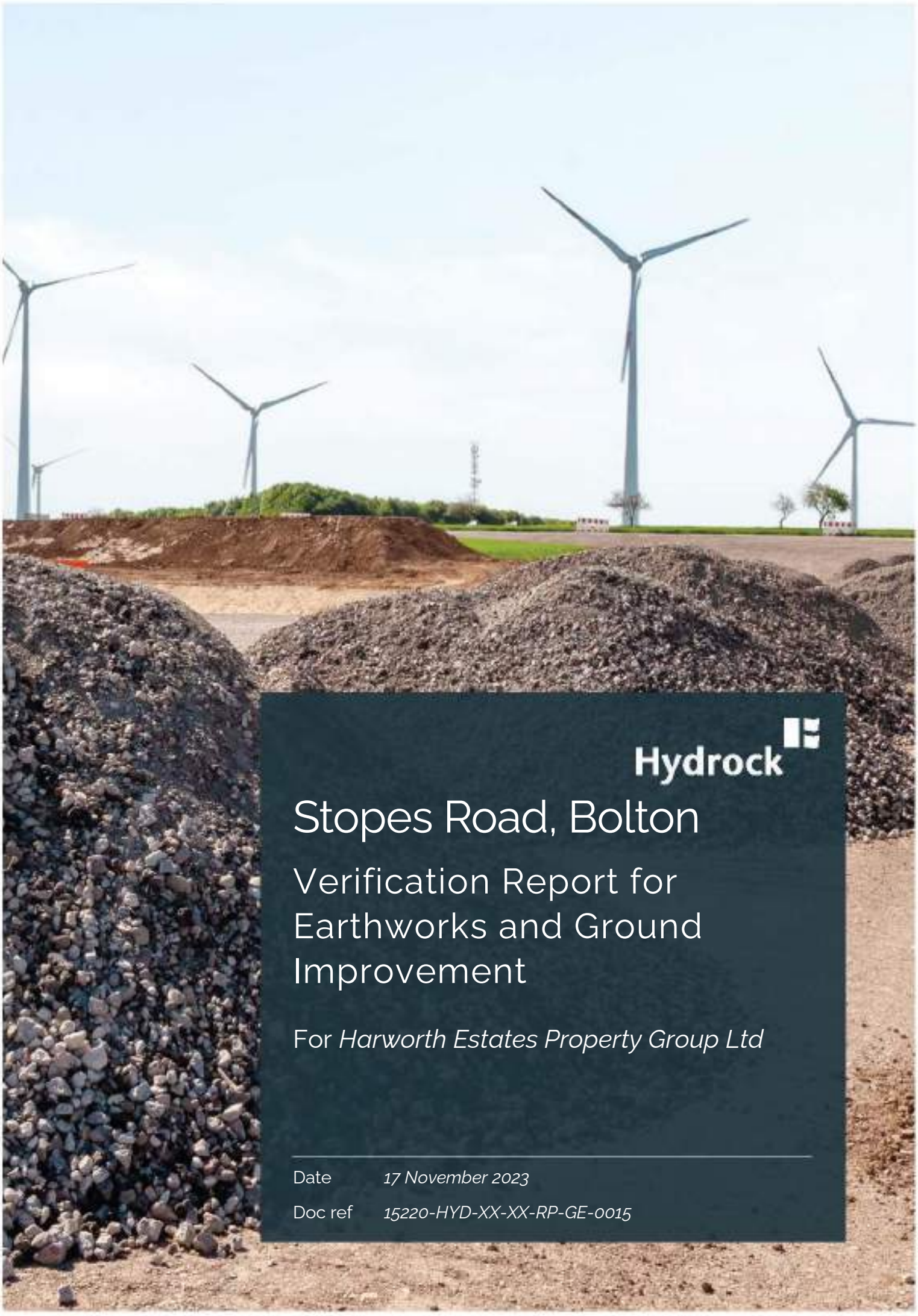

Hydrock

Stopes Road, Bolton

Verification Report for Earthworks and Ground Improvement

For *Harworth Estates Property Group Ltd*

Date	*17 November 2023*
Doc ref	*15220-HYD-XX-XX-RP-GE-0015*

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Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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Appendix B Mine Entry Treatment Completion Reports

Appendix C VHE Addendum Validation Report (JMS/SR/JP/47366-RP006 Rev A)

Appendix D Hydrock Site Visit Records

Appendix E Updated Geotechnical Risk Register

Appendix F Settlement Monitoring Assessment

Appendix G Updated Foundation Zonation Plan

Appendix H Updated Ground Model and Cross Sections

EXECUTIVE SUMMARY

SITE INFORMATION AND SETTING	
Objective	The purpose of this report is to confirm that the remediation and enabling works have been undertaken in accordance with the requirements of the tender documents (Remediation Strategy reference 15220-HYD-XX-XX-RP-GE-0006-S2-P4 and Geotechnical Design Report reference 15220-HYD-XX-XX-RP-GE-0005-S2-P03) and detailed designs developed by the Contractor or Specialist Contractor.
Client	Harworth Estates Property Group Ltd.
Contractor	VHE Construction (VHE).
Contractor's Designer	Alan Wood and Partners (AWP).
Site name and location	Stopes Road, Bolton. Land off Stopes Road, 4.4km southeast of Bolton, Greater Manchester, BL3 1NP
Current Site	The site was previously used as a Tarmac block manufacturing plant, comprising several buildings with associated areas of external storage of materials and finished products. There is a small field north of the manufacturing plant that also lies within the site boundary.
Proposed Development	Hydrock understands that the proposed development is to comprise up to 145 residential houses of 2 to 3 storeys with associated gardens, parking and soft landscaping. The field in the north of the site is to remain as public open space.
EARTHWORKS AND GROUND IMPROVEMENT	
Geotechnical Design Report	Tender design of the earthworks and ground improvement (not including VSC) included in Hydrock report reference: 15220-HYD-XX-XX-RP-GE-0006-S2-P3. This formed the basis of the Contractors Geotechnical Design Report under a Design and Built Contract reference JS/AC/47366-Rp002 Rev A, dated June 2022.
End performance criteria	The compaction requirements for the fill are: » Class 1 (development areas) - in situ density greater than 95% laboratory maximum, determined using the vibrating hammer and minimum CBR of 5%; » Class 2A/2B/2C (development areas) – in situ density greater than 95% of the laboratory maximum, determined using the 2.5kg rammer, minimum undrained shear strength of 50kN/m2 and maximum air void content of 5%; » Class 4 (POS outside development area) – Clause 620; » Class 6A/6C (embankment starter layer/ drainage blanket, where required) - method placement in accordance with SHW Table 6/4; and » Class 6F1/6F2/6F5 (temporary surfacing/working platform/running layer) - method placement in accordance with SHW Table 6/4. Specific performance requirements outside the scope of the VHE works may be required where the material is used as part of a temporary working platform. The design subgrade CBR for the site has been set at 2.5%. Following completion of the earthworks, subgrade protection has been installed as follows:

	» 150mm layer of Class 6F2 granular material, sourced from the initial site strip and crushing and processing of Made Ground and obstructions. The design predicted total residual consolidation settlement for the maximum thickness of fill to be approximately 25mm after 6 months. Post-construction time periods greater than 6 months will result in residual settlements of less than 25mm. The above performance requirements have been validated through testing and monitoring as part of the works.
Summary of enabling works	*Main Works* Total Cut = 87,344m^3 Total Fill = 81,323m^3 Surplus (6F2) = 6,021m^3 as a running layer on completion *Second Phase of Works* Cut = 1,229m^3 Fill = 1,103m^3 Surplus removed from site As built survey on completion is shown on VHE drawing VHEJ808-202. *Main Works* General sequence of works completed: » Surface strip to remove hardstanding, topsoil and vegetation; » the site wide over-excavation of Made Ground and removal of obstructions to between 1.50m and 3.00m below existing level (or proposed levels in areas of cut) » Removal and remediation hydrocarbon impacted soils; » Processing, crushing, screening of concrete and Made Ground; » Laboratory source approval testing of all proposed fill materials; » Identification and remediation of contamination and hotspots as identified by the investigation and as encountered as part of the discovery strategy; » Identification and removal of soft spots at the base of excavation; » Over-excavation and removal of peat and organic soils indicated from the site investigation; » Completion of as built topographic surveys at the base of all excavations including areas of local over-excavation and soft spot removal; » Investigation and over-excavation of the potential landfill material in the centre west of the site; » Treatment of mine entry 006 by drilling and grouting; » Compaction trials for all fill materials and for all proposed methods of compaction and compaction plant » Undertake dynamic compaction ground improvement in the form of RDC at the base of excavation; » Installation, commissioning and reading of monitoring equipment; » Excavation of a borrow pit in the north of the site; » Placement and compaction of general fill in accordance with the specification; » Completion of in situ validation testing;

	» Backfilling of the Borrow pit; » Installation of a 150mm 6F2 running layer on completion of the works. » Completion of all as built surveys and provision of records; » Continued monitoring of geotechnical instrumentation; » Completion of validation reporting and updating the Geotechnical Risk Register. *Second Phase of Works* » Treatment of mine entries 007 and 008 by drilling and grouting; » Completion of the treatment of Hotspot 2; » Completion of cut / fill in vicinity of shafts 007 and 008 » Completion of over-excavation of Made Ground and re-engineering » Continued monitoring of geotechnical instrumentation.
Problems not envisaged in the GDR and their solutions	Shortfall of material due to surveying discrepancy within the topographic survey and RDC compaction was not envisaged in the Contractor's design. VHE proposed to bring FGL 160mm (10mm + 150mm running layer) lower than designed level. Due to the granular non plastic nature of the ash fill material AWP and VHE have proposed to treat the material as a 1A granular material, whilst the gradings indicate a borderline material. Variability in the fill material particularly with particle density resulted in difficulty in assessing results. Additional testing was proposed to demonstrate suitability and compliance. The specifics of the borrow pit including settlement of fill placed was not calculated and elaborated in the GDR. The Contractor proposed a method of placement to mitigate settlement. As part of the second phase of works the majority of the excavated fill was found to be too wet to meet the specification. The material was removed from site and replaced with imported primary granular material.
Groundwater and temporary drainage measures	Perched water in some excavations and standing water recorded which were controlled by sump pumping techniques across the site.
Source & location of all material placed	All soils used in the permanent works were site won and comprised: » Processed Made Ground from site; » Site derived and processed crushed concrete; » Glacial Till (sandy cohesive material); and » Weathered Coal Measures (cohesive material). Source approval testing was undertaken by the Contractor to assess suitability.
Imported Materials	Class 6F5 for the Phase 2 works
Over-excavation	There was a requirement for a site-wide over-excavation of Made Ground to a depth of 1.5-3.0m below existing ground level (or PPL where cut is proposed). This was for the purpose of identification and removal of obstructions, unsuitable materials, identification of contamination and to facilitate treatment of the residual Made Ground following the over-excavation. The design depth of excavation was based on the thickness of Made Ground.

	» As built base of excavation shown on VHE drawing VHEJ808-101 » As built final level shown on VHE drawing VHEJ808-202 and design level comparison shown on the accompanying excel data sheet
Ground Improvement	Dynamic surface compaction in the form of Rolling Dynamic Compaction (RDC) was design and undertaken by the Contractor in the areas of the site where there is residual Made Ground greater than 1m thick following the site-wide over-excavation of Made Ground. Surveyed areas of ground improvement shown on VHE drawings VHEJ808-1202 and VHEJ808-1203.
Settlement Monitoring	Settlement monitoring was required to demonstrate that consolidation settlement is completed prior to construction. This comprised establishment of control points for level monitoring, surveyed by appropriate methods and the use of geotechnical instrumentation, including Rod Settlement Gauges (RSG) and Vibrating Wire Piezometers (VWP). Total settlements recorded in line with the GDR. Residual settlement expected to be <25mm. No further monitoring required.
GEO-ENVIRONMENTAL	
Hotspot Removal	Eight hotspots were encountered on site during the site investigation and earthworks. The hot spots were isolated and remediated in accordance with the requirements of the Remediation Strategy. Hotspot 1,2, 4, 7 and 8 were TPH hotspots and hotspots 3, 5 and 6 were asbestos hotspots. All hotspots were remediated in accordance with the RSVP and discovery strategy. The latest version of the Contractors Hotspot Validation report is provided in Appendix E of the AWP Addendum Report.
Routine Analysis	Routine chemical testing was undertaken on all excavated material at a rate of 1 test per 1000m^3. No elevated concentrations of chemicals of potential concern recorded. No further treatment required.
Discovery Strategy	Three ACM and three TPH hotspots recorded during the course of the works that were not identified in the original site investigation. All hotspots were remediated in accordance with the RSVP and discovery strategy. The Contractors Hotspot Validation report is provided in Appendix G of the AWP Validation Report. Two underground fuel tanks were encountered during the works in the southwest of the site. The tanks were removed and the surrounding areas validated in accordance with the remediation strategy. No significant spillage or migration of contamination was recorded.
DECOMMISSIONING	
Abstraction Wells	Two historical abstractions wells were shown on the drawing reference VHEJ808-404. Abstraction well no.1 with national grid reference Easting 376330E and 407550N was not found during the enabling works. The second historical well was encountered in national grid reference 376219.369E, 407619.724N during the earthworks. After consulting Hydrock, VHE contacted specialist contractor M & J Drilling to decommission the abstraction well by grouting. The abstraction well no.2 was fully grouted up to 17m depth.

Mine Shafts	Three mine shafts are located within the site boundary and require treatment prior to development. The three shafts treated as part of the enabling works include: » 376407-006 » 376407-007 » 376407-008 Details of the treatment of mine-shaft 376407-006 is provided in the Van Elle completion report in Appendix B. Details of the treatment of mine-shafts 376407-007 and 008 is provided in the AWP completion report also in Appendix B.
VALIDATION	
Contractor's Validation Reports	The following validation reports have been provided to Hydrock by the Contractor: » AWP validation report, document reference is SR/BK/47366-RP004 Rev B » AWP addendum validation report, document reference MS/SR/JP/47366-RP006 Rev A » Van Elle Completion Report, document reference is VE 221883 – PS3426 V2 » AWP Mine Shaft Treatment Validation report, document reference JMS/SR/JP/47366-RP005 Rev A
GEOTECHNICAL RISK REGISTER & RESIDUAL HEALTH & SAFETY RISKS	
Geotechnical Risk Register	An updated geotechnical risk register is provided in Appendix E.
Residual health & safety Risks	Hydrock notes the following: » The mine-shaft 376407-002 recorded by the CA in the northwest outside boundary of the site is considered a residual risk by Hydrock and will require mitigation as part of future construction. » The presence of unrecorded mine entries, whilst unlikely, should not be totally discounted. » Whilst visual asbestos containing materials were removed by VHE during the on site excavations, ACM may be present at depth. Furthermore, it is likely residual asbestos fibres are present in the Made Ground.
DEVELOPER CONSTRUCTION PHASE WORKS	
Site Constraints	The following development site constraints exist: » Live underground and overhead services; » An electrical substation; » An underground culvert; » Three mine shafts (treated) with associated no build zones; » An offsite mine shaft but in close proximity to the boundary; » Root protection zones at the site boundaries;
Summary of Construction Phase Requirements	The Construction Phase of works will either be undertaken by a separate Contractor, or the same Enablement Works Contractor. The Contractor shall undertake » Installation of barrier pipework for potable water supplies (to be confirmed by the regulator).

	» Over-excavation of service trenches and backfilling with 'clean' soil. » Installation of gas protection measures appropriate for CS2 conditions across the site. » The installation of a 600mm cover system within gardens and 450mm cover system within public open space, comprising a subsoil beneath a topsoil thickness of 150mm. Validation of the above during Construction Works is provided in RSVP sections 8.4
Foundations	The enabling works has been driven by a particular foundation strategy for different areas of the site. The preliminary foundation zonation is shown on Hydrock drawing 15220-HYD-XX-XX-DR-GE-8002-P1. Foundations are to comprise a mixture of: » Piled foundations » Foundations supported by VSC/CMC; » Shallow foundations
Highways and subgrades	The design subgrade stiffness for the site is 30MPa approximately equivalent to 2.5% CBR.

This Executive Summary forms part of Hydrock Consultants Limited report number 15220-HYD-XX-XX-RP-GE-0015 and should not be read in isolation.

1. INTRODUCTION

1.1 Scope and Objective of the Report

Hydrock Consultants Ltd (Hydrock) were commissioned by Harworth Estates Property Group Ltd (the Client); to undertake a part-time watching brief and verification reporting for the Enablement Works (remediation and enabling earthworks) for a proposed development at the at the former Tarmac block manufacturing plant, at Stopes Road, Bolton.

Following the ground investigation, Hydrock compiled a 'Remediation Strategy and Verification Plan' (June 2022) and a 'Geotechnical Design Report and Earthworks Specification' (June 2022) as listed in Section 1.4. The objective of the remediation and earthworks is to deliver the site Suitable for Use (SFU) for the defined new use as residential dwellings with associated infrastructure. Additional detail is presented in the Hydrock reports and supporting documentation.

Following award of the enabling works contract to VHE (the Contractor) Alan Wood & Partners (AWP) were separately appointed by the Contractor in order to provide geotechnical and geo-environmental design, site supervision, specialist advice and consultancy services with regards to the environmental remediation and in particular the earthworks and re-engineering.

The Geotechnical Design Report (GDR) and specification requires the compilation of a validation report in accordance with Appendix 1/24 Clause 5. The validation report has been prepared by AWP on behalf of VHE and is referenced JMS/SR/BK/47366-RP004 Rev A in Appendix A.

Hydrock have compiled this verification report on behalf of Harworth Estates Property Group Ltd (the Client) in order to provide a review of the Contractors records and verification that the works have been completed in accordance with the design.

Between May 2022 and June 2023, remediation and earthwork were undertaken by VHE across the site excluding areas within the influence of untreated shafts 007 and 008. These original works to the main site are detailed in the AWP Validation Report Rev B.

Between October and November 2023, treatment to shafts 007 and 008 was undertaken and the associated remediation and earthworks completed. These works are detailed in the AWP Addendum Report Rev A. Where relevant updated drawings and surveys are included in the Addendum Report. Where a drawing is not included in the Addendum Report, reference should be made to the Validation Report Rev B for the latest version.

All works are now complete at the site and this report relates to all phases of the remediation and earthworks.

1.2 Limits of Area Covered by the Report

This report covers the earthworks, remediation and ground improvement activities completed by VHE at the site and includes treatment of mine shaft references 376407-006, 007 and 008 undertaken by Specialist Contractors Van Elle and M & J drilling.

Figure 1-1 shows the area covered by the site earthworks and remediation (red line). The extent of the works is shown on the VHE as built records included in the AWP report. Note the actual extent of the enabling works is dictated by the various boundary constraints and does not necessarily go up to the red line.

Figure 1-1: Site boundary and extent of works covered by this report

1.3 Objectives

This verification report has been prepared to demonstrate that the remediation and associated earthworks undertaken as part of the Enablement Works have been undertaken in accordance with the Contractor's approved designs (See Section 1.4).

The data collected by the Contractor is presented as validation and compliance with the remediation objectives in accordance with the RS&VP and the GDR. This report therefore includes details of:

- The enablement remediation works undertaken, and the data collected to support compliance with remediation objectives and criteria;
- The earthworks and ground improvement undertaken and the data collected to support compliance with the GDR and EWS;
- Descriptions of the works with reference to associated 'as built' drawings and construction records; and
- Details of any residual risks.

1.4 Bibliography of Scheme Specific Reports

1.4.1 Site Investigation and Background Information

Several stages of site investigation works have previously been undertaken at the site by Hydrock. The findings of the desk study, ground investigation, geo-environmental and geotechnical interpretation at the site is detailed in the following documents (and all historical documents referenced therein), which should be read in conjunction with this report for detailed background information:

- Hydrock. September 2020. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Phase 1 Desk Study, ref: 15220-HYD-XX-XX-RP-GE-0001_P03_S2.
- Hydrock. September 2020. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Coal Mining Risk Assessment, ref: 15220-HYD-XX-XX-RP-GE-0002_P02_S2.
- Hydrock. November 2020. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Phase 2 Interpretative Report, ref: 15220-HYD-XX-XX-RP-GE-0003_P02_S2.

- Hydrock. June 2021. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Supplementary Phase 2 Investigation Report, ref: 15220-HYD-XX-XX-RP-GE-0004_P02_S2.
- Hydrock. September 2023. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Mine Shaft Investigation, ref: 15220-HYD-XX-XX-RP-GE-0011_P04_S2.
- Hydrock. October 2021. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Tank discovery during Mine Shaft Investigation, ref: 15220-HYD-XX-XX-RP-GE-0010_P01_S2.

Copies of the above site investigation reports (and all historical documents referenced therein) can be provided on request. This Verification Report is written on the assumption that the reader is familiar with the site investigation documents.

1.4.2 Tender Design Documents

Following site investigation, design of the remediation and earthworks was undertaken for the purposes of tendering the enabling works contract and is presented in the following reports:

- Hydrock. June 2022. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Material Management Plan, ref: 15220-HYD-XX-XX-RP-GE-0012_P02_S2.
- Hydrock. February 2022. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Remediation Strategy & Verification Plan, ref: 15220-HYD-XX-XX-RP-GE-0006_P04_S2.
- Hydrock. June 2022. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Geotechnical Design Report for Earthworks, ref: 15220-HYD-XX-XX-RP-GE-0005_P03_S2.
- Hydrock. April 2022. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Dynamic Ground Improvement, ref: 15220-HYD-XX-XX-RP-GE-0013_P01_S2.
- Hydrock. June 2022. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Building 1 demolition watching brief and fuel tank validation, ref: 15220-HYD-XX-XX-RP-GE-0014_P02_S2.
- Hydrock. July 2021. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Drilling Grouting Specification, ref: 15220-HYD-XX-XX-RP-GE-0007_P01_S2.
- Hydrock. October 2021. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Cables and Services, ref: 15220-HYD-XX-XX-RP-GE-0008_P01_S2.
- Hydrock. October 2021. 'Former Tarmac block manufacturing plant, Main Works, Stopes Road, Bolton. Water Well Borehole Decommissioning, ref: 15220-HYD-XX-XX-RP-GE-0009_P01_S2.

Copies of the above design and specification reports can be provided on request. This Verification Report is written on the assumption that the reader is familiar with the design and Specification documents.

1.4.3 Contractors Design Documents

The following lists the Contractors design reports which form the compliance requirements to be met during the enabling and remediation works:

- Alan Wood & Partners. June 2022. Remediation Strategy, Stopes Road, Bolton. Reference JS/AC/47366-Rp001.
- Alan Wood & Partners. June 2022. Earthworks Specification, Stopes Road, Bolton. Reference JS/AC/47366-Rp002 Rev A.
- VHE. July 2022. RDC compaction and compaction measurement with Polygon roller BW 226 on ground improvement project stopes road, Bolton.

- Alan Wood & Partners. June 2022. Technical Note – Mine Shaft Treatment Specification. Reference JS/AC/47366-TN-001 Rev A.
- Van Elle. July 2022. Stopes Road, Bolton Specification for Consolidation of Mining Features by Drilling and Grouting. Reference 221883.
- Alan Wood & Partners. September 2023. Mine Shaft Treatment Specification at Stopes Road, Bolton – Shafts 007 and 008. Report reference JS/AHB/SR/47366-TN101.

A series of quality procedures were also issued by the Contractor for various aspects of the works.

1.4.4 *Contractors Validation Records*

The following documents were provided by the Contractor (VHE Construction) and Contractor's design team (Alan Wood and Partners and Van Elle) and form the basis of this verification report:

- Alan Wood and Partners. 26th April 2023. 'Former Tarmac block manufacturing plant, Stopes Road, Bolton. Validation Report', SR/BK/47366-Rp004 Rev B (referred to herein as the AWP Validation Report) in Appendix A;
- Van Elle. January 2023. 'Former Tarmac block manufacturing plant Bolton. Shaft Treatment Completion Report'. Ref: VE 221883- PS3426 V2 in Appendix B.
- Alan Wood and Partners. 16th November 2023. Stopes Road, Radcliffe, Manchester, M26 3TW Addendum to Earthworks Remediation Validation Report. Ref JMS/SR/JP/47366-RP006 Rev A (referred to herein as the AWP Addendum Report) in Appendix C;
- Alan Wood and Partners. November 2023. Stopes Road, Bolton. Mine Shaft Treatment Validation Report. Ref JMS/SR/JP/47366-RP005 Rev A in Appendix B.

1.4.5 *Hydrock Construction Phase Records*

Observations by Hydrock Consultants have been made on behalf of the Client during the remediation works, earthworks and ground improvement. Copies of the Hydrock Site Visit Records (SVR) are presented in Appendix D.

2. SITE PREPARATION AND REMEDIATION WORKS

The following sections summarise the tasks required by the approved Remediation Strategy and Verification Plan (Hydrock report reference 15220-HYD-XX-XX-RP-GE-0006_P03_S2).

The majority of the works (excluding mine shafts 007 and 008) were completed between May 2022 and June 2023 and are included in the AWP Validation Report.

A second phase of enabling works were undertaken between October and November 2023 in the immediate vicinity of mine shafts 007 and 008 and are included in the AWP Addendum Report.

2.1 Task 1 and 2: Permits, Licences, Consents and Approvals

The development falls under planning permission reference 09616/20 for Bolton Council and reference 66064.for Bury Council. Prior to commencement, part discharge of Condition 9 (Levels), Condition 12 (Coal Mining), Condition 15 (Contaminated Land) and Condition 18 (Soil Testing Methodology) was granted in May 2022. This included approval of the above referenced Remediation Strategy and Verification Plan.

The earthworks were undertaken in accordance with the Materials Management Plan reference 15220-HYD-XX-XX-RP-GE-0012-S2-P01 approval of which confirmed by the Environment Agency and Local Authority Environmental Health Officer in March 2022.

The treatment of mine shaft reference 376407-006 was undertaken under the Coal Authority permit Ref:25705, dated 27th September 2022. A copy of the permit is included in Appendix B in the Van Elle shaft treatment completion report.

The treatment of mine shafts referenced 376407-007 and 008 was undertaken under the Coal Authority permit Ref 27404, dated 5th October 2023. A copy of the permit is included in Appendix B.

2.2 Task 3: Air Quality, Noise and Vibration Monitoring

Details of the environmental monitoring are provided in Section 9.0 of the AWP Validation Report.

During the bulk of the earthworks, vibration, dust and noise monitoring was undertaken in those areas near the residential houses and buildings deemed sensitive receptors, particularly on the southern boundary.

One complaint was received regarding noise generated by the rolling dynamic compaction. Noise monitoring was on-going and the local resident was assured the noise was below the threshold. Moreover, as a result of complaints from the RDC vibration, vibration monitoring was set up in selected back gardens and areas close to residents to assess levels of vibration and ensure set thresholds were not exceeded.

Monitoring data and further detail is included in the AWP validation report in Appendix A of this report. No exceedances of the threshold values were reported by the AWP.

Asbestos air monitoring was undertaken during asbestos hand picking of hotspots 5 and 6. This is described further in Section 2.3.4.

Figure 2-1: Asbestos air monitoring during handpicking

2.3 Task 4: Watching Brief During the Works

Hydrock Consultants Ltd (Hydrock) was commissioned by Harworth to provide a supporting role throughout the enabling works at Stopes Road, which included part time site attendance. Hydrock has prepared reports for each site visit, copies of each report are presented in Appendix D. For details on the location of each source of fill, the final point of placement, weather condition and specific details of compaction methods and material movements on site, reference should be made to the Hydrock site visit reports.

Moreover, Alan Wood and Partners (AWP) was appointed by VHE to work as a specialist designer to assist the planning, managing, monitoring and coordination of the remediation and earthworks. AWP also undertook periodic site visits and have provided a validation report for the remediation and earthworks, which includes all test certificates and as built records.

2.3.1 Mine Entries and Mining Features

Mine Shaft 376407-003 in the centre west of the site was not located during the site investigation and therefore a watching brief during excavation works in this area was advised. During enabling works evidence of mine shaft 376407-003 and any other unrecorded shafts were not recorded.

No mine features or evidence of underground workings were reported during the enabling works.

2.3.2 Landfill Made Ground

Potential landfill material was identified during the initial site investigation and there is a requirement of the earthworks strategy to chase out unsuitable materials. Following the 1.5m excavation in the western part of the site, the landfill Made Ground removed did not appear to be significantly worse or different than the general site wide Made Ground. General deleterious materials including cobbles of brick, concrete, timber, asphalt, aggregates, ash, clinker, tar, timber, plastic, glass, slate and fabric existed in the landfill Made Ground but was separated, collected and stockpiled separately before removal from site.

The soil from the landfill was tested and used as fill on site based on the specification criteria (see Sections 2.8.1 and 3.6.6). Figure 2-2 shows excavation of landfill Made Ground on site. A survey of the base of excavation is provided on VHE drawing VHEJ808-101 included in the AWP Validation Report.

2.3.3 Over-excavation of Peat and Organic Materials

As part of the enabling works strategy the over-excavation and removal of peat and organic soils was required from the northeast corner.

Areas of peat that were found in the centre eastern part of the site were over-excavated and temporarily stockpiled before being placed in the borrow pit in the POS area in the north. Moreover, in some locations, peat was chased out and removed to a greater depth than anticipated in the east and centre east of the site. The location of removed peat and organic material is shown on the VHE drawing reference VHEJ808-102 included in the AWP Validation Report. Hydrock witnessed the excavation, removal and stockpiling of the peat and organic material on site (Figure 2-3). Approximately 2,761m^{3}of peat and organic materials were removed and placed in the borrow pit.

It should be noted that the VHE drawing VHEJ808-102 is not completely clear due to the hatching and shading used. Clarification has been sought with VHE and the blue shading indicates areas where the full planned excavation depth was not completed as natural soils (that don't require excavation) were encountered at shallow depth. The green cross hatching indicates where peat was chased out to a shallower depth than predicted by the previous site investigation. No residual peat or organic soils were left within the development area.

Figure 2-2: Excavation of landfill Made Ground in the centre west.

Figure 2-3: Peat removal in the centre eastern part of the site (southern part of the culvert).

Based on the data provided to Hydrock and the regular site visits undertaken, Hydrock are satisfied that the peat and organic soils have been removed in line with the enabling works requirements.

2.3.4 Asbestos Hotspots – Delineation and Remediation

Details of the hotspots encountered and remediated during the works are provided in Section 8.0 of the AWP Validation Report with a standalone hotspot validation report provided in Appendix G of the AWP report.

As part of the remediation strategy a discovery strategy is in place, facilitated by the site attendance by the VHE design team, in order to identify areas of unexpected contamination during the site strip and excavations.

One asbestos hotspot was identified during the previous investigation (Hotspot 3) and a total of three asbestos hotspots were identified on site as part of the discovery strategy. The three unexpected hotspots include Hotspot 5 in the southwest, Hotspot 6 near the western boundary and Hotspot 9 in the south (Figure 2-4). Asbestos hotspot excavation works were conducted in accordance with VHE Quality Procedure MS010, presented in Appendix A of the AWP report. A location plan of each hotspot is included in the AWP Validation Report (VHE drawing VHEJ808-601 Rev A) with an extract provided below Figure 2-4.

Based on the information provided to Hydrock in the AWP Validation Report and the works witnessed on site, Hydrock are satisfied that the asbestos encountered by VHE has been effectively remediated. However, it should be noted that asbestos containing materials may be present within the ground below the depth of excavation.

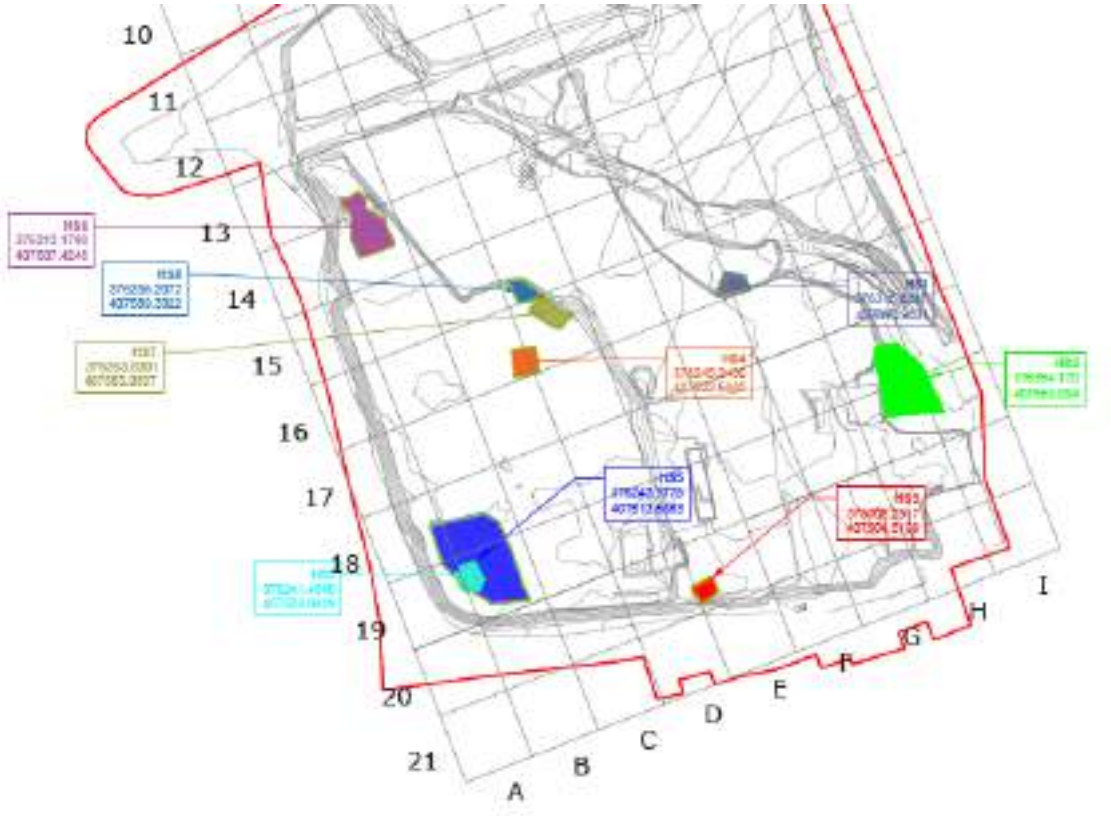


Figure 2-4: Hotspot Locations (extract from VHE drawing 601 Rev B)

Where suitable, the arisings from each of the asbestos hotspots were re-used on site as fill. The locations were recorded by VHE and shown on drawing VHE J808-902 in the AWP Validation Report.

Hotspot 3

Hotspot 3 was found prior to VHE's work commencing and included in the Hydrock Remediation Strategy and Verification Plan report. This hotspot relates to borehole RO12 where asbestos was observed from 0.1m to 0.2m bgl in the form of amosite sheeting/board debris. In addition, asbestos fibres (<0.001%v/v of chrysotile and amosite) were detected in three samples of the Made Ground. An area of 8m x 9m overlying RO12 was excavated by VHE to a depth of 0.5m, a volume of 28m^3 of clean overburden was excavated and stockpiled to one side, 12m^3 of material containing low levels of visible asbestos cement was stockpiled separately and sheeted within close proximity to the hotspot to reduce the plant requirement for the task. Validation samples were then obtained from the side and base of the excavation. Both the excavation and sheeted asbestos containing material were surrounded by fencing with ample signage. The excavation photos can be found in Appendix 4 of the Hotspot Validation report included as Appendix G in the AWP Validation Report.

Asbestos air monitoring was carried out during the works. An airborne fibre concentration of <0.005F/ml were reported. This is indistinguishable to ambient fibre levels. A copy of the report is provided in Appendix K of the AWP Validation Report.

The location and details of all validation samples obtained and sent for laboratory testing are presented in Appendix G of the AWP Validation Report.

In conclusion, asbestos was not detected in the validation samples. Following the picking works and sampling of the residual arisings, material from Hotspot 3 was reused and placed in grid squares B18 and B19 at a depth of 2.0m below finish ground level.

Hotspot 5

Hotspot 5 was found in the southwest part of the site during the earthworks. Asbestos cement sheeting was identified in the excavated material. Asbestos containing Material was left in situ and the surrounding ground with no asbestos was excavated and used as fill. The material left in situ is estimated to be around 120m^3. Approximately 1,000Kg of asbestos containing material was hand-picked by a qualified subcontractor between 31/08/22 and 02/09/22.

Asbestos material was disposed of in a licenced facility, organised by the subcontractor.

Following the picking works and removal of visible asbestos, samples were taken from the material to assess the suitability of the material for reuse. The results indicated no concentrations of asbestos fibres. As a result, the material was used as fill at depth within the 3m over dig area (VHE Area 3).

Hotspot 6

Hotspot 6 was discovered near the western boundary during the earthworks. Asbestos cement sheeting and small amounts of fibrous lagging were identified in the material. Works were suspended due to the presence of fibrous lagging, and a qualified subcontractor was contacted to evaluate the material and provide a remedial solution. It was agreed that works could be continued as a non-licenced work due to the relatively small amounts of fibrous material.

Asbestos containing material was left in situ and the surrounding ground which was free of asbestos was excavated and used as fill. The material left in situ was estimated at 160m^3. Approximately 2,328Kg of Asbestos Containing Material was then hand-picked by an appropriately qualified subcontractor between 12/09/22 to 22/09/22. Asbestos material was disposed in a licenced disposal facility, organised by the subcontractor. The results of the laboratory testing are presented in Appendix 1 of the VHE Hotspot Validation report included as Appendix G of the AWP Validation Report.

Following hand-picking and removal of visible asbestos, the material was resampled to assess the fibre concentration and the suitability of the material for reuse. The results of the testing indicated that the material was suitable for use as fill within the enabling works.

Hotspot 9

Hotspot 9 was encountered while excavating a sump drain. The excavator which undertook the excavation exposed asbestos containing materials at the base of the excavation, which were brought to the surface. Samples were transferred for testing and asbestos fibres were found in the soil at a level of 0.39%.

The asbestos containing soils were sent to an area covered with visqueen. A total of 8m^3 of asbestos containing material was removed to a suitable disposal facility on 22/5/23, organised by the Contractor. A total of five validation samples were taken from the sides of excavations and the base of excavation and the results confirmed that the impacted material was restricted to the area of the sump drain. The relevant consignment notes and test reports can be found in Appendix 2 and 3 of the VHE Hotspot Validation Report included as Appendix G the AWP Validation Report.

2.3.5 Hydrocarbon Impacted Soils

During the watching brief a further three hydrocarbon hotspots were encountered during excavation of the Made Ground. This is further discussed in Section 2.6.3.

2.4 Task 5: Demolition, breaking out of hardstanding and below ground obstructions and below slab inspection.

The breaking out of hardstanding and removal of below ground obstructions was undertaken by VHE prior to remediation and excavation across the site area. The material removed comprised the following broad categories:

- Concrete, broken out from the former floor slabs and foundations;
- Brick derived from the block paving, Made Ground and underground structures; and
- Redundant underground services, drainage and ducting.

The following figures present examples of the structures and hardstanding broken out on site.

Figure 2-5: Concrete from general site surface removal

Figure 2-6: Asphalt from surface and exposed subgrade

Figure 2-7: Example of concrete from surface in the centre of the site

Figure 2-8: Example of asphalt from surface in the centre of the site

Figure 2-9: Metal and plastic in the excavated concrete

Figure 2-10: High voltage live electricity cables exposed in excavation

Figure 2-11: Concrete, bricks, plastic and metal in excavation of landfill Made Ground in the northwest of the site.

Figure 2-12: Residual Made Ground at the formation of the 1.5m over-excavation

Concrete and hardstanding materials were broken out and stockpiled ready for processing (see Section 2.8.1)

Due to the sensitivity of the surrounding areas and the weather conditions during the summer months, dust suppression measures were implemented those days when the dust could be carried off site from the breaking and earthworks operations. The dust measures comprised water mist spray fans directed at the areas being broken out and a tractor bowser damping the major haul routes.

