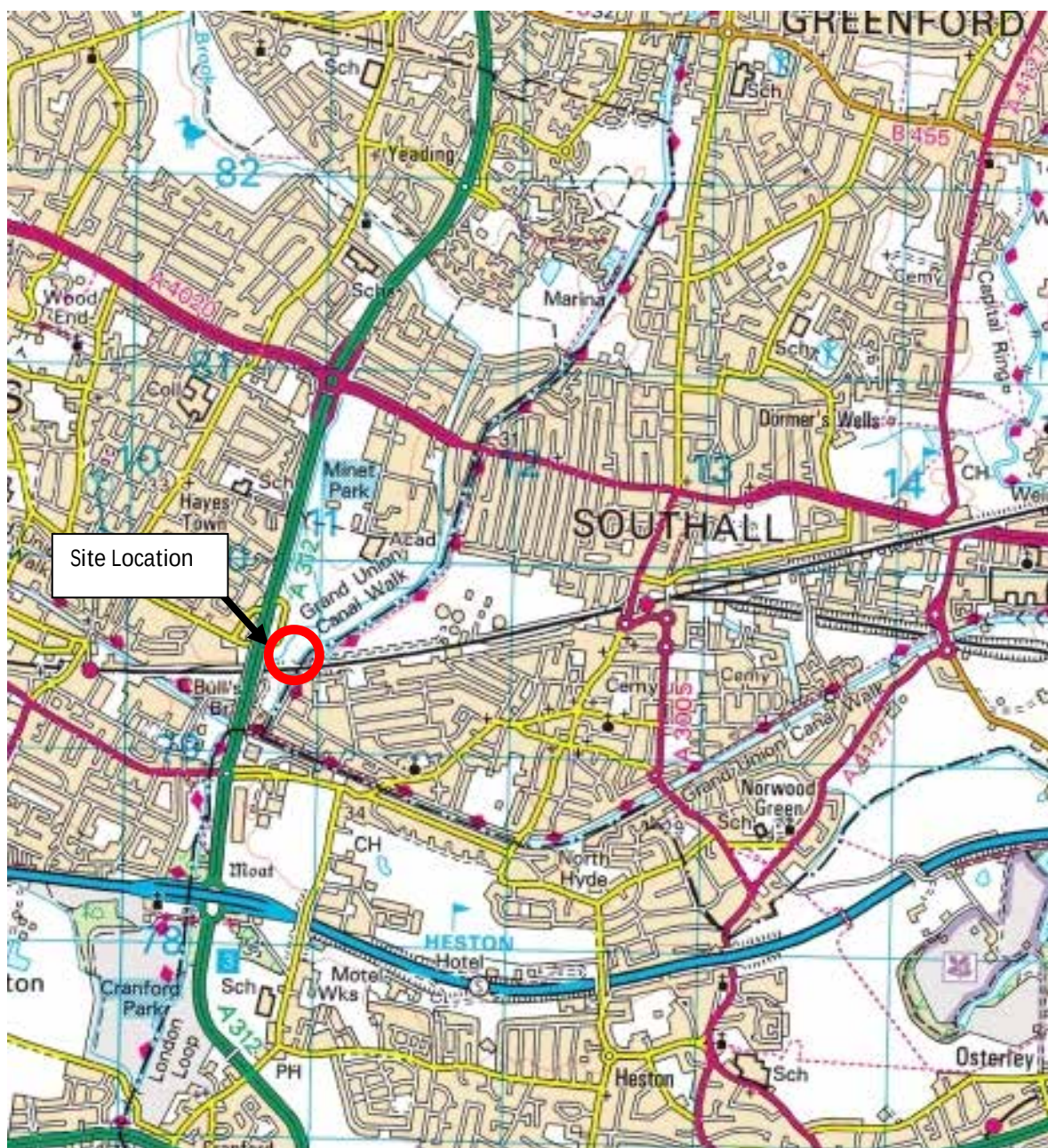


- Validation laboratory test results for treated soils.
- Groundwater and surface water monitoring records.

On completion of the remediation works, a Verification Report should be prepared. This report should detail the works undertaken and should include copies of all relevant information listed above including waste transfer records, validation test results, inspection records, membrane material specifications and source certificates for imported materials.

This document should be made available to London Borough of Hillingdon and the Environment Agency, as evidence of the works carried out, and will ultimately form part of the health and safety file for the site.

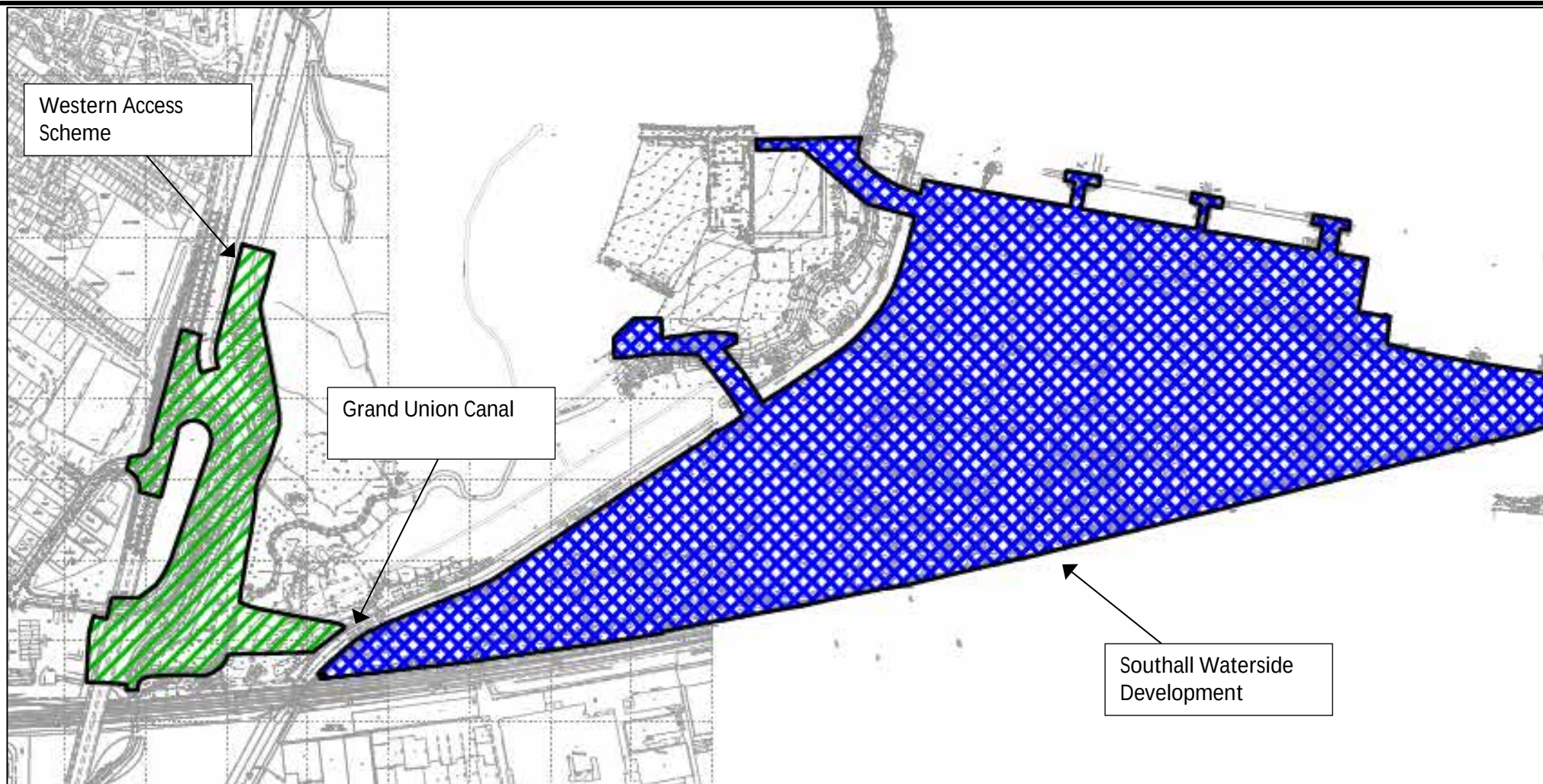
FIGURES



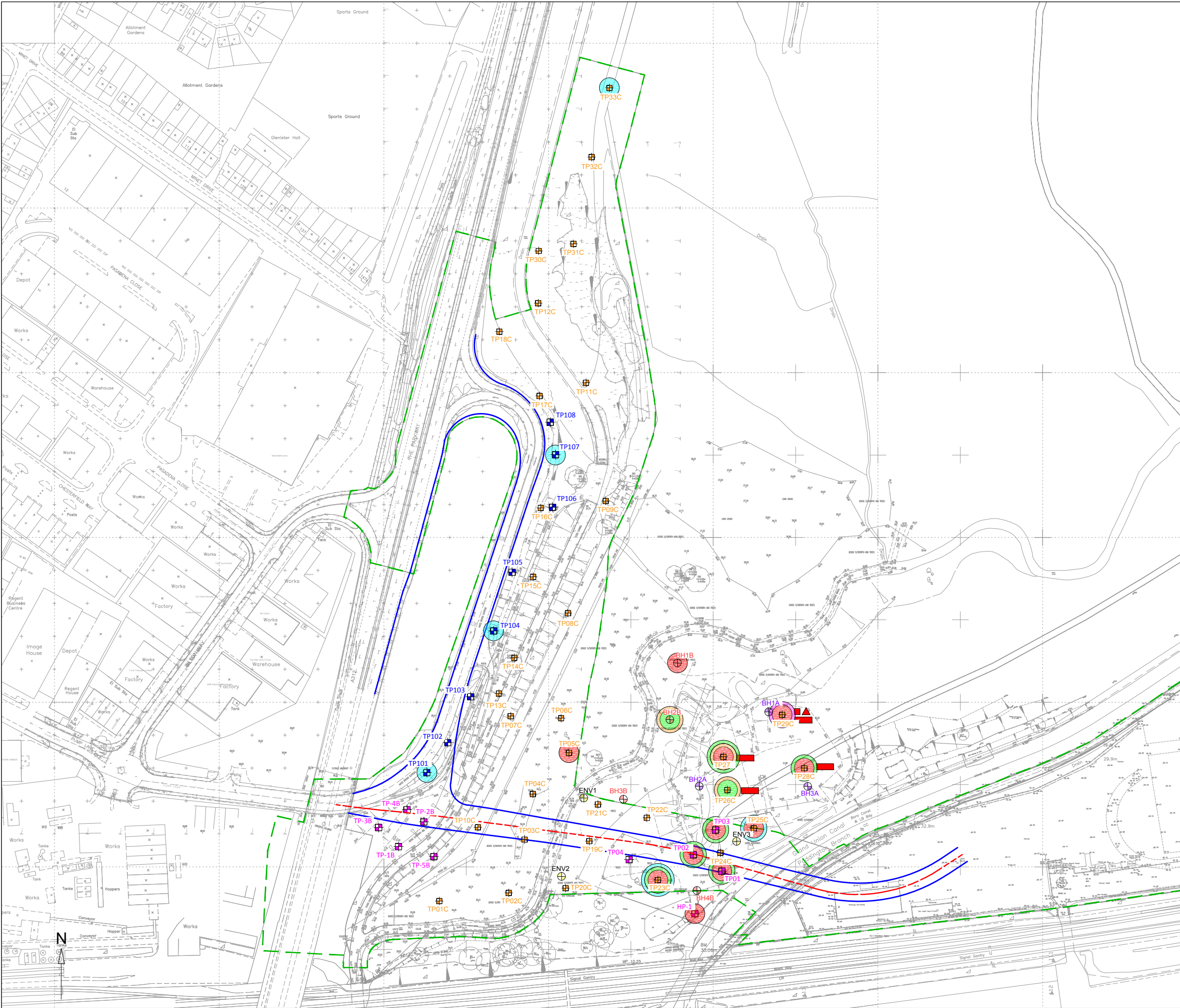
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Client Clark Smith Partnership	Project Western Access	Job No CGN/37321
	Title Site Location Plan	Figure 1



Client Clark Smith Partnership	Project Western Access	Job No CGN/037321
	Title Development Overview Plan	Figure 2



- KEY**
- Completed trial pits (CGL 17th Feb 2017)
 - Completed trial pits (CGL 24th Feb 2017)
 - Completed trial pits (CGL 27th March 2017)
 - 'Sentinel' groundwater monitoring well positions (CGL 2017)
 - Lagoon 'source' groundwater monitoring well positions (CGL 2017)

- Western Access Site boundary
- Western Access Road Alignment
- Indicative highway extents
- Asbestos fibres present in Topsoil/Made Ground
- Cyanide (total) exceedance above re-use criteria
- Benzo(a)pyrene exceedance above re-use criteria
- Cadmium exceedance above re-use criteria
- Phenol exceedance above re-use criteria
- Strong hydrocarbon odour
- Marzipan odour
- Spent oxide 'Blue Billy' observed between 1.3mbgl and 1.5mbgl

1	07/07/17	Updated alignment east of GUC, contaminant exceedences	
0	21/06/17	First Issue	
Rev	Date	Comments	
 Card Geotechnics Ltd 4 Godalming Business Centre Woolsack Way Godalming Surrey GU7 1XW T: 01483 310600			
Project		Southall Western Access	
Client		FM Conway Limited	
Drawing title		Contamination Observation Plan	
Scale(s)		Job No.	
NTS		CGN/03732I	
Drawn	TSB	21/06/17	Dwg No.
Checked			A720-E05-IW-CGL-EW-DR-0002
Approved			Rev.
			1
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Sources

