

**GEOTECHNICAL REPORT ON
GROUND INVESTIGATION**

19 PARK SQUARE EAST, LONDON

FOR

19 PARK SQUARE EAST LTD



Giving our all

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APPROVAL & DISTRIBUTION SHEET

PROJECT DETAILS	
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JOB NAME	The Diorama
CLIENT	19 Park Square East Ltd
STATUS	Final
VERSION	V0

DISTRIBUTION			
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FOREWORD

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1. INTRODUCTION

This interpretative report has been prepared upon the written instruction of Quartz Project Services Ltd. acting on behalf of 19 Park Square East Ltd, on 3rd of October 2019.

The subject site is located at 19 Park Square East, London and comprises a five-storey former office building. It is proposed to redevelop the site by extending the existing basement beneath the existing courtyard area. Information provided by the Structural Engineer indicates that the foundations are to have line loadings between 320kN/m and 19.8kN/m.

A ground investigation was requested by the client, to provide information on the ground conditions underlying the site to inform the design of the structure.

The fieldwork was undertaken in October 2019 and comprised one 20.45m deep cable percussion borehole and two modular windowless sampler boreholes to 18m and 20m below ground level. This report is based upon the above fieldwork and subsequent geotechnical laboratory testing programme.

A Preliminary Risk Assessment and waste classification has also been carried out by CET and will be reported separately. A separately report Basement Impact Assessment (BIA) has been produced and should be read in conjunction with this report.

Attention is drawn to the fact that whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there is a potential for variations in ground and groundwater conditions between and beyond the specific locations investigated. No liability can be accepted for any such variations. Furthermore, any recommendations are specific to the client's requirements as detailed herein and no liability will be accepted should these be used by third parties without prior consultation with CET Structures Limited.

A geotechnical desk study as recommended in BS5930 "Code of practice for site investigations" was not requested and has therefore not been carried out.

2. SITE SETTINGS

The subject site is located at approximate Ordnance Survey grid reference TQ 287822 (see Figure 1) and comprises a five-storey disused office building located roughly in the centre of Park Square East, NW1.

The terraced building occupies the majority of the site footprint, with the remaining part of the site being occupied by soft landscaped courtyard areas. The property is bordered to the south and north by No. 20 and No. 18 Park Square East respectively and to the east and west by the public carriageways of Park Square East and Albany Terrace respectively. There are no trees within the site boundary or the neighbouring properties.

The subject site is essentially level at around 30mAOD, which is generally in keeping with the surrounding area.

Reference to the publications of the British Geological Survey indicates that the site is underlain by the deposits of the London Clay Formation, which is mantled by superficial deposits of Lynch Hill Gravel Member. Typically, these deposits may be described as follows: -

Stratum	Description
Lynch Hill Gravel Member	Sand and gravel, locally with lenses of silt, clay or peat. Rests on bedrock geology of London Clay, or Woolwich and Reading Beds. Average thickness 6m, but much thicker where infilling deep hollows.
London Clay Formation	Grey overconsolidated clay that weathers to a characteristic brown colour where it outcrops. Layers of claystone (septarian) nodules are common place within the London Clay Formation, as is the presence of selenite.

The ground investigation ascertained that the site was underlain by deposits of London Clay Formation, mantled by superficial deposits of Langley Silt Member over Lynch Hill Gravel Member. These deposits were mantled by Made Ground to a maximum depth of 1.9m m below ground level in BH03.

3. GROUND INVESTIGATION

The fieldwork was undertaken in October 2019 and comprised one 20.45m deep cable percussion borehole and two modular windowless sampler boreholes to 18m and 20m below ground level. The approximate locations of the exploratory holes are shown on Figure 2.

Prior to commencing each exploratory hole, the locations were scanned for services with a Cable Avoidance Tool (CAT) by the CET engineer. The locations with hard surfaced material were then cored out using a concrete coring rig.

Details of the ground conditions encountered in the exploratory holes are presented on the engineer's logs in Appendix A. Reference should be made to these logs for detailed descriptions of the strata penetrated and the results of any in situ tests carried out. A summary only of the ground conditions encountered in the exploratory holes is presented below:-

Strata name	Approximate level to top of strata (mAOD)	Thickness (m)	Description
Made Ground	30	0.25 to 1.9	Very clayey, slightly sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick.
Langley Silt Member	28.2 to 28.25	1.2 to 1.75m	Firm and firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. Or Soft, brown, slightly fine sandy, silty CLAY.
Lynch Hill Gravel Member	27 to 25.78	5.18 to 5.9m	Loose to very dense, brown, very fine to coarse sandy, locally sandy and slightly sandy GRAVEL of sub-angular to rounded, fine to coarse flint.
Weathered and Relatively	21.3 to 20.6	Not proved.	Stiff, brown mottled grey, becoming brown and grey mottled CLAY with occasional sand size selenite and silt

Unweathered London Clay Formation.			partings. Or Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite.
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From ground level, Made Ground was encountered locally to a maximum depth of 1.9m below ground level in BH03. Typically, this material was encountered as Very clayey, slightly sandy GRAVEL. This material was only present within the courtyard area. As this material will be removed during the basement excavation it will likely not have any impact on the basement design.

Deposits of the Langley Silt Member were found locally in BH01 and BH03 beneath a mantle of concrete or Made Ground respectively to a maximum depth of 3.1m below ground level. Typically, this material was encountered as brown, slightly gravelly CLAY or brown, slightly fine sandy, silty CLAY.

Beneath the Langley Silt Member and locally beneath a mantle of concrete deposits the Kempton Park Gravel Member were encountered to a maximum depth of 9m depth as Loose to very dense, brown, very fine to coarse sandy, locally sandy and slightly sandy GRAVEL.

The deposits of the weathered and relatively unweathered London Clay Formation were penetrated below the Lynch Hill Gravel Member deposits. These deposits were proved to a maximum depth of 20.45m below ground level.

Roots and rootlets were not observed in any of the exploratory holes.

Groundwater was encountered in BH01 at a depth of 9.5m, rising to 8m below ground level after 20 minutes of monitoring. Subsequent readings of the piezometers installed in the boreholes made during two post site work monitoring visits can be found summarised in the below table:-

Standpipe ID	BH01		BH02		BH03	
Date of Monitoring Visit.	05/12/2019	12/12/2019	05/12/2019	12/12/2019	05/12/2019	12/12/2019
Level (mAOD)	Dry	21.65	21.72	21.74	22.42	23.0

LABORATORY TESTING

The following geotechnical laboratory testing programme was carried out to provide further information on the engineering properties of the subsoil. Unless stated otherwise, these tests were carried out in accordance with BS 1377 “Methods of Test for Soils for Civil Engineering Purposes”.

No.	Test	UKAS Accreditation
6	Moisture content determination	CET Supplier
8	Atterberg limits	CET Supplier
9	PSD Wet Sieving	CET Supplier
4	Water soluble sulphate	CET Supplier
4	pH	CET Supplier
4	BRE SD1 Suite	CET Supplier

4. DISCUSSION AND RECOMMENDATIONS

GENERAL

The subject site is located at 19 Park Square East, London and comprises a five storey former office building. It is proposed to redevelop the site by extending the existing basement beneath the existing courtyard area. Information provided by the Structural Engineer indicates that the foundations are to have a bearing pressure between 320kN/m and 19.8kN/m. A ground investigation was requested by the client, to provide information on the ground conditions underlying the site to inform the design of the structure.

The fieldwork was undertaken in October 2019 and comprised one 20.45m deep cable percussion borehole and two modular windowless sampler boreholes to 18m and 20m below ground level.

The works established that the site is locally underlain by Made Ground to a maximum depth of 1.9m below ground level. Underlying this are superficial deposits of the Langley Silt Member over deposits of Lynch Hill Gravel Member. Superficial deposits were encountered to a maximum depth of 9.2m below ground level. Underlying superficial deposits, the weathered and relatively unweathered deposits of the London Clay Formation were penetrated to a maximum depth of 20.45m below ground level.

Groundwater was encountered in BH01 at a depth of 9.5m below ground level rising to 8m after 20 minutes during the course of the fieldwork. However, post site work monitoring of the well recorded a water level at a depth of between 23mAOD and 21.65mAOD.

Roots and rootlets were not encountered in any of the exploratory holes.

FOUNDATION RECOMMENDATIONS

In light of foundation design documents provided by the structural engineer a series of 'hit and miss underpinning blocks is the proposed method of construction. The underpinned walls will form the permanent retaining structure and therefore no temporary works are likely to be required.

In choosing an appropriate underpinning method the contractor must take into account the ability of the relevant company and the available equipment in being able to provide the required working loads within the settlement tolerances allowed by Camden Borough Council.

The recommendations made herein are based on underpinning blocks with a width of 1m and founded in Lynch Hill Gravel Member at a level of no lower than 23.5mAOD. The maximum line loadings on the walls

provided by the structural engineer indicate loadings of 320kN/m run spread over a 1m wide footing. Based on an average SPT 'N' value for the Lynch Hill Gravel Member a presumed net allowable bearing capacity of 320kN/m² could be accommodated by strip foundations bearing at least 1m below slab level.

For likely settlements as a result of the basement construction the Ground Movement Assessment section of the BIA should be consulted.

RETAINING WALL DESIGN AND EXCAVATION SUPPORT

Due to the nature of the Lynch Hill Gravel Member deposits encountered on site continuous support of these materials will be required to maintain the stability of excavations through these deposits. Any loss of support will result in catastrophic settlement to the neighbouring structures. As such Lynch Hill Gravel Member deposits should not be left unsupported for any length of time. One prospective method of construction, among other methods, that will preclude loss of support include injection grouting.

The permanent basement walls will need to be designed as permanent retaining structures. With reference to the laboratory test results and BS8002: 2015, the design parameters in the below table are appropriate for the design of retaining walls.

The design of retaining walls should adopt k_0 , the lateral earth pressure at rest, to mitigate the risk of lateral movement and damage to adjacent structures.

Material	ϕ'_{crit}	c'	γ
Langley Silt Member	21.5°	0	18kN/m ³
Lynch Hill Gravel Member	30°	0	20kN/m ³

FLOOR SLAB DESIGN

Based on drawings provided by the structural engineer the anticipated formation level of the ground floor slab will be within the Lynch Hill Gravel Member deposits. Based on the SPT results from the formation level of the slab a ground bearing floor slab design may be adopted for this scheme.