2.4.1 Abstraction Boreholes

Two historical abstractions wells were shown to be present on site. Previous investigation failed to locate them and therefore location and treatment formed part of the enabling works. Reference should be made to Hydrock Technical Note reference 15220-HYD-XX-ZZ-RP-GE-0009 for details. Abstraction well no.1, with national grid reference 376330E, 407550N thought to be located in the south of the site was not found during the enabling works. The investigation conducted during the enabling works comprised a 10m x 10m reduced level excavation centred on the coordinate location. No evidence of an abstraction borehole was recorded (see Figure 2-14).

The second historical well was encountered at national grid reference 376219.369E, 407619.724N during the earthworks. The well was dipped by VHE at 4m deep. The discovered abstraction well

was disused and considered to be a very low risk. Given the relatively shallow depth, Hydrock suggested that to decommission this feature the appropriate solution would be to excavate. Hydrock proposed to decommission the abstraction borehole in line with Environment Agency, 2012, 'Good practice for decommissioning redundant boreholes and wells'. The guidance and schematic of well decommissioning options were elaborated on in the Hydrock Technical Note reference 15220-HYD-XX-ZZ-RP-GE-0009-P01-S2.

After consulting Hydrock, VHE contacted specialist contractor M&J Drilling Services Ltd to undertake decommissioning of the abstraction well by grouting. The abstraction well no.2 was drilled out and found to be 16m deep. Approximately 0.55 tonnes of grout was used to infill the well and the well was backfilled to approximately 4m below final finished level where it was cut off.

Details of the grouting and the drillers logs are provided in Section 11.0 of the AWP Validation Report. Hydrock was not present during grouting of the abstraction well but did observe the completed grouting when cut off at 4.0m below ground level (Figure 2-13).

Figure 2-13: Grouting of abstraction well completed in Grid B11

Figure 2-14: Investigation of Abstraction Well 1 (blue arrow) not located

2.4.2 Culvert Repair

A 275mm diameter culvert crosses the northern part of the site from east to west.

Following removal of the surface soils and during the site excavation, a depression in the formation was observed near the culvert. Works were stopped in this area and an excavation was undertaken to investigate the cause of the depression. As a result a 3m section of the culvert was damaged. The section of damaged clay pipe was replaced with a 3.1m length of 275mm diameter HDPE pipe connected at both ends of the culvert with band sealing couplings.

Details of the culvert repair including the surveyed location are shown in the AWP Validation Report on drawing VHEJ808-011 Culvert Repair.

During the second phase of works between October and November 2023, it is intended for the culvert to be replaced in its entirety. It is understood that all works, including the new culvert location, are within the existing easement and therefore an area not subject to remediation. As such, these works do not impact the validation of the remediation and enabling works at the site as the culvert will remain a constraint to the development. At the time of writing works to replace the culvert are on-going and programmed to be complete in early December 2023.

2.5 Task 6: Excavation and probing to locate mine shafts present within the site boundary

The site has a legacy of coal mining from a number of seams present below the site. The Phase 1 and Phase 2 investigations and Coal Mining Risk Assessment indicated the presence of four recorded mine entries within the site boundary.

Hydrock was commissioned to carry out works to further investigate and potentially locate (or confirm the absence of) the four mine shafts that, based on Coal Authority (CA) records, are present at the site. Full details of investigations can be found in Hydrock's technical note reference 15220-HYD-XX-XX-RP-GE-0011-P04. These works were completed over two investigation phases, in accordance with Hydrock fee proposal documents Ref. C-15220-FP-GE-0007 and C-15220-FP-GE-0012.

The two phases of works have proven the following:

- Shaft reference 376407-002 in the northwest 3m outside boundary of the site is a recorded shaft by the Coal Authority. The shaft is on third party land and was not able to be investigated. Further risk management will be required as part of the development. A recommendation has been made for restricted access to the northwestern corner of the site.
- Shaft reference 376407-003 is located in the northwest of the site and was investigated by the drilling of 365 probe holes covering a 10m departure radius from the Coal Authority recorded co-ordinate. The shaft was not located. This was discussed with the Coal Authority and the investigation concluded that there is a low risk of a mine shaft being present. Additional watching brief was undertaken during the enabling earthworks to identify any evidence of the shaft and none was recorded (see Section 2.3.1). However, subsequent communication with the Coal Authority identified a new coordinate approximately 6m north of the original position. Additional ground investigation was completed in August 2023, which did not record evidence of the shaft. The Coal Authority database has been updated to reflect this.
- Shaft reference 376407-006 was identified on site at the surface. It appears to have been loosely backfilled, is brick lined and has an internal diameter of 2.9m. This shaft was treated by Specialist Contactor Van Elle on behalf of VHE as part of these works. Further details are provided in Section 4.
- Shaft reference 376407-007 was identified by probing on site. The top of the shaft is likely to be set within the rockhead at approximately 5.0m - 6.0m bgl, and has a diameter of 3.0 - 4.0m, but unable to be fully constrained further due to electric cables in the vicinity. This shaft was treated by Specialist Contactor M&J Drilling on behalf of VHE as part of the second phase of works. Further details are provided in Section 4.
- Shaft reference 376407-008 was identified by probing on site. The top of the shaft is likely to be set within the rockhead at approximately 5.0m bgl, and has an approximate diameter of 3.0m. This shaft was treated by Specialist Contactor M&J Drilling on behalf of VHE as part of the second phase of works. Further details are provided in Section 4.

2.6 Task 7 and 8: Hotspot delineation and removal of petroleum hydrocarbon impacted soils

Two hydrocarbon hotspots were encountered in the southeast of the site during the previous site investigation and required remediation. This is detailed in the Hydrock Remediation Strategy and Verification Plan and the location shown on Hydrock Drawing 15220-HYD-XX-XX-DR-GE-1017. Hotspot 1 relates to historical TP216 and WS01 and Hotspot 2 relates to TT03A. Hotspot 2 was partially remediated and validated by Hydrock prior to VHE commencing works on site. This is detailed in Hydrock report 15220-HYD-XX-XX-RP-GE-0010-P01.

Hotspot validation, including the presentation of results, is discussed in detail in Section 8.0 and Appendix G of the AWP Validation Report and Section 5.0 and Appendix E of the AWP Addendum Report.

2.6.1 Hotspot 1 (WS01/TP216)

As detailed in the Hydrock RSVP reference 15220-HYD-XX-XX-RP-GE-0006-P03-S2, a hotspot of petroleum hydrocarbons was identified at WS01 between 1.20m bgl and 1.60m bgl. Chemical testing confirmed exceedance of both aliphatic and aromatic fractions at 1.30m and 1.40m bgl. Further supplementary ground investigation found the petroleum hydrocarbons to be localised within WS01 and the adjacent TP216 where hydrocarbon impact has occurred between 1.60m and 2.60m bgl. This localised hydrocarbon contamination was thought to be associated with the former location of a tank.

Hotspot 1 was excavated by VHE between 07/06/22 and 08/06/22 under the supervision of AWP who coordinated the removal of visual and olfactory clean and contaminated materials. The excavation was extended as required to remove potentially contaminated materials. The remediation excavation measured approximately 10m x 5m with a maximum depth of 2.7m on completion. A slight hydrocarbon odour was noted during excavation.

On completion of the excavation, the hotspot was visually inspected by Hydrock and the AWP representative to agree that visual and olfactory evidence of contamination had been removed. Ten validation samples were taken from the base and sides of the excavation in accordance with the remediation strategy and compared against the remedial target values. The testing demonstrated that all hydrocarbon impacted material had been removed as far as possible.

All excavated hydrocarbon contaminated materials were taken to the designated stockpiling area. Out of an excavation volume of 135m^3 the volume of impacted material was 29m^3. This material was sampled for further assessment.

Excavated contaminated material was stockpiled separately on an impermeable membrane to prevent any cross contamination. This was overturned to allow volatilisation in accordance with RPS215. Additional samples were taken from this material and reported no exceedances of the petroleum hydrocarbon re-use criteria. The material was then approved for reuse as fill and placed at a depth of approximately 2.0m below the finished ground level in grid squares B18 and B19.

In conclusion, Hydrock consider the hotspot was fully delineated with no further risk posed to proposed development subject to implementation of the construction phase mitigation measures. Details of all validation samples, laboratory analysis and excavation surveys can be found in the AWP Validation Report reference JMS-SR-BK-47366-RP003 Rev B.

2.6.2 Hotspot 2 (TT203A and underground tanks)

Historical tanks are known to have been present on the site from historical mapping, as detailed in the Phase 1 Desk Study ref: 15220-HYD-XX-XX-DR-GE-0010.

During the investigation evidence of hydrocarbon contamination was also found in TT203A. Visual and olfactory observations included strong hydrocarbon odours and evidence of black oil in three strata between 0.55m and 2.00m bgl. Chemical testing confirmed both aliphatic and aromatic fractions between 0.60m and 0.70m bgl. The hotspot is associated with an historic tank location and associated fuel lines, and subsequent ground investigation works for coal mining discovered a large tank in the immediate vicinity. Given the extent of live services surrounding, these services will require disconnecting and to be cut off prior to removal of the tank and delineation of the associated hotspot. This is reported in the Supplementary Ground Investigation Report ref: 15220-HYD-XX-XX-RP-GE-0004.

The procedure for the removal of the tank in line with Hydrock's Remediation Strategy is presented in Section 3 of the 'tank discovery during Mine Shaft Investigation Technical Note reference 15220-HYD-XX-XX-DR-GE-0010-P01.

Tank removal validation work was coordinated by Hydrock and is presented in building 1 demolition watching brief and fuel tank validation technical note reference 15220-HYD-XX-XX-DR-GE-0014-P02. A Hydrock engineer completed a watching brief during the removal of the below ground fuel tank; the works were undertaken by Demolition Services Limited. Hydrock's role was to ensure compliance with Coal Authority Permit 22581 regarding Shaft 376407-007. The removal was completed over 2 days between Wednesday 27th and Thursday 28th April 2022.

Soils from the base and sides of the tank excavation were sampled. All samples, with one exception (sample V2), returned results below the limit of detection (LoD) for all THP-CWG bandings. Sample V2, on the southern side of the excavation at 2.0m bgl, returned results below the LoD for all except 2 bandings; Aromatic >EC5 - EC7 and Aromatic >EC8 - EC10. The results were 0.003 mg/kg and 0.019 mg/kg respectively, which are significantly below the Remedial Target Values (RTVs) of 150 mg/kg and 84 mg/kg respectively.

However, the Hydrock excavation works were constrained by the presence of live services and as such additional validation was completed by VHE. As part of the excavation works AWP obtained additional samples on the southwestern side of the hotspot to determine the extent of any further hydrocarbon contamination. The works undertaken are detailed in Appendix G of the AWP Validation Report.

As part of the second phase of enabling works, including the treatment of Shaft 007, further excavation and delineation of Hotspot 2 was undertaken by VHE. These works are detailed in Appendix E of the AWP Addendum Report, which includes an updated survey drawing. This allowed the hotspot to be fully delineated and included validation sampling at the sides and base (additional 4 samples). A total of 381m^3 of contaminated material was excavated and removed from site as there was insufficient time to allow ex-situ remediation. The material was replaced by imported granular material.

As part of these works it was confirmed by VHE that the electric cables the ran through this area were redundant and so have been removed as far back as the limit of excavation. This is shown on the updated Excavation Constraints drawing VHEJ808-401 Rev E, included in the AWP Addendum Report.

Based on the works completed to date, Hydrock can confirm that the contaminated soils associated with the tank and tank infrastructure in the immediate vicinity have been removed from the hotspot and the soils at the base and sides of the excavation are validated. However, potentially impacted soils within the easement of the live services have not been removed.

2.6.3 Additional Hydrocarbon Hotspots encountered during the Watching Brief

Additional hotspots encountered during the watching brief are detailed in Appendix G of the AWP Validation Report with the locations shown in Figure 2-4.

Hotspot 4

Visual and olfactory evidence of hotspot 4 was discovered during the earthworks in grid square C13. The hotspot was completely removed on 14/07/2022 and validation samples of the sides and base of the excavation were taken. Validation samples did not indicate hydrocarbon concentrations in exceedance of the approved re-use criteria as detailed in section 6.5 of the Hydrock Remediation Strategy and Verification Plan and therefore further excavation was not required. The excavation measures approximately 8m x 8m x 0.8m deep and comprised 36m^3 of impacted material.

Three samples were taken from the stockpiled material and indicated no exceedance of the remedial target values. As a result, this material was approved for reuse as fill and placed at a depth of 2.0m below finished ground level in grid squares B18 and B19. Therefore, Hydrock consider that Hotspot 4 was fully delineated and excavated by VHE and poses no further risk to the development subject to completion of construction phase remediation.

Hotspot 7

Visual and olfactory evidence of hotspot 7 was discovered during the earthworks in grid square D15 in the form of suspected tars. The hotspot was removed and validation samples of the sides and base of the excavation were taken. The in situ validation samples did not show hydrocarbon concentrations in exceedance of the validation re-use criteria and no further excavation was required. The excavation measures 10m x 7m x 1.2m deep and comprised approximately 80m^3 of impacted material.

Excavated contaminated material was stockpiled separately and lined with Visqueen to prevent cross contamination with material on site. The initial testing of the arisings indicated elevated concentrations of hydrocarbon contamination (TPH EC16-EC21). In accordance with the VHE remediation methodology the material was turned periodically to allow volatilisation. Stockpile testing continued until the recorded concentrations reduced to below the remedial target limits. The material was then approved for re-use on site in the earthworks.

Based on the works witnessed by Hydrock on site and the data provided by AWP in relation to Hotspot 7, Hydrock are satisfied that the requirements of the remediation strategy have been met.

Hotspot 8

Visual and olfactory evidence of hydrocarbons at hotspot 8 was noted during the earthworks and included a sheen observed on groundwater. The hotspot was removed completely and validation samples of the sides and base of the excavation were taken. The insitu validation samples did not indicate hydrocarbon concentrations in exceedance of the provided petroleum hydrocarbon hotspot validation re-use criteria and further excavation and delineation was not required. Excavated contaminated material was stockpiled separately and lined with Visqueen to prevent cross contamination. Subsequent testing of the arisings showed significant exceedance of TPH reuse criteria and ex situ remediation was not considered appropriate. As such the material was removed from site to a licensed waste disposal plant due to failing the reuse criteria.

Material in the vicinity of Hotspot 8 also contained asbestos cement sheeting found in an isolated area adjacent to Hotspot 7. Material containing asbestos was left in situ and the surrounding ground which was free of asbestos was excavated and employed as fill. The material left in situ estimated roughly 13m^3. Visible asbestos containing material was hand-picked by a qualified subcontractor between 31/08/22 and 02/09/22 and disposed in a licenced disposal facility, organised by the subcontractor.

Sampling of the arisings indicated significant concentrations of asbestos fibres between 0.014 and 0.436% and as such the material was removed from site.

Based on the works witnessed by Hydrock on site and the data provided by AWP, Hydrock are satisfied that the requirements of the remediation strategy have been met with regards to works associated with Hotspot 8.

2.7 Task 9: Treatment of Mine Entries

In order to prepare the site for the proposed new residential development treatment of mine entries at the site is required. At the time of tender only shaft reference 376407-006 had been positively identified and as such only provisional items were included for the remaining mine entries (shafts 376407-007 and 008). Further details are provided below and in Section 4.

2.7.1 Shaft 376407-006

Van Elle were commissioned by VHE as a specialist contractor to prepare a design and specification for the treatment. This specification was accepted and approved by VHE, the local planning authority and The Coal Authority (permit reference 25705). The design of the treatment is presented in Van Elle (VE) report reference 221883, dated July 2022.

The treatment were undertaken in accordance with the specification prepared by VE and CIRIA guidance C758 on the treatment of shallow mine workings.

In total, 4 no. stabilisation boreholes were drilled within the shaft backfill to a depth of 100m. Over the period from 6th October and 7th November 2022, approximately 1,029 tonnes of grout was injected into the shaft. This was more than was expected and it is considered likely that some of the grout could have found pathways outside of the shaft. Figure 2-15 shows treatment of shaft 006.

Figure 2-15: Grouting shaft no.006 in eastern part of the site by Van Elle

In conclusion, the shaft no. 367407-006 was treated in accordance with the specialist contractor's design. Van Elle completion report reference VE 221883 – PS3426 V1 dated 02.12.2022 is provided in Appendix B of this report. Further details of shaft treatment are provided in Section 4.

2.7.2 Shaft 376407-007 and 376407-008

The treatment of shafts 007 and 008 was completed in October 2023 by M&J Drilling in accordance with the design and specification prepared by AWP (reference JS/AHB/SR/47366-TN101). The treatment comprised drilling and grouting to stabilise the infill.

The works are detailed in the AWP Mineshaft Treatment Validation Report in Appendix B.

Both shafts were drilled and grouted to the full depth of 76m bgl for shaft 007 and 86m bgl for shaft 008. The total grout take was approximately 200 tonnes and included two validation boreholes per shaft, which had no significant grout take beyond infilling the borehole. Figure 2-16 and Figure 2-17 shows the rig and drilling platform set up at each shaft location.

In conclusion, shafts 007 and 008 were treated in accordance with the Specialists Design. Further details of shaft treatment are provided in Section 4.

Figure 2-16: Drilling rig set up on shaft no.007

Figure 2-17: Drilling rig set up on shaft no.008

2.8 Task 10 and 11: Excavation to required formation level, stockpiling and re-use of soils

Soils on site were excavated to reach the required formation level in accordance with a cut to fill model and placement of fill was in accordance with an earthworks specification. Excavated materials were stockpiled and tested to determine their fate (on-site re-use or off-site disposal) in accordance with a Materials Tracking System which was formulated by the contractor. The Principal Contractor, VHE, managed the works in accordance with relevant legislation. Any areas of unexpected contamination encountered during excavation works were dealt with in line with the Discovery Strategy at Appendix C and the relevant Task 7 and 8 in the Hydrock Remediation Strategy and Verification Plan (RSVP).

The enabling works strategy required the over-excavation of all Made Ground to a minimum of 1.5m and 3.0m below ground level (final ground level in areas of cut and original ground level in areas of fill) as shown on the Hydrock drawing 15220-HYD-XX-XX-DR-GE-6001 in the GDR. The base of excavation survey is shown on VHE drawing reference VHEJ808-101 included in the AWP Addendum Report. Where natural soils were recorded at shallower depths than stated above the excavation was terminated in accordance with the GDR. These areas are highlighted in blue on VHE drawing reference VHEJ808-102 Rev B in the AWP Addendum Report and include the majority of the eastern half of the site as generally anticipated in the GDR.

Reuse of soils was undertaken in accordance with the CL:AIRE 'Development Industry Code of Practice - Definition of Waste' i.e. in accordance with the approved Materials Management Plan (MMP) reference 15220-HYD-XX-XX-RP-GE-0012.

For reusing material in accordance with an MMP, segregation and stockpiling of soils was based on the following broad suitability criteria:

- Concrete, brick and asphalt that could be processed into an aggregate.
- Made Ground soils potentially suitable for reuse on site (below clean cover) for landscaped areas, buildings and hardstanding areas.
- Soils unsuitable for use (e.g. untreated petroleum hydrocarbon hotspots or soils containing gross ACM. These were disposed of off-site).
- Natural soils excavated from the Glacial Till or weathered Coal Measures.

Soils that were reused on site were recorded by the Contractor and accompanied by supporting excavation and placement logs. Details of the volumetrics and material movements will be provided in a separate MMP verification report.

Bulk excavation of the Made Ground and Glacial Till was undertaken. In parts of the site, specific excavations were undertaken for the following:

- Identification and removal of obstructions, obstructions such as redundant foundations were identified at the base of the over-excavation and removed.
- The presence of TPH contaminated material; Hydrocarbon hotspot excavation works were conducted in accordance with VHE Quality Procedure MS009, presented in Appendix 2 of the AWP report;
- The presence of asbestos containing material; Asbestos hotspot excavations works were conducted in accordance with VHE Quality Procedure MS010, presented in Appendix 2 of the AWP report;
- The presence of low strength unsuitable material, Peat and organic material were excavated in the eastern part of the site. Depth of peat and organic material excavation were typically between 4m and 1.5m respectively. Low strength Glacial Till was excavated in the southeast and POS area in the north;
- The presence of soft spots. Following the removal of surface covering, hardstanding and topsoil, reduced level excavation in Made Ground and proof rolling, localised soft spots were identified at the cut formation and base of excavation. The definition of a soft spot is a material with a CBR value of less than 2.5%. In addition, areas where the on-board E_{vib} values from the RDC recorded <20MN/m^2 were recorded as 'soft spots' and were treated in accordance with the specification. The 'soft spots' were excavated to either their full depth or to 1.0mbgl, based on whichever is lesser. Appendix I of AWP verification report, presents 'soft spots' location, extent and actions taken to remediate (this is detailed further in Section 3.5.2).
- The presence of deep Made Ground; Landfill Made ground was excavated in the west to 1.5m depth. Landfill Made Ground comprised unsuitable material including tyres, timber, asphalt and over-size materials. Deeper Made Ground associated with former backfilled excavations was excavated in the southwest to 3m depth. General Made Ground was excavated across the majority of the site to 1.5m unless natural deposits were encountered in the cut.
- To facilitate treatment of the residual Made Ground following the over-excavation Rolling Dynamic Compaction (RDC) was carried out. This was undertaken in the areas of the site where there was residual Made Ground greater than 1m thick following the site-wide over-excavation of Made Ground in the western half and southeast of the site. The proposed overdig area is shown on the Ground Improvement Plan drawing (ref: 15220-HYD-XX-XX-DR-GE-6001) in Appendix B of the Hydrock GDR. Further details are described in the Ground Improvement Section in Section 3.5.

Example photographs of the excavations are shown in Figure 2-18 and Figure 2-25.

Figure 2-18: Excavation and stockpile of asbestos hotspot 3

Figure 2-19: Excavation and stockpile of asbestos hotspot 5

Figure 2-20: Excavation and Stockpile of potentially asbestos contaminated material hotspot 6.

Figure 2-21: Excavation and hand picking of asbestos hotspot 5.

Figure 2-22: Excavation and hand picking of asbestos hotspot 6

Figure 2-23: TPH hotspot 1 excavation

Figure 2-24: Excavation of material down to natural soils in the vicinity of shaft 007

Figure 2-25: Commencing excavation of material in the vicinity of shaft 008

2.8.1 Stockpiling during excavation

Stockpiling and segregation of excavated and treated materials is an intrinsic part of the materials management process on site. A number of stockpiling designations have been used onsite for materials excavated and re-used, comprising:

- Metal, wood and plastic;
- Peat and organic material for backfilling borrow pit;
- Concrete, bricks, asphalt and hardstanding: Materials for crushing and processing;
- 6F1/6F2: Crushed and screened hardstanding materials;
- Fine material from crusher;
- Granular (limestone) Made Ground;
- Dark ashy general fill material;
- General Made Ground;
- Topsoil;
- Unsuitable wet and low strength material originated after excavation of soft spots and Glacial Till.
- Materials with no significant visual and olfactory evidence of contamination, which were stockpiled for testing and reuse.
- Materials with significant visual and olfactory evidence of contamination, which was stockpiled for TPH and asbestos testing.
- Untreatable materials with significant visual and olfactory evidence of contamination, which was disposed directly off-site.

During the earthworks the stockpiles were predominantly segregated as follows:

- Potentially contaminated stockpile (visual and olfactory evidence) to be treated and tested prior to re-use;
- Unsuitable material to be disposed of off-site or to be used in backfilling of borrow pit;
- Suitable Made Ground;
- Topsoil;

In addition, the natural soils were segregated based on colour and geology (i.e. yellow, brown gravelly clay of the Glacial Till).

Regular stockpile survey drawings and weekly volumetric analysis were provided to Hydrock by the Contractor. A record of the survey drawings and weekly measure sheets will be collated within the MMP Verification Report.

Demolition and excavation stockpile examples are provided in Figure 2-26 to Figure 2-43.

Figure 2-26: Concrete, bricks and asphalt stockpile

Figure 2-27: Scrap metal stockpile to be removed from the site

Figure 2-28: Wood stockpiled for removal from site

Figure 2-29: Stockpile of excavated general Made Ground

Figure 2-30: Granular Made Ground and landfill Made Ground stockpiles

Figure 2-31: 6F2 selected granular fill stockpiling for reuse

Figure 2-32: Peat stockpile

Figure 2-33: Stockpiles of topsoil and unsuitable materials

Figure 2-34: Organic material and peat stockpiles

Figure 2-35: Stockpile of low strength Glacial till

Figure 2-36: Fine material from crusher stockpile.

Figure 2-37: Potential asbestos contaminated material stockpile from hotspot 5

Figure 2-38: Potential TPH contaminated soil from the tank hotspot excavations (Hotspot 2)

Figure 2-39: Stockpile of potentially contaminated sand material from the tank excavation at Hotspot 2

Figure 2-40: Stockpile of potentially contaminated material from hotspot 4 (TPH)

Figure 2-41: Excavation of TPH hotspot 1.

Figure 2-42: Stockpiling and segregation of materials as part of the second phase of works

Figure 2-43: Stockpiling and segregation of materials as part of the second phase of works

The approximate location and movement of the stockpiles and general comments on materials management are presented on the Hydrock Site Visit Records in Appendix D.

However, this does not contain accurate volumetric information. Stockpile surveys and material tracking records from the Contractor will be provided in the Materials Management Plan (MMP) Verification Report.

2.8.2 *Material Testing and Validation*

In addition to the geotechnical testing required in the Earthworks Specification and the specific testing required as part of hotspot removal and ex-situ remediation, the following chemical testing is required to allow general re-use of soils.

» General chemical testing suite including ACM.

Routine chemical testing in accordance with the GDR and the RSVP is to be sampled at a rate of 1 test per 1,000m^3 of soil to demonstrate that the excavated materials contaminants that require further remediation. Geotechnical suitability of soils is discussed further in Section 3.

Excavation and placement works were undertaken in accordance with a Materials Management Plan (MMP) in line with CL:AIRE's 'Definition of Waste Code of Practice' Version 2, dated March 2011.

Figure 2-44 and Figure 2-45 shows general reuse and processing of site won material.

Figure 2-44: Class 2A/2B filling using site-won material

Figure 2-45: Class 6F2 material produced following screening

The materials used on site were all site-won. Validation testing of stockpiles following processing, was undertaken in general accordance with the Geotechnical Design Report, Appendix 1/5 and the RSVP.

The results of the validation sampling of the stockpiles are discussed in Section 7.0 and presented in Appendix F of the AWP Validation Report provided in Appendix A. A review of the minimum frequency of chemical testing is presented in Table 2-1.

Table 2-1: Assessment of Frequency of Chemical Testing for General Re-Use

Material Reference	Volume of Material not requiring separate treatment	Number of Chemical Tests Required	Number of Tests Undertaken
Ash Made Ground	47,000 m^3	47	56
Natural Clay	11,000 m^3	11	18
Gravel/ subbase	4,000 m^3	4	13

Material Reference	Volume of Material not requiring separate treatment	Number of Chemical Tests Required	Number of Tests Undertaken
6F2	6,000 m^3	12*	12
Site won Made Ground as part of second phase works	360m^{3**}	1	1

frequency of 1/500m³

****remainder of fill comprised imported primary 6F5 and no chemical testing was required***

For the soils used during the earthworks, one samples tested above the RTV for TPH in grid square C13. This grid square was then isolated and recorded as hotspot 4. The sample showed exceedance of aromatic EC16 - EC21 band at 650 mg/kg against the RTV 550mg/kg. The details of hotspot 4 can be found in the AWP report and are discussed in Section 2.6.3.

A validation summary of the stockpiled material is presented in Table 7-2 of the AWP Validation Report. Review of the data demonstrates no elevated levels of chemical of potential concern and no specific remediation is required. Further mitigation is required as part of the construction phase in the form of a clean cover system in areas of soft landscaping.

On the basis of the above, the fill material re-used on site, where specific treatment was not required, is in accordance with the RSVP and is considered chemically suitable for use.

2.8.3 Assessment of Combustibility of Re-used Soils

The site and surrounding area have a history of coal mining and the surface extraction of clay to supply the local brickworks. These activities have resulted in the deposition of Made Ground and surplus soils at the site.

The ground investigation report describes the materials as:

- Very loose to medium dense sandy gravel / gravelly sand of ash, cinders, clinker and shale along with occasional brick, concrete, sandstone and coal; and
- Interbedded cohesive and granular fill of soft to very stiff sandy gravelly clay and loose to dense sandy clayey gravel / gravelly sand with gravel of ash, clinker, mudstone, sandstone, brick, concrete, plastic, quartzite, ceramic and aggregates.

Some of the materials have been derived from the coal mining industry and therefore an assessment of the combustion risk has been undertaken.

As part of the ground investigation two tests for calorific value (CV) were undertaken on samples of the Made Ground. It is generally considered that materials with a CV of 10MJ/kg or greater are highly likely to be combustible and material with a CV above 7MJ/kg are at increased risk of smouldering. CV of around 2Mg/kg or less are not likely to burn.

Samples at the site returned CV values between 0.93 and 2.56MJ/kg and are therefore considered to be at low risk of smouldering or spontaneous combustion based on this test criteria.

Furthermore, the ground improvement works at the site, including dynamic surface compaction of residual Made Ground and compaction of fill in layers, is considered to have significantly reduced the risk of ignition by limiting the availability of oxygen.

On completion of the works, the site will include the construction of buildings and areas of hardstanding. In garden areas there will be a minimum cover of 0.60m of inert imported material providing a further level of protection.

On the basis of the above assessment, the material is considered a low risk of combustion with the risk further reduced by the ground improvement and following development. This hazard is included in the updated risk register in Appendix E.

2.9 Task 12: Off-site disposal of geotechnically or environmentally unsuitable material

All materials deemed to be unsuitable for reuse on the site as part of the remediation and earthworks were disposed of off-site. Further detailed information regarding the disposal (including waste transfer notes) is provided in Appendix G and H of the AWP Validation Report in Appendix A of this report and in Appendix E the AWP Addendum Report in Appendix C.

The majority of fill materials used in the fill operations were sourced from on-site locations and were suitable for use in their placed locations as either Class 2A/2B/2C (Cohesive General Fill); 1A (Granular General Fill); or Class 6F2 for the running layer. A small volume of 6F5 was imported as part of the second phase of works (Table 3-3).

VHE have recorded the following chemically and geotechnically unsuitable materials removed from site, as summarised in Table 2-2.

Table 2-2: Summary of Materials Removed from Site

Material Type	Approximate Amount	Disposal Location (waste management licence)
Arisings from hotspot 5, 6 & 8 (asbestos)	3,328kg	MCP Environmental Limited (EPR/UP3498VG)
Asbestos hotspot 9 arisings	8m^3	Whitemoss Landfill Ltd (EPR/DP3639LM/V005)
TPH hotspot 8 material	20m^3	Provectus Soils Management Ltd (EPP/3891EL/A001)
Material with a high moisture content (second phase of works)	1,134m^3	Booth Ventures Ltd, Harwood Quarry, Bolton BL2 4LT (EPR/BV8741IL)
TPH hotspot 2 material (second phase of works)	381m^3	

2.10 Task 13: Validation during Enablement Works and Reporting

Earthworks and remediation was completed by VHE between May 2022 and November 2023 and validation was provided by AWP on behalf of VHE reference JMS-SR-BK-47366-RP004 Rev B and addendum report JMS/SR/JP/47366-RP006 Rev A. AWP was separately employed by VHE in order to provide site supervision, specialist geotechnical and geo-environmental advice and consultancy design services. Validation sampling of the remedial excavations and stockpiles were undertaken by VHE in general accordance with Hydrock's RSVP. Review of the data by Hydrock and inspection of the site as part of the watching brief demonstrates that the remedial activities during the enabling phase is compliant with the targets set in the RSVP. Reference should be made to the AWP validation in Appendix A and Appendix C for detailed information. The Hydrock site visit reports are provided in Appendix D.

3. EARTHWORKS AND GROUND IMPROVEMENT

The specification for the testing and placement of materials at the site is provided in AWP report reference JS/AC/47366-Rp002 Rev A, which is based on Appendix A of the GDR (Hydrock report reference 15220-HYD-XX-XX-RP-GE-0005-S2-P03). The basis for the earthworks specification is the Manual of Contract Documents for Highway Works (MCHW), Volume 1, and Specification for Highway Works (SHW) Series 600, published by TSO, amended February 2016.

In summary, the earthworks included the over-excavation of Made Ground to a set level of 1.5m and 3.0m below ground level and unsuitable natural soils (with remediation works as described in Section 2) and removal and processing of hardstanding and obstructions for use as a geotechnically suitable fill to form the development levels.

For the purposes of the works undertaken by VHE the site was constructed to the Enabling Works Formation Level (EWFL) as shown on VHE drawing VHEJ808-202 Finished Levels.

The earthworks were constructed using fill derived from site-won material, including remediated and processed Made Ground and natural soils. A small volume of 6F5 was imported as part of the second phase of works. The final surface (at EWFL) was completed with a 150mm running layer of 6F2 graded granular material derived from the processing and crushing of hardstanding and below ground structures.

The volumetric analysis provided by VHE is summarised in Table 3-1. The area reference relates to the VHE working areas as shown on drawing VHEINT – 003 and reproduced as Figure 3-1.

Table 3-1: Excavation and Fill Volumes (J789 VHE_MMP Tracking Form and Measure Sheet Client Issue)

Area Reference	Material Source Volume		
	Cut	Fill	Difference
	(m^3)	(m^3)	(m^3)
Area A	4,438	2,254	2,184
Area B	6,094	7,116	-1,022
Area C	7,564	7,992	-428
Area D	1,751	536	1,215
Area 3	16,190	13,674	2,516
Area 4	17,681	10,756	6,925
Area 3A	4,248	3,828	420
POS (inc borrow pit)	15,660	13,570	2,090
Remaining	13,718	21,597	-7,879
Second phase of works	360 (material reused)	1,103	743 (imported)
Total	**87,704**	**82,558**	**6,764**

Following a review of the provided volumetrics a surplus of 6,021m^3 is indicated (not including import for second phase). This represents the crushed and processed concrete and hard materials re-used as a running layer across the site.

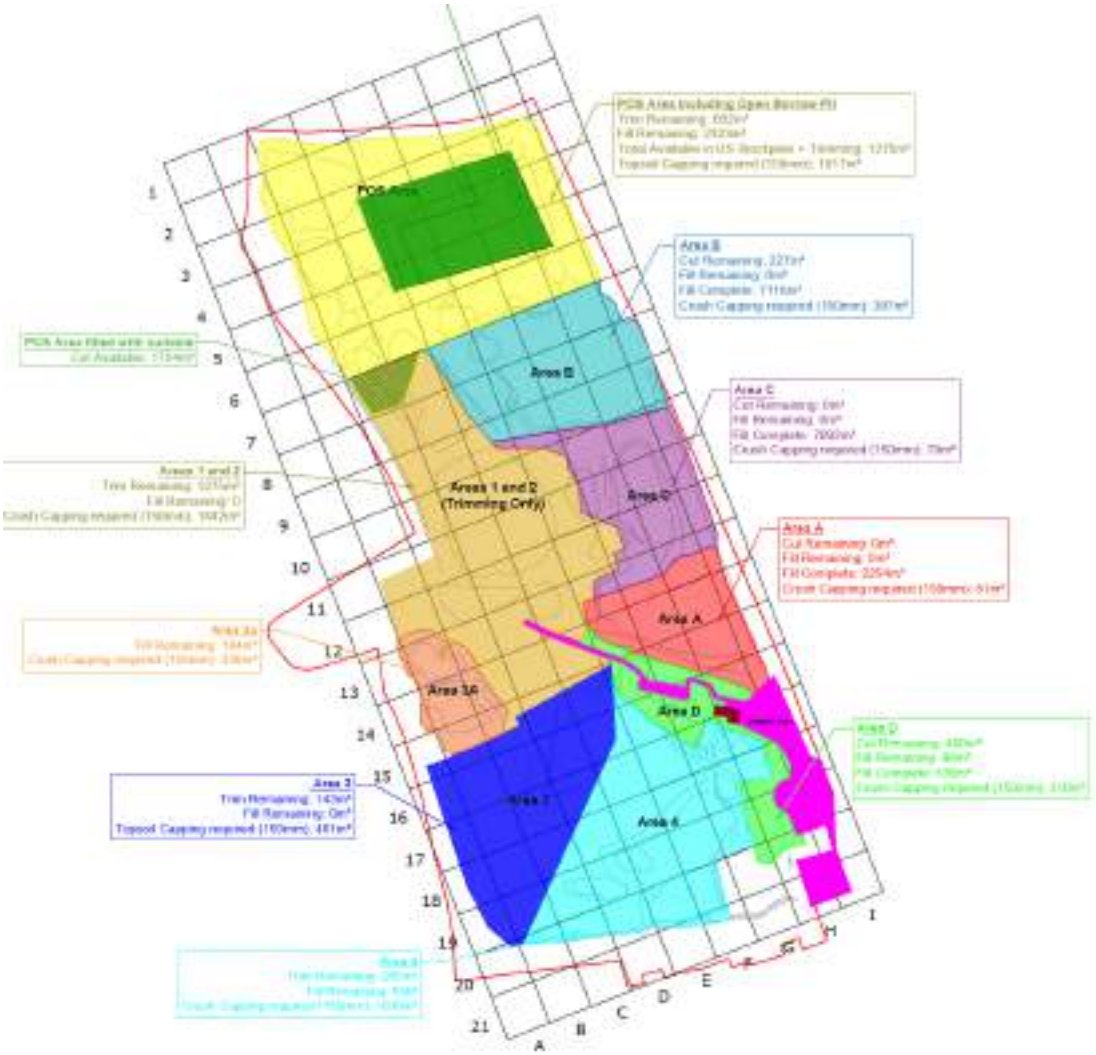


Figure 3-1: Earthworks Area Zonation (VHEINT - 003)

3.1 Application of acceptability criteria

Earthworks acceptability and compliance testing was undertaken throughout the site operations. Testing was undertaken in accordance with Appendix 1/5 of the Earthworks Specification in order demonstrate suitability in accordance with Appendix 6/1. Reference should be made to Section 3.6.8 for a review of the testing undertaken.

The design requires all earthworks fill materials to be placed as General Fill classification with a number of end product requirements to ensure that the fundamental requirements of the design are met. The requirements of the earthworks design and therefore the end product criteria, is based on proposed foundation solution (Hydrock drawing 15220-HYD-XX-XX-DR-GE-8002-P1). On this basis, the acceptability requirements were developed to ensure that the placed fill exhibited sufficient strength and stiffness to support future external works and follow on ground improvement. The fill specification assumes that all structural loads are supported from suitable natural soils or fill subjected to ground improvement (VSC).

A summary of the acceptability criteria for the fill is provided in Table 3-2.

Table 3-2: Summary of Acceptability Criteria

Earthworks Class and Description	Predicted Source Material	Typical Use	Acceptability Criteria
Class 6F2/6F1 (6F5) **Selected granular material**	Crushed asphalt / brick / block Crushed concrete	Running layer	Method Placement Table 6/4 Method 6 » Moisture content range = OMC -2% to OMC. » (OMC determined by the vibrating hammer)
Class 1A general granular material	Made Ground	Fill for raising levels across the site, and backfilling of soft spots	End Product » SHW Table 6/4 Method 2 modified as required following compaction trial to ensure minimum 95% of MDD » OMC/MDD determined using Vibrating Hammer » OMC-3% - OMC+3% » CBR at NMC 5%
Class 2A/2B/2C selected cohesive	Made Ground, Glacial Till and weathered Pennine Middle Coal Measures Formation	Fill for raising levels across the site, and backfilling of soft spots	End Product » SHW Table 6/4 Method 1 for 2A and Methos 2 for 2B and 2C modified as required following compaction trial to ensure minimum 95% of MDD » OMC/MDD determined using 2.5 (2A and 2C) and 4.5kg (for 2B) Rammer » <5% air voids » Cu >50kN/m^2
Class 4 Landscape Fill	Various	Fill to landscape areas and POS	SHW Clause 620 » Material to be placed to an appropriate method so as to limit future self-weght settlement
Class 6A	Selected well graded granular material	Below water	No compaction
Class 6C	Selected uniformly graded granular material	Starter layer	SHW Table 6/4 Method 3 » OMC to be determined using Vibrating Hammer

Earthworks Class and Description	Predicted Source Material	Typical Use	Acceptability Criteria
			unless otherwise agreed with Hydrock

Guidance on the appropriate methodology for compaction was based the compaction trials for the bulk filling. Material placed for the granular running surface was controlled using Method Placement and does not form part of a permanent bearing layer.

