3 October 2024

Motor Fuel Group Ltd
10 Bricket Road
St Albans
Hertfordshire
AL1 3JX

SLR Project No.: 409.010156.00001

RE: Brooklands Service Station – Trial Pit Soakage Testing

1.0 Introduction

In September 2024 SLR Consulting Ltd (SLR) was commissioned by Motor Fuel Group Ltd (MFG) to undertake infiltration testing to support redevelopment at Brooklands Service Station, 331 Brighton Road, Worthing, BN11 2HP (the site).

The proposed redevelopment of the petrol filling station (PFS) requires modification of the site's current drainage system. The proposed modifications involve the construction of an infiltration basin in an area of undeveloped land to the immediate northeast of the PFS. A proposed development plan is shown on Drawing 01, attached as Appendix A.

The purpose of this technical note is to present the findings of the initial infiltration testing to ascertain whether the soils in this area of the site are conducive to the disposal of water via the planned method.

2.0 Geology

SLR excavated three trial pits (TP101 to TP103) to depths of between 3.0m and 3.3m bgl across the site. TP101 was initially advanced within the boundary of the proposed infiltration basin however due to significant deposits of Made Ground the further two trial pits were excavated at other locations across the site. The trial pit locations are shown on Drawing 01, attached as Appendix A.

The ground conditions encountered generally comprised four distinct deposits as summarised below. Logs of the trial pits are attached as Appendix B.

Topsoil

At the grounds surface to a maximum depth of 0.10m bgl a topsoil layer was encountered in all trial pits, comprising of dark brown clayey gravelly sand with frequent rootlets.

Made Ground

Made Ground was encountered in all three of the trial pits to a maximum depth of 3.05m bgl (TP101). The Made Ground generally comprised of brown/dark brown slightly clayey gravelly sand with frequent inclusions of anthropogenic material such as brick, concrete, asphalt, metal, plastic and glass. A suspected fragment of asbestos cement sheeting was identified within the Made Ground in TP103 at a depth of 2.1m bgl.

Clay

In TP101 and TP102 brownish grey sandy gravelly clay was encountered from 2.40m bgl to a maximum depth of 3.30m bgl.

Storm Beach Deposits

In TP102 and TP103 yellowish brown sandy gravel was encountered from a depth of 2.45m bgl to maximum depth of 3.30m bgl.

Groundwater

SLR has previously carried out groundwater monitoring at the PFS. Groundwater levels within the monitoring wells on the PFS are recorded as between 2.95m and 3.61m bgl and found to be resting within the superficial deposits. No groundwater was encountered in the trial pits during the investigation, the area in which the trial pits were excavated is at a slightly higher elevation than the PFS. Due to the proximity of the sea the groundwater level is influenced by the tide. SLR has previously assessed the tides influence on the groundwater by installing level loggers in the monitoring wells, the analysis found the groundwater level fluctuated by approximately 0.5m with a 2-hour lag time[1].

3.0 Soakage testing

Water cannot be discharged into Made Ground, therefore natural soils are required for carrying out soakage testing. TP102 was found to have the thickest deposits of natural soils and therefore the soakage test was carried out within this trial pit. TP101 and TP103 were not found to have sufficient deposits of natural soils and therefore soakage tests were not carried out.

A single soakage test was carried out in TP102. The test was carried out in general accordance with best practice guidance as set out in BRE Digest 365. Once the trial pit was excavated it was rapidly filled with water to the top of the natural strata and allowed to drain while the depth to water from ground level was measured at regular intervals.

4.0 Infiltration Test Results

The result of the soakage test is attached as Appendix C. BRE 365 stipulates that an infiltration rate can be established from the time taken for the volume of water to drop from 75% volume to 25% and ideally this would be repeated three times. Due to the nature of the geology encountered the water did not drain to 75% capacity of the initial volume of water added, therefore only one “fill” was carried out rather than the three outlined in the guidance.

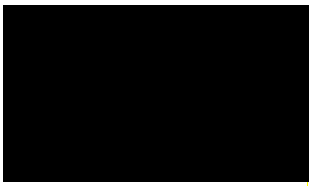
As the drop from 75% volume to 25% was not achieved in this instance, BRE 365 would define this as a failed test. In some instances, it is possible to extrapolate the data collected in the field to produce approximate infiltration rates. This approach is not recommended by BRE 365, and in this instance even if extrapolated the calculated infiltration rate would be lower than the cut-off rate of 10^{-6}m/s outlined in the SuDS Manual[2]. The soakage test result shows that the ground conditions are unlikely to be favourable for shallow soakaways due to the limited infiltration rates and the encountered depths of Made Ground. In light of these findings, it may be necessary to consider an alternative drainage strategy for the proposed development.