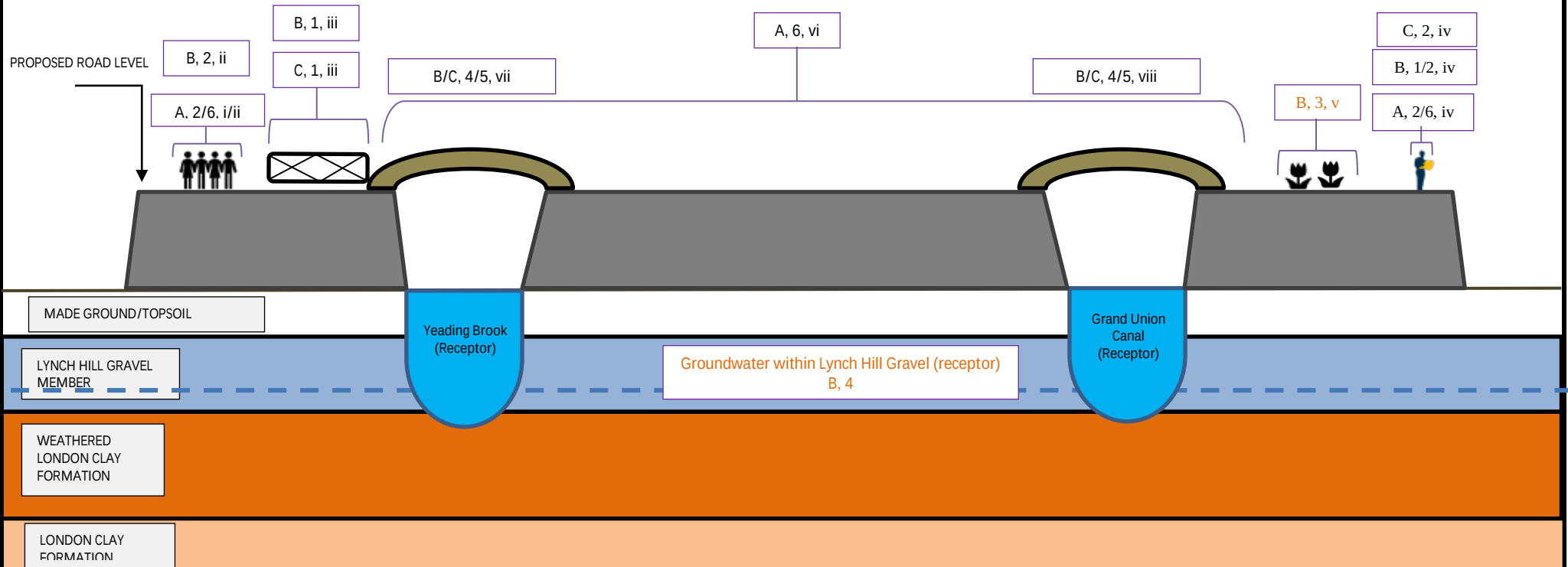
- A) Explosive/asphyxiating gases from Made Ground and Lagoon deposits
- B) Contaminants in soils within flood compensation area and Lagoon Bund to be used in embankment construction
- C) Dissolved phase contamination within the Lynch Hill Gravel groundwater

Potential Exposure Route

- 1) Direct contact
- 2) Ingestion and inhalation
- 3) Uptake via roots
- 4) Leaching from soils to groundwater
- 5) Lateral migration
- 6) Upward migration

Receptors

- i) Future Users
- ii) off-site occupants
- iii) Buildings, Structures, and Services
- iv) Construction Workers
- v) Plants and Vegetation
- vi) Embankment & bridge structures and services
- vii) Yeading Brook
- viii) Grand Union Canal



Client
Clark Smith Partnership

Project
Western Access

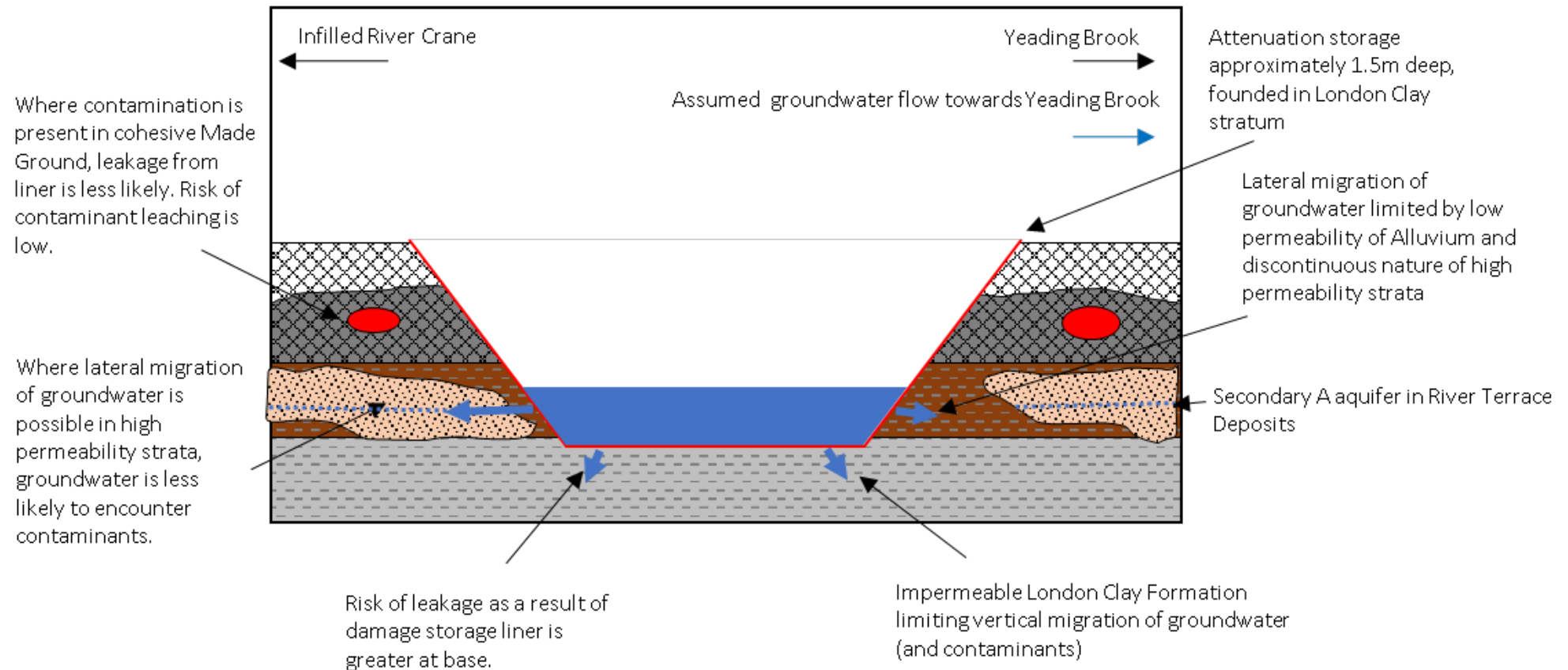
Job No
CGN/037321



Title
Conceptual Site Model

Figure 5

Risk of contaminant migration as a result of attenuation storage leakage



Client	Project	Job No
Clark Smith Partnership	Western Access – Remediation Scheme Addendum	CGN/03732I
	Title	
	Detention Basin Conceptual Model	Figure 6

APPENDIX A

Earthworks Material Acceptability and Waste Classification Reports

A720-E05-IW-BR-CGL-EW-TS-0003 P1

A720-E05-IW-BR-CGL-EW-TS-0004 P1

A720-E05-IW-BR-CGL-EW-TS-0005 P1



Clark Smith Partnership

Western Access, Southall
*Earthworks Material Acceptability
and Waste Characterisation (Pump
Lane Bund)*

May, 2017



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Issue Date		May 2017

Contents

1.	INTRODUCTION	3
2.	SITE DESCRIPTION	4
3.	INTRUSIVE INVESTIGATION	5
3.1	Summary of works	5
3.2	Ground conditions	5
3.2.1	Pump Lane Bund	5
3.2.2	Visual and olfactory indicators of contamination	5
3.3	Environmental laboratory testing	5
3.4	Geotechnical laboratory testing	5
4.	MATERIAL CHARACTERISATION	6
4.1	Earthworks classification and acceptability testing	6
4.1.1	Sulfates	6
4.1.2	Atterberg Limit & Moisture Content	7
4.1.3	Particle Size Distribution testing	7
4.1.4	Maximum dry density/moisture content relationship	8
4.1.5	Moisture Condition Value (MCV) and MCV/mc relationship	8
4.1.6	Undrained Shear Strength	9
4.1.7	Summary of geotechnical results	9
4.2	Contamination assessment - Risks to human health	10
4.3	Waste characterisation	10
4.3.1	Pump Lane Bund	11
5.	SUMMARY	12

FIGURES

Figure 1 - Site Location Plan

Figure 2 – Trial Pit Location Plan

APPENDICES

Appendix A – Trial Pit Logs

Appendix B – Geotechnical Test Results

Appendix C – Chemical Test Results

1. INTRODUCTION

Card Geotechnics Limited (CGL) have been instructed by Clark Smith Partnership (CSP) to undertake initial trial pit and laboratory testing in order to provide a preliminary assessment of material suitability for direct transfer off-site or reuse on-site under a Materials Management Plan (MMP). Additionally, the testing has been scheduled to identify the suitability of these site won materials for lime or cement stabilisation.

This trial pitting at the Western Access in Southall was completed on the Friday 17th February 2017. This Letter Report specifically details the findings from the investigation undertaken at the location of an earth bund running parallel to the Pump Lane access road. The Preliminary Geotechnical Design Report (PGDR) detailing the ground conditions across the site was re-issued in December 2016¹.

¹ CGL (December 2016). *CGN03732 Southall, Pump Lane Western Access*. Preliminary Geotechnical Design Report. Rev1

2. SITE DESCRIPTION

The development area as a whole covers approximately 7.66Ha. The area encompassing all three permanent earthworks is centred approximately on National Grid Reference (NGR) 511254, 179810. An overall site location plan is presented as Figure 1 and a trial pit location plan showing the site areas relevant to this report is presented as Figure 2.

The earth bund considered within this investigation comprises a stockpile of material (herein referred to as *Pump Lane Bund*) located approximately immediate adjacent of the Pump Lane access road and west of the River Crane. The bund stretches runs approximately south-west to north-east along a length of approximately 500m. The Pump Lane Bund is proposed to be reduced in height by approximately 2-3m to facilitate the construction of temporary access and laydown areas. It is proposed that the excavated material be stockpiled for future use within the earthworks construction, subject to suitability.

3. INTRUSIVE INVESTIGATION

3.1 Summary of works

Eight trial pits were excavated in the Pump Lane Bund within Made Ground and natural strata during the investigation undertaken on the 17th February 2017. Representative samples were taken from each trial pit location for the purposes of geotechnical and chemical testing and are shown on the trial pits logs presented in Appendix A.

3.2 Ground conditions

3.2.1 *Pump Lane Bund*

The Pump Lane Bund is comprised of Made Ground recorded as brown slightly sandy slightly gravelly silty clay with fragments of brick, flint, concrete, wood, and rare plastic. Whilst the material was heterogeneous in nature, no distinct differences in the material were recorded between pit locations TP101 to TP108.

3.2.2 *Visual and olfactory indicators of contamination*

No visual and olfactory indicators of contamination were recorded within the material at either location.

3.3 Environmental laboratory testing

A total of six soils samples retrieved from the Pump Lane Bund were scheduled for testing for a range of contaminants including; heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), BTEX and asbestos screening. A further five samples were scheduled for Asbestos Quantification based upon screening results.

3.4 Geotechnical laboratory testing

Eight samples from the Pump Lane Bund were scheduled for geotechnical testing including; Atterberg Limits, particle size distribution, moisture content, MCV, MCV/mc relationship, mc/MDD relationship, unconsolidated undrained triaxial and sulphates.

4. MATERIAL CHARACTERISATION

CGL have compared the results of the geotechnical and chemical tests to the limiting criteria detailed in the Earthworks Specification contained within the PDGR and have designated each of the locations under each of the three headings below:

- Material acceptability – compared against criteria within Appendix 6/1.

This indicates whether the material is acceptable for use in the earthworks based upon geotechnical properties. If the in-situ material is considered to be unacceptable, then the suitability for lime or cement stabilisation has been assessed;

- Contamination concentrations – compared against limiting values within Appendix 6/14

This indicates whether the material is acceptable for use in the earthworks based upon concentrations of contamination recorded within the in-situ materials. Where exceedances are noted, the material may be classified as Class U1B or U2 unacceptable material;

In order to assess the likely requirements for re-use and/or disposal off-site, CGL has reviewed the Morgan Tucker drawings (A720-E05-IW-MTU-EW-DR-0610 and A720-E05-IW-MTU-EW-DR-0600), which detail the proposed earthworks cut and fill volumes. Based upon a net cut of approximately 76,000m³ and a net fill of 80,400m³ across the development area, a deficit of approximately 4,300m³ of fill exists. The drawings indicate smaller zones of material balance across the site, however as these zones still generally cover larger areas than that sampled within this investigation, the volumes stated cannot be applied to these results.

4.1 Earthworks classification and acceptability testing

4.1.1 Sulfates

Testing was undertaken to TRL 477² methods 1, 2 & 4 to determine the Total Potential Sulfate (TPS) within six samples taken from the Pump Lane Bund. The mean value of the two highest results has been reported in accordance with MCHW 1. The results are presented below in Table 1.

² TRL Limited (2001). *Sulfate specification for structural backfills*. TRL Report TRL447.

Table 1 - Summary of sulfate test results

	Total Potential Sulfate (%SO ₄) ¹	Acid Soluble Sulfate (%SO ₄) ²
Pump Lane Bund	0.48	0.29
¹ Average of two highest recorded values		
² Maximum value across all samples		

The results indicate that Total Potential Sulfates (TPS) exceed the recommended limiting value of 0.25%³ for suitability for lime improvement and stabilisation. The risk of expansion will be related to the percentage addition of lime required to achieved the necessary properties and can be further assessed by undertaking trials on lime treated material.

4.1.2 Atterberg Limit & Moisture Content

Five samples from *Pump Lane Bund* were tested to determine the Plastic and Liquid Limits of the cohesive soils in accordance with BS 1377 (1990), Part 2, Clause 5.3. Full laboratory testing data is provided in Appendix B, and a summary of the Plastic and Liquid Limits for the site won materials is set out below in Table 2.

Table 2 - Summary of Atterberg Limit test results

Atterberg Limits						
Strata	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	% material <425µm	I _p ²	Volume change potential
<i>Pump Lane Bund</i>	15-32	55-74	22-25	50-97	17-49	Low – Medium

All samples have natural moisture contents exceeding a lower limit PL-4, therefore conform to a Class 2A material based upon Moisture Content (combined with below grading assessment). The Liquid Limit for all samples is greater than 50, which places additional limitations on the Compaction Method 1 for a Class 2A material.

4.1.3 Particle Size Distribution testing

Six samples from the *Pump Lane Bund* were tested for Particle Size Distribution (PSD) in accordance BS 1377:1990 Part 2:9.2. Full geotechnical laboratory testing data is provided in Appendix B.

The results indicate that two samples (TP106 & TP108) conform to the Class 2A specification. Four samples (66% of samples tested) conform to the Class 2C specification due to the lack of materials passing the 2mm sieve during testing. However, samples from TP102 & TP103 were only slightly below the criteria for a Class 2A material and it is

³ Britpave (2005). *Stabilisation of sulfate-bearing soils- Technical Guidelines*. Britpave: Camberley.

anticipated that mixing of soils may permit these materials to meet the criteria for a Class 2A material based upon grading.

Significant larger cobbles and concrete slabs exceeding 125mm were noted. These would require removal before the material could be incorporated into the earthworks.

4.1.4 Maximum dry density/moisture content relationship

Three samples from the *Pump Lane Bund* area were tested to determine the optimum moisture contents and maximum dry density of the soils in accordance with BS 1377 (1990), Part 4, Clause 3.6 using a 2.5kg CBR mould. Full laboratory testing data is provided in Appendix B, and a summary of the maximum dry densities for the site won materials is set out below in Table 3.

Table 3 - Summary of compaction test results (2.5kg hammer method)

Material	Number of tests	Maximum dry density for end-product verification (Mg/m ³)	Optimum moisture content range (%)
Pump Lane Bund	3	1.52-1.66	19.9-25.7

The results indicate that all samples tested from the *Pump Lane Bund* area were received as 'wet of optimum moisture content'. The results indicate a small range of optimum moisture content for these samples taken from the northern end of the Pump Lane Bund, suggesting that normal site controls may be adequate for the handling of this material.

4.1.5 Moisture Condition Value (MCV) and MCV/mc relationship

Two samples from the *Pump Lane Bund* were tested to determine a single point Moisture Condition Value in accordance with BS 1377 (1990), Part 4. Full laboratory testing data is provided in Appendix B, and a summary of the undrained shear strength for the tested materials is set out below in Table 4.

Table 4 - Summary of MCV test results

Material	Number of tests	Single point Moisture Condition Value (MCV)
Pump Lane Bund	2	8.7-9.2

The Moisture Condition Value can provide a simple controlling value for a given soil to obtain near-full compaction. The results indicate that both samples from the *Pump Lane Bund* fall outside of typical limiting values for a Class 2A soil (lower limit 12 and upper limit 16) but are within typical limiting values for a Class 2C material (lower limit 8 and upper limit 16).

Three samples from the *Pump Lane Bund* were also tested to determine the relationship between Moisture Condition Value and Moisture Content in accordance with BS 1377 (1990), Part 4, Clause 5.5. This provides a calibration line for the materials tested and allows a more specific assessment of limiting values of MCV. The results indicate that the samples from the *Pump Lane Bund* may warrant a MCV lower limit of 8 and an MCV upper limit of around 16, for use within the Earthworks Specification.

4.1.6 Undrained Shear Strength

Five samples from the *Pump Lane Bund* were tested to determine the undrained shear strength in accordance with BS 1377 (1990), Part 7. Full laboratory testing data is provided in Appendix B, and a summary of the undrained shear strength for the tested materials is set out below in Table 5.

Table 5 - Summary of unconsolidated undrained triaxial test results

Material	Number of tests	Undrained Shear Strength (kN/m ²)
Pump Lane Bund	5	40-55

The results indicate that all samples exceed the value of undrained shear strength that has been assumed within the PGDR of 40kN/m².

4.1.7 Summary of geotechnical results

The results of the geotechnical testing indicate the material from the southern and central areas of *Pump Lane Bund* would be generally acceptable as a Class 2C material based upon grading, with the material at the northern most area of the bund tending towards a Class 2A material. Natural moisture contents were recorded as at or around optimum, with samples at the northern end of the bund tending to be wetter and two samples at the far southern end recorded as being dry of optimum.

The majority of samples are close to the lower limit of undrained shear strength characteristics and may benefit from stabilisation to improve strength.

Sulfate concentrations recorded within bund exceed the recommended limits for lime treatment, should this be used for these materials. Lime treatment trials should be undertaken to determine the risk of expansion of the treated material based upon the percentage of lime expected to be required for improvement and/or stabilisation. It may

be necessary to stabilise the material using Ground Granulated Blastfurnace Slag (GGBS) in combination with lime, if the material is stabilised to improve its strength.

4.2 Contamination assessment - Risks to human health

The chemical results have been compared against the limiting values within Appendix 6/14 of the PDGR, derived from the Generic Assessment Criteria (GACs) derived in house by CGL for the “commercial” land-use category, considered to be conservative in this scenario. None of the concentrations recorded within the Made Ground exceeded the assessment criteria.

Asbestos in the form of loose fibres of Chrysotile was detected within three samples (TP101, TP104 & TP107). Subsequent Stage 2 Quantification undertaken on these samples recorded asbestos quantities below the limit of detection of 0.001%. For the purposes of waste disposal, these quantities are below the limit of 0.1%, above which material would be considered ‘Hazardous Waste’. Furthermore, these quantities are below the value considered to pose a risk to human health, however it would be prudent to prevent this material from drying out where fibres are more susceptible to transportation by wind.

4.3 Waste characterisation

The waste characterisation of the sampled material was undertaken in accordance with the waste classification guidance document, WM3⁴ to determine its characterisation and hazardous properties.

It should be noted that in May/June 2012, HMR&C issued Briefs 15/12 and 18/12 clarifying how construction spoil and excess soils will be assessed for landfill tax purposes. Detailed accurate descriptions of waste are required for all wastes to support the landfill tax assessment. Uncontaminated naturally occurring soils will remain inert by default and eligible for the lower rate of landfill tax. Similarly ‘reworked soils’ and demolition ‘stone’ comprising ONLY materials listed in the Schedule of the Landfill Tax (Qualifying Material) Order 2011 (SI 2011/1017) will also be eligible for the lower rate of landfill tax. However, Made Ground containing soil and foreign objects such as timber, plastic, rubber, metal, paper, plasterboard, asbestos etc., regardless of the results of chemical analysis for waste classification purposes, will be eligible for the standard (higher) rate of landfill tax. Therefore, to maximise eligibility for lower rate landfill tax on waste construction spoil/

reworked ground, careful waste segregation and controls are necessary, and Made Ground recorded onsite will need sorting to remove foreign objects.

4.3.1 Pump Lane Bund

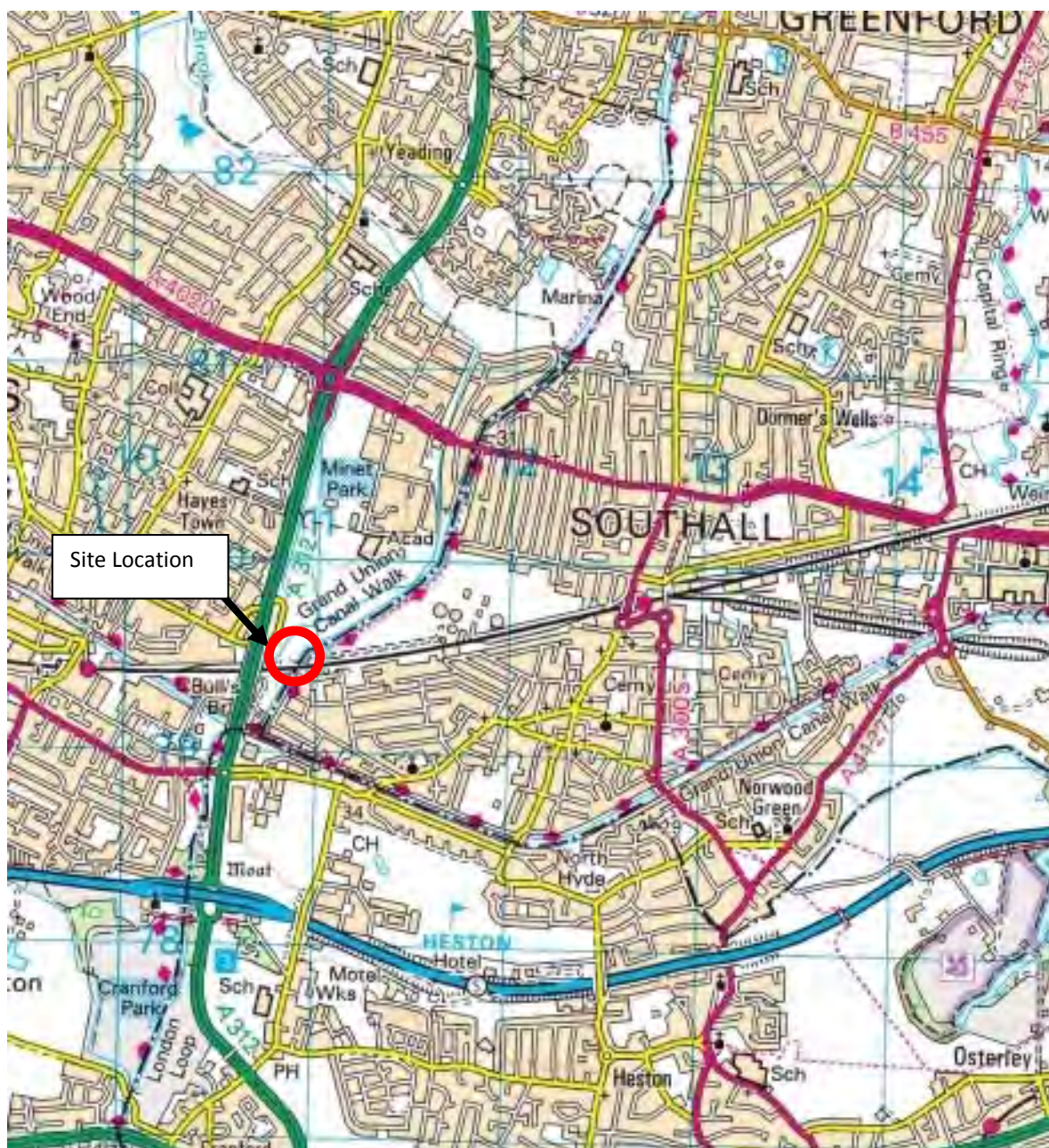
The results of the preliminary assessment using WM3 assessment criteria, indicate that the material associated with the samples from the *Pump Lane Bund* are deemed 'not-hazardous'. WAC testing has not been undertaken on these soils due to the low contaminant concentrations noted and the likely suitability for re-use as an earthworks material. However if the material was required to be disposed of off-site, based on the 'not-hazardous' WM3 classification, an Inert WAC test should be undertaken to determine whether the material was required to be taken to an Inert or Non-Hazardous waste disposal facility.

5. SUMMARY

This report provides the results of trial pitting undertaken and subsequent laboratory testing undertaken as part of the advanced works phase of the Western Access scheme.

The results show that the material from the Pump Lane Bund area demonstrates low variability and will likely be suitable for re-use providing good site controls are employed to manage the source materials on site.

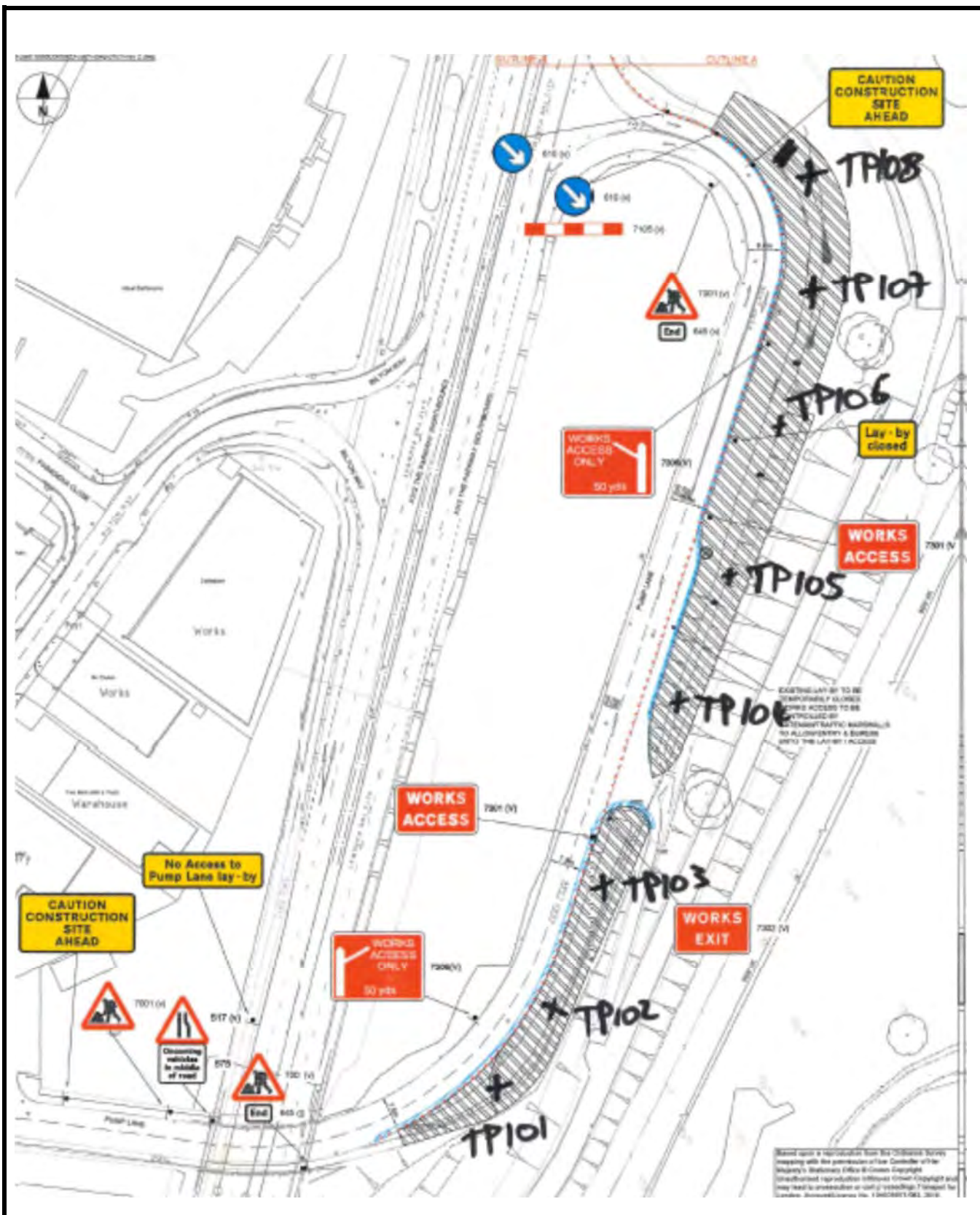
FIGURES



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Client	Project	Job No
CSP Limited	Southall Advanced Works	CGN/3732C
	Title	
	Site location plan	Figure 1



Client	Project	Job No
CSP Limited	Southall Advanced Works	CGN/3732C
	Title	Figure 2
	Trial pit location plan	

APPENDIX A

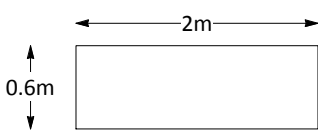
Trial Pit Logs

TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP101
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)	
Client Conway				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA		
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	DESCRIPTION
1.00	ES/B					Grass over soft dark brown slightly clayey slightly sandy gravelly silt. Gravel is angular to subrounded fine to coarse of brick, concrete, flint and rare tarmac. Frequent inclusions of orange brown slightly gravelly clay. [MADE GROUND]
					(1.50)	
					1.50	(Pit terminated at 1.5m)

Plan  Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
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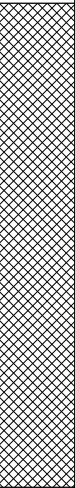
Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
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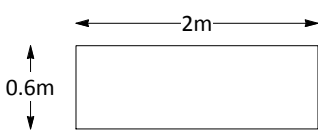
CGL TP LOG CGN03732C.GPJ GINT STD AGS 3.1 GDT 17/2/17

TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP102	
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)		
Client Conway				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA		
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	DESCRIPTION
0.80	ES/B					Grass over soft dark brown and orange brown sandy gravelly silty clay. Gravel is angular to subrounded fine to coarse of brick, concrete and flint. Rare brick and concrete cobbles. [MADE GROUND]
					(1.00)	
					1.00	(Pit terminated at 1m)

Plan  Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
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Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
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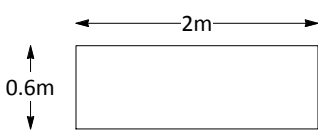
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TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP103	
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)		
Client Conway				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thickness)	DESCRIPTION
0.80	ES/B					(1.50)	Grass over soft dark orange brown silty slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, flint and concrete. Occasional brick and concrete cobbles. One concrete boulder noted. Frequent rootlets. [MADE GROUND]
						1.50	(Pit terminated at 1.5m)

Plan  Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
--	---

Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
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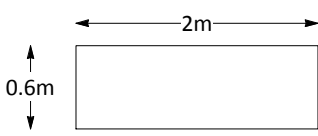
CGL TP LOG CGN03732C.GPJ GINT STD AGS 3.1 GDT 17/2/17

TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP104
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)	
Client Conway				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thickness)	DESCRIPTION
0.60	ES/B					(1.50)	Grass over soft orange brown and occasional dark grey brown gravelly silty clay. Gravel is angular to subrounded fine to coarse of brick, concrete and occasional flint. Occasional brick cobbles. One curb stone noted. Frequent rootlets and twigs. [MADE GROUND]
						1.50	(Pit terminated at 1.5m)

Plan  Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
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Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
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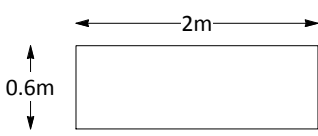
CGL TP LOG CGN03732C.GPJ GINT STD AGS 3.1 GDT 17/2/17

TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP105
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)	
Client Conway				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA		
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	DESCRIPTION
1.20	ES/B					Grass over soft dark orange brown sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of flint, brick and concrete. Occasional concrete cobbles. Rare roots. [MADE GROUND]
					(1.50)	
					1.50	(Pit terminated at 1.5m)

Plan  Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
--	---

Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
-----------------------	------------	------------------	---------------------

CGL TP LOG CGN03732C.GPJ GINT STD AGS 3.1 GDT 17/2/17

TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP107
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)	
Client Conway				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thickness)	DESCRIPTION
1.50	ES/B					(0.20) 0.20	Grass and vegetation stumps over gravelly organic silt with abundant roots. Gravel is angular to subrounded fine to coarse of flint and brick. [MADE GROUND]
						(1.80)	Loose dark brown sandy very silty angular to subrounded fine to coarse gravel and cobbles of brick, concrete, ceramic, flint and occasional plastic fragments. Occasional inclusions of orange brown silty clay. Occasional concrete boulders. [MADE GROUND]
						2.00	(Pit terminated at 2m)

Plan Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
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Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
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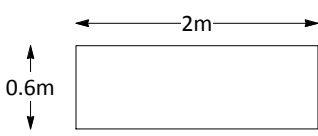
CGL TP LOG CGN03732C.GPJ GINT STD AGS 3.1 GDT 17/2/17

TRIAL PIT LOG



Project Southall access advanced works				TRIAL PIT No TP108
Job No CGN/03732C	Date 17-02-17	Ground Level (m)	Co-Ordinates (m)	
Client Conway				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA		
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	DESCRIPTION
1.20	ES/B					Dark brown gravelly organic silt with abundant roots. Gravel is angular to subrounded fine to coarse of flint, concrete and brick. [MADE GROUND]
						0.20
						(1.80)
						2.00
				(Pit terminated at 2m)		

Plan  Stability:	General Remarks 1. Trial pit excavated on the eastern side of bund 2. Samples: B = bulk disturbed sample, ES = environmental sample 3. No groundwater seepage noted during excavation 4. Hole backfilled with arisings on completion
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Method/ Plant Used	Field Crew	Logged By OJR	Checked By DRAFT
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CGL TP LOG CGN03732C.GPJ GINT STD AGS 3.1 GDT 17/2/17

APPENDIX B

Geotechnical Test Results

INDEX PROPERTIES & TRIAXIAL COMPRESSION TESTS

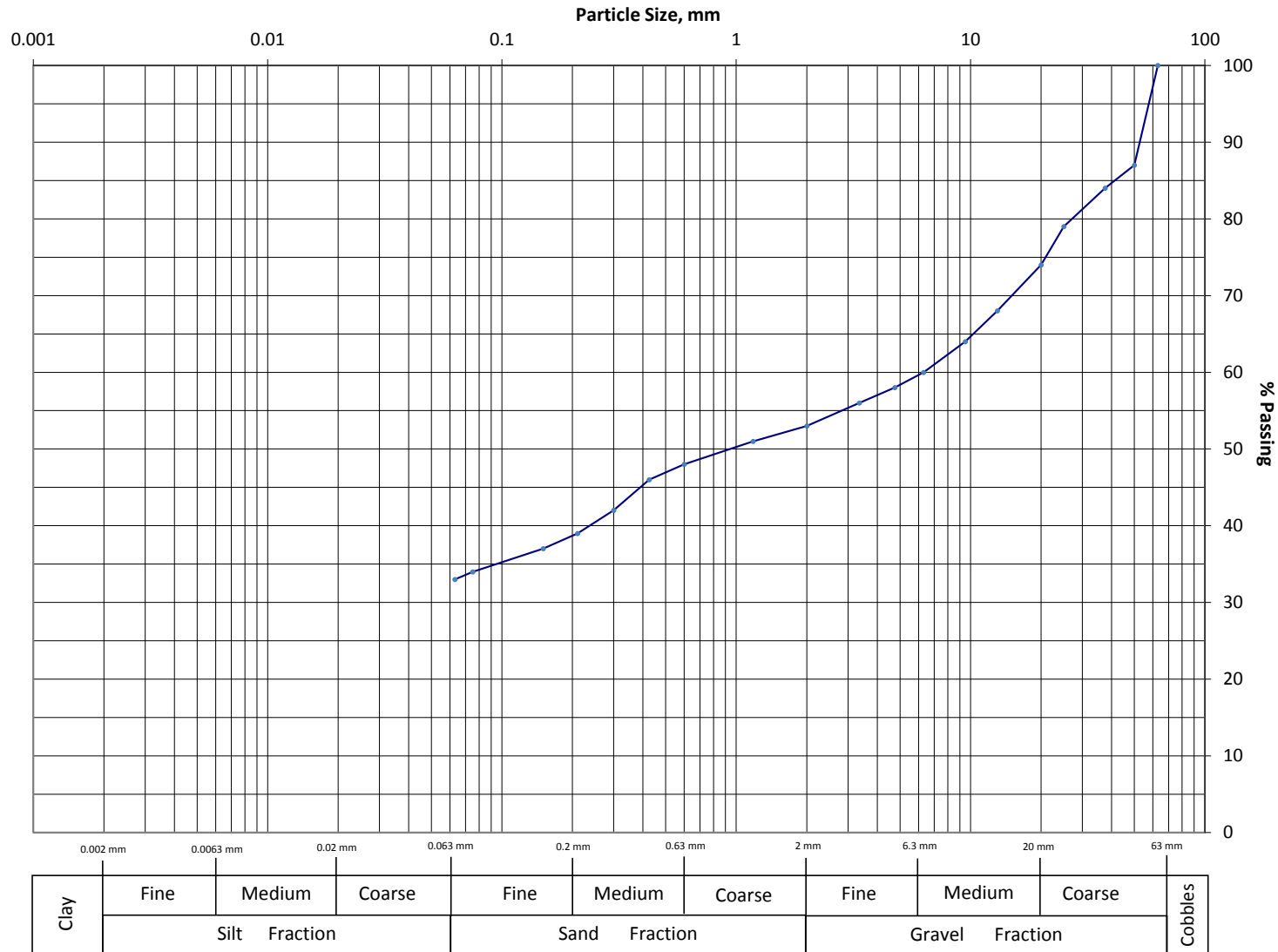
BS 1377 : Parts 2 & 7 : 1990

Report Ref	T17/1676	Contract	Southall Access Advanced Works
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TP No.	Sample		INDEX PROPERTIES						TRIAXIAL COMPRESSION							Remarks
	Depth m	Description	Liquid Limit %	Plastic Limit %	Plasticity Index %	% Passing 425micron Sieve	Corrected Plasticity Index IP %	Soil Plasticity	Code	Lateral Pressure kPa	Compressive Strength kPa	Cohesion kPa	Angle of Friction °	Bulk Density kg/cu.m	Water Content % dry wt	
101	1.00	Made ground (brown clayey sand, occasional pockets of sandy clay with gravel and cobbles including brick and concrete)													15.4	
102	0.80	Made ground (brown very sandy clay, occasional gravel including brick, ceramic tile and concrete fragments)													19.2	
103	0.80	Made ground (brown sandy clay, occasional gravel and cobbles including bricks and roots)	67	25	42	80	34	CH	U100	10 20 40	70 75 80	40		2095	30.3	
104	0.60	Made ground (brown sandy clay, occasional gravel including concrete and roots)	58	24	34	63	21	CH	U100	10 20 40	105 110 115	55		2205	25.8	
105	1.20	Made ground (brown sandy clay, occasional gravel and very occasional concrete)	55	22	33	50	17	CH	U100	10 20 40	90 105 110	50		2270	21.4	
106	1.00	Made ground (brown clay, very occasional gravel including concrete and brick fragments)	74	24	50	97	49	CV	U100	10 20 40	90 90 95	45		2105	32.2	
108	1.20	Made ground (brown clay, occasional gravel, very occasional concrete and brick fragments)	67	24	43	89	38	CH	U100	10 20 40	100 105 110	55		2130	31.1	
KEY: <i>Code:</i> 38 - 38mm nominal diameter specimen 100 - 100mm nominal diameter specimen R - Remoulded F - Functional LV - Laboratory Vane U - Undrained CD - Consolidated Drained CU - Consolidated Undrained M - Multi Stage S - Single Stage <i>Soil Type:</i> C - Clay M - Silt O - Organic NP - Non Plastic <i>Plasticity:</i> L - Low I - Intermediate H - High V - Very High E - Extremely High																

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 : Part 2 : Clauses 9.2, 9.3 : 1990 Particle Size Distribution by Wet/Dry Sieving Method



BS Test Sieve Aperture Size (mm)	Percentage Passing
75	100
63	87
50	84
37.5	79
25	74
20	68
13	64
9.5	60
6.3	58
4.75	56
3.35	53
2	51
1.18	48
0.6	46
0.425	42
0.3	39
0.21	37
0.15	34
0.075	33
0.063	33

Particle Proportions (%)	
Cobbles	0
Gravel	47
Sand	20
Silt & Clay	33

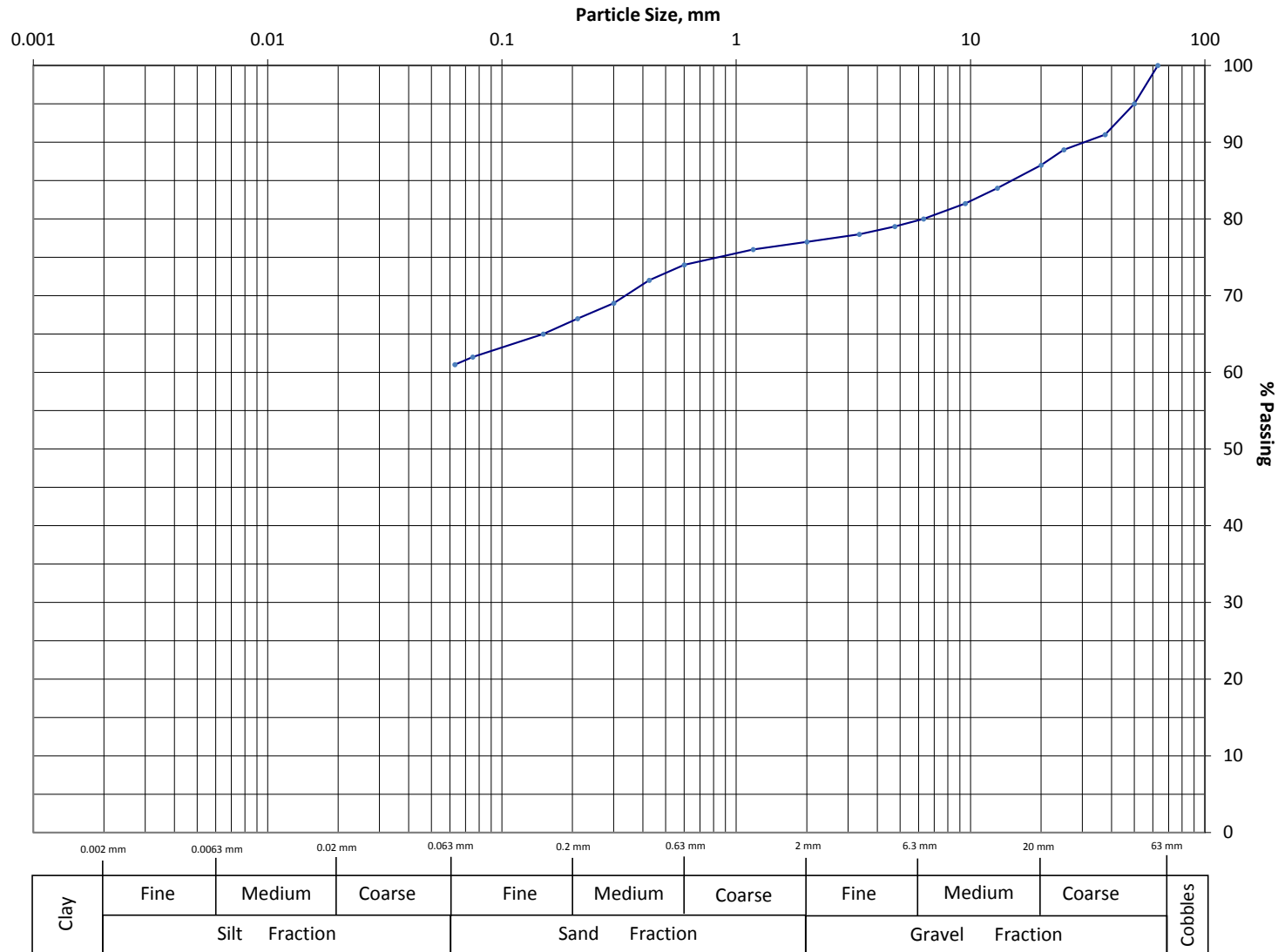
BH/TP No.	TP101	Depth, m	1.00	Report Ref	T17/1676
Visual Description	Made ground (brown clayey sand with occasional pockets of brown sandy clay with gravel including brick and concrete)			Contract	Southall Access Advanced Works



ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 : Part 2 : Clauses 9.2, 9.3 : 1990 Particle Size Distribution by Wet/Dry Sieving Method



BS Test Sieve Aperture Size (mm)	Percentage Passing
75	100
63	95
50	91
37.5	89
25	87
20	84
13	82
9.5	80
6.3	79
4.75	78
3.35	77
2	76
1.18	74
0.6	72
0.425	69
0.3	67
0.21	65
0.15	62
0.075	61
0.063	61

Particle Proportions (%)	
Cobbles	0
Gravel	23
Sand	16
Silt & Clay	61

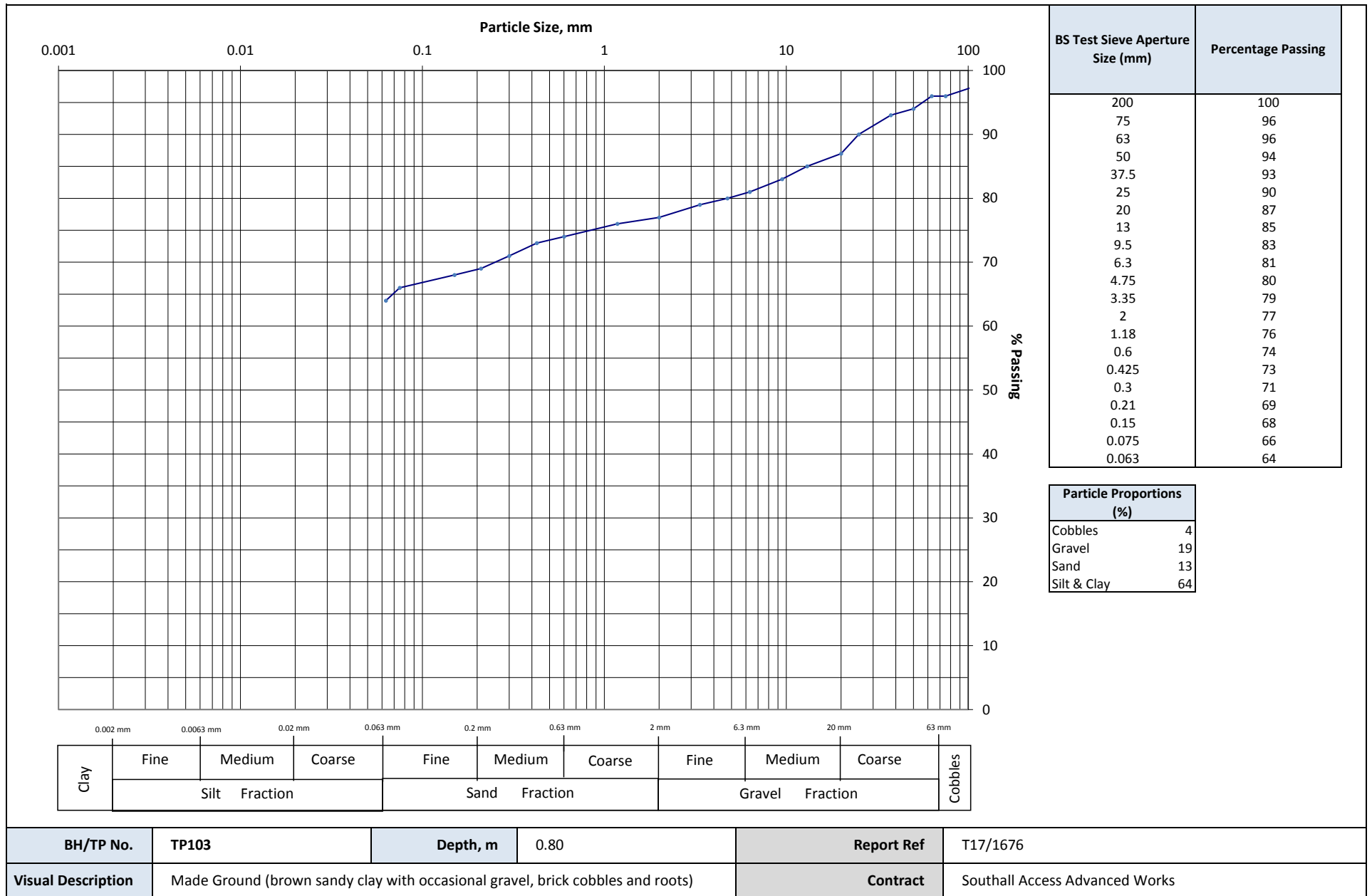
BH/TP No.	TP102	Depth, m	0.80	Report Ref	T17/1676
Visual Description	Made ground (brown very sandy clay, occasional gravel including brick, ceramic tile and concrete fragments)			Contract	Southall Access Advanced Works



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PARTICLE SIZE DISTRIBUTION TEST

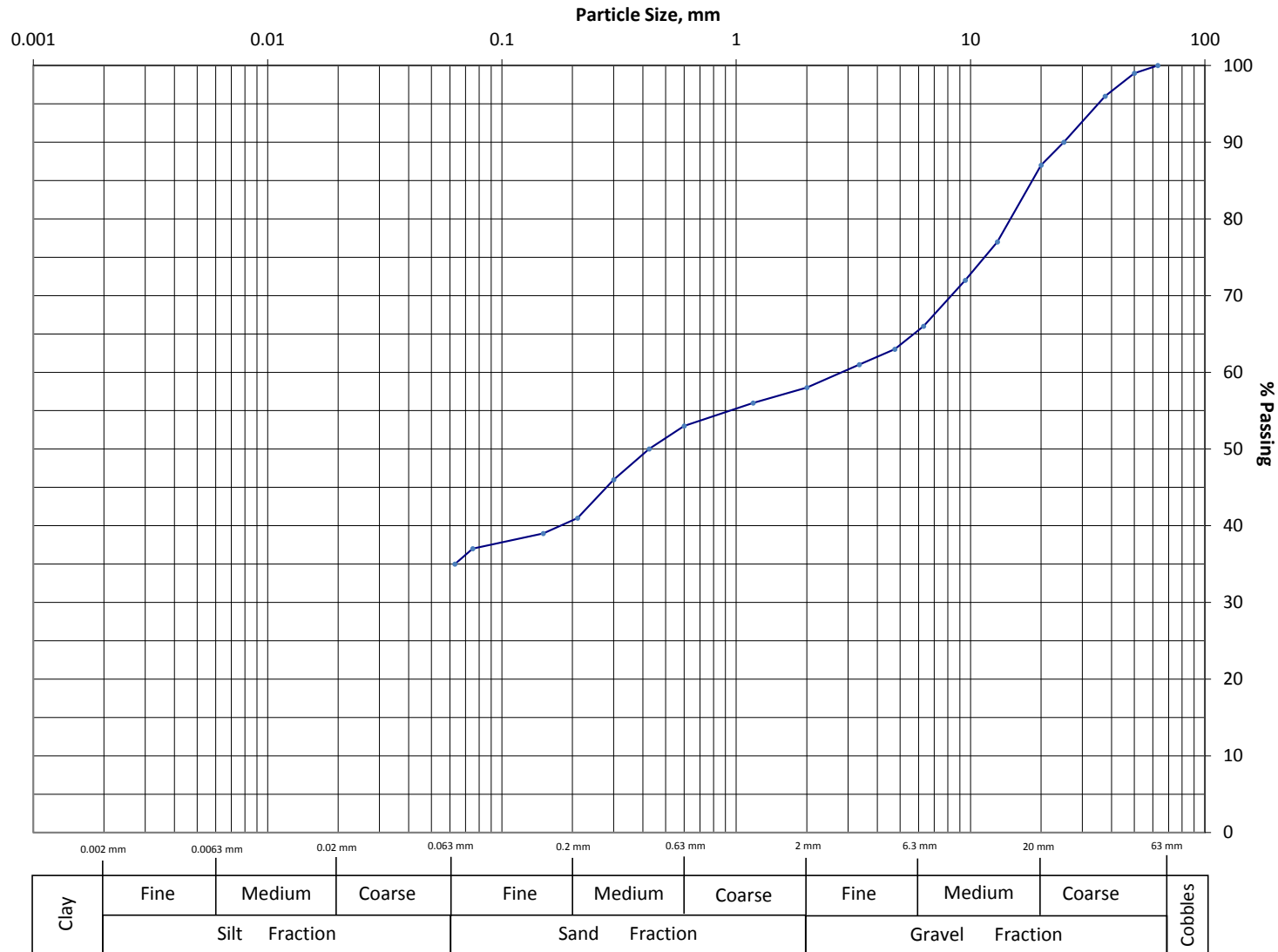
BS 1377 : Part 2 : Clauses 9.2, 9.3 : 1990 Particle Size Distribution by Wet/Dry Sieving Method



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PARTICLE SIZE DISTRIBUTION TEST

BS 1377 : Part 2 : Clauses 9.2, 9.3 : 1990 Particle Size Distribution by Wet/Dry Sieving Method



BS Test Sieve Aperture Size (mm)	Percentage Passing
75	100
63	99
50	96
37.5	90
25	87
20	77
13	72
9.5	66
6.3	63
4.75	61
3.35	58
2	56
1.18	53
0.6	50
0.425	46
0.3	41
0.21	39
0.15	37
0.075	35
0.063	35

Particle Proportions (%)	
Cobbles	0
Gravel	42
Sand	23
Silt & Clay	35

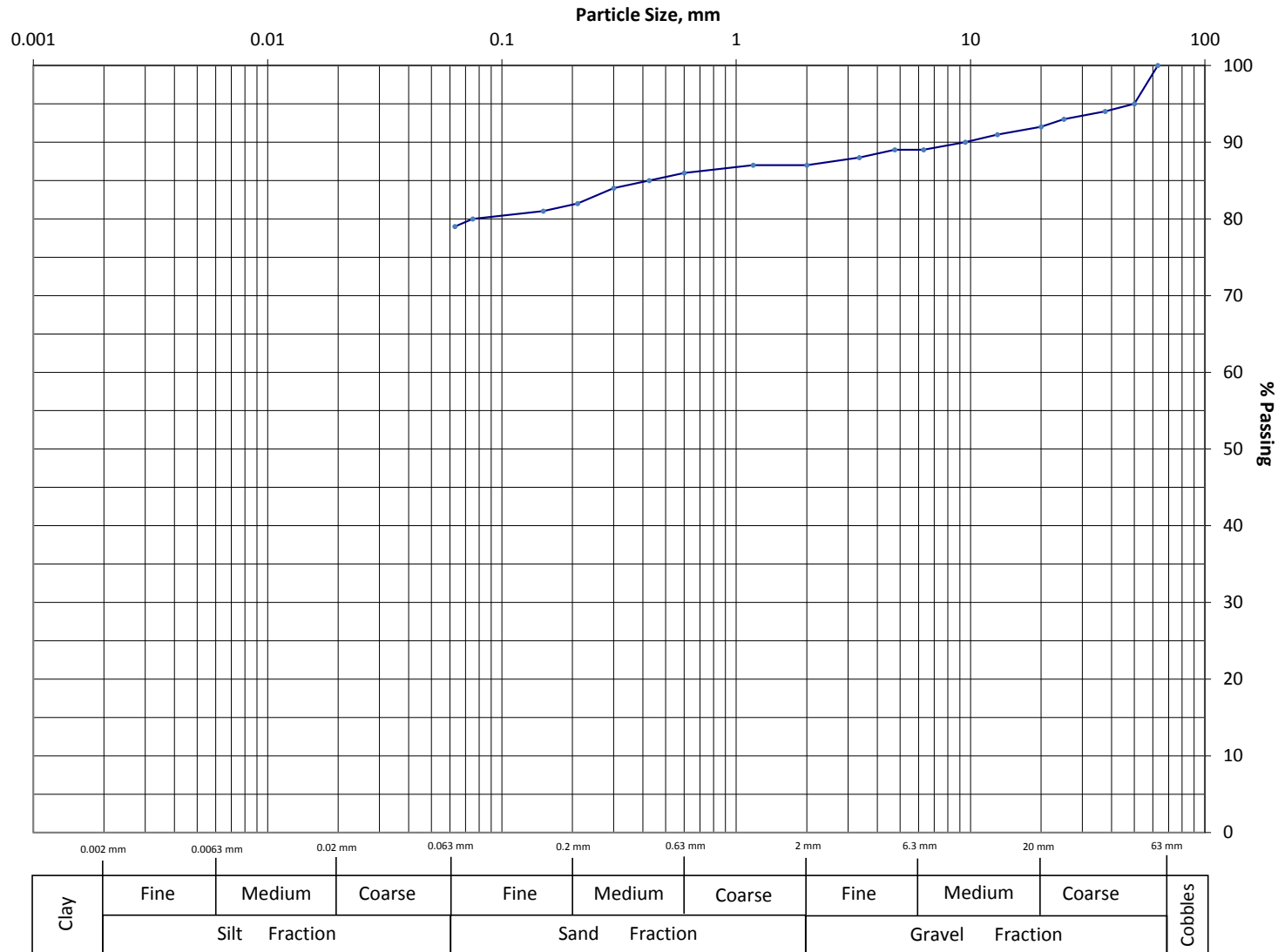
BH/TP No.	TP105	Depth, m	1.20	Report Ref	T17/1676
Visual Description	Made ground (brown sandy clay, occasional gravel and very occasional concrete)			Contract	Southall Access Advanced Works



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PARTICLE SIZE DISTRIBUTION TEST

BS 1377 : Part 2 : Clauses 9.2, 9.3 : 1990 Particle Size Distribution by Wet/Dry Sieving Method



BS Test Sieve Aperture Size (mm)	Percentage Passing
75	100
63	95
50	94
37.5	93
25	92
20	91
13	90
9.5	89
6.3	89
4.75	88
3.35	87
2	87
1.18	86
0.6	85
0.425	84
0.3	82
0.21	81
0.15	80
0.075	79
0.063	79

Particle Proportions (%)	
Cobbles	0
Gravel	13
Sand	8
Silt & Clay	79

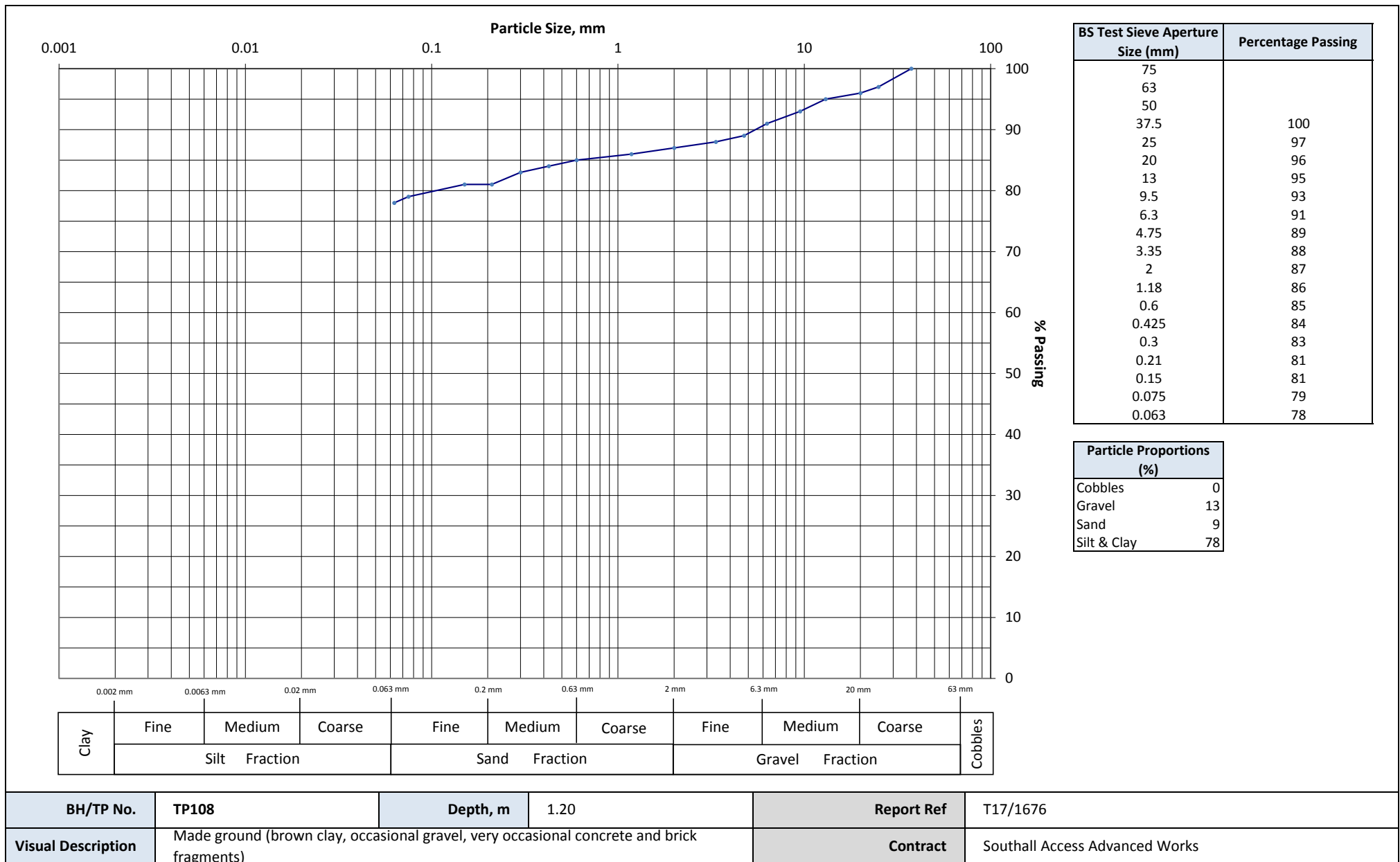
BH/TP No.	TP106	Depth, m	1.00	Report Ref	T17/1676
Visual Description	Made ground (brown clay, very occasional gravel including concrete and brick fragments)			Contract	Southall Access Advanced Works



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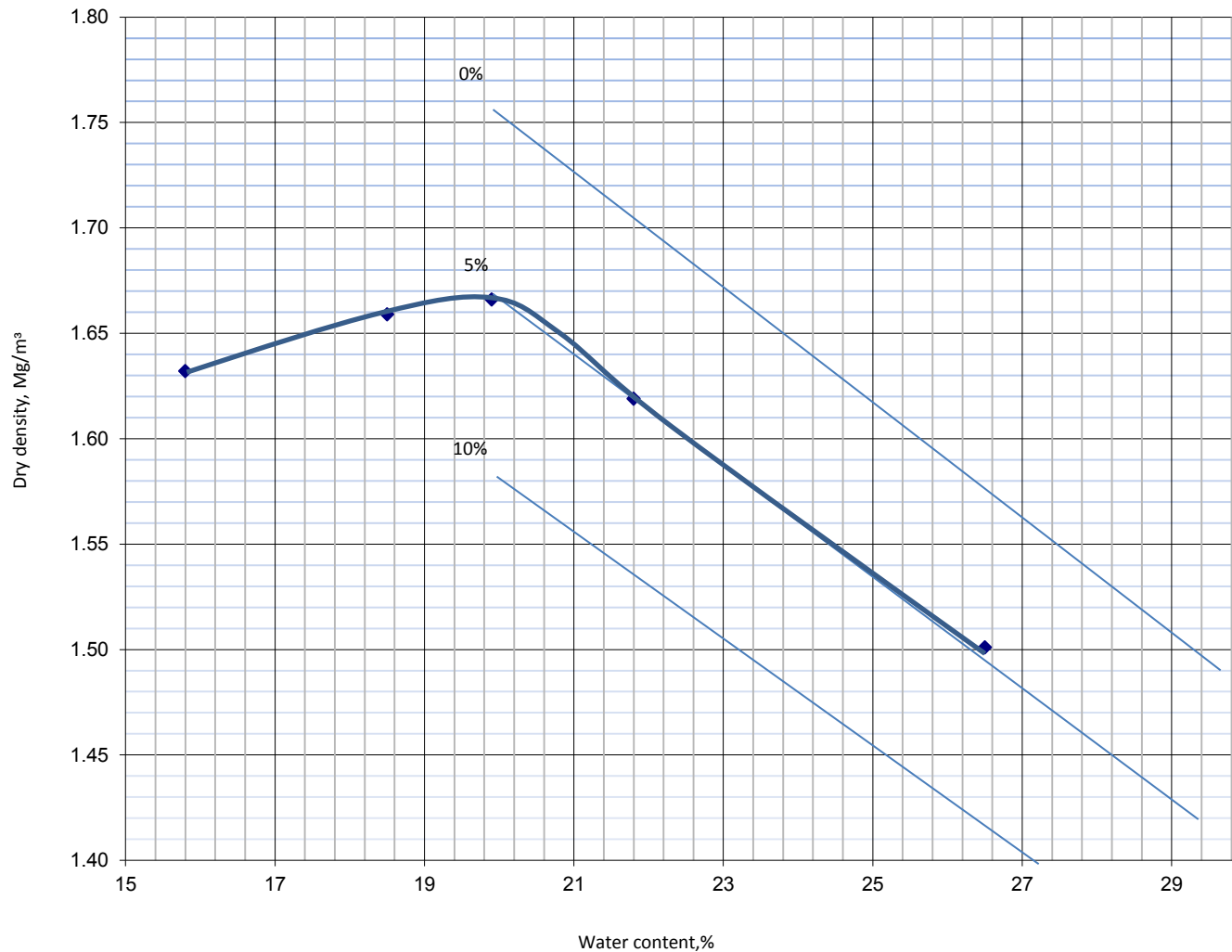
PARTICLE SIZE DISTRIBUTION TEST

BS 1377 : Part 2 : Clauses 9.2, 9.3 : 1990 Particle Size Distribution by Wet/Dry Sieving Method



ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH

Determination of dry density/moisture content relationship in accordance with BS1377 Part 4 Clause 3.6



Natural MC: 21.4%
Maximum dry density: 1.666Mg/m³
Optimum MC: 19.9%
Particle density(assumed): 2.70Mg/m³

Initial wet mass sieved: 45879g
% retained on 37.5mm:4.1
% retained on 20mm: 13.2%

Sample type: disturbed

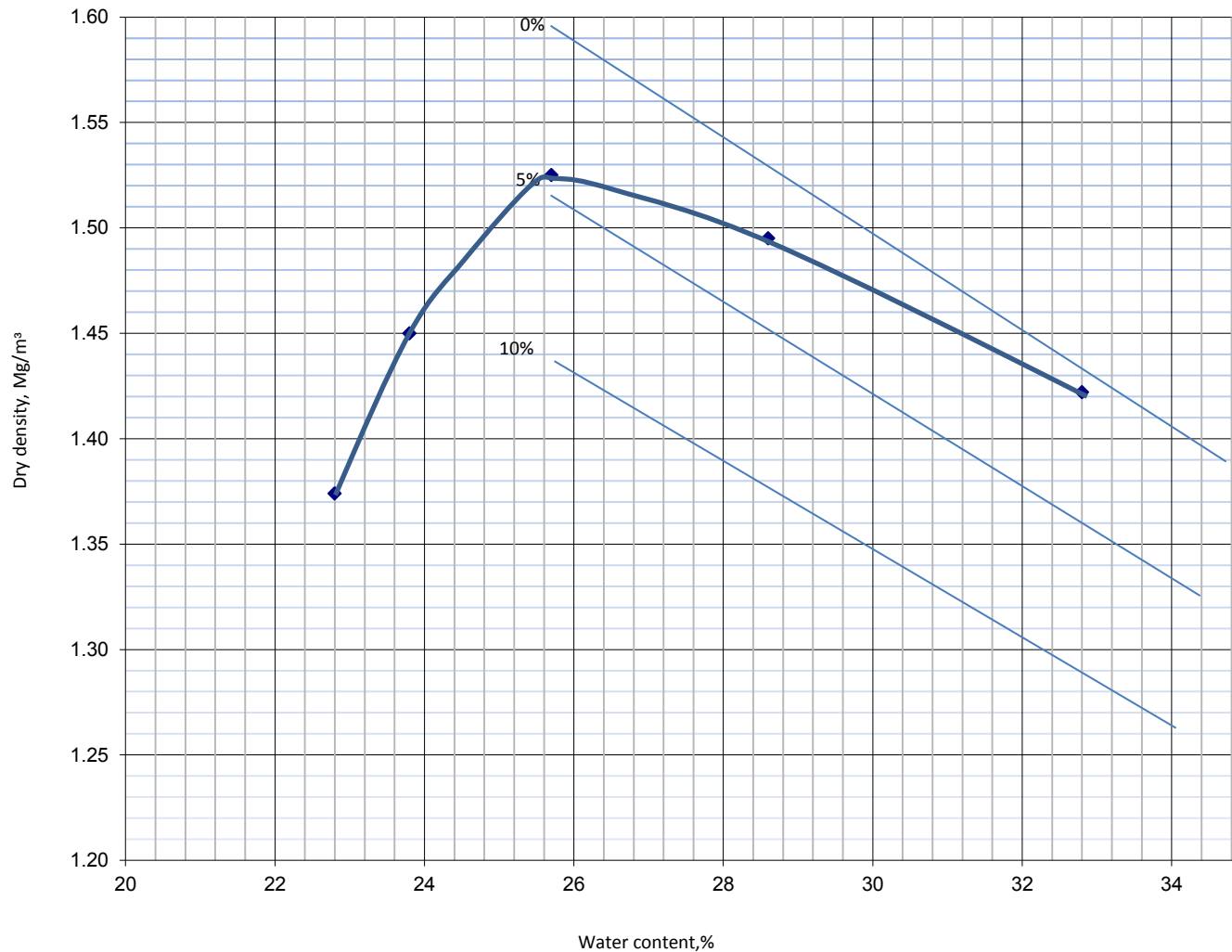
Method:
Sample prepared by passing 20mm
and 37.5mm sieve
Single sample
CBR Mould
2.5kg hammer
Drop height: 300mm
62 blows/layer
3 layers

Sample description: Made ground
(brown sandy clay with occasional
gravel and very occasional concrete)

Southall access advanced works

Sample: TP105 1.20m

Determination of dry density/moisture content relationship in accordance with BS1377 Part 4 Clause 3.6



Natural MC: 32.2%
Maximum dry density: 1.525Mg/m³
Optimum MC: 25.7%
Particle density(assumed): 2.70Mg/m³

Initial wet mass sieved: 40463g
% retained on 37.5mm:5.8%
% retained on 20mm: 7.7%

Sample type: disturbed

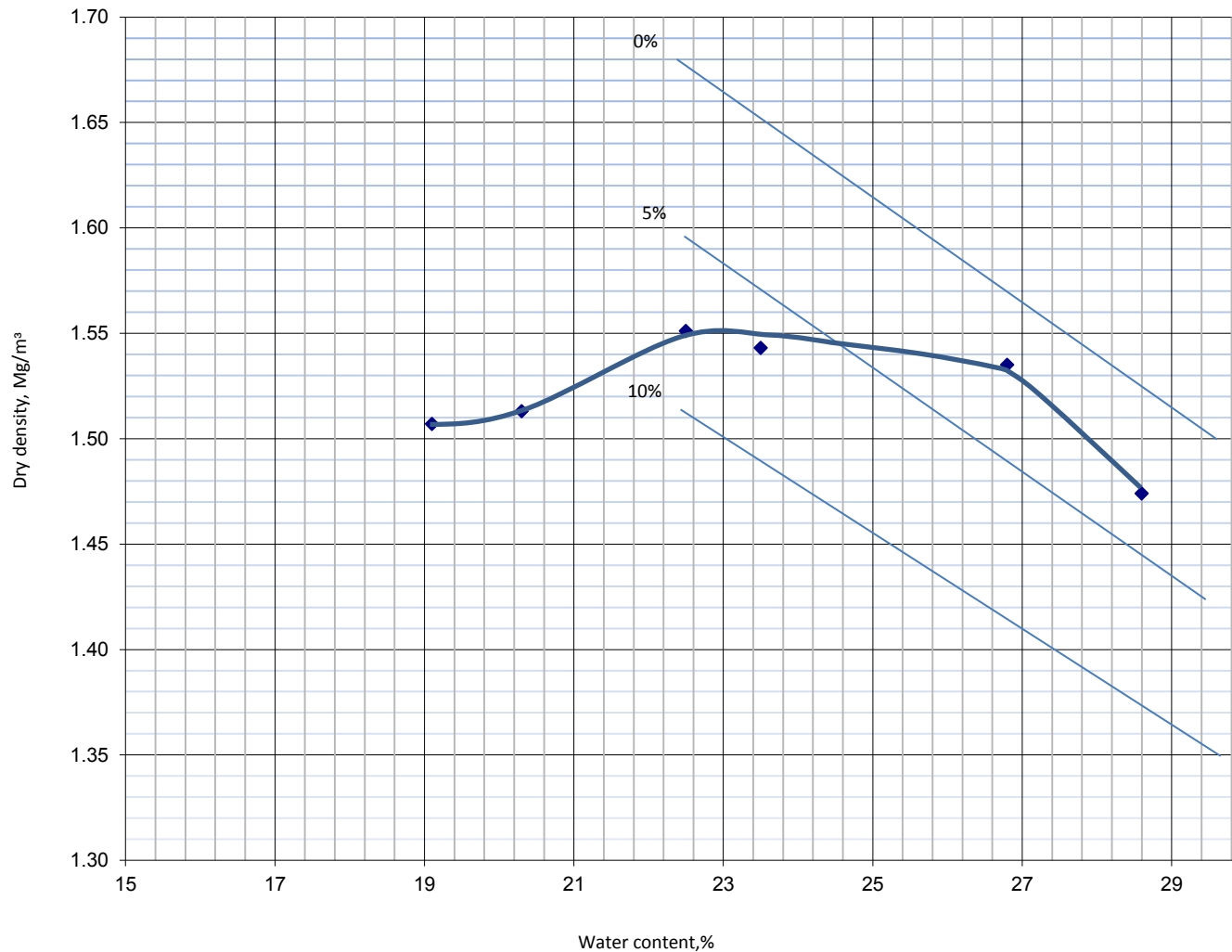
Method:
Sample prepared by passing 20mm
and 37.5mm sieve
Single sample
CBR Mould
2.5kg hammer
Drop height: 300mm
62 blows/layer
3 layers

Sample description: Made ground
(brown sandy clay with occasional
gravel and very occasional concrete
and brick)

Southall access advanced works

Sample: TP106 1.00m

Determination of dry density/moisture content relationship in accordance with BS1377 Part 4 Clause 3.6



Natural MC: 31.1%
Maximum dry density: 1.551 Mg/m^3
Optimum MC: 22.5%
Particle density(assumed): 2.70 Mg/m^3

Initial wet mass sieved: 46530g
% retained on 37.5mm: 0%
% retained on 20mm: 3.8%

Sample type: disturbed

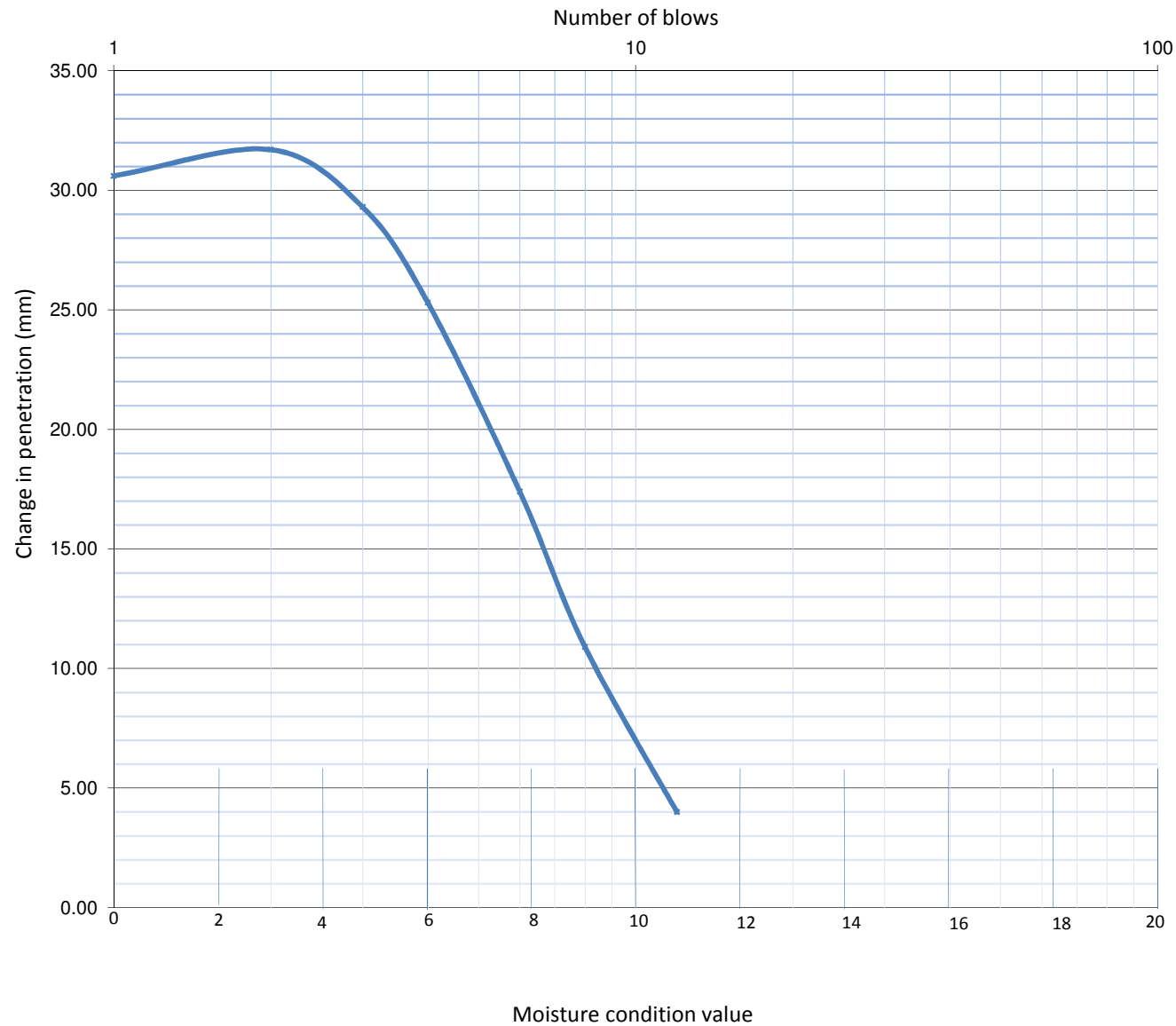
Method:
Sample prepared by passing 20mm
and 37.5mm sieve
Single sample
Proctor Mould
2.5kg hammer
Drop height: 300mm
27 blows/layer
3 layers

Sample description: Made ground
(brown sandy clay with occasional
gravel and very occasional concrete
and brick)

Southall access advanced works

Sample: TP108 1.20m

Determination of moisture condition value in accordance with BS1377 Part 4 Clause 5



Moisture content: 19.9

MCV: 10.6

Initial wet mass sieved: 45879g

% retained on 20mm: 13.2

% retained on 37.5mm: 4.1

Sample type: disturbed

Method:

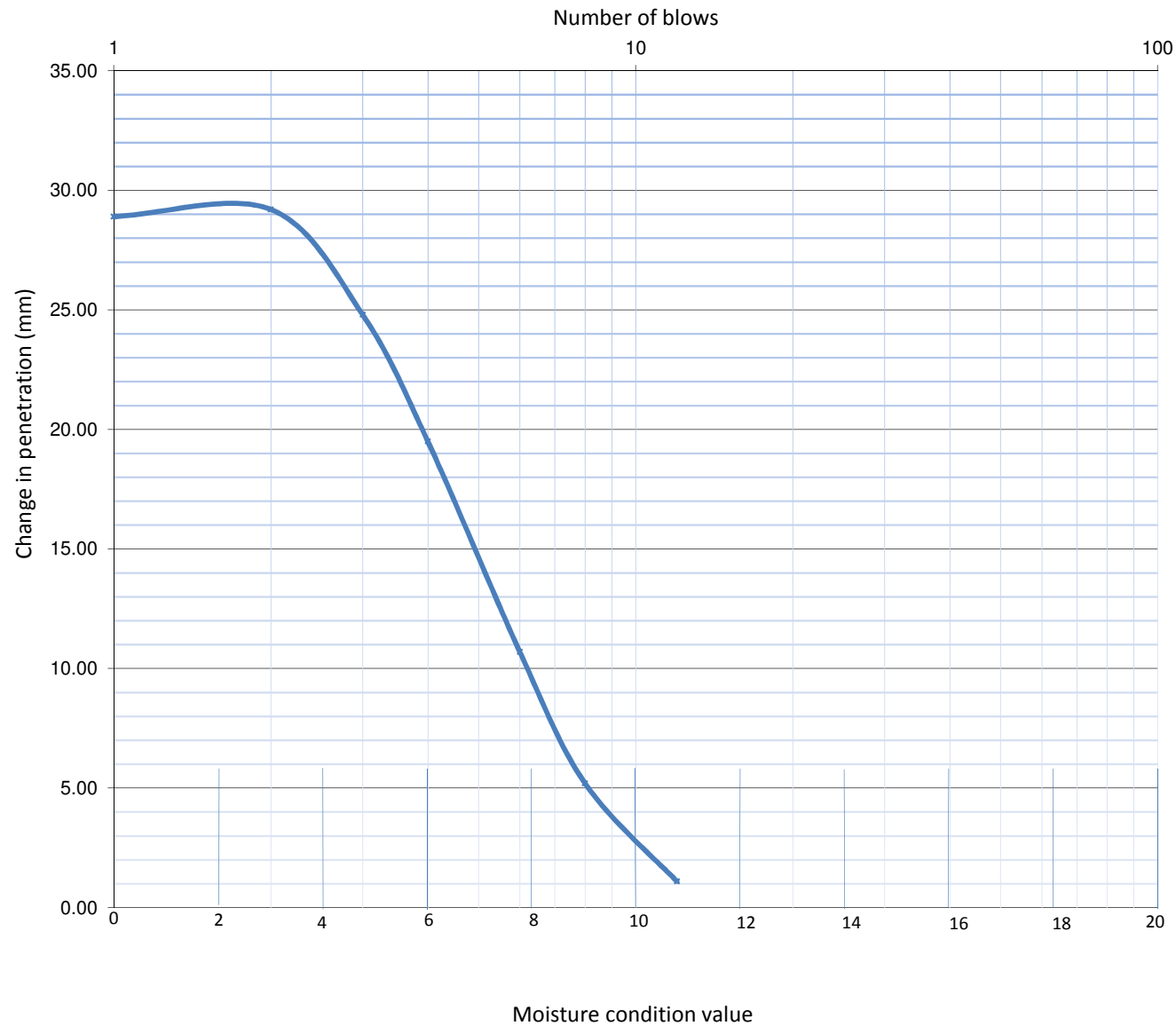
Sample prepared by passing 20mm sieve

Batch prepared

Graph interpretation: steepest line through 5mm change in penetration

Sample description: Made ground: brown sandy clay with occasional gravel and very occasional concrete

Determination of moisture condition value in accordance with BS1377 Part 4 Clause 5



Moisture content: 21.4%
MCV: 9.1

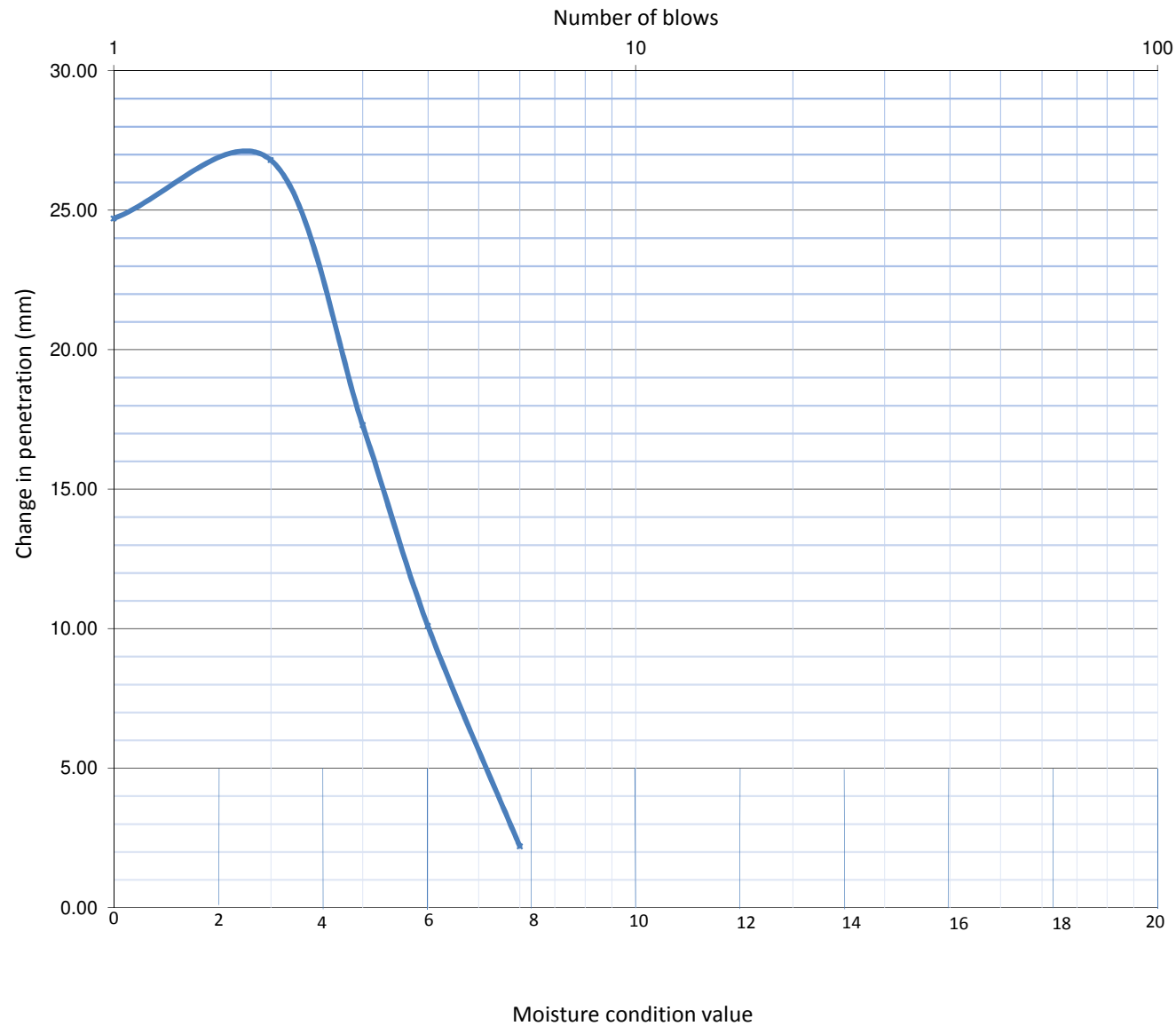
Initial wet mass sieved: 45879g
% retained on 20mm: 13.2
% retained on 37.5mm: 4.1

Sample type: disturbed

Method:
Sample prepared by passing 20mm
sieve
Batch prepared
Graph interpretation: steepest line
through 5mm change in penetration

Sample description: Made ground:
brown sandy clay with occasional
gravel and very occasional concrete

Determination of moisture condition value in accordance with BS1377 Part 4 Clause 5



Moisture content: 23.0

MCV: 7.2

Initial wet mass sieved: 45879g

% retained on 20mm: 13.2

% retained on 37.5mm: 4.1

Sample type: disturbed

Method:

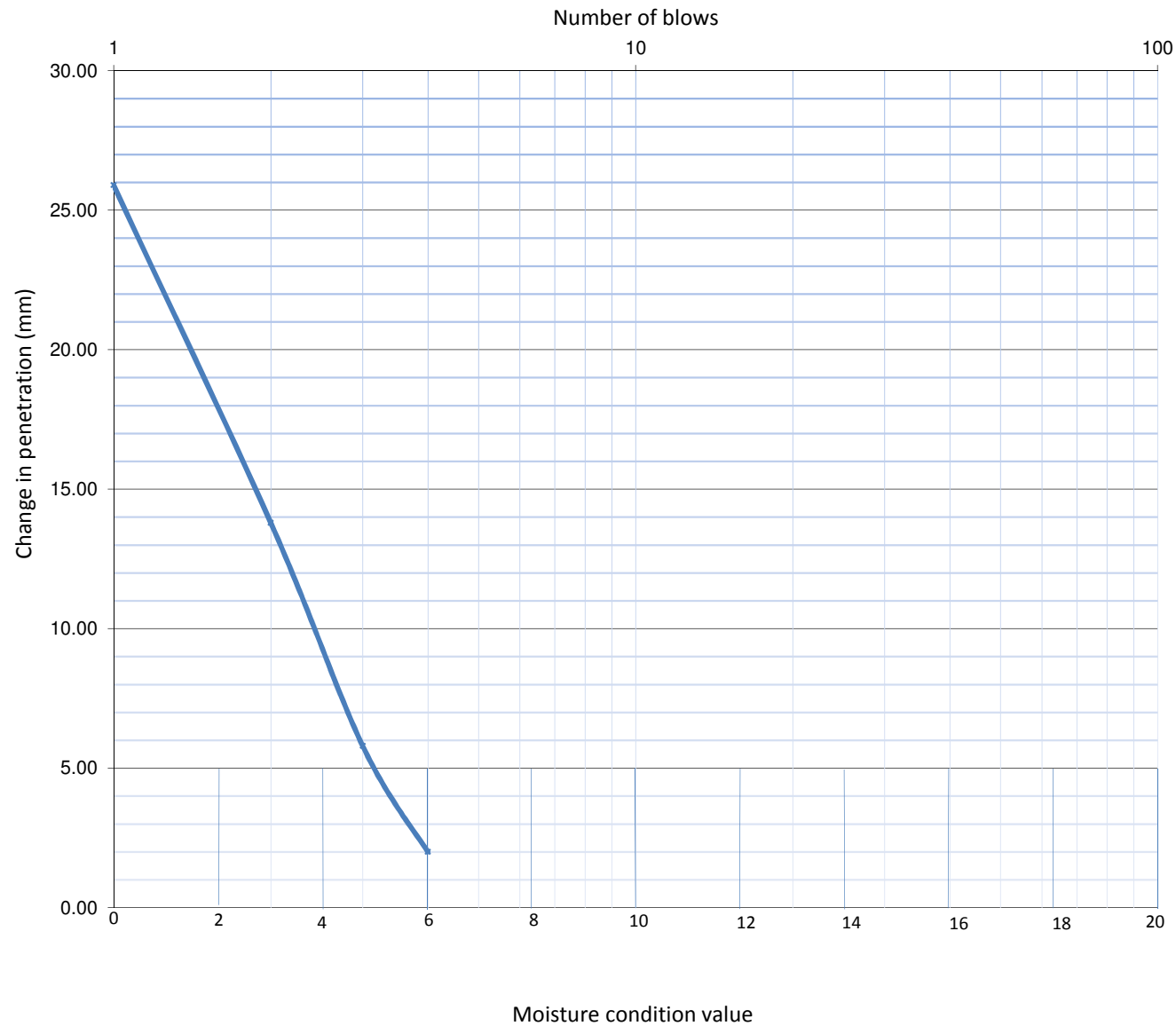
Sample prepared by passing 20mm sieve

Batch prepared

Graph interpretation: steepest line through 5mm change in penetration

Sample description: Made ground: brown sandy clay with occasional gravel and very occasional concrete

Determination of moisture condition value in accordance with BS1377 Part 4 Clause 5



Moisture content: 24.6
MCV: 5.1

Initial wet mass sieved: 45879g
% retained on 20mm: 13.2
% retained on 37.5mm: 4.1

Sample type: disturbed

Method:
Sample prepared by passing 20mm
sieve
Batch prepared
Graph interpretation: steepest line
through 5mm change in penetration

Sample description: Made ground:
brown sandy clay with occasional
gravel and very occasional concrete

Determination of moisture condition value in accordance with BS1377 Part 4 Clause 5