Compaction trials were undertaken in accordance with the Specification (under Hydrock guidance) to confirm that the natural moisture content of the material and the method adopted were suitable to allow the minimum engineering performance to be demonstrated against the earthworks design. Confirmation of the suitability of the adopted method has been provided by compliance with the end product testing requirements.

3.2 Changes to The Enabling Works Design and Specification

3.2.1 Air Void Content

Ash Made Ground fill material was the most used material on site. This material covered approximately 75% of general fill on site. The laboratory source testing indicated a high variability in terms of grading, bulk density and particle density. For example, the range in particle density for the Made Ground graded as Class 2C is between 1.37-2.61Mg/m^3. The material is regarded as a mixed soil with a variable fines content between granular (<15% passing 63µm) and cohesive (>15% passing 63µm). However, the majority of the ash Made Ground was non-plastic based on Atterberg tests.

Given the high variability it was not possible to assess the compacted fill source against a characteristic compaction curve and air void line. By way of an example, Figure 3-2 shows the measured moisture content and dry density for the ash Made Ground graded as Class 2C compared against an average compaction curve and associated particle density (2.09Mg/m^3). This resulted in a significant number of high air voids being recorded as well as numerous negative air voids. Furthermore, a number of the laboratory compaction curves indicated that an air void content of less than 5% was not achievable even at high moisture contents likely due to the poorly graded nature of some of the ash material. Therefore, an updated testing regime was completed by the Contractor in order to demonstrate that the high air void content is either as a result of the poorly graded (or granular) nature of the fill or incorrect application of the characteristic particle density rather than poor compaction. It is indicated in the AWP report that all fill was to be treated as granular and the 5% air void limit was removed as a criterion. This is not totally correct as where the material was able to achieve <5% air voids in the laboratory a suitable method was still required to be determined on site in order to compact the material to <5% air voids.

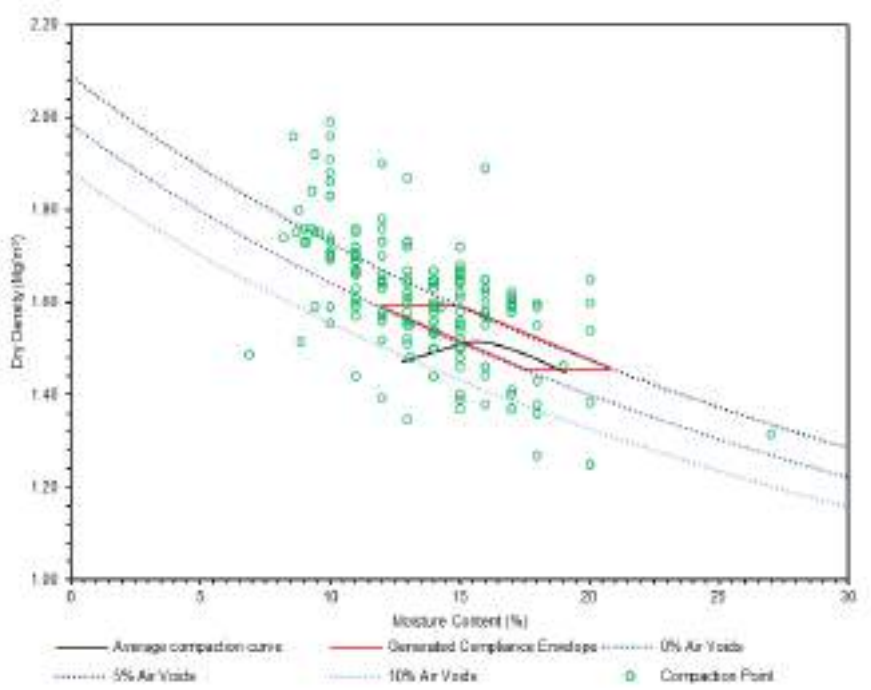


Figure 3-2: Measured In Situ Moisture Content/Dry Density for the Ash Made Ground (graded as 2C)

The updated testing methodology included undertaking the following additional tests approximately every 20 measurements of in situ density:

- a laboratory compaction test;
- particle density; and
- sand replacement test.

This methodology was designed to remove the problem of assigning the correct laboratory data to the insitu measurement and would therefore prove whether the method was suitable to meet the design requirements. The data is reported on individual certificates designed by Hydrock, which were provided in the AWP interim report but have not been included in the final version of the report. However, a number of graphical plots from the certificates, together with a more detailed review is included in Section 3.6.8.

3.2.2 Areas not requiring Dynamic Surface Compaction

The enabling works design required dynamic surface compaction to be undertaken in specific areas of the site based on the predicted thickness of Made Ground from the ground investigation (see VHE Drawing reference VHEJ0808-1201). However, during the works there were a number of areas within the proposes zone of dynamic compaction where natural cohesive soils were at or very close to the sub-formation (base of excavation) and therefore did not need ground improvement by dynamic compaction.

The method of dynamic compaction undertaken by VHE was Rolling Dynamic Compaction (RDC) and was not undertaken in the centre east, centre west and southeast of the site due to existence of shallow natural ground at the base of excavation. These areas are shown on VHE drawing reference VHEJ808-1202.

Further details of the ground improvement undertaken is provided in Section 3.5.1.

3.3 Weather conditions

During periods of wet weather, site works were temporarily suspended. In spells of excessively dry weather, the soil was damped to improve the compaction conditions, whilst after very wet weather conditions lime was added to the soil to improve the moisture of the fill.

Where it was observed that degradation to the formation had occurred (generally due to weathering), the surface layer was either removed, or bladed to aerate prior to continuing fill placement.

Weather records are noted on each of the Hydrock site visit reports presented in Appendix D. Hydrock has not been provided with any specific weather records from the Contractor.

3.4 Excavations

The enabling works at the site required over-excavation and treatment of Made Ground within 1.5m/3.0m of the surface and contaminated natural soils before placement of fill back up to the EWFL.

3.4.1 Location of excavations

A composite base of excavation survey, reference VHEJ808-101, has been provided by the Contractor and is included in the AWP Validation Report . The survey was also provided to Hydrock in AutoCAD format (.dwg) to allow more detailed review. Based on review of the survey the excavations ranged from 1.5m to 4.00m deep in the east with reference to the final ground levels in areas of cut or original ground level in areas of fill.

Figure 3-3 indicates the as built excavation depths based on the construction records.

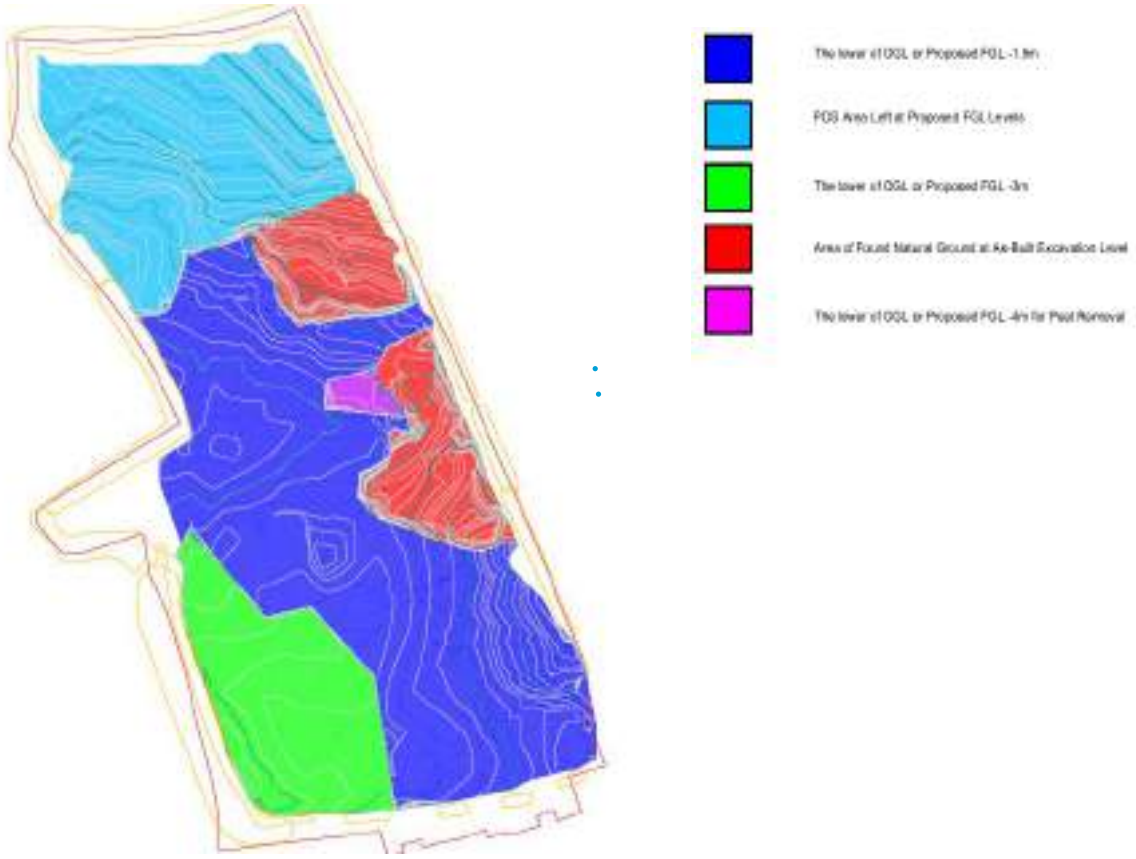


Figure 3-3: Base of Excavation given Proposed Finished Levels

Typical depth of excavation was 1.5m increasing in areas of deep Made Ground excavation to a maximum depth of approximately 4m in the east of the site where the peat and organic soils were removed.

VHE drawing reference 102 Rev B indicates where the excavation was deepened compared to the design depth was shallower than the design depth. Where the excavation was shallower than the design depth it was as a result of encountering natural soils at the base of excavation. This includes the area of the second phase of works.

An updated ground model and cross sections have been produced which includes the as built survey information provided by VHE. The updated ground model is presented on Hydrock drawing 15220-HYD-XX-XX-DR-GE-1032 in Appendix H.

3.4.2 *Instability problems and unusual ground conditions*

In the earthworks design (Hydrock 15220-HYD-XX-XX-RP-GE-0005-S2-P3) there was a requirement that all open excavations should be stepped and at an angle no steeper than 1:1 (45°) to mitigate instability and ensure long term differential settlement complies with the design performance requirements.

All temporary excavations were subject to a Contractors temporary works design. Some localised areas were initially excavated steeper than 1:1 by the Contractor and these excavations were undertaken under control of the Contractor, in accordance with the Contractors temporary works design. As part of the site attendance Hydrock carried out routine inspections of the excavations during the earthworks period and did not observe any significant instability.

Prior to backfilling slope angles were reduced to 1:1 to receive the new fill. This is demonstrated on the base of excavation survey (VHE drawing reference VHEJ808-101) in the AWP Addedum Report.

As part of the second phase of excavation works around shafts 007 and 008 the majority of the material was excavated in a very wet condition. In order to maintain the programme, 1,134m^3 of material was removed from site and replaced with imported 6F5 from a primary source.

Ground surface instability was recorded by the drillers during treatment of shaft 007. Further details are included in Section 4.

3.4.3 *Groundwater conditions*

Generally, groundwater was not recorded in significant quantities during excavation, instead shallow perched groundwater was found in some instances on the top of the less permeable Glacial Till and within the Made Ground generally near the base of excavation at around 2.0-3.0m bgl. As part of the water treatment strategy, VHE undertook pumping of standing water from excavations when required during the earthworks and discharged into the sewers.

Figure 3-4: Perched water in centre east of the site.

Figure 3-5: Pumping standing water in the west of the site.

Figure 3-6: Pumping standing water in the northeast.

Figure 3-7: Reduction in water levels after dewatering in the west.

Earthworks was halted due to heavy rain and accumulation of water on site in November and it was recommenced again in April.

3.5 Ground Improvement

3.5.1 Dynamic Surface Compaction

Dynamic compaction was undertaken in the areas of the site where there was residual Made Ground greater than 1m thick following the site-wide over-excavation of Made Ground. This was designed to densify the near surface soils, close up voids and reduce the stiffness differential such that the road pavements and services will not be adversely affected by long-term settlement of the Made Ground.

This was not proposed to be designed for the support of structural foundations, which will require additional foundation specific ground improvement methods to be adopted (i.e., vibro stone columns, vibro concrete columns etc) or piled foundations.

The proposed area for treatment by dynamic compaction and the proposed foundation zonation is shown in the Ground Improvement Plan drawing (ref: VHEJ808-1302 RDC Areas) in the AWP Validation Report.

Dynamic compaction was undertaken the form of Rolling Dynamic Compaction designed by VHE. The typical depth of influence was between 2m and 4m below ground level, providing densification of the soils within this zone.

The detailed design was undertaken by a specialist contractor from Bomag in Germany. The Bomag's 226 Polygonal roller and an on-board Continuous Compaction Control (CCC) system was used as a quality control method and performance indication in earthworks by means of roller integrated dynamic measuring and documentation systems.

The method of using a roller-integrated measurement and documentation system is referred to as continuous comparison control (CCC) and specified as CEN TS 17006, published in December 2016 published by European Committee for Standardization.

The polygon roller is equipped with a continuously measuring Evib compaction measuring system (MN/m^2) and the BOMAG Compaction Management (BCM) documentation system with GPS, which enables 100 % area measurement, recording of compaction quality and stiffness information and as well as mapping of roller passes completed.The BCM05 software allows the following elements to be assessed:

1. Increase in compaction with number of passes,

2. Analysis of weak spots and uniformity of stiffness of soil layers
3. Maximum achievable compaction
4. Documentation of compaction works completed
5. Correlations between roller compaction measurement value (Evib) and plate test parameters
6. Correlations between roller compaction measurement values (Evib) and density in case of granular soils

Following the excavation within the RDC areas, compaction trials on the material was conducted. The compaction trials were undertaken on two material types including black ash fill and Type 1.

Compaction trial was carried out by the BOMAG 226DI roller on 4 no. 10m x 40m trial areas (Figure 3-8). The RDC process increased the Evib (stiffness) values from around 10 – 40 (MN/m^2) to 60 MN/m^2 and above. The results indicated that the optimum number of passes required for RDC was betwen 10 and 12 passes at maximum amplitude (2.5 mm/s).

Figure 3-8: RDC trial on ash Made ground in the northwest of the site.

Figure 3-9: Proof rolling by BOMAG's 226 DI dynamic compaction roller on landfill Made Ground in northern part of the site

The results of the compaction trials and proof rolling measurements conducted indicated 10 no. passes was considered as optimum number of passes for dynamic compaction of the site (i.e. no further improvement was achieved with further passes).

For the purposes of validation the target Evib was set at 20MN/m^2, which approximately correlated with a CBR value between 3.0 and 4.0%. Where improvement of the subgrade could not be increased above 20MN/m^2 the area was treated as a soft spot (Section 3.5.2). The output of the RDC is a colour coded plot showing the achieved subgrade stiffness following completion of the full number of passes. This is included in the AWP Validation Report as drawing reference VHEJ808-1202.

A summary is provided in the AWP report showing the improvement between the first pass and last pass of the RDC equipment. Based on the records provided to Hydrock and the works witnessed on site the ground improvement by RDC is considered to be highly effective for the ground conditions encountered.

3.5.2 Soft Spot Treatment

According to the earthworks specification, a 'soft spot' is a localised area which fails to achieve the minimum of a 2.5% CBR. Moreover, areas where the on-board Evib values from the RDC recorded <20MN/m^2 were also considered as 'soft spots' and were treated in accordance with the specification.

A total of eighteen 'soft spots' were identified across the site, which includes 2 as part of the second phase of works. The 'soft spots' were excavated to either their full depth or to 1.0m BGL, based on whichever is lesser. The soft spot locations, extent and actions taken to remediate them are recorded in Appendix E of the AWP Validation report and Appendix C of the AWP Addendum Report. It was agreed that the soft spot treatment criteria is a minimum undrained shear strength of 40kN/m^2 at the base of excavation.

The location of all soft spots was surveyed in and is presented on VHE drawing reference VHEJ808-701. Each soft spot is accompanied by an Excavation Inspection Report which includes a surveyed location, photographic records, description of mitigation measures and results of in situ testing.

3.6 Filling

The enabling works at the site required restoration of the site levels following over-excavation of the Made Ground, contaminated soils and obstructions.

The finished level as built is presented on VHE drawing reference VHEJ808-202 in the AWP Addendum Report. A check of the finished level has been undertaken following review of the accompanying Excel data sheet provided by the Contractor.

3.6.1 Source and location of all material placed

All of the fill materials used in the earthworks were sourced from the site. Prior to commencing filling, source approval testing was undertaken, in order to classify the different materials proposed for reuse as fill. A summary and appraisal of the source testing carried out is provided in Section 3.9 of the AWP Validation report and Section 3.6.6 of this report.

The volumes of each source material used are shown in Table 3-3.

Table 3-3: Summary of Fill Sources

Source Reference	General Description	Approximate Volume Excavated
Yellow Gravel	Yellow brown sandy gravel derived from subbase and capping of the former development	4,000m^3
Ash Made Ground	Dark grey brown silty sandy gravelly clay and clayey gravelly sand with a high ash content derived from general excavation across the site	47,000m^3
Natural Clay	Firm yellow brown and grey slightly gravelly sandy CLAY derived from the Glacial Till	11,000m^3
Recycled Aggregate	Grey sandy Gravel derived from processing concrete, brick and asphalt.	6,000m^3
Peat and Organics	Dark brown silty clay with organic content and peat derived from excavations in the east of the site. Also includes soft and low strength natural cohesive soils not suitable for general fill.	13,500m^3
Imported Aggregate	Light yellow brown sandy gravel (limestone)	743m^3

3.6.2 Plant used and details of problems encountered

Details of the plant and equipment used for the works is presented in Section 3.8 of the AWP Validation Report. The Contractor reported that parts of the excavators were vandalised and stolen in May 2023. No other issues with the Contractor's plant and equipment were reported.

3.6.3 Instability problems and unusual ground conditions

The stability of the fill material was monitored by visual inspection during the earthworks period.

A number of soft spots were observed during filling caused by a combination of material placed at the upper limit of moisture content and continuous trafficking. The standard remediation of soft spots included the over-excavation and replacement of the affected material (See Section 3.5.2. A general example of soft spots due to trafficking of plant is shown in Figure 3-10 and Figure 3-11.

Figure 3-10: General example of soft spots due to trafficking of plant.

Figure 3-11: Excavation of soft spot in southern part of the site.

3.6.4 Subgrade inspection and preparation before filling

Following excavation, the exposed formation was proof-rolled, inspected and tested in situ by the Contractor using a Dual Cycle Plate Load test in accordance with the enabling works strategy.

Hydrock have undertaken an independent review of all the plate load test data completed by the Contractor. A summary of the plate load testing undertaken at the base of excavation is provided in Table 3-4.

Table 3-4: Base of Excavation Plate Load Testing (600mm diameter)

Number of Tests	CBR Range (%)	Average CBR (%)	Stiffness Ratio (Ev2/Ev1)	Average Stiffness Ratio (Ev2/Ev1)
22	1.6– 12.6	5.2	0.78-2.28	1.24

One of the 22 plate load tests recorded a CBR of less than 2.5% located in Grid I13 at 1.6% and one recorded a stiffness ratio above 2.2 in D17.

Following inspection by Hydrock remediation was not considered necessary in Grids D17 and I13 as inspection of the ground conditions did not indicate a soft spot or unstable ground conditions.

Following excavation of the Made Ground during the second phase of works in the vicinity of shafts 007 and 008, the natural ground was exposed; however, it was observed to be low strength and was therefore treated as a soft spot. This included over-excavation of the material, testing for

undrained shear strength using the HSV and installing a granular starter layer prior to filling. Plate load testing was then completed at this level following the remediation.

Based on the in-situ testing undertaken and Hydrock's observations, the stiffness of the formation soils (base of excavation prior to filling) was found to be equivalent to, or better than, that modelled as part of the design.

3.6.5 *Engineered Fill*

Following proof rolling, inspection and subgrade testing the excavations were backfilled as either Class 1A (granular Fill) or Class 2A/2B/2C (cohesive fill). A photographic record of the filling is provided in Figure 3-123-13 to Figure 3-18.

Bulk fill was undertaken across the majority of the site, with a specific excavation, filling and compacting exercise undertaken at the southwestern edge of the site (as a separate excavation and filling exercise) due to misalignment of the root protection zone. These works required a small amount of over-excavation and reprofiling at the boundary in the southwest corner once the fence had been moved to the correct position. A check against the site boundary following these works is shown on VHE drawing 'VHEJ808-103 Base of Excavation Standoffs and Batters' in the AWP Validation Report.

Figure 3-123-13: Filling and compacting class 1 (ash fill) material in the northwest.

Figure 3-14: Processed material from crusher as fill in the southwest.

Figure 3-15: Filling with class 2 material.

Figure 3-16: Compaction of class 2 material in southern part of the site.

Figure 3-17: Filling and compacting class 2 (clay and mudstone) material in the northeast.

Figure 3-18: Plate load testing on final layer of general fill adjacent to 6F2 capping.

All excavation, processing and placement works were managed in accordance with the QP declared Materials Management Plan (MMP) and managed by VHE. Where observations were made by Hydrock and AWP action was generally promptly taken by the Contractor to rectify the fill. The suitability of fill material was verified by laboratory source approval and in situ testing.

3.6.6 Materials testing

The geotechnical testing on site was completed in accordance with the site-specific Appendices 1/5 (Table 1/5 'Earthworks Testing Requirements') and 6/1 (Table 6/1 'Acceptable Earthworks Materials: Classification and Compaction Requirements') of Hydrock's 'Geotechnical Design Report and Earthworks Specification' (Ref: 15220-HYD-XX-XX-RP-GE-0005-S2-P3) and as reproduced in the AWP Earthworks Specification as part of the Contractor design.

Murry Rix Limited (CTS) and PSL are an independent UKAS accredited testing laboratory service and were commissioned by VHE to undertake the earthworks classification, compliance and in situ testing in order to demonstrate compliance with the geotechnical design.

A summary of the laboratory and in situ testing completed for the earthworks and the earthworks test certificates are presented in the AWP Validation Report under Section 3.9 and 6.0 and in the AWP Addendum Report under Section 3.7. The in situ test location data is referred to by grid square location. The site has been divided into a 20m local grid system, which is shown on the VHE drawing reference VHEJ808-302. The grid starts in Grid A1 in the north-west and finishes with Grid I21 in the south-east.

3.6.6.1 Source approval testing

All excavated soils were tested and assessed for their suitability and acceptance for reuse as Class 1, 2 (General Fill) or Class 6 (Selected Fill).

Crushed concrete from the demolition of the former roads and infrastructure on site was graded to Class 6F2 for the final 150mm running layer.

Four different fill material were employed on site including Yellow gravel, Ash Fill (General Fill), Clay and crushed material as summarised in Table 3-3. As part of the second phase of enabling works 875m^3 of primary aggregate was imported to supplement the works.

The materials were sent for classification testing in accordance with table 6/1 of the Specification for Highways Works Series 600.

Tables 3-9 to 3-12 in the AWP Validation Report and Tables 3-9 to 3-10 in the AWP Addendum Report indicate the quantities and frequency of testing undertaken according to the volume of material measured during the earthworks. Review of the source acceptability testing indicates that sufficient testing has been undertaken to classify and characterise each fill source.

Based on the above, it is considered that suitable and sufficient testing was carried out so far as to approve suitability of the source material for reuse.

3.6.7 Compaction trials

Compaction trials were performed for materials using a BOMAG 219 roller as shown in Figure 3-19. The compaction trials were completed on 2A/2C black ash fill and 1A (coarse granular fill) material. A total of four trial pads were constructed, two for each type of fill material. Each trail pad was approximately 20m long and 5m wide. Each pad consisted of three layers of material placed at layers of 275mm thick. Table 3-5 shows details of compaction trials.

Table 3-5: Summary of Compaction Trials

Material	Layer thickness(mm)	Number of layers	Number of passes
Black ash	275	3	4
	275	3	6
Coarse granular	275	3	4
	275	3	6

The compaction trial indicated that an optimum number of 6 passes with vibration was required for a maximum 275mm layer thickness in order to meet the performance criteria. Although based on the in situ test data the minimum end product requirements were achieved at 6 passes. The results of the trial pads indicated that compaction criteria is achieved for the materials based on the plant and equipment proposed by the Contractor.

Figure 3-19: Compaction trial by BOMAG's 219 roller

3.6.8 In situ testing

The in situ earthworks testing was co-ordinated by VHE and undertaken by Murry Rix and PSL, which provided part-time site technicians during the placement of fill. A review of the insitu testing and presentation of the test certificates is included in the AWP Validation Report as Section 6.0 and Appendix C and in the AWP Addendum Report as Section 4.0 and Appendix B.

3.6.8.1 *In situ Dry Density and Moisture Content*

The in situ dry density and moisture content were measured using a Nuclear Density Meter (NDM), core cutter and Sand Replacement Density (SRD) test and compared to laboratory moisture content/dry density relationship results completed as part of the source approval testing.

In accordance with the GDR, for Class 2 fill: a minimum compaction of 95% of the maximum dry density (MDD) and less than 5% Air Voids was required. The MDD was determined with both the 2.5kg and 4.5kg rammer.

The earthworks comprised a total of 847 NDM and 88 SRD measurements of in situ density, which generally complies with the frequency in the specification at 1 density test per 80m^3 of fill. Nuclear Density Meter testing was undertaken at one test per 275mm layer in every 20m x 20m grid square. Table 6-2 of AWP report indicates the percentage compaction and percentage air voids, recorded from each NDM test. 829 of the 847 in situ density results achieved greater than the required 95% compaction, 23 of the 847 recorded greater than 110% compaction. The remaining 18 of the 839 NDG results were below the required 95% compaction which equates to 2.1% of NDM results being <95% compaction.

A total of 88 sand replacement Density (SRD) tests were undertaken onsite. Table 6-3 of the AWP report presents the percentage compaction and percentage air voids of each SRT. A comparison between the NDG and SRT results were made and appended to the AWP report.

All 88 of the SRD results achieved greater than the required 95% compaction which meet the specification requirements.

With regards to air voids the density testing initially indicates approximately 55% of the data for the ash Made Ground falling between 5% and 10%. On this basis a risk of future collapse settlement was identified due to the high air void content. The source testing had identified considerable variation and as such the application of characteristic material properties to the fill source proved problematic.

A review of the air void content and updated to the testing methodology is provided in Section 3.2.

The updated testing methodology was designed to demonstrate that the ash Made Ground was properly compacted by comparing the insitu data with laboratory data from same location as the insitu test. The results are presented on a series of certificates developed by Hydrock. The certificates were provided to Hydrock in the Interim Validation Report. However, for reference, a series of figures are shown below in order to present the data. Because the particle density and laboratory compaction curve were measured from the same location, a direct comparison and therefore assessment of compaction could be made. An X represents the NDM result and the triangle represents the SRD result. All compaction studies were conducted using the 4.5kg rammer. Air void lines are shown for 0%, 5% and 10%.

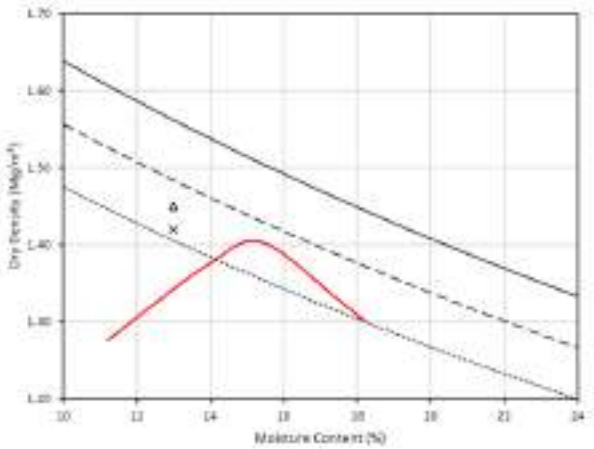


Figure 3-20: E11 Layer 1. 102% MDD, 8.1% Air Voids and NMC is -2% OMC (PD 1.96Mg/m³)

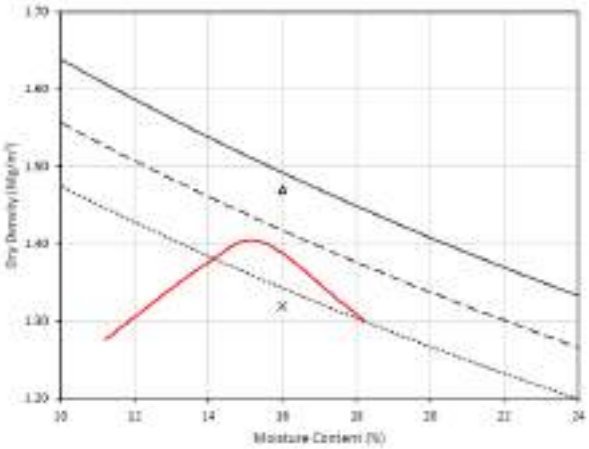


Figure 3-21: F11 Layer 4. 99% MDD, 6.5% Air Voids and NMC is +1% OMC (PD 1.96Mg/m³)

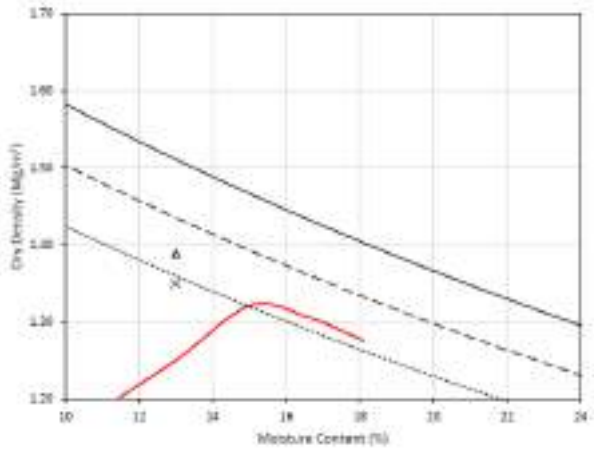


Figure 3-22: F10 Layer 1. 105% MDD, 9.4% Air Voids and NMC is -3% OMC (PD 1.88Mg/m³)

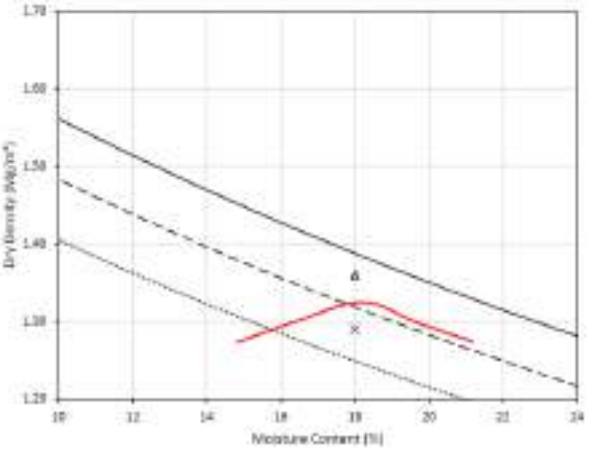


Figure 3-23: D11 Layer 5. 100% MDD, 4.5% Air Voids and NMC is at OMC (PD 1.85Mg/m³)

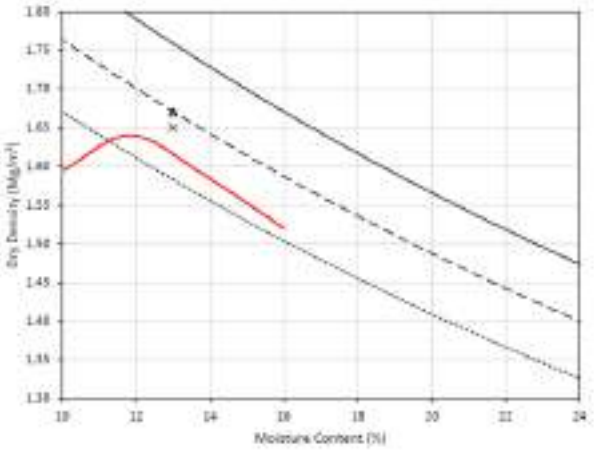


Figure 3-24: C12 Layer 6. 101% MDD, 5.6% Air Voids and NMC is +1% OMC (PD 2.28Mg/m³)

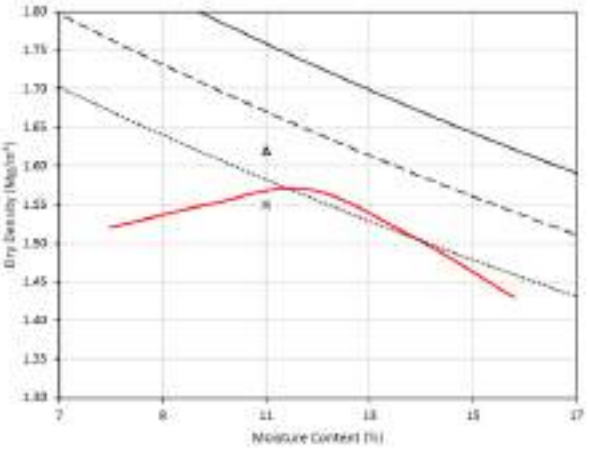


Figure 3-25: G12 Layer 7. 101% MDD, 9.9% Air Voids and NMC is -1% OMC (PD 2.18Mg/m³)

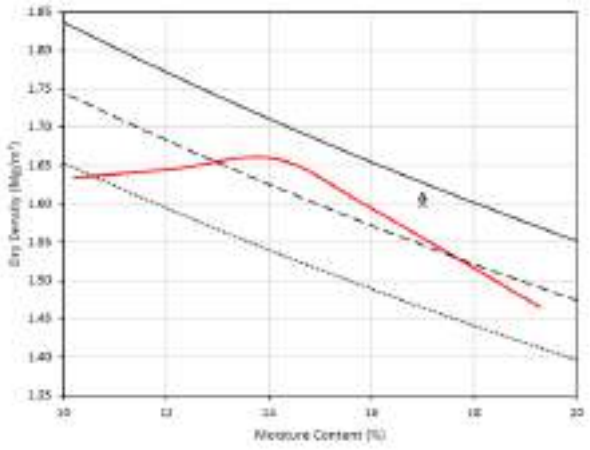


Figure 3-26: C18 Layer 2. 97% MDD, 1.4% Air Voids and NMC is +3% OMC (PD 2.25Mg/m^3)

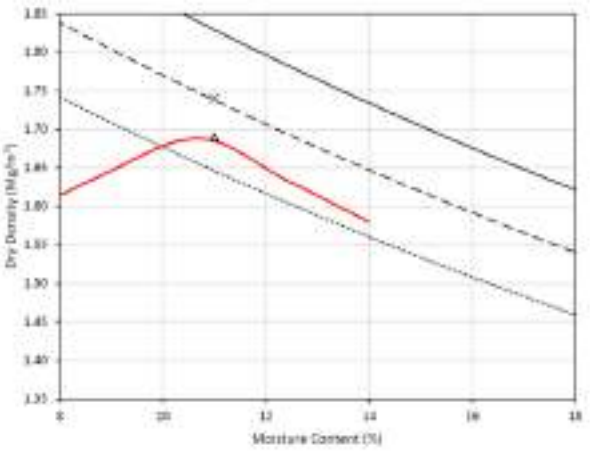


Figure 3-27: A17 Layer 5. 101% MDD, 6.2% Air Voids and NMC is +1% OMC (PD 2.29Mg/m^3)

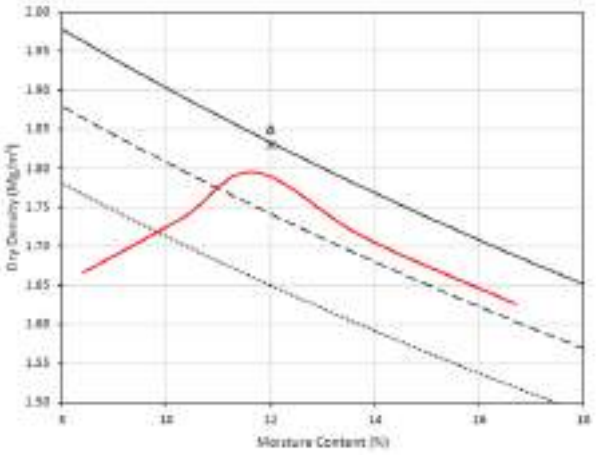


Figure 3-28: B15 Layer 6. 103% MDD, -0.4% Air Voids and NMC is at OMC (PD 2.35Mg/m^3)

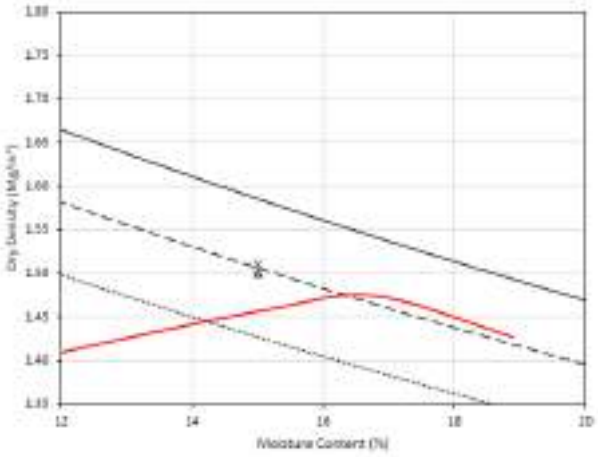


Figure 3-29: H13 Layer 2. 102% MDD, 5.1% Air Voids and NMC is -1% OMC (PD 2.08Mg/m^3)

Review of the data above shows that where the correct compaction and particle density data is used to validate the fill, a suitable level of compaction is achieved. This demonstrates that the method of compaction was suitable for the ash Made Ground used as fill. On this basis there is considered to be a negligible risk of collapse or inundation settlement due to poorly compacted fill. Furthermore, the data shows generally good agreement between the NDM and SRT.

Whilst the testing on the ash Made Ground showed considerable variation, testing on the natural clay source proved much more consistent and therefore characteristic compaction data was able to be used to assess the material (Figure 3-30).

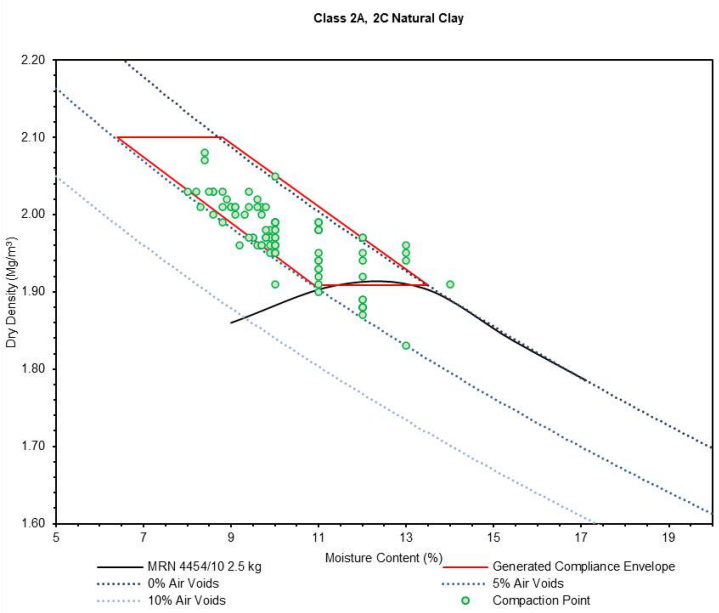


Figure 3-30: In situ density assessment for Natural Clay

Based on the assessment of density and moisture content Hydrock consider that the material placed and compacted at the site meet the minimum requirements of the specification.