We trust our findings meet with your requirements and that you will not hesitate to contact us with any further questions or queries.

Regards,

SLR Consulting Limited

[1] 230717_427.009935.00001_Brooklands_DQRA
[2] CIRIA, C753: The SuDS Manual, 2015



Dominic Goodchild-James, MCIWEM
Associate Consultant

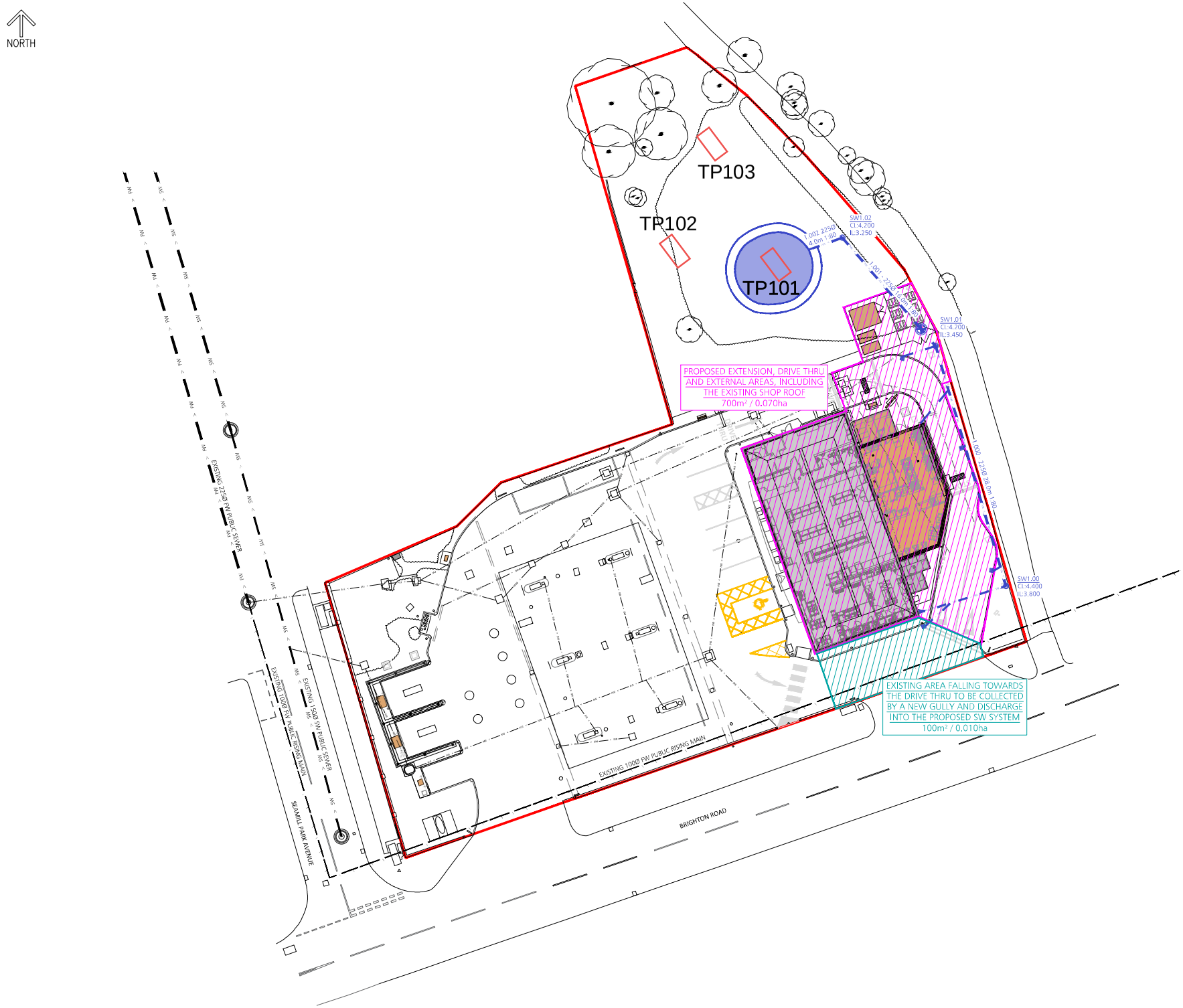
Office phone +44 3300 886631
Mobile 07816 332000
dgoodchild-james@slrconsulting.com

Appendix A Drawings

Brooklands Service Station – Trial Pit Soakage Testing

SLR Project No.: 409.010156.00001

3 October 2024



DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

IT IS ASSUMED THAT ALL WORKS WILL BE UNDERTAKEN BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT. IN ADDITION TO THE HAZARDS TYPICALLY ASSOCIATED WITH THE TYPES OF CONSTRUCTION DETAILED ON THIS DRAWING, ANY KNOWN ABNORMAL HAZARDS SPECIFIC TO THIS SCHEME HAVE BEEN IDENTIFIED.

