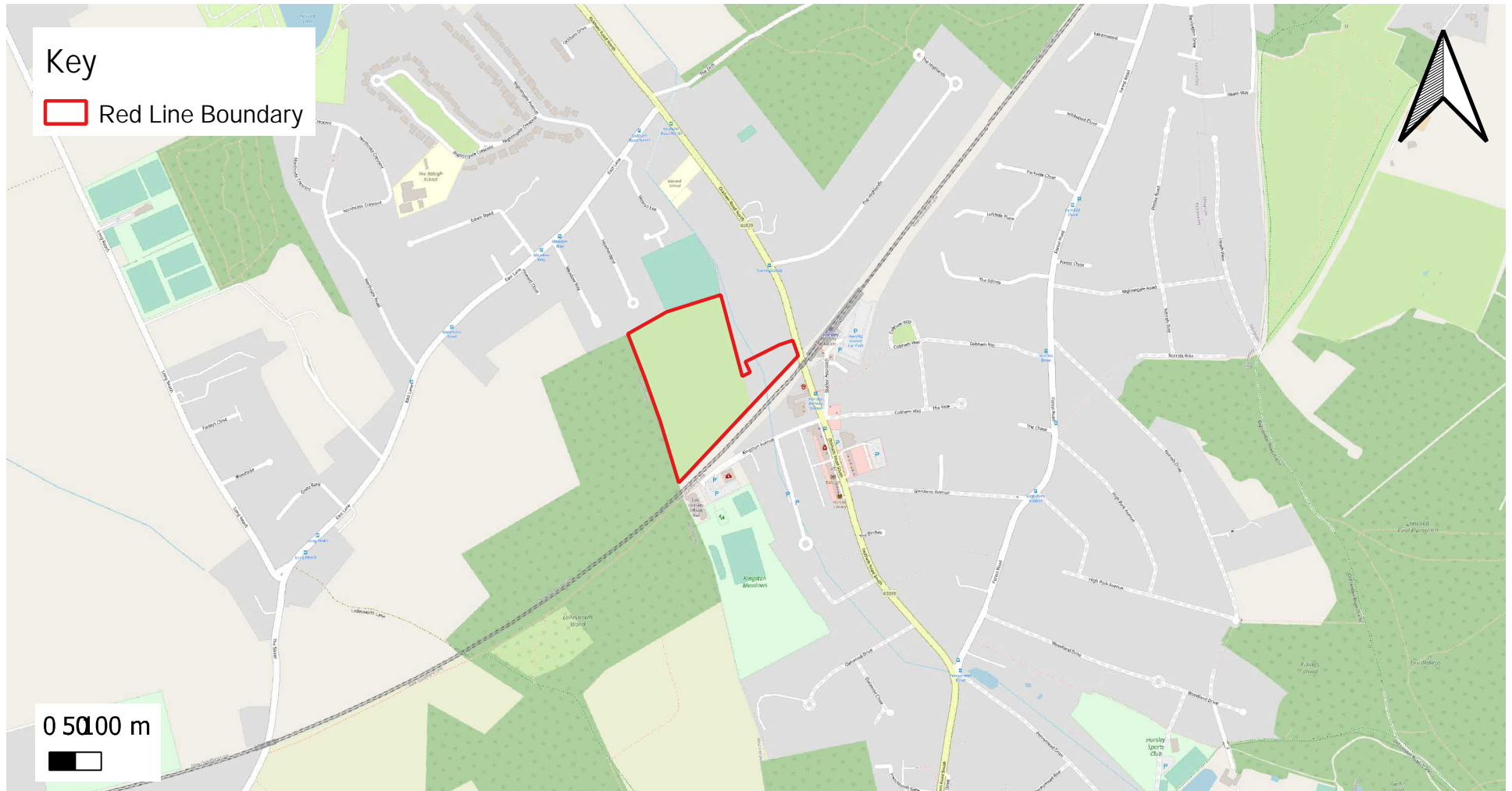
Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.


This report is confidential to the Client, and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk.