As part of the second phase of works, in situ density and moisture content testing was undertaken on each source of material with the results presented in Tables 4-2 to 4-4 of the AWP Addendum Report. The results indicate around 100% compaction (4.5kg rammer) and <5% air voids for the site won general fill and similarly around 100% compaction (vib hammer) and 5-10% air voids for the imported granular material. The results appear favourable and it is considered that this is a reflection of the removal of unsuitable material from site and the re-use of only the most suitable site won material.

3.6.8.2 Dual Cycle Plate Load Tests

Where fill was placed the Specification required plate load CBR tests to be undertaken on a 40m x 40m grid, with one at each meter of fill during filling to complement the density data. Table 6-4 of the AWP report presents the CBR results, and the stiffness ratio recorded at each location.

The approved specification requires the CBR was >2.5% for 2A/2B/2C cohesive material and >5% for 1A granular material. In addition to the CBRs the specification requires the stiffness ratio to be less than 2.2. Hydrock have assessed each plate load test against the compliance criteria with a summary of the data presented in Table 3-6.

Table 3-6: Plate Load Test Data during filling

Fill Type	Number of tests	Plate Settlement Modulus MN/m²/m	CBR (average) %	Stiffness Ratio
Class 1A	14	16.39 – 58.02	3.4 – 34.7 (8.6)	0.80 – 2.07
Ash Made Ground (Class 2)	31	8.80 – 137.62	1.9 – 89.5* (21.3)	0.54 – 2.25
Natural Clay (Class 2)	15	10.59 – 58.13	2.1 – 38.3* (11.5)	0.27 – 1.65

Fill Type	Number of tests	Plate Settlement Modulus MN/m²/m	CBR (average) %	Stiffness Ratio
Imported aggregate (Class 2) second phase of works	1	53.5	28.4	1.0

**1 test below 2.5%*

Review of the plate load test data indicates the fill has achieved a relatively high stiffness. Furthermore, this stiffness ratio was below 2.2 in all but 1 case demonstrating a sufficient level of compaction and is commensurate with the density data. The marginal failures on two of the tests is not considered to be significant.

On completion of the works approximately 20 plate load tests were required at the final earthworks level to validate the subgrade stiffness. The minimum design subgrade stiffness is 2.5%. A summary of the plate load tests at the final formation level is provided in Table 3-7.

Table 3-7: Final Level Plate Load Tests

Location	Number of tests	Plate Settlement Modulus MN/m²/m	CBR (average) %	Stiffness Ratio
Final Earthworks Level	24	12.89 – 110.81	2.7 – 77.8	0.79 – 2.47*
Final Earthworks Level (second phase of works)	2	43.50 – 50.50	19.8 – 25.7	1.10 – 1.50

**1 test above 2.2*

3.6.9 *Summary of test data*

To date, Hydrock has undertaken an assessment of the earthworks based on:

- the test data provided by VHE;
- assessment undertaken by AWP and Hydrock; and
- the works witnessed by Hydrock as part of their part-time site attendance.

On the basis of the review, the data shows that the earthworks have been placed and compacted in accordance with the specification. Hydrock are satisfied that the requirements of the earthworks and ground improvement design have been met.

3.7 Geotechnical Monitoring

As part of the enabling works, there is a requirement for land raising (up to 3m). To assess settlement of the underlying ground, geotechnical instrumentation is required to monitor the consolidation. The geotechnical monitoring requirements are detailed in Section 1.6 of the GDR and Appendix 6/12 of the Earthworks Specification (Appendix A of the GDR). The as built location of the monitoring installations is shown on drawing reference VHEJ808-1001 in the AWP Validation Report. The monitoring requirements include the following:

- Vibrating Wire Piezometers (VWP) installed within the residual Made Ground at the base of the earthworks to monitor changes in pore water pressure due to embankment construction; and

» Rod Settlement Gauges (RSG) installed at the base of excavations prior to the placement of the fill to measure displacement due to the preload and surcharge.

The purpose of the monitoring is to demonstrate that consolidation settlement within the Made Ground has completed prior to the construction phase.

3.7.1 Installed Equipment

The manufacturer details of the equipment used is summarised in Table 3-8. VWPs were installed and set up by Geotron UK Limited and the RSG were installed by VHE.

Table 3-8: Details of Monitoring Equipment

Equipment	Component	Details
Vibrating Wire Piezometers	Sensor	Geotron UK Ltd W9 Standard Vibrating Wire Piezometer (readings taken hourly)
Rod Settlement Gauges	Rod Settlement System	Geosense GEO-XR with PVC sleeve

The locations of the Rod Settlement Gauges and the Vibrating Wire Piezometers installed are shown on the drawings reference VHEJ808-1001. Rod Settlement Gauges (RSGs) were supported by precast concrete manhole rings and sealed using fine granular material. Installation details of the Vibrating Wire Piezometers are summarised in Table 3-9.

Table 3-9 Vibrating Wire Piezometer Installation Details

Piezometer Reference	Serial Number	Date Installed	Strata Description	Installed Depth (below original ground level)	Installed Level
VWP01	-	01/08/22	Landfill Made Ground	1.50m	95mOD
VWP02	-	01/08/22	General Made Ground	1.50m	95mOD
VWP03	-	22/08/22	Opencast Made Ground	3.0m	96.8mOD
VWP04	-	22/08/22	Opencast Made Ground	3.0m	95.3mOD

3.7.2 Monitoring Results

Full details of the monitoring is provided in Section 10 of the AWP Validation Report.

The earthworks fill supporting the development plots is up to 3m in height and therefore, the imposed load will cause consolidation within the underlying soils. Furthermore, settlement within the engineered fill due to internal loading (self-weight settlement) will also occur and is added to the assessment of total settlement. The geotechnical design identified up to 40mm of consolidation settlement due to land raising and around 10mm of self-weight (internal loading) settlement in the area of maximum fill.

Due to the thickness of fill placed on site, pore-water pressure and settlement monitoring was undertaken during fill placement in order to ensure both the short-term stability of the embankment and the long-term consolidation is within the requirements of the design.

The settlement monitoring data is provided in appendices I and J of the AWP Validation Report.

The following section provides an assessment of the settlement data and review within the context of the design.

In order to assess the consolidation occurring in the underlying soils as the embankments are constructed, four piezometers and ten settlement gauges (RSG1 not reported) were installed on the western, southwestern, northwestern and central part of the site representing the thickest section of fill. The data obtained from this area of the site was used to confirm the consolidation characteristics of the soils.

3.7.2.1 Vibrating Wire Piezometers

The vibrating wire piezometers are designed to measure the change in pore-water pressure during fill placement and subsequent consolidation. Where the fill is placed quickly the increase in pore-water pressure is equal to the increase in stress. During the subsequent consolidation phase the pore-water flows out of the soil under the induced hydraulic gradient and the pore-water pressure decreases. This dissipation is accompanied by volume change and therefore settlement.

The results obtained to date (the date of AWP report) from the piezometers are provided in Appendix J of AWP report as a series of plots showing the change in pore-water pressure level with time for each monitoring location.

- The VWP01 data indicates a general steady pressure trend over the monitoring period with no significant increase in pore pressure. AWP report that VWP01 is installed within an area of predominantly granular fill and therefore the permeable nature of the fill would help to dissipate pore water pressure relatively quickly.
- The VWP02 data indicated a steady increase in pore-water pressure commensurate with the level of filling over the time period. AWP report that VWP 2 is installed within an area of fill where the natural clay was found shallower than the bottom of the dig level. This shallow clay is considered to have a lower permeability and would prevent the pore water pressure from dissipating quickly. From late October the pore pressure appears to have reached an equilibrium level albeit slightly higher than the start of filling.
- VWP3 is installed within the deeper areas of Made Ground, where approximately 3m of fill was placed above. The VWP03 data presented no significant steady increase in pore water pressure and appears to represent natural seasonal fluctuation.
- AWP report that in mid-August 2 layers of fill were placed around VWP4. The monitoring data aligns with this, as a slight increase in pore water pressure and then followed by a fall over the next month. In the mid-September to mid-October a further 2.5m of fill was placed in this area again resulting increasing pore water pressure. However, due to the damaged logger data was not recorded in this area until June 2023, when the final layers of fill were placed, Thus a fall in pore water pressure is not shown on the graph in Appendix J of the AWP report.

At the time of writing piezometers continue to monitor and transmit pore pressure data. From review of the data there does not appear to be any significant excess pore-pressure that could give rise to future consolidation.

3.7.2.2 Rod Settlement Gauges

To monitor the settlement induced as a result of the ground improvement ten Rod Settlement Gauges (RSG) were installed. The results of the monitoring are presented in Appendix I of AWP Validation Report as a series of plots comparing the rate of settlement with fill placement. An updated data set has been provided by the Contractor to include monitoring through to November 2023 and is included in Appendix F of this report.

In order to assess the settlement Hydrock have completed an analysis of each gauge. Each RSG has been assessed in terms of a degree of consolidation of 90% (U_{90}), which was required to be demonstrated by the Contractor in accordance with the design.

An assessment of the date of when this occurred (or when it will occur) has also been completed. In order to predict the point at which U_{90} occurs, adjustment of the time factor and ground stiffness has been undertaken to model a curve that fits the measured data. The data includes monitoring up to 10/11/23.

The data is presented in Appendix F and summarised in Table 3-10 below.

Table 3-10: RSG Data Summary

Gauge Reference	Monitoring Period (Day 1 adjusted)	Maximum Induced Settlement	Predicted time to 90% consolidation (date)	Maximum residual settlement including creep Cα=0.001	Comments
RSG02	345 days	12mm	258 days (15/08/23)	10mm	Gauge in area of 1.5m fill thickness. Slight recovery observed from day 250
RSG03	447 days	28mm	160 days (26/01/23)	8mm	Gauge in area of 1.5m fill thickness.
RSG04	455 days	33mm	246 days (15/04/23)	10mm	Gauge in area of 1.5m fill thickness.
RSG05	465 days	21mm	277 days (05/05/23)	10mm	Gauge in area of 1.5m fill thickness.
RSG06	470 days	26mm	338 days (02/07/23)	11mm	Gauge in area of 1.5m fill thickness.
RSG07	460 days	21mm	201 days (24/02/23)	9mm	Gauge in area of 1.5m fill thickness.
RSG08	415 days	20mm	203 days (12/04/23)	8mm	Gauge in area of 3m fill thickness.
RSG09	332 days*	21mm	199 days (26/02/23)	8mm	Gauge in area of 1.5m fill thickness.
RSG10	410 days	20mm	215 days (28/04/23)	8mm	Gauge in area of 3m fill thickness.
RSG11	378 days	24mm	400 days (02/12/23)	8mm	Gauge in area of 3m fill thickness.

final reading 10/07/23 (RSG damaged)

Review of the data indicates that typically 20-30mm of settlement has been induced over the earthworks period with all but one of the gauges (RSG11) indicting consolidation is complete. The residual settlement is a function of any remaining consolidation beyond 90% and secondary compression. For the purposes of the analysis a creep factor (Cα) of 0.001 has been applied to each

set of results. This indicates between 8-11mm of residual settlement over the design life (60 years), which is considered to be within tolerable limits.

Fill placement in the vicinity of RSG11 really only commenced in April 2023 and so at the time of the last monitoring visit (10/11/23) around 87% consolidation has been induced rather than the target 90%. Furthermore, the rate of settlement does appear to be slightly slower than shown by the other gauges. The delayed fill placement and slower consolidation has combined to indicate a U_{90} of 400 days since the start of placement. It is considered that the accuracy of the monitoring data has allowed a suitably accurate prediction of settlement by fitting the model settlement profile to the data. This indicates 90% consolidation within the next 2-3 weeks with a residual settlement over the design life of around 8mm. Whilst the target consolidation has not been met, it is considered that there is sufficient data to confirm that residual settlement at this location will be less than 25mm and likely less than 10mm over the design life.

Whilst the magnitude of settlement is in line with the predictions in the GDR, the duration of consolidation appears to be significantly longer. This is potentially because the onset of consolidation appeared to be delayed 2-3 months following completion of fill placement. It is a pattern common to all but one of the gauges. A reason for the unusual settlement pattern has not been provided by the Contractor, but is considered to potentially be related to an issue with the levelling or datum, which appeared to be resolved in the new year in 2023.

3.7.3 Settlement Assessment

An assessment of the degree of consolidation has been undertaken for the fill placed in the development area and is summarised above.

From review of the data it is considered that residual consolidation settlement from the placement of the fill will be less than the target 25mm for the following reasons:

- the fill has been in place for a significant period of time and in excess of the 6 months required by the GDR before construction commences;
- no significant excess pore pressure is indicated by the VWPs;
- consolidation settlement appears to be complete based on the RSG data; and
- organic, peat and low strength soils have been removed from the development area.

Based on the above analysis, Hydrock consider that residual settlements will be within tolerable limits of the future construction, subject to all structural loads founded below Made Ground or in fill that has been further improved.

Hydrock consider that no further monitoring is necessary to satisfy the requirements of the design.

4. TREATMENT OF MINE ENTRIES

In April 2020, Hydrock undertook a Coal Mining Risk Assessment (CMRA) to identify and assess the risks to the proposed development from coal mining legacy at Stopes Road. The CMRA is referenced 15220-HYD-XX-XX-RP-GE-0002.

Further to the CMRA and the outcome of subsequent ground investigation, Hydrock prepared a Performance Specification for the stabilisation of shallow mine workings and mine entries reference 15220-HYD-XX-XX-RP-GE-1001-S2. The objective of the specification was to implement a stabilisation scheme to mitigate the risk posed to the proposed future development of the site by shallow mine workings and mine shafts in accordance with the Mitigation Strategy set out in the Coal Mining Risk Assessment. The Hydrock specification is referenced 15220-HYD-XX-XX-RP-GE-0007-S2-P02.

As part of the enabling works the Client has elected to only treat the mine entries. As the development layout is not completely fixed treatment of the underground workings is to be completed as part of the construction phase.

At present three mine entries require treatment at the site:

- 376407-006
- 376407-007
- 376407-008

The work to treat shaft 376407-006 was undertaken under a permit (Ref:25705, dated 27th September 2022) issued by The Coal Authority (TCA). A copy of the permit is included as Appendix B in the Van Elle (VE) completion report. The VE completion report is provided in Appendix B.

The treatment of shafts 376407-007 and 008 was undertaken in October 2023 by M & J Drilling in accordance with permit reference 27404, Dated 5th October 2023. The Mine Treatment Validation report is provided by AWP and is included in Appendix B.

This report includes treatment of shafts referenced above only and does not include treatment to underground workings.

4.1 Performance Specification and Design

Hydrock prepared a drilling and grouting specification for mine treatment. This formed the basis of the Specialist Contractors Design Report (reference 221883, dated July 22). The key objectives of the design are to:

- locate the position of mine shafts by probing (where not undertaken prior to the works);
- stabilise mine shafts by infilling or by consolidation of pre-existing infill material to mitigate future collapse or sinking of the existing shaft infill.

Shaft 006 is located within a no build zone and as such will not be influenced by structural loads. On this basis a concrete cap in addition to the grouting was not required.

The depth of the shaft was not proven however Coal Authority records indicate the shaft is approximately 260m deep. Design of the treatment required consolidation to a minimum depth of 100m.

4.2 Treatment of Mine-shafts

4.2.1 Shaft 376407-006

Mine-shaft 376407-006 was exposed at the surface and therefore further investigation was not required. The mine-shaft was stabilised by grouting of the existing infilling materials under pressure. The general grouting procedure is as follows:

1. Drilling and grouting of 1 no. Primary grout injection borehole (BH1) to a depth of 120m bgl;
2. Drilling and grouting of 1 no. Secondary grout injection boreholes (BH2) to depths of 100m bgl;
3. Drilling and grouting of 2 no. Validation boreholes (BH3 + BH4) to a depth of 100m bgl;
4. Grouting injection boreholes with a grout mix comprising PFA:OPC at the ratio of10:1; however, this was soon changed to a grout mix comprising PFA:SAND:OPC at a ratio of 8:2:1;

The Specification allowed for the use of PFA and OPC at a 10:1 ratio. The decision to replace part of the PFA with SAND was agreed at an early stage in the grouting process after it became apparent that the Primary grout injection borehole (BH1) was taking a large quantity of grout. The addition of the sand was undertaken to increase compressive strength and reduce flowability of the grout as permitted by the Hydrock treatment specification.

The compressive strength of the grout was measured in the laboratory at 7, 14 and 28 days as follows:

» 7 day - 0.9 to 1.4 N/mm^2
» 14 day - 1.4 to 3.0 N/mm^2
» 28 day - 1.5 to 3.5 N/mm^2

Further details of the treatment for mine-shaft 376407-006 is provided in the VE completion report in Appendix B with a summary presented in Table 4-1.

Table 4-1: Summary of Mine-shaft Treatment (006)

Shaft Ref	Previously Recorded or unrecorded	Coordinates of centre of shaft		Level at top (mOD)	Approx. Shaft depth (m)	Shaft Diameter (m)	Date Grouted
		Easting	Northing				
376407-006	Recorded	376348.3	407592.7	102.31	262	2.9	07/11/22

4.2.2 *Shaft 376407-007 and 376407-008*

Shafts 007 and 008 were treated as part of the second phase of works by Specialist Contractor M&J Drilling by a method of drilling and grouting in accordance with the AWP design report reference JS/AHB/SR/47366-TN101.

Allowance was made in the design for partial depth treatment as the depth of the shafts were unknown at the time of design. However, the base of both shafts was proven during the works and as such the shafts can be considered to have been treated to full depth.

The process of treatment included the drilling of a primary borehole, injection grouting using a PFA:OPC mix of 10:1 followed by 2 validation holes in each shaft to demonstrate the effectiveness of the treatment. The total grout take was generally as expected at around 200 tonnes and significant loss of grout was not recorded.

The results of the cube strength tests for the grout are not included in the AWP Mine Treatment Validation Report. However, the data has been reviewed and they are appended separately in Appendix B. The compressive strength of the grout was measured in the laboratory at 28 days as follows:

» 28 day - 6.4 to 10.9 N/mm^2

Details of the treatment are provided in the AWP Mine Treatment Validation Report in Appendix B and summarised in Table 4-2.

Table 4-2: Summary of shaft treatment (007 and 008)

Shaft Ref	Previously Recorded or unrecorded	Coordinates of centre of shaft		Level at top (mOD)	Approx. Shaft depth (m)	Shaft Diameter (m)	Date Grouted
		Easting	Northing				
376407-007	Recorded	376367.5	407559.1	102.88	76	2.5-3.5	12/10/23
376407-008	Recorded	376380.8	407524.4	102.07	86	3.0	16/10/23

It is noted that some instability of the shaft backfill was recorded by the drillers when drilling the primary hole at Shaft 007 (Figure 4-1). Whilst not considered a significantly unusual occurrence, it does highlight the risk of instability when drilling into historic mineshafts and the need for appropriate safety precautions as were in place at the time. Drilling recommenced at shaft 007 once the depression had been backfilled.

Figure 4-1: Shaft settlement during drilling of 007 (12/10/23)

4.3 Gas Monitoring

In accordance with the conditions of the Coal Authority permit gas monitoring was undertaking during drilling to ensure unsafe levels of mine gas are not present that could pose a hazard to the drilling crews as well as off-site receptors. Gas monitoring was used throughout the shaft treatment to identify presence of harmful gases including carbon monoxide (CO), hydrogen sulphide (H_2S) and Methane (CH4). Levels of airborne Oxygen (O_2) were also be monitored. The results of the gas monitoring were not provided by VE during treatment of shaft 006.

Slightly elevated carbon monoxide was recorded on 12th October when pulling the casing from shaft 007. However, further elevated gas was not recorded during subsequent redrilling at this location.

4.4 Concluding Remarks on Mitigation Strategy

Following completion of the treatment of mine-shafts 376407-006, 007 and 008, the residual risk to the development from this hazard is considered low.

The treatment records should be made available for future developers. The design of the mine treatment strategy is not based on any particular site layout and therefore, future designers must

consider the scope and extent of the treatment undertaken within their designs. The VHE constraints drawing reference 401 Rev E and includes an appropriate no-build zone around each of the three shafts.

5. RESIDUAL RISK

5.1 Introduction

The works undertaken to date have suitably remediated the site to allow future construction in line with the requirements of the RSVP and Enabling works GDR. The following is a summary of the residual risks that should be taken into consideration during construction and any future design.

All future and on-going works are to be undertaken in accordance with the approved RS&VP and a site specific/structure specific GDR.

The updated Geotechnical Risk Register is presented in Appendix E.

The residual constraints following the VHE works are shown on the drawings in the AWP Validation Report.

5.2 Residual health and safety risks

VHE has not informed Hydrock of any specific residual health and safety risks on site.

Hydrock notes the following:

- The mine-shaft 376407-002 recorded by the CA in the northwest outside boundary of the site is considered a residual risk by Hydrock and will require mitigation as part of future construction.
- The presence of unrecorded mine entries, whilst unlikely, should not be totally discounted.
- Whilst visual asbestos containing materials were removed by VHE during the on site excavations, ACM may be present at depth. Furthermore, it is likely residual asbestos fibres are present in the Made Ground.

5.3 Underground and Overhead Services

A number of live services are present on or in close proximity of the site. These are shown on VHE drawing VHEJ808-401 Excavation Constraints. The known services include:

- Live electricity extending from the western boundary through the centre of the site to the southeast corner. A substation is also present in the centre east of the site. Live electricity cables are located on the eastern boundary;
- Surface water drain is located along the western boundary;
- A medium pressure gas main runs along the southern boundary;
- Overhead BT cables are located across the site entrance; and
- An underground culvert runs from east to west through the centre north of the site.

Any follow on works shall positively locate all nearby services prior to commencing works.

5.4 Residual geo-environmental risk

Asbestos fibres, laboratory quantification confirms concentrations below 0.001%, and residual concentrations of hydrocarbons and PAH are present within the engineered fill. Whilst not a risk to future end users (as a cover system is to be installed) temporary works and excavations within the fill should take this into consideration.

5.5 Root Protection

A root protection zone is located around the site boundary. Reference should be made to the Tyler Grange drawings. The location of the root protection fence is shown on VHE drawing VHEJ808-301.

5.6 Residual geotechnical risk

Reference should be made to the VHE as built surveys for confirmation of the extent of excavation.

The site is handed over following installation of a 150mm granular running layer. This layer is designed only to provide an improved surface on which to traffic over and above the cohesive fill. Its long-term performance is not guaranteed. It should also not be relied upon for a working platform for the support of plant, scaffolding or other temporary structures.

The engineered fill at the site is designed to support the external areas associated with the development only. Any structural loadings not able to be supported form natural ground need to be supported from piled foundations or on ground improved by VSC or similar. Furthermore, the contents of the GDR and this report shall be referred to for the design of all temporary works.

The presence of obstruction below the base of the remediation excavation should not be discounted in the future design.

Abandoned mine workings from several seams are present at shallow depth and present a risk to the future development. Treatment of these workings will be required as part of any future works.

Settlement is expected within the POS area in the north of the site due to excavation and backfilling of the borrow pit.

Existence of a slope in adjacent land in the northwest potentially steeper than would be recommended for long term stability. This should be reviewed as part of any future design in this part of the site.

An updated Geotechnical Risk Register following the enablement and remediation works is presented in Appendix E.

An updated ground model and cross sections is presented on Hydrock drawing 15220-HYD-XX-XX-DR-GE-1032 in Appendix H.

An updated foundation zonation plan referenced 15220-HYD-XX-XX-DR-GE-8002-P02 has been completed and presented in Appendix G, which takes into consideration the as built excavation depths, surveys and soft spot remedial works. Following the review of the foundation zonation no update was required.

6. ONGOING AND FUTURE WORKS

Below is a summary of the works required during the Construction Stage remediation and ongoing enabling works across the wider site.

6.1 Enabling

At the time of writing, on going works include:

» replacement of the culvert.

However, these works are within the easement (un-remediated zone) of the former culvert structure and as such the works do not impact the remediation and earthworks completed at the site.

6.2 Construction Works

The Construction Phase of works will be undertaken by a separate Contractor or Specialist Contractors on behalf of the housebuilder. The Contractor shall undertake

» Installation of barrier pipework for potable water supplies (to be confirmed by the regulator).

» Over-excavation of service trenches and backfilling with 'clean' soil.

» Installation of gas protection measures appropriate for CS2 conditions across the site.

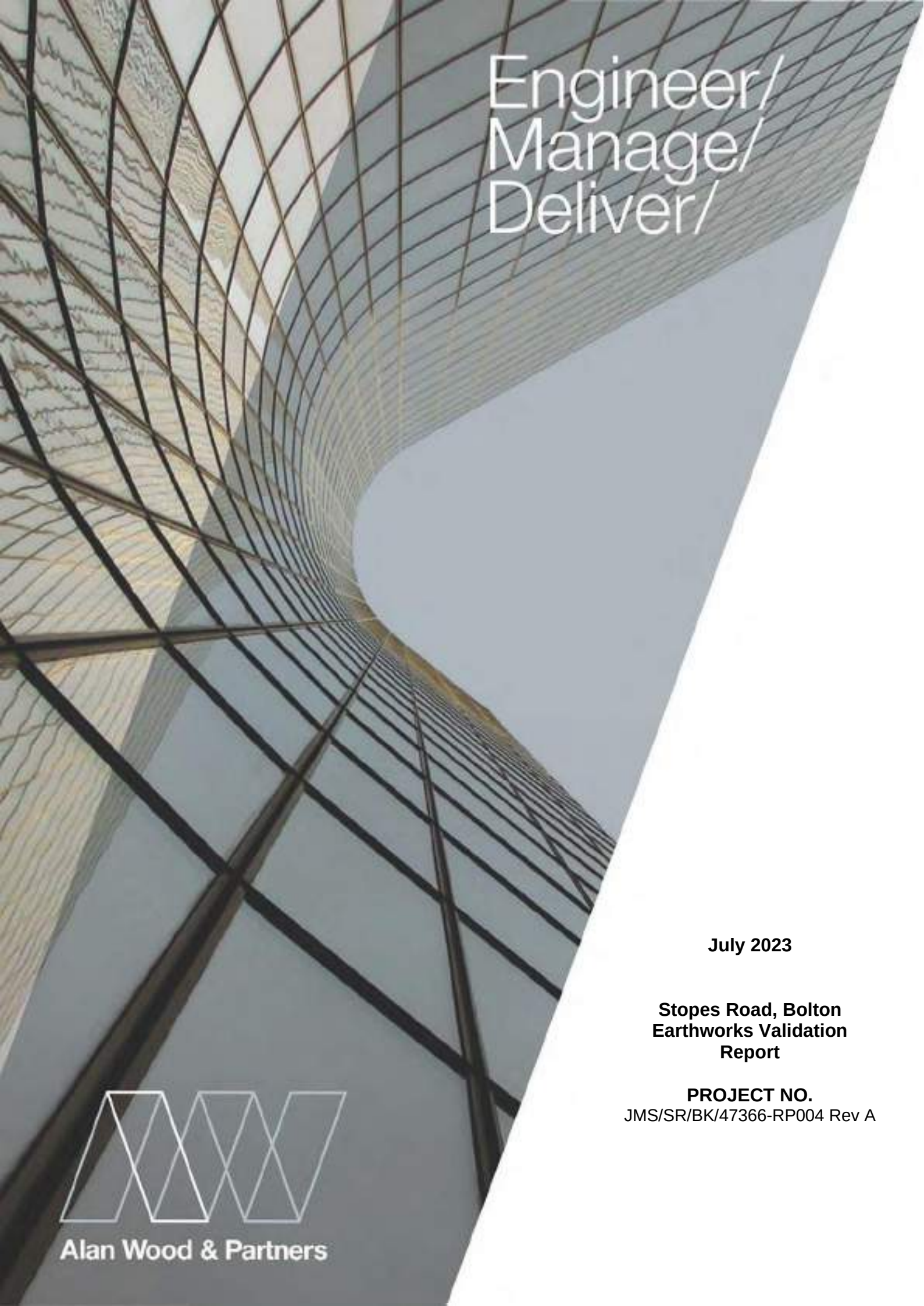
» The installation of a 600mm cover system within gardens and 450mm cover system within public open space, comprising a subsoil beneath a topsoil thickness of 150mm.

» The testing of all imported materials in accordance with the RSVP and compliance with an MMP.

» Validation of the above during Construction Works is provided in RSVP sections 8.4.

» Treatment of underground mine workings is required. Moreover, placement of protection fencing adjacent to the shaft no.002 in the northwestern corner of the site is a recommended mitigation measure.

Appendix A VHE Validation Report (AWP report JMS/SR/BK/47366-RP004 Rev B)



July 2023

Stopes Road, Bolton Earthworks Validation Report

PROJECT NO.
JMS/SR/BK/47366-RP004 Rev A

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STOPES ROAD, RADCLIFFE, MANCHESTER, M26 3TW
EARTHWORKS REMEDIATION VALIDATION REPORT

For

VHE CONSTRUCTION PLC

Project Reference: JS/SR/BK/47366-Rp004

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Date: 30th June 2023

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Signed:

Date: 30th June 2023

Issue	Revision	Revised by	Approved by	Revised Date
Rev A	Addressed Hydrock and NHBC Comments	BK	SR	24th July 2023
Rev B	Addressed Additional NHBC Comments	BK		

For the avoidance of doubt, the parties confirm that these conditions of engagement shall not and the parties do not intend that these conditions of engagement shall confer on any party any rights to enforce any term of this Agreement pursuant of the Contracts (Rights of third Parties) Act 1999.
The Appointment of Alan Wood & Partners shall be governed by and construed in all respects in accordance with the laws of England & Wales and each party submits to the exclusive jurisdiction of the Courts of England & Wales.

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EXECUTIVE SUMMARY

This presents the salient points of the report and should not be referred to in isolation.

Site Location and Description	The site is located off Stopes Road, Radcliffe, Manchester, M26 3TW and is centred at approximate National Grid Reference (NGR) 376262mE, 407648mN, approximately 4.4 km southeast of Bolton town centre. The site is an irregularly shaped parcel of land occupying an area of approximately 5.8 hectares. The site has historically been utilised for commercial and industrial purposes including an old tarmac manufacturing plant and an electricity substation.
Earthworks/ Remedial Objectives	Excavation works were carried out by VHE in order to process near surface made ground to construct a development platform, remove below ground obstructions and identify and remediate any shallow contamination. In accordance with the Hydrock Earthworks Specification (adopted by AWP and VHE), the bulk fill operation is required to achieve 95% compaction. The material was classified throughout the earthworks, in order to assess their suitability of re-use as general fill. The earthworks were required to achieve less than 5% air voids for cohesive fill materials and between 5% and 10% air voids was agreed to be would be acceptable for granular fill. The site is to be redeveloped for residential end use, remediation has been recommended to ensure that unacceptable harm to human health during normal site use following redevelopment does not occur. Alan Wood & Partners undertook regular inspections to confirm site works were being carried out in accordance with the agreed specification.
Earthworks Specification	The earthworks specification (15220-HYD-XX-XX-RP-GE-0006) and remediation strategy (15220-HYD-XX-XX-RP-GE-0005-S2-P03) by Hydrock adopted by AWP, along with subsequent AWP amendments (JS/AC/47366-Rp001 and JS/AC/47366-Rp002 Rev A) were used during the earthworks validation works, covered by this report. Materials to be placed were to be engineered to achieve 95% compaction and air voids of less than 5% for cohesive soils and up to 10% for granular soils. Earthworks materials were classified in accordance with the criteria in Tables 6/1 and 6/2 in Series 600 of the Specification for Highway Works, and fell into one or other of the following general classifications: '**Acceptable material:** natural excavated material from within the site, or artificial materials processed through standard engineering means, which meet the requirements of Table 6/1 and Table 6/2 for acceptability for use in the earthworks. The maximum particle size shall be 125mm.' '**Unacceptable material**: Class U1 or U2 as defined in clause 2.2, shall not be used for the earthworks.'
Remediation Strategy	In accordance with the Hydrock Remediation Strategy and Hydrock Earthworks Specification, adopted by AWP and VHE, contamination testing was undertaken throughout the programme where required. The Hydrock Earthwork Specification stipulates all material to be re-used within the remedial works should be free from visual asbestos-containing materials. Where laboratory analysis identifies the presence of TPH above the assessment criteria set out in table 6.1 of the Hydrock Remediation Strategy, it shall be treated as a hotspot and remediated.

Earthworks Classification	The earthworks and remediation operation was predominantly completed by the end of October 2022 and was undertaken by VHE Construction Plc. Due to adverse weather conditions October 2022 the earthworks was halted resumed in April 2023, and was further completed by VHE Construction Plc in June 2023. Alan Wood & Partners were separately employed by the Contractor in order to provide site supervision, specialist geotechnical advice and consultancy services with the environmental remediation and re-engineering of the variable fill material. Ground conditions encountered across the site comprised made ground to depths of between 1.5 m and around 3.0m below original ground level. The made ground encountered predominantly fell into two categories. These were a granular ash material and a granular limestone material. A subsequent borrow pit was excavated in the northern POS where natural clay material was won to use within the engineered development platform. The three types of engineered fill were classified in accordance with Table 6/1 of the Specification for Highways Works Series 600. The granular ash material was predominantly classified as 2C (stony cohesive), the granular limestone material was classified as 1A (well graded granular), and the reworked natural clay was classified as 2C (stony cohesive).
Geotechnical Testing	Laboratory testing was carried out on samples of fill materials to classify their Geotechnical properties. Testing included: • Particle Size Distribution; • Optimum Moisture Content (OMC); • Maximum Dry Density (MDD) (4.5kg rammer); and • Air voids at OMC. The ash made ground proved to be highly variable across the site, even within the same grid square. Values of optimum moisture content ranged from 6.2% to 20%, with an average of 14.7%. Maximum dry density values range from 1.23 Mg/m^3 to 2.14 Mg/m^3, with an average of 1.51 Mg/m^3. From the information provided the air voids at optimum moisture content for these samples ranged from 1% to 20%, with an average of 6.6%. The clay also proved to be variable across the site. Values of optimum moisture content ranged from 9.8% to 20%, with an average of 12.73%. Maximum dry density values range from 1.61 Mg/m^3 to 2.05 Mg/m^3, with an average of 1.9 Mg/m^3. From the information provided the air voids at optimum moisture content for these samples ranged from 1% to 5%, with an average of 2.6%. The limestone hardcore material had values of optimum moisture content ranging between 6.7% and 12%, with an average of 9.1%. Maximum dry density values range from 1.71 Mg/m^3 to 2.15 Mg/m^3, with an average of 2.0 Mg/m^3. From the information provided the air voids at optimum moisture content for these samples ranged from 0% to 6%, with an average of 3%.
Compaction Validation Testing	The degree of compaction across the site has been validated through the use of 847 No. nuclear density gauge tests. With a further 88 sand

	replacement tests were undertaken as further calibration for the NDG testing. 813 No. of the 847 No. produced NDG results in accordance with the specification. All of the SRT results demonstrated the placed fill had met the specification criteria. In addition, 107 no. of CBR tests have been used to validate the base, the surface and every meter of fill in between.
Chemical Validation Testing	Chemical testing was undertaken of samples taken from trial pits excavated across the site at the initial stages of the site turnover. Chemical samples were also taken throughout the earthworks, to validate the fill and identified hotspots. No potential contaminants of concern in relation to human health or the environment were detected above the specified acceptance criteria.
Conclusions	The results of verification testing have confirmed that the works have been completed in accordance with the specifications and agreed variations. The remediation objectives are considered to have been met and there are no residual unacceptable risks to end users associated with soil contamination. There was no unacceptable risk to controlled water / groundwater identified prior to commencement of the earthworks. Chemical sampling has proven that the overall contaminant loading has decreased, with grossly contaminated soils having been removed from site. Therefore, it is considered that there is no residual unacceptable risk to controlled waters. This report should be included in the Health and Safety file for the site to ensure future maintenance which could penetrate the cover system can be carried out safely with due consideration for residual soil.

1 INTRODUCTION

1.1 Details of Commission

1.1.1 Alan Wood & Partners (AWP) were commissioned by VHE Construction (the "Client") as Principal Designer to provide technical services associated with the earthworks, environmental remediation and validation during the enablement works of the development area at the Stopes Road, Radcliffe, Manchester, M26 3TW.

1.1.2 This report presents technical validation of on-site earthwork and remediation activity, based on the following reports as well as their accompanying documents:

- Hydrock, Geotechnical Design Report for Earthworks (*15220-HYD-XX-XX-RP-GE-0005-S2-P03*), dated June 2022;
- Hydrock, Remediation Strategy & Verification Plan (*15220-HYD-XX-XX-RP-GE-0006*), dated June 2022;
- Alan Wood & Partners, Earthwork Specification (JS/AC/47366-Rp002 Rev A), dated September 2022;
- Alan Wood & Partners, Remediation Strategy (JS/AC/47366-Rp001), dated June 2022;
- Alan Wood and Partners Technical Note 47366-Tn005 Pre-classification geotechnical testing and trial pad results, dated 2nd September 2022;
- Method statement produced by VHE Construction;
- Han Kloubert, RDC Compaction and Compaction Measurement with Polygon Roller prepared for VHE;

1.2 Site Location & Description

1.2.1 The site is located off Stopes Road, Radcliffe, Manchester, M26 3TW National Grid Reference (NGR) 376262mE, 407648mN, approximately 4.4 km south east of Bolton town centre.

1.2.2 The area to be remediated is irregularly shaped and cover an area of approximately 5.8ha in size. A site location plan is presented as Figure 47366/001.

1.2.3 The site is currently accessed from the southeast, off Stopes Road.

1.2.4 The site has historically been utilised for commercial and industrial purposes including a tarmac block manufacturing plant, which consists of several buildings and an electricity substation.

1.2.5 Demolition of above ground structures had been executed down to slab level prior to these works, however additional deeper concrete slabs were still present.

1.2.6 This report covers earthworks and remediation carried out across the site.

1.3 Objectives of the Earthworks and Remediation

1.3.1 To achieve a suitable-for-use site, remediation has been recommended to ensure that unacceptable harm does not occur to human health and the wider environment during normal site use following redevelopment.

1.3.2 Compaction of the placed materials in future development areas should be to 95% of the maximum dry density. Air voids in placed fill shall be less than 5% for cohesive soils and between 5% and 10% would be acceptable for granular fill.

1.4 Scope of Works

1.4.1 This report covers the earthworks and remediation undertaken between the end of May 2022 and the end of May 2023 by VHE Construction.

1.4.2 The works undertaken by VHE comprised;

- Site clearance;
- Site wide reduced level within made ground to 1.50-3.00m below EGL (as shown on Hydrock drawing 5220-HYD-XX-XX-DR-GE-6001).
- Rolling Dynamic Compaction to densify the near surface soils on the reduced levels.
- The removal of all existing surface hardstanding and localised above ground structures;
- Turnover and removal of existing below ground obstructions to a depth of 1.5m below existing or proposed ground level whichever is deeper, or the top of natural soils;
- Over-excavation of the peat to depths of up to 4m (as indicated on Hydrock drawing 5220-HYD-XXXX-DR-GE-6001);
- Over-excavation of contamination hotspots;
- Protection of existing drainage culvert and electricity cable running through the centre of the site;
- Segregation of excavated materials and processing of artificially hard materials; and

2 EARTHWORKS SPECIFICATION AND REMEDIATION STRATEGY

2.1 General

2.1.1 The pre-remediation investigations conducted by Hydrock, remediation strategy (15220-HYD-XX-XX-RP-GE-0005-S2-P03, dated June 2022) and earthworks specification (15220-HYD-XX-XX-RP-GE-0006) were adopted by AWP and used as the basis for the Alan Wood and Partners Earthworks Specification and Remediation strategy and subsequent amendments, and used during the earthwork's validation works, covered by this report. These documents were adopted by AWP and VHE and should be read with their accompanying documents.