CONCRETE BELOW GROUND

Chemical testing was carried out on soil samples recovered from the Langley Silt Member, Lynch Hill Gravel Member and London Clay Formation encountered in the three cable percussion boreholes. However based on the current design of the basement deposits of the London Clay Formation Will not be penetrated and therefore concrete will not come in to contact with soils from this strata.

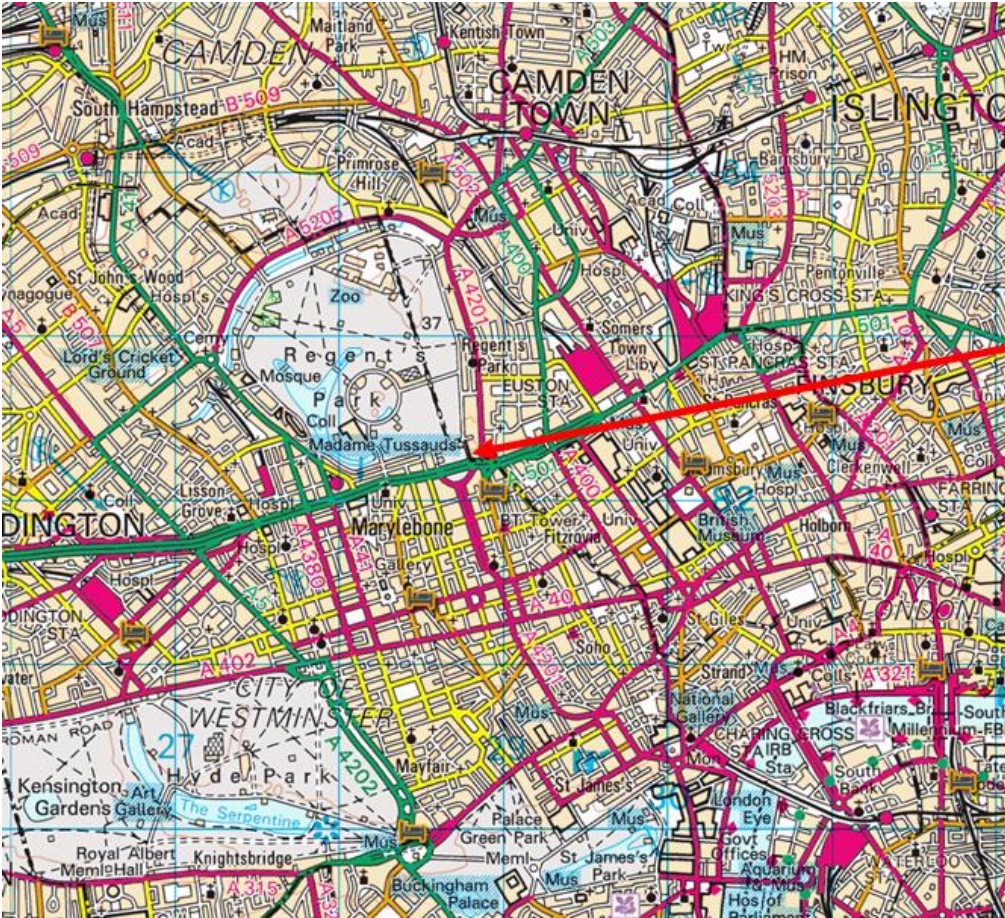
The underlying groundwater condition within the Lynch Hill Gravel Member is likely to be classified as 'mobile', while the Langley Silt and London Clay Formation are likely to be classified as 'static' as defined in BRE Special Digest 1:2005 Third Edition "Concrete in Aggressive Ground".

In accordance with BRE Special Digest 1:2005 Third Edition "Concrete in Aggressive Ground", Table C2 "Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations", the Design Sulphate Class and ACEC Class have been established based upon the available laboratory results.

The results of the water-soluble sulphate, for Langley Silt Member and strata indicate that the concrete could be designed to Design Sulphate Class DS-1 and ACEC Class AC-1s. While deposits of the Lynch Hill Gravel Member could be designed to Class DS-1 and ACEC Class AC-1.

FIGURES

CET INFRASTRUCTURE Giving our all	The Diorama			Lead No. 1038915
Northdown House, Ashford Road, Harrietsham, Maidstone Kent, ME17 1QW Telephone: 01622 858545 Facsimile: 01622 858544	Created By: JM	Checked: PJW	Approved: PJW	Date: November 2019



Site Location Plan

Scale: Not to Scale

FIGURE 1

The Diorama

Created By:
JM

Checked:
PJW

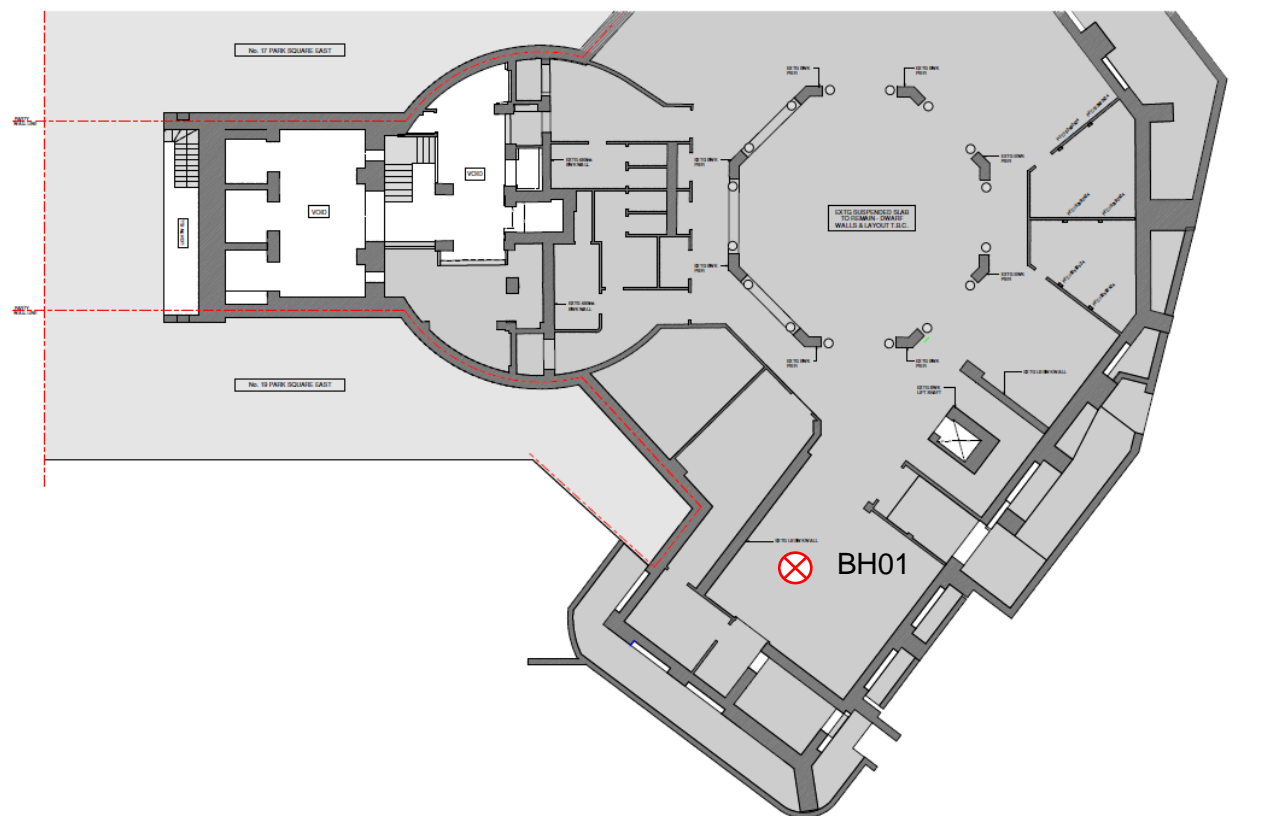
Approved:
PJW

Lead No.

1038915

Date:

November 2019



EXISTING LOWER GROUND FLOOR LEVEL - PART 2
1:1000 (1:1000)

0 10 20 30 40 50 60 70 80 90 100
1:100 (20m) 1:100 (20m)

Approximate Exploratory Hole Location Plan

Scale: Not to Scale

FIGURE 2 (page 1 of 3)

The Diorama

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Checked:
PJW

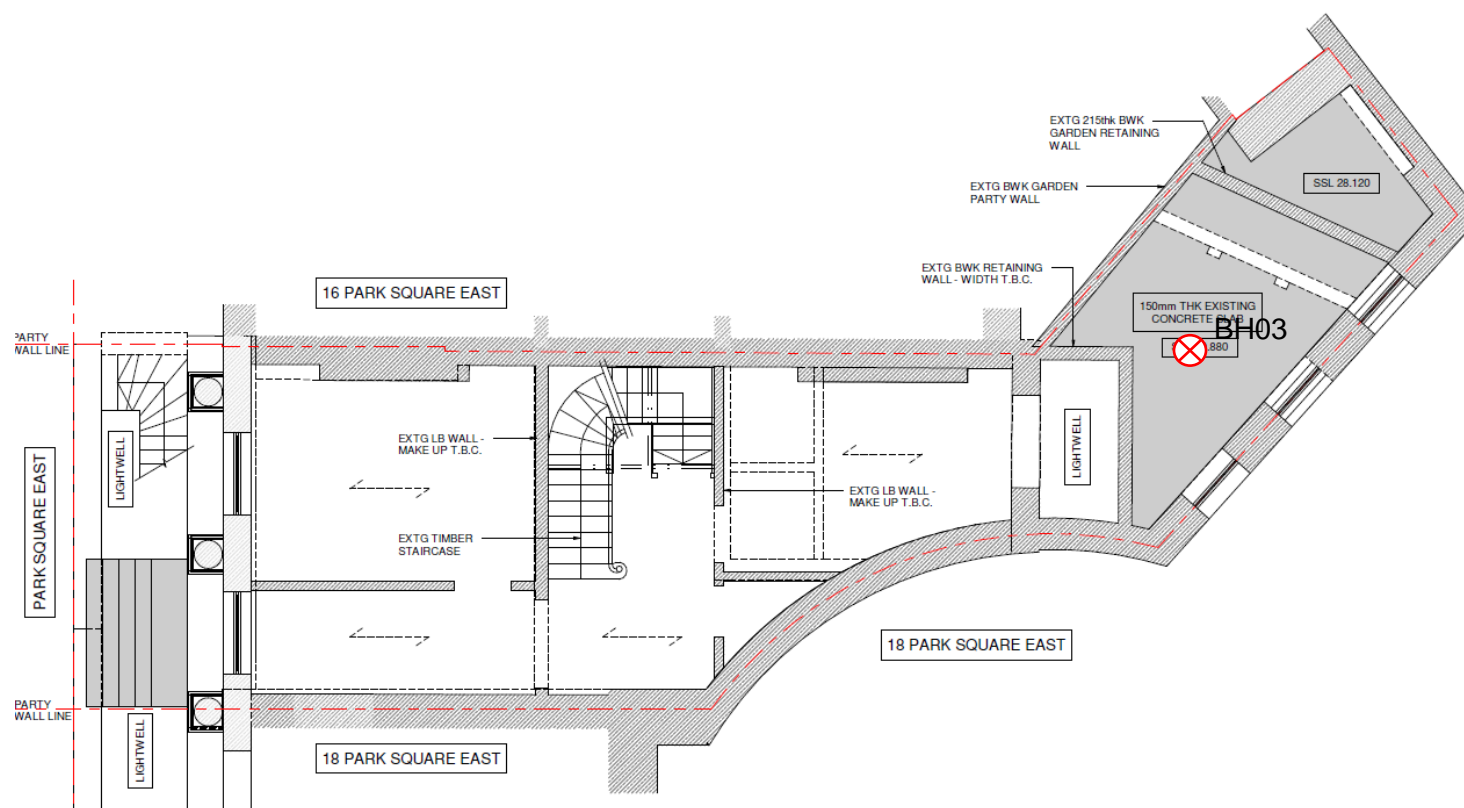
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PJW