APPENDIX A – FIGURES AND DRAWINGS

Figures and Drawings




Basemap: © OpenStreetMaps Contributors
 Note 1: Exploratory holes have been positioned by local measurements made by site engineer/handheld GPS survey/3rd party surveyors and should therefore only be taken as approximate
 Note 2: Exploratory holes shown are not to

	Client:	Taylor Wimpey	Title:	Site Location Plan	Project ID:	LP3089
	Project:	Lollesworth Fields, East Horsley, KT24 6PU	Date:	02/11/2022	Figure No.	1b



Basemap: © OpenStreetMaps Contributors
 Note 1: Exploratory holes have been positioned by local measurements made by site engineer/handheld GPS survey/3rd party surveyors and should therefore only be taken as approximate
 Note 2: Exploratory holes shown are not to

	Client:	Taylor Wimpey	Title:	Intrusive Location Plan	Project ID:	LP3089
	Project:	Lollesworth Fields, East Horsley, KT24 6PU	Date:	02/11/2022	Figure No.	1

APPENDIX B – SITE PHOTOGRAPHS

Site Photographs



Plate 1 – Site overview facing south-west.



Plate 2 – Entrance track to site facing south as heading out of site.



Plate 3 – Exit to the fields facing east towards the access track



Plate 4 – Orangish brown gravelly sandy CLAY encountered in trial pit TP1.



Plate 5 – Trial pit TP1 down to 2.00m.



Plate 6 – TP1 trial pit arisings.



Plate 7 – Pipework installed in TP1 for BRE365 Soakage test.



Plate 8 – Dark brown gravelly SAND encountered in trial pit TP2.



Plate 9 – Dark brown gravel SAND encountered in trial pit TP2.



Plate 10 – Trial pit TP2 arisings and pipework installed for BRE365 Soakage test.

APPENDIX C –EXPLORATORY HOLE LOGS

Exploratory Hole Logs



Leap Environmental Ltd
 The Atrium, Curtis Road
 Dorking, Surrey RH4 1XA
 Tel: 01306 646510
 www.leapenvironmental.com

Trial Pit Log

Trialpit No

TP1

Sheet 1 of 1

Project Name:	Lollesworth Fields, East Horsley	Project No.	LP3089	Co-ords:	-	Level:		Date	10/10/2022
Location:	Lollesworth Fields, East Horsley, Leatherhead, KT24 6PU			Dimensions (m):	0.6	1.9		Scale	1:25
Client:	Taylor Wimpey UK Ltd			Depth	2.00			Logged	IA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.45		
				0.90		
				2.00		

Remarks: Trial pit remained dry and stable. Backfilled with x3 one tonne bags of gravel.

Stability:





Leap Environmental Ltd
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 Dorking, Surrey RH4 1XA
 Tel: 01306 646510
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Trial Pit Log

Trialpit No

TP2

Sheet 1 of 1

Project Name:	Lollesworth Fields, East Horsley	Project No.	LP3089	Co-ords: -	Level:		Date	10/10/2022
Location:	Lollesworth Fields, East Horsley, Leatherhead, KT24 6PU			Dimensions (m):	0.6	1.9	Scale	1:25
Client:	Taylor Wimpey UK Ltd			Depth	1.50		Logged	IA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend
	Depth	Type	Results			
				0.45		
				1.50		

Remarks: Trial pit remained dry and stable. Backfilled with a single one tonne bag of gravel and the generated trial pit arisings.

Stability:

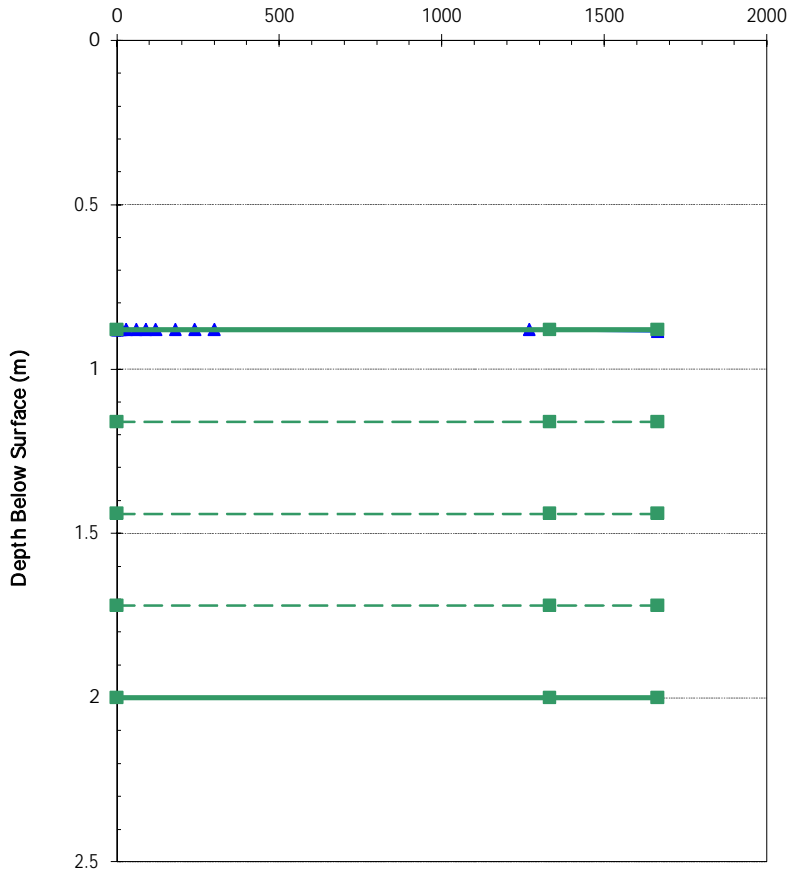


APPENDIX D –SOAKAGE TEST RESULTS

Soakage Test Results

BRE Digest 365 -Soakage Test

Filling to Max Water Depth (min)



Test Hole No: TP1
Test No: Test No 1

Pit Length (m)	1.9
Pit Width (m)	0.6
Depth to Pit Base (m)	2
Depth to Top of Permeable Soils (m)	
Depth to Groundwater Surface (m)	
Depth to Top of Granular Fill (m)	0.5
Voids Assumed for Granular Fill (%)	35%

Depth of Water at Start of Test (m)	0.88
Max Water Dropdown during Test (m)	0.005
Total Soakage Test Time (min)	1664
Mean Internal Discharge Area (m ²)	6.718125
Discharge Rate (litre/min)	0.00429
Soakage Rate (litre/m ² /min)	0.000639

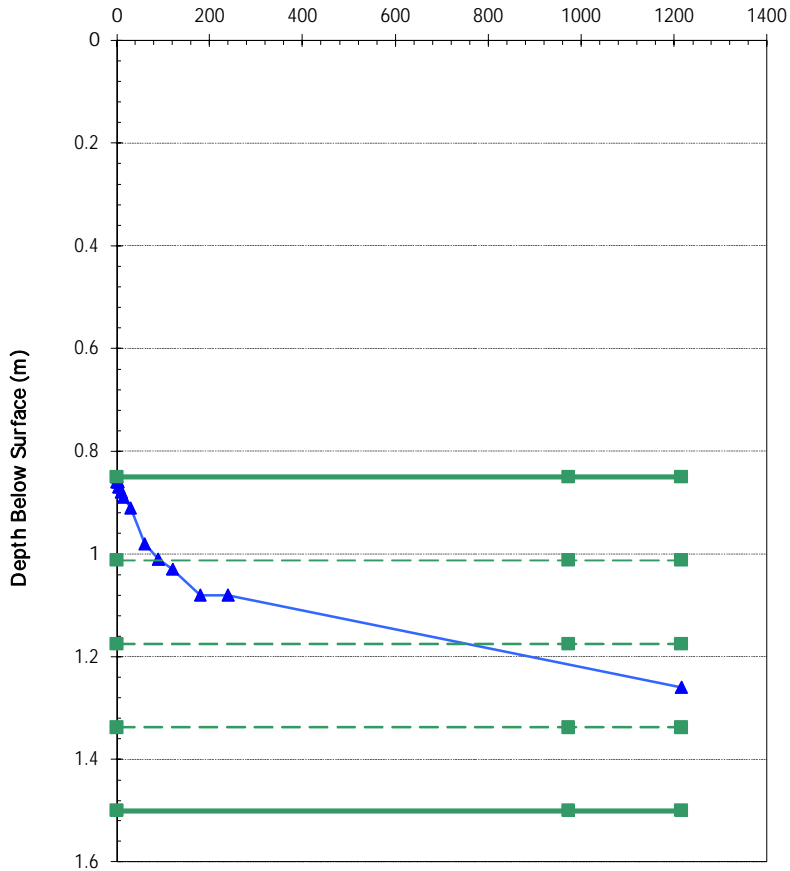
BRE Soil Infiltration Rate (m/sec)	1.06E-08
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Comments: Water level did not fall to 75% max water depth, calculations were based on actual fall of water level. Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	Taylor Wimpey
Site:	LP3089
Tested By:	IA
Test Date:	10.10.2022