2.2 Earthworks Assessment

2.2.1 Excavated materials were classified in accordance with the criteria in Tables 6/1 and 6/2 in Series 600 of the Specification for Highway Works, and fell into one or other of the following general classifications:

i) '**Acceptable material:** natural excavated material from within the site, or artificial materials processed through standard engineering means, which meet the requirements of Table 6/1 and Table 6/2 for acceptability for use in the earthworks. The maximum particle size shall be 125mm.'

ii) '**Unacceptable material**: Class U1 or U2 as defined in clause 2.2, shall not be used for the earthworks.'

2.2.2 In addition to these grading requirements, the maximum particle size of any fill material shall be no more than two-thirds of the proposed compacted layer thickness.

2.2.3 The Contractor was responsible for classifying all acceptable material types to be incorporated into the earthworks.

2.3 Remediation Strategy

2.3.1 In accordance with the Hydrock Remediation Strategy, AWP Remediation Strategy and Hydrock Earthworks Specification, contamination testing was undertaken throughout the programme where required.

2.3.2 A ‘contamination hotspot’ was identified by Hydrock within the remediation boundary of the site during intrusive investigation. Hotspot WS01 contained elevated levels of both aliphatic and aromatic petroleum hydrocarbons at depths of 1.20m-1.60mbgl. Further investigations found evidence of hydrocarbon contamination, hotspot TT203A, at depths of 0.60m-0.70mbgl.

2.3.3 In the southwest of the site at depths between 0.10m to 0.20m bgl Made Ground was found to contain laboratory confirmed amosite sheeting/board debris. In addition, asbestos fibres (<0.001% of chrysotile and amosite) have been detected in three samples of the made ground (general and ash made ground).

2.3.4 The Hydrock Earthwork Specification stipulates all material to be re-used within the remedial works should be free from visual asbestos-containing materials.

2.3.5 As part of the chemical validation testing to ensure the material was suitable for re-use and does not present an unacceptable residual risk to future site end users or the wider environment; samples from across the site and of any material with visual and/or olfactory evidence of contamination were tested. Chemical analysis was compared to table 6.1 of Hydrock remediation strategy.

2.3.6 Alan Wood & Partners undertook regular inspections to confirm site works were being carried out in accordance with the agreed specification.

3 EARTHWORKS EXECUTION

3.1 General

3.1.1 The earthworks and remediation operation was predominantly completed by the end of October 2022 however, due to adverse weather conditions during October works were halted. The works resumed in April 2023 and were completed on 6th June 2023, all works were undertaken by VHE Construction Plc. Alan Wood & Partners were separately employed by the Contractor in order to provide site supervision, specialist geotechnical advice and consultancy services with the environmental remediation and re-engineering of the variable fill material.

3.1.2 For ease of material tracking a grid with alphanumeric identifiers was established for the site, as shown on drawing VHEJ808-302 Site Boundary with 20m Grid.

3.2 Earthworks Duration

3.2.1 The earthworks were completed between the end of May 2022 to the end of May 2023. Due to heavy rain resulting in poor ground conditions, the earthworks were suspended between November 2022 and April 2023.

3.3 Prevailing Weather Conditions

3.3.1 The first half of the earthwork's operation was generally carried out during a period of warm weather. During the early part of the week beginning 18th of July 2022 the site was subject to extreme heat, with the temperature rising to approximately 38°C. Following this period, the weather got cooler, and rain became more frequent. Operations were temporarily suspended between November 2022 and April 2023 due to extremely wet weather. Weather conditions between April 2023 and the conclusion of the works were generally mild, with the occasional rain.

3.4 Site Preparation

Excavation of Buried Structures

3.4.1 All remnant sub-surface structures encountered were excavated to depths between 1.5m – 3.0m below previous or finished ground level, depending on the specified overdig depth in that area. Sub-surface structures that extended below 1.5m - 3.0m bgl, were all removed in accordance with the approved earthworks specification.

3.4.2 All structures were visually and olfactorily inspected for signs of contamination. No structures showed any signs of either.

3.4.3 Buried relic structures were identified upon removal of hardstanding and made ground. These structures were indicative of concrete walls, slabs and brick walls between original ground level and around 4.0m below original ground level. The contractor excavated all relic substructures to a depth of, the deeper of, 2.0m below original or proposed ground level. The only remaining substructures are the abstraction well, culvert and cable, these are shown on drawing VHEJ808-401 Excavation Constraints.

3.4.4 The existing drainage culvert was protected during the works. A 3.1m section of the culvert was damaged during the overdig process, this section was replaced with a solid twin wall HDPE pipe after consultation with Hydrock's drainage engineer as shown on drawing VHEJ808-011 Culvert Repair.

3.4.5 All concrete and hardstanding were processed to a 6F2 graded material and were stockpiled onsite, the 6F2 was later used on site as a 150mm protection layer across the whole of the completed development platform. The geotechnical data for the 6F2 is presented in section 1.8 and geotechnical certificates can be found in appendix C.

Decommissioning of Fuel Tanks

3.4.6 Two fuel tanks were uncovered as part of the works in the south east of the site. They were both primarily filled with sand with a small volume of liquid which was observed to have a strong hydrocarbon odour. The liquid was sampled, and the results are presented in Appendix F. The liquid contained elevated levels TPH, and was sent for disposal to Valgrove Ind Services the consignment note can be found in appendix H.

3.4.7 The sand within the fuel tanks was also chemically tested, the results are presented in Appendix F. The recorded concentrations within this material were below site specfiifc assessment criteria and the material was reused on site, with agreement from Hydrock.

3.4.8 The walls of the subsequent excavation to remove the tanks were sampled to assess whether the surrounding soils had been impacted by hydrocarbon contamination associated with the removed tanks. The results showed contaminant concentrations within the surrounding ground to be below the SSACs and was included in the earthworks. The results are provided in Appendix F. Due to health and safety restrictions the base of the tanks couldn't be tested as they were located over the mineshaft exclusion zone.

Preliminary Investigations

3.4.9 47 No. trial pits were excavated across the site by VHE, to collect samples for geotechnical classification and chemical testing (Ref. VHEJ808-501 Trial Pits and Chemical Samples). Each sample was screened against the SSACs to assess the suitability of materials to be used on site. Geotechnical testing was undertaken to determine compaction characteristics and define the appropriate compaction method with consideration for the plant employed on site.

3.4.10 Two contamination hotspots were identified by Hydrock's previous site investigation, petroleum hydrocarbons were identified along the with the discovery of a tank (Hydrock TT203A and VHE Hotspot 2). Further petroleum hydrocarbons were identified in Hydrocks WS01/TP216 and VHE Hotspot 1.

3.5 Engineered Fill Operation

3.5.1 The compaction plant used on site was approved by Alan Wood & Partners.

3.5.2 The excavation, placement and compaction of all engineered fill was completed solely by VHE Construction Plc using plant supplied by Bullen Plant Hire, Lancashire Crushers, Hurts Plant Hire, Cleehill Plant Hire, CRH Plant Hire and Smiths Plant Hire.

3.5.3 In accordance with the Remediation Strategy for the area of future development, a 1.5m to 3.0m turnover of the made ground was required. The approved Earthworks Specification indicated that landform remodelling, including backfilling voids and modifying the existing site profile to create a profile as shown on Hydrock Ground Improvement Strategy Drawing 15220-HYD-XX-XX-DR-G-6001 was required. During the early stages, it became apparent that available material volumes on site, coupled with the higher than anticipated settlement induced by the RDC works would result in final levels being 160mm lower than the original design levels. As such to avoid the requirement for material import the final formation level for the Earthworks and Remediation was varied from the original drawings. It was agreed that VHE Construction Plc would finish 160mm below the levels shown on Hydrock Ground Improvement Strategy Drawing 15220-HYD-XX-XX-DR-G-6001.

3.5.4 All of the capping material (final 600 mm to bring site to final development level) is to be placed by the future developers of the site at a later date.

3.5.5 The final levels achieved are shown on the VHE as-built survey drawing VHEJ808-201 Formation Level.

3.6 Encountered Ground Conditions

3.6.1 Ground conditions encountered across the site during the previous intrusive investigations comprised made ground to depths of between 0.4 m and approximately 7.5m below original ground level. The made ground encountered predominantly fell into two categories; an ash material and a sandy limestone gravel.

3.6.2 The made ground was predominantly underlain by Glacial till, comprised of clay interbedded with, silt, sand and gravel.

3.6.3 An area was identified where peat was present up to 1.0m thick, locally in the east of the site to a maximum depth of 3.9mbgl.

3.6.4 While excavating the granular material in cell C13 and D15 evidence of visual and olfactory contamination (hydrocarbons) was witnessed. Samples of the material from both areas were recovered, and the chemical results showed the presence of elevated levels of hydrocarbons in both areas. The results of this testing are discussed further in Section 8.

3.6.5 While excavating material in grid squares B13, B19, D15 and E20, five hotspots of asbestos were found observed as asbestos cement and insulation board. In grid squares B13 and B19 Asbestos containing material was witnessed, which was handpicked and the soils tested for asbestos fibre levels were found to be acceptable for reuse. Soils found in grid square D15 were found to contain asbestos fibres and hydrocarbons that exceed the site criteria for re-use. This contaminated soil was removed to an area with an impermeable membrane and bunded prior to disposal off site to a licensed carrier and a licensed disposal facility. Asbestos containing materials were found in grid square E20, soil samples were sent for testing and a gross amount of fibres were found in the soil. The soils were bunded and sent for disposal with a licensed carrier and disposal facility. The results of this testing are discussed further in Section 8

3.6.6 All waste documents are presented in appendix H.

3.6.7 During the initial surface strip, other than where specifically reported, no further visual or olfactory evidence of contamination was identified.

3.7 Peat Excavation

3.7.1 An area of peat was identified up to 1.0m thick, locally encountered in the east of the site to a maximum depth of 3.9mbgl.

3.7.2 A total of 2700m^3 of peat was excavated and relocated to reinstate the borrow pit in the POS in the north of site, this is shown on drawing VHEJ808-102.

3.8 Operational Plant

3.8.1 A daily record was kept of the specific on-site cut and fill operations with details including weather conditions and the type of plant in operation. The relevant specifications of this plant are detailed in Table 3-1 below.

3.8.2 During the earthworks fill operation, the material being placed was described in accordance with BS5930:1999, (BS5930:1999 Amendment 1) and BS EN 1997-2/2007 (EC7 Part 2).

3.8.3 A screening team and crushing works were mobilised in August 2022 to screen the site won oversize previously hardstanding material and create a 6F2 graded product. The oversized material was then crushed and screened to a 6F2 graded material using a Powerscreen Premiertrak R400X track crusher and a Sandvik QJ241 which were onsite October 2022 and May 2023, respectively.

Table 3-1 Operational Plant Specifications

Machine Description	Make	Model	Plant Hire Company	Operating Weight (kg)	Drum Width (mm)	Static Linear Load (kg/cm)
360º Tracked Excavator	Case	CX130	Bullen Plant Hire	12,273	N/A	N/A
360º Tracked Excavator	Hitachi	ZX290LC-5N	Bullen Plant Hire	28,700	N/A	N/A
360º Tracked Excavator	Hitachi	ZX290LC-5N	Bullen Plant Hire	28,700	N/A	N/A
360º Tracked Excavator	Hitachi	ZX225US-6	Bullen Plant Hire	23,000	N/A	N/A
360º Tracked Excavator	Hitachi	ZX225US-6	Bullen Plant Hire	13,900	N/A	N/A
360º Tracked Excavator	Doosan	DX225LC-3	Lancashire Crushers	21,900	N/A	N/A
360º Tracked Excavator	Hitachi	ZX225US-6	Bullen Plant Hire	23,000	N/A	N/A
360º Tracked Excavator	Hitachi	ZX225US-6	Bullen Plant Hire	23,000	N/A	N/A
360º Tracked Excavator	Komatsu	PC210	Bullen Plant Hire	24,161	N/A	N/A
360º Tracked Excavator	Case	CX300D	Bullen Plant Hire	30,154	N/A	N/A
360º Tracked Excavator	Hitachi	ZX290LC-5N	Bullen Plant Hire	28,700	N/A	N/A
Dozer	Case	1150M	Hurts Plant Hire	14,804	N/A	N/A
Dozer	CAT	D6T	Bullen Plant Hire	20,148	N/A	N/A
Dozer	CAT	D6T	Bullen Plant Hire	20,148	N/A	N/A
Dozer	Komatsu	D61PX	Bullen Plant Hire	19,460	N/A	N/A

Machine Description	Make	Model	Plant Hire Company	Operating Weight (kg)	Drum Width (mm)	Static Linear Load (kg/cm)
Dozer	Komatsu	D51 Pxi	Bullen Plant Hire	14,260	N/A	N/A
Dozer	CAT	D6K	Bullen Plant Hire	12,886	N/A	N/A
Articulated Dump Truck	Volvo	A30G	Bullen Plant Hire	Unloaded: 23,300 Loaded: 52,300	N/A	N/A
Articulated Dump Truck	Volvo	A25F	Bullen Plant Hire	Unloaded: 21,900 Loaded: 45,900	N/A	N/A
Articulated Dump Truck	Volvo	A30G	Hurts Plant Hire	Unloaded: 23,300 Loaded: 52,300	N/A	N/A
Articulated Dump Truck	Volvo	A25F	Bullen Plant Hire	Unloaded: 21,900 Loaded: 45,900	N/A	N/A
Articulated Dump Truck	Volvo	A30G	Lancashire Crushers	Unloaded: 23,300 Loaded: 52,300	N/A	N/A
Articulated Dump Truck	Volvo	A30G	Bullen Plant Hire	Unloaded: 23,300 Loaded:52,300	N/A	N/A
Articulated Dump Truck	Volvo	A30F	Bullen Plant Hire	Unloaded: 23,300 Loaded: 51,200	N/A	N/A

Machine Description	Make	Model	Plant Hire Company	Operating Weight (kg)	Drum Width (mm)	Static Linear Load (kg/cm)
Articulated Dump Truck	Volvo	A30F	Bullen Plant Hire	Unloaded: 23,300 Loaded: 51,200	N/A	N/A
Articulated Dump Truck	Volvo	A30G	Bullen Plant Hire	Unloaded: 23,300 Loaded: 52,300	N/A	N/A
Articulated Dump Truck	Volvo	A30G	Bullen Plant Hire	Unloaded: 23,300 Loaded: 52,300	N/A	N/A
Loading Shovel	Case	821F	Lancashire Crushers	17,633	N/A	N/A
Tracked Jaw Crusher	Powerscreen	Premiertrak R400X	Lancashire Crushers	52,300	N/A	N/A
Tracked Jaw Crusher	Sandvik	QJ241	Lancashire Crushers	32,568	N/A	N/A
Screener	Powertrak	750	Hurt Plant Hire	19,000	N/A	N/A
Roller / Compactor	Bomag	219 DH5	Cleehill Plant Hire	19,400	2130	60.1
Roller / Compactor	Bomag	BW226 DI4	Smiths Plant Hire	25,760	2130	92.7
Roller / Compactor	Bomag	BW213 D5	Cleehill Plant Hire	12,600	2130	35.4
Roller / Compactor	Bomag	BW213 D5	Bullen Plant Hire	12,600	2130	35.4
Padfoot Roller / Compactor	Bomag	BW213 PD5	Cleehill Plant Hire	13,470	2130	N/A
Padfoot Roller / Compactor	Bomag	BW213 PD5	CRH Plant Hire	13,470	2130	N/A

3.9 Engineered Fill

3.9.1 Thirty-two reports have been reviewed that contain classification test data, for the materials proposed for use within the earthworks. As presented in the reports below. All the reports received are included in appendix C.

Table 3-2: Geotechnical Classification Reports

Report	Contents	Report	Contents
MRN 4454/1	Classification	MRN 4454/67	Classification
MRN 4454/2	Classification	MRN 4454/69	Classification
MRN 4454/3	Classification	MRN 4454/71	Classification
MRN 4454/4	Classification	MRN 4454/72	Classification
MRN 4454/5	Classification	MRN 4454/73	Classification
MRN 4454/9	Classification	MRN 4454/74	Classification
MRN 4454/10	Classification	MRN 4454/75	Classification
MRN 4454/11	Classification	MRN 4454/76	Classification
MRN 4454/12	Classification	MRN 4454/77	Classification
MRN 4454/14	Classification	MRN 4454/78	Classification
MRN 4454/35	Classification	MRN 4454/88	Classification
MRN 4454/38	Classification	MRN 4454/90	Classification
MRN 4454/51	Classification	MRN 4454/95	Classification
MRN 4454/52	Classification	MRN 4454/97	Classification
MRN 4454/55+55A	Classification	MRN 4454/99	Classification
MRN 4454/64	Classification	PSL23/3339	Classification

3.9.2 The majority of the ash material was classified as **2C** (stony cohesive) due to the high proportion of the material passing the 63μm sieve, the clay was classified as either **2C** (stony cohesive) or a **2A/2B** (Wet/Dry Cohesive), the yellow limestone gravel was classified as **1A** (well graded granular), and the site generated Recycled Crush was classified as **6F1** and **6F2.**

3.9.3 A total of 139 samples have been sent to the lab for classification testing prior to being incorporated into the earthworks, 108 of which are described as “ash fill” and “general fill”. The “ash fill” and “general fill” material has a variety of gradings; 96 are 2C, 3 are 2A/2B and 7 are 1A. The “clay” material, from the borrow pit, has had 14 samples tested, 9 of the samples have been graded as a 2A/2B and 4 of the samples have been graded as a 2C. 6

samples of “yellow gravel” have been tested with results grading the material as 1A. 12 samples of “recycled crush” were tested, 8 of which indicate 6F2 and 4 of which indicate 6F1. The 4 samples classified as 6F1 are due to a slightly higher fines content of 66, 65, 62 and 63, with the 6F2 fines content being 60.

3.9.4 The laboratory typically named the black ash fill as either “ash” or “general” fill. The material reused on site from the borrow pit was classified as “clay fill”, with the reused limestone gravel being named as “yellow gravel”.

3.9.5 The majority of the “ash fill” and “general fill” was returning as non-plastic, only four samples were found to be plastic, with a plastic limit of 13% and 26%. 11 samples could be tested for shear strength using a undrained shear strength test and the results ranged between 74kPa and 449kPa.

3.9.6 The ash and general fill graded as a 2C, has the following compaction characteristics. The compaction curves indicated that in nineteen samples <5% air voids was achieved. The majority of the samples, thirty-eight, achieved a range of between 5% and 10%. A further four samples recorded >10% air voids.

Table 3-3: Ash 2C Characteristics

Ash 2C Characteristic	Minimum Value	Maximum Value	Average Value
Bulk Density	1.34	2.1	1.64
Particle Density	1.37	2.61	2.09
Optimum Moisture Content	6.2	20	14.7
Natural Moisture Content	4.2	30	-
Maximum Dry Density	1.23	2.14	1.51
Air Voids @ OMC	1	20	6.6

3.9.7 The three ash and general fill samples graded as a 2A/2B, had the following compaction characteristics. The compaction curves indicated that <5% air voids was achieved in two of the three samples.

Table 3-4: Ash 2A/2B Characteristics

Ash 2A/2B Characteristic	Minimum Value	Maximum Value	Average Value
Bulk Density	1.36	2.02	1.6
Particle Density	2.14	2.64	2.46
Optimum Moisture Content	6.2	15	11.7
Natural Moisture Content	17	36	-
Maximum Dry Density	1.2	1.84	1.62
Air Voids @ OMC	4	20	13

3.9.8 The five ash and general fill samples graded as a 1A, have the following compaction characteristics. The compaction curves indicated that <5% air voids was achieved in four of the five samples.

Table 3-5: Ash 1A Characteristics

Ash 1A Characteristic	Minimum Value	Maximum Value	Average Value
Bulk Density	2.02	2.05	2.04
Particle Density	2.5	2.58	2.54
Optimum Moisture Content	7.1	11	9.05
Natural Moisture Content	4.3	13	-
Maximum Dry Density	1.89	1.91	1.9
Air Voids @ OMC	3	13	8

3.9.9 The thirteen samples of grey and brown clay have been classified as 2A/2B and 2C material, the material has the following compaction characteristics. The compaction curves indicated that in all samples <5% air voids was achieved in all samples.

Table 3-6: Clay 2A/2B and 2C Characteristics

Clay 2A/2B and 2C Characteristic	Minimum Value	Maximum Value	Average Value
Bulk Density	1.75	2.17	2.06
Particle Density	2.4	2.72	2.58
Optimum Moisture Content	9.8	20	12.73
Natural Moisture Content	9.8	29	-
Maximum Dry Density	1.61	2.05	1.9
Air Voids @ OMC	1	5	2.6

3.9.10 The seven samples of yellow gravel have been classified as 1A, the material has the following compaction characteristics. The compaction curves indicated that in all samples <5% air voids was achieved.

Table 3-7: Yellow Gravel 1A Characteristics

Yellow Gravel 1A Characteristic	Minimum Value	Maximum Value	Average Value
Bulk Density	2.22	2.24	2.23
Particle Density	2.30	2.65	2.58
Optimum Moisture Content	6.70	12	9.10
Natural Moisture Content	2.90	18	-
Maximum Dry Density	1.71	2.15	2.00
Air Voids @ OMC	0	6	3

3.9.11 The twelve samples of recycled crush have been classified as 6F1/6F2, the material has the following compaction characteristics. The compaction curves indicated that in all samples <5% air voids was achieved. Ten samples were sent for constituent parts testing

with the proportion of Ra content having an range of between 1.5% and 8.1% and an average of 3.95%. The maximum Ra content of 8.1% is below the threshold which would require bitumen content to be tested. (As per table 1/5-1 of the approved specification)

Table 3-8: Recycled Crush 6F1/2 Characteristics

Recycled Crush 6F1/2 Characteristic	Minimum Value	Maximum Value	Average Value
Bulk Density	1.75	2.05	1.94
Particle Density	2.5	2.5	2.5
Optimum Moisture Content	3	6.6	5.45
Natural Moisture Content	2	9.7	-
Maximum Dry Density	1.84	1.93	1.88
Bitumen Materials (Ra)	1.5	8.1	3.95
Other Recycled Aggregate (X)	0.1	0.8	0.44
Bitumen Content	Only required if Ra is >20%		

3.9.12 As the ash fill / general fill accounts for 75% of fill placed and the majority of classification tests in this material indicate that <5% air voids could not be achieved in the lab, it was anticipated that where this material was placed in permanent works it would not achieve air voids of <5%. Although the gradings classified the material as a cohesive material (2C) the Atterberg tests confirm it to be non-plastic which aligns with site observations that the material is behaving as a granular material. A total of ninety-nine samples of the ash fill material have had pre-classification tests, carried out by Murray Rix, with grading classifying materials as a 2C (stony cohesive). A total of ninety of the ninety-nine had a plastic limit tested carried out, with eighty-six recording the material as being non plastic. Due to the granular non plastic nature of the ash fill material AWP and VHE have proposed to treat the material as a 1A granular material, which was agreed with Hydrock. As the material is now being treated as a granular material the performance requirements for this material, as per the approved specification, are >95% compaction and a CBR >5% with a stiffness ratio of <2.2.

3.9.1 The tables below show the quantities and frequency of testing carried out on site.

Table 3-9: Yellow Gravel Testing Frequency

Material Type	Volume (m^3)	Test	Frequency Required	Tests Required	Onsite Frequency	Remaining Tests	Comments
Yellow Gravel	4,000	Grading	1 per 750m^3	5	14	0	Approximate volume from onsite Surveys
		MC	1 per 750m^3	5	14	0	
		Uniformity	1 per 750m^3	5	5	0	
		Particle Density	1 per 1500m^3	3	8	0	
		OMC/MDD	1 per 1500m^3	3	11	0	
		CBR at OMC	1 per 1000m^3	4	7	0	

Table 3-10: Ash Fill Testing Frequency

Material Type	Volume (m^3)	Test	Frequency Required	Tests Required	Onsite Frequency	Remaining Tests	Comments
General/Ash Fill Material	47,000	Grading	1 per 750m^3	63	104	0	Approximate volume from onsite Surveys
		MC	1 per 750m^3	63	101	0	
		PL/LL	1 per 750m^3	63	97	0	
		CBR at NMC	1 per 1500m^3	32	48	0	
		Undrained	1 per 1500m^3	32	63	0	
		OMC/MDD	1 per 1500m^3	32	67	0	

Table 3-11: Clay Fill Testing Frequency

Material Type	Volume(m^3)	Test	Frequency Required	Tests Required	Onsite Frequency	Remaining Tests	Comments
Clay	11,000	Grading	1 per 750m^3	15	16	0	Approximate volume from
		MC	1 per 750m^3	15	16	0	

Material Type	Volume(m^3)	Test	Frequency Required	Tests Required	Onsite Frequency	Remaining Tests	Comments
		PL/LL	1 per 750m^3	15	16	0	onsite Surveys
		CBR at NMC	1 per 1500m^3	8	10	0	
		Undrained	1 per 1500m^3	8	10	0	
		OMC/MDD	1 per 1500m^3	8	10	0	

Table 3-12: Recycled Crush Testing Frequency

Material Type	Volume(m^3)	Test	Frequency Required	Tests Required	Onsite Frequency	Remaining Tests	Comments
Recycled Crush	6,000	PSD	1 per 500m^3	12	12	0	Approximate volume from onsite Surveys
		Uniformity	1 per 500m^3	12	12	0	
		MC	1 per 500m^3	12	12	0	
		OMC	1 per 1500m^3	4	4	0	
		CBR at NMC	1 per 1500m^3	4	4	0	
		PL, LL	1 per 1500m^3	4	4	0	
		Constituent	3 per Source	10	10	0	
		LA	1 per 3000m^3	2	2	0	
		Bitumen	Only needed if Constituents show more than 20% bitumen				

4 ROLLING DYNAMIC COMPACTION

4.1 Introduction

4.1.1 In order to facilitate development, made ground of varying depths across the development area requires treatment and re-engineering to provide a stable, homogenous platform to support the external works and infrastructure associated with the proposed development. A geotechnical design completed by Hydrock identified the requirement for treatment of deeper areas of made ground prior to re-engineering made ground within 1.5m to 3.0m of proposed site levels in order to achieve the required platform stability.

4.1.2 A rolling dynamic compaction (RDC) treatment has been adopted to achieve this homogeneity.

4.2 Results of the Compaction Trials

4.2.1 GPS measurement has been used to track the Evib value across the site, this has produced a coloured heat map showing ground improvement. The first and last pass drawings have been appended to this report.

4.2.2 Below are the EVIB values showing ground improvement in each area. As shown in drawing VHEJ808-1202 Smiths RDC Survey.

Table 4-1: Area 1 and 2a

EVIB (MN/m^3)	1st Pass (%)	Last Pass (%)
>49	49	57
43-49	7	13
36-42	8	12
28-35	9	9
20-27	8	5
<20	19	4

Table 4-2: Area 2b

EVIB (MN/m^3)	1st Pass (%)	Last Pass (%)
>49	25	70
43-49	5	14
36-42	8	8
28-35	10	4
20-27	13	2
<20	39	2

Table 4-3: Area 3

EVIB (MN/m^3)	1st Pass (%)	Last Pass (%)
>49	4	74
43-49	2	12
36-42	3	6
28-35	4	3
20-27	8	1
<20	79	4

Table 4-4: Area 4

EVIB (MN/m^3)	1st Pass (%)	Last Pass (%)
>49	6	73
43-49	4	9
36-42	6	5
28-35	7	5
20-27	10	3
<20	67	5

4.2.3 The agreed approach was to set the red areas as <20MN/m^2 (3.9% CBR equivalent) to identify any soft spots that need remediating. The upper-level setting for the Evib measurement, (blue zone) was set at >49 MN/m^2. The marginal levels between the red and blue zones will be graded Green zones, whereby a 15% CBR is equated to an Evib value of 36 MN/m^2 which is a standard target level for highways construction in the UK.

4.2.4 The RDC data shows significant improvement across the site, with all areas having more than 50% of coverage resulting in an EVIB value of >49MN/m^2. All areas have less than 5% coverage of <20MN/m^2. This shows there are minimal soft spots and that the ground has been improved past the 3.9% CBR value.

4.2.5 Areas where natural clay have been found near the surface have been excluded from the RDC works, these areas are shown on drawing VHEJ808-1202 Smiths RDC Survey.

5 SOFT SPOTS

5.1 Soft Spot Records

5.1.1 As per the approved earthworks specification, the site-specific requirements for a 'soft spot' on site is a localised area where excessive mattressing, bow-waving or ground heave is present and fails to achieve the minimum of a 2.5% CBR. In addition, areas where the on-board Evib values from the RDC recorded <20MN/m^2 were considered to indicate 'soft spots' and were treated in accordance with the specification.

5.1.2 A total of sixteen 'soft spots' have been identified across the site, a drawing showing the location of these soft spots has been appended. The 'soft spots' have been excavated to either their full depth or to 1.0mBGL, based on whichever is lesser. Appendix E presents reports produced during the works documenting 'soft spots' location, extent and actions taken to remediate.

6 GEOTECHNICAL TESTING

6.1 Geotechnical Testing Frequencies

6.1.1 Three geotechnical testing techniques were used to verify the compaction of the engineered fill, Plate bearing Tests (PBT), Nuclear Density Gauge (NDG) and Sand Replacement tests (SRT). The table below shows how many tests were required on site and how many tests were undertaken.

Table 6-1: Geotechnical Validation Testing Frequency

Test	Frequency Required	Tests Required (Total)	Frequency Taken	Remaining Tests
CBR	1 per 40m at surface and every 1m	80.0	107	0
NDG	1 per 20m, per 275mm layer	867.0	847	0
SRT	1 per every 10 NDGs	87.0	88	0

6.2 Compaction Testing

6.2.1 Nuclear Density Gauge and Core Cutter

6.2.1.1 Nuclear Density Gauge testing has been carried out at one test per 275mm layer in every 20mx20m grid square. A combined total of 847 in-situ density test have been carried out across the site.

6.2.1.2 A total of 839 NDG tests and 8 core cutter tests have been used to validate the compaction and air voids across the site. Table 6.1 below shows the percentage compaction and percentage air voids, recorded from each in-situ density test.

6.2.1.3 The approved specification requires >95% compaction of laboratory maximum dry density. 829 of the 847 in-situ density testes carried out using either the NDG or core cutter results achieved greater than the required 95% compaction. The remaining 18 of

the 847 in-situ density tests fell below the required 95% compaction (97.88% of all NDG and Core Cutters achieved <95% compaction).

6.2.1.4 23 of the 847 tests recorded >110%, these were carried out in the early stages of land raising. The first round of lab tests used to calculate %compaction were based on rammer tests conducted using a 2.5kg rammer. The compaction plant being utilised on site has a high mass per metre width of drum, which was not appropriately represented by the 2.5kg rammer test. The lab test used to measure MDD for classification purposes was adjusted to test using a 4.5kg rammer test. The adjustment in the laboratory testing method has resulted in a more representative test, which has reduced the number of validation results recording % compaction of >110%. The field tests which were compared against the 2.5kg rammer lab tests are highlighted pale red in table 6.2.

6.2.1.5 The spatial distribution of the material that achieved <95% compaction was mostly sporadic with only one cluster of failures within grid square D9 Layer 4 and Layer 5. However, a further 6 layers of fill was placed on top of this material and subsequently all achieved >95%.

6.2.1.6 The original approved specification requires <5% air voids in the clay and ash fill. A total of 838 tests were carried out in the ash and clay material. 354 of the 838 test results achieved the required <5% air voids, a further 470 fell between 5% and 10% air voids, while 14 recorded greater than 10% air voids.

6.2.1.7 The results indicate that approximately 55% of the air voids are between 5 and 10%. Due to the granular nature of the ash it was agreed that the performance criteria for this material be revised such that <5% air voids becomes a target for the ash material, which was accepted may not be achievable. However, it was proposed that an upper limit of 10% for this material be the performance criteria adopted moving forwards. In order to show that the 5-10% air voids were due to variability in laboratory particle density and maximum dry density rather than the material being poorly compacted, additional in-situ compaction tests were carried out, where NDG and SRDs were carried out at the same

location on the exact same date. A comparison of the NDG and SRD results has been made and discussed further in section 6.1.2.

6.2.1.8 A total of 88 tests were conducted in clay fill, 84 of which achieved the required <5%. 4 recorded air voids between 5% and 6.5%.

6.2.1.9 The spatial distribution of the material that achieved >10% air voids was mostly sporadic with only one cluster of failures across grid square B11, B12 and C11, Layer 1. The material was ash fill that had a requirement of <10% air voids, the failures achieved between 11.73 and 12.88%. The moisture content of the material was between 2 and 3% wet of OMC. B11 and B12 had a further 8 layers placed on top of this material all of which achieved <10% air voids. C11 also had 8 layers placed on top, with only one of the further layers not achieving <10% air voids. Due to the isolated locations marginal failure and level within the placed fill, remedial works were no deemed necessary as the overlying fill, of which there was significant thickness, achieved the performance criteria.

6.2.1.10 A total of 98.13% of the placed ash fill has achieved <10% air voids, as recorded by the in-situ density tests. A total of 95.5% of the clay fill has achieved <5% air voids. With an overall 97.85% of the fill achieving the required air void specification.

6.2.2 Sand Replacement Tests

6.2.2.1 A total of 88 sand replacement tests (SRT) have been carried out. Table 6.2 below shows the percentage compaction and percentage air voids, recorded from each SRT.

6.2.2.2 The approved specification requires >95% compaction of laboratory maximum dry density. All 88 of the SRT results achieved greater than the required 95% compaction.

6.2.2.3 The approved specification requires <5% air voids in a stony cohesive 2C material, including the ash fill material. A total of 80 tests have been undertaken on the ash material, 44 of the 88 results have achieved the required <5% air voids, the remaining 36 fell between 5% and 10% air voids and none were greater than 10% air voids.

6.2.2.4 A further 8 tests were undertaken on the clay fill, all of these achieved the <5% required.

6.2.2.5 A comparison has been made between the SRT and NDG results, the results can be seen in table 6.3 The comparison has been made between 51 NDG and SRT that have been tested on the same date and the same location. The results show that both %compaction and %air voids are similar.

6.2.3 Dual Cycle Plate Bearing Test

6.2.3.1 A total of 77 dual cycle Plate Load Tests (PLT) using a 600mm diameter plate and a further 30 single stage PLT have been carried out on site. The frequency of the PLT has been carried out based on one at formation, one at each metre of fill placed and one on the finished surface within each 40x40m grid square. Table 6.4 shows the CBR results, and the stiffness ratio recorded at each location.

6.2.3.2 The approved specification requires the CBR to be >2.5% when on a stony **2C**, wet or dry **2A/2B** cohesive material and >5% when on a granular material **1A**. In addition to the CBRs the specification requires the stiffness ratio to be less than 2.2. 73 of the 77 dual cycle PLT met both the CBR and stiffness ratio acceptance criteria. A further 30 single stage PLT passed the required CBR acceptance criteria.

6.2.3.3 Two of the plate tests (D7 Layer 7 and G20 Layer 0) failed to meet the CBR value required and only achieved 2% and 2.7% respectively. A further two (G20 Layer 5 and D12 Layer 8) failed to achieve the <2.2 stiffness ratio and both recorded a ratio of 2.3. G20 Layer 0 was retested on the 6th of October 2022 and achieved the required criteria. G20 Layer 5 was retested on the 25th of October and achieved the required criteria. D7 L7 was retested on the 3rd of May 2023 and achieved the criteria. D12 L8 was retested on the 12th of September 2022 and achieved the criteria.