ABNORMAL HAZARD REFERENCE

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS TO BE REPRODUCED IN COLOUR.
3. IF ANY DISCREPANCIES ARE FOUND IN THIS DRAWING, PLEASE REPORT TO DUDLEYS CONSULTING ENGINEERS.
4. THIS DRAWING HAS BEEN ORIENTATED TO OS BRITISH NATIONAL GRID (EPSG:27700 OSGB36). EXISTING SURVEY STATIONS ARE SHOWN ON THE TOPOGRAPHICAL SURVEY.
5. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   5.1. 50385-01 - TOPOGRAPHICAL SURVEY BY MALCOLM HUGHES DATED OCTOBER 2017.
   5.2. 240479-01 - GENERAL SITE LAYOUT BY JENNINGS DESIGN DATED JUNE 2024.
   5.3. WASTEWATER PLAN BY SOUTHERN WATER DATED JUNE 2024.
6. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS AND SEWERAGE SECTOR CODES OF PRACTICE.

DATE	REVISION DESCRIPTION	BY	CHK.	REV.
02.07.24	PRELIMINARY ISSUE	GD	SDR	P01

DUDLEYS CONSULTING ENGINEERS
Tithe House
35 Town Street
Leeds, LS18 5JJ
0113 258 3611
info@dudleys.co.uk

PROJECT
BROOKLANDS SERVICE STATION
311 BRIGHTON ROAD
WORTHING, BN11 2HP

JOB 24230

TITLE
PROPOSED IMPERMEABLE AREAS

SCALE	PAPER	STATUS
1:200	A1	PRELIMINARY

DRAWING NO.
24230-DCE-XX-XX-D-C-103

REV.
P01

Appendix B Trial Pit Logs

Brooklands Service Station – Trial Pit Soakage Testing

SLR Project No.: 409.010156.00001

3 October 2024

TRIAL PIT LOG

TRIAL PIT No **TP101**

Client: **MFG Ltd**

Project: **Brooklands PFS Soakage Testing**

Project No:	Date:	Ground Level:	Co-ordinates:	Sheet
409.010156.00001	18/09/2024			1 of 1

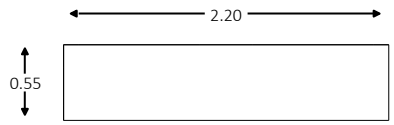
SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(0.10) 0.10	Dark brown slightly clayey slightly gravelly sand with frequent rootlets. Sand is fine to medium. Gravel is subangular to rounded, fine to coarse flint.	
							(0.10) 0.20	TOPSOIL	
								Brown slightly clayey slightly gravelly sand. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of flint, chalk and brick. MADE GROUND	
							(1.00)	Brown slightly clayey slightly gravelly sand. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of flint, concrete, chalk and brick. Occasional cobbles of brick and concrete. MADE GROUND	
1							1.20		
1.40								Dark brown gravelly sand. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint, concrete, chalk, brick, slate and asphalt. Occasional rope and metal. Occasional cobbles of brick and concrete. MADE GROUND	
2							(1.40)		
							2.60		
							(0.35)	Soft light yellowish brown slightly gravelly sandy clay. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of flint, brick and concrete. MADE GROUND	
							2.95		
3							(0.10) 3.05	Dark brown slightly gravelly sand. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of flint, concrete, brick and chalk. Frequent glass, metal and slate. Frequent cobbles of brick and concrete. MADE GROUND	
							3.10		
							(0.20)	Firm brownish grey sandy CLAY. Sand is fine to medium.	
							3.30	Soft brownish grey sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse of flint.	
								Trial Pit Complete at 3.30m	

GENERAL REMARKS:

Excavation backfilled with arisings.