BRE Digest 365 -Soakage Test

Filling to Max Water Depth (min)



Test Hole No:	TP2
Test No:	Test No 1

Pit Length (m)	1.9
Pit Width (m)	0.6
Depth to Pit Base (m)	1.5
Depth to Top of Permeable Soils (m)	
Depth to Groundwater Surface (m)	
Depth to Top of Granular Fill (m)	0.7
Voids Assumed for Granular Fill (%)	35%

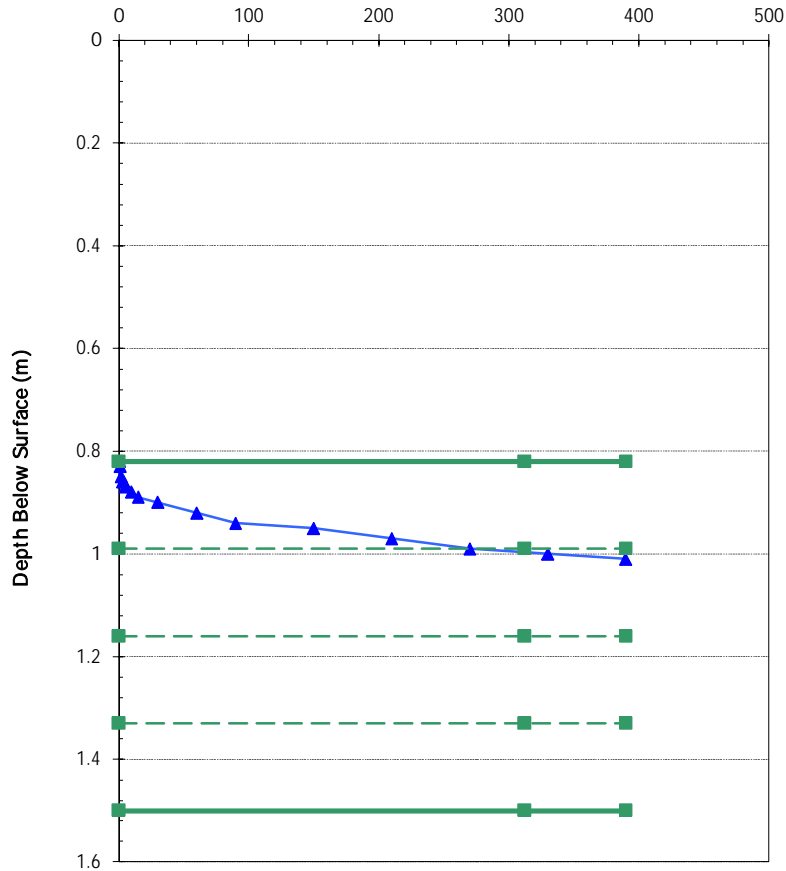
Depth of Water at Start of Test (m)	0.85
Max Water Dropdown during Test (m)	0.41
Total Soakage Test Time (min)	1216
Mean Internal Discharge Area (m ²)	2.95875
Discharge Rate (litre/min)	0.087995
Soakage Rate (litre/m ² /min)	0.029741
BRE Soil Infiltration Rate (m/sec)	4.96E-07

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

Client:	Taylor Wimpey
Site:	LP3089
Tested By:	IA
Test Date:	10.10.2022

BRE Digest 365 -Soakage Test

Filling to Max Water Depth (min)



Test Hole No:	TP2
Test No:	Test No 2

Pit Length (m)	1.9
Pit Width (m)	0.6
Depth to Pit Base (m)	1.5
Depth to Top of Permeable Soils (m)	
Depth to Groundwater Surface (m)	
Depth to Top of Granular Fill (m)	0.7
Voids Assumed for Granular Fill (%)	35%

Depth of Water at Start of Test (m)	0.82
Max Water Dropdown during Test (m)	0.19
Total Soakage Test Time (min)	390
Mean Internal Discharge Area (m ²)	3.70875
Discharge Rate (litre/min)	0.093593
Soakage Rate (litre/m ² /min)	0.025236

BRE Soil Infiltration Rate (m/sec)	4.21E-07
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Comments: Water level fell to 75% -- 50% max water depth, calculations were based on actual fall of water level. Result not compliant with BRE365 requirement since water did not fall to 25% max water depth.

Client:	Taylor Wimpey
Site:	LP3089
Tested By:	IA
Test Date:	11.10.2022