Table 6-2 Summary of NDG Results

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
A13	1	Black Ash/Sand	12	1.58	99%	Pass	8.3	Pass
A14	1	Black Ash/Sand	11	1.59	99%	Pass	9.1	Pass
A15	1	Black Ash/Sand	11	1.57	103%	Pass	6.4	Pass
A15	2	Black Ash/Sand	13	1.61	102%	Pass	5	Pass
A15	3	Black Ash/Sand	15	1.64	99%	Pass	-2	Pass
A15	4	Black Ash/Sand	10	1.71	101%	Pass	8.3	Pass
A15	5	Black Ash/Sand	11	1.69	100%	Pass	8	Pass
A15	6	Black Ash/Sand	17	1.4	99%	Pass	5.1	Pass
A15	7	Black Ash/Sand	18	1.38	97%	Pass	4.7	Pass
A15	8	Black Ash/Sand	16	1.57	94%	Fail	4.9	Pass
A15	9	Ash Fill	14	1.62	101%	Pass	9.7	Pass
A15	10	Ash Fill	15	1.59	99%	Pass	9.6	Pass
A15	11	Ash Fill	17	1.54	96%	Pass	9.7	Pass
A16	1	Black Ash/Sand	14	1.67	104%	Pass	-0.5	Pass
A16	2	Black Ash/Sand	11	1.6	102%	Pass	8.5	Pass
A16	3	Black Ash/Sand	15	1.66	100%	Pass	-0.7	Pass
A16	4	Black Ash/Sand	11	1.75	104%	Pass	5	Pass
A16	5	Black Ash/Sand	11	1.69	100%	Pass	8.3	Pass
A16	6	Black Ash/Sand	17	1.37	97%	Pass	6	Pass
A16	7	Black Ash/Sand	17	1.37	96%	Pass	6.7	Pass
A16	8	Black Ash/Sand	17	1.61	97%	Pass	1.3	Pass
A16	9	Black Ash/Sand	12	1.9	101%	Pass	1.4	Pass
A16	9	Ash Fill	18	1.53	96%	Pass	9	Pass
A16	10	Ash Fill	17	1.54	96%	Pass	9.5	Pass
A16	11	Ash Fill	16	1.57	98%	Pass	9.3	Pass
A17	1	Black Ash/Sand	14	1.65	103%	Pass	1	Pass
A17	2	Black Ash/Sand	12	1.63	104%	Pass	5.2	Pass
A17	3	Black Ash/Sand	14	1.59	96%	Pass	-7.5	Pass
A17	4	Black Ash/Sand	12	1.7	101%	Pass	5.8	Pass
A17	5	Black Ash/Sand	8.2	1.74	103%	Pass	9.9	Pass
A17	6	Black Ash/Sand	18	1.36	96%	Pass	5.7	Pass
A17	7	Black Ash/Sand	17	1.41	100%	Pass	4.2	Pass
A17	8	Black Ash/Sand	15	1.65	99%	Pass	2.4	Pass
A17	9	Black Ash/Sand	13	1.67	99%	Pass	8.8	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
A17	10	Black Ash/Sand	12	1.73	103%	Pass	6.5	Pass
A17	11	Ash Fill	16	1.57	98%	Pass	9.2	Pass
A17	12	Ash Fill	14	1.65	103%	Pass	8.6	Pass
A18	1	Black Ash/Sand	13	1.6	96%	Pass	8.7	Pass
A18	2	Black Ash/Sand	13	1.58	95%	Pass	9.6	Pass
A18	3	Black Ash/Sand	15	1.56	99%	Pass	5.3	Pass
A18	4	Black Ash/Sand	15	1.54	98%	Pass	6.5	Pass
A18	5	Black Ash/Sand	10	1.88	99%	Pass	7.4	Pass
A18	6	Black Ash/Sand	10	1.86	98%	Pass	8.1	Pass
A18	7	Black Ash/Sand	10	1.86	99%	Pass	6.6	Pass
A18	8	Black Ash/Sand	10	1.91	101%	Pass	5.6	Pass
A18	9	Black Ash/Sand	9.4	1.92	101%	Pass	5.7	Pass
A18	10	Black Ash/Sand	8.6	1.96	104%	Pass	4.8	Pass
A18	11	Ash Fill	14	1.63	102%	Pass	9.3	Pass
A18	12	Ash Fill	14	1.62	101%	Pass	9.9	Pass
A18	13	Ash Fill	14	1.64	103%	Pass	9	Pass
A18	14	Ash Fill	13	1.64	103%	Pass	9.8	Pass
A19	1	Black Ash/Sand	15	1.65	99%	Pass	1.4	Pass
A19	2	Black Ash/Sand	15	1.67	100%	Pass	0.3	Pass
A19	3	Black Ash/Sand	15	1.55	99%	Pass	5.7	Pass
A19	4	Black Ash/Sand	13	1.56	99%	Pass	8.3	Pass
A19	5	Black Ash/Sand	11	1.7	103%	Pass	5.6	Pass
A19	6	Black Ash/Sand	13	1.64	99%	Pass	6	Pass
A19	7	Black Ash/Sand	12	1.66	100%	Pass	6.7	Pass
A19	8	Black Ash/Sand	11	1.66	100%	Pass	8.4	Pass
A19	9	Black Ash/Sand	12	1.64	99%	Pass	8.1	Pass
A19	10	Black Ash/Sand	10	1.73	104%	Pass	5.4	Pass
A19	11	Ash Fill	16	1.57	98%	Pass	9.4	Pass
A19	12	Ash Fill	17	1.54	96%	Pass	9.8	Pass
A19	13	Ash Fill	17	1.55	97%	Pass	9.2	Pass
A19	14	Ash Fill	16	1.56	98%	Pass	9.9	Pass
B11	1	Black Sand / ASH	20	1.383	98%	Pass	12.88	Fail
B11	2	Black Sand / ASH	10	1.691	118%	Pass	4.17	Pass
B11	3	Black Sand / ASH	6.9	1.487	105%	Pass	3.95	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
B11	5	Black Ash/Sand	13	1.55	99%	Pass	8.2	Pass
B11	6	Black Ash/Sand	14	1.5	99%	Pass	6	Pass
B11	7	Black Ash/Sand	17	1.61	97%	Pass	1.7	Pass
B11	8	Black Ash/Sand	15	1.58	95%	Pass	6	Pass
B12	1	Black Sand / ASH	27	1.316	93%	Fail	11.74	Fail
B12	2	Black Sand / ASH	10	1.709	120%	Pass	4.87	Pass
B12	3	Black Sand / ASH	12	1.571	111%	Pass	-2.71	Pass
B12	4	Black Ash/Sand	15	1.5	99%	Pass	5.7	Pass
B12	5	Black Ash/Sand	12	1.56	99%	Pass	9.8	Pass
B12	6	Black Ash/Sand	15	1.48	97%	Pass	6.1	Pass
B12	7	Black Ash/Sand	15	1.72	96%	Pass	1.2	Pass
B12	8	Black Ash/Sand	15	1.66	100%	Pass	2	Pass
B13	1	Black Ash/Sand	20	1.54	101%	Pass	1.9	Pass
B13	2	Ash Fill	16	1.56	98%	Pass	9.9	Pass
B13	3	Ash Fill	16	1.57	98%	Pass	9.6	Pass
B13	4	Ash Fill	15	1.6	100%	Pass	9.3	Pass
B13	5	Ash Fill	17	1.54	96%	Pass	9.6	Pass
B13	6	Ash Fill	15	1.6	100%	Pass	9.6	Pass
B13	7	Ash Fill	17	1.56	98%	Pass	8.4	Pass
B13	8	Ash Fill	17	1.55	97%	Pass	9.2	Pass
B13	9	Ash Fill	15	1.61	101%	Pass	8.9	Pass
B13	10	Ash Fill	15	1.6	100%	Pass	9.5	Pass
B13	11	Ash Fill	15	1.6	100%	Pass	9.6	Pass
B13	12	Ash Fill	17	1.54	96%	Pass	9.5	Pass
B13	13	Ash Fill	17	1.54	96%	Pass	9.4	Pass
B13	14	Ash Fill	16	1.57	98%	Pass	9.7	Pass
B14	1	Black Ash/Sand	18	1.6	105%	Pass	2.6	Pass
B14	2	Black Ash/Sand	15	1.37	96%	Pass	7.5	Pass
B14	2	Ash Fill	15	1.6	100%	Pass	9.5	Pass
B14	3	Ash Fill	15	1.6	100%	Pass	9.1	Pass
B14	4	Ash Fill	14	1.63	102%	Pass	9.1	Pass
B14	5	Ash Fill	14	1.64	103%	Pass	8.9	Pass
B14	6	Ash Fill	15	1.62	101%	Pass	8	Pass
B14	7	Ash Fill	15	1.6	100%	Pass	9.2	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
B14	8	Ash Fill	14	1.62	101%	Pass	9.7	Pass
B14	9	Ash Fill	16	1.58	99%	Pass	9.2	Pass
B14	10	Ash Fill	15	1.6	100%	Pass	9.2	Pass
B14	11	Ash Fill	15	1.6	100%	Pass	9.3	Pass
B14	12	Ash Fill	14	1.63	102%	Pass	9.8	Pass
B15	1	Black Ash/Sand	10	1.59	105%	Pass	8.1	Pass
B15	2	Black Ash/Sand	15	1.61	103%	Pass	1.4	Pass
B15	3	Black Ash/Sand	13	1.72	104%	Pass	-1.7	Pass
B15	4	Black Ash/Sand	11	1.66	98%	Pass	9.6	Pass
B15	5	Black Ash/Sand	10	1.74	103%	Pass	7.1	Pass
B15	6	Black Ash/Sand	10	1.83	102%	Pass	3.4	Pass
B15	7	Black Ash/Sand	15	1.4	99%	Pass	7.2	Pass
B15	8	Black Ash/Sand	16	1.62	98%	Pass	2.9	Pass
B15	9	Ash Fill	16	1.61	101%	Pass	7.3	Pass
B15	10	Ash Fill	18	1.53	96%	Pass	9.4	Pass
B15	11	Ash Fill	17	1.57	98%	Pass	8.6	Pass
B16	1	Black Ash/Sand	9.1	1.73	101%	Pass	9.1	Pass
B16	2	Black Ash/Sand	14	1.65	105%	Pass	0.4	Pass
B16	3	Black Ash/Sand	20	1.6	96%	Pass	3.3	Pass
B16	4	Black Ash/Sand	9	1.73	102%	Pass	9.2	Pass
B16	5	Black Ash/Sand	8.7	1.75	104%	Pass	8.5	Pass
B16	6	Black Ash/Sand	9.3	1.76	98%	Pass	9	Pass
B16	7	Black Ash/Sand	18	1.43	101%	Pass	1.2	Pass
B16	8	Black Ash/Sand	17	1.59	96%	Pass	2.2	Pass
B16	9	Black Ash/Sand	13	1.87	99%	Pass	1.3	Pass
B16	10	Black Ash/Sand	12	0.18	99%	Pass	2.6	Pass
B16	11	Ash Fill	15	1.59	99%	Pass	9.8	Pass
B16	12	Ash Fill	17	1.54	96%	Pass	9.4	Pass
B17	1	Black Ash/Sand	12	1.64	96%	Pass	8.4	Pass
B17	2	Black Ash/Sand	11	1.63	104%	Pass	7.1	Pass
B17	3	Black Ash/Sand	17	1.62	98%	Pass	0.1	Pass
B17	4	Black Ash/Sand	9.4	1.75	103%	Pass	7.3	Pass
B17	5	Black Ash/Sand	11	1.72	102%	Pass	6.6	Pass
B17	6	Black Ash/Sand	9.6	1.75	98%	Pass	8.6	Pass
B17	7	Black Ash/Sand	14	1.5	106%	Pass	2.6	Pass
B17	8	Black Ash/Sand	18	1.59	96%	Pass	1.3	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
B17	9	Black Ash/Sand	13	1.73	103%	Pass	4.9	Pass
B17	10	Ash Fill	17	1.55	97%	Pass	9.8	Pass
B17	11	Ash Fill	14	1.63	102%	Pass	9.7	Pass
B17	12	Ash Fill	14	1.63	102%	Pass	10	Pass
B18	1	Black Ash/Sand	17	1.61	97%	Pass	1.5	Pass
B18	2	Black Ash/Sand	16	1.65	99%	Pass	0.2	Pass
B18	3	Black Ash/Sand	15	1.55	99%	Pass	5.8	Pass
B18	4	Black Ash/Sand	14	1.6	102%	Pass	3.9	Pass
B18	5	Black Ash/Sand	10	1.96	104%	Pass	3.3	Pass
B18	6	Black Ash/Sand	10	1.99	105%	Pass	1.7	Pass
B18	7	Black Ash/Sand	10	1.83	97%	Pass	8.2	Pass
B18	8	Black Ash/Sand	9.3	1.84	97%	Pass	9.6	Pass
B18	9	Black Ash/Sand	12	1.76	104%	Pass	5.3	Pass
B18	10	Black Ash/Sand	13	1.73	103%	Pass	6.1	Pass
B18	12	Ash Fill	13	1.65	103%	Pass	9	Pass
B18	13	Ash Fill	16	1.56	98%	Pass	9.8	Pass
B19	1	Black Ash/Sand	16	1.58	95%	Pass	5.1	Pass
B19	2	Black Ash/Sand	12	1.64	99%	Pass	7.5	Pass
B19	3	Black Ash/Sand	14	1.54	98%	Pass	8.1	Pass
B19	4	Black Ash/Sand	12	1.57	100%	Pass	9.1	Pass
B19	5	Black Ash/Sand	17	1.59	96%	Pass	2.5	Pass
B19	6	Black Ash/Sand	16	1.63	98%	Pass	2	Pass
B19	7	Black Ash/Sand	16	1.65	99%	Pass	0.2	Pass
B19	8	Black Ash/Sand	16	1.65	99%	Pass	1.2	Pass
B19	9	Black Ash/Sand	13	1.65	100%	Pass	5.9	Pass
B19	10	Black Ash/Sand	12	1.73	104%	Pass	3.1	Pass
B19	11	Black Ash/Sand	15	1.67	101%	Pass	0.2	Pass
B19	11	Ash Fill	15	1.6	100%	Pass	9.3	Pass
B19	11	Ash Fill	13	1.65	103%	Pass	9.6	Pass
B19	12	Ash Fill	14	1.62	101%	Pass	9.8	Pass
B19	13	Ash Fill	16	1.57	98%	Pass	9.5	Pass
C10	1	Black Sand / ASH	8.9	1.515	117%	Pass	5.93	Pass
C10	2	Black Sand / ASH	12	1.393	97%	Pass	9.97	Pass
C10	3	Black Sand / ASH	15	1.68	99%	Pass	0.79	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
C10	4	Black Sand / ASH	10	1.555	97%	Pass	9.97	Pass
C10	5	Black Sand / ASH	20	1.25	95%	Pass	4.91	Pass
C10	6	Black Ash/Sand	13	1.51	99%	Pass	7.5	Pass
C10	7	Black Ash/Sand	15	1.64	100%	Pass	4.3	Pass
C10	8	Black Ash/Sand	17	1.6	96%	Pass	2.3	Pass
C10	9	Black Ash/Sand	12	1.65	99%	Pass	6.5	Pass
C10	10	Black Ash/Sand	11	1.67	101%	Pass	7.4	Pass
C11	1	Black Sand / ASH	13	1.522	108%	Pass	11.73	Fail
C11	2	Black Sand / ASH	13	1.345	94%	Fail	11.73	Fail
C11	3	Black Sand / ASH	16	1.379	98%	Pass	2.08	Pass
C11	4	Black Sand / ASH	12	1.518	111%	Pass	9.06	Pass
C11	5	Black Sand / ASH	18	1.27	96%	Pass	-4.42	Pass
C11	6	Black Ash/Sand	13.1	1.48	97%	Pass	9.4	Pass
C11	7	Black Ash/Sand	15	1.64	99%	Pass	2.2	Pass
C11	8	Black Ash/Sand	16	1.6	96%	Pass	3	Pass
C12	2	Black Sand / ASH	11	1.667	117%	Pass	11.85	Fail
C12	3	Black Sand / ASH	19	1.462	104%	Pass	9.97	Pass
C12	4	Black Ash/Sand	16	1.46	96%	Pass	6.9	Pass
C12	5	Black Ash/Sand	13	1.62	103%	Pass	4.7	Pass
C12	6	Black Ash/Sand	13	1.65	101%	Pass	6.8	Pass
C12	7	Black Ash/Sand	14	1.63	98%	Pass	4.5	Pass
C12	8	Black Ash/Sand	14	1.64	99%	Pass	4.2	Pass
C13	1	Black Sand / ASH	14	1.439	102%	Pass	7.23	Pass
C13	2	Black Ash/Sand	11	1.44	101%	Pass	8.1	Pass
C13	3	Black Ash/Sand	14	1.58	96%	Pass	7.9	Pass
C13	4	Black Ash/Sand	13.1	1.55	99%	Pass	8.7	Pass
C13	5	Black Ash/Sand	9.4	1.59	105%	Pass	8.8	Pass
C13	6	Black Ash/Sand	16	1.46	103%	Pass	2.4	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
C13	7	Black Ash/Sand	14	1.64	115%	Pass	4.1	Pass
C14	1	Black Sand / ASH	15	1.504	107%	Pass	13.79	Fail
C14	2	Black Ash/Sand	15	1.39	97%	Pass	6.3	Pass
C14	3	Black Ash/Sand	14	1.56	95%	Pass	9.5	Pass
C14	4	Black Ash/Sand	14.3	1.59	101%	Pass	4.4	Pass
C14	5	Black Ash/Sand	17	1.59	96%	Pass	3.1	Pass
C14	6	Black Ash/Sand	15	1.46	103%	Pass	3.2	Pass
C14	6	Ash Fill	16	1.63	102%	Pass	6	Pass
C14	7	Black Ash/Sand	16	1.44	101%	Pass	3.1	Pass
C15	1	Black Ash/Sand	16	1.55	102%	Pass	0.3	Pass
C15	2	Black Ash/Sand	17	1.58	95%	Pass	2.3	Pass
C15	3	Black Ash/Sand	14	1.54	98%	Pass	7.2	Pass
C15	4	Black Ash/Sand	10	1.7	100%	Pass	8.5	Pass
C15	4	Ash Fill	19	1.53	96%	Pass	7.2	Pass
C15	5	Black Ash/Sand	11	1.76	104%	Pass	3.4	Pass
C15	6	Black Ash/Sand	8.8	1.8	101%	Pass	7.5	Pass
C15	7	Ash Fill	16	1.58	99%	Pass	9.1	Pass
C15	8	Ash Fill	15	1.59	99%	Pass	9.8	Pass
C15	9	Ash Fill	17	1.57	98%	Pass	8	Pass
C15	10	Ash Fill	16	1.57	98%	Pass	9.2	Pass
C15	11	Ash Fill	15	1.62	101%	Pass	8.5	Pass
C16	1	Black Ash/Sand	11	1.61	103%	Pass	8.5	Pass
C16	2	Black Ash/Sand	16	1.58	95%	Pass	4.6	Pass
C16	3	Black Ash/Sand	14	1.53	97%	Pass	7.8	Pass
C16	4	Black Ash/Sand	10	1.7	101%	Pass	8	Pass
C16	5	Black Ash/Sand	11	1.7	101%	Pass	7.8	Pass
C16	6	Black Ash/Sand	9	1.76	98%	Pass	9.2	Pass
C16	7	Black Ash/Sand	15	1.62	103%	Pass	1.4	Pass
C16	8	Black Ash/Sand	16	1.59	102%	Pass	1.3	Pass
C16	9	Ash Fill	14	1.62	101%	Pass	9.6	Pass
C16	10	Ash Fill	19	1.51	94%	Fail	8.6	Pass
C16	11	Ash Fill	18	1.53	96%	Pass	8.5	Pass
C17	1	Black Ash/Sand	12	1.63	95%	Pass	9.8	Pass
C17	2	Black Ash/Sand	20	1.54	96%	Pass	6.2	Pass
C17	3	Black Ash/Sand	18	1.55	99%	Pass	0.1	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
C17	4	Black Ash/Sand	11	1.71	101%	Pass	7.1	Pass
C17	5	Black Ash/Sand	11	1.67	99%	Pass	9.3	Pass
C17	6	Black Ash/Sand	12	1.78	99%	Pass	3.3	Pass
C17	7	Ash Fill	19	1.52	95%	Pass	7.7	Pass
C17	8	Black Ash/Sand	15	1.52	97%	Pass	7.4	Pass
C17	9	Ash Fill	17	1.56	98%	Pass	8.5	Pass
C17	10	Ash Fill	16	1.58	99%	Pass	9.1	Pass
C17	11	Ash Fill	15	1.61	101%	Pass	8.7	Pass
C18	1	Black Ash/Sand	11	1.66	97%	Pass	9.1	Pass
C18	2	Black Ash/Sand	17	1.6	96%	Pass	2.6	Pass
C18	3	Black Ash/Sand	13	1.54	98%	Pass	8.5	Pass
C18	4	Black Ash/Sand	8.6	1.73	102%	Pass	9.5	Pass
C18	5	Black Ash/Sand	7.6	1.76	104%	Pass	9.9	Pass
C18	6	Black Ash/Sand	20	1.47	96%	Pass	2.4	Pass
C18	7	Black Ash/Sand	14	1.54	98%	Pass	8.1	Pass
C18	8	Ash Fill	18	1.53	96%	Pass	9	Pass
C18	8	Ash Fill	18	1.55	97%	Pass	7.5	Pass
C18	9	Ash Fill	18	1.54	96%	Pass	8	Pass
C18	10	Ash Fill	16	1.57	98%	Pass	9.6	Pass
C18	11	Ash Fill	17	1.55	97%	Pass	9.2	Pass
C19	1	Black Ash/Sand	12.3	1.56	99%	Pass	9.4	Pass
C19	2	Black Ash/Sand	22	1.53	95%	Pass	3.3	Pass
C19	3	Black Ash/Sand	14	1.57	100%	Pass	5.8	Pass
C19	4	Black Ash/Sand	9.5	1.77	105%	Pass	5.9	Pass
C19	5	Black Ash/Sand	8.4	1.74	103%	Pass	9.3	Pass
C19	6	Black Ash/Sand	20	1.46	96%	Pass	3.8	Pass
C19	7	Black Ash/Sand	15	1.65	99%	Pass	2.6	Pass
C19	8	Black Ash/Sand	15	1.64	99%	Pass	1.7	Pass
C19	9	Black Ash/Sand	16	1.6	96%	Pass	3.2	Pass
C19	10	Black Ash/Sand	16	1.59	96%	Pass	4.2	Pass
C19	11	Ash Fill	16	1.57	98%	Pass	9.5	Pass
C20	1	Black Ash/Sand	9.2	1.92	102%	Pass	5.8	Pass
C20	2	Black Ash/Sand	16	1.59	96%	Pass	4.3	Pass
C20	3	Black Ash/Sand	13	1.73	102%	Pass	5.7	Pass
C20	4	Black Ash/Sand	13	1.77	105%	Pass	4.1	Pass
C20	5	Black Ash/Sand	13	1.76	104%	Pass	3.6	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
C20	6	Black Ash/Sand	11	1.81	96%	Pass	8.5	Pass
C20	7	Black Ash/Sand	10	1.84	97%	Pass	7.6	Pass
C20	8	Black Ash/Sand	11	1.84	97%	Pass	7.4	Pass
C20	9	Black Ash/Sand	11	1.84	97%	Pass	7.1	Pass
C20	10	Black Ash/Sand	11	1.84	97%	Pass	6.9	Pass
C20	11	Ash Fill	16	1.59	99%	Pass	8.2	Pass
C20	12	Ash Fill	16	1.57	98%	Pass	9.7	Pass
C20	13	Ash Fill	17	1.54	96%	Pass	9.6	Pass
C6	6	Black Ash/Sand	11	1.42	99%	Pass	9.5	Pass
C6	7	Black Ash/Sand	15	1.54	98%	Pass	6.3	Pass
C7	1	Black Sand / ASH	14	1.711	132%	Pass	-14.96	Pass
C7	2	Black Sand / ASH	10	1.682	118%	Pass	-5.35	Pass
C7	3	Black Sand / ASH	16	1.67	99%	Pass	-0.29	Pass
C7	3	Black Ash/Sand	13	1.66	98%	Pass	-5.1	Pass
C7	4	Black Sand / ASH	13	1.265	97%	Pass	-2.47	Pass
C7	5	Black Sand / ASH	19	1.25	95%	Pass	-2.37	Pass
C7	6	Black Ash/Sand	10	1.44	101%	Pass	9	Pass
C7	7	Black Ash/Sand	18	1.51	96%	Pass	3.6	Pass
C7	8	Black Ash/Sand	14	1.7	104%	Pass	2.4	Pass
C8	1	Black Sand / ASH	16	1.56	120%	Pass	-7.94	Pass
C8	2	Black Sand / ASH	10	1.636	114%	Pass	-2.47	Pass
C8	3	Black Sand / ASH	16	1.67	99%	Pass	-0.29	Pass
C8	4	Black Sand / ASH	15	1.243	96%	Pass	-5.35	Pass
C8	6	Black Ash/Sand	13	1.37	96%	Pass	9.5	Pass
C8	7	Black Ash/Sand	12	1.58	101%	Pass	8.4	Pass
C8	8	Black Ash/Sand	13	1.58	104%	Pass	3.5	Pass
C8	9	Black Ash/Sand	12	1.45	102%	Pass	8.8	Pass
C8	10	Black Ash/Sand	15	1.56	99%	Pass	5.4	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
C9	1	Black Sand / ASH	8.2	1.442	111%	Pass	11.47	Fail
C9	2	Black Sand / ASH	13	1.372	96%	Pass	9.95	Pass
C9	3	Black Sand / ASH	17	1.65	98%	Pass	-0.74	Pass
C9	4	Black Sand / ASH	15	1.243	96%	Pass	0.00	Pass
C9	5	Black Sand / ASH	19	1.27	96%	Pass	-2.67	Pass
C9	6	Black Ash/Sand	14	1.43	100%	Pass	4.8	Pass
C9	7	Black Ash/Sand	8.9	1.63	107%	Pass	7.1	Pass
C9	8	Black Ash/Sand	7.5	1.51	99%	Pass	16.1	Fail
C9	9	Black Ash/Sand	15	1.61	97%	Pass	3.8	Pass
C9	10	Black Ash/Sand	12	1.73	97%	Pass	5.3	Pass
C9	11	Black Ash/Sand	12	1.64	97%	Pass	-8.5	Pass
D10	1	Black Sand / ASH	14	1.386	98%	Pass	9.88	Pass
D10	2	Black Sand / ASH	11	1.414	99%	Pass	10.02	Pass
D10	3	Black Sand / ASH	15	1.71	101%	Pass	-0.98	Pass
D10	4	Black Sand / ASH	11	1.378	101%	Pass	1.31	Pass
D10	5	Black Sand / ASH	19	1.26	95%	Pass	0.93	Pass
D10	6	Black Ash/Sand	14.6	1.51	99%	Pass	5.2	Pass
D10	7	Black Ash/Sand	16	1.58	96%	Pass	5.3	Pass
D10	8	Black Ash/Sand	15	1.64	100%	Pass	3.3	Pass
D10	9	Black Ash/Sand	10	1.84	103%	Pass	4.5	Pass
D10	10	Black Ash/Sand	9	1.89	106%	Pass	2.6	Pass
D10	11	Black Ash/Sand	13	1.64	97%	Pass	-6.8	Pass
D11	1	Black Sand / ASH	12	1.563	111%	Pass	1.50	Pass
D11	2	Black Sand / ASH	10	1.391	97%	Pass	12.88	Fail
D11	3	Black Sand / ASH	17	1.65	98%	Pass	-0.74	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
D11	4	Black Sand / ASH	11	1.523	111%	Pass	7.73	Pass
D11	5	Black Sand / ASH	18	1.29	98%	Pass	2.08	Pass
D11	6	Black Ash/Sand	14	1.52	100%	Pass	5.7	Pass
D11	8	Black Ash/Sand	15	1.53	101%	Pass	3.8	Pass
D11	10	Black Ash/Sand	12	1.59	101%	Pass	7.9	Pass
D11	11	Black Ash/Sand	10	1.69	100%	Pass	-9.1	Pass
D12	1	Black Sand / ASH	15	1.609	124%	Pass	-9.72	Pass
D12	2	Black Sand / ASH	9.7	1.459	102%	Pass	9.88	Pass
D12	3	Black Sand / ASH	19	1.538	91%	Fail	-15.69	Pass
D12	4	Black Sand / ASH	12	1.723	105%	Pass	4.22	Pass
D12	5	Black Ash/Sand	15	1.49	98%	Pass	6.2	Pass
D12	6	Black Ash/Sand	15	1.51	96%	Pass	7.7	Pass
D12	7	Black Ash/Sand	14	1.52	97%	Pass	9.2	Pass
D12	8	Black Ash/Sand	14	1.53	97%	Pass	7.8	Pass
D12	9	Black Ash/Sand	13	1.44	101%	Pass	8.1	Pass
D12	10	Black Ash/Sand	13	1.58	101%	Pass	6.6	Pass
D12	10	Ash Fill	19	1.52	95%	Pass	7.8	Pass
D13	1	Black Sand / ASH	11	1.486	105%	Pass	6.40	Pass
D13	2	Black Ash/Sand	16	1.39	97%	Pass	4.5	Pass
D13	3	Black Ash/Sand	18	1.48	97%	Pass	1.7	Pass
D13	4	Black Ash/Sand	18	1.53	97%	Pass	2.6	Pass
D13	5	Black Ash/Sand	8.4	1.79	100%	Pass	8.8	Pass
D13	6	Black Ash/Sand	17	1.45	102%	Pass	1.1	Pass
D13	7	Black Ash/Sand	15	1.62	114%	Pass	3.9	Pass
D14	1	Black Sand / ASH	18	1.458	103%	Pass	6.83	Pass
D14	2	Black Ash/Sand	17	1.42	99%	Pass	1.5	Pass
D14	3	Black Ash/Sand	18	1.47	97%	Pass	2.2	Pass
D14	4	Black Ash/Sand	13	1.58	101%	Pass	7.9	Pass
D14	5	Black Ash/Sand	10	1.79	100%	Pass	5.7	Pass
D14	6	Black Ash/Sand	14	1.48	104%	Pass	3.2	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
D15	1	Ash Fill	18	1.53	96%	Pass	9	Pass
D15	2	Ash Fill	18	1.53	96%	Pass	5.8	Pass
D15	3	Black Ash/Sand	11	1.62	103%	Pass	7.5	Pass
D15	3	Ash Fill	17	1.54	96%	Pass	9.7	Pass
D15	4	Ash Fill	17	1.55	97%	Pass	9.2	Pass
D15	5	Ash Fill	17	1.56	98%	Pass	8.7	Pass
D15	6	Ash Fill	17	1.56	98%	Pass	8.7	Pass
D16	1	Black Ash/Sand	11	1.79	105%	Pass	2.6	Pass
D16	2	Black Ash/Sand	19	1.53	95%	Pass	7.9	Pass
D16	3	Black Ash/Sand	15	1.56	99%	Pass	4.5	Pass
D16	4	Black Ash/Sand	13	1.62	96%	Pass	8.5	Pass
D16	5	Black Ash/Sand	13	1.65	98%	Pass	6.1	Pass
D16	6	Black Ash/Sand	13	1.77	99%	Pass	2.8	Pass
D16	7	Black Ash/Sand	14	1.53	97%	Pass	8.6	Pass
D16	8	Black Ash/Sand	15	1.6	102%	Pass	2.8	Pass
D16	9	Black Ash/Sand	16	1.65	100%	Pass	0.3	Pass
D16	10	Black Ash/Sand	15	1.67	101%	Pass	0.8	Pass
D16	11	Black Ash/Sand	14	1.67	100%	Pass	2.6	Pass
D17	1	Black Ash/Sand	12	1.6	102%	Pass	6.6	Pass
D17	2	Black Ash/Sand	18	1.57	98%	Pass	7	Pass
D17	3	Black Ash/Sand	15	1.51	96%	Pass	7.7	Pass
D17	4	Black Ash/Sand	12	1.68	99%	Pass	6.4	Pass
D17	5	Black Ash/Sand	14	1.62	96%	Pass	7.1	Pass
D17	6	Black Ash/Sand	13	1.76	98%	Pass	2.9	Pass
D17	7	Black Ash/Sand	15	1.58	100%	Pass	4.1	Pass
D17	7	Ash Fill	17	1.55	97%	Pass	9.2	Pass
D17	9	Black Ash/Sand	16	1.65	99%	Pass	0.3	Pass
D17	10	Black Ash/Sand	16	1.63	98%	Pass	1.8	Pass
D17	11	Black Ash/Sand	15	1.64	99%	Pass	2.6	Pass
D18	1	Black Ash/Sand	9.8	1.75	102%	Pass	6.9	Pass
D18	2	Black Ash/Sand	21	1.56	97%	Pass	3.7	Pass
D18	3	Black Ash/Sand	13	1.57	100%	Pass	6.9	Pass
D18	4	Black Ash/Sand	10	1.69	100%	Pass	8.5	Pass
D18	5	Black Ash/Sand	9.1	1.76	104%	Pass	7.2	Pass
D18	6	Black Ash/Sand	21	1.47	96%	Pass	1	Pass
D18	7	Black Ash/Sand	16	1.57	100%	Pass	2.8	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
D18	8	Black Ash/Sand	12	1.82	96%	Pass	6.4	Pass
D18	9	Black Ash/Sand	12	1.74	103%	Pass	6.5	Pass
D18	10	Ash Fill	18	1.53	96%	Pass	8.5	Pass
D18	11	Ash Fill	17	1.54	96%	Pass	9.7	Pass
D19	1	Black Ash/Sand	14	1.55	99%	Pass	7.8	Pass
D19	2	Black Ash/Sand	19	1.55	96%	Pass	7.8	Pass
D19	3	Black Ash/Sand	15	1.62	103%	Pass	0.7	Pass
D19	4	Black Ash/Sand	10	1.67	99%	Pass	9.2	Pass
D19	5	Black Ash/Sand	10	1.69	100%	Pass	9.2	Pass
D19	6	Black Ash/Sand	21	1.47	96%	Pass	1.2	Pass
D19	7	Black Ash/Sand	15	1.62	98%	Pass	3.5	Pass
D19	8	Black Ash/Sand	14	1.65	99%	Pass	3.9	Pass
D19	9	Black Ash/Sand	14	1.72	104%	Pass	-0.1	Pass
D19	10	Black Ash/Sand	16	1.6	96%	Pass	3.3	Pass
D19	11	Ash Fill	19	1.53	96%	Pass	7.4	Pass
D20	1	Ash Fill	18	1.62	101%	Pass	3.7	Pass
D20	2	Black Ash/Sand	20	1.57	98%	Pass	4.8	Pass
D20	3	Black Ash/Sand	8.8	1.85	103%	Pass	5.4	Pass
D20	3	Ash Fill	18	1.57	98%	Pass	6	Pass
D20	4	Black Ash/Sand	9	1.94	103%	Pass	5	Pass
D20	4	Ash Fill	17	1.61	101%	Pass	6.1	Pass
D20	5	Black Ash/Sand	9.1	1.97	104%	Pass	3.7	Pass
D20	5	Ash Fill	17	1.59	99%	Pass	6.2	Pass
D20	6	Black Ash/Sand	16	1.55	101%	Pass	3.7	Pass
D20	7	Black Ash/Sand	9	1.99	105%	Pass	3.2	Pass
D20	8	Black Ash/Sand	9	1.98	105%	Pass	3.2	Pass
D20	9	Black Ash/Sand	9	1.98	105%	Pass	3.2	Pass
D20	10	Black Ash/Sand	13	1.69	100%	Pass	7.4	Pass
D20	11	Ash Fill	17	1.54	96%	Pass	9.7	Pass
D20	12	Ash Fill	17	1.56	98%	Pass	8.7	Pass
D20	13	Ash Fill	18	1.53	96%	Pass	8.5	Pass
D20	14	Ash Fill	17	1.54	96%	Pass	9.7	Pass
D6	3	Black Sand / ASH	17	1.607	95%	Pass	11.47	Fail
D6	6	Black Ash/Sand	13	1.42	99%	Pass	7.2	Pass
D6	7	Black Ash/Sand	12	1.57	100%	Pass	8.8	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
D6	8	Black Ash/Sand	17	1.49	98%	Pass	2.4	Pass
D7	1	Black Sand / ASH	17	1.59	122%	Pass	-11.60	Pass
D7	2	Black Sand / ASH	16	1.448	101%	Pass	-7.94	Pass
D7	3	Black Sand / ASH	14	1.73	102%	Pass	-0.43	Pass
D7	4	Black Sand / ASH	11	1.342	98%	Pass	-4.11	Pass
D7	5	Black Sand / ASH	18	1.29	98%	Pass	2.56	Pass
D7	6	Black Ash/Sand	13	1.51	99%	Pass	7.9	Pass
D7	7	Black Ash/Sand	13	1.53	97%	Pass	9.9	Pass
D7	8	Black Ash/Sand	13	1.6	98%	Pass	8.8	Pass
D8	1	Black Sand / ASH	16	1.672	129%	Pass	-15.69	Pass
D8	2	Black Sand / ASH	12	1.527	107%	Pass	1.31	Pass
D8	3	Black Sand / ASH	16	1.68	99%	Pass	-0.89	Pass
D8	4	Black Sand / ASH	10	1.536	112%	Pass	9.95	Pass
D8	5	Black Sand / ASH	20	1.23	93%	Fail	1.78	Pass
D8	6	Black Ash/Sand	11	1.44	101%	Pass	9.2	Pass
D8	7	Black Ash/Sand	18	1.49	98%	Pass	1.1	Pass
D8	8	Black Ash/Sand	13	1.58	104%	Pass	3.5	Pass
D8	9	Black Ash/Sand	11	1.78	99%	Pass	4.4	Pass
D9	2	Black Sand / ASH	16	1.517	106%	Pass	-4.11	Pass
D9	3	Black Sand / ASH	16	1.63	96%	Pass	2.11	Pass
D9	4	Black Sand / ASH	16	1.353	84%	Fail	10.02	Pass
D9	5	Black Sand / ASH	20	1.23	93%	Fail	5.60	Pass
D9	6	Black Ash/Sand	14	1.44	101%	Pass	4	Pass
D9	6	Ash Fill	17	1.55	97%	Pass	9.2	Pass
D9	7	Ash Fill	18	1.58	99%	Pass	5.4	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
D9	8	Black Ash/Sand	9.1	1.65	109%	Pass	5.7	Pass
D9	9	Black Ash/Sand	9.2	1.75	98%	Pass	9.5	Pass
D9	10	Black Ash/Sand	9.2	1.76	98%	Pass	9	Pass
E10	1	Black Sand / ASH	17	1.419	101%	Pass	3.48	Pass
E10	2	Black Sand / ASH	15	1.417	99%	Pass	0.00	Pass
E10	3	Black Sand / ASH	16	1.69	100%	Pass	-1.49	Pass
E10	4	Black Sand / ASH	15	1.217	86%	Fail	0.62	Pass
E10	5	Black Ash/Sand	15	1.47	97%	Pass	7.3	Pass
E10	6	Black Ash/Sand	14	1.62	103%	Pass	3.8	Pass
E10	7	Black Ash/Sand	14	1.59	97%	Pass	8.6	Pass
E10	8	Black Ash/Sand	14	1.61	98%	Pass	6.9	Pass
E10	9	Black Ash/Sand	15	1.38	97%	Pass	8.6	Pass
E10	10	Black Ash/Sand	13	1.57	100%	Pass	7	Pass
E10	11	Black Ash/Sand	13	1.61	95%	Pass	-8.7	Pass
E11	1	Black Sand / ASH	15	1.426	101%	Pass	5.85	Pass
E11	2	Black Sand / ASH	11	1.387	97%	Pass	11.74	Fail
E11	3	Black Sand / ASH	15	1.6	95%	Pass	5.52	Pass
E11	4	Black Sand / ASH	10	1.645	100%	Pass	0.62	Pass
E11	6	Black Ash/Sand	15	1.49	95%	Pass	9.6	Pass
E11	8	Black Ash/Sand	14	1.47	97%	Pass	9	Pass
E11	9	Black Ash/Sand	10	1.47	104%	Pass	9.7	Pass
E11	10	Black Ash/Sand	16	1.55	99%	Pass	3.8	Pass
E12	1	Black Sand / ASH	15	1.574	121%	Pass	-7.33	Pass
E12	2	Black Sand / ASH	11	1.45	101%	Pass	1.50	Pass
E12	3	Black Sand / ASH	14	1.781	105%	Pass	8.08	Pass
E12	4	Black Sand / ASH	11	1.748	107%	Pass	6.02	Pass
E12	5	Black Ash/Sand	14	1.52	100%	Pass	5.8	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
E12	6	Black Ash/Sand	12	1.57	100%	Pass	9.5	Pass
E12	7	Black Ash/Sand	21	1.46	96%	Pass	-1.3	Pass
E12	8	Black Ash/Sand	21	1.46	96%	Pass	-0.8	Pass
E12	9	Black Ash/Sand	11	1.48	104%	Pass	8	Pass
E13	1	Black Ash/Sand	18	1.47	97%	Pass	3.2	Pass
E13	2	Black Ash/Sand	19	1.49	95%	Pass	2.4	Pass
E13	3	Ash Fill	19	1.54	96%	Pass	6.7	Pass
E13	3	Ash Fill	16	1.67	104%	Pass	4.7	Pass
E13	4	Ash Fill	15	1.68	105%	Pass	5.6	Pass
E13	5	Black Ash/Sand	13	1.71	96%	Pass	5	Pass
E13	6	Ash Fill	18	1.59	99%	Pass	4.9	Pass
E13	6	Ash Fill	18	1.56	98%	Pass	7	Pass
E13	7	Ash Fill	16	1.58	99%	Pass	9.2	Pass
E13	8	Ash Fill	17	1.56	98%	Pass	8.7	Pass
E14	1	Ash Fill	17	1.54	96%	Pass	9.7	Pass
E14	4	Ash Fill	18	1.53	96%	Pass	9	Pass
E14	5	Black Ash/Sand	13	1.8	101%	Pass	0	Pass
E15	1	Ash Fill	17	1.56	98%	Pass	8.7	Pass
E15	2	Ash Fill	18	1.6	100%	Pass	4.4	Pass
E15	3	Ash Fill	19	1.53	96%	Pass	7.2	Pass
E15	4	Ash Fill	17	1.55	97%	Pass	9.2	Pass
E15	5	Ash Fill	18	1.56	98%	Pass	7	Pass
E16	1	Black Ash/Sand	15	1.65	100%	Pass	1.7	Pass
E16	2	Black Ash/Sand	15	1.61	97%	Pass	4.3	Pass
E16	3	Black Ash/Sand	15	1.61	97%	Pass	4.3	Pass
E16	4	Black Ash/Sand	16	1.63	98%	Pass	2.1	Pass
E16	5	Black Ash/Sand	15	1.6	96%	Pass	5.1	Pass
E17	1	Black Ash/Sand	15	1.57	95%	Pass	6.7	Pass
E17	2	Black Ash/Sand	14	1.61	97%	Pass	5.4	Pass
E17	3	Black Ash/Sand	17	1.62	98%	Pass	1.3	Pass
E17	4	Black Ash/Sand	18	1.6	96%	Pass	0.7	Pass
E17	5	Black Ash/Sand	17	1.62	98%	Pass	0.3	Pass
E17	6	Black Ash/Sand	16	1.64	99%	Pass	0.1	Pass
E17	7	Black Ash/Sand	17	1.61	97%	Pass	0.7	Pass
E18	1	Black Ash/Sand	13	1.68	101%	Pass	3.5	Pass
E18	2	Black Ash/Sand	16	1.64	99%	Pass	0	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
E18	3	Black Ash/Sand	8	1.97	104%	Pass	5.2	Pass
E18	3	Black Ash/Sand	15	1.64	99%	Pass	3	Pass
E18	4	Black Ash/Sand	9	1.94	102%	Pass	4.8	Pass
E18	4	Ash Fill	22	1.53	96%	Pass	2.4	Pass
E18	4	Ash Fill	17	1.57	98%	Pass	7.7	Pass
E18	5	Black Ash/Sand	9	1.93	102%	Pass	5.8	Pass
E18	5	Ash Fill	18	1.53	96%	Pass	8.5	Pass
E18	6	Black Ash/Sand	17	1.55	101%	Pass	2.4	Pass
E18	6	Black Ash/Sand	9.7	1.91	101%	Pass	5.3	Pass
E18	6	Ash Fill	17	1.58	99%	Pass	7.2	Pass
E19	1	Black Ash/Sand	16	1.62	98%	Pass	2.1	Pass
E19	3	Ash Fill	17	1.56	98%	Pass	8.2	Pass
E19	4	Ash Fill	21	1.55	97%	Pass	3.2	Pass
E19	5	Ash Fill	17	1.55	97%	Pass	9.2	Pass
E19	6	Black Ash/Sand	18	1.56	102%	Pass	0.1	Pass
E19	6	Ash Fill	18	1.56	98%	Pass	7	Pass
E20	1	Black Ash/Sand	17	1.63	98%	Pass	0.3	Pass
E20	2	Ash Fill	18	1.54	96%	Pass	8	Pass
E20	4	Ash Fill	19	1.6	100%	Pass	3.1	Pass
E20	5	Ash Fill	17	1.55	97%	Pass	9.2	Pass
E20	6	Black Ash/Sand	15	1.57	103%	Pass	4.7	Pass
E20	6	Ash Fill	17	1.56	98%	Pass	8.7	Pass
E7	1	Clay Fill	10	2.05	102%	Pass	0.5	Pass
E7	2	Clay Fill	11	1.98	99%	Pass	2.8	Pass
E7	3	Clay Fill	10	1.99	99%	Pass	3	Pass
E7	4	Clay Fill	12	1.97	98%	Pass	0.9	Pass
E7	5	Ash Fill	14	1.7	106%	Pass	4.8	Pass
E7	6	Ash Fill	14	1.69	106%	Pass	5.4	Pass
E8	1	Clay Fill	11	1.99	99%	Pass	1.1	Pass
E8	2	Clay Fill	11	1.99	99%	Pass	1.9	Pass
E8	3	Black Sand / ASH	14	1.649	98%	Pass	5.19	Pass
E8	3	Clay Fill	9.7	2.01	100%	Pass	2.9	Pass
E8	4	Clay Fill	9.6	2.02	100%	Pass	2.7	Pass
E8	5	Ash Fill	17	1.54	96%	Pass	9.9	Pass
E8	6	Ash Fill	19	1.53	96%	Pass	7.2	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
E8	7	Ash Fill	19	1.56	98%	Pass	5.2	Pass
E9	1	Black Sand / ASH	13	1.549	110%	Pass	0.83	Pass
E9	1	Black Sand / ASH	14	1.368	105%	Pass	8.08	Pass
E9	2	Black Sand / ASH	12	1.482	104%	Pass	5.93	Pass
E9	3	Black Sand / ASH	16	1.75	104%	Pass	8.59	Pass
E9	4	Black Sand / ASH	13	1.531	109%	Pass	0.00	Pass
E9	5	Black Ash/Sand	13	1.53	101%	Pass	6.8	Pass
E9	6	Black Ash/Sand	19	1.52	97%	Pass	1.4	Pass
E9	7	Black Ash/Sand	16	1.44	95%	Pass	7.7	Pass
E9	8	Black Ash/Sand	16	1.44	95%	Pass	7.7	Pass
E9	9	Black Ash/Sand	12	1.44	101%	Pass	9.2	Pass
E9	10	Black Ash/Sand	13	1.58	101%	Pass	7	Pass
E9	11	Black Ash/Sand	14	1.76	98%	Pass	0.3	Pass
F10	1	Black Sand / ASH	14	1.36	105%	Pass	8.62	Pass
F10	2	Black Sand / ASH	11	1.477	103%	Pass	11.47	Fail
F10	3	Black Sand / ASH	17	1.65	98%	Pass	-0.74	Pass
F10	3	Black Sand / ASH	18	1.63	96%	Pass	-1.15	Pass
F10	4	Black Sand / ASH	13	1.345	95%	Pass	2.51	Pass
F10	5	Black Ash/Sand	13	1.52	100%	Pass	7.5	Pass
F10	6	Black Ash/Sand	15	1.49	95%	Pass	8.9	Pass
F10	7	Black Ash/Sand	14	1.58	96%	Pass	8.2	Pass
F10	8	Black Ash/Sand	15	1.57	96%	Pass	7.9	Pass
F10	9	Black Ash/Sand	16	1.41	99%	Pass	5.2	Pass
F10	10	Black Ash/Sand	11	1.58	101%	Pass	9.6	Pass
F11	1	Black Sand / ASH	13	1.381	106%	Pass	8.59	Pass
F11	2	Black Sand / ASH	19	1.328	93%	Fail	7.11	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
F11	3	Black Sand / ASH	15	1.609	95%	Pass	0.00	Pass
F11	4	Black Sand / ASH	12	1.33	94%	Fail	1.49	Pass
F11	5	Black Ash/Sand	14	1.49	98%	Pass	7.8	Pass
F11	6	Black Ash/Sand	11	1.58	101%	Pass	9.7	Pass
F11	7	Black Ash/Sand	15	1.59	97%	Pass	6.4	Pass
F11	8	Black Ash/Sand	14	1.61	98%	Pass	7.1	Pass
F11	9	Black Ash/Sand	14	1.44	101%	Pass	6	Pass
F11	10	Black Ash/Sand	15	1.56	99%	Pass	4.5	Pass
F12	1	Black Sand / ASH	13	1.381	106%	Pass	8.59	Pass
F12	2	Black Sand / ASH	9.8	1.412	99%	Pass	0.83	Pass
F12	3	Black Ash/Sand	11	1.6	102%	Pass	8.6	Pass
F12	4	Black Sand / ASH	10	1.527	111%	Pass	11.85	Fail
F12	5	Black Ash/Sand	12	1.5	99%	Pass	9.9	Pass
F12	6	Black Ash/Sand	13	1.57	100%	Pass	7.7	Pass
F12	8	Black Ash/Sand	23	1.41	93%	Fail	-0.5	Pass
F13	1	Black Ash/Sand	19	1.49	95%	Pass	9.4	Pass
F13	2	Black Ash/Sand	18	1.51	96%	Pass	9.7	Pass
F13	3	Black Ash/Sand	21	1.5	96%	Pass	5.7	Pass
F13	4	Black Ash/Sand	20	1.54	98%	Pass	5.3	Pass
F13	5	Black Ash/Sand	19	1.49	95%	Pass	9.6	Pass
F13	6	Black Ash/Sand	17	1.55	99%	Pass	9.2	Pass
F13	7	Black Ash/Sand	19	1.55	99%	Pass	6.2	Pass
F13	8	Black Ash/Sand	19	1.51	96%	Pass	8.5	Pass
F14	1	Black Ash/Sand	20	1.6	102%	Pass	1.2	Pass
F14	2	Black Ash/Sand	22	1.48	94%	Fail	5.9	Pass
F14	3	Black Ash/Sand	24	1.48	94%	Fail	3.4	Pass
F14	4	Black Ash/Sand	19	1.61	103%	Pass	1.8	Pass
F14	5	Black Ash/Sand	20	1.5	96%	Pass	7.6	Pass
F14	6	Black Ash/Sand	22	1.51	96%	Pass	4.4	Pass
F14	7	Black Ash/Sand	20	1.48	94%	Fail	8.8	Pass
F14	8	Black Ash/Sand	23	1.55	99%	Pass	0	Pass
F15	1	Ash Fill	19	1.57	98%	Pass	4.7	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
F15	2	Ash Fill	17	1.57	98%	Pass	7.7	Pass
F15	3	Ash Fill	18	1.53	96%	Pass	9	Pass
F15	4	Ash Fill	19	1.52	95%	Pass	7.7	Pass
F15	5	Ash Fill	17	1.57	98%	Pass	7.7	Pass
F16	1	Ash Fill	19	1.53	96%	Pass	7.2	Pass
F16	2	Ash Fill	17	1.55	97%	Pass	9.2	Pass
F16	3	Ash Fill	18	1.53	96%	Pass	9	Pass
F16	4	Ash Fill	19	1.53	96%	Pass	7.2	Pass
F16	5	Ash Fill	18	1.53	96%	Pass	8.5	Pass
F17	1	Black Ash/Sand	16	1.5	99%	Pass	8.9	Pass
F17	2	Black Ash/Sand	20	1.56	103%	Pass	3.7	Pass
F17	3	Black Ash/Sand	17	1.57	103%	Pass	8.2	Pass
F17	4	Black Ash/Sand	20	1.56	103%	Pass	3.4	Pass
F17	5	Ash Fill	15	1.61	101%	Pass	9	Pass
F18	1	Black Ash/Sand	20	1.54	101%	Pass	5.8	Pass
F18	2	Black Ash/Sand	16	1.57	103%	Pass	9.5	Pass
F18	3	Black Ash/Sand	21	1.5	99%	Pass	5.7	Pass
F18	4	Black Ash/Sand	20	1.48	97%	Pass	8.6	Pass
F18	5	Ash Fill	18	1.53	96%	Pass	9	Pass
F18	6	Ash Fill	17	1.56	98%	Pass	8.2	Pass
F19	1	Black Ash/Sand	23	1.49	98%	Pass	4.2	Pass
F19	2	Black Ash/Sand	21	1.6	105%	Pass	0.3	Pass
F19	3	Black Ash/Sand	23	1.5	99%	Pass	2.7	Pass
F19	4	Black Ash/Sand	20	1.56	103%	Pass	4	Pass
F19	5	Ash Fill	16	1.57	98%	Pass	9.5	Pass
F19	6	Ash Fill	19	1.54	96%	Pass	6.7	Pass
F20	1	Black Ash/Sand	18	1.6	96%	Pass	-0.1	Pass
F20	2	Black Ash/Sand	21	1.55	102%	Pass	3.2	Pass
F20	3	Black Ash/Sand	21	1.5	99%	Pass	6.3	Pass
F20	4	Black Ash/Sand	19	1.53	101%	Pass	7.2	Pass
F20	5	Ash Fill	17	1.56	98%	Pass	8.2	Pass
F7	1	Clay Fill	9.8	2.01	100%	Pass	2.8	Pass
F7	2	Clay Fill	10	1.99	99%	Pass	3.5	Pass
F7	3	Clay Fill	9.9	1.97	98%	Pass	4.3	Pass
F7	4	Clay Fill	9.4	2.03	101%	Pass	2.6	Pass
F8	1	Clay Fill	9	2.01	100%	Pass	3.2	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
F8	2	Clay Fill	9.6	1.96	103%	Pass	4.8	Pass
F8	3	Clay Fill	8.8	1.99	105%	Pass	4.8	Pass
F8	4	Clay Fill	9.4	2.01	106%	Pass	2.8	Pass
F8	5	Clay Fill	11	1.92	101%	Pass	4.3	Pass
F8	6	Clay Fill	9.5	1.97	104%	Pass	4.5	Pass
F8	7	Clay Fill	11	1.91	101%	Pass	4.4	Pass
F8	8	Clay Fill	10	1.99	105%	Pass	2.5	Pass
F9	1	Clay Fill	8.8	2.03	101%	Pass	4	Pass
F9	2	Clay Fill	8.6	2.03	101%	Pass	4.4	Pass
F9	3	Clay Fill	9	2.01	100%	Pass	4.5	Pass
F9	4	Clay Fill	9.1	2.01	100%	Pass	4.3	Pass
F9	5	Clay Fill	11	1.93	102%	Pass	4.1	Pass
F9	6	Clay Fill	10	1.98	104%	Pass	2.9	Pass
F9	7	Clay Fill	12	1.88	99%	Pass	4.4	Pass
F9	8	Clay Fill	13	1.83	96%	Pass	4.8	Pass
G10	1	Clay Fill	9.9	1.96	103%	Pass	4.5	Pass
G10	2	Clay Fill	11	1.95	103%	Pass	2.9	Pass
G10	3	Clay Fill	9.2	1.96	103%	Pass	5.7	Fail
G10	4	Clay Fill	8.6	2.03	107%	Pass	3.8	Pass
G10	5	Ash Fill	16	1.65	103%	Pass	4.6	Pass
G10	6	Ash Fill	15	1.66	104%	Pass	5.4	Pass
G10	7	Ash Fill	16	1.65	103%	Pass	4.6	Pass
G10	8	Ash Fill	16	1.67	104%	Pass	4.7	Pass
G10	9	Ash Fill	16	1.6	100%	Pass	4.9	Pass
G10	10	Ash Fill	17	1.57	98%	Pass	7.5	Pass
G11	1	Clay Fill	9.7	2	100%	Pass	3.6	Pass
G11	2	Clay Fill	9.6	2.01	100%	Pass	3.3	Pass
G11	3	Clay Fill	9.1	2.01	100%	Pass	4.4	Pass
G11	4	Clay Fill	8.5	2.03	101%	Pass	4.3	Pass
G11	5	Ash Fill	19	1.52	95%	Pass	7.7	Pass
G11	6	Ash Fill	18	1.54	96%	Pass	8.4	Pass
G11	7	Ash Fill	17	1.56	98%	Pass	8.5	Pass
G12	1	Black Sand / ASH	11	1.477	114%	Pass	5.19	Pass
G12	2	Black Ash/Sand	14	1.52	97%	Pass	8.9	Pass
G12	3	Black Ash/Sand	16	1.52	97%	Pass	6.3	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
G12	4	Black Sand / ASH	12	1.518	111%	Pass	4.87	Pass
G12	6	Black Ash/Sand	13	1.55	99%	Pass	8.8	Pass
G12	7	Black Ash/Sand	14	1.55	99%	Pass	6.7	Pass
G12	8	Black Ash/Sand	16	1.47	104%	Pass	0.8	Pass
G12	9	Black Ash/Sand	12	1.47	104%	Pass	6.8	Pass
G13	1	Black Ash/Sand	22	1.51	96%	Pass	3.7	Pass
G13	2	Black Ash/Sand	20	1.49	95%	Pass	7.8	Pass
G13	3	Black Ash/Sand	19	1.49	95%	Pass	9.5	Pass
G13	4	Black Ash/Sand	19	1.49	95%	Pass	9.5	Pass
G13	5	Black Ash/Sand	18	1.52	97%	Pass	9.5	Pass
G13	6	Ash Fill	17	1.57	98%	Pass	8.2	Pass
G13	7	Ash Fill	14	1.68	105%	Pass	7	Pass
G14	1	Black Ash/Sand	24	1.49	95%	Pass	2.2	Pass
G14	2	Black Ash/Sand	19	1.5	96%	Pass	9.1	Pass
G14	3	Black Ash/Sand	21	1.53	97%	Pass	4.2	Pass
G14	4	Black Ash/Sand	21	1.5	96%	Pass	5.7	Pass
G14	5	Black Ash/Sand	22	1.52	97%	Pass	2.9	Pass
G15	1	Ash Fill	17	1.6	100%	Pass	5.9	Pass
G15	2	Ash Fill	18	1.53	96%	Pass	8.5	Pass
G15	3	Ash Fill	17	1.56	98%	Pass	8.5	Pass
G15	4	Ash Fill	18	1.53	96%	Pass	9	Pass
G15	5	Ash Fill	18	1.56	98%	Pass	7	Pass
G15	6	Ash Fill	18	1.53	96%	Pass	8.5	Pass
G17	1	Ash Fill	19	1.53	96%	Pass	7.5	Pass
G17	2	Ash Fill	20	1.53	96%	Pass	6	Pass
G17	3	Ash Fill	20	1.52	95%	Pass	6.2	Pass
G17	4	Ash Fill	18	1.55	97%	Pass	6.9	Pass
G17	5	Ash Fill	19	1.53	96%	Pass	7.8	Pass
G18	1	Yellow Gravel	6.9	2.04	96%	Pass	3.5	Pass
G18	1	Ash Fill	20	1.57	98%	Pass	3.5	Pass
G18	2	Yellow Gravel	6.5	2.04	96%	Pass	3.2	Pass
G18	2	Ash Fill	20	1.57	98%	Pass	3.9	Pass
G18	3	Yellow Gravel	6.8	2.01	95%	Pass	8.6	Pass
G18	3	Ash Fill	19	1.61	101%	Pass	2.5	Pass
G18	4	Yellow Gravel	6.6	2.03	96%	Pass	6.6	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
G18	4	Ash Fill	17	1.63	102%	Pass	3.7	Pass
G18	5	Yellow Gravel	6.1	2.05	97%	Pass	4.5	Pass
G18	5	Ash Fill	18	1.62	101%	Pass	3	Pass
G18	6	Ash Fill	17	1.54	96%	Pass	9.7	Pass
G19	1	Black Ash/Sand	19	1.58	104%	Pass	4.8	Pass
G19	2	Black Ash/Sand	19	1.55	102%	Pass	6.2	Pass
G19	3	Black Ash/Sand	19	1.57	103%	Pass	5.4	Pass
G19	4	Black Ash/Sand	20	1.57	103%	Pass	4.2	Pass
G19	5	Ash Fill	17	1.55	97%	Pass	9.2	Pass
G20	1	Yellow Gravel	8.4	2	95%	Pass	6.8	Pass
G20	2	Yellow Gravel	8.9	2.01	96%	Pass	5.3	Pass
G20	3	Yellow Gravel	8.8	1.95	93%	Fail	8.4	Pass
G20	4	Yellow Gravel	8.8	2.18	104%	Pass	-2.4	Pass
G7	1	Clay Fill	13	1.94	98%	Pass	3.6	Pass
G7	2	Clay Fill	8.2	2.03	101%	Pass	5	Pass
G7	3	Clay Fill	8.4	2.08	103%	Pass	2.5	Pass
G7	4	Clay Fill	11	1.99	99%	Pass	1.5	Pass
G8	1	Clay Fill	14	1.91	96%	Pass	2.9	Pass
G8	2	Clay Fill	8	2.03	107%	Pass	4.9	Pass
G8	3	Clay Fill	8.4	2.08	109%	Pass	1.8	Pass
G8	4	Clay Fill	8.3	2.01	106%	Pass	5	Pass
G8	5	Clay Fill	10	1.97	104%	Pass	3.7	Pass
G8	6	Clay Fill	9.7	1.96	103%	Pass	5	Pass
G8	7	Clay Fill	9.9	1.98	104%	Pass	3.5	Pass
G9	1	Clay Fill	13	1.96	99%	Pass	2.7	Pass
G9	2	Clay Fill	8.6	2	105%	Pass	5.1	Fail
G9	3	Clay Fill	10	1.95	103%	Pass	4.8	Pass
G9	4	Clay Fill	10	1.97	104%	Pass	3.5	Pass
G9	5	Clay Fill	10	1.98	104%	Pass	3	Pass
G9	6	Clay Fill	12	1.89	99%	Pass	3.9	Pass
G9	7	Clay Fill	12	1.92	101%	Pass	2.4	Pass
G9	8	Clay Fill	11	1.94	102%	Pass	2.5	Pass
G9	9	Clay Fill	12	1.89	99%	Pass	4	Pass
H10	1	Clay Fill	8.9	2.02	100%	Pass	4	Pass
H10	2	Clay Fill	11	1.9	95%	Pass	5.9	Fail
H10	3	Clay Fill	9.3	2	100%	Pass	4.5	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
H10	4	Clay Fill	8.8	2.01	100%	Pass	4.7	Pass
H10	5	Ash Fill	15	1.61	101%	Pass	8.7	Pass
H10	6	Ash Fill	16	1.59	99%	Pass	8.5	Pass
H10	7	Ash Fill	14	1.65	103%	Pass	8.3	Pass
H10	8	Ash Fill	15	1.63	102%	Pass	7.8	Pass
H10	9	Ash Fill	16	1.65	103%	Pass	5	Pass
H11	1	Black Ash/Sand	20	1.42	96%	Pass	2.7	Pass
H11	2	Black Ash/Sand	19	1.44	97%	Pass	2.9	Pass
H11	3	Black Ash/Sand	21	1.44	97%	Pass	0.3	Pass
H11	4	Black Ash/Sand	21	1.45	98%	Pass	0.5	Pass
H11	5	Clay Fill	12	1.87	98%	Pass	4.6	Pass
H11	6	Clay Fill	10	1.95	103%	Pass	4.8	Pass
H11	7	Clay Fill	9.7	1.96	103%	Pass	4.7	Pass
H11	8	Clay Fill	10	1.95	103%	Pass	4.9	Pass
H11	9	Clay Fill	10	1.91	101%	Pass	6.5	Fail
H12	1	Black Ash/Sand	17	1.51	102%	Pass	1	Pass
H12	2	Black Ash/Sand	16	1.53	103%	Pass	1.7	Pass
H12	3	Black Ash/Sand	15	1.54	104%	Pass	3.2	Pass
H12	4	Black Ash/Sand	17	1.49	101%	Pass	3.7	Pass
H12	5	Black Ash/Sand	17	1.47	99%	Pass	4.2	Pass
H12	6	Clay Fill	12	1.88	99%	Pass	4.3	Pass
H12	7	Clay Fill	9.9	1.96	103%	Pass	4.6	Pass
H12	8	Clay Fill	10	1.95	103%	Pass	4.1	Pass
H13	1	Black Ash/Sand	12	1.51	102%	Pass	8.9	Pass
H13	2	Black Ash/Sand	13	1.51	102%	Pass	7.3	Pass
H13	3	Black Ash/Sand	13	1.54	104%	Pass	6.9	Pass
H13	4	Black Ash/Sand	13	1.55	105%	Pass	5.3	Pass
H13	5	Black Ash/Sand	17	1.48	100%	Pass	4.1	Pass
H14	1	Black Ash/Sand	14	1.71	96%	Pass	2.6	Pass
H14	2	Black Ash/Sand	20	1.53	97%	Pass	5.9	Pass
H14	3	Black Ash/Sand	19	1.53	97%	Pass	7.4	Pass
H14	4	Black Ash/Sand	20	1.48	94%	Fail	8.3	Pass
H15	1	Black Ash/Sand	16	1.69	94%	Fail	1.5	Pass
H15	2	Black Ash/Sand	20	1.52	97%	Pass	7.2	Pass
H15	3	Black Ash/Sand	19	1.55	99%	Pass	5.9	Pass
H15	4	Black Ash/Sand	19	1.55	99%	Pass	6.9	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
H17	1	Ash Fill	17	1.55	97%	Pass	9.1	Pass
H17	2	Ash Fill	19	1.55	97%	Pass	6	Pass
H17	3	Ash Fill	15	1.59	99%	Pass	9.9	Pass
H17	4	Ash Fill	16	1.58	99%	Pass	9	Pass
H17	5	Ash Fill	15	1.6	100%	Pass	9.3	Pass
H17	6	Ash Fill	17	1.55	97%	Pass	9.2	Pass
H18	1	Ash Fill	17	1.54	96%	Pass	9.7	Pass
H18	2	Ash Fill	18	1.54	96%	Pass	8	Pass
H18	3	Ash Fill	16	1.58	99%	Pass	9	Pass
H18	4	Ash Fill	18	1.56	98%	Pass	7	Pass
H18	5	Ash Fill	17	1.55	97%	Pass	9.2	Pass
H19	1	Ash Fill	16	1.57	98%	Pass	9.7	Pass
H19	2	Ash Fill	13	1.66	104%	Pass	8.8	Pass
H19	3	Ash Fill	14	1.66	104%	Pass	7.9	Pass
H19	4	Ash Fill	14	1.65	103%	Pass	8.6	Pass
H19	5	Ash Fill	14	1.62	101%	Pass	9.3	Pass
H20	1	Ash Fill	15	1.63	102%	Pass	7.8	Pass
H20	2	Ash Fill	15	1.62	101%	Pass	8.7	Pass
H20	3	Ash Fill	16	1.63	102%	Pass	6.4	Pass
H20	4	Ash Fill	19	1.58	99%	Pass	3.7	Pass
H20	5	Ash Fill	16	1.62	101%	Pass	6.6	Pass
H9	7	Clay Fill	13	1.95	98%	Pass	3.1	Pass
H9	8	Clay Fill	12	1.97	99%	Pass	3.8	Pass
I10	1	Clay Fill	9.5	1.97	104%	Pass	4.6	Pass
I10	2	Clay Fill	11	1.93	102%	Pass	3.8	Pass
I10	3	Clay Fill	10	1.96	103%	Pass	4.2	Pass
I10	4	Clay Fill	9.4	1.97	104%	Pass	5.1	Fail
I10	5	Ash Fill	16	1.66	104%	Pass	5	Pass
I11	1	Black Ash/Sand	17	1.47	99%	Pass	3.9	Pass
I11	2	Black Ash/Sand	18	1.46	99%	Pass	2.8	Pass
I11	3	Black Ash/Sand	19	1.45	98%	Pass	2.1	Pass
I11	4	Black Ash/Sand	19	1.44	97%	Pass	2.6	Pass
I11	5	Black Ash/Sand	19	1.45	98%	Pass	3.2	Pass
I11	6	Clay Fill	12	1.94	102%	Pass	2.1	Pass
I11	7	Clay Fill	11	1.98	104%	Pass	1.5	Pass
I11	8	Clay Fill	11	1.95	103%	Pass	3	Pass

Sample Location	Layer	Material	Moisture Content (%)	Dry Density (mg/m3)	Compaction (%)	Achieved Compaction	Air voids (%)	Air Voids Achieved
I12	1	Black Ash/Sand	18	1.49	101%	Pass	1.5	Pass
I12	2	Black Ash/Sand	16	1.53	103%	Pass	1.5	Pass
I12	3	Black Ash/Sand	17	1.53	103%	Pass	1.3	Pass
I12	4	Black Ash/Sand	17	1.46	99%	Pass	5	Pass
I12	5	Black Ash/Sand	18	1.47	99%	Pass	2.5	Pass
I12	6	Clay Fill	9.8	1.97	104%	Pass	4	Pass
I13	1	Black Ash/Sand	14	1.49	101%	Pass	7.4	Pass
I13	2	Black Ash/Sand	14	1.47	99%	Pass	8.2	Pass
I13	3	Black Ash/Sand	13	1.49	101%	Pass	9.3	Pass
I13	4	Black Ash/Sand	14	1.47	99%	Pass	9.1	Pass
I13	5	Black Ash/Sand	19	1.47	99%	Pass	1.4	Pass
I14	1	Black Ash/Sand	12	1.72	96%	Pass	6.5	Pass
I14	2	Black Ash/Sand	20	1.5	96%	Pass	7.6	Pass
I14	3	Black Ash/Sand	19	1.55	99%	Pass	6.5	Pass
I14	4	Black Ash/Sand	18	1.57	100%	Pass	6.1	Pass
I15	1	Black Ash/Sand	13	1.75	98%	Pass	2.8	Pass
I15	2	Black Ash/Sand	17	1.59	101%	Pass	6.6	Pass
I15	3	Black Ash/Sand	18	1.58	101%	Pass	6.1	Pass
I15	4	Black Ash/Sand	15	1.64	104%	Pass	7.5	Pass
I9	1	Clay Fill	12	1.96	103%	Pass	4.1	Pass
I9	2	Clay Fill	12	1.88	99%	Pass	4.1	Pass
I9	3	Clay Fill	10	1.99	105%	Pass	2.6	Pass
I9	4	Clay Fill	10	1.96	103%	Pass	4.3	Pass
I9	5	Clay Fill	12	1.88	99%	Pass	4.3	Pass
I9	6	Clay Fill	10	1.96	103%	Pass	3.6	Pass
I9	7	Clay Fill	11	1.98	104%	Pass	1	Pass
I9	8	Clay Fill	9.8	1.98	104%	Pass	3.8	Pass

Table 6-3 Summary of SRT

Test No	Material Description	Location	Layer	SRD Date Tested	SRD % MDD	Achieved Compaction	SRD Air Voids %	Achieved Air Voids
114845	Black Sand/ASH	E11	L1	28/7/22	103%	Pass	7.11	Pass
115020	Black Sand/ASH	F10	L1	29/7/22	107%	Pass	8.06	Pass
115079	Black Sand/ASH	D8	L2	2/8/2022	109%	Pass	2.69	Pass

Test No	Material Description	Location	Layer	SRD Date Tested	SRD % MDD	Achieved Compaction	SRD Air Voids %	Achieved Air Voids
115080	Black Sand/ASH	D11	L2	2/8/2022	106%	Pass	8.66	Pass
115152	Black Sand/ASH	F11	L1	4/8/2022	104%	Pass	4.27	Pass
115153	Black Sand/ASH	G12	L2	4/8/2022	103%	Pass	5.58	Pass
115154	Black Sand/ASH	D8	L1	4/8/2022	104%	Pass	2.76	Pass
115178	Black Sand/ASH	115178	L1	8/8/2022	99%	Pass	5.52	Pass
115254	Black Sand/ASH	F11	L4	10/8/2022	104%	Pass	1.48	Pass
115255	Black Sand/ASH	C12	L3	10/8/2022	105%	Pass	2.29	Pass
115256	Black Sand/ASH	D14	L1	10/8/2022	109%	Pass	-4.75	Pass
115397	Black Sand/ASH	D11	L5	11/8/2022	103%	Pass	2.01	Pass
115405	Black Sand/ASH	D14	L2	15/8/2022	103%	Pass	0.58	Pass
115406	Black Sand/ASH	B11	L4	15/8/2022	99%	Pass	8.38	Pass
115407	Black Sand/ASH	E11	L5	15/8/2022	95%	Pass	8.54	Pass
115408	Black Sand/ASH	G12	L5	15/8/2022	96%	Pass	9.37	Pass
115567	Black Sand/ASH	D10	L6	16/8/2022	100%	Pass	4.12	Pass
115799	Black Sand/ASH	C12	L6	19/8/2022	102%	Pass	5.04	Pass
115800	Black Sand/ASH	D9	L7	19/8/2022	99%	Pass	7.89	Pass
115884	Black Sand/ASH	D11	L7	23/8/22	98%	Pass	4.72	Pass
115886	Black Sand/ASH	G12	L7	23/8/22	103%	Pass	7.87	Pass
115885	Black Sand/ASH	D11	L8	23/8/22	103%	Pass	-0.60	Pass
116031	Black Sand/ASH	E13	L5	25/8/2022	99%	Pass	9.30	Pass
116032	Black Sand/ASH	B11	L8	25/8/2022	106%	Pass	-1.10	Pass
116124	Black Sand/ASH	F12	L8	31/8/22	108%	Pass	1.47	Pass
116125	Black Sand/ASH	E12	L8	31/8/22	108%	Pass	-1.81	Pass
116126	Black Sand/ASH	D12	L8	31/8/22	107%	Pass	7.48	Pass
115164	Black Sand/ASH	C16	L1	31/8/22	99%	Pass	4.10	Pass
115165	Black Sand/ASH	C19	L1	31/8/22	101%	Pass	9.57	Pass
116229	Black Sand/ASH	C18	L2	1/9/2022	97%	Pass	1.07	Pass
116230	Black Sand/ASH	C16	L2	1/9/2022	98%	Pass	1.48	Pass
116231	Black Sand/ASH	C20	L2	1/9/2022	96%	Pass	2.30	Pass
116453	Black Sand/ASH	D12	L9	6/9/2022	98%	Pass	7.50	Pass
116454	Black Sand/ASH	C8	L9	6/9/2022	101%	Pass	5.00	Pass
116551	Black Sand/ASH	B15	L3	9/9/2022	103%	Pass	0.10	Pass
116552	Black Sand/ASH	B17	L3	9/9/2022	98%	Pass	0.30	Pass
116654	Black Sand/ASH	D9	L10	14/9/2022	97%	Pass	7.10	Pass
116655	Black Sand/ASH	D8	L9	14/9/2022	97%	Pass	2.30	Pass
116656	Black Sand/ASH	C9	L11	14/9/2022	104%	Pass	4.00	Pass

Test No	Material Description	Location	Layer	SRD Date Tested	SRD % MDD	Achieved Compaction	SRD Air Voids %	Achieved Air Voids
116797	Black Sand/ASH	B15	L4	16/9/2022	103%	Pass	1.70	Pass
116798	Black Sand/ASH	A17	L5	16/9/2022	101%	Pass	7.40	Pass
116870	Black Sand/ASH	D17	L6	22/9/2022	98%	Pass	0.50	Pass
116871	Black Sand/ASH	B15	L6	22/9/2022	103%	Pass	-0.90	Pass
116974	Black Sand/ASH	A15	L6	23/9/2022	99%	Pass	6.70	Pass
117051	Black Sand/ASH	B17	L8	27/9/2022	100%	Pass	3.20	Pass
117133	Black Sand/ASH	A18	L2	28/9/2022	100%	Pass	7.60	Pass
117134	Black Sand/ASH	A18	L1	28/9/2022	98%	Pass	6.50	Pass
117137	Black Sand/ASH	E19	L1	30/9/2022	99%	Pass	1.10	Pass
117138	Black Sand/ASH	B13	L1	30/9/2022	102%	Pass	3.20	Pass
117657	Yellow Gravel	G18	L4	12/10/2022	95%	Pass	7.70	Pass
117658	Black Sand/ASH	B19	L3	12/10/2022	98%	Pass	5.00	Pass
117811	Black Sand/ASH	C19	L10	18/10/2022	99%	Pass	0.50	Pass
117812	Black Sand/ASH	A19	L10	18/10/2022	101%	Pass	0.80	Pass
117950	Black Sand/ASH	A17	L10	19/10/22	101%	Pass	7.1	Pass
117951	Black Sand/ASH	D20	L10	19/10/22	99%	Pass	3.7	Pass
118067	Black Sand/ASH	D16	L11	21/10/22	105%	Pass	5.1	Pass
118068	Black Sand/ASH	E16	L6	21/10/22	98%	Pass	3.3	Pass
118069	Black Sand/ASH	E17	L11	21/10/22	97%	Pass	3.1	Pass
118378	Black Sand/ASH	D18	L10	25/10/22	97%	Pass	-0.1	Pass
118379	Black Sand/ASH	I15	L1	25/10/22	97%	Pass	0.4	Pass
118764	Black Sand/Gravel	I12	L1	8/11/2022	101%	Pass	5.3	Pass
118765	Black Sand/Gravel	H14	L4	8/11/2022	101%	Pass	4	Pass
118766	Black Sand/Gravel	I14	L4	8/11/2022	101%	Pass	5.8	Pass
118918	Black Sand/ASH	I12	L1	16/11/22	103%	Pass	2.3	Pass
118919	Black Sand/ASH	H13	L2	16/11/22	101%	Pass	5.1	Pass
119172	Black Sand/ASH	I13	L5	22/11/22	101%	Pass	0.1	Pass
124156	Black Sand/ASH	F17	L1	25/4/23	99%	Pass	9.8	Pass
124157	Black Sand/ASH	F20	L2	25/4/23	99%	Pass	3.9	Pass
124398	Clay Fill	I9	L4	26/4/23	100%	Pass	3.2	Pass
124997	Clay Fill	E7	L2	4/5/2023	97%	Pass	1.6	Pass
124998	Clay Fill	E8	L3	4/5/2023	99%	Pass	3.6	Pass
124999	Clay Fill	G8	L4	4/5/2023	100%	Pass	4.9	Pass
125259	Clay Fill	F9	L7	12/5/2023	103%	Pass	4.1	Pass
125260	Clay Fill	I11	L8	12/5/2023	99%	Pass	4.3	Pass
125261	Clay Fill	G8	L6	12/5/2023	104%	Pass	4	Pass

Test No	Material Description	Location	Layer	SRD Date Tested	SRD % MDD	Achieved Compaction	SRD Air Voids %	Achieved Air Voids
125475	Black Sand/ASH	A19	L14	18/5/2023	98%	Pass	9.8	Pass
125476	Black Sand/ASH	B19	L13	18/5/2023	98%	Pass	9.5	Pass
SRD 1	Clay Fill	G9	L1	3/5/2023	97	Pass	2	Pass
SRD 1	Black Sand/ASH	C20	L3	28/4/2023	100	Pass	3.1	Pass
SRD 2	Black Sand/ASH	E19	L4	28/4/2023	97	Pass	2.6	Pass
SRD 3	Black Sand/ASH	F18	L4	28/4/2023	99	Pass	3.6	Pass
125644	Black Sand/ASH	B14	L12	18/5/23	102.5	Pass	7.1	Pass
125645	Black Sand/ASH	C18	L8	18/5/23	102.7	Pass	5.4	Pass
125646	Black Sand/ASH	C19	L11	18/5/23	97.5	Pass	8.5	Pass
125647	Black Sand/ASH	D15	L6	18/5/23	100.3	Pass	7.7	Pass
126149	Black Sand/ASH	H17	L6	31/5/23	97.5	Pass	8.5	Pass
126150	Black Sand/ASH	G19	L5	31/5/23	100.3	Pass	9.3	Pass
126151	Black Sand/ASH	H20	L5	31/5/23	102.5	Pass	5.4	Pass

Table 6-4 Comparison of NDG and SRT

Test No	Material Description	Report Reference	Location	SRD Date Tested	NDG Date Tested	SRD Dry Density (Kg/m3)	NDG Dry Density (Kg/m3)	SRD % MDD	NDG % MDD	SRD Air Voids %	NDG Air Voids %
114845	Black Sand/ASH	MRN4454/18	SRD E11	28/7/22	28/7/22	1451	1426	103%	101%	7.11	5.85
115020	Black Sand/ASH	MRN4454/19	SRD L1 F10	29/7/22	29/7/22	1389	1360	107%	105%	8.06	8.59
115254	Black Sand/ASH	MRN4454/30	F11 L4	10/08/22	10/08/22	1470	1330	104%	94%	1.48	1.49
115256	Black Sand/ASH	MRN4454/30	L1 D14	10/08/22	10/08/22	1540	1458	109%	103%	-4.75	6.83
115397	Black Sand/ASH	MRN4454/31	L5 D11	11/08/22	11/08/22	1360	1290	103%	98%	2.01	2.08
115567	Black Sand/ASH	MRN4454/34	L6 D10	16/8/2022	16/8/22	1520	1510	100%	99%	4.12	5.20
115799	Black Sand/ASH	MRN4454/39	L6 C12	19/8/2022	19/8/22	1670	1650	102%	101%	5.04	6.80
115886	Black Sand/ASH	MRN4454/41	L7 G12	23/8/22	23/8/22	1620	1550	103%	99%	7.87	6.70
115885	Black Sand/ASH	MRN4454/41	L8 D11	23/8/22	23/8/22	1570	1530	103%	101%	-0.60	3.80
116031	Black Sand/ASH	MRN4454/43	L5 E13	25/8/2022	25/8/22	1780	1710	99%	96%	9.30	5.00
116032	Black Sand/ASH	MRN4454/43	L8 B11	25/8/2022	25/8/22	1760	1580	106%	95%	-1.10	6.00
115164	Black Sand/ASH	MRN4454/45	L1 C16	31/8/22	31/8/22	1550	1610	99%	103%	4.10	8.50
115165	Black Sand/ASH	MRN4454/45	L1 C19	31/8/22	31/8/22	1590	1560	101%	99%	9.57	9.40
116229	Black Sand/ASH	MRN4454/46	L2 C18	01/09/22	01/09/22	1610	1600	97%	96%	1.07	2.60
116230	Black Sand/ASH	MRN4454/46	L2 C16	01/09/22	01/09/22	1630	1580	98%	95%	1.48	4.60
116231	Black Sand/ASH	MRN4454/46	L2 C20	01/09/22	01/09/22	1590	1590	96%	96%	2.30	4.30
116551	Black Sand/ASH	MRN4454/53	L3 B15	09/09/22	09/09/22	1590	1720	103%	104%	0.10	-1.70
116552	Black Sand/ASH	MRN4454/53	L3 B17	09/09/22	09/09/22	1350	1620	98%	98%	0.30	0.10
116656	Black Sand/ASH	MRN4454/57	L11 C9	14/9/2022	14/9/22	1760	1640	104%	97%	4.00	-8.50
116797	Black Sand/ASH	MRN4454/59	L4 B15	16/9/2022	16/9/22	1730	1660	103%	98%	1.70	9.60
116798	Black Sand/ASH	MRN4454/59	L5 A17	16/9/2022	16/9/22	1690	1740	101%	103%	7.40	9.90
1168	Black Sand/ASH	MRN4454/61	L6 B15	22/9/2022	22/9/22	1850	1830	103%	102%	-0.90	3.40

Test No	Material Description	Report Reference	Location	SRD Date Tested	NDG Date Tested	SRD Dry Density (Kg/m3)	NDG Dry Density (Kg/m3)	SRD % MDD	NDG % MDD	SRD Air Voids %	NDG Air Voids %
116974	Black Sand/ASH	MRN4454/62	L6 A15	23/9/2022	23/9/22	1410	1400	99%	99%	6.70	5.10
117051	Black Sand/ASH	MRN4454/63	L8 B17	27/9/2022	27/8/22	1660	1590	100%	96%	3.20	1.30
117133	Black Sand/ASH	MRN4454/65	L2 A18	28/9/2022	28/9/22	1670	1580	100%	95%	7.60	9.60
117134	Black Sand/ASH	MRN4454/65	L1 A18	28/9/2022	28/9/22	1630	1600	98%	96%	6.50	8.70
117137	Black Sand/ASH	MRN4454/66	L1 E19	30/9/2022	30/9/22	1640	1620	99%	98%	1.10	2.10
117657	Yellow Gravel	MRN4454/79	L4 G18	12/10/22	12/10/22	2020	2040	95%	96%	7.70	6.60
117658	Black Sand/ASH	MRN4454/79	L3 B19	12/10/22	12/10/22	1530	1540	98%	98%	5.00	8.10
117811	Black Sand/ASH	MRN4454/81	L10 C19	18/10/2022	18/10/22	1650	1590	99%	96%	0.50	4.20
117812	Black Sand/ASH	MRN4454/81	L10 A19	18/10/2022	18/10/22	1670	1730	101%	104%	0.80	5.40
118067	Black Sand/ASH	MRN4454/85	L11 D16	21/10/22	21/10/22	2110	1670	105%	100%	5.1	2.6
118379	Black Sand/ASH	MRN4454/86	L1 I15	25/10/22	25/10/22	1730	1750	97%	99%	0.4	6.5
118918	Black Sand/ASH	MRN4454/98	L1 I12	16/11/22	16/11/22	1530	1490	103%	101%	2.3	1.5
118919	Black Sand/ASH	MRN4454/98	L2 H13	16/11/22	16/11/22	1500	1510	101%	102%	5.1	7.3
119172	Black Sand/ASH	MRN4454/100	L5 I13	22/11/22	22/11/22	1490	1470	101%	99%	0.1	1.4
124156	Black Sand/ASH	MRN4742/2	L1 F17	25/4/23	25/4/23	1560	1500	99%	104%	9.8	8.9
124157	Black Sand/ASH	MRN4742/2	L2 F20	25/4/23	25/4/23	1560	1550	99%	102%	3.9	3.2
124997	Clay Fill	MRN4742/4	L2 E7	4/5/2023	4/5/2023	1950	1980	97%	98.8	1.6	2.8
124998	Clay Fill	MRN4742/4	L3 E8	4/5/2023	4/5/2023	1990	2010	99%	100.4	3.6	2.9
124999	Clay Fill	MRN4742/4	L4 G8	4/5/2023	4/5/2023	2000	2010	100%	100.4	4.9	5.8
125259	Clay Fill	MRN4742/4	L7 F9	12/5/2023	12/5/2023	1960	1880	103%	98.8	4.1	4.4
125260	Clay Fill	MRN4742/4	L8 I11	12/5/2023	12/5/2023	1880	1950	99%	102.4	4.3	3
125261	Clay Fill	MRN4742/4	L6 G8	12/5/2023	12/5/2023	1970	1960	104%	104	4	3.5
125475	Black Sand/ASH	MRN 4742/12	L14 A19	18/5/2023	18/5/2023	1560	1560	98%	97.7	9.8	9.9
125476	Black Sand/ASH	MRN 4742/12	L13 B19	18/5/2023	18/5/2023	1570	1570	98%	98.1	9.5	9.5
SRD 1	Clay Fill	PSL23/3127	L1 G9	3/5/2023	3/5/2023	1930	1960	97	99	2	2.7

Test No	Material Description	Report Reference	Location	SRD Date Tested	NDG Date Tested	SRD Dry Density (Kg/m3)	NDG Dry Density (Kg/m3)	SRD % MDD	NDG % MDD	SRD Air Voids %	NDG Air Voids %
SRD 2	Black Sand/ASH	PSL23/3127	L4 E19	28/4/2023	28/4/23	1550	1550	97	97	2.6	3.2
126149	Black Sand/ASH	MRN4741/16	L6 H17	31/5/23	31/5/23	1560	1550	97.5	96.7	8.5	9.2
126150	Black Sand/ASH	MRN4741/16	L5 G19	31/5/23	31/5/23	1600	1550	100.3	96.7	9.3	9.2
126151	Black Sand/ASH	MRN4741/16	L5 H20	31/5/23	31/5/23	1640	1620	102.5	101.4	5.4	6.6

Table 6-4 Summary of CBR Test Results

Report Ref	Location	Date	Description	CBR Value	Achieved CBR	Stiffness Ratio	Achieved Stiffness Ratio
MRN 4454/6	Test 1- Lane 3	14.7.22	Ash Fill	11.8	Pass	1.7	Pass
MRN 4454/7	Test 1- Lane 2	15.7.22	Ash Fill	14.6	Pass	1.9	Pass
MRN 4454/7	Test 2- Lane 1	15.7.22	Ash Fill	28.9	Pass	1.5	Pass
MRN 4454/7	Test 3- Lane 0	15.7.22	Ash Fill	21.9	Pass	1.8	Pass
MRN 4454/7	Test 4- Lane 4	15.7.22	Ash Fill	41.7	Pass	1.4	Pass
MRN 4454/8	Test 1 - Lane 1	19.7.22	Ash Fill	10	Pass	2.1	Pass
MRN 4454/8	Test 2 - Lane 2	19.7.22	Ash Fill	33.9	Pass	1.2	Pass
MRN 4454/8	Test 3 - Lane 3	19.7.22	Ash Fill	41.1	Pass	1.4	Pass
MRN 4454/13	Test 1 - Area 2A-1	22.7.22	Ash Fill	63.2	Pass	1.1	Pass
MRN 4454/13	Test 2 - Area 2B-1	22.7.22	Ash Fill	11.9	Pass	1.1	Pass
MRN 4454/13	Test 3 - Area 2B-2	22.7.22	Ash Fill	10.8	Pass	1.2	Pass
MRN 4454/27	Test 1- E12 L4	9.8.22	Ash Fill	6.1	Pass	1.8	Pass
MRN 4454/27	Test 2- D10 L4	9.8.22	Ash Fill	26.7	Pass	1.6	Pass
MRN 4454/27	Test 3- D8 L4	9.8.22	Ash Fill	52.4	Pass	1.6	Pass
MRN 4454/28	Test 1- F10 L4	10.8.22	Ash Fill	14	Pass	1.4	Pass
MRN 4454/33	Test 1 - E13 L0	15.8.22	Clay Fill	3.4	Pass	1.4	Pass
MRN 4454/33	Test 2 -	15.8.22	Ash Fill	5.4	Pass	1.4	Pass
~~MRN 4454/36~~	~~Test 1 - D7 L7~~	~~17.8.22~~	~~Ash Fill~~	~~2~~	~~Fail~~	~~1.8~~	~~Pass~~
PSL23/3127	Test 1 - D7 L7	3.5.23	Ash Fill	13.5	Pass	-	-
MRN 4454/36	Test 2 - D16 L0	17.8.22	Ash Fill	9.9	Pass	1.6	Pass
MRN 4454/37	Test 1 - B17 L0	18.8.22	Ash Fill	13.3	Pass	1.4	Pass
~~MRN 4454/37~~	~~Test 2 - G20 L0~~	~~25.7.22~~	~~Yellow Gravel~~	~~2.7~~	~~Fail~~	~~1.7~~	~~Pass~~
MRN 4454/70	Test 2 - G20 L0	6.10.22	Yellow Gravel	16	Pass	1.4	Pass
MRN 4454/41	Test 1- D19 L0	23.8.22	Ash Fill	5.1	Pass	1.1	Pass
MRN 4454/42	Test1 - G20 L4	24.8.22	Crush	12.7	Pass	1.5	Pass

Report Ref	Location	Date	Description	CBR Value	Achieved CBR	Stiffness Ratio	Achieved Stiffness Ratio
MRN 4454/42	Test2 - B13 L0	24.8.22	Ash Fill	13.7	Pass	1.2	Pass
MRN 4454/42	Test3 - D17 L0	24.8.22	Clay Fill	3.1	Pass	1.9	Pass
MRN 4454/42	Test4- C11 L4	24.8.22	Ash Fill	8.2	Pass	1.1	Pass
~~MRN 4454/43~~	~~Test 1- G20 L5~~	~~25.8.22~~	~~Yellow Gravel~~	~~7.4~~	~~Pass~~	~~2.3~~	~~Fail~~
MRN 4454/86	Test 1 - G20 L5	25.10.22	Yellow Gravel	14.3	Pass	0.9	Pass
MRN 4454/44	Test 1- C14 L4	25.8.22	Ash Fill	21.1	Pass	1.8	Pass
MRN 4454/46	Test 1 - C12 L8	1.9.22	Ash Fill	11.5	Pass	1.2	Pass
~~MRN 4454/46~~	~~Test 2 - D12 L8~~	~~1.9.22~~	~~Ash Fill~~	~~19~~	~~Pass~~	~~2.3~~	~~Fail~~
MRN 4454/54	Test 1 - D12 L8	12.9.22	Ash Fill	19.5	Pass	1.8	Pass
MRN 4454/47	Test 1 - F12 L8	2.9.22	Ash Fill	118.3	Pass	1	Pass
MRN 4454/47	Test 2 - D9 L8	2.9.22	Ash Fill	10.8	Pass	1.9	Pass
MRN 4454/48	Test 1- C14 L4	25.8.22	Ash Fill	12.4	Pass	1.3	Pass
MRN 4454/50	Test 1- B15 L4	7.9.22	Ash Fill	5.2	Pass	1.4	Pass
MRN 4454/53	Test 1 - C19 L4	9.9.22	Ash Fill	8.3	Pass	1.3	Pass
MRN 4454/53	Test 2 - D12 L9	9.9.22	Ash Fill	111	Pass	0.5	Pass
MRN 4454/54	Test 2 - D10 L11	12.9.22	Ash Fill	24.9	Pass	1	Pass
MRN 4454/56	Test 1 - E10 L11	13.9.22	Ash Fill	21	Pass	0.9	Pass
MRN 4454/57	Test 1 - D14 L5	14.9.22	Ash Fill	17.1	Pass	1.6	Pass
MRN 4454/58	Test 1 - B17 L4	15.9.22	Ash Fill	5	Pass	1.1	Pass
MRN 4454/58	Test 2 - C16 L4	15.9.22	Ash Fill	7.1	Pass	1.1	Pass
MRN 4454/61	Test 1- E20 L0	22.9.22	Ash Fill	5.1	Pass	1	Pass
MRN 4454/62	Test 1 - D15 L0	23.9.22	Ash Fill	5	Pass	1	Pass

Report Ref	Location	Date	Description	CBR Value	Achieved CBR	Stiffness Ratio	Achieved Stiffness Ratio
MRN 4454/62	Test 2 - B18 L0	23.9.22	Ash Fill	5.9	Pass	0.9	Pass
MRN 4454/63	Test 1 - B16 L8	27.9.22	Ash Fill	5.2	Pass	1	Pass
MRN 4454/63	Test 2 - C18 L8	27.9.22	Ash Fill	5	Pass	1.1	Pass
MRN 4454/65	Test 1 - D16 L8	29.9.22	Ash Fill	5.1	Pass	1.1	Pass
MRN 4454/70	Test 1 -	6.10.22	Yellow Gravel	34	Pass	1.3	Pass
MRN 4454/80	Test1 - I13 L0	17.10.22	Clay Fill	2.5	Pass	1	Pass
MRN 4454/80	Test2 - I15 L0	17.10.22	Clay Fill	4.6	Pass	0.9	Pass
MRN 4454/80	Test3 - G14 L0	17.10.22	Clay Fill	2.5	Pass	1.2	Pass
MRN 4454/80	Test4- B19 L4	17.10.22	Ash Fill	5.5	Pass	1	Pass
MRN 4454/84	Test1 - H19 L0	20.10.22	Clay Fill	5	Pass	1	Pass
MRN 4454/84	Test2 - H7 L0	20.10.22	Clay Fill	5	Pass	1.1	Pass
MRN 4454/84	Test3 - H11 L0	20.10.22	Clay Fill	5.3	Pass	0.8	Pass
MRN 4454/84	Test4- A19 L8	20.10.22	Ash Fill	7.3	Pass	1.3	Pass
MRN 4454/93	Test1 - G13 L0	14.11.22	Clay Fill	5.1	Pass	1.2	Pass
MRN 4454/93	Test2 - H12 L0	14.11.22	Ash Fill	8.7	Pass	1.1	Pass
MRN 4454/93	Test3 - H14 L4	14.11.22	Sand Fill	5.5	Pass	1.3	Pass
MRN 4454/93	Test4- H15 L4	14.11.22	Sand Fill	7.1	Pass	1.1	Pass
MRN 4454/96	Test 1 - F7 L0	16.11.22	Clay Fill	5.1	Pass	1	Pass
MRN 4454/96	Test 2 - F9 L0	16.11.22	Clay Fill	5.1	Pass	1	Pass
MRN 4742/1	Test 1 -G14 L5	20.4.23	Ash Fill	5	Pass	1	Pass
MRN 4742/1	Test 2 - F14 L4	20.4.23	Ash Fill	5.2	Pass	1	Pass
MRN 4742/2	Test 1 -E17 L4	25.4.23	Ash Fill	5.1	Pass	1.1	Pass
MRN 4742/3	Test 1 -H9 L8	26.4.23	Clay Fill	2.6	Pass	1.3	Pass
MRN 4742/3	Test 2 - H8 L4	26.4.23	Clay Fill	2.7	Pass	1.1	Pass
MRN 4742/7	Test 1 - H16 L1	11.5.23	Clay Fill	35.3	Pass	1.4	Pass

Report Ref	Location	Date	Description	CBR Value	Achieved CBR	Stiffness Ratio	Achieved Stiffness Ratio
MRN 4742/7	Test 2 - G19 L1	11.5.23	Clay Fill	36.8	Pass	1.2	Pass
MRN 4742/10	Test 1 - F17 L1	17.5.23	Clay Fill	5.8	Pass	1.2	Pass
MRN4742/10	Test 2 - F16 L1	17.5.23	Clay Fill	7.3	Pass	1.1	Pass
MRN4742/10	Test 3 - G17 L1	17.5.23	Clay Fill	8.8	Pass	1.3	Pass
PSL23/3127	Test 2 - G18 L4	3.5.23	Ash Fill	12.6	Pass	-	Pass
PSL23/3127	Test 3 - I8 L8	3.5.23	Clay Fill	2.9	Pass	-	Pass
PSL23/3127	Test 4 - I9 L4	3.5.23	Clay Fill	3.2	Pass	-	Pass
PSL23/3127	Test 5 - H11 L8	3.5.23	Clay Fill	3.6	Pass	-	Pass
PSL23/3127	Test 1 - E18 L4	28.4.23	Ash Fill	5.4	Pass	-	Pass
PSL23/3127	Test 2 - F9 L4	3.5.23	Clay Fill	5.4	Pass	-	Pass
PSL23/3127	Test 3 - F20 L4	3.5.23	Ash Fill	5.6	Pass	-	Pass
PSL23/3603	Test 1 - B12 L12	15.5.23	Sand Fill	4.1	Pass	-	Pass
PSL23/3603	Test 2 - B14 L8	15.5.23	Clay Fill	3.4	Pass	-	Pass
PSL23/3603	Test 3 - B15 L4	15.5.23	Sand Fill	3.6	Pass	-	Pass
PSL23/3603	Test 4 - E7 FGL	15.5.23	Clay Fill	12	Pass	-	Pass
PSL23/3603	Test 5 - G7 FGL	15.5.23	Clay Fill	3.1	Pass	-	Pass
PSL23/3603	Test 6 - G9 FGL	15.5.23	Clay Fill	3.1	Pass	-	Pass
PSL23/3603	Test 7 - I8 FGL	15.5.23	Clay Fill	3.6	Pass	-	Pass
PSL23/3603	Test 8 - I9 FGL	15.5.23	Clay Fill	3.4	Pass	-	Pass
PSL23/3603	Test 1 - B13 FGL	16.5.23	Clay Fill	6.9	Pass	-	Pass
PSL23/3603	Test 2 - F15 L4	16.5.23	Clay Fill	5.2	Pass	-	Pass
PSL23/3603	Test 3 - G11 FGL	16.5.23	Clay Fill	3.7	Pass	-	Pass
PSL23/3603	Test 4 - G13 FGL	16.5.23	Clay Fill	6.5	Pass	-	Pass
PSL23/3603	Test 5 - I11 FGL	16.5.23	Clay Fill	3.4	Pass	-	Pass
PSL23/3603	Test 6 - I13 FGL	16.5.23	Clay Fill	3.2	Pass	-	Pass
PSL23/3920	Test 1 - B16 FGL	23.5.23	Sand Fill	3.9	Pass	-	Pass
PSL23/3920	Test 2 - B18 FGL	23.5.23	Sand Fill	10	Pass	-	Pass
PSL23/3920	Test 3 - B19 FGL	23.5.23	Sand Fill	5.7	Pass	-	Pass
PSL23/3920	Test 4 - C16 FGL	23.5.23	Sand Fill	13.1	Pass	-	Pass
PSL23/3920	Test 5 - C18 FGL	23.5.23	Sand Fill	26.7	Pass	-	Pass
PSL23/3920	Test 6 - C19 FGL	23.5.23	Sand Fill	68.7	Pass	-	Pass
PSL23/3920	Test 7 - F7 L4	23.5.23	Clay Fill	26.1	Pass	-	Pass
PSL23/3920	Test 8 - F15 L4	23.5.23	Clay Fill	13.8	Pass	-	Pass
MRN 4742/16	Test 1 -H17 L4	2.6.23	Ash Fill	30.5	Pass	1.6	Pass
MRN 4742/16	Test 2 - F20 FGL	2.6.23	Ash Fill	36.1	Pass	1.1	Pass

7 CHEMICAL TESTING

7.1 Introduction

7.1.1 Chemical testing was undertaken prior to beginning the turnover (to assess the general degree and nature of contamination within the on-site soils), when unexpected contamination was encountered and to validate the fill material once it was placed.

7.1.2 In accordance with the remediation strategy samples of material which were to be reused during the earthworks were tested at a rate of 1 per 1000 m^3 against the cover system suite, 1 per 1500 m^3 for organic matter and 1 per 1500 m^3 for the sulphate suite.

7.1.3 Soil samples taken for chemical testing were collected in plastic tubs, 250 ml amber jars and 60 ml amber vials and dispatched to i2 Analytical Ltd.

7.1.4 A total backfill volume of 68,000 m^3 has been estimated for the site. The majority of which was made ground. A minimum of 68 No. tests are therefore required to comply with the specification. A total of 185 chemical tests have been conducted on site, including the trial pitting samples, in-situ sampling and hotspot validation.

7.1.5 The soils samples were analysed for the following general suite of contaminants, as specified: metals, petroleum hydrocarbons, PAHs, BTEX and asbestos (qualification and quantification).

7.1.6 The chemical test results were compared against the approved site-specific assessment criteria available in Hydrock's Remediation Strategy (15220-HYD-XX-XX-RP-GE-0006), Table 6-1. This criterion is for soil placed below the clean cover suite, further works will be undertaken by another contractor that will install a 600mm, within gardens, and a 450mm, within public open space, clean cover suite.

7.2 Chemical Testing Frequencies

7.2.1 Three chemical testing criteria have been used to verify the suitability of the engineered fill: Cover System assessment criteria, Organic Matter and Sulphate Suite. The material on site has split into 4 separate types; Ash, Clay, Gravel and 6F2. Table 7-1 shows how

many tests are required on site, how many tests have been undertaken and how many tests are left to complete.

Table 7-1: Chemical Testing Frequency

Material	Volume	Test	Frequency Required	Tests Required	Frequency Taken	Remaining Tests	Comments
Ash	47,000	Cover System Suite	1 Per 1000m^3	47	56	0	Approximate volume from onsite Surveys
		Organic Matter	1 Per 1500m^3	32	35	0	
		Sulphate Suite	1 Per 1000m^3	47	56	0	
Clay	11,000	Cover System Suite	1 Per 1000m^3	11	18	0	
		Organic Matter	1 Per 1500m^3	8	18	0	
		Sulphate Suite	1 Per 1000m^3	8	18	0	
Gravel	4,000	Cover System Suite	1 Per 1000m^3	4	13	0	
		Organic Matter	1 Per 1500m^3	3	13	0	
		Sulphate Suite	1 Per 1000m^3	3	13	0	
6F2	6,000	Organic Matter	1 Per 500m^3	12	12	0	
		Sulphate suite	1 Per 500m^3	12	12	0	

7.3 Pre-classification Chemical Testing

7.3.1 Prior to starting the turnover, classification trial pits were undertaken across a 25m square grid.

7.3.2 Trial pitting was carried out to characterise the on-site soils and assess their suitability for re-use as general fill based on a proposed residential end use. The location of the sample trial pits are shown on drawing VHEJ808-501 Trial Pits and Chemical Samples.

7.3.3 47 No. trial pits were advanced, and 91 No. samples were taken for chemical testing.

7.3.4 One of the samples taken from the trial pitting in grid square C13 indicated exceedances in the SSACs, for petroleum hydrocarbons.

7.3.5 A previous site investigation carried out by Hydrock identified three contamination hotspots. TP206 and WS01 correlating to VHE hotspot 1, TT03A correlating to VHE hotspot 2 and RO12 relating to VHE hotspot 3.

7.3.6 The hotspot contamination details are presented in section 8. The locations from which samples were taken are presented in appendix G.

7.3.7 A copy of the individual test results are presented in full in Appendix F.

7.4 Validation Chemical Testing

7.4.1 The site was divided into grid system with alpha numeric references, during the earthwork and remedial works, see drawing VHEJ808-302 Site Boundary on 20m Grid.

7.4.2 During the earthworks 36 No. samples from in-situ material and stockpiles were sent for chemical testing. A further 46No. samples were sent for chemical testing from hotspots, these samples included excavated hotspot material for re-use on site and the validation of the bases and sides of the excavations. The hotspot contamination details are presented in section 8.

7.4.3 Hardstanding was processed to a 6F2/6F1 graded material, the test results confirming this are provided in Appendix F. 12 No. of samples of crushed hardstanding were sent for sulphate content, organic matter and “cover suite” testing as required by the approved specification. Chemical testing showed no elevated contaminants with the 6F1/6F2 material.

7.4.4 The locations of the soil samples taken is shown in VHEJ808-501and a summary of the chemical verification of the engineered fill is provided in Table 7-2.

Table 7-2 – Chemical Verification Sample Summary

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
A16	0.3	06/06/2022	Made Ground: Yellow Gravel	22-63849	Pass	-
A16	1.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A16	2.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A16	2.8	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A16	3.4	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A16	4.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A15	0.2	06/06/2022	Made Ground: Yellow Gravel	22-63849	Pass	-
A15	1.3	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A15	3.3	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A15	4.0	06/06/2022	Made Ground: Yellow-Brown Clay	22-63849	Pass	-
A14	0.3	06/06/2022	Made Ground: Yellow Gravel	22-63849	Pass	-
A14	1.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A14	2.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A14	3.4	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A14	4.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A13	0.3	06/06/2022	Made Ground: Yellow Gravel	22-63849	Pass	-
A13	1.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A13	2.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A13	3.2	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
A13	4.0	06/06/2022	Made Ground: Black Ash/Sand	22-63849	Pass	-
C15	0.3	01/06/2022	Made Ground: Yellow Gravel	22-63556	Pass	-
C15	1.0	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-
C15	2.0	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
C15	3.2	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-
C15	4.0	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-
D15	0.3	01/06/2022	Made Ground: Yellow Gravel	22-63556	Pass	-
D15	1.0	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-
D15	2.7	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-
D15	4.0	01/06/2022	Made Ground: Black Ash/Sand	22-63556	Pass	-
B14	1.0	30/05/2022	Made Ground: Yellow Gravel	22-63015	Pass	-
B14	1.7	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
B14	3.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
B14	4.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
C14	0.5	30/05/2022	Made Ground: Yellow Gravel	22-63015	Pass	-
C14	1.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
C14	2.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
C14	2.4	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
C14	4.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
D14	0.3	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
D14	0.7	30/05/2022	Made Ground: Yellow Gravel	22-63015	Pass	-
D14	1.6	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
D14	2.3	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
D14	4.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
C13	0.3	30/05/2022	Made Ground: Yellow Gravel	22-63015	Pass	-
C13 (HS4)	0.8	30/05/2022	Made Ground: Black Ash/Sand	22-63015	FAIL (650) *	Hotspot 4
C13	0.8	02/08/2022	Made Ground: Black Ash/Sand	22-75377	Pass	-
C13	2.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
C13	4.0	30/05/2022	Made Ground: Black Ash/Sand	22-63015	Pass	-
B13	1.0	31/05/2022	Made Ground: Yellow Gravel	22-63014	Pass	-
B13	2.0	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
B13	2.8	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
B13	4.0	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
B15	0.8	31/05/2022	Made Ground: Yellow Gravel	22-63014	Pass	-
B15	2.0	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
B15	3.5	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
B15	4.0	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
B16	1.0	31/05/2022	Made Ground: Black Ash/Sand	22-63014	Pass	-
F6	0.4	20/06/2022	Made Ground: Black Ash/Sand	22-66969	Pass	-
G6	1.0	20/06/2022	Made Ground: Black Ash/Sand	22-66969	Pass	-
F7	1.1	20/06/2022	Made Ground: Black Ash/Sand	22-66969	Pass	-
G7	0.5	20/06/2022	Made Ground: Black Ash/Sand	22-66969	Pass	-
C8	0.6	23/06/2022	Made Ground: Black Ash/Sand	22-68571	Pass	-
C11	1.5	23/06/2022	Made Ground: Black Ash/Sand	22-68571	Pass	-
D6	1.5	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
D8	0.4	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
E8	1.5	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
C9	1.5	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
C7	1.2	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
D7	0.6	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
D9	1.5	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
E9	0.4	26/05/2022	Made Ground: Black Ash/Sand	22-63016	Pass	-
C6	1.5	17/06/2022	Made Ground: Black Ash/Sand	22-66117	Pass	-
E6	1.1	17/06/2022	Made Ground: Black Ash/Sand	22-66117	Pass	-
E7	1.5	17/06/2022	Made Ground: Black Ash/Sand	22-66117	Pass	-
F7	1.2	17/06/2022	Made Ground: Black Ash/Sand	22-66117	Pass	-
D19	0.3	15/08/2022	Made Ground: Yellow Gravel	22-78624	Pass	-
D19	2.0	15/08/2022	Made Ground: Black Cobble	22-78624	Pass	-
C12	0.9	26/09/2022	Made Ground: Black Ash/Sand	22-87588	Pass	-
D12	0.9	26/09/2022	Made Ground: Black Ash/Sand	22-87588	Pass	-
D13	0.9	26/09/2022	Made Ground: Black Ash/Sand	22-87588	Pass	-
SP Black Fines	-	26/09/2022	Made Ground: Black Ash/Sand	22-87588	Pass	-
SP Black Fines	-	26/09/2022	Made Ground: Black Ash/Sand	22-87588	Pass	-
SP Black Fines	-	26/09/2022	Made Ground: Black Ash/Sand	22-87588	Pass	-
F13	-	11/10/2022	Made Ground: Black Ash/Sand	22-62426	Pass	-
E13	-	11/10/2022	Made Ground: Black Ash/Sand	22-62426	Pass	-
G13	-	11/10/2022	Made Ground: Black Ash/Sand	22-62426	Pass	-
G14	-	11/10/2022	Made Ground: Black Ash/Sand	22-62426	Pass	-
F14	-	11/10/2022	Made Ground: Black Ash/Sand	22-62426	Pass	-
SP66	-	11/10/2022	Made Ground: Black Ash/Sand	22-62426	Pass	-
POS-G4-1	1.0	26/10/2022	Made Ground: Black Ash/Sand	22-93221	Pass	-
POS-G4-2	1.0	26/10/2022	Made Ground: Black Ash/Sand	22-93221	Pass	-
POS-G4-3	1.0	26/10/2022	Made Ground: Black Ash/Sand	22-93221	Pass	-
I14	-	26/10/2022	Made Ground: Black Ash/Sand	22-93221	Pass	-

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
I15	-	26/10/2022	Made Ground: Black Ash/Sand	22-93221	Pass	-
H15	-	26/10/2022	Made Ground: Black Ash/Sand	22-93221	Pass	-
SP73	-	24/10/2022	Made Ground: Black Ash/Sand	22-92305	Pass	-
SP29	-	24/10/2022	Made Ground: Black Ash/Sand	22-92305	Pass	-
SP25	-	24/10/2022	Made Ground: Black Ash/Sand	22-92305	Pass	-
SP61	-	24/10/2022	Made Ground: Black Ash/Sand	22-92305	Pass	-
A18-SP	-	20/10/2022	Made Ground: Black Ash/Sand	22-92102	Pass	-
A16-SP	-	20/10/2022	Made Ground: Black Ash/Sand	22-92102	Pass	-
SP74	-	20/10/2022	Made Ground: Black Ash/Sand	22-92102	Pass	-
SP75	-	20/10/2022	Made Ground: Black Ash/Sand	22-92102	Pass	-
SP31	-	19/10/2022	Made Ground: Black Ash/Sand	22-92098	Pass	-
E3	0.5	2/11/2022	Natural: YB Clay	22-95424	Pass	-
E3	2.0	2/11/2022	Natural: GG Clay	22-95424	Pass	-
E3	0.5	2/11/2022	Natural: Yellow Clay	22-95424	Pass	-
POS-N	-	3/11/2022	Natural: Brown Clay	22-94864	Pass	-
POS	1.6	27/10/2022	Natural: Grey Clay	22-93452	Pass	-
POS	1.7	27/10/2022	Natural: Grey Clay	22-93452	Pass	-
POS	1.65	27/10/2022	Natural: Grey Clay	22-93452	Pass	-
Area 4-1	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Fail**	See Hotspot 9
Area 4-2	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-3	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-4	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-5	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
Area 4-6	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-7	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-8	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-9	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-10	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 4-11	-	27/04/2023	Made Ground: Black Ash/Sand	23-31376	Pass	-
Area 3a-12	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-13	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-14	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-15	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-16	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-17	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-18	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-19	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-20	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
Area 3a-21	-	05/05/2023	Made Ground: Black Ash/Sand	23-32500	Pass	-
6F2 -SP- 1	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 2	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 3	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 4	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 5	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 6	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 7	-	04/05/2023	6F2	23-32486	Pass	-

Grid Square	Depth bgl (m)	Date Sampled	Material Description	Report	Pass/Fail	Comments
6F2 -SP- 8	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 9	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 10	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 11	-	04/05/2023	6F2	23-32486	Pass	-
6F2 -SP- 12	-	04/05/2023	6F2	23-32486	Pass	-

*Failed on EC16-EC21 TPH, limit is 550mg/kg
**Failed on asbestos, asbestos fibres were quantified at 0.39%

8 HOTSPOT VALIDATION

8.1.1 During the preliminary trial pitting investigation and earthworks, six hotspots were encountered on site which had not previously been identified by the available site investigation. These have been individually isolated and remediated in accordance with the requirements of the Remediation Strategy.

8.1.2 All hotspot validation reports are shown in appendix G.

8.2 Hotspot 1

8.2.1 Hotspot 1 correlated with previously identified hotspot TP206 and WS01, the affected material from this hotspot was excavated and placed on an impermeable sheet and bunded. The material was then turned over allowing for volatilisation to take place of the identified petroleum hydrocarbons. The material was retested, and subsequently found to meet the acceptance criteria allowing it to be re-used on site.

8.3 Hotspot 2

8.3.1 Hotspot 2 correlates with TT03A. Hydrock remediated the hotspot and validated the West, North and East side of the resulting excavation, however the southern face of the hotspot was within mineshaft 007s exclusion zone and as such works to remove affected material could not progress further south. VHE recovered samples from the southside of the hotspot, although due to the restrictions imposed by the mineshaft the samples were taken from the closest safe working area. These samples were found to meet the SSACs.

8.4 Hotspot 3

8.4.1 Hotspot 3 was an unforeseen asbestos hotspot, which was found to contain asbestos sheeting debris (containing amosite). Samples were taken from the soils in direct contact with the asbestos and from the base and sides of the excavated hotspot. Of

the 8 eight samples from this hotspot only trace amounts (<0.001%) were found in one sample, allowing for re-use of the soils on site.

8.5 Hotspot 4

8.5.1 Hotspot 4 was an unexpected TPH hotspot. A trial pit excavated in this location revealed a slight elevation of TPH at 0.8m below ground level in grid square C16. The material from this grid square was stockpiled on an impermeable sheet and bunded. The material was then turned over allowing for volatilisation of the hydrocarbons to take place. The material was retested, and subsequently found to meet the acceptance criteria allowing for it to be re-used on site.

8.6 Hotspot 5 and 6

8.6.1 Hotspots 5 and 6 were unexpected asbestos hotspots, containing fragmented asbestos cement. The asbestos was handpicked and sent off site for disposal. The remaining soils where then screened and tested. The testing confirmed the remaining soils contained no asbestos, they were used on site. Drawing VHEJ808-902 shows the placed clean soils.

8.7 Hotspot 7

8.7.1 Hotspot 7 was an unexpected TPH hotspot, the soils were placed in a bund lined with a visqueen sheet to prevent contamination of the underlying soils. Three soil samples were sent for testing, with two samples containing material suitable for testing and the third being reported by the lab as an unsuitable sample, due to the unsuitable sample a retest of the material was carried out immediately. The results indicated that the hotspot contained elevated levels of Aromatic TPH EC16 – EC21 in sample number 245540 (680 mg/kg). The results were above the acceptance criteria when compared against the criteria for petroleum hydrocarbons in table 6.1 of the remediation strategy. The material excavated from this hotspot was turned over periodically, to allow volatilisation of the hydrocarbons to reduce the concentrations to acceptable levels.

After treatment the material was retested but concentrations remained elevated, additional treatment time was required to fully treat the material. Samples were recovered for testing upon returning to site in April 2023 and the results have confirmed that treatment has been successful and the material was suitable for re-use within the earthworks on site.

8.8 Hotspot 8

8.8.1 Hotspot 8 was a combined Asbestos and TPH hotspot with a visible hydrocarbon sheen present, three samples were sent for analysis. The results indicate that two of the three samples contain aromatic EC16-EC21 and aromatic EC21-EC35 in excess of the acceptance criteria. For aromatic EC16- EC21 the acceptance criteria for petroleum hydrocarbons in table 6.1 of the remediation strategy is 550mg/kg, the samples indicate levels of 1500mg/kg and 1600mg/kg within the stockpile. For EC21-EC35 the acceptance criteria for petroleum hydrocarbons in table 6.1 of the remediation strategy is 1500mg/kg, the two samples indicate levels of 2300mg/kg and 3200mg/kg within the stockpile. Material excavated from Hotspot 8 amounted to approximately 20m^3 and was sent off site for disposal, the consignment note is appended to this report.

8.9 Hotspot 9

8.9.1 Hotspot 9 was an unexpected area asbestos containing materials. Which was encountered while excavating a sump to drain excess water from the heavy rain. The excavator carrying out the excavation exceeded the planned depth in advertently exposing asbestos containing materials, which were brought to the surface onto the existing placed fill. Samples were sent for testing and asbestos fibres were found in the soil at a level of 0.39%. Operations were immediately ceased in this area and the material was excavated and placed on a visqueen liner to be sent off site for disposal. The asbestos containing materials and surrounding soils were sent for disposal to a licensed waste facility. Samples were recovered from the sides and base of the

excavation to remove the material for testing and the results have confirmed that the material is now suitable for re-use within the earthworks on site.

8.10 IBC and Tank Disposal

8.10.1 Two IBCs and two buried fuel tanks were present onsite at the start of the works. The two IBC units contained an unknown liquid that was sent for laboratory analysis, the liquid in both IBC's contained elevated levels of TPH (C10-C40) and subsequently was sent off site for disposal.

8.10.2 The walls of the excavation for the fuel tank were sampled to assess whether the surrounding soils had been impacted by hydrocarbon contamination associated with the removed tanks. The results showed the surrounding soils to have TPH concentrations to be below SSAC. The results are provided in Appendix F.

8.10.3 One of the fuel tanks contained no liquid but did contain a sandy soil. This soil was sent for laboratory analysis, the results indicate that the soil met the acceptance criteria for re-use on site.

8.10.4 The second fuel tank contained an unknown liquid, this liquid was sampled and sent for chemical analysis and was determined to have high levels of TPH (C10-C40) and was therefore sent off site for disposal.

8.10.5 The consignment notes are appended to this report (appendix H).

Table 8-1: Hotspot Source Material Reuse Verification

Hotspot	Location	Depth bgl (m)	Date Sampled	Material Description	Report Number	Pass/Fail	Comments
Hotspot 1	HS1-D2	-	15/06/22	Made Ground: Black Ash/Sand	22-65159	Pass	-
Hotspot 1	HS1-D3	-	15/06/22	Made Ground: Black Ash/Sand	22-65159	Pass	-
Hotspot 2	HS2-D2	-	15/06/22	Made Ground: Black Ash/Sand	22-65159	Pass	-
Hotspot 2	HS2-D3	-	15/06/22	Made Ground: Black Ash/Sand	22-65159	Pass	-
Hotspot 3	HS3-D1	-	28/06/22	Made Ground: Black Ash/Sand	22-68571	Pass	-
Hotspot 3	HS3-D2	-	28/06/22	Made Ground: Black Ash/Sand	22-68571	Pass	-
Hotspot 3	HS3-D3	-	28/06/22	Made Ground: Black Ash/Sand	22-68571	Pass	-
Hotspot 4	HS4-1	-	02/08/22	Made Ground: Black Ash/Sand	22-75377	Pass	-
Hotspot 4	HS4-2	-	02/08/22	Made Ground: Black Ash/Sand	22-75377	Pass	-
Hotspot 4	HS4-3	-	02/08/22	Made Ground: Black Ash/Sand	22-75377	Pass	-
Hotspot HYD	HS-HYD-1	-	02/08/22	Made Ground: Black Ash/Sand	22-75380	Pass	-
Hotspot HYD	HS-HYD-2	-	02/08/22	Made Ground: Black Ash/Sand	22-75380	Pass	-
Hotspot HYD	HS-HYD-3	-	02/08/22	Made Ground: Black Ash/Sand	22-75380	Pass	-
Hotspot 5	Post -HS5-1	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 5	Post -HS5-2	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 5	Post -HS5-3	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 6	Post -HS6-1	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 6	Post -HS6-2	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 6	Post -HS6-3	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 7	Post -HS7-1	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Fail	Failed to meet TPH, treatment commenced
Hotspot 7	Post -HS7-2	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Pass	-

Hotspot	Location	Depth bgl (m)	Date Sampled	Material Description	Report Number	Pass/Fail	Comments
Hotspot 7	Post -HS7-3	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	U/S	Unsuitable Sample
Hotspot 7 Retest	Post -HS7-1	-	26/09/22	Made Ground: Black Ash/Sand	22-87591	Pass	-
Hotspot 7 Retest	Post -HS7-2	-	26/09/22	Made Ground: Black Ash/Sand	22-87591	Pass	-
Hotspot 7 Retest	Post -HS7-3	-	26/09/22	Made Ground: Black Ash/Sand	22-87591	Fail	Failed to meet TPH, treatment continued
Hotspot 7 Retest	Post -HS7-1	-	14/10/22	Made Ground: Black Ash/Sand	22-92423	Pass	-
Hotspot 7 Retest	Post -HS7-2	-	14/10/22	Made Ground: Black Ash/Sand	22-92423	Fail	Failed to meet TPH treatment continued
Hotspot 7 Retest	HS7-1	-	06/04/23	Made Ground: Black Ash/Sand	23-27432	Pass	-
Hotspot 7 Retest	HS7-2	-	06/04/23	Made Ground: Black Ash/Sand	23-27432	Pass	-
Hotspot 7 Retest	HS7-3	-	06/04/23	Made Ground