



GROUNDTECH
CONSULTING

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Plans

<i>Plan Reference</i>	<i>Revision</i>	<i>Title</i>
GRO-21438-P01	-	Project Location Plan
GRO-21438-P04	1.1	Exploratory Hole Location Plan

1.0 INTRODUCTION

1.1 Project Objectives

Groundtech Consulting Limited have been instructed by Kennedy Redford on behalf of JD Sports to undertake further soil percolation testing and forensic analysis testing of the Made Ground soils for a site in Bury.

The following reports have previously been produced for the site:

- Preliminary Risk Assessment referenced GRO-21438-3118, dated February 2022 produced by Groundtech Consulting Limited.
- Coal Mining Risk Assessment referenced GRO-21438-3119, dated 26 January 2022 produced by Groundtech Consulting Limited.
- Phase 2 Site Investigation referenced 4251-ROC-ZZ-XX-RP-ES-PH2SI, dated 01 December 2021 produced by RoC Consulting.
- Geo-Environmental Appraisal referenced GRO-21438-3308, dated 31 March 2022 produced by Groundtech Consulting Limited.

The above should be read in conjunction with this report.

1.2 Proposed Development

The proposed development is commercial end use comprising a three-storey office block in the east with associated staff welfare facilities including two five-a-side football pitches. A creche is also proposed in the south west of the site.



1.3 Limitations

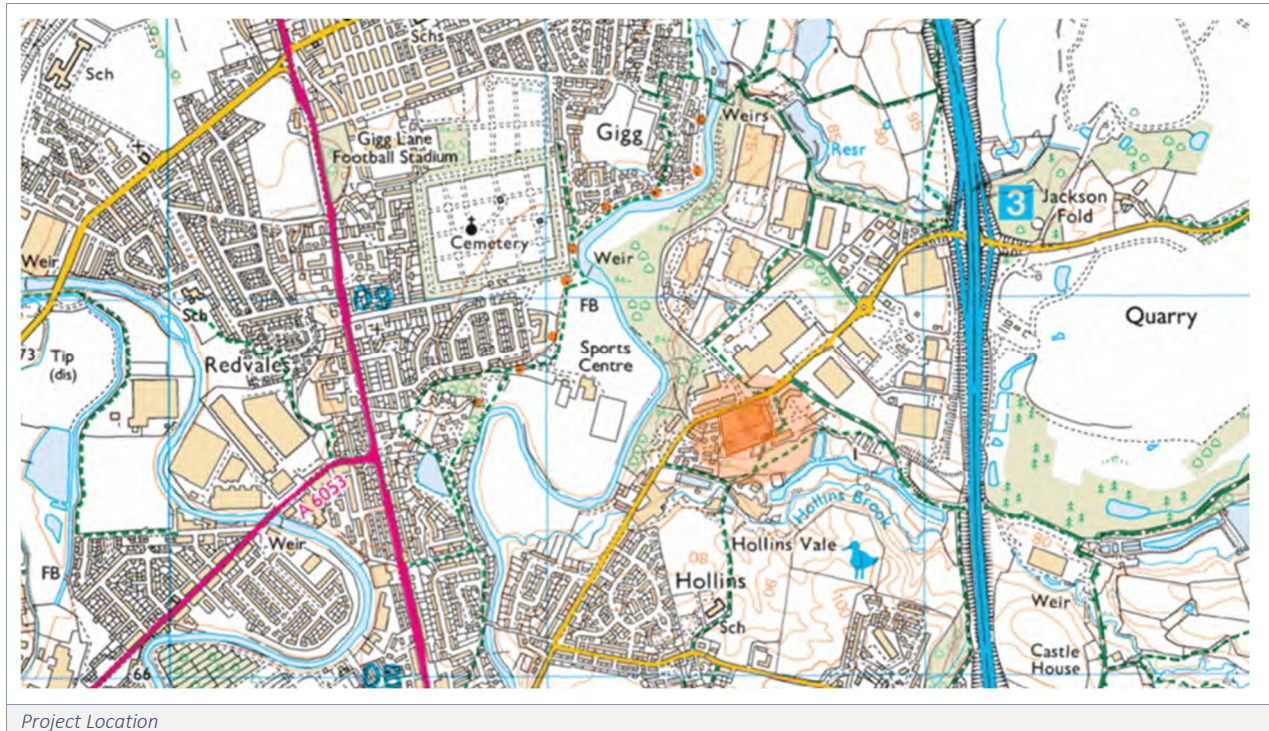
Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

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2.0 SITE SETTING

2.1 Location

The site is located circa 2.4km south east of Bury Town Centre, as shown on the Project Location Plan GRO-21438-P01 and is approximately centred on National Grid Reference 381527, 408662.



Access to the site is gained off Pilsworth Road to the north east.

2.2 Site Description

The site is relatively level across its footprint and roughly rectangular in shape, encompassing an area of approximately 1.5 hectares.

Site Features

The site was most recently occupied by a large warehouse unit which has recently been demolished. The footprint of the former building is surfaced with grass and some light vegetation which is uneven. The concrete hardsurfacing previously present across the site had recently been broken out prior to the latest visit, leaving the majority of the site surfaced with granular Made Ground soils.

A gas main crosses the north east corner of the site.

A vegetated strip is present along the site's northern boundary with some semi-mature and mature trees present.

Site Boundaries and Surrounding Features

The site boundaries are formed by metal fencing and trees are present close to the site's northern, eastern and southern boundaries.

The site is surrounded by the following features/land uses:

- *North* - *Pilsworth Road followed by light industrial/commercial units.*
- *East* - *Hollins Brook Way, commercial offices and an associated car park.*
- *South* - *Commercial office premises and Local Nature Reserve.*
- *West* - *Commercial buildings and residential housing estate.*

Site photographs are presented in *Appendix 2*.

3.0 SCOPE OF INVESTIGATION AND RATIONALE

3.1 Project Objectives

The aim of the fieldwork was to:

Determine the stratification beneath the site.
Maintain a watching brief for visual and olfactory evidence of contamination.
Determine soil infiltration rates.
Obtain samples of the Made Ground for Forensic analysis.

3.2 Scope of Works

The following scope of works was completed by Groundtech Consulting between 18th July and 19th July 2022:

- 3 No. trial pits (TP101 to TP103) were excavated to a depth of 1.0m bgl using a JCB 3CX excavator.
- 5 No. soil percolation tests (SuDS101 to SuDS105) were undertaken at depths between 1.1m and 2.3m bgl.

The exploratory hole locations are presented on Groundtech Plan GRO-21438-P04_1.1.

The exploratory holes were positioned to target any areas of concern as summarised in the table below:

Location	Target Rationale
TP101 to TP103	Proposed building footprint
SuDS101 to SuDS105	Proposed SuDS drainage locations

3.3 Ground Conditions

Made Ground

Made Ground was encountered in all locations to depths between 0.66m and 1.35m bgl and comprised the following two main populations:

- Sandy gravelly cobbles of concrete and brick were in all locations from ground level to a maximum depth of 0.6m bgl.
- Firm brown sandy gravelly clay was in all exploratory locations underlying the granular Made Ground to depths between 0.66m and 1.35m bgl.

Natural Ground

A single main natural stratum was observed in all locations comprising red brown slightly clayey slightly gravelly Sand to a maximum depth of 2.3m bgl.

Bedrock

Bedrock was not encountered during this Ground Investigation.

Groundwater

Groundwater was encountered in SuDS104 and SuDS105 at depths of 2.0m and 1.9m bgl respectively, within the natural Sand.

Watching Brief

A watching brief was maintained for visual or olfactory evidence of potential contamination during the investigation.

No evidence of contamination was noted.

The exploratory hole logs are presented in *Appendix 3*.

3.4 Soil Sampling

The samples obtained are summarised in the table below.

Soil Sample	Number
<i>Bulk Disturbed Sample</i>	6

The samples have been obtained in accordance with current environmental guidance.

3.5 Geo-Environmental Analysis

To inform the Ground Gas Risk Assessment, the following geo-environmental testing was scheduled:

Contaminants of Concern	Matrix	Number
<i>Forensic Analysis in accordance with CL:AIRE RB17</i>	<i>Soil</i>	5
<i>Total Organic Carbon (TOC)</i>	<i>Soil</i>	5

The Geo-Environmental Laboratory Testing Results are presented in *Appendix 4*.

3.6 Geo-Environmental Testing Results – Soils

A summary of the Geo-Environmental Testing results is presented below:

<i>SuDS102</i>		
Constituent	Proportion (%)	TOC (%)
<i>Fine soil including gravel less than 10mm.</i>	38.7	0.7
<i>Coarse inert particles including gravel, concrete, brick greater than 10mm.</i>	60.7	-
<i>Cloth, leather.</i>	0.5	-
<i>SuDS103</i>		
Constituent	Proportion (%)	TOC (%)
<i>Fine soil including gravel less than 10mm.</i>	42.8	0.4
<i>Coarse inert particles including gravel, concrete, brick greater than 10mm.</i>	56.9	-
<i>Cloth, leather.</i>	0.4	-

TP101		
Constituent	Proportion (%)	TOC (%)
<i>Fine soil including gravel less than 10mm.</i>	<i>39.0</i>	<i>0.9</i>
<i>Coarse inert particles including gravel, concrete, brick greater than 10mm.</i>	<i>61.0</i>	<i>-</i>
TP102		
Constituent	Proportion (%)	TOC (%)
<i>Fine soil including gravel less than 10mm.</i>	<i>47.9</i>	<i>1.3</i>
<i>Coarse inert particles including gravel, concrete, brick, etc greater than 10mm.</i>	<i>51.9</i>	<i>-</i>
<i>Wood, trees, branches, etc.</i>	<i>0.2</i>	<i>-</i>
TP103		
Constituent	Proportion (%)	TOC (%)
<i>Fine soil including gravel less than 10mm.</i>	<i>48.0</i>	<i>0.5</i>
<i>Coarse inert particles including gravel, concrete, brick, etc greater than 10mm.</i>	<i>45.0</i>	<i>-</i>
<i>Metal.</i>	<i>7.0</i>	<i>-</i>

4.0 GROUND GAS RISK ASSESSMENT

4.1 Regulatory Liaison

Gas monitoring standpipes were installed as part of the previous investigation undertaken by Groundtech Consulting. Two monitoring visits have been carried out to date. However, the monitoring standpipes have since been destroyed during the enabling works on the site to break out and remove the hardsurfacing.

Groundtech Consulting contacted the Contaminated Land Officer at Bury Council to determine the best way to proceed with respect to producing a ground gas risk assessment with the limited data.

It was agreed with the Contaminated Land Officer that the assessment methodology outlined in CL:AIRE RB17 could be used alongside the existing gas monitoring results to quantify the ground gas risk. The results of the assessment are discussed in the following sections.

4.2 Permanent Ground Gases

Three standpipes were installed for gas monitoring, during the previous investigation, within BH01, BH02 and BH04. Two monitoring visits have been carried out to date on 28th February and 1st April 2022. BH01 was located in the vicinity of the proposed creche and the proposed office building was targeted by BH02 and BH04.

Concentrations of methane (CH₄) were not recorded within any monitoring locations. Carbon dioxide (CO₂) has been recorded at a maximum concentration of 4.3% v/v in BH01 and detectable levels of oxygen (O₂) were recorded within the standpipes at a minimum level of 12.3% v/v.

No positive gas flow rates were detected during the monitoring visits.

The atmospheric pressure ranged between 1008mb and 1012mb during the monitoring visits which were completed during periods of falling and steady barometric pressure.

Groundwater was recorded within all standpipes at depths of between 0.47m and 4.0m bgl.

Characterisation of the Gas Screening Value (GSV)

Based upon the initial results recorded, in accordance with CIRIA Report C665, the risk to the site from ground gases has been assessed by converting the results to gas screening values (GSVs), calculated by multiplying the typical maximum gas concentrations with the recorded maximum positive flow rates. In addition, individual “hazardous gas flow rates” (Q_{hg}) have been derived for each monitoring point. As no levels of methane have been recorded, a GSV for carbon dioxide only has been calculated.

$$GSV \text{ (l/hr)} = \text{max borehole flow rate (l/hr)} \times \text{max gas concentration (\%)}$$

For this assessment, the maximum recorded concentration of carbon dioxide of 4.3%v/v has been used. No positive gas flow rates have been detected therefore the limit of detection of the gas analyser of 0.1 l/hr has been used to calculate the GSV.

$$\text{Carbon Dioxide GSV} = 0.043 \text{ (4.3\%)} \times 0.1 = 0.0043 \text{ l/hr}$$

Assessment

In order to assess the ground gas regime beneath the site and the need to incorporate ground gas precautions, guidance was taken from CIRIA C655 'Assessing risks posed by hazardous ground gases to buildings'. Based on the site having commercial end use which includes an office block in the east and a creche in the west, the Wilson and Card method has been used to carry out the assessment.

When considering the results to date in accordance with CIRIA C665 (Section A Development and Table 8.5 – Modified Wilson and Card Classification) it can be seen that the GSV value for carbon dioxide is below the assessment GSV of 0.07l/hr and typical carbon dioxide concentrations are less than 5% v/v, the site falls into CS1 based on the monitoring undertaken to date. Individual hazardous gas flow rates are also significantly below assessment criteria.

Characteristic Situation 1

The proposed development at the site will include building types B & C in accordance with BS 8485:2015 and the site falls into CS1 in accordance with Table 2 of the above guidance and no gas protection measures are required.

The above recommendations are based on the gas monitoring carried out to date. No further visits can be undertaken due to the standpipes being destroyed. The ground gas risk will be further quantified by the RB17 Assessment in the following section.

Radon

The site is not located in an area where radon precautions are required within new structures.

4.3 CL:AIRE RB17 Ground Gas Assessment

Background

The CL:AIRE RB17 research bulletin details the methodology by which the likely gas generation from a source can be estimated and has been used to inform the below assessment.

Forensic analysis has been undertaken of five bulk samples of the Made Ground as detailed in Section 4.5. The percentages of the following fractions in each sample were recorded:

- *Fine soil including gravel less than 10mm*
- *Coarse inert particles including gravel, concrete, brick, etc greater than 10mm*
- *Wood, trees, branches*
- *Green vegetation, grass, food waste, etc*
- *Cloth, leather*
- *Metal*
- *Glass*
- *Ceramics*
- *Other inert material*
- *Plastic*
- *Paper and Card*

- *Other degradable material*

Total Organic Carbon testing was undertaken for the fine fraction of each sample in accordance with the method described in 'Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures' (Environment Agency, 2005).

Assessment

Made Ground has been encountered in all locations to a maximum depth of 1.35m bgl, although it is generally present to less than 1.0m bgl. In the previous investigation, Made Ground was encountered in all locations to a maximum depth of 1.8m bgl, although it was again generally less than 1.0m thick.

The Made Ground predominantly consists of sandy gravelly cobbles of concrete and brick which are considered to be demolition material from the previous buildings on site. Firm brown sandy gravelly clay was encountered locally underlying the granular Made Ground, generally as a thin band.

Note 4 from Figure 2 in RB17 states that Made Ground deposits less than 1m thick such as general fill below roads and car parks or road construction can be ignored for the purpose of this assessment. Although Made Ground soils have been recorded to depths in excess of 1.0m bgl, they are generally less than 1m thick and comprise general granular fill material which was present beneath the previous car park/yard indicating a low risk from gas generation potential.

Samples were obtained of both the granular and cohesive Made Ground soils at the site for forensic analysis, with locations TP101 to TP103 targeting the footprint of the proposed building.

The results of the forensic analysis have shown that the Made Ground soils predominantly comprise either fine soil or coarse inert particles including gravel, concrete and brick. Proportions of cloth/leather were recorded in SuDS102 and SuDS103 at 0.5% and 0.4% respectively. Wood was recorded in the sample from location TP102 at a low concentration of 0.2% and metal was present in the sample from TP103 at a concentration of 7.0%.

None of the other fractions tested for were identified in the samples of the Made Ground.

The forensic analysis demonstrates that the Made Ground soils contain little or no organic or degradable material. Only small portions of cloth/leather and wood have been detected which are not likely to generate significant concentrations of ground gases.

Based on Table 1 of RB17, the site can be characterised as CS1 if the results of the TOC analysis are less than or equal to 1% and the thickness of Made Ground is less than 5m maximum and the average thickness is less than 3m. The results of the TOC analysis are all below 1.0% with the exception of TP102 which recorded a slightly elevated TOC percentage of 1.3%.

It is considered suitable that the site can be classified as CS1 based on the TOC analysis as the results are predominantly below 1% with only one slight exceedance of the threshold recorded.

4.4 Conclusions

The Made Ground across the site is generally present to a depth of less than 1.0m bgl comprising granular inert material. Gas monitoring undertaken to date has indicated the site should be classified as CS1.

The forensic analysis testing demonstrates that very little degradable or organic material is present in the Made Ground soils. TOC testing has generally placed the site in CS1 based on the CL:AIRE RB17 Research Bulletin.

Based on the numerous lines of evidence detailed above, the site has been classified as CS1 and no gas protection measures are considered necessary within the proposed commercial development.

5.0 GROUND ENGINEERING

5.1 Sustainable Urban Drainage System (SuDS)

Soil percolation testing was carried out in general accordance with BRE Digest 365 at positions SuDS101 to SuDS105. The depths and locations of tests SuDS101 to SuDS103 were specified by Kennedy Redford. Additional locations SuDS104 and SuDS105 were positioned by Groundtech Consulting due to the poor soil infiltration rates observed in the initial tests at locations SuDS101 to SuDS103.

The results are presented in *Appendix 5* and a summary is presented in the table below:

Location	Test No.	Depth (m bgl)	Stratum	Soil Infiltration Rate (m/sec)
SuDS101	1	1.60	Sand	3.88×10^{-6}
SuDS101	2	1.60	Sand	9.15×10^{-7}
SuDS101	3	1.60	Sand	3.88×10^{-7}
SuDS102	1	1.10	Sand	7.03×10^{-6}
SuDS102	2	1.10	Sand	4.67×10^{-6}
SuDS102	3	1.10	Sand	3.77×10^{-6}
SuDS103	1	1.20	Sand	2.73×10^{-5}
SuDS103	2	1.20	Sand	4.47×10^{-6}
SuDS103	3	1.20	Sand	4.69×10^{-6}
SuDS104	1	2.30	Sand	5.50×10^{-6}
SuDS104	2	2.30	Sand	4.56×10^{-6}
SuDS104	3	2.30	Sand	3.18×10^{-6}
SuDS105	1	2.00	Sand	2.91×10^{-6}
SuDS105	2	2.00	Sand	4.57×10^{-6}
SuDS105	3	2.00	Sand	2.88×10^{-6}

The natural strata tested at all locations comprised of slightly clayey occasionally silty gravelly Sand. The soil infiltration rates recorded generally indicate poor drainage conditions with the exception of the initial test undertaken at location SuDS103 which demonstrated a good soil infiltration rate.

Groundwater was encountered at the base of the excavations at locations SuDS104 and SuDS105 and is likely contributing to the poor soil infiltration rates observed.

The results at the locations and depths tested are not generally favourable for the use of a SuDS drainage scheme within the natural Sand deposits.

Groundwater has been encountered at depths between 1.9m and 2.0m bgl. This will need to be considered within the design of SuDS drainage as the groundwater table should be 1m below the base of SuDS drainage to account for seasonal variations.

APPENDIX 1 - Plans



GROUNDTECH CONSULTING	CLIENT	DATE			Status	Notes - Site Location
	JD SPORTS	JANUARY 2022			Preliminary	
	PROJECT TITLE	SCALE			Draft	
	NEW OFFICE BLOCK, BURY	NTS			Issued	
	PLAN TITLE	PLAN NUMBER			For Comment	
	PROJECT LOCATION PLAN	GRO-21438-P01	Rev.	Details	Date	Approved







APPENDIX 2 - Site Photographs



Photograph 1 – SuDS101



Photograph 2 – SuDS102



Photograph 3 – SuDS103



Photograph 4 – SuDS104



Photograph 5 – SuDS105



APPENDIX 3 - Exploratory Hole Logs

Trial Pit Log

Trialpit No
SuDS101
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -
Level:

Date
18/07/2022

Location: BURY

Dimensions (m):

Scale
1:25

Client: JD SPORTS

Depth
1.60

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.80	B					MADE GROUND: Grey sandy gravelly angular to subangular cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of mixed lithologies including concrete and brick.	
				0.60			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine to medium. Gravel is subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	1
				1.10			Red brown slightly clayey slightly gravelly fine SAND. Gravel is angular to subangular fine to coarse of mixed lithologies.	
				1.60			End of pit at 1.60 m	2
								3
								4
								5

Remarks: 1. No groundwater encountered 2. Pit sides stable 3. Soil Percolation test undertaken at 1.6m bgl. 4. Pit backfilled with arisings.

Stability:



Trial Pit Log

Trialpit No
SuDS103
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -
Level:

Date
18/07/2022

Location: BURY

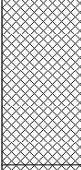
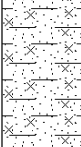
Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
1.20

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.60	B					MADE GROUND: Grey sandy gravelly angular to subangular cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of mixed lithologies including concrete and brick. <u>Rebar at 0.4m bgl.</u>	
				0.55			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravel is subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	
				0.66			Red brown slightly clayey slightly gravelly fine SAND. Gravel is angular to subangular fine to coarse of mixed lithologies.	1
				1.20			End of pit at 1.20 m	
								2
								3
								4
								5

Remarks: 1. No groundwater encountered 2. Pit sides unstable 3. Soil Percolation test undertaken at 1.2m bgl. 4. Pit backfilled with arisings.

Stability:



Trial Pit Log

Trialpit No
SuDS104
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -
Level:

Date
19/07/2022

Location: BURY

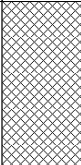
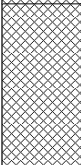
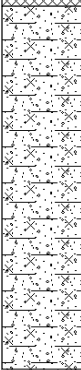
Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
2.30

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.55			MADE GROUND: Grey sandy gravelly angular to subangular cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of mixed lithologies including concrete and brick.	
				1.10			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravel is subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	1
				2.30			Red brown slightly clayey slightly silty slightly gravelly fine SAND. Gravel is angular to subangular fine to coarse of mixed lithologies.	2
							End of pit at 2.30 m	3
								4
								5

Remarks: 1. Groundwater encountered at 2m bgl. 2. Pit sides unstable 3. Soil Percolation test undertaken at 2.3m bgl. 4. Pit backfilled with arisings.

Stability:



Trial Pit Log

Trialpit No
SuDS105
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -
Level:

Date
19/07/2022

Location: BURY

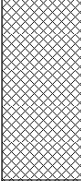
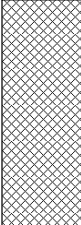
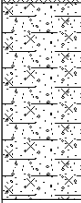
Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
2.00

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼				0.60			MADE GROUND: Grey sandy gravelly angular to subangular cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of mixed lithologies including concrete and brick.	
							MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravel is subrounded to subangular fine to coarse of mixed lithologies including brick and concrete. <u>Membrane at 0.8m bgl.</u>	1
				1.35			Red brown slightly clayey slightly silty slightly gravelly fine SAND. Gravel is angular to subangular fine to coarse of mixed lithologies.	
				2.00			End of pit at 2.00 m	2
								3
								4
								5

Remarks: 1. Groundwater encountered at 1.90m bgl. 2. Pit sides unstable 3. Soil Percolation test undertaken at 2.0m bgl. 4. Pit backfilled with arisings.

Stability:



Trial Pit Log

Trialpit No
TP101
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -
Level:

Date
18/07/2022

Location: BURY

Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
1.00

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.80	B					MADE GROUND: Grey sandy gravelly angular to subangular cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of mixed lithologies including concrete and brick.	
				0.60			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravel is subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	
				0.80			Red brown slightly clayey slightly gravelly fine SAND. Gravel is angular to subangular fine to coarse of mixed lithologies.	
				1.00			End of pit at 1.00 m	1
								2
								3
								4
								5

Remarks: 1. No groundwater encountered 2. Pit sides stable 3. Pit backfilled with arisings.

Stability:



Trial Pit Log

Trialpit No
TP103
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -
Level:

Date
18/07/2022

Location: BURY

Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
1.00

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.80	B					MADE GROUND: Grey sandy gravelly angular to subangular cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of mixed lithologies including concrete and brick.	
				0.60			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravel is subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	
				0.80			Red brown slightly clayey slightly gravelly fine SAND. Gravel is angular to subangular fine to coarse of mixed lithologies.	
				1.00			End of pit at 1.00 m	1
								2
								3
								4
								5

Remarks: 1. No groundwater encountered 2. Pit sides stable 3. Pit backfilled with arisings.

Stability:





APPENDIX 4 - Geo-Environmental Laboratory Testing Results



Jamie Donohue

Groundtech Consulting Ltd
First Floor, Lloyd House
Oxford Court
Greenfold Way
WN7 3XJ

t: 07449819886

e: jod@groundtechconsulting.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 22-74183

Project / Site name:	New Office Block Bury	Samples received on:	21/07/2022
Your job number:	GRO 21438	Samples instructed on/ Analysis started on:	27/07/2022
Your order number:	GRO 21438 2717	Analysis completed by:	08/08/2022
Report Issue Number:	1	Report issued on:	08/08/2022
Samples Analysed:	5 soil samples		


Signed:

Anna Goc
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 22-74183
 Project / Site name: New Office Block Bury
 Your Order No: GRO 21438 2717

Lab Sample Number				2366780	2366781	2366782	2366783	2366784
Sample Reference				TP02	TP03	TP04	TP05	TP06
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-1.00	0.00-1.00	0.00-1.00	0.00-1.00	0.00-1.00
Date Sampled				18/07/2022	18/07/2022	18/07/2022	18/07/2022	18/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	55	68	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	4	2.6	3.8	9.2	2.2
Total mass of sample received	kg	0.001	NONE	2	2	2	2	2

Geotechnical

Geotechnical Testing - Various		N/A	NONE	See attached	See attached	See attached	See attached	See attached
--------------------------------	--	-----	------	--------------	--------------	--------------	--------------	--------------

General Inorganics

Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.7	0.4	0.9	1.3	0.5
--	---	-----	--------	-----	-----	-----	-----	-----

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 22-74183

Project / Site name: New Office Block Bury

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2366780	TP02	None Supplied	0.00-1.00	Grey sand with concrete and gravel.
2366781	TP03	None Supplied	0.00-1.00	Grey sand with concrete and stones.
2366782	TP04	None Supplied	0.00-1.00	Brown sandy loam with concrete and stones.
2366783	TP05	None Supplied	0.00-1.00	Brown loam and clay with gravel.
2366784	TP06	None Supplied	0.00-1.00	Grey rubble with concrete and brick.

Analytical Report Number : 22-74183
Project / Site name: New Office Block Bury

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Geotechnical Testing in Soil	See attached geotechnical report	See attached geotechnical report		W	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
TOC Forensic	See attached report.	Research Bulletin RB17 November 2012 ISSN 2047-6450	PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

TEST CERTIFICATE

TOC FORENSIC

Tested in Accordance with: Research Bulletin RB17
November 2012 ISSN 2047-6450

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: Groundtech Consulting Ltd
Client Address: First Floor, Lloyd House, Oxford Court,
Greenfold Way, WN7 3XJ

Contact: Jamie Donohue
Site Address: New Office Block Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: GRO 21438
Job Number: 22-74183
Date Sampled: 18/07/2022
Date Received: 21/07/2022
Date Tested: 01/08/2022
Sampled By: Client - JOD

Test Results:

Laboratory Reference: 2366780
Client ID: TP02
Sample Reference: Not Given
Soil Description: Greyish very sandy GRAVEL

Depth Top [m]: 0.00
Depth Base [m]: 1.00
Sample Type: B

Sample preparation: Sample was dried at 40 °C

Constituents	Proportion (%)
Fine soil including gravel less than 10mm	38.7
Coarse inert particles including gravel, concrete, brick, etc greater than 10mm	60.7
Wood, trees, branches, etc	0.0
Green vegetation, grass, food waste, etc	0.0
Cloth, leather	0.5
Metal	0.0
Glass	0.0
Ceramics	0.0
Other inert material	0.0
Plastic	0.0
Paper and card	0.0
Other degradable material	0.0

Total Organic Carbon*	TOC (%)	Limit of detection (%)	Accreditation Status
	0.7	0.1	MCERTS

TOC job no 22-74183, sample no 2366780.

Note: *Tested in accordance with In house method L009-PL Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

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November 2012 ISSN 2047-6450

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Northampton NN4 7EB



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Greenfold Way, WN7 3XJ

Contact: Jamie Donohue
Site Address: New Office Block Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: GRO 21438
Job Number: 22-74183
Date Sampled: 18/07/2022
Date Received: 21/07/2022
Date Tested: 01/08/2022
Sampled By: Client - JOD

Test Results:

Laboratory Reference: 2366781
Client ID: TP03
Sample Reference: Not Given
Soil Description: Greyish brown very sandy GRAVEL

Depth Top [m]: 0.00
Depth Base [m]: 1.00
Sample Type: B

Sample preparation: Sample was dried at 40 °C

Constituents	Proportion (%)
Fine soil including gravel less than 10mm	42.8
Coarse inert particles including gravel, concrete, brick, etc greater than 10mm	56.9
Wood, trees, branches, etc	0.0
Green vegetation, grass, food waste, etc	0.0
Cloth, leather	0.0
Metal	0.4
Glass	0.0
Ceramics	0.0
Other inert material	0.0
Plastic	0.0
Paper and card	0.0
Other degradable material	0.0

Total Organic Carbon*	TOC (%)	Limit of detection (%)	Accreditation Status
	0.4	0.1	MCERTS

TOC job no 22-74183, sample no 2366781.

Note: *Tested in accordance with In house method L009-PL Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.

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Northampton NN4 7EB



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Greenfold Way, WN7 3XJ

Contact: Jamie Donohue
Site Address: New Office Block Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: GRO 21438
Job Number: 22-74183
Date Sampled: 18/07/2022
Date Received: 21/07/2022
Date Tested: 01/08/2022
Sampled By: Client - JOD

Test Results:

Laboratory Reference: 2366782
Client ID: TP04
Sample Reference: Not Given
Soil Description: Greyish brown very sandy GRAVEL

Depth Top [m]: 0.00
Depth Base [m]: 1.00
Sample Type: B

Sample preparation: Sample was dried at 40 °C

Constituents	Proportion (%)
Fine soil including gravel less than 10mm	39.0
Coarse inert particles including gravel, concrete, brick, etc greater than 10mm	61.0
Wood, trees, branches, etc	0.0
Green vegetation, grass, food waste, etc	0.0
Cloth, leather	0.0
Metal	0.0
Glass	0.0
Ceramics	0.0
Other inert material	0.0
Plastic	0.0
Paper and card	0.0
Other degradable material	0.0

Total Organic Carbon*	TOC (%)	Limit of detection (%)	Accreditation Status
	0.9	0.1	MCERTS

TOC job no 22-74183, sample no 2366782.

Note: *Tested in accordance with In house method L009-PL Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.

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Contact: Jamie Donohue
Site Address: New Office Block Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: GRO 21438
Job Number: 22-74183
Date Sampled: 18/07/2022
Date Received: 21/07/2022
Date Tested: 01/08/2022
Sampled By: Client - JOD

Test Results:

Laboratory Reference: 2366783
Client ID: TP05
Sample Reference: Not Given
Soil Description: Greyish brown very sandy GRAVEL

Depth Top [m]: 0.00
Depth Base [m]: 1.00
Sample Type: B

Sample preparation: Sample was dried at 40 °C

Constituents	Proportion (%)
Fine soil including gravel less than 10mm	47.9
Coarse inert particles including gravel, concrete, brick, etc greater than 10mm	51.9
Wood, trees, branches, etc	0.2
Green vegetation, grass, food waste, etc	0.0
Cloth, leather	0.0
Metal	0.0
Glass	0.0
Ceramics	0.0
Other inert material	0.0
Plastic	0.0
Paper and card	0.0
Other degradable material	0.0

Total Organic Carbon*	TOC (%)	Limit of detection (%)	Accreditation Status
	1.3	0.1	MCERTS

TOC job no 22-74183, sample no 2366783.

Note: *Tested in accordance with In house method L009-PL Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.

Remarks:

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Northampton NN4 7EB



Client: Groundtech Consulting Ltd
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Greenfold Way, WN7 3XJ

Contact: Jamie Donohue
Site Address: New Office Block Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: GRO 21438
Job Number: 22-74183
Date Sampled: 18/07/2022
Date Received: 21/07/2022
Date Tested: 01/08/2022
Sampled By: Client - JOD

Test Results:

Laboratory Reference: 2366784
Client ID: TP06
Sample Reference: Not Given
Soil Description: Greyish brown very sandy GRAVEL

Depth Top [m]: 0.00
Depth Base [m]: 1.00
Sample Type: B

Sample preparation: Sample was dried at 40 °C

Constituents	Proportion (%)
Fine soil including gravel less than 10mm	48.0
Coarse inert particles including gravel, concrete, brick, etc greater than 10mm	45.0
Wood, trees, branches, etc	0.0
Green vegetation, grass, food waste, etc	0.0
Cloth, leather	0.0
Metal	7.0
Glass	0.0
Ceramics	0.0
Other inert material	0.0
Plastic	0.0
Paper and card	0.0
Other degradable material	0.0

Total Organic Carbon*	TOC (%)	Limit of detection (%)	Accreditation Status
	0.5	0.1	MCERTS

TOC job no 22-74183, sample no 2366784.

Note: *Tested in accordance with In house method L009-PL Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.

Remarks:

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Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

APPENDIX 5 - Soil Percolation Testing Results

SOIL PERCOLATION TEST



Sheet 1 of 2

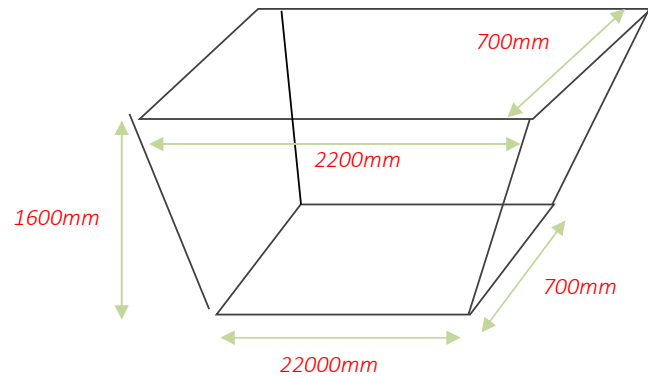
Date of Test: 18/07/2022

POSITION: SuDS101
TEST 1

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1600

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

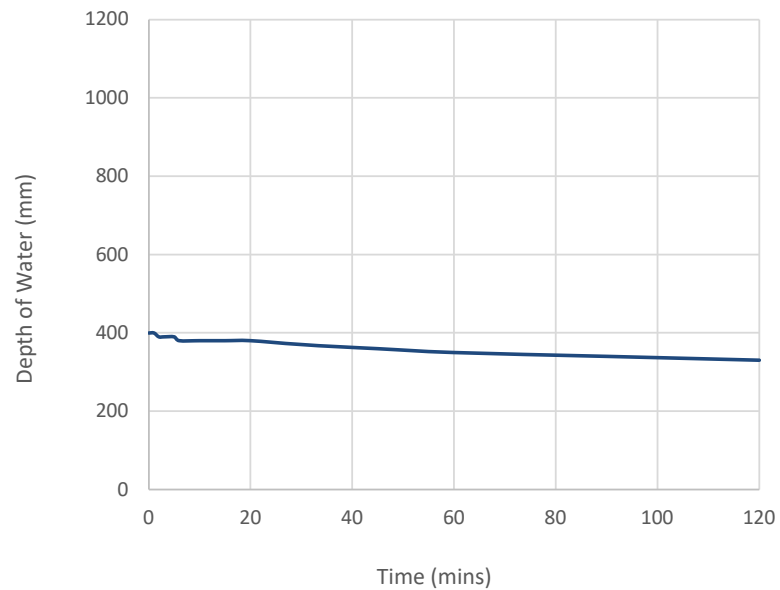
Time Elapsed (mins)	Depth to Water Level (mm)
0	1200
1	1200
2	1210
3	1210
5	1210
6	1220
10	1220
15	1220
20	1220
30	1230
45	1240
60	1250
90	1260
120	1270

SOIL PERCOLATION TEST

POSITION: SuDS101
TEST 1



Depth vs Time



Volume of Pit (m ³)	2.464
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.616

Compliance Check:

Water Level at 75% effective depth (mm)	300
---	-----

Water Level at 25% effective depth (mm)	100
---	-----

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	400
Water Level 2	330
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1078

Discharge Area (m ²)	3.657
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0002456
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	4.09E-06
--------------------------------	----------

SOIL PERCOLATION TEST



Sheet 1 of 2

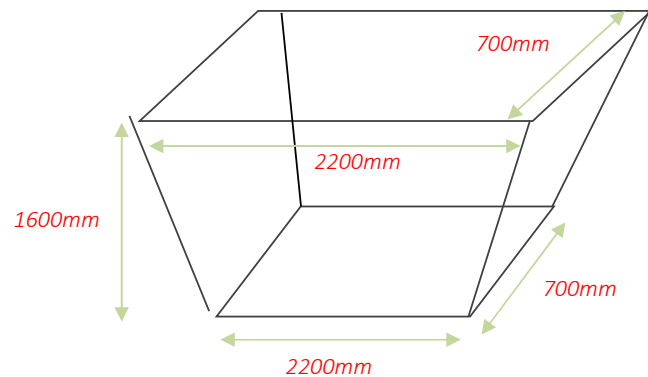
Date of Test: 18/07/2022

POSITION: SuDS101
TEST 2

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1600

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

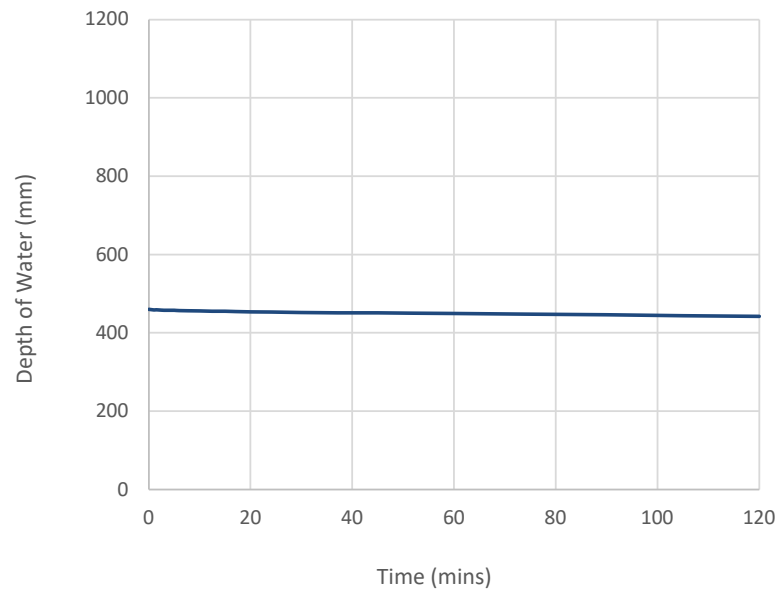
Time Elapsed (mins)	Depth to Water Level (mm)
0	1140
1	1141
2	1141
3	1142
5	1142
6	1143
10	1144
15	1145
20	1146
30	1148
45	1149
60	1150
90	1154
120	1158

SOIL PERCOLATION TEST

POSITION: SuDS101
TEST 2



Depth vs Time



Volume of Pit (m ³)	2.464
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.7084

Compliance Check:

Water Level at 75% effective depth (mm)	345
Water Level at 25% effective depth (mm)	115

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	460
Water Level 2	442
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.02772

Discharge Area (m ²)	4.1558
----------------------------------	--------

Soil Infiltration Rate (m/min)	5.558E-05
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	9.26E-07
--------------------------------	----------

SOIL PERCOLATION TEST



Sheet 1 of 2

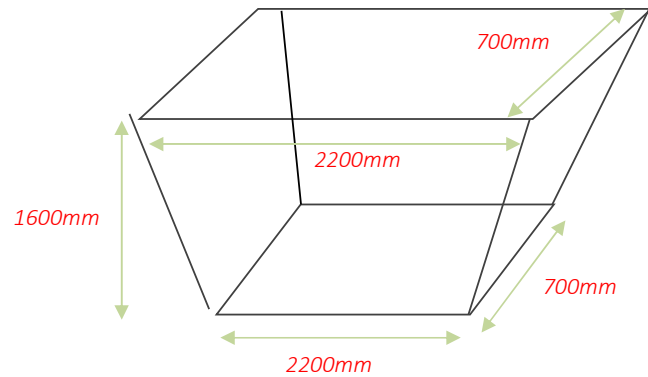
Date of Test: 18/07/2022

POSITION: SuDS101
TEST 3

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1600

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

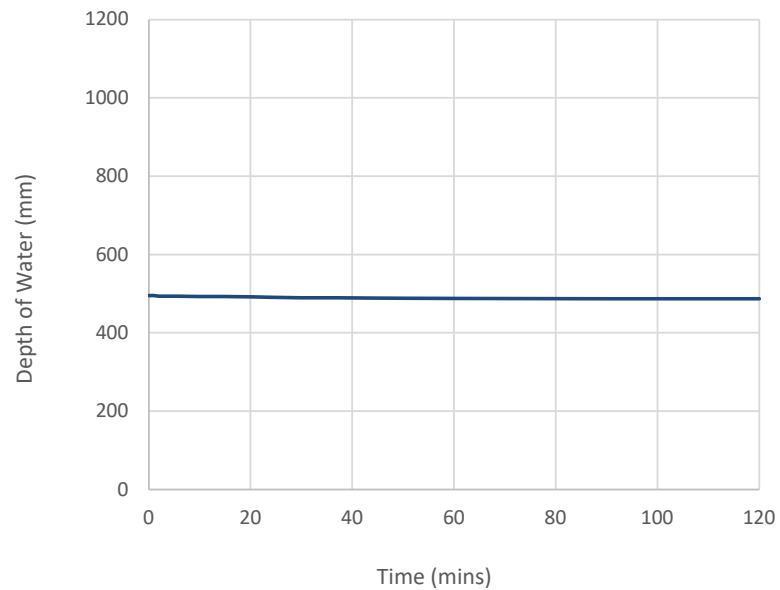
Time Elapsed (mins)	Depth to Water Level (mm)
0	1105
1	1105
2	1106
3	1106
5	1106
6	1106
10	1107
15	1107
20	1108
30	1110
45	1111
60	1112
90	1113
120	1113

SOIL PERCOLATION TEST

POSITION: SuDS101
TEST 3



Depth vs Time



Volume of Pit (m ³)	2.464
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.7623

Compliance Check:

Water Level at 75% effective depth (mm)	371.25
Water Level at 25% effective depth (mm)	123.75

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	495
Water Level 2	487
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.01232

Discharge Area (m ²)	4.3878
----------------------------------	--------

Soil Infiltration Rate (m/min)	2.34E-05
--------------------------------	----------

Soil Infiltration Rate (m/sec)	3.90E-07
--------------------------------	----------

SOIL PERCOLATION TEST



Sheet 1 of 2

Date of Test: 18/07/2022

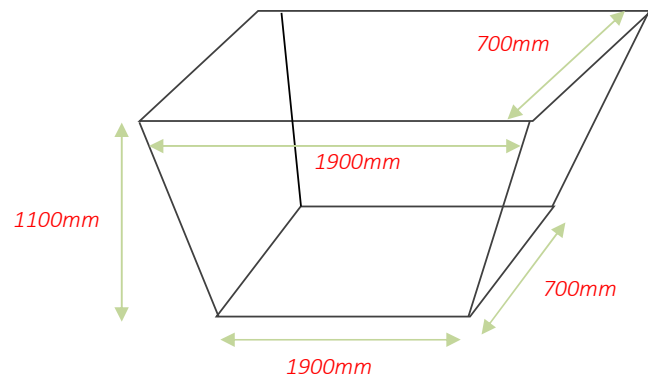
POSITION: SuDS102
TEST 1

Weather: Sunny

Engineer: J Donohue

Checked:

Trial Pit Measurements



Pit Depth (mm): 1100

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

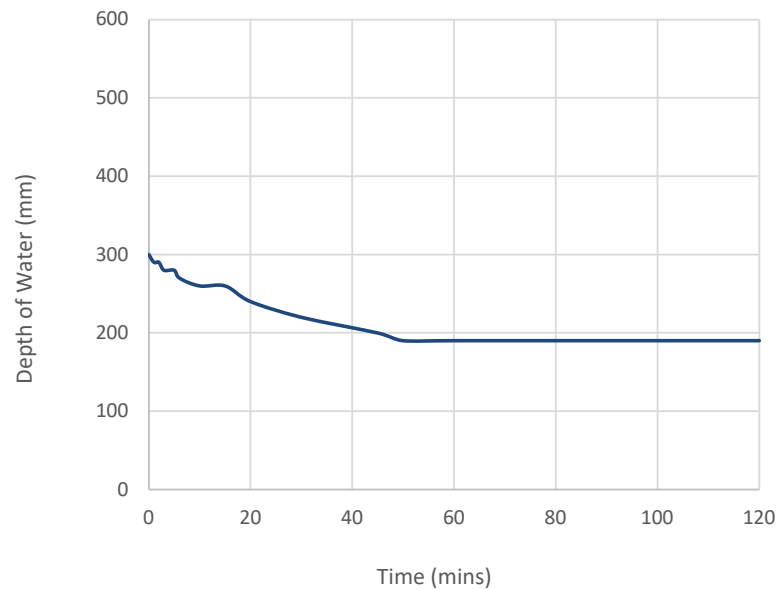
Time Elapsed (mins)	Depth to Water Level (mm)
0	800
1	810
2	810
3	820
5	820
6	830
10	840
15	840
20	860
30	880
45	900
50	910
60	910
90	910
120	910

SOIL PERCOLATION TEST

POSITION: SuDS102
TEST 1



Depth vs Time



Volume of Pit (m ³)	1.463
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.399

Compliance Check:

Water Level at 75% effective depth (mm)	225
Water Level at 25% effective depth (mm)	75

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	300
Water Level 2	190
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1463

Discharge Area (m ²)	2.604
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0004682
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	7.80E-06
--------------------------------	----------

SOIL PERCOLATION TEST



Sheet 1 of 2

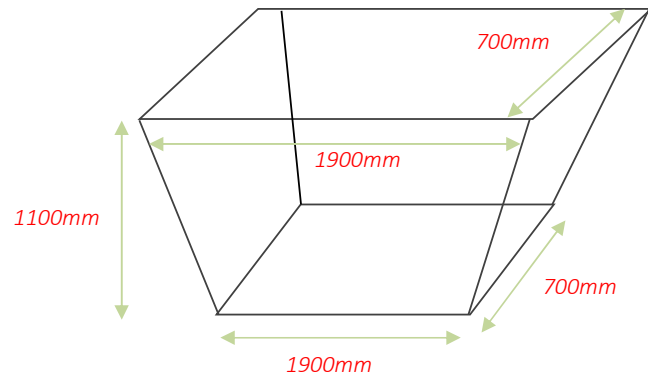
Date of Test: 18/07/2022

POSITION: SuDS102
TEST 2

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1100

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

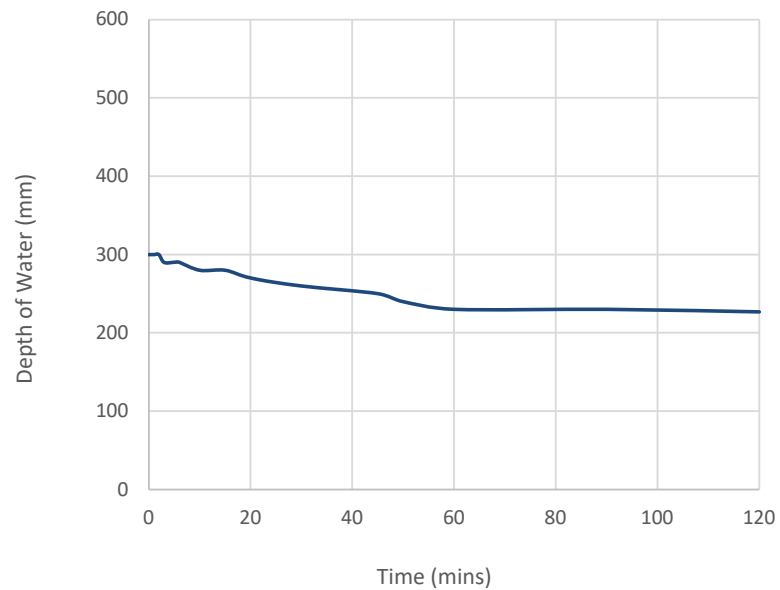
Time Elapsed (mins)	Depth to Water Level (mm)
0	800
1	800
2	800
3	810
5	810
6	810
10	820
15	820
20	830
30	840
45	850
50	860
60	870
90	870
120	873

SOIL PERCOLATION TEST

POSITION: SuDS102
TEST 2



Depth vs Time



Volume of Pit (m ³)	1.463
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.399

Compliance Check:

Water Level at 75% effective depth (mm)	225
Water Level at 25% effective depth (mm)	75

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	300
Water Level 2	227
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.09709

Discharge Area (m ²)	2.7002
----------------------------------	--------

Soil Infiltration Rate (m/min)	0.0002996
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	4.99E-06
--------------------------------	----------

SOIL PERCOLATION TEST



Sheet 1 of 2

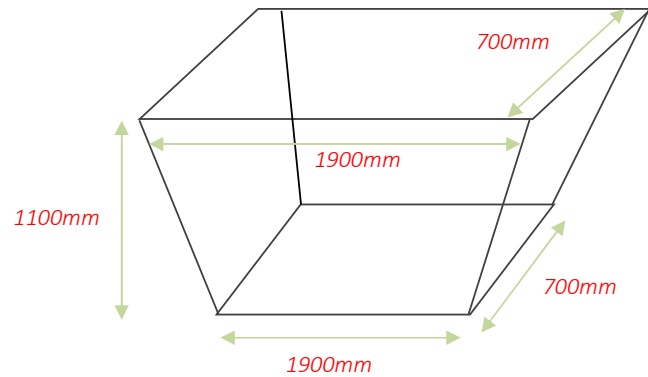
Date of Test: 18/07/2022

POSITION: SuDS102
TEST 3

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1100

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

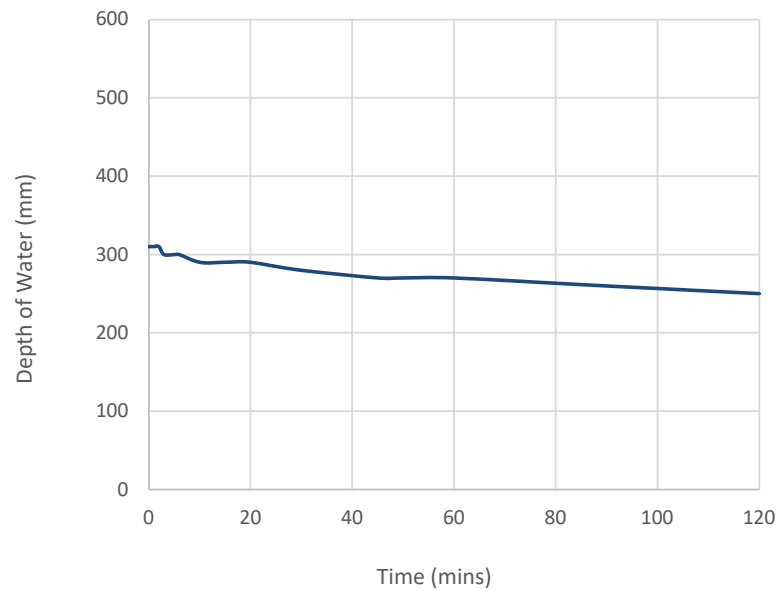
Time Elapsed (mins)	Depth to Water Level (mm)
0	790
1	790
2	790
3	800
5	800
6	800
10	810
15	810
20	810
30	820
45	830
50	830
60	830
90	840
120	850

SOIL PERCOLATION TEST

POSITION: SuDS102
TEST 3



Depth vs Time



Volume of Pit (m ³)	1.463
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.4123

Compliance Check:

Water Level at 75% effective depth (mm)	232.5
Water Level at 25% effective depth (mm)	77.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	310
Water Level 2	250
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0798

Discharge Area (m ²)	2.786
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0002387
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	3.98E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

Date of Test: 18/07/2022

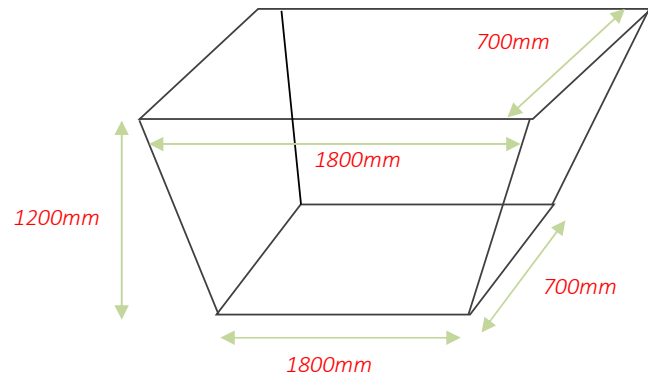
POSITION: SuDS103
TEST 1

Weather: Sunny, clear

Engineer: J Donohue

Checked:

Trial Pit Measurements



Pit Depth (mm): 1200

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

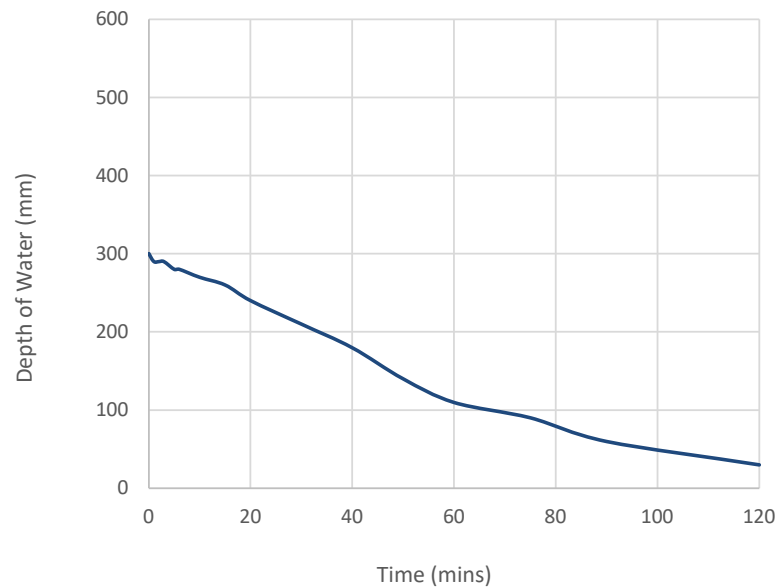
Time Elapsed (mins)	Depth to Water Level (mm)
0	900
1	910
2	910
3	910
5	920
6	920
10	930
15	940
20	960
30	990
40	1020
50	1060
60	1090
75	1110
90	1140
120	1170

SOIL PERCOLATION TEST

POSITION: SuDS103
TEST 1



Depth vs Time



Volume of Pit (m ³)	1.512
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.378

Compliance Check:

Water Level at 75% effective depth (mm)	225
Water Level at 25% effective depth (mm)	75

Compliant with BRE 365

Soil Infiltration Rate Calculation

Water Level 1	225
Water Level 2	75
Time to Drain from Level 1 to Level 2 (mins)	47.5
Volume of water discharged (m ³)	0.189

Discharge Area (m ²)	2.01
----------------------------------	------

Soil Infiltration Rate (m/min)	0.0019796
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Soil Infiltration Rate (m/sec)	3.30E-05
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SOIL PERCOLATION TEST



Sheet 1 of 2

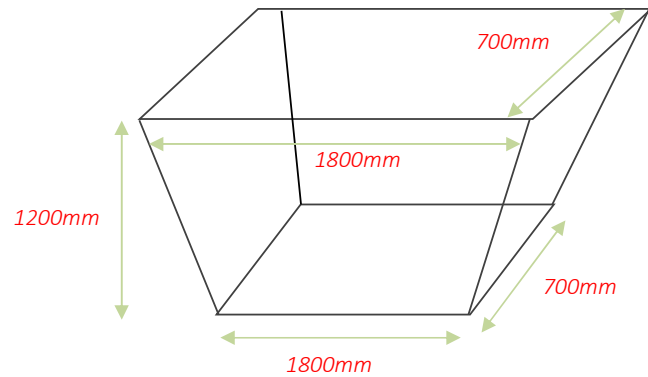
Date of Test: 18/07/2022

POSITION: SuDS103
Test 2

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1200

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

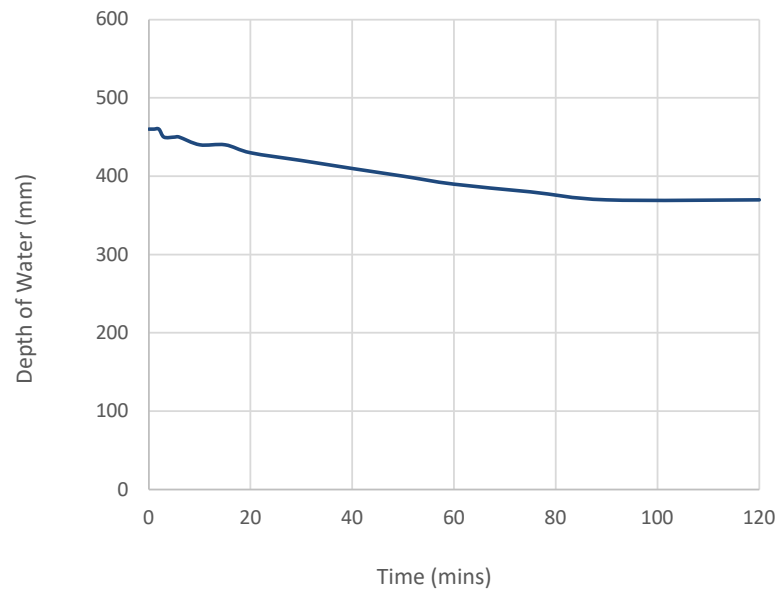
Time Elapsed (mins)	Depth to Water Level (mm)
0	740
1	740
2	740
3	750
5	750
6	750
10	760
15	760
20	770
30	780
40	790
50	800
60	810
75	820
90	830
120	830

SOIL PERCOLATION TEST

POSITION: SuDS103
Test 2



Depth vs Time



Volume of Pit (m ³)	1.512
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.5796

Compliance Check:

Water Level at 75% effective depth (mm)	345
Water Level at 25% effective depth (mm)	115

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	460
Water Level 2	370
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1134

Discharge Area (m ²)	3.335
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Soil Infiltration Rate (m/min)	0.0002834
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Soil Infiltration Rate (m/sec)	4.72E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

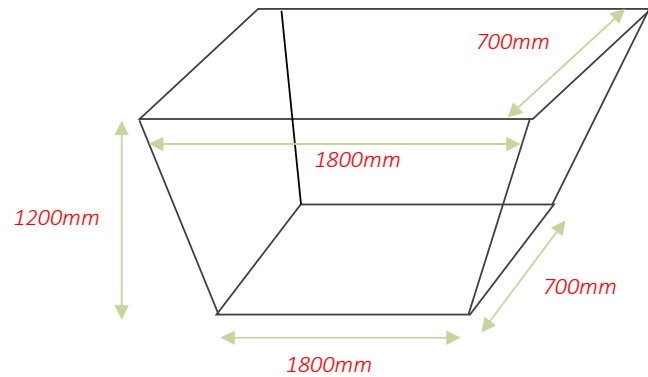
Date of Test: 18/07/2022

POSITION: SuDS103
Test 3

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1200

Pit Details: Open with no stone filling

Groundwater Level: NGW

Test Data

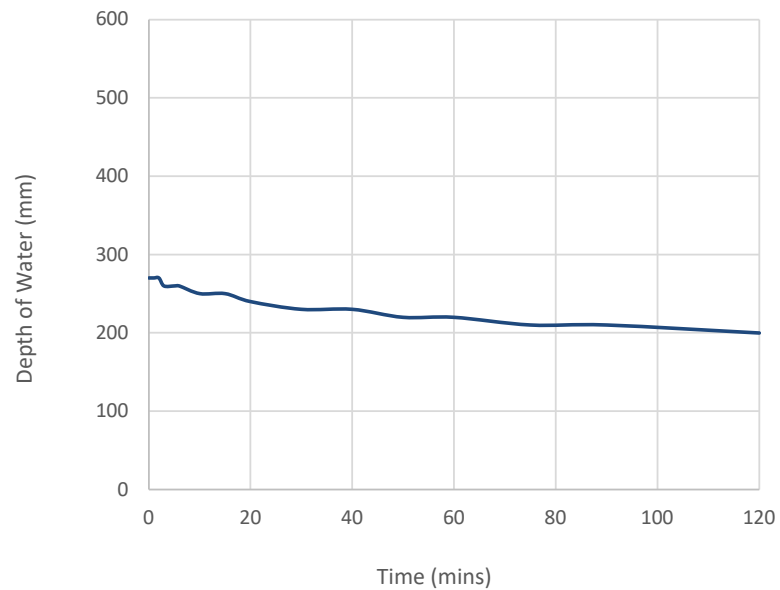
Time Elapsed (mins)	Depth to Water Level (mm)
0	930
1	930
2	930
3	940
5	940
6	940
10	950
15	950
20	960
30	970
40	970
50	980
60	980
75	990
90	990
120	1000

SOIL PERCOLATION TEST

POSITION: SuDS103
Test 3



Depth vs Time



Volume of Pit (m ³)	1.512
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.3402

Compliance Check:

Water Level at 75% effective depth (mm)	202.5
Water Level at 25% effective depth (mm)	67.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	270
Water Level 2	200
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0882

Discharge Area (m ²)	2.435
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Soil Infiltration Rate (m/min)	0.0003018
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Soil Infiltration Rate (m/sec)	5.03E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

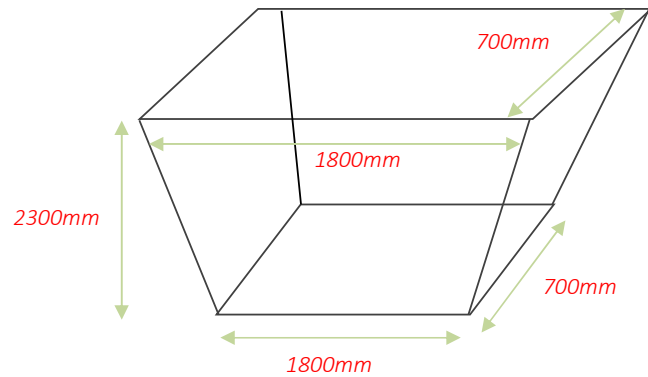
Date of Test: 19/07/2022

POSITION: SuDS104
Test 1

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2300

Pit Details: Open with no stone filling

Groundwater Level: 2000

Test Data

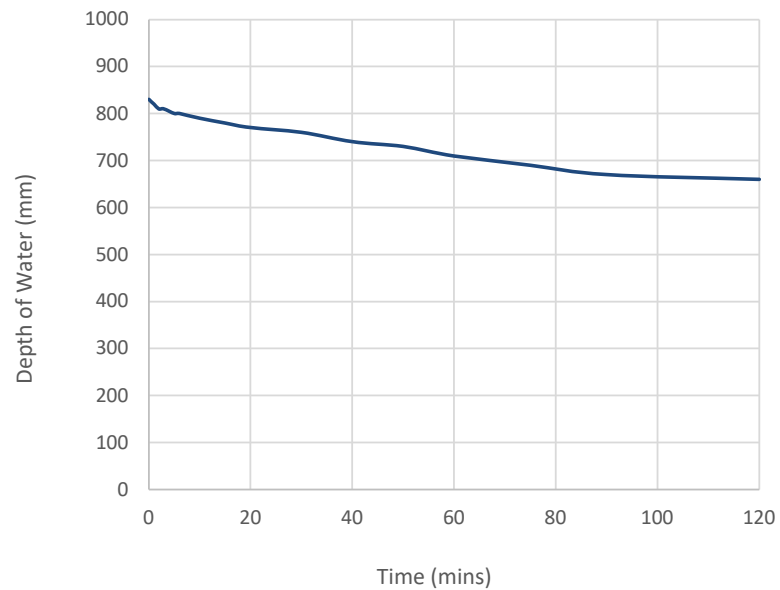
Time Elapsed (mins)	Depth to Water Level (mm)
0	1470
1	1480
2	1490
3	1490
5	1500
6	1500
10	1510
15	1520
20	1530
30	1540
40	1560
50	1570
60	1590
75	1610
90	1630
120	1640

SOIL PERCOLATION TEST

POSITION: SuDS104
Test 1



Depth vs Time



Volume of Pit (m ³)	2.898
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	1.0458

Compliance Check:

Water Level at 75% effective depth (mm)	622.5
Water Level at 25% effective depth (mm)	207.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	830
Water Level 2	660
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.2142

Discharge Area (m ²)	4.985
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0003581
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Soil Infiltration Rate (m/sec)	5.97E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

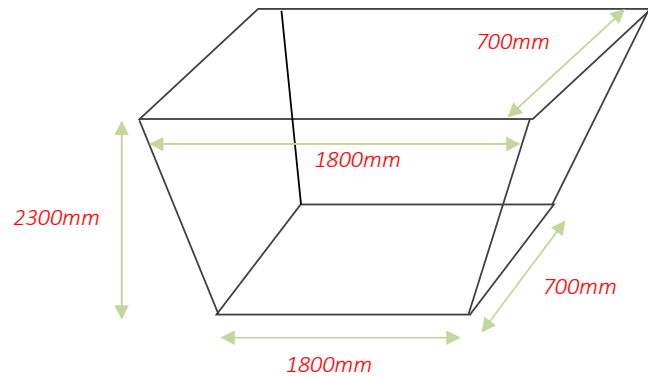
Date of Test: 19/07/2022

POSITION: SuDS104
Test 2

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2300

Pit Details: Open with no stone filling

Groundwater Level: 1970

Test Data

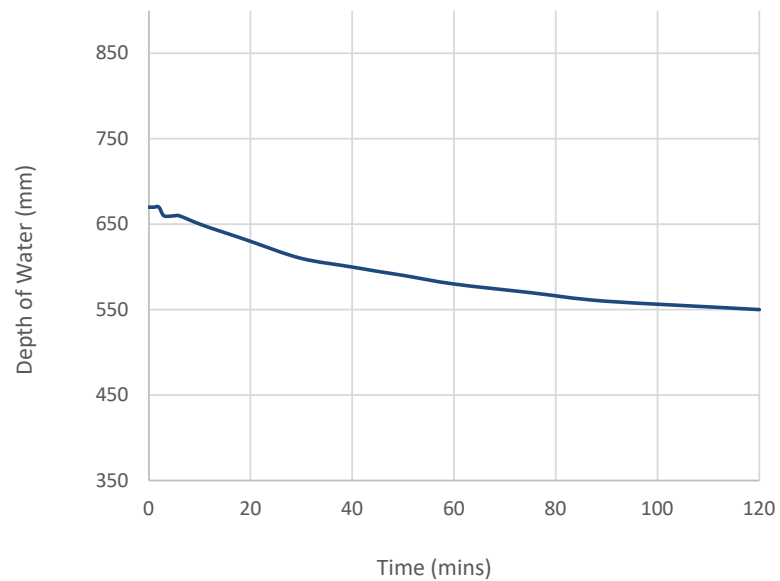
Time Elapsed (mins)	Depth to Water Level (mm)
0	1630
1	1630
2	1630
3	1640
5	1640
6	1640
10	1650
15	1660
20	1670
30	1690
40	1700
50	1710
60	1720
75	1730
90	1740
120	1750

SOIL PERCOLATION TEST

POSITION: SuDS104
Test 2



Depth vs Time



Volume of Pit (m ³)	2.898
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.8442

Compliance Check:

Water Level at 75% effective depth (mm)	502.5
Water Level at 25% effective depth (mm)	167.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	670
Water Level 2	550
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1512

Discharge Area (m ²)	4.31
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Soil Infiltration Rate (m/min)	0.0002923
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Soil Infiltration Rate (m/sec)	4.87E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

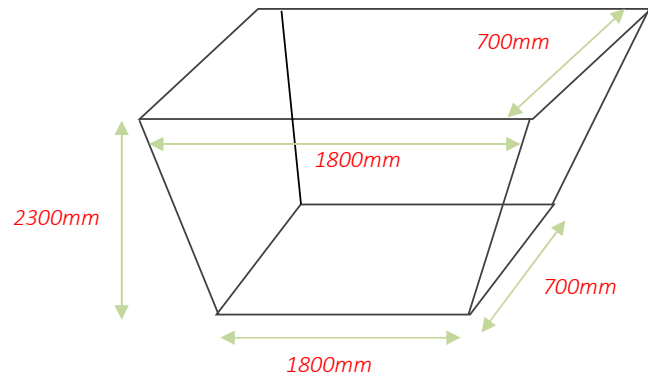
Date of Test: 19/07/2022

POSITION: SuDS104
Test 3

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2300

Pit Details: Open with no stone filling

Groundwater Level: 1968

Test Data

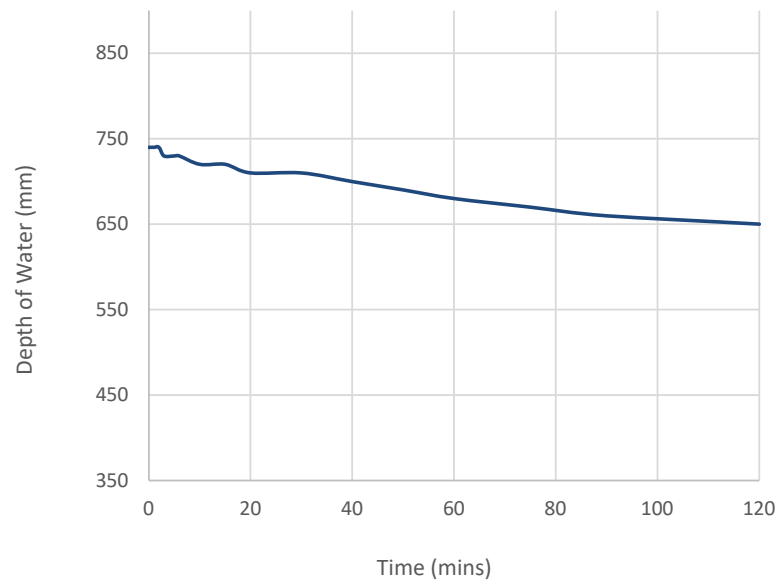
Time Elapsed (mins)	Depth to Water Level (mm)
0	1560
1	1560
2	1560
3	1570
5	1570
6	1570
10	1580
15	1580
20	1590
30	1590
40	1600
50	1610
60	1620
75	1630
90	1640
120	1650

SOIL PERCOLATION TEST

POSITION: SuDS104
Test 3



Depth vs Time



Volume of Pit (m ³)	2.898
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.9324

Compliance Check:

Water Level at 75% effective depth (mm)	555
Water Level at 25% effective depth (mm)	185

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	740
Water Level 2	650
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1134

Discharge Area (m ²)	4.735
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Soil Infiltration Rate (m/min)	0.0001996
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Soil Infiltration Rate (m/sec)	3.33E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

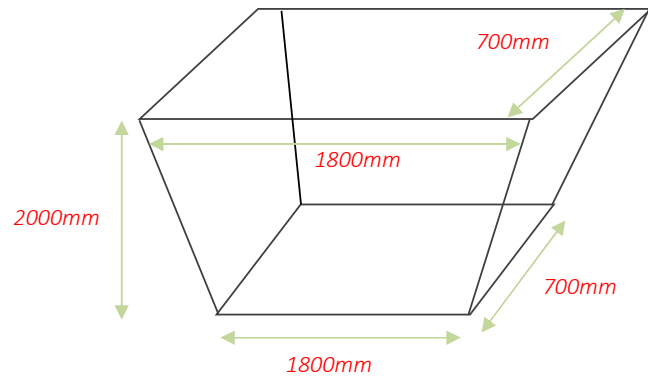
Date of Test: 19/07/2022

POSITION: SuDS105
Test 1

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: 1900

Test Data

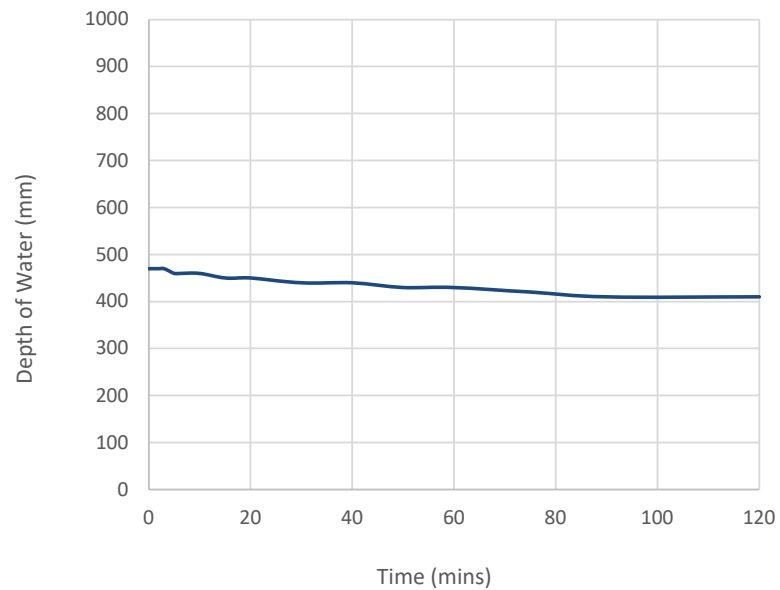
Time Elapsed (mins)	Depth to Water Level (mm)
0	1530
1	1530
2	1530
3	1530
5	1540
6	1540
10	1540
15	1550
20	1550
30	1560
40	1560
50	1570
60	1570
75	1580
90	1590
120	1590

SOIL PERCOLATION TEST

POSITION: SuDS105
Test 1



Depth vs Time



Volume of Pit (m ³)	2.52
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.5922

Compliance Check:

Water Level at 75% effective depth (mm)	352.5
Water Level at 25% effective depth (mm)	117.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	470
Water Level 2	410
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0756

Discharge Area (m ²)	3.46
----------------------------------	------

Soil Infiltration Rate (m/min)	0.0001821
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Soil Infiltration Rate (m/sec)	3.03E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

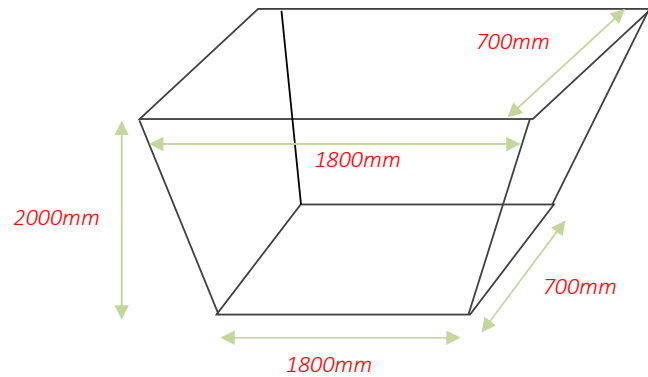
Date of Test: 19/07/2022

POSITION: SuDS105
Test 2

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: 1900

Test Data

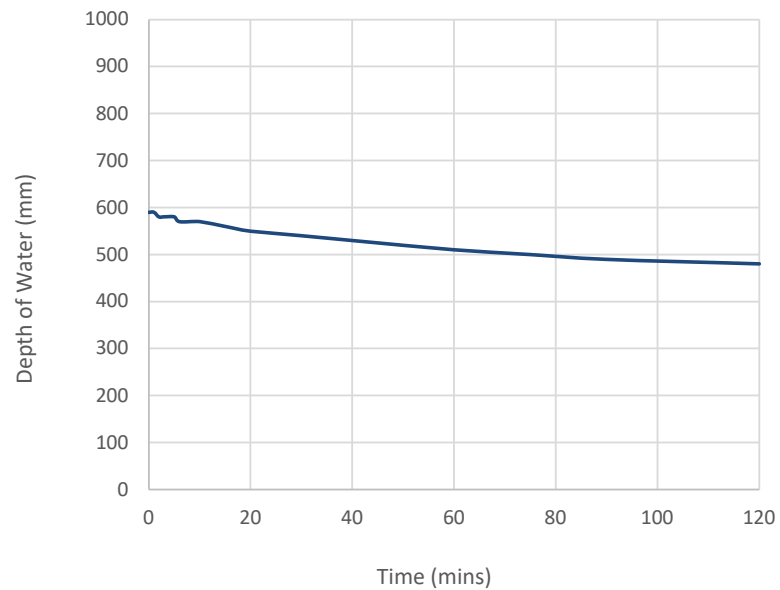
Time Elapsed (mins)	Depth to Water Level (mm)
0	1410
1	1410
2	1420
3	1420
5	1420
6	1430
10	1430
15	1440
20	1450
30	1460
40	1470
50	1480
60	1490
75	1500
90	1510
120	1520

SOIL PERCOLATION TEST

POSITION: SuDS105
Test 2



Depth vs Time



Volume of Pit (m ³)	2.52
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.7434

Compliance Check:

Water Level at 75% effective depth (mm)	442.5
Water Level at 25% effective depth (mm)	147.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	590
Water Level 2	480
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1386

Discharge Area (m ²)	3.935
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0002935
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Soil Infiltration Rate (m/sec)	4.89E-06
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SOIL PERCOLATION TEST



Sheet 1 of 2

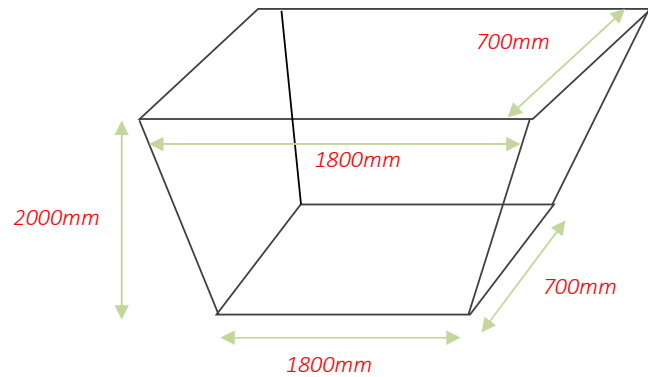
Date of Test: 19/07/2022

POSITION: SuDS105
Test 3

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: 1900

Test Data

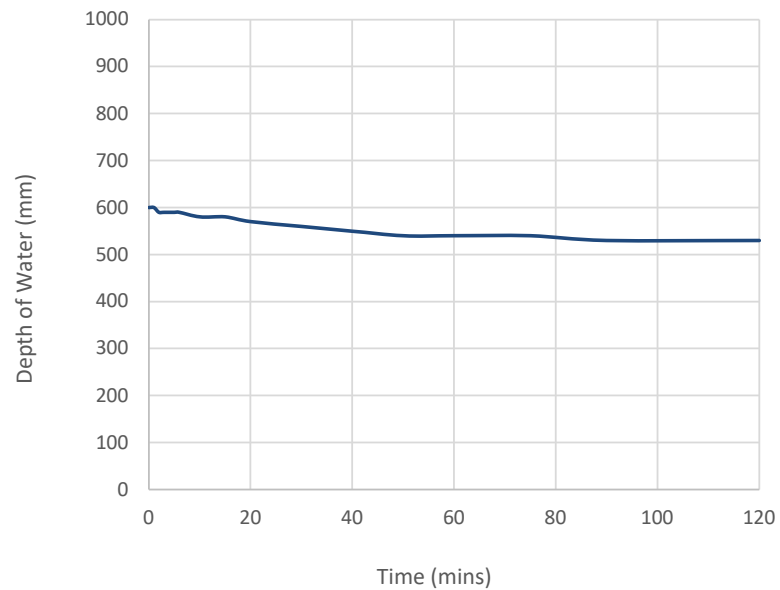
Time Elapsed (mins)	Depth to Water Level (mm)
0	1400
1	1400
2	1410
3	1410
5	1410
6	1410
10	1420
15	1420
20	1430
30	1440
40	1450
50	1560
60	1460
75	1460
90	1470
120	1470

SOIL PERCOLATION TEST

POSITION: SuDS105
Test 3



Depth vs Time



Volume of Pit (m ³)	2.52
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.756

Compliance Check:

Water Level at 75% effective depth (mm) 450

Water Level at 25% effective depth (mm) 150

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	600
Water Level 2	530
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0882

Discharge Area (m²) 4.085

Soil Infiltration Rate (m/min) 0.0001799

Soil Infiltration Rate (m/sec) 3.00E-06



APPENDIX 6 - Limitations



Limitations

This report (Report) forms part of the Services and if applicable Additional Services undertaken by Groundtech Consulting Ltd pursuant to a written contract (Agreement) which contains detailed provisions including express limitations of the liability of Groundtech Consulting Ltd.

This Report was prepared using reasonable skill and care as stated in the Agreement for the purpose including intended end use stated by the Client (Purpose) and the liability of Groundtech Consulting Ltd in respect of the form and content of this Report is no greater than its liability under the Agreement. All records, measurements notes, or any other data (Data) obtained by or for the benefit of the Consultant were obtained at a specific point in time and it may not be assumed by the Client or any person relying on this Report that the Data will remain unaffected by the passage of time, the seasons, weather conditions, changes in the water table or the carrying out and completion of works at the Site.

Unless otherwise agreed this Report has been prepared exclusively for the use and reliance of the Client and may not be relied upon, by any other party except as provided for in the Agreement. A third party who relies on this Report, does so at their own and sole risk and Groundtech Consulting Ltd has no liability to such parties.

Groundtech Consulting Ltd that this Report is to be used for the Purpose. The Purpose was instrumental in determining the scope and of the Services provided. If the Purpose should change, the Client may not be able to rely on the Report without the separate agreement of Groundtech Consulting Ltd.

Since the Report was written, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change (see below) and should be investigated if there is any significant delay in acting on the findings of this Report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions in this Report should not be relied upon in the future without written confirmation from Groundtech Consulting Ltd that it is safe to do so.

The observations and conclusions outlined in this Report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting Ltd.

Groundtech Consulting Ltd is not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The Report is based upon Groundtech Consulting Ltd's observations of existing physical conditions at the Site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the Client on the history and usage of the Site. The findings and recommendations contained in this Report are based in part upon information provided by third parties, and Groundtech Consulting Ltd have relied upon such information assuming it to be correct.

Groundtech Consulting Ltd accepts no responsibility for errors or inaccuracies in third party information presented in this Report. Groundtech Consulting Ltd was not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services or Additional Services. Groundtech Consulting Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting Ltd and forms the contract with the client.



Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions may also vary due to the ground's heterogeneous properties and because investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this Report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. If so stipulated in the Agreement, geo-environmental testing was carried out for a limited number of parameters based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

Any groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and groundwater levels may occur at other times of the year which are higher than were recorded during this investigation.

Any site drawings provided in this Report are preliminary and used to present the general relative locations of features on, and surrounding, the Site.