KEY
V = Hand Vane Shear Strength
PP = Pocket Penetrometer Shear Strength
J = Jar Sample
D = Disturbed Sample
B = Large Bulk Sample
HS = Head Space Measurement

Trial Pit Dimensions:



Shoring/Support:

Stability:

All dimensions in metres	Contractor: Woodmancote Contractors Ltd	Method: Trial pit/trench	Logged By:	Approved By:
Scale 1:25	Plant: JCB 3CX		DC	

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

TRIAL PIT LOG

TRIAL PIT No
TP102

Client:
MFG Ltd

Project:
Brooklands PFS Soakage Testing

Project No:	Date:	Ground Level:	Co-ordinates:	Sheet
409.010156.00001	18/09/2024			1 of 1

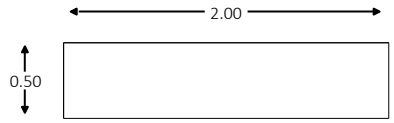
SAMPLES & TESTS				Water	STRATA				Instrument Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(0.10) 0.10	Dark brown slightly clayey slightly gravelly sand with frequent rootlets. Sand is fine to medium. Gravel is subangular to rounded, fine to coarse flint. TOPSOIL	
0.50							(1.20)	Brown slightly clayey slightly gravelly sand. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint, chalk, asphalt and brick. Frequent cobbles of brick and concrete. MADE GROUND	
1							1.30		
							(1.10)	Light yellowish brown gravelly sand. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of flint, brick and concrete. Frequent cobbles of brick and concrete. MADE GROUND *1.30 - 1.50 Black staining.*	
2							2.40		
							2.45	Firm brownish grey gravelly sandy CLAY. Sand is fine to medium. Gravel is angular to subrounded, fine to coarse of flint.	
							(0.85)	Yellowish brown very sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse of flint. STORM BEACH DEPOSITS	
3							3.30		
								Trial Pit Complete at 3.30m	

GENERAL REMARKS:

Excavation backfilled with arisings. Soakage test carried out in trial pit.

KEY
V = Hand Vane Shear Strength
PP = Pocket Penetrometer Shear Strength
J = Jar Sample
D = Disturbed Sample
B = Large Bulk Sample
HS = Head Space Measurement

Trial Pit Dimensions:



Shoring/Support:

Stability:

All dimensions in metres	Contractor: Woodmancote Contractors Ltd	Method: Trial pit/trench	Logged By:	Approved By:
Scale 1:25	Plant: JCB 3CX		DC	

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

TRIAL PIT LOG

TRIAL PIT No
TP103

Client:
MFG Ltd

Project:
Brooklands PFS Soakage Testing

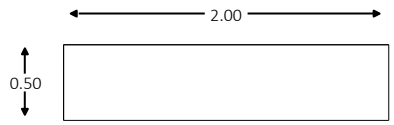
Project No:	Date:	Ground Level:	Co-ordinates:	Sheet
409.010156.00001	18/09/2024			1 of 1

SAMPLES & TESTS				Water	STRATA				Instrument Backfill
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
							(0.10) 0.10	Dark brown slightly gravelly, slightly clayey sand. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse of flint. TOPSOIL	
							(0.80) 0.90	Brown slightly gravelly slightly clayey sand. Sand is fine to medium. Gravel is subrounded, fine to medium of flint, chalk, concrete and brick. Occasional cobbles of brick and concrete. MADE GROUND	
1.00	1						(1.30) 2.20	Brown gravelly sand. Sand is fine to medium. Gravel is angular to subangular, fine to coarse of flint, chalk, brick, conrete and slate. Frequent cobbles of brick and concrete. Frequent metal, glass and plastic. MADE GROUND	
2								*2.10 Asbestos cement sheeting.*	
							(0.60) 2.80	Dark brown clayey gravelly sand. Sand is fine to medium. Gravel is angular to subrounded, fine to coarse of flint, brick, concrete and slate. Frequent cobbles of brick and concrete. Frequent metal and glass. MADE GROUND	
3							(0.20) 3.00	Light yellowish brown clayey, sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse of flint. STORM BEACH DEPOSITS	
								Trial Pit Complete at 3.00m	

GENERAL REMARKS:
Excavation backfilled with arisings.

KEY
V = Hand Vane Shear Strength
PP = Pocket Penetrometer Shear Strength
J = Jar Sample
D = Disturbed Sample
B = Large Bulk Sample
HS = Head Space Measurement

Trial Pit Dimensions:



Shoring/Support:
Stability:

All dimensions in metres Scale 1:25	Contractor: Woodmancote Contractors Ltd Plant: JCB 3CX	Method: Trial pit/trench	Logged By: DC	Approved By:

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

Appendix C Infiltration Rate Data

Brooklands Service Station – Trial Pit Soakage Testing

SLR Project No.: 409.010156.00001

3 October 2024

SOP FORM 3.3.3 - SOIL INFILTRATION RATE TEST

(See B.R.E. Digest 365, 1991, Soakaway Design.)

Project:	MFG Brooklands Service Station (FS609)
Project No.:	427.009935.00001
Date of Test:	18/09/2024

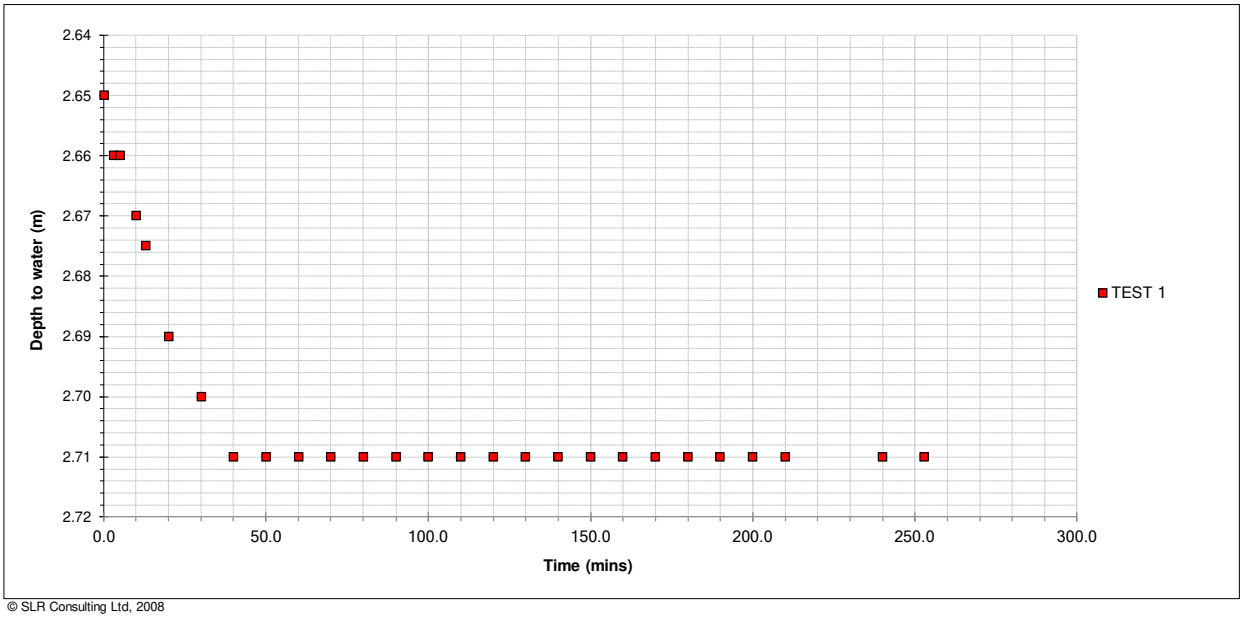
Trial Pit No.:	TP2	
TP Length:	2.00	m
TP Width:	0.50	m
TP Depth:	3.30	m
Groundwater Level:	Dry	mbgl

Remarks -
See logs. Made Ground encountered to 2.4m bgl.
Test carried out in natural soils, filled to 2.65m bgl.

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0.0	2.65				
3.0	2.66				
5.0	2.66				
10.0	2.67				
13.0	2.68				
20.0	2.69				
30.0	2.70				
40.0	2.71				
50.00	2.71				
60.0	2.71				
70.0	2.71				
80.0	2.71				
90.0	2.71				
100.0	2.71				
110.0	2.71				
120.0	2.71				
130.0	2.71				
140.0	2.71				
150.0	2.71				
160.0	2.71				
170.0	2.71				
180.0	2.71				
190.0	2.71				
200.0	2.71				
210.0	2.71				
240.0	2.71				
253.0	2.71				

Effective Storage Depth	m	0.65		
75% Effective Storage Depth	m	0.49		
(i.e. depth below GL)	m	2.81		
25% Effective Storage Depth	m	0.16		
(i.e. depth below GL)	m	3.14		
Effective Storage Depth 75%-25%	m	0.33		
Time to fall to 75% effective depth	mins	Not reached - FAIL		
Time to fall to 25% effective depth	mins	Not reached - FAIL		
V (75%-25%)	m3	0.33		
a (50%)	m2	2.63		
t (75%-25%)	mins	Not reached - FAIL		
SOIL INFILTRATION RATE	m/s	Not reached - FAIL		

DESIGN SOIL INFILTRATION RATE, f Not reached - FAIL



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