

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE17469
Location: Project Otter
Contact: Ben Greenfield

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/18024	1	WBH111	0.20	3	Simon Postlewhite	11/11/2022	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	11/11/2022	Asbestos Fibres	NAD
					Simon Postlewhite	11/11/2022	Asbestos ACM	NAD
					Simon Postlewhite	11/11/2022	Asbestos Type	NAD
22/18024	1	WBH112	0.50	23	Simon Postlewhite	11/11/2022	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	11/11/2022	Asbestos Fibres	NAD
					Simon Postlewhite	11/11/2022	Asbestos ACM	NAD
					Simon Postlewhite	11/11/2022	Asbestos Type	NAD
22/18024	4	WBH113	0.80	89	Catherine Coles	11/11/2022	General Description (Bulk Analysis)	sand/stone
					Catherine Coles	11/11/2022	Asbestos Fibres	NAD
					Catherine Coles	11/11/2022	Asbestos ACM	NAD
					Catherine Coles	11/11/2022	Asbestos Type	NAD
22/18024	5	WBH114	0.50	132	Catherine Coles	11/11/2022	General Description (Bulk Analysis)	soil, stone
					Catherine Coles	11/11/2022	Asbestos Fibres	NAD
					Catherine Coles	11/11/2022	Asbestos ACM	NAD
					Catherine Coles	11/11/2022	Asbestos Type	NAD
22/18024	5	WBH114	1.50	138	Catherine Coles	11/11/2022	General Description (Bulk Analysis)	sand/stone
					Catherine Coles	11/11/2022	Asbestos Fibres	NAD
					Catherine Coles	11/11/2022	Asbestos ACM	NAD
					Catherine Coles	11/11/2022	Asbestos Type	NAD
22/18024	8	WBH115	0.80	201	Charlotte Taylor	22/11/2022	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	22/11/2022	Asbestos Fibres	NAD
					Charlotte Taylor	22/11/2022	Asbestos ACM	NAD
					Charlotte Taylor	22/11/2022	Asbestos Type	NAD
22/18024	8	WBH115	1.30	207	Charlotte Taylor	22/11/2022	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	22/11/2022	Asbestos Fibres	NAD
					Charlotte Taylor	22/11/2022	Asbestos ACM	NAD
					Charlotte Taylor	22/11/2022	Asbestos Type	NAD
22/18024	10	WBH116	0.50	249	Emma Woodward	25/11/2022	General Description (Bulk Analysis)	Brown soil stone
					Emma Woodward	25/11/2022	Asbestos Fibres	NAD
					Emma Woodward	25/11/2022	Asbestos ACM	NAD
					Emma Woodward	25/11/2022	Asbestos Type	NAD

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22/18024	10	WBH116	3.00	264	Matthew Turner	25/11/2022	General Description (Bulk Analysis)	Brown soil/Stone
					Matthew Turner	25/11/2022	Asbestos Fibres	NAD
					Matthew Turner	25/11/2022	Asbestos ACM	NAD
					Matthew Turner	25/11/2022	Asbestos Type	NAD
22/18024	12	WBH101	0.60	285	Emma Woodward	28/11/2022	General Description (Bulk Analysis)	Brown soil stone
					Emma Woodward	28/11/2022	Asbestos Fibres	Trace Asbestos
					Emma Woodward	28/11/2022	Asbestos ACM	NAD
					Emma Woodward	28/11/2022	Asbestos Type	Chrysotile
22/18024	13	WBH106	0.15	342	Charlotte Taylor	29/11/2022	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	29/11/2022	Asbestos Fibres	NAD
					Charlotte Taylor	29/11/2022	Asbestos ACM	NAD
					Charlotte Taylor	29/11/2022	Asbestos Type	NAD
22/18024	13	WBH106	1.60	348	Charlotte Taylor	29/11/2022	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	29/11/2022	Asbestos Fibres	NAD
					Charlotte Taylor	29/11/2022	Asbestos ACM	NAD
					Charlotte Taylor	29/11/2022	Asbestos Type	NAD
22/18024	14	WBH103	1.60	375	Charlotte Taylor	01/12/2022	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	01/12/2022	Asbestos Fibres	Free Fibres
					Charlotte Taylor	01/12/2022	Asbestos ACM	Bitumen Products
					Charlotte Taylor	01/12/2022	Asbestos Type	Chrysotile
22/18024	15	WBH105	1.30	420	Matthew Turner	06/12/2022	General Description (Bulk Analysis)	Grey soil/Stone
					Matthew Turner	06/12/2022	Asbestos Fibres	NAD
					Matthew Turner	06/12/2022	Asbestos ACM	NAD
					Matthew Turner	06/12/2022	Asbestos Type	NAD
22/18024	15	WBH105	4.00	438	Matthew Turner	06/12/2022	General Description (Bulk Analysis)	Grey soil/Stone
					Matthew Turner	06/12/2022	Asbestos Fibres	Fibre Bundles
					Matthew Turner	06/12/2022	Asbestos ACM	NAD
					Matthew Turner	06/12/2022	Asbestos Type	Chrysotile
22/18024	16	WBH102	1.00	474	Anthony Carman	01/12/2022	General Description (Bulk Analysis)	Brown Soil/Stones
					Anthony Carman	01/12/2022	Asbestos Fibres	NAD
					Anthony Carman	01/12/2022	Asbestos ACM	NAD
					Anthony Carman	01/12/2022	Asbestos Type	NAD
22/18024	17	WBH107	1.50	516	Anthony Carman	01/12/2022	General Description (Bulk Analysis)	Brown Soil/Stones
					Anthony Carman	01/12/2022	Asbestos Fibres	Fibre Bundles
					Anthony Carman	01/12/2022	Asbestos ACM	NAD
					Anthony Carman	01/12/2022	Asbestos Type	Chrysotile
22/18024	18	WBH108	1.50	547	Catherine Coles	01/12/2022	General Description (Bulk Analysis)	soil,stone
					Catherine Coles	01/12/2022	Asbestos Fibres	NAD
					Catherine Coles	01/12/2022	Asbestos ACM	NAD
					Catherine Coles	01/12/2022	Asbestos Type	NAD
22/18024	18	WBH104	1.00	572	Catherine Coles	01/12/2022	General Description (Bulk Analysis)	soil,stone
					Catherine Coles	01/12/2022	Asbestos Fibres	Fibre Bundles
					Catherine Coles	01/12/2022	Asbestos Fibres (2)	Fibre Bundles

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EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/18024	18	WBH104	1.00	572	Catherine Coles	01/12/2022	Asbestos ACM	NAD
					Catherine Coles	01/12/2022	Asbestos ACM (2)	NAD
					Catherine Coles	01/12/2022	Asbestos Type	Chrysotile
					Catherine Coles	01/12/2022	Asbestos Type (2)	Amosite
22/18024	18	WBH104	3.70	584	Catherine Coles	01/12/2022	General Description (Bulk Analysis)	soil,stone
					Catherine Coles	01/12/2022	Asbestos Fibres	NAD
					Catherine Coles	01/12/2022	Asbestos ACM	NAD
					Catherine Coles	01/12/2022	Asbestos Type	NAD
22/18024	18	WBH104	14.0	620	Catherine Coles	01/12/2022	General Description (Bulk Analysis)	soil,stone
					Catherine Coles	01/12/2022	Asbestos Fibres	NAD
					Catherine Coles	01/12/2022	Asbestos ACM	NAD
					Catherine Coles	01/12/2022	Asbestos Type	NAD
22/18024	19	WBH109	0.80	629	Simon Postlewhite	06/12/2022	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	06/12/2022	Asbestos Fibres	NAD
					Simon Postlewhite	06/12/2022	Asbestos ACM	NAD
					Simon Postlewhite	06/12/2022	Asbestos Type	NAD
22/18024	19	WBH109	3.00	641	Simon Postlewhite	06/12/2022	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	06/12/2022	Asbestos Fibres	NAD
					Simon Postlewhite	06/12/2022	Asbestos ACM	NAD
					Simon Postlewhite	06/12/2022	Asbestos Type	NAD
22/18024	19	WBH109	7.00	653	Simon Postlewhite	06/12/2022	General Description (Bulk Analysis)	Brown soil/stones
					Simon Postlewhite	06/12/2022	Asbestos Fibres	NAD
					Simon Postlewhite	06/12/2022	Asbestos ACM	NAD
					Simon Postlewhite	06/12/2022	Asbestos Type	NAD
22/18024	20	WBH110	0.80	670	Catherine Coles	14/12/2022	General Description (Bulk Analysis)	soil,stone
					Catherine Coles	14/12/2022	Asbestos Fibres	NAD
					Catherine Coles	14/12/2022	Asbestos ACM	NAD
					Catherine Coles	14/12/2022	Asbestos Type	NAD
22/18024	20	WBH110	2.10	680	Catherine Coles	14/12/2022	General Description (Bulk Analysis)	white loose soil,stone
					Catherine Coles	14/12/2022	Asbestos Fibres	NAD
					Catherine Coles	14/12/2022	Asbestos ACM	NAD
					Catherine Coles	14/12/2022	Asbestos Type	NAD

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Matrix : Liquid

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/18024

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x3 Dilution
AB	x5 Dilution
AC	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 22/18024

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes

EMT Job No: 22/18024

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details				
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

EMT Job No: 22/18024

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.			AD	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			

EMT Job No: 22/18024

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

EMT Job No: 22/18024

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM77	Modified DDCEN/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.				

EMT Job No: 22/18024

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM170	Determination of Trace Metals by ICP-MS (Inductively Coupled Plasma – Mass Spectrometry): Modified USEPA Method 200.8, Rev. 5.4, 1994; Modified EPA Method 6020A, Rev.1, Feb 2007; Modified BS EN ISO 17294-2:2016	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

APPENDIX 5 – Geotechnical Testing Results



3

LABORATORY REPORT



4043

Contract Number: PSL22/7581

Report Date: 16 December 2022
Client's Reference: WIE17469-WBH101
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Michael Berry

Contract Title: Project Otter
Date Received: 28/11/2022
Date Commenced: 28/11/2022
Date Completed: 16/12/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Senior Technician)

S Eyre
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WBH101		B	0.20		Brown very gravelly very sandy CLAY.
WBH101		B	0.40		Brown gravelly very sandy CLAY.
WBH101		U	2.50		Stiff light brown sandy CLAY.
WBH101		D	3.50		Light brown slightly gravelly sandy CLAY.
WBH101		U	4.50		Brown mottled grey slightly gravelly slightly sandy CLAY.
WBH101		U	7.50		Stiff brown mottled grey CLAY.
WBH101		U	16.50		Very stiff brown mottled grey CLAY.
WBH101		D	17.00		Brown mottled grey CLAY.
WBH101		U	28.50		Very stiff brown mottled grey CLAY.