Lead No.

1038915

Date:

November 2019



Approximate Exploratory Hole Location Plan

Scale: Not to Scale

FIGURE 2 (page 2 of 3)

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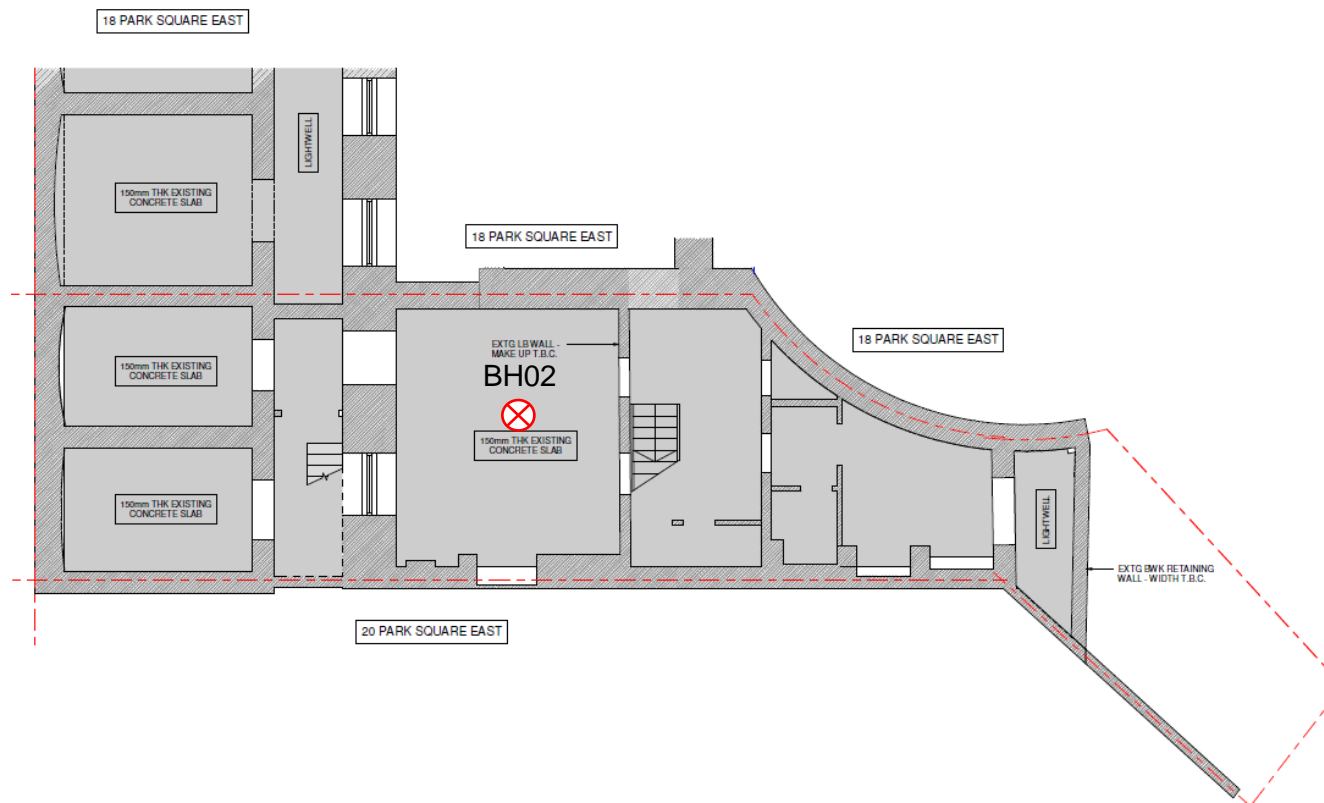
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Lead No.

1038915

Date:

November 2019



Approximate Exploratory Hole Location Plan




Scale: Not to Scale




FIGURE 2 (page 3 of 3)




APPENDIX A




Fieldwork




Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 100 to 20.45m				BOREHOLE NUMBER BH01 Sheet 1 of 3			
Method: Cable Percussion				Casing Dia. (mm): 150 to 7.50m							
Date Started: 14/10/2019		Co-ordinates		Ground Level (m AOD) 28.50		Ref. No: 1038915					
Backfill/Well		Water		Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results					
0.50			0.00 - 1.00	B			28.50	(0.25)	Concrete.		
			0.50	D			28.25	0.25	Firm, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. (Langley Silt Member)		
			1.20	D	C	N = 4		(1.45)			
			1.70	D			26.80	1.70	Soft, brown slightly fine sandy, silty CLAY. (Langley Silt Member)		
2.00			2.00	D	C	N = 8	26.50	(0.30)	Loose to medium dense, brown, slightly fine sandy, becoming very sandy at 4m below ground level GRAVEL of sub-angular to rounded, fine to coarse flint. Low cobble content of rounded flint. (Lynch Hill Gravel Member)		
			2.50	D							
			3.00	D	C	N = 8					
			3.00 - 4.00	B							
			3.50	D							
			4.00	D	C	N = 18					
			4.50	D				(5.20)			
			5.00	D	C	N = 23					
			6.00	D							
			6.00 - 7.00	B							
			6.50	D	C	N = 24					
7.00			7.00				21.30	7.20	Stiff brown mottled grey, becoming brown and grey mottled at 9m below ground level, CLAY with occasional sand size selenite and silt partings. (Weathered London Clay Formation)		
7.50			7.50	D							
			8.00	D	C	N = 12		(2.80)			
			9.00	D							
			9.50	D	C	N = 13					
General Remarks: 1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.											
Driller:	LH	BOREHOLE RECORD Scale 1:50 See Key Sheet for explanation of symbols, etc.									
Logged:	JM										
Checked:		The Diorama						FIG A1			
Appr'd:											





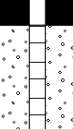

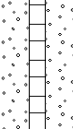
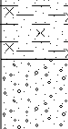
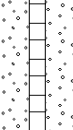
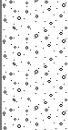
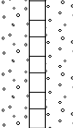
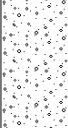
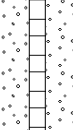
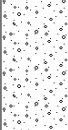



Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 100 to 20.45m		BOREHOLE NUMBER BH01 Sheet 2 of 3					
Method: Cable Percussion				Casing Dia. (mm): 150 to 7.50m							
Date Started: 14/10/2019		Co-ordinates		Ground Level (m AOD) 28.50	Ref. No: 1038915						
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend	
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results					
							18.50	10.00	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)		
			10.50	D							
			11.00 - 12.00	D B	C	N = 18					
			12.50	D	C	N = 19					
			13.50	D							
					C	N = 19					
								(10.45)			
					C	N = 24					
			16.00 - 17.00	B							
					C	N = 27					
					C	N = 25					
General Remarks: 1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.											
Driller:	LH	BOREHOLE RECORD Scale 1:50 See Key Sheet for explanation of symbols, etc.						 INFRASTRUCTURE Giving our all			
Logged:	JM										
Checked:		The Diorama						FIG A1			
Appr'd:											




Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd						Hole Diameter (mm): 100 to 20.45m			BOREHOLE NUMBER BH01 Sheet 3 of 3	
Method: Cable Percussion						Casing Dia. (mm): 150 to 7.50m				
Date Started: 14/10/2019		Co-ordinates		Ground Level (m AOD) 28.50		Ref. No: 1038915				
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
20.00					C	N = 28	8.05	20.45	End of Borehole at 20.45m	
General Remarks: 1. Water strike at 9.5m rising to 8m below ground level after 20 minutes.										
Driller:	LH	BOREHOLE RECORD Scale 1:50 See Key Sheet for explanation of symbols, etc.						 INFRASTRUCTURE Giving our all		
Logged:	JM									
Checked:		The Diorama						FIG A1		
Appr'd:										




Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 75mm tapering with depth to 18.45m				BOREHOLE NUMBER BH02 Sheet 1 of 3		
Method: Windowless Sampler				Ground Level (m AOD) 26.10		Ref. No: 1038915				
Date Started: 21/10/2019		Co-ordinates								
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
0.50							26.10	(0.32)	Concrete.	
1.00							25.78	0.32	Dense to very dense, brown, very fine to coarse sandy, locally sandy GRAVEL of sub-rounded to rounded, fine to coarse flint. (Lynch Hill Gravel Member)	
			1.00 - 2.00	B	S	N = 58				
			2.00 - 3.00	B	S	N = 42				
			3.00 - 4.00	B	S	N = 47		(5.18)		
			4.00 - 5.00	B	S	N = 43				
			5.00 - 6.00	B	S	N = 14				
			6.00 - 7.00	B	S	N = 25				
6.00							20.60	5.50	Stiff, brown mottled grey CLAY with rare silty fine sand partings. (Weathered London Clay Formation)	
6.50							20.20	5.90	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
General Remarks: 1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.										
Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.								
Logged:	JM									
Checked:		The Diorama						FIG A2		
Appr'd:										




Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd						Hole Diameter (mm): 75mm tapering with depth to 18.45m			BOREHOLE NUMBER BH02 Sheet 2 of 3	
Method: Windowless Sampler										
Date Started: 21/10/2019			Co-ordinates			Ground Level (m AOD) 26.10		Ref. No: 1038915		
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			7.00 - 8.00	B	S	N = 24				
			8.00 - 9.00	B	S	N = 26				
			9.00 - 10.00	B	S	N = 24				
			10.00 - 11.00	B	S	N = 29				
			11.00 - 12.00	B	S	N = 33				
			12.00 - 13.00	B	C	N = 38		(12.55)		
			13.00 - 14.00	B	S	N = 38				
General Remarks: 1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.										
Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.						 INFRASTRUCTURE Giving our all		
Logged:	JM									
Checked:		The Diorama						FIG A2		
Appr'd:										

Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 75mm tapering with depth to 18.45m				BOREHOLE NUMBER BH02 Sheet 3 of 3			
Method: Windowless Sampler											
Date Started: 21/10/2019		Co-ordinates		Ground Level (m AOD) 26.10		Ref. No: 1038915					
Backfill/Well		Water		Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results					
			14.00 - 15.00	B	S	N = 44					
			15.00 - 16.00	B							
			16.00 - 17.00	B	S	N = 44					
			17.00 - 18.00	B							
					S	N = 52					
							7.65	18.45	End of Borehole at 18.45m		
General Remarks: 1. Gravel transitioning to Clay at 5.0m below ground level, inferred from drop in SPT N value.											
Driller:	AR	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.									
Logged:	JM										
Checked:		The Diorama						FIG A2			
Appr'd:											

Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 75mm tapering with depth to 20m				BOREHOLE NUMBER BH03 Sheet 1 of 4			
Method: Windowless Sampler				Ground Level (m AOD) 30.10		Ref. No: 1038915					
Date Started: 25/10/2019		Co-ordinates									
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend	
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results					
0.50			0.00 - 1.00	B			30.10	(0.10)	Decorative gravel.		
							30.00	0.10	Loose, dark brown mottled red, very clayey, slightly fine to coarse sandy GRAVEL of angular to rounded, fine to coarse flint and brick. Low cobble content of angular brick. (Made Ground)		
2.00			1.00 - 2.00	B	S	N = 4		(1.80)			
			2.00 - 3.00	B	S	N = 14	28.20	1.90	Firm becoming stiff with depth, brown, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium flint. (Langley Silt Member)		
			3.00 - 4.00	B	S	N = 51	27.00	3.10	Very dense, brown, very fine to coarse sandy, locally sandy GRAVEL of sub-rounded to rounded, fine to coarse flint. (Lynch Hill Gravel Member)		
			4.00 - 5.00	B	S	N = 50/160mm					
			5.00 - 6.00	B	S	N = 50/275mm					
			6.00 - 7.00	B	S	N = 50		(5.90)			
General Remarks:											
Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.						 INFRASTRUCTURE Giving our all			
Logged:	JM										
Checked:		The Diorama						FIG A3			
Appr'd:											

Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 75mm tapering with depth to 20m				BOREHOLE NUMBER BH03 Sheet 2 of 4		
Method: Windowless Sampler				Ground Level (m AOD) 30.10		Ref. No: 1038915				
Date Started: 25/10/2019		Co-ordinates								
Backfill/Well		Water	Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results				
			7.00 - 8.00	B	S	N = 62				
			8.00 - 9.00	B	S	N = 50				
			9.00 - 10.00	B	S	N = 22	21.10	9.00	Stiff, brown mottled grey CLAY with rare silty fine sand partings. (Weathered London Clay Formation)	
10.00			10.00 - 11.00	B	S	N = 33	20.30	9.80	Stiff, grey, very closely to closely fissured CLAY with rare fine and medium sand size selenite. (London Clay Formation)	
10.50			11.00 - 12.00	B	S	N = 25				
			12.00 - 13.00	B	S	N = 28				
			13.00 - 14.00	B	S	N = 35				
General Remarks:										
Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.						 INFRASTRUCTURE Giving our all		
Logged:	JM									
Checked:		The Diorama						FIG A3		
Appr'd:										

Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd				Hole Diameter (mm): 75mm tapering with depth to 20m				BOREHOLE NUMBER BH03 Sheet 3 of 4			
Method: Windowless Sampler											
Date Started: 25/10/2019		Co-ordinates		Ground Level (m AOD) 30.10		Ref. No: 1038915					
Backfill/Well		Water		Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results					
			14.00 - 15.00	B	S	N = 42					
			15.00 - 16.00	B	S	N = 50/95mm		(10.20)			
			16.00 - 17.00	B							
			17.00 - 18.00	B	S	N = 21					
			18.00 - 19.00	B							
			19.00 - 20.00	B	S	N = 33					
General Remarks:											
Driller:	MW	BOREHOLE RECORD Scale 1:33 See Key Sheet for explanation of symbols, etc.						 INFRASTRUCTURE Giving our all			
Logged:	JM										
Checked:		The Diorama						FIG A3			
Appr'd:											

Client: 17 Park Square East Ltd, 19 Park Square East Ltd, The Diorama Estate Ltd						Hole Diameter (mm): 75mm tapering with depth to 20m			BOREHOLE NUMBER BH03 Sheet 4 of 4		
Method: Windowless Sampler											
Date Started: 25/10/2019			Co-ordinates			Ground Level (m AOD) 30.10		Ref. No: 1038915			
Backfill/Well		Water		Samples		In Situ Tests		Reduced Level (mAOD)	Depth & (Thickness) (m)	Description of Strata	Legend
Depth (m)	Legend	Depth (m)	Depth (m)	Type	Type	Results					
							10.10	20.00	End of Borehole at 20.00m		
General Remarks:											
Driller:	MW	BOREHOLE RECORD Scale 1:33 <small>See Key Sheet for explanation of symbols, etc.</small>						 CET INFRASTRUCTURE Giving our all			
Logged:	JM										
Checked:		The Diorama						FIG A3			
Appr'd:											



APPENDIX B

Laboratory Testing

SUMMARY OF GEOTECHNICAL TESTING

Sample details							Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments	
Borehole / Trial Pit	Depth (m)	Sample Ref	Type	Spec. Ref	Spec. Depth (m)	Description	WC	LL	PL	PI	<425 μm	Bulk	Dry	Condition	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg		
							(%)	(%)	(%)	(%)	(%)	Mg/m³	Mg/m³		kPa	kPa	kPa		(g/L)	(mg/L)		
BH01	0.50		B			Greyish brown slightly sandy gravelly silty CLAY with rare cobbles. Gravel includes brick fragments with traces of bitumen.																Particle Size Distribution
BH01	1.20		D			Brown slightly fine sandy silty CLAY with rare fine chalk gravel.	29.0	62	19	43	99											
BH01	3.00-4.00		B			Orangish brown very sandy GRAVEL.																Particle Size Distribution
BH01	6.00-7.00		B			Yellowish brown very gravelly SAND.																Particle Size Distribution
BH01	8.00		D			Brown and dark brown slightly fine sandy silty CLAY with rare fine gravel.	29.3	80	26	54	99											
BH01	10.50		D			Dark grey and dark brown slightly fine sandy silty CLAY with rare fine gravel.	30.5	74	25	49	99											
BH02	1.00-2.00		WS			Orangish brown SAND and GRAVEL.																Particle Size Distribution
BH02	4.00-5.00		WS			Orangish brown very gravelly SAND.																Particle Size Distribution
BH02	5.00-6.00		WS		5.50	Dark brown and dark greyish brown slightly sandy slightly gravelly silty CLAY.	28.2	72	29	43	92											
BH02	6.00-7.00		WS			Dark brown slightly fine sandy silty CLAY.	26.7	74	25	49	100											



Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by  S Burke - Senior Technician 18/12/2019	Project Number:	GEO / 30305 THE DIORAMA 1038915	
	Project Name:		

SUMMARY OF GEOTECHNICAL TESTING

Sample details							Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Borehole / Trial Pit	Depth (m)	Sample Ref	Type	Spec. Ref	Spec. Depth (m)	Description	WC	LL	PL	PI	<425 µm	Bulk	Dry	Condition	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg	
							(%)	(%)	(%)	(%)	(%)	Mg/m³	Mg/m³		kPa	kPa	kPa		(g/L)	(mg/L)	
BH03	2.00-3.00		WS			Dark brown and yellowish brown slightly sandy silty CLAY with rare gravel.		71	20	51	97										
BH03	3.00-4.00		WS			Orangish brown very sandy GRAVEL.															Particle Size Distribution
BH03	4.00-5.00		WS			Orangish brown SAND and GRAVEL.															Particle Size Distribution
BH03	5.00-6.00		WS			Yellowish brown very sandy GRAVEL.															Particle Size Distribution
BH03	7.00-8.00		WS			Orangish brown SAND and GRAVEL.															Particle Size Distribution
BH03	9.00-10.00		WS			Dark brown slightly fine sandy silty CLAY.		81	26	55	100										
BH03	11.00-12.00		WS			Dark brown slightly fine sandy silty CLAY.	22.9	71	22	49	100										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by  S Burke - Senior Technician 18/12/2019	Project Number: <div style="text-align: center; font-weight: bold; font-size: 1.2em;">GEO / 30305</div> Project Name: <div style="text-align: center; font-weight: bold; font-size: 1.2em;">THE DIORAMA 1038915</div>	
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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

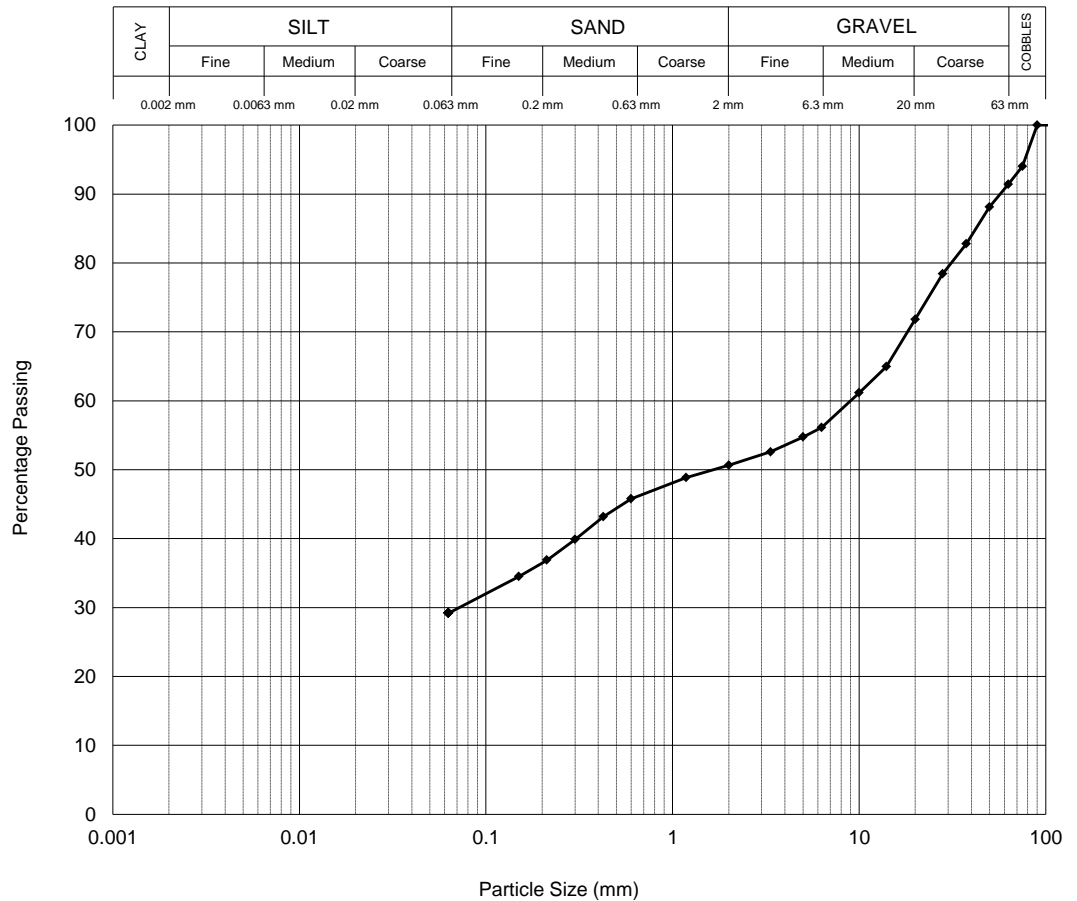
BH01
0.50
B

Description

Greyish brown slightly sandy gravelly silty CLAY with rare cobbles. Gravel includes brick fragments with traces of bitumen.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	94
63.0 mm	91
50.0 mm	88
37.5 mm	83
28.0 mm	78
20.0 mm	72
14.0 mm	65
10.0 mm	61
6.30 mm	56
5.00 mm	55
3.35 mm	53
2.00 mm	51
1.18 mm	49
600 µm	46
425 µm	43
300 µm	40
212 µm	37
150 µm	34
63 µm	29



Particle Proportions	
Cobbles	9
Gravel	41
Sand	21
Silt & Clay	29

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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Project Name:

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

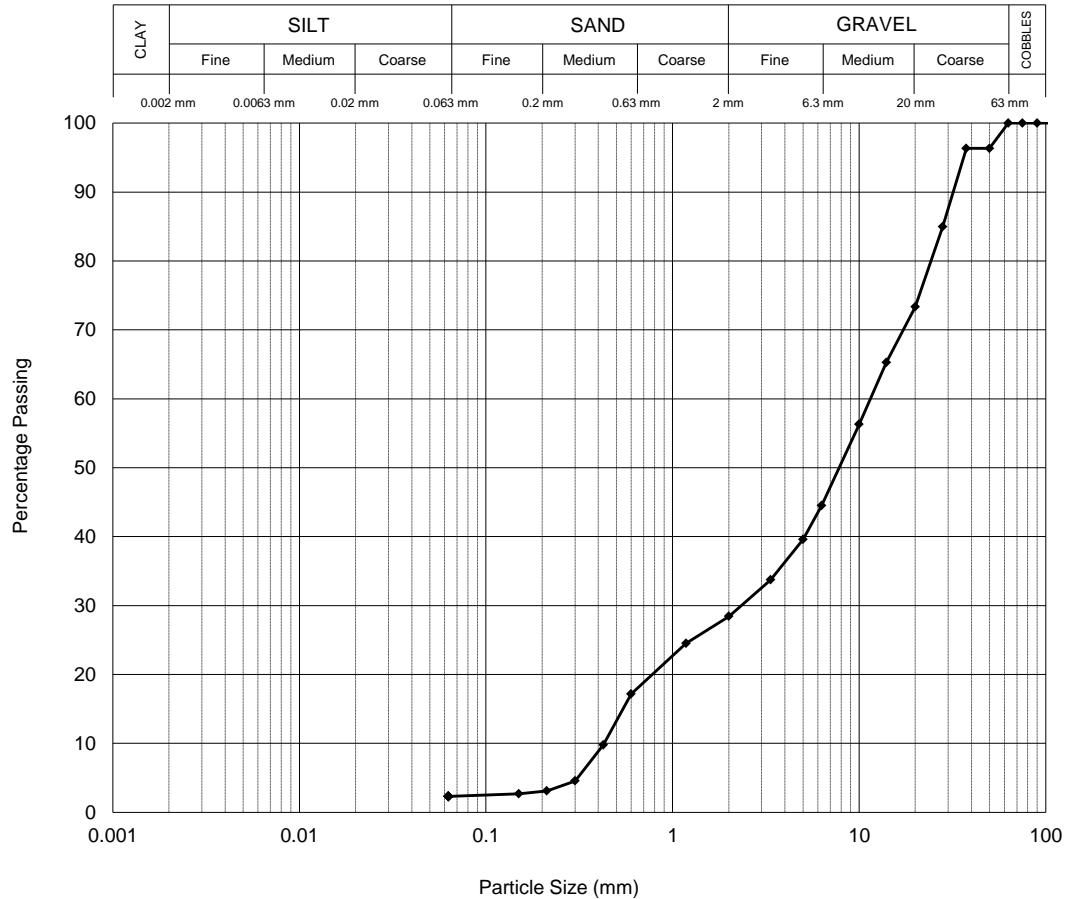
BH01
3.00-4.00
B

Description

Orangish brown very sandy GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	96
37.5 mm	96
28.0 mm	85
20.0 mm	73
14.0 mm	65
10.0 mm	56
6.30 mm	45
5.00 mm	40
3.35 mm	34
2.00 mm	28
1.18 mm	25
600 µm	17
425 µm	10
300 µm	5
212 µm	3
150 µm	3
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	72
Sand	26
Silt & Clay	2

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S Burke

S Burke - Senior Technician
18/12/2019

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1038915**

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

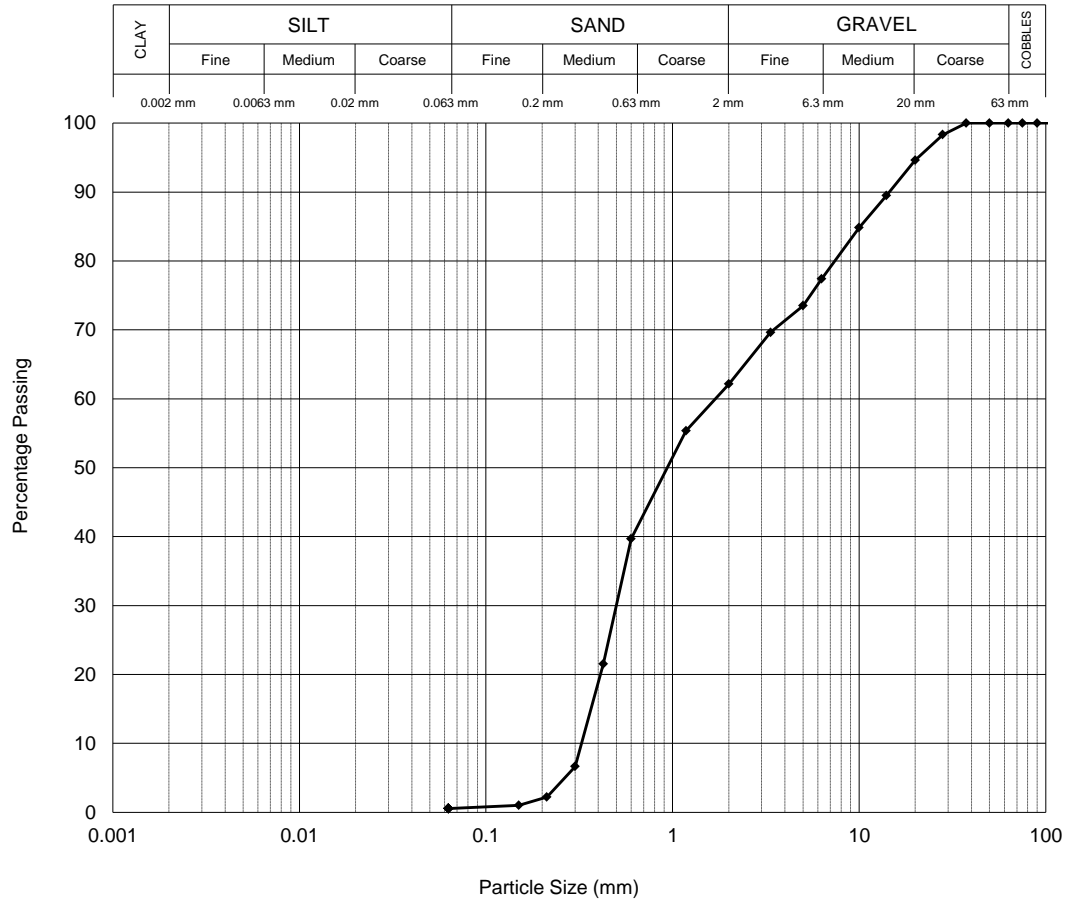
BH01
6.00-7.00
B

Description

Yellowish brown very gravelly SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	98
20.0 mm	95
14.0 mm	89
10.0 mm	85
6.30 mm	77
5.00 mm	73
3.35 mm	70
2.00 mm	62
1.18 mm	55
600 µm	40
425 µm	22
300 µm	7
212 µm	2
150 µm	1
63 µm	1



Particle Proportions	
Cobbles	0
Gravel	38
Sand	62
Silt & Clay	0

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S Burke - Senior Technician
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GEO / 30305

Project Name:

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

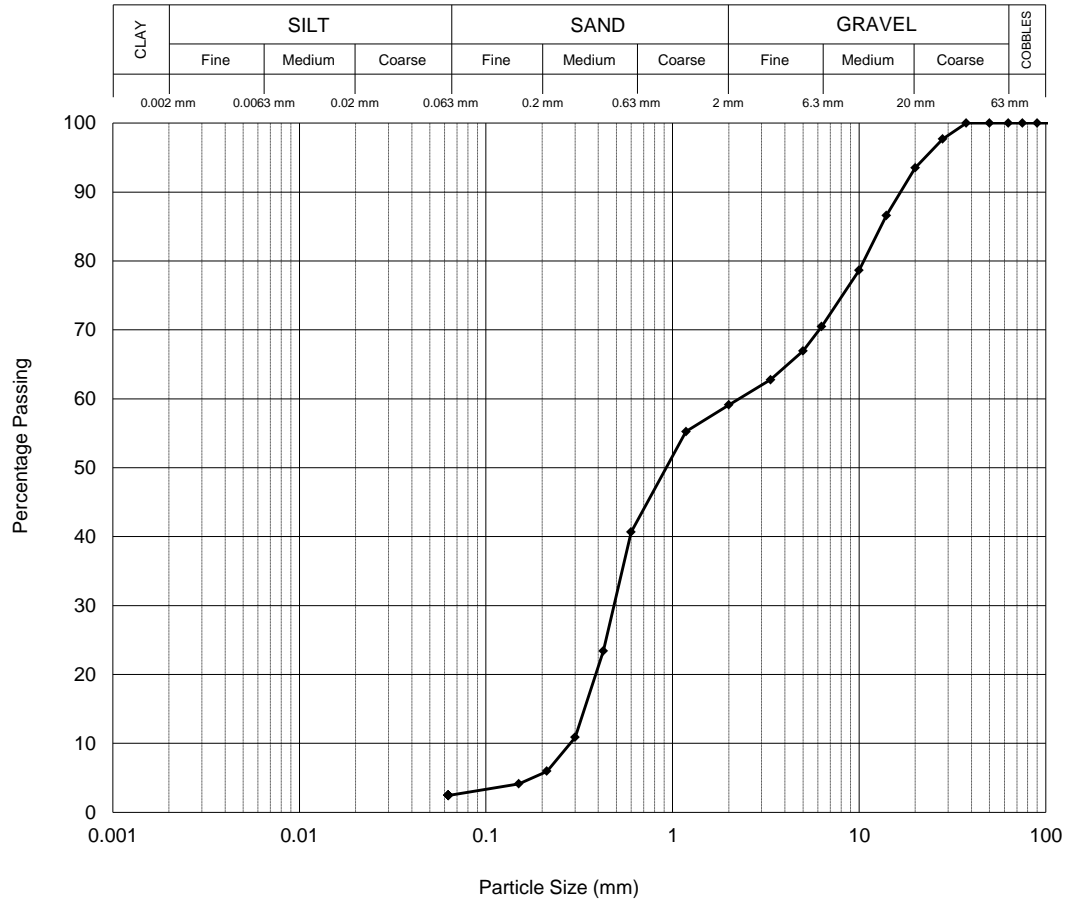
BH02
1.00-2.00
WS

Description

Orangish brown SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	98
20.0 mm	94
14.0 mm	87
10.0 mm	79
6.30 mm	70
5.00 mm	67
3.35 mm	63
2.00 mm	59
1.18 mm	55
600 µm	41
425 µm	23
300 µm	11
212 µm	6
150 µm	4
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	41
Sand	57
Silt & Clay	2

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S Burke

S Burke - Senior Technician
18/12/2019

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

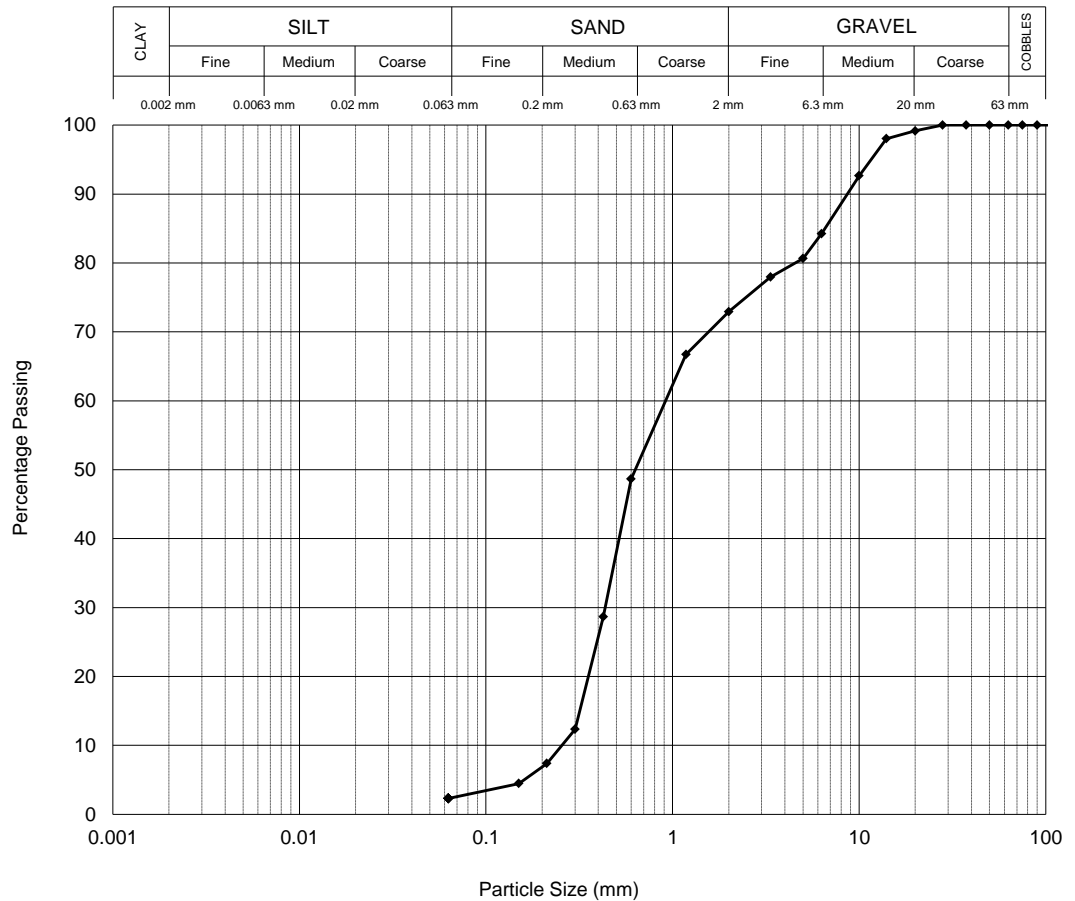
BH02
4.00-5.00
WS

Description

Orangish brown very gravelly SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	99
14.0 mm	98
10.0 mm	93
6.30 mm	84
5.00 mm	81
3.35 mm	78
2.00 mm	73
1.18 mm	67
600 µm	49
425 µm	29
300 µm	12
212 µm	7
150 µm	4
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	27
Sand	71
Silt & Clay	2

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S Burke

S Burke - Senior Technician
18/12/2019

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

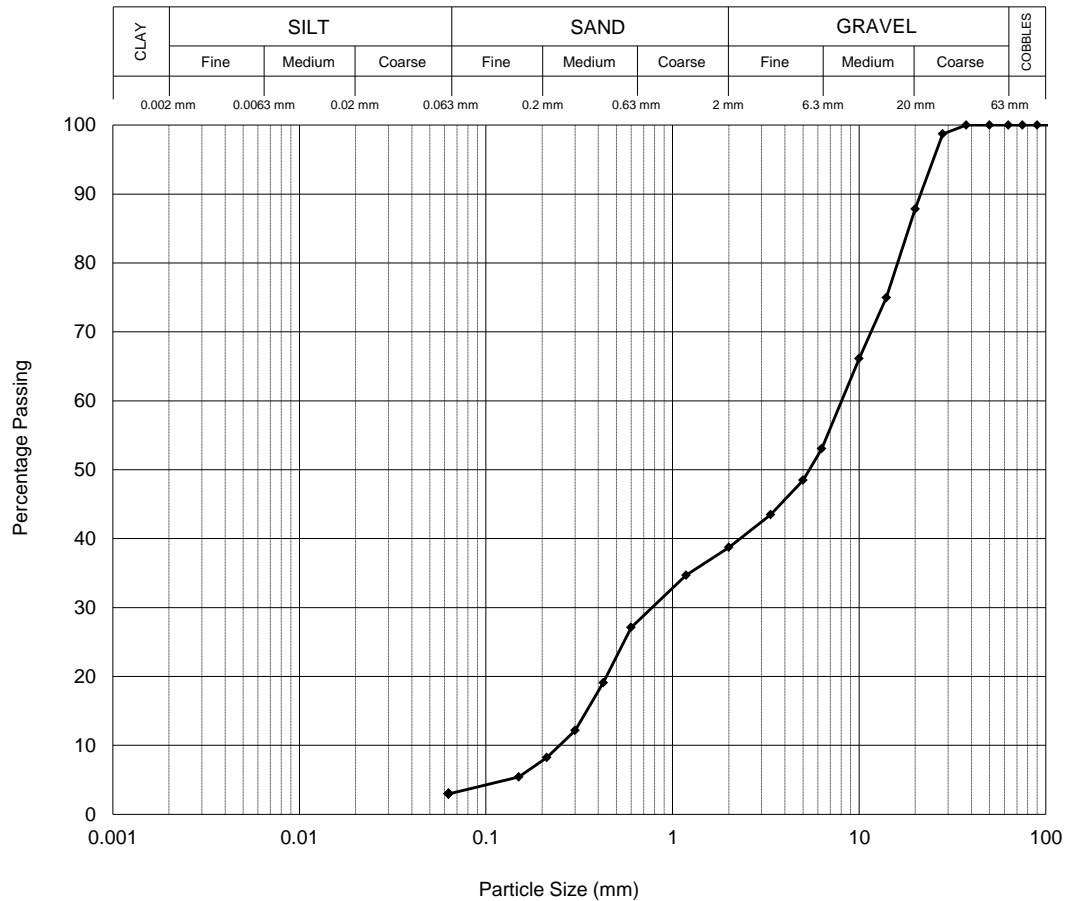
BH03
3.00-4.00
WS

Description

Orangish brown very sandy GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	99
20.0 mm	88
14.0 mm	75
10.0 mm	66
6.30 mm	53
5.00 mm	48
3.35 mm	43
2.00 mm	39
1.18 mm	35
600 µm	27
425 µm	19
300 µm	12
212 µm	8
150 µm	5
63 µm	3



Particle Proportions	
Cobbles	0
Gravel	61
Sand	36
Silt & Clay	3

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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Project Name:

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

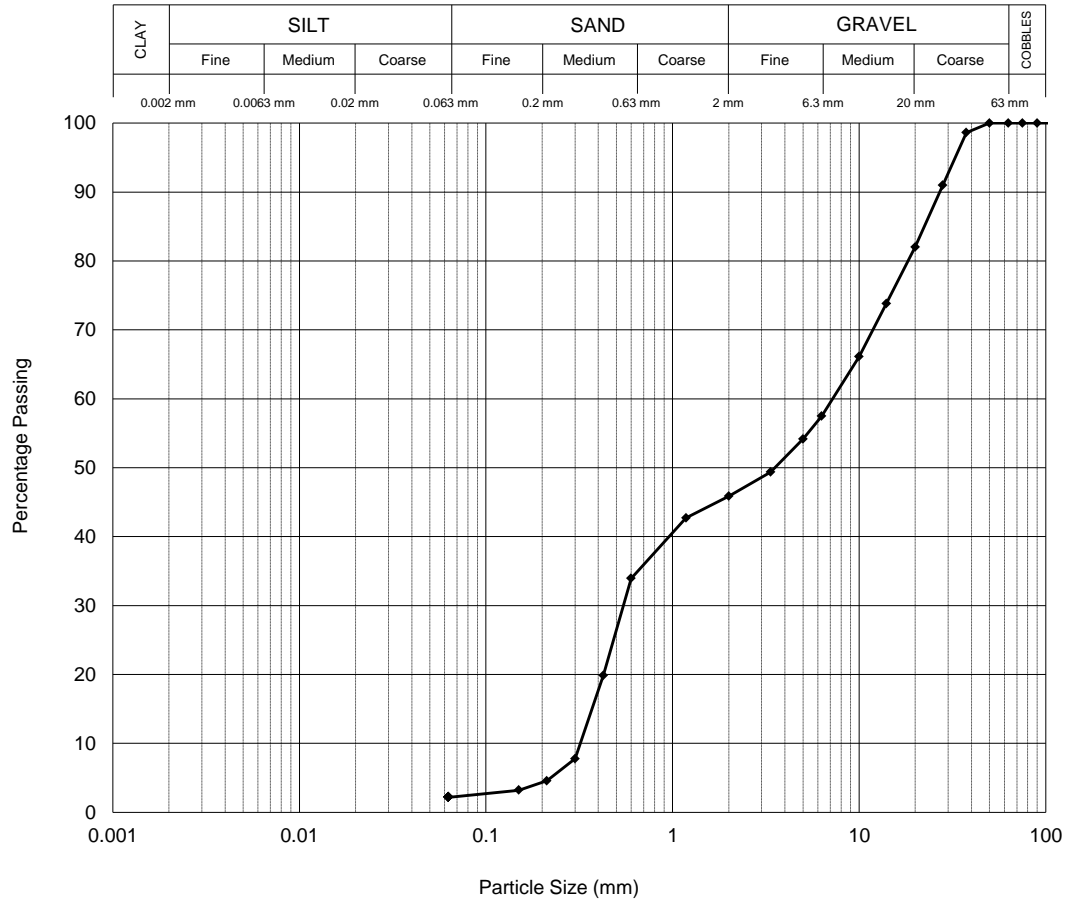
BH03
4.00-5.00
WS

Description

Orangish brown SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	99
28.0 mm	91
20.0 mm	82
14.0 mm	74
10.0 mm	66
6.30 mm	57
5.00 mm	54
3.35 mm	49
2.00 mm	46
1.18 mm	43
600 µm	34
425 µm	20
300 µm	8
212 µm	5
150 µm	3
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	54
Sand	44
Silt & Clay	2

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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Project Name:

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

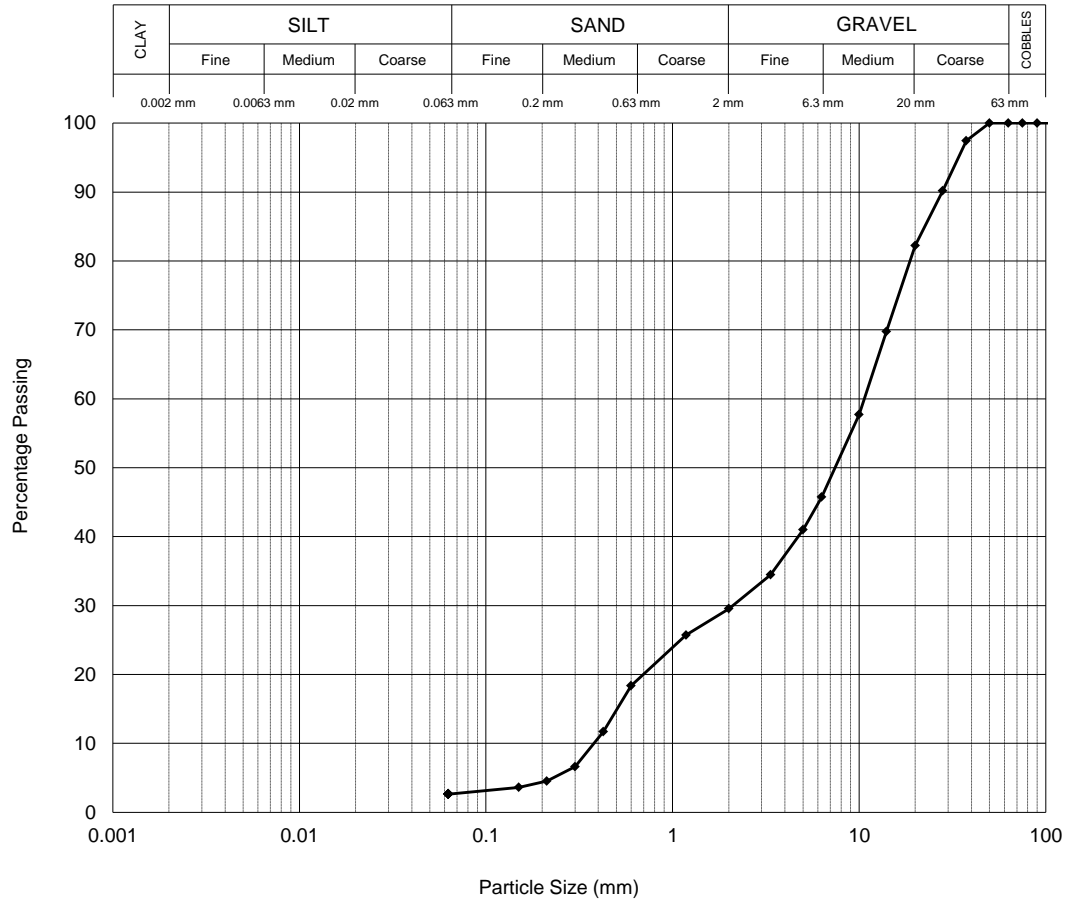
BH03
5.00-6.00
WS

Description

Yellowish brown very sandy GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	97
28.0 mm	90
20.0 mm	82
14.0 mm	70
10.0 mm	58
6.30 mm	46
5.00 mm	41
3.35 mm	34
2.00 mm	30
1.18 mm	26
600 µm	18
425 µm	12
300 µm	7
212 µm	5
150 µm	4
63 µm	3



Particle Proportions	
Cobbles	0
Gravel	70
Sand	27
Silt & Clay	3

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

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Project Name:

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PARTICLE SIZE DISTRIBUTION

BH / TP No.
Depth (m)
Sample Type

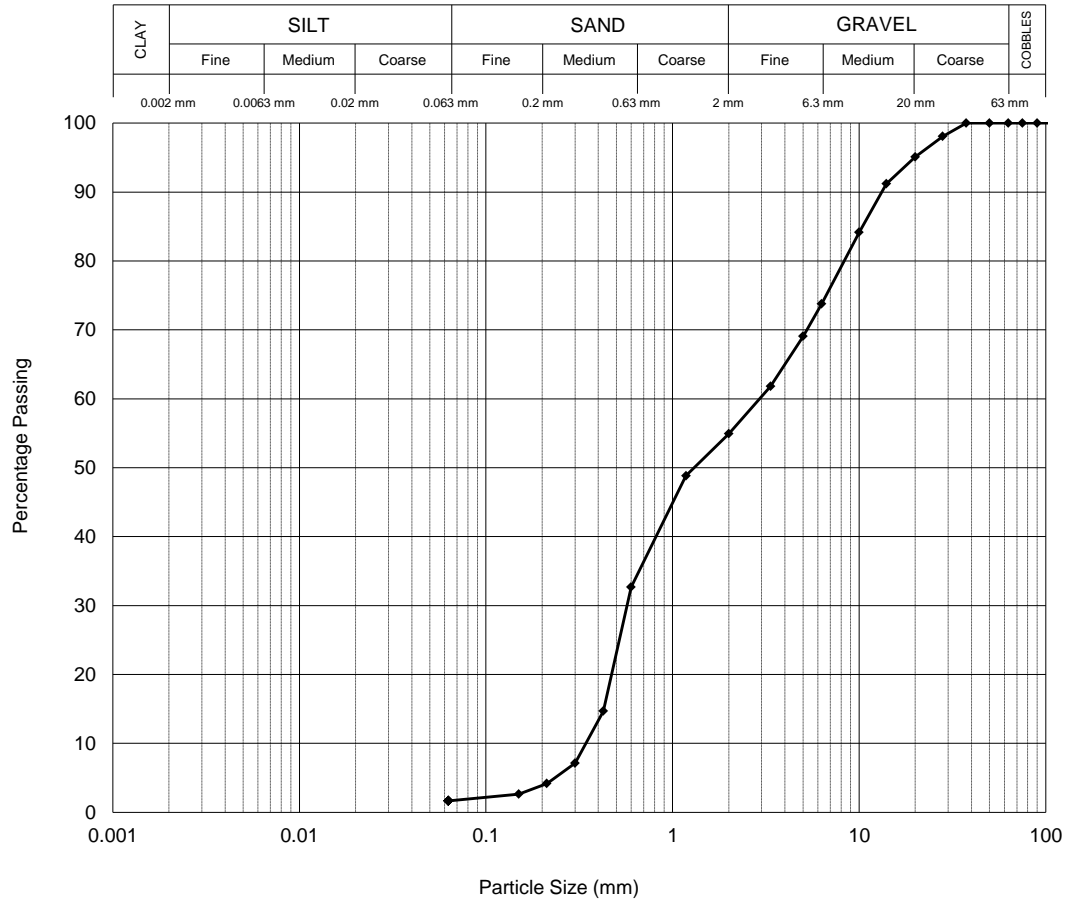
BH03
7.00-8.00
WS

Description

Orangish brown SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Dry Sieve

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	98
20.0 mm	95
14.0 mm	91
10.0 mm	84
6.30 mm	74
5.00 mm	69
3.35 mm	62
2.00 mm	55
1.18 mm	49
600 µm	33
425 µm	15
300 µm	7
212 µm	4
150 µm	3
63 µm	2



Particle Proportions	
Cobbles	0
Gravel	45
Sand	53
Silt & Clay	2

Checked and Approved by

S Burke

S Burke - Senior Technician
18/12/2019

Project Number:

GEO / 30305

Project Name:

THE DIORAMA
1038915

GEOLABS





2183

Final Report

Report No.:	19-41044-1		
Initial Date of Issue:	31-Dec-2019		
Client	GEOLABS Limited		
Client Address:	Bucknalls Lane Garston Watford Hertfordshire WD25 9XX		
Contact(s):	ChemResults		
Project	GEO/30305 Park Square East		
Quotation No.:	Q17-10216	Date Received:	06-Dec-2019
Order No.:	GEO/30305	Date Instructed:	09-Dec-2019
No. of Samples:	10		
Turnaround (Wkdays):	5	Results Due:	13-Dec-2019
Date Approved:	31-Dec-2019		
Approved By:			
Details:	Glynn Harvey, Laboratory Manager		

Results - Soil

Project: GEO/30305 Park Square East

Client: GEOLABS Limited	Chemtest Job No.:				19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044
Quotation No.: Q17-10216	Chemtest Sample ID.:				939523	939524	939525	939526	939527	939528	939529	939530	939531	939532
Order No.: GEO/30305	Client Sample Ref.:				D1									B
	Client Sample ID.:				344348	344383	344391	344387	344381	344392	344369	344365	344372	344749
	Sample Location:				BH01	BH02	BH02	BH02	BH02	BH03	BH03	BH03	BH03	BH01
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	1.00	2.00	5.00	12.00	2.00	4.00	9.00	11.00	0.50
	Bottom Depth (m):					2.00	3.00	6.00	13.00	3.00	5.00	10.00	12.00	
	Asbestos Lab:				COVENTRY									COVENTRY
Determinand	Accred.	SOP	Units	LOD										
ACM Type	U	2192		N/A	-									-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected									No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-									-
Moisture	N	2030	%	0.020	17	1.9	2.5	18	15	13	3.0	17	17	15
Chromatogram (TPH)	N			N/A	See Attached									See Attached
pH	U	2010		4.0	[A] 9.2			[A] 9.2	[A] 9.1			[A] 8.9	[A] 8.8	[A] 9.8
pH (2.5:1)	N	2010		4.0		[A] 9.1	[A] 8.6			[A] 8.4	[A] 9.4			
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40									0.87
Magnesium (Water Soluble)	N	2120	g/l	0.010				0.99	2.3			2.2	6.2	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.16	0.027	0.063	0.017	0.099	< 0.010	< 0.010	0.076	0.39	0.40
Total Sulphur	U	2175	%	0.010				[A] 0.046	[A] 0.41			[A] 0.18	[A] 0.78	
Chloride (Water Soluble)	U	2220	g/l	0.010				[A] < 0.010	[A] 0.016			[A] < 0.010	[A] 0.029	
Nitrate (Water Soluble)	N	2220	g/l	0.010				< 0.010	< 0.010			< 0.010	< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	[A] < 0.50									[A] < 0.50
Ammonium (Water Soluble)	U	2120	g/l	0.01				0.90	0.44			0.42	0.62	
Sulphate (Total)	U	2430	%	0.010				[A] 0.038	[A] 0.82			[A] 0.33	[A] 1.1	
Arsenic	U	2450	mg/kg	1.0	8.1									15
Cadmium	U	2450	mg/kg	0.10	0.20									0.26
Chromium	U	2450	mg/kg	1.0	12									23
Copper	U	2450	mg/kg	0.50	8.6									34
Mercury	U	2450	mg/kg	0.10	< 0.10									0.13
Nickel	U	2450	mg/kg	0.50	16									22
Lead	U	2450	mg/kg	0.50	11									560
Selenium	U	2450	mg/kg	0.20	0.20									< 0.20
Zinc	U	2450	mg/kg	0.50	25									90
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50									< 0.50
Total Organic Carbon	U	2625	%	0.20	[A] 0.23									[A] 0.48
Fuel Type	N	2670		N/A	N/A									N/A
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[AC] < 1.0									[AC] < 1.0

Results - Soil

Project: GEO/30305 Park Square East

Client: GEOLABS Limited	Chemtest Job No.:				19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044
Quotation No.: Q17-10216	Chemtest Sample ID.:				939523	939524	939525	939526	939527	939528	939529	939530	939531
Order No.: GEO/30305	Client Sample Ref.:				D1								B
	Client Sample ID.:				344348	344383	344391	344387	344381	344392	344369	344365	344372
	Sample Location:				BH01	BH02	BH02	BH02	BH02	BH03	BH03	BH03	BH03
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	1.00	2.00	5.00	12.00	2.00	4.00	9.00	11.00
	Bottom Depth (m):					2.00	3.00	6.00	13.00	3.00	5.00	10.00	12.00
	Asbestos Lab:				COVENTRY								COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[AC] < 5.0								[AC] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[AC] < 5.0								[AC] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[AC] < 10								[AC] < 10
Naphthalene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Acenaphthylene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Acenaphthene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Fluorene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Phenanthrene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Anthracene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Fluoranthene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Pyrene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Chrysene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Coronene	N	2700	mg/kg	0.10	[A] < 0.10								[A] < 0.10
Total Of 17 PAH's	N	2700	mg/kg	2.0	[A] < 2.0								[A] < 2.0
Benzene	U	2760	µg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Toluene	U	2760	µg/kg	1.0	[AC] < 1.0								[AC] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[AC] < 1.0								[AC] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[AC] < 1.0								[AC] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[AC] < 1.0								[AC] < 1.0
PCB 28	U	2815	mg/kg	0.010	[AC] < 0.010								[AC] < 0.010
PCB 52	U	2815	mg/kg	0.010	[AC] < 0.010								[AC] < 0.010
PCB 90+101	U	2815	mg/kg	0.010	[AC] < 0.010								[AC] < 0.010

Results - Soil

Project: GEO/30305 Park Square East

Client: GEOLABS Limited	Chemtest Job No.:					19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044	19-41044
Quotation No.: Q17-10216	Chemtest Sample ID.:					939523	939524	939525	939526	939527	939528	939529	939530	939531
Order No.: GEO/30305	Client Sample Ref.:					D1								B
	Client Sample ID.:					344348	344383	344391	344387	344381	344392	344369	344365	344372
	Sample Location:					BH01	BH02	BH02	BH02	BH02	BH03	BH03	BH03	BH03
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					0.50	1.00	2.00	5.00	12.00	2.00	4.00	9.00	11.00
	Bottom Depth (m):						2.00	3.00	6.00	13.00	3.00	5.00	10.00	12.00
	Asbestos Lab:					COVENTRY								COVENTRY
Determinand	Accred.	SOP	Units	LOD										
PCB 118	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010
PCB 153	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010
PCB 138	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010
PCB 180	U	2815	mg/kg	0.010	[AC] < 0.010									[AC] < 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	[AC] < 0.10									[AC] < 0.10
Total Phenols	U	2920	mg/kg	0.30	< 0.30									< 0.30

TPH Chromatogram on Soil Sample: 939523

TPH Chromatogram on Soil Sample: 939532

Results - Single Stage WAC

Project: GEO/30305 Park Square East

Chemtest Job No: 19-41044					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 939523					Limits		
Sample Ref: D1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID: 344348							
Sample Location: BH01							
Top Depth(m): 0.50							
Bottom Depth(m):							
Sampling Date:							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	[A] 0.23	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[AC] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[AC] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.013	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0014	< 0.050	0.5	10	70
Copper	1450	U	0.0011	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0042	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0014	0.014	0.1	0.5	7
Zinc	1450	U	0.0034	< 0.50	4	50	200
Chloride	1220	U	9.2	92	800	15000	25000
Fluoride	1220	U	1.6	16	10	150	500
Sulphate	1220	U	68	680	1000	20000	50000
Total Dissolved Solids	1020	N	160	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.8	78	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: GEO/30305 Park Square East

Chemtest Job No: 19-41044 Chemtest Sample ID: 939532 Sample Ref: B Sample ID: 344749 Sample Location: BH01 Top Depth(m): 0.50 Bottom Depth(m): Sampling Date:					Landfill Waste Acceptance Criteria Limits		
					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	[A] 0.48	3	5	6
Loss On Ignition	2610	U	%	1.5	--	--	10
Total BTEX	2760	U	mg/kg	[AC] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[AC] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.049	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	0.0062	0.062	0.5	2	25
Barium	1450	U	0.013	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0021	< 0.050	0.5	10	70
Copper	1450	U	0.0013	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0011	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0027	< 0.50	4	50	200
Chloride	1220	U	2.4	24	800	15000	25000
Fluoride	1220	U	0.067	< 1.0	10	150	500
Sulphate	1220	U	44	440	1000	20000	50000
Total Dissolved Solids	1020	N	120	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.1	61	500	800	1000

Solid Information

Dry mass of test portion/kg	0.090
Moisture (%)	15

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
939523	D1	344348	BH01		AC	Plastic Tub 500g
939524		344383	BH02		A	Plastic Bag
939525		344391	BH02		A	Plastic Bag
939526		344387	BH02		A	Plastic Bag
939527		344381	BH02		A	Plastic Bag
939528		344392	BH03		A	Plastic Bag
939529		344369	BH03		A	Plastic Bag
939530		344365	BH03		A	Plastic Bag
939531		344372	BH03		A	Plastic Bag
939532	B	344749	BH01		AC	Plastic Bag

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils (Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easily liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com