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Client Ref:

WIE17469

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



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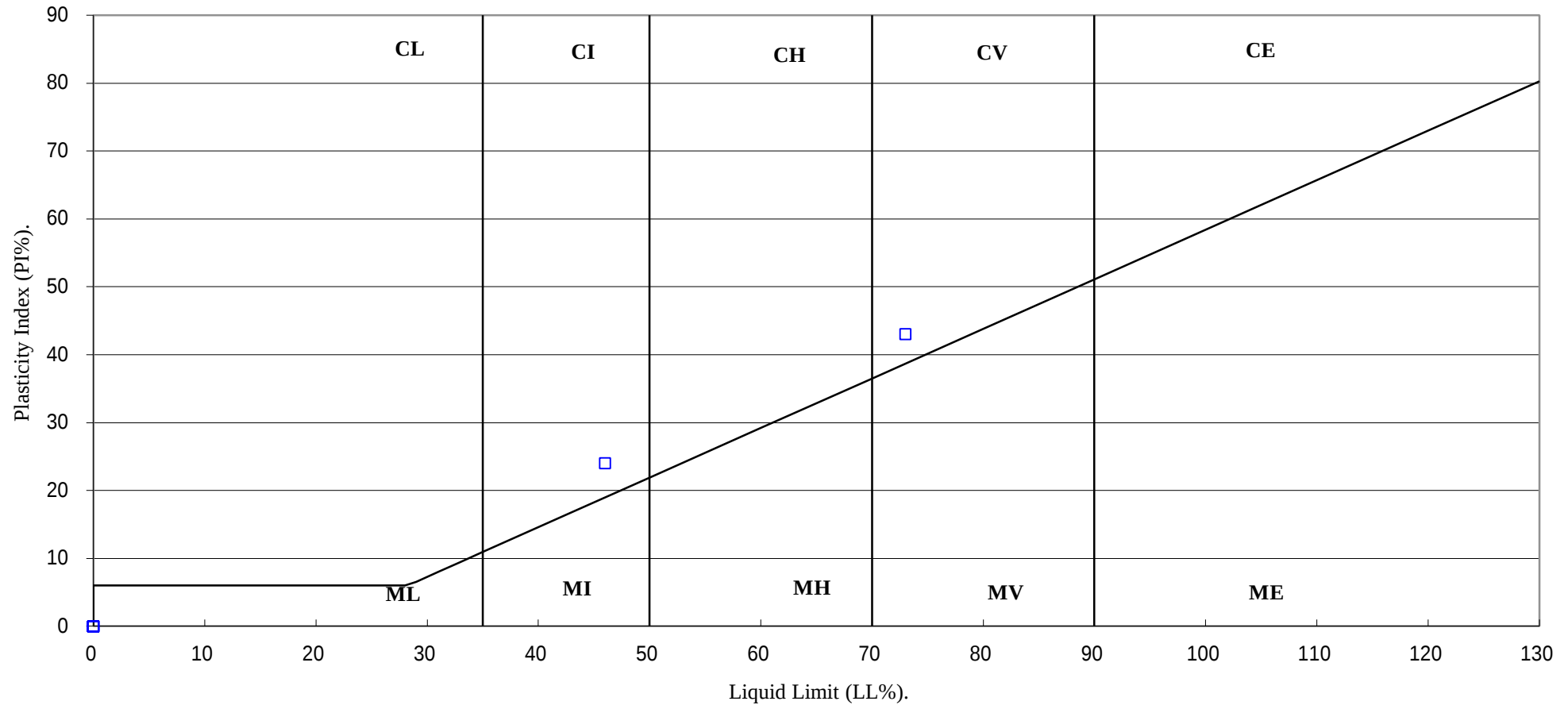
Contract No:

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PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH101

Top Depth (m):

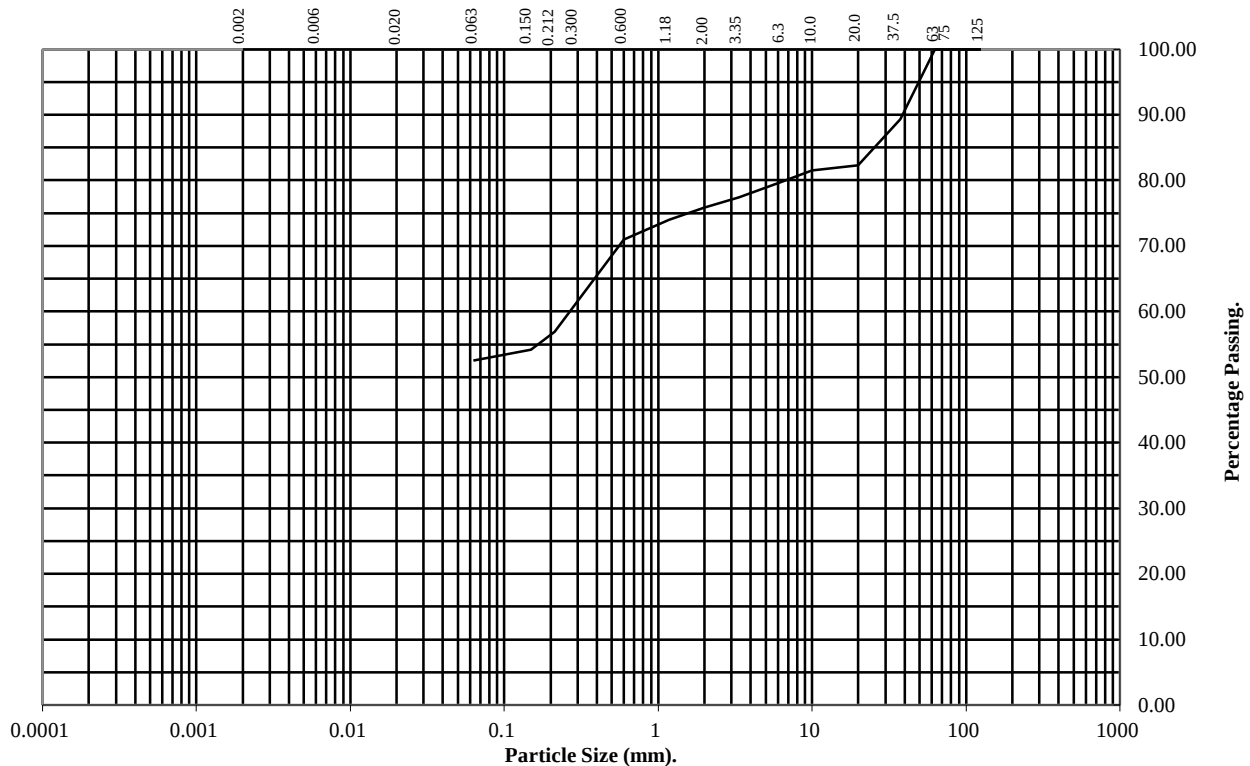
0.20

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	89
20	82
10	82
6.3	80
3.35	77
2	76
1.18	74
0.6	71
0.3	62
0.212	57
0.15	54
0.063	53

Soil Fraction	Total Percentage
Cobbles	0
Gravel	24
Sand	23
Silt/Clay	53

Remarks:

See Summary of Soil Descriptions



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Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

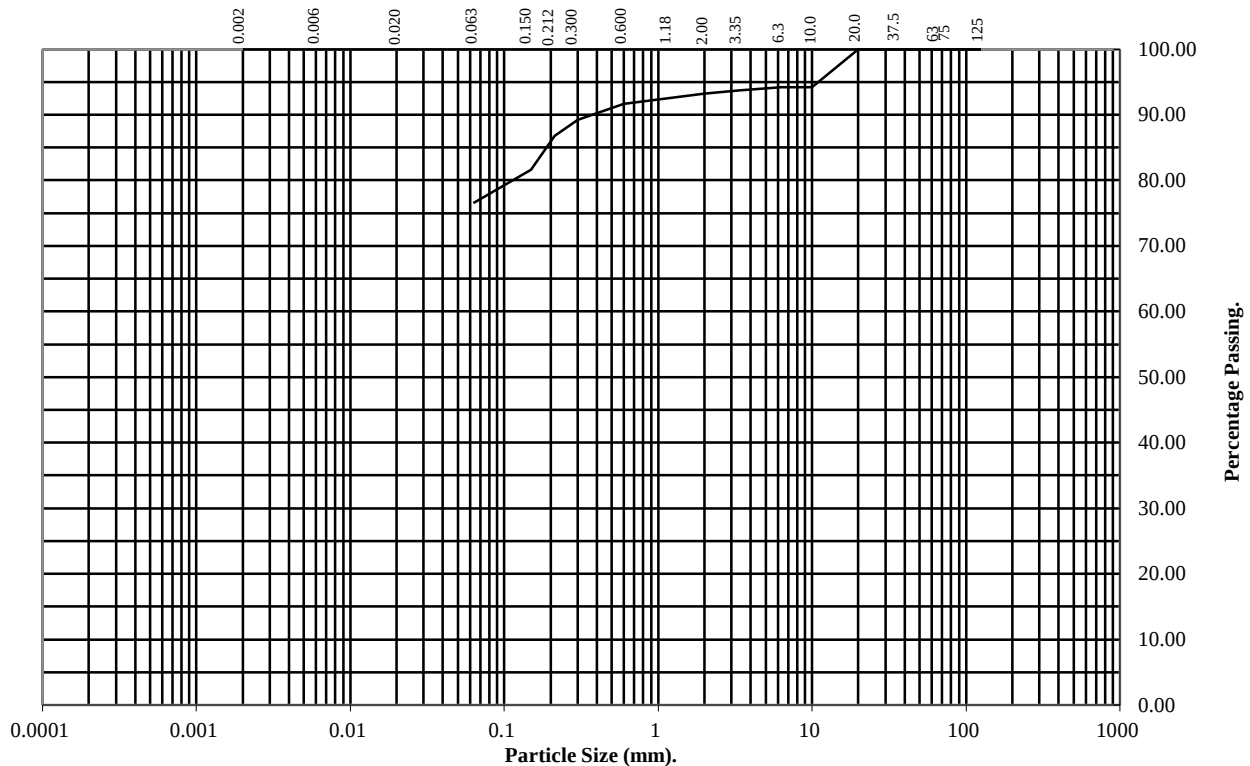
Hole Number: WBH101

Top Depth (m): 3.50

Sample Number:

Base Depth(m):

Sample Type: D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	94
6.3	94
3.35	94
2	93
1.18	92
0.6	92
0.3	89
0.212	87
0.15	82
0.063	77

Soil Fraction	Total Percentage
Cobbles	0
Gravel	7
Sand	16
Silt/Clay	77

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

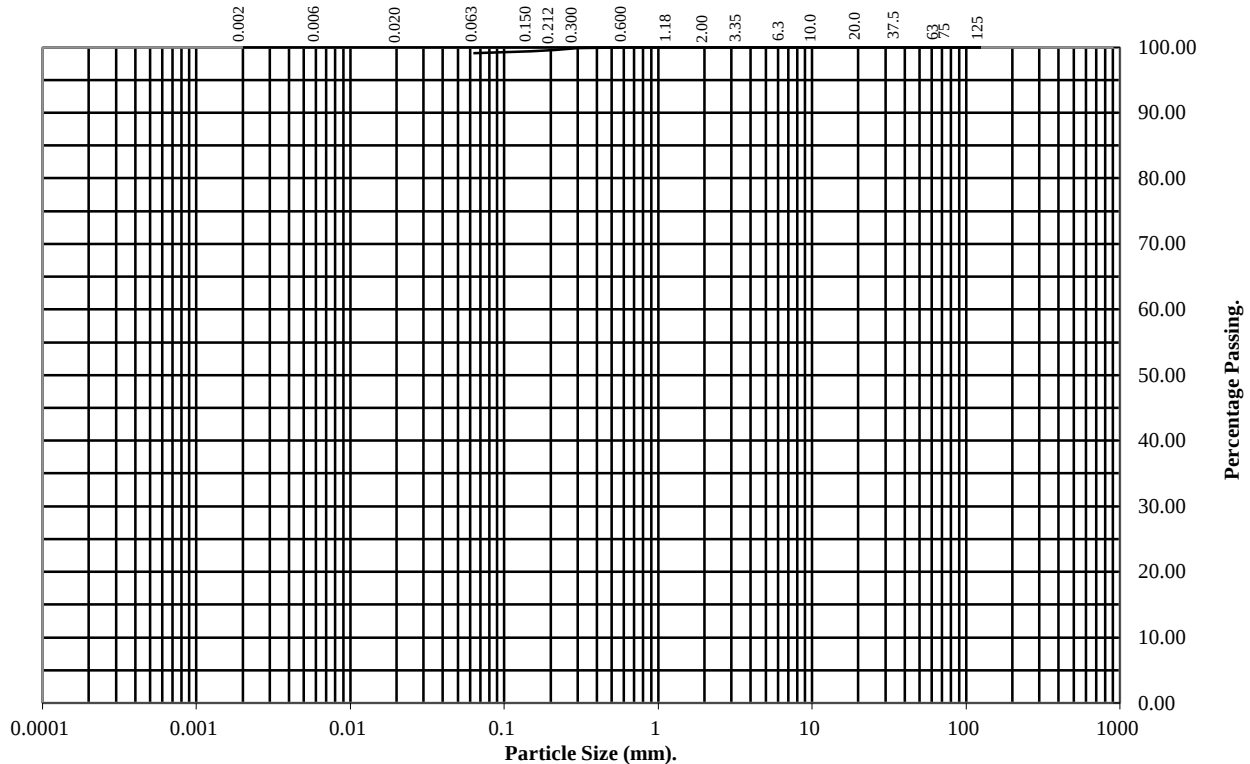
Hole Number: WBH101

Top Depth (m): 17.00

Sample Number:

Base Depth(m):

Sample Type: D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	100
0.212	100
0.15	99
0.063	99

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	1
Silt/Clay	99

Remarks:

See Summary of Soil Descriptions



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Contract No:
PSL22/7581
Client Ref:
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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

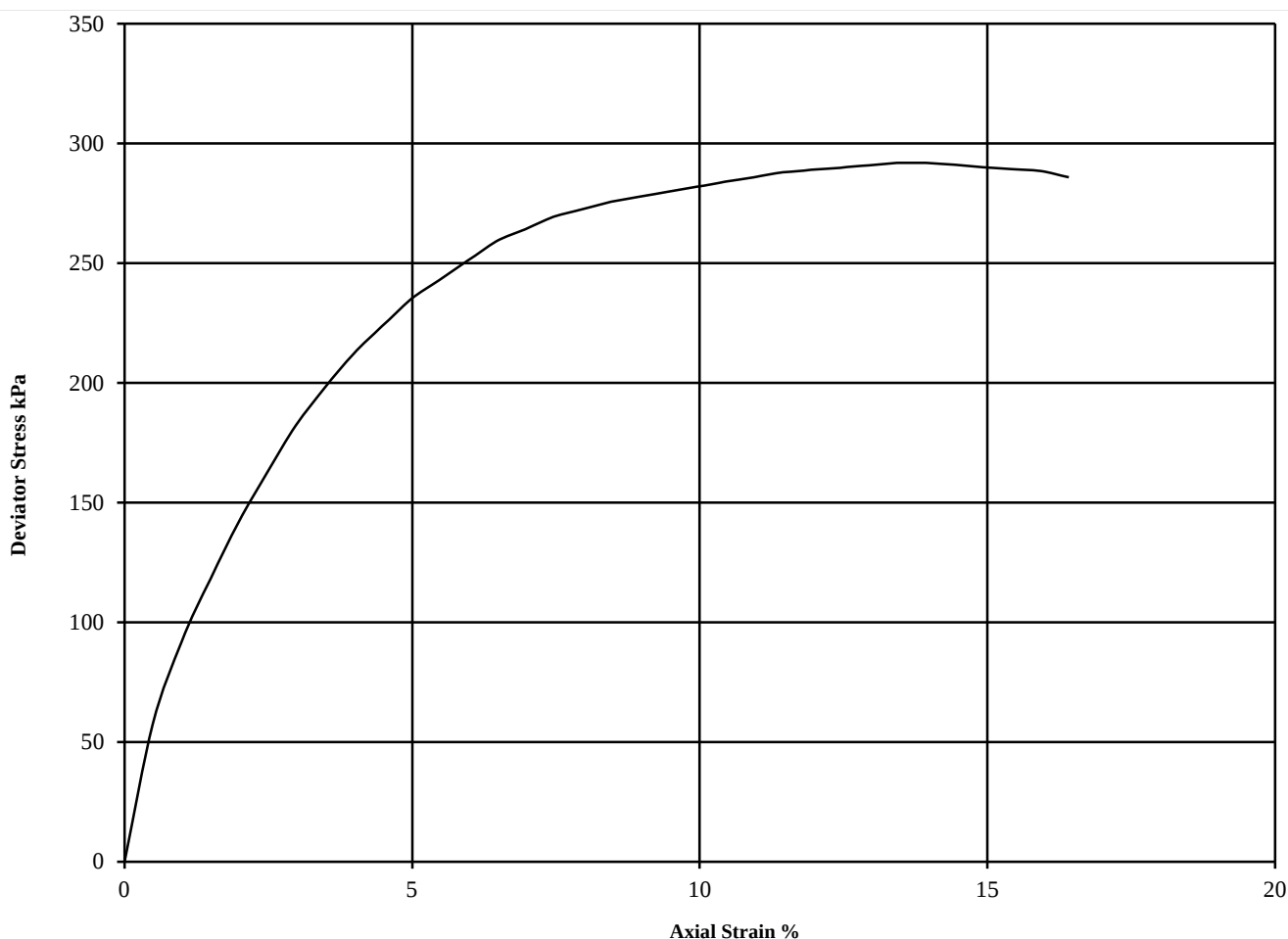
Hole Number: WBH101

Top Depth (m): 2.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
					$\frac{1}{2}(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	24	1.97	1.59	50	292	146	13.9	Brittle	



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Project Otter

Contract No:

PSL22/7581

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

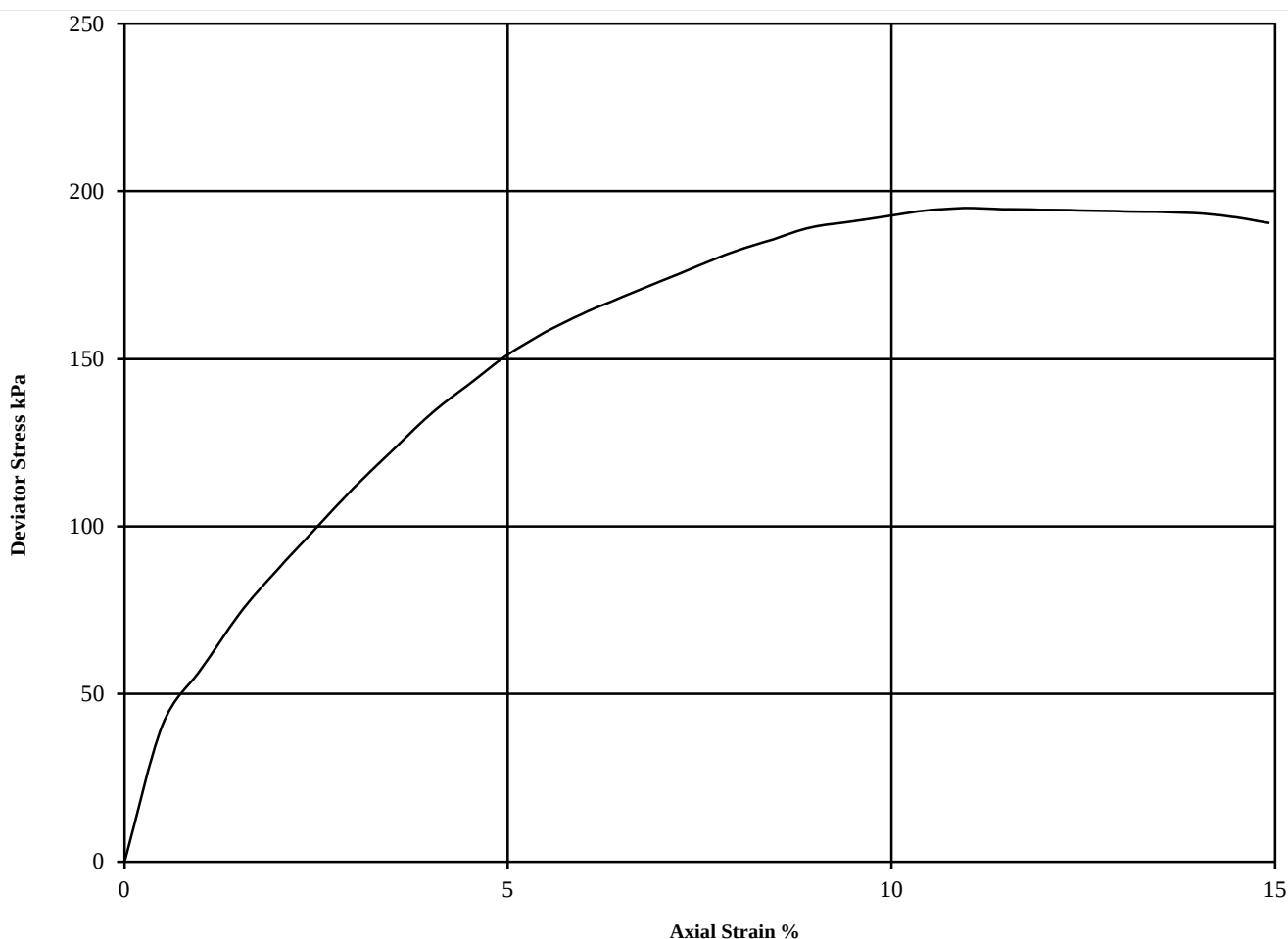
Hole Number: WBH101

Top Depth (m): 7.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	44	1.74	1.21	150	195	97	10.9	Brittle	



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Client Ref:

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

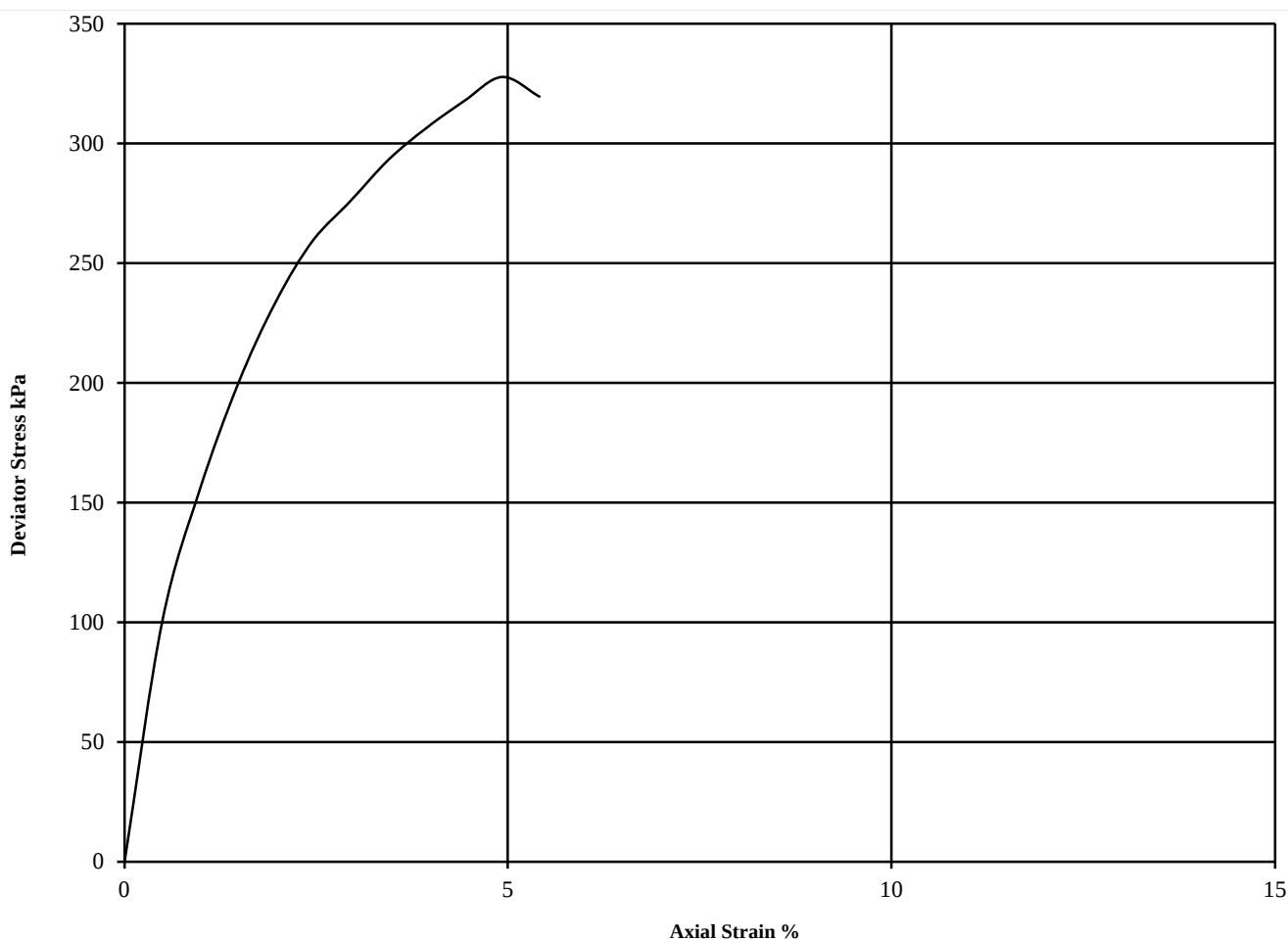
Hole Number: WBH101

Top Depth (m): 16.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		102	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	27	1.92	1.52	330	328	164	4.9	Brittle	



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Contract No:

PSL22/7581

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

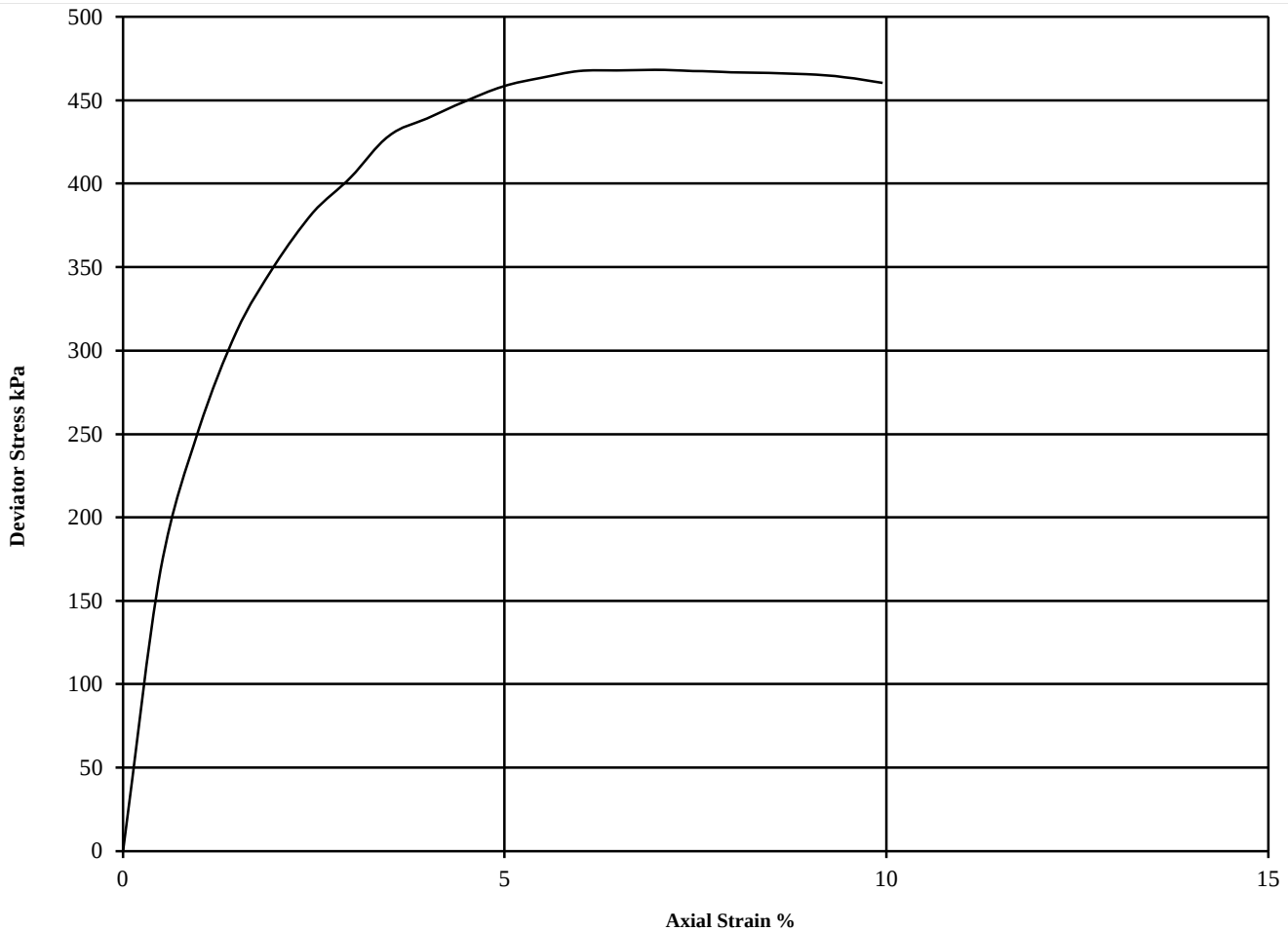
Hole Number: WBH101

Top Depth (m): 28.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	25	1.97	1.57	570	468	234	7.0	Brittle	



Project Otter

Contract No:

PSL22/7581

Client Ref:

WIE17469

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

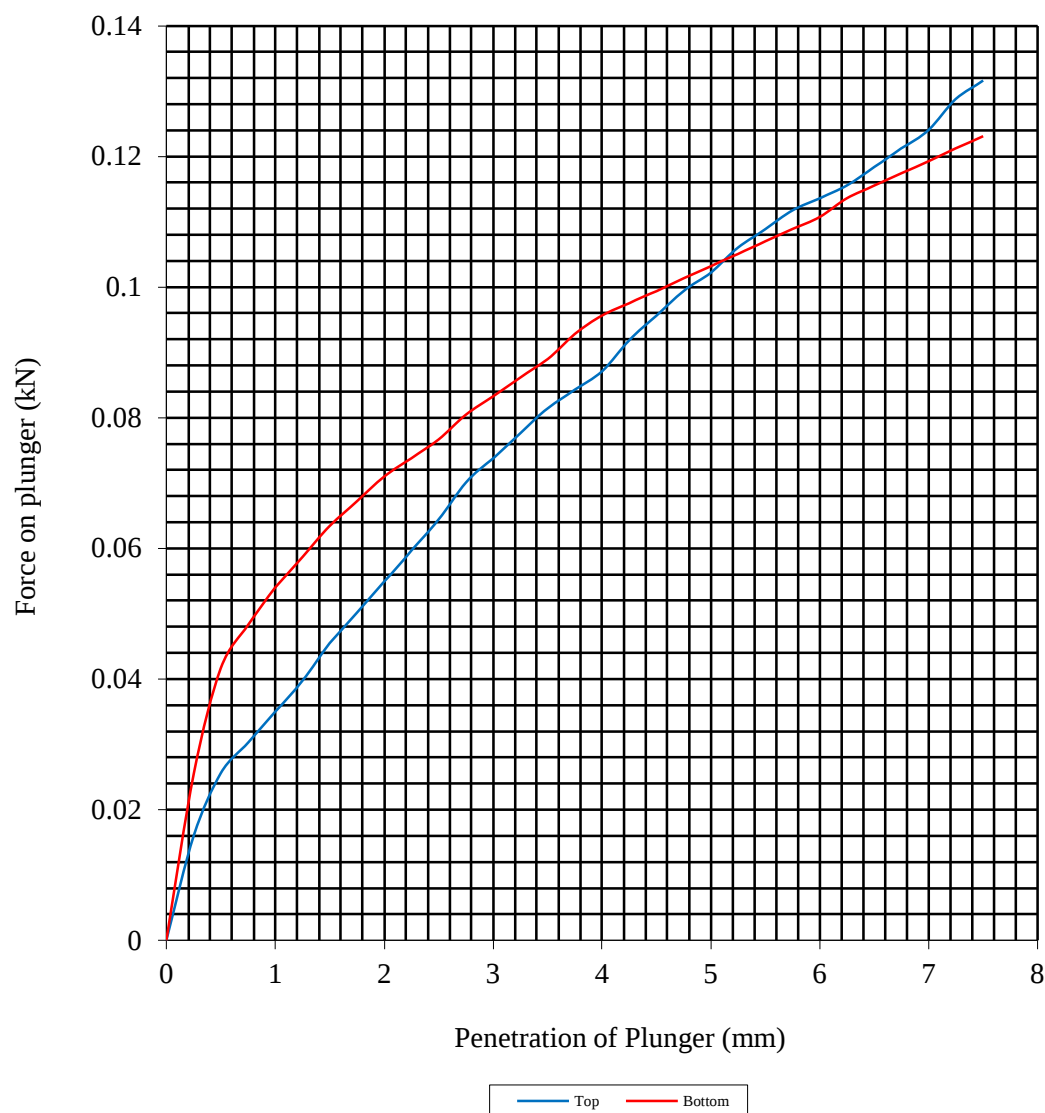
Hole Number: WBH101

Top Depth (m): 0.40

Sample Number:

Base Depth (m):

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	19	Surcharge Kg:	4.20	Sample Top	19	Sample Top	0.5
Bulk Density Mg/m3:	2.06	Soaking Time hrs	0	Sample Bottom	19	Sample Bottom	0.6
Dry Density Mg/m3:	1.74	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		4					
Compaction Conditions		2.5kg					



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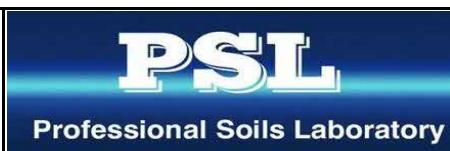
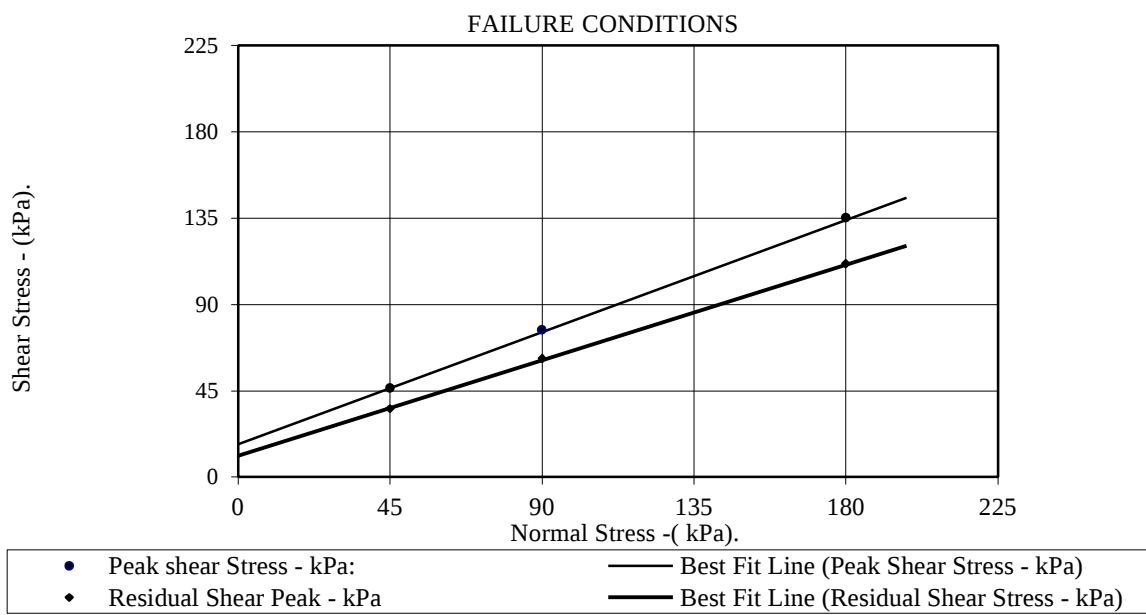
Project Otter

Contract No:
PSL22/7581
Client Ref:
WIE17469

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377 : 1990 Part 7 Clause 4

Hole Number:	WBH101		Top Depth	4.50	
Sample Number:			Base Depth		
Sample Conditions:	Submerged		Sample Type	U	
Particle Density - Mg/m3:	2.65	Assumed	Remarks:		
Specimen Preparation	Cut and trimmed Undisturbed				
Sample Description:	See summary of soil descriptions				
STAGE			1	2	3
Initial Conditions					
Height - mm:			19.99	19.99	19.99
Length - mm:			60.05	60.05	60.05
Moisture Content - %:			26	26	26
Bulk Density - Mg/m3:			1.98	1.98	1.98
Dry Density - Mg/m3:			1.57	1.57	1.57
Voids Ratio:			0.684	0.684	0.684
Normal Pressure- kPa			45	90	180
Consolidation Stage					
Consolidated Height - mm:			19.55	18.82	18.39
Peak Shear					
Rate of Strain - mm/min			0.500	0.500	0.500
Displacement at peak shear stress - mm			3.00	3.90	3.90
Peak shear Stress - kPa:			46	77	135
Residual Shear					
Rate of Strain - mm/min			0.500	0.500	0.500
Displacement at residual shear stress - mm			30.00	30.00	30.00
Residual shear Stress - kPa:			36	62	111
Final Consolidation Conditions					
Moisture Content - %:			29	27	26
Bulk Density - Mg/m3:			2.03	2.11	2.16
Dry Density - Mg/m3:			1.58	1.66	1.72
Peak Shear					
Angle of Shearing Resistance:(0)			33		
Effective Cohesion - kPa:			17		
Residual Shear					
Angle of Shearing Resistance:(0)			29		
Effective Cohesion - kPa:			11		



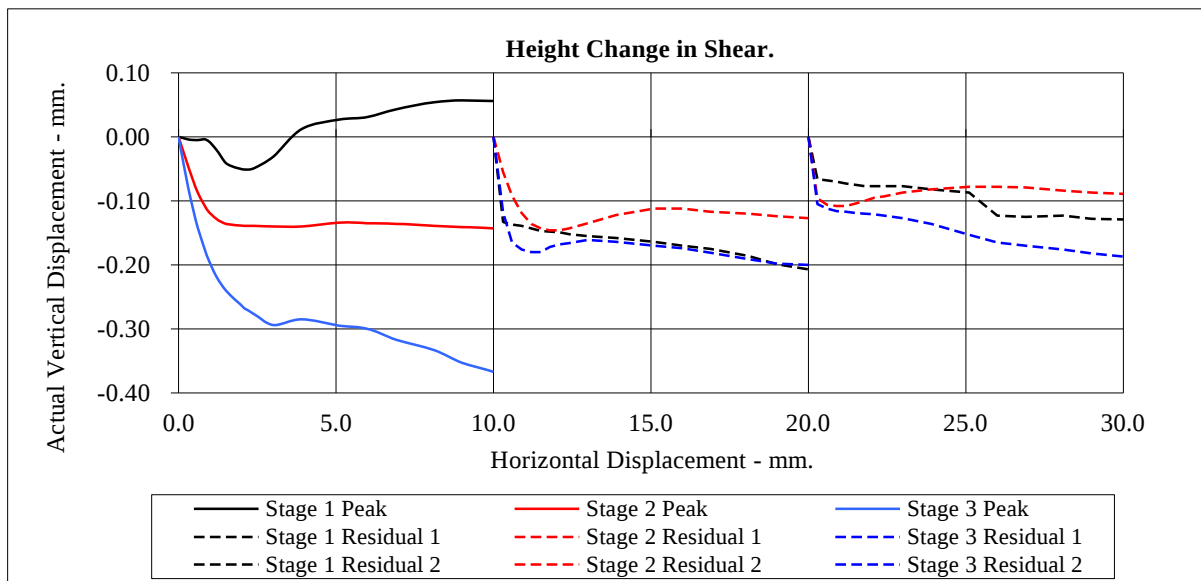
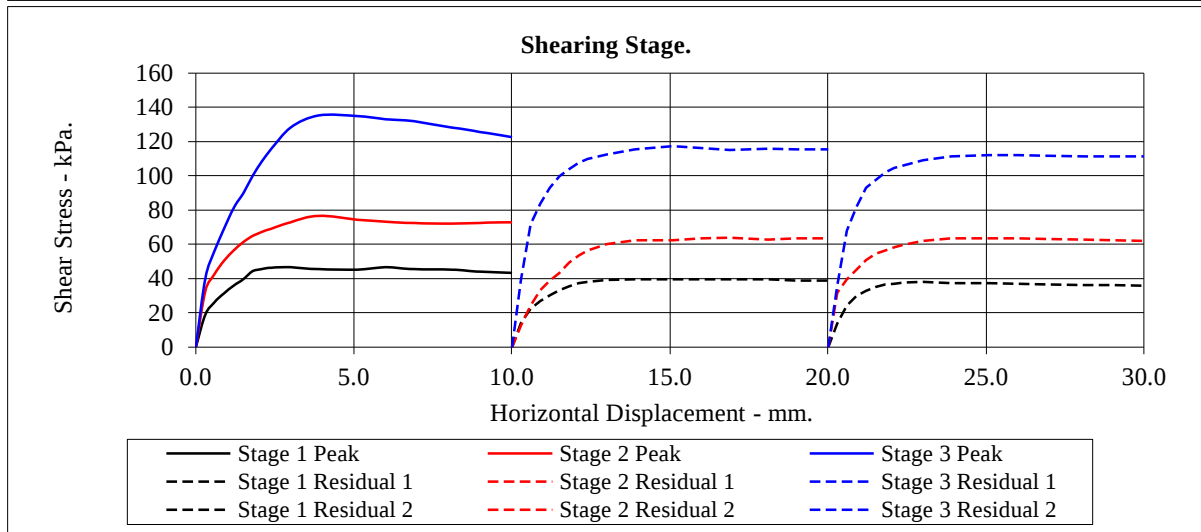
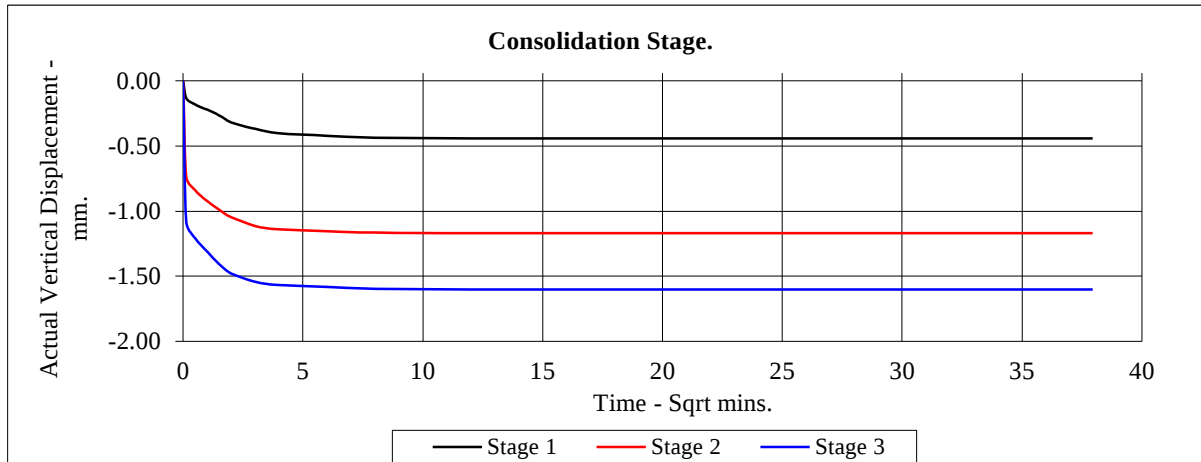
Project Otter

Contract No:
PSL22/7581
Client Ref:
WIE17469-WBH101

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377 : 1990 Part 7 Clause 4

Hole Number:	WBH101	Top Depth:	4.50
Sample Number:		Base Depth:	



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Project Otter

Contract No:
PSL22/7581
Client Ref:
WIE17469-WBH101



Certificate of Analysis

Certificate Number 22-25493

Issued: 15-Dec-22

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 22-25493

Client Reference PSL22/7581

Order No (not supplied)

Contract Title WIE17469:PROJECT Otter

Description One Soil sample.

Date Received 09-Dec-22

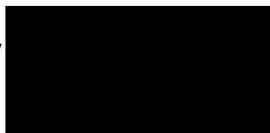
Date Started 09-Dec-22

Date Completed 15-Dec-22

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis

Soil Samples

Our Ref 22-25493
 Client Ref PSL22/7581
 Contract Title WIE17469:PROJECT Otter

Lab No	2096409
.Sample ID	WBH101
Depth	3.00
Other ID	
Sample Type	SOIL
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10
Inorganics				
pH	DETSC 2008#		pH	9.8
Chloride Aqueous Extract	DETSC 2055	1	mg/l	53
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	3.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	110
Sulphur as S, Total	DETSC 2320	0.01	%	0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.13

Information in Support of the Analytical Results

Our Ref 22-25493
 Client Ref PSL22/7581
 Contract WIE17469:PROJECT Otter

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2096409	WBH101 3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report



LABORATORY REPORT



4043

Contract Number: PSL22/7846

Report Date: 04 January 2023
Client's Reference: WIE17469-WBH102
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Michael Berry

Contract Title: Project Otter
Date Received: 9/12/2022
Date Commenced: 9/12/2022
Date Completed: 04/01/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)



L Knight
(Assistant Laboratory Manager)

R Berriman
(Quality Manager)

S Eyre
(Senior Technician)

S Royle
(Laboratory Manager)

T Watkins
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7846

Client Ref:

WIE17469

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



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Project Otter

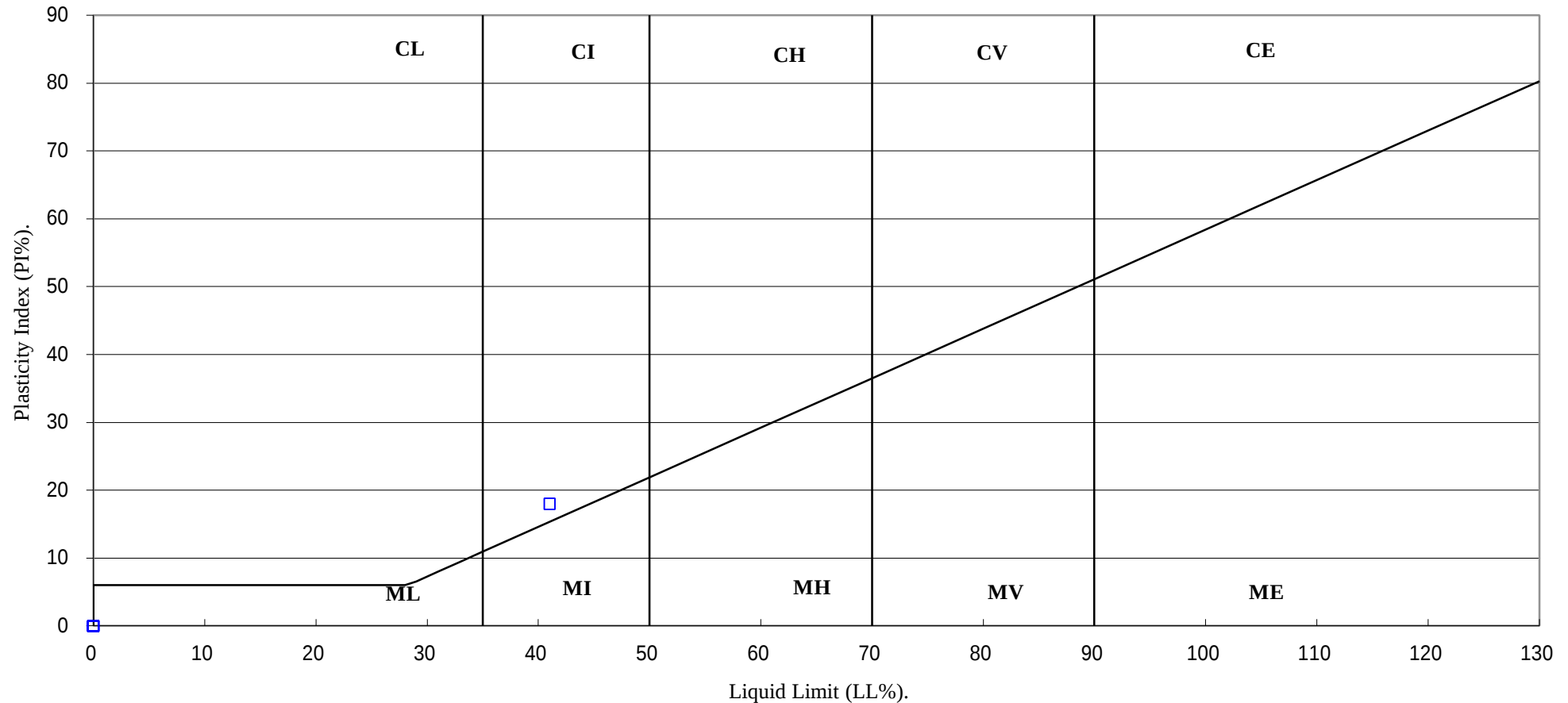
Contract No:

PSL22/7846

Client Ref:

WIE17469

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

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Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7846

Client Ref:

WIE17469

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH102

Top Depth (m):

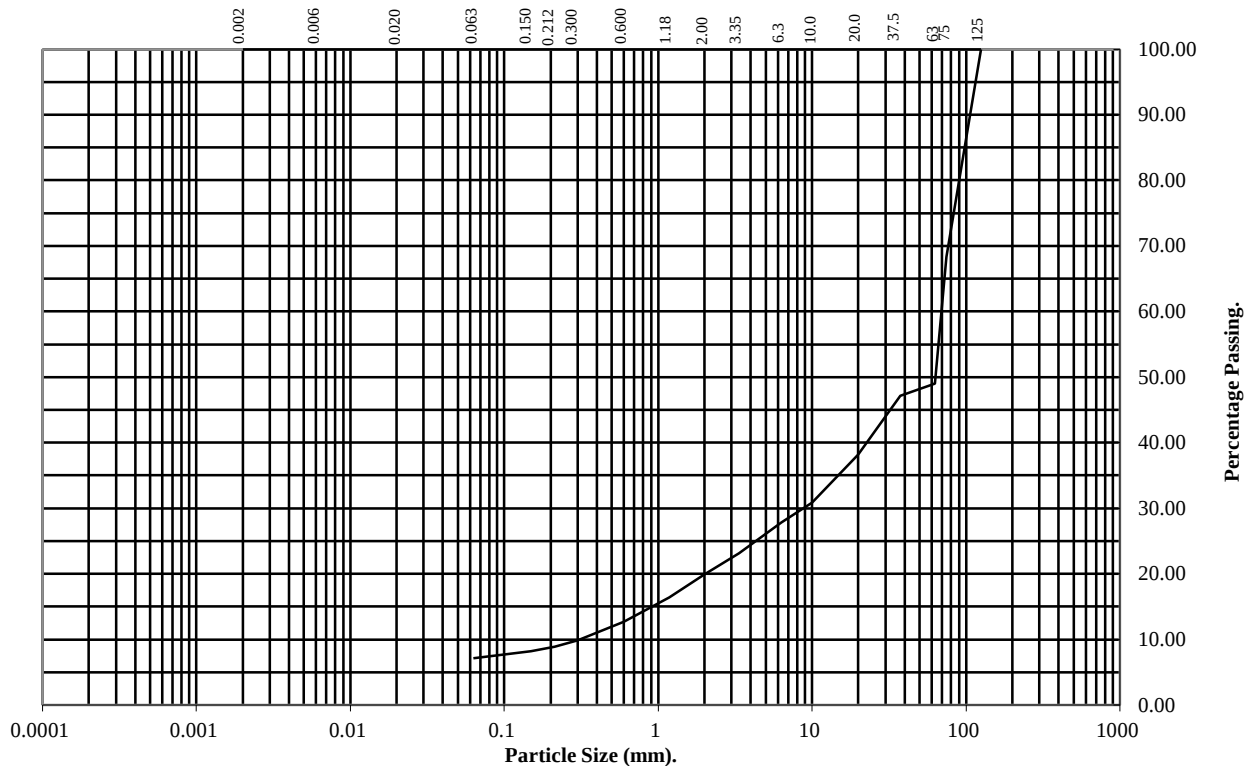
0.40

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	68
63	49
37.5	47
20	38
10	31
6.3	28
3.35	23
2	20
1.18	16
0.6	13
0.3	10
0.212	9
0.15	8
0.063	7

Soil Fraction	Total Percentage
Cobbles	51
Gravel	29
Sand	13
Silt/Clay	7

Remarks:

See Summary of Soil Descriptions



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Professional Soils Laboratory

Project Otter

Contract No:
PSL22/7846
Client Ref:
WIE17469

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WBH102

Top Depth (m):

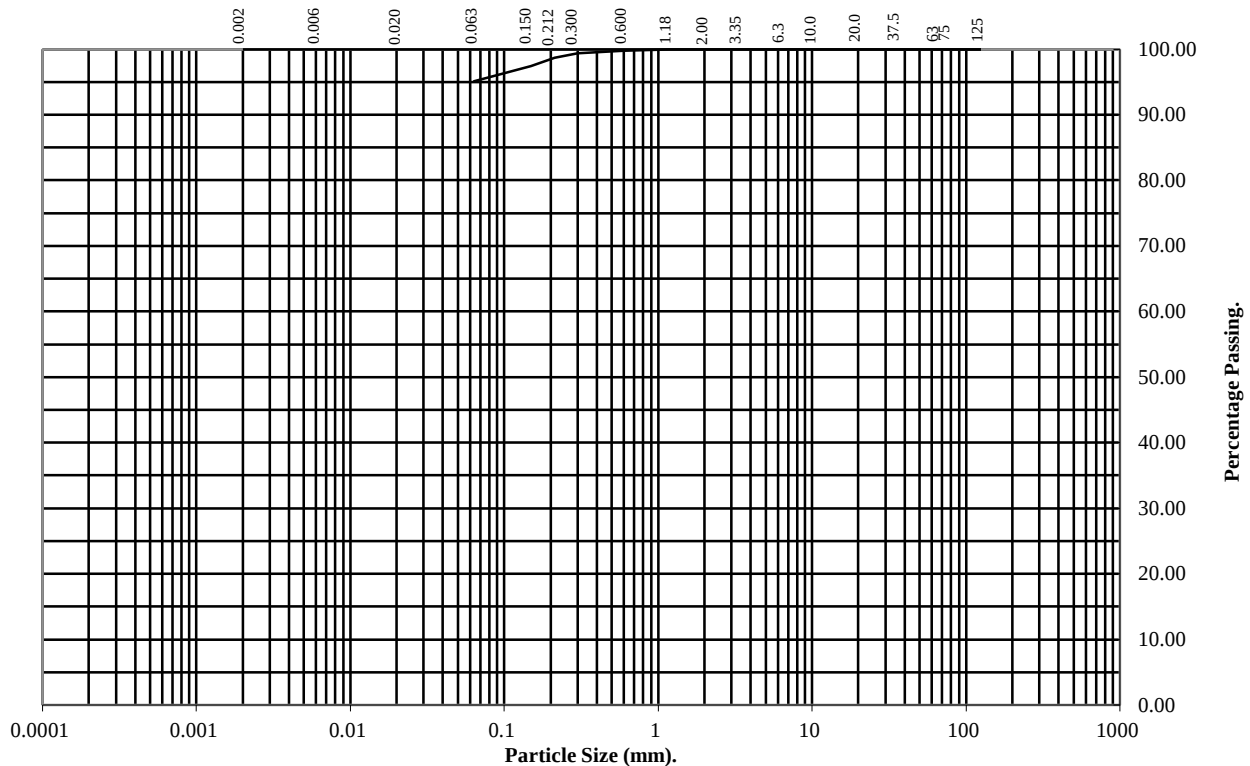
4.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	99
0.212	99
0.15	97
0.063	95

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	5
Silt/Clay	95

Remarks:

See Summary of Soil Descriptions



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Professional Soils Laboratory

Project Otter

Contract No:
PSL22/7846
Client Ref:
WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

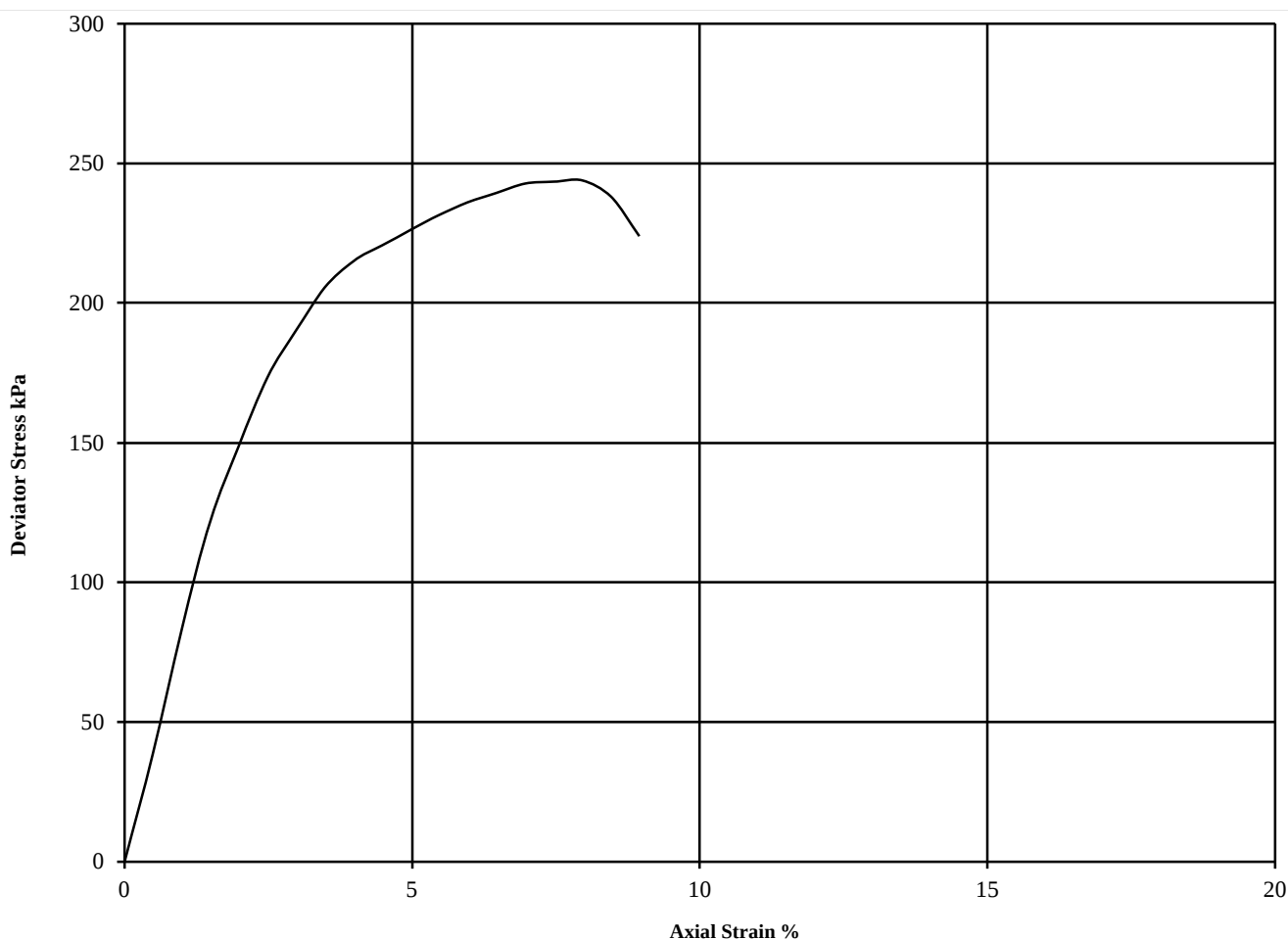
Hole Number: WBH102

Top Depth (m): 4.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35 See summary of soil descriptions
				3	$(\frac{1}{2} \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	31	1.95	1.49	90	244	122	8.0	Brittle	



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Project Otter

Contract No:

PSL22/7846

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

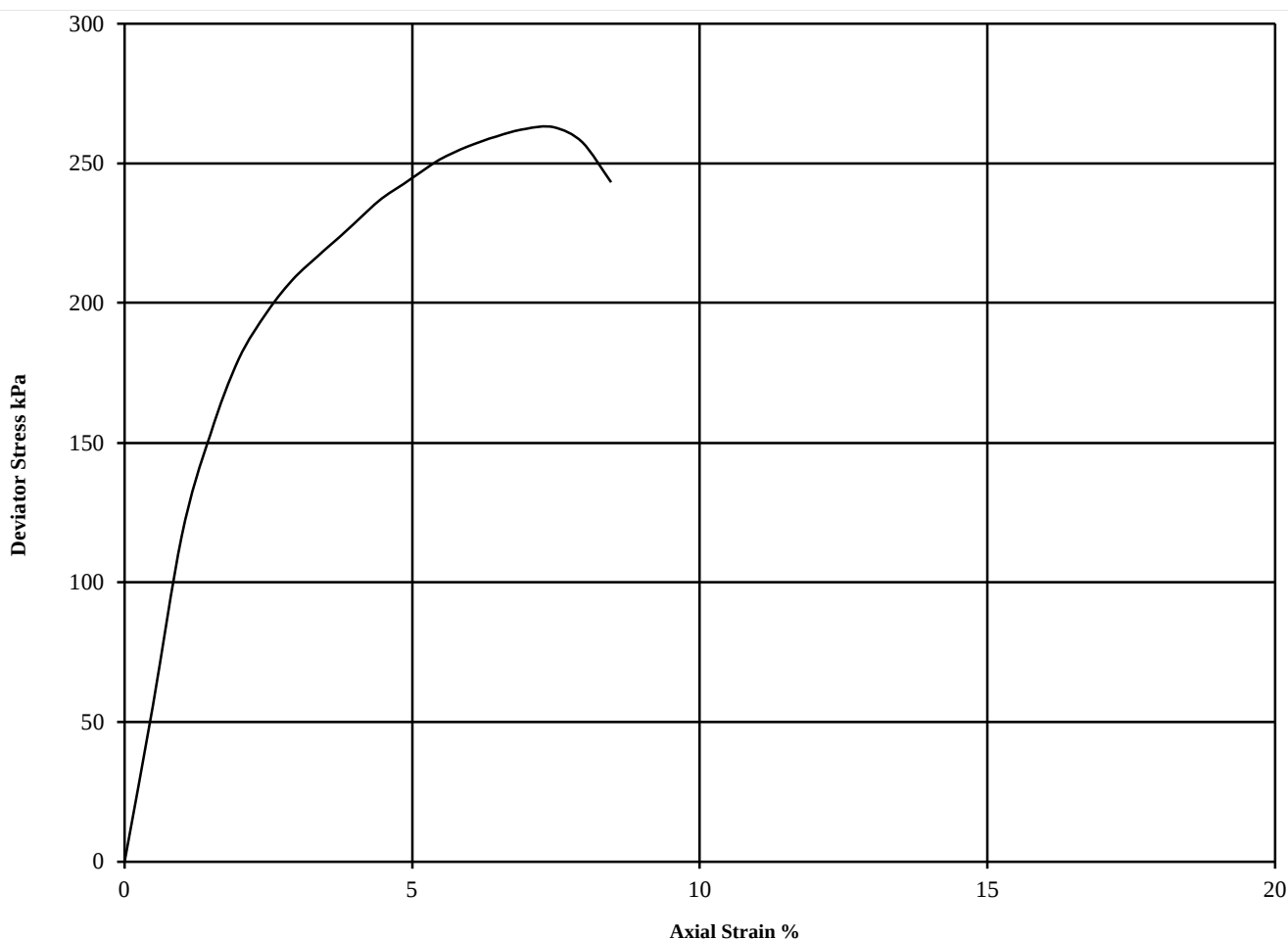
Hole Number: WBH102

Top Depth (m): 10.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$\frac{1}{2}(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	28	1.97	1.54	210	263	131	7.5	Brittle	



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Project Otter

Contract No:

PSL22/7846

Client Ref:

WIE17469

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

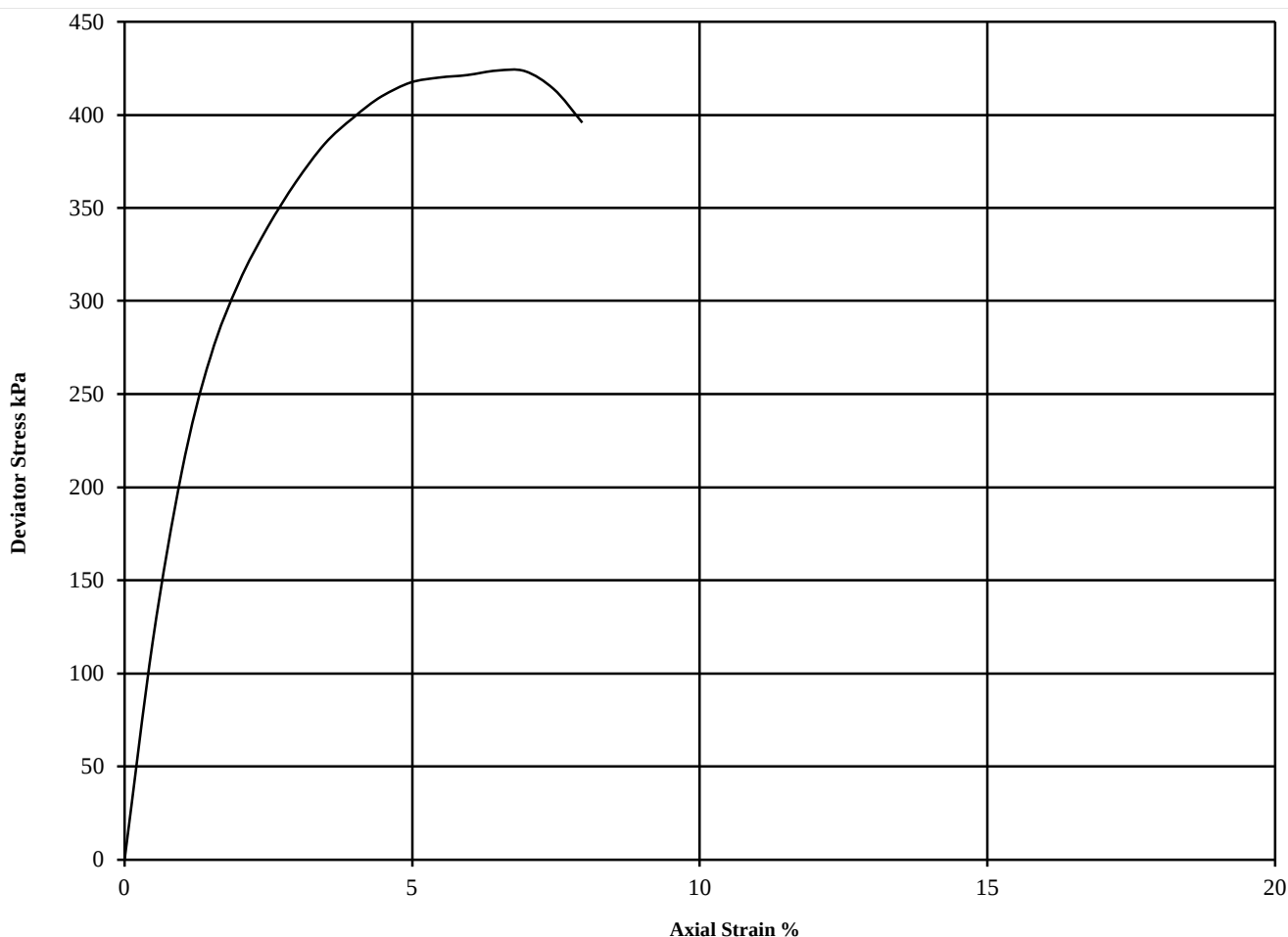
Hole Number: WBH102

Top Depth (m): 28.50

Sample Number:

Base Depth (m):

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.36 See summary of soil descriptions
					$(\sigma_1 - \sigma_3)_f$	$\frac{1}{2}(\sigma_1 - \sigma_3)_f$			
1	28	1.94	1.51	570	424	212	6.5	Brittle	



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Client Ref:

WIE17469

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

[illegible]

Project Otter

Contract No:

PSL22/7846

Client Ref:

WIE17469

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

[illegible]

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular



Project Otter

Contract No:

PSL22/7846

Client Ref:

WIE17469

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

[illegible]

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random



Project Otter

Contract No:

PSL22/7846

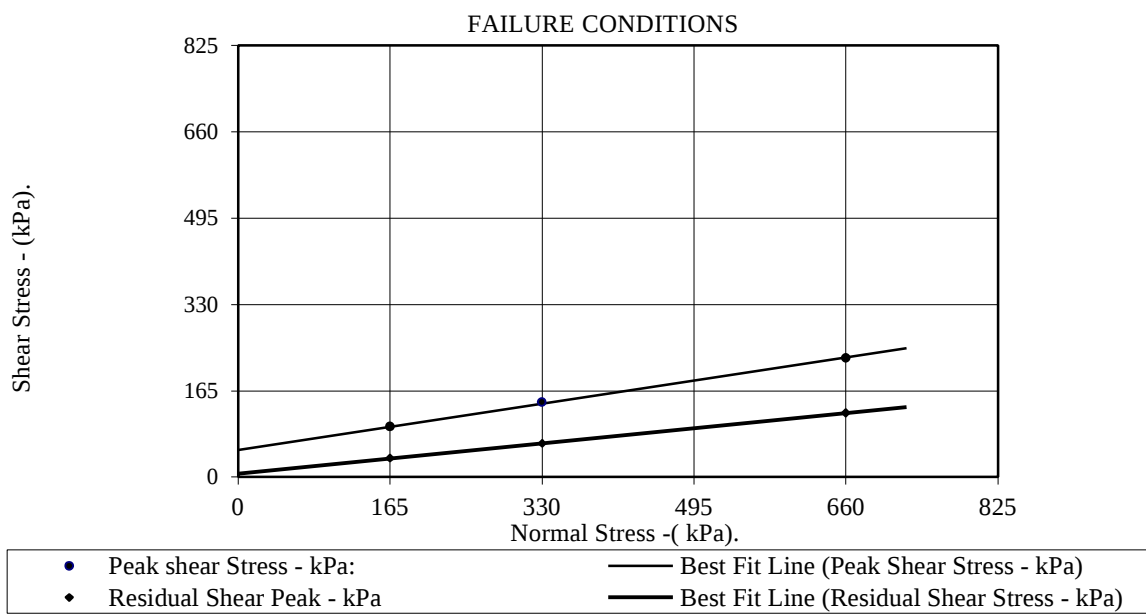
Client Ref:

WIE17469

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377 : 1990 Part 7 Clause 4

Hole Number:	WBH102		Top Depth	16.50	
Sample Number:			Base Depth		
Sample Conditions:	Submerged		Sample Type	U	
Particle Density - Mg/m3:	2.65	Assumed	Remarks:		
Specimen Preparation	Cut and trimmed Undisturbed				
Sample Description:	See summary of soil descriptions				
STAGE			1	2	3
Initial Conditions					
Height - mm:			19.99	19.99	19.99
Length - mm:			60.05	60.05	60.05
Moisture Content - %:			26	26	26
Bulk Density - Mg/m3:			1.88	1.88	1.88
Dry Density - Mg/m3:			1.49	1.49	1.49
Voids Ratio:			0.775	0.775	0.775
Normal Pressure- kPa			165	330	660
Consolidation Stage					
Consolidated Height - mm:			19.05	18.59	17.73
Peak Shear					
Rate of Strain - mm/min			0.041	0.041	0.041
Displacement at peak shear stress - mm			1.80	2.40	1.80
Peak shear Stress - kPa:			96	143	228
Residual Shear					
Rate of Strain - mm/min			0.082	0.082	0.082
Displacement at residual shear stress - mm			30.00	30.00	20.00
Residual shear Stress - kPa:			36	65	123
Final Consolidation Conditions					
Moisture Content - %:			31	29	28
Bulk Density - Mg/m3:			1.97	2.02	2.12
Dry Density - Mg/m3:			1.51	1.57	1.66
Peak Shear					
Angle of Shearing Resistance:(0)			15		
Effective Cohesion - kPa:			52		
Residual Shear					
Angle of Shearing Resistance:(0)			10		
Effective Cohesion - kPa:			6		



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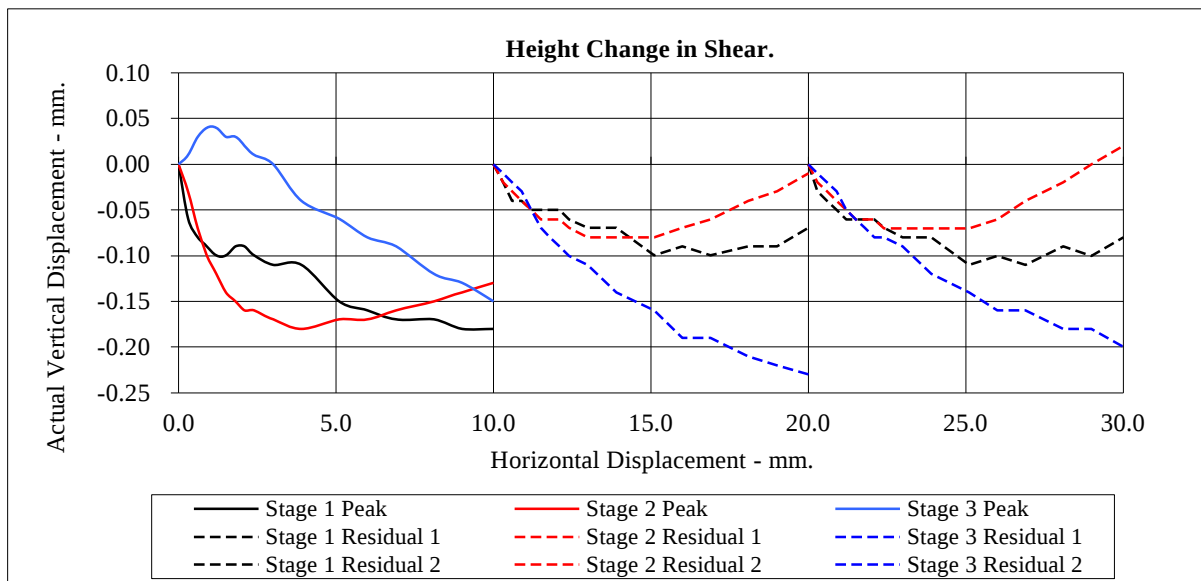
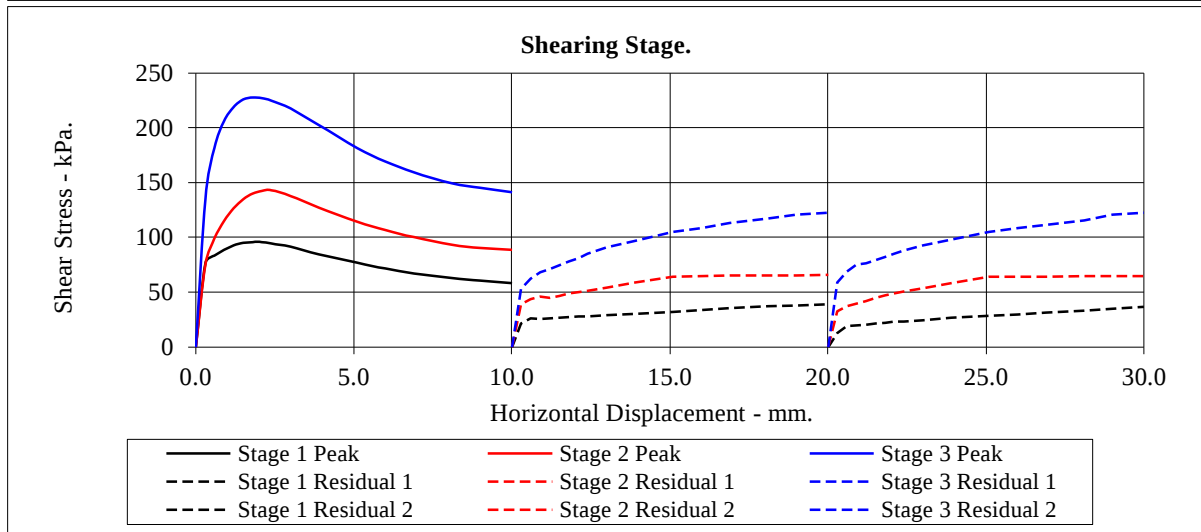
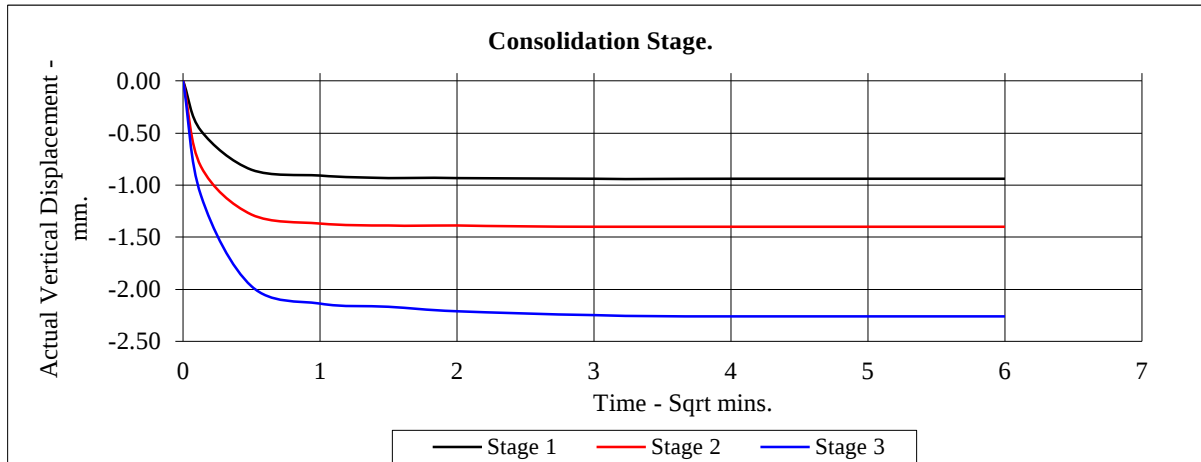
Project otter

Contract No:
PSL22/7846
Client Ref:
WIE17469

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377 : 1990 Part 7 Clause 4

Hole Number:	WBH102	Top Depth:	16.50
Sample Number:		Base Depth:	



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Professional Soils Laboratory

Project otter

Contract No:
PSL22/7846
Client Ref:
WIE17469



LABORATORY REPORT



4043

Contract Number: PSL22/7582

Report Date: 14 December 2022
Client's Reference: WIE17469-WBH103
Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Michael Berry

Contract Title: Project Otter
Date Received: 28/11/2022
Date Commenced: 28/11/2022
Date Completed: 14/12/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

T Watkins
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7582

Client Ref:

WIE17469

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL

Professional Soils Laboratory

Project Otter

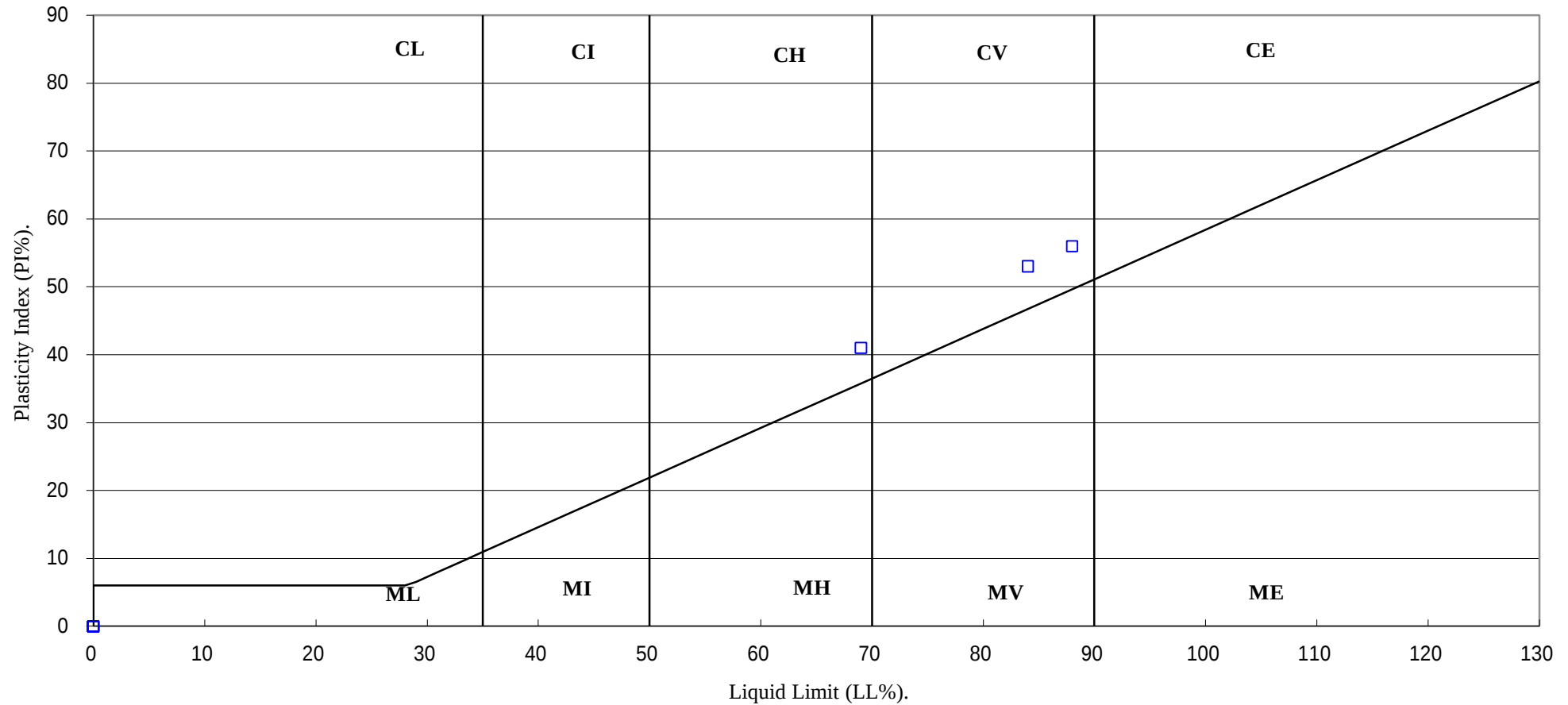
Contract No:

PSL22/7582

Client Ref:

WIE17469

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Project Otter

Contract No:

PSL22/7582

Client Ref:

WIE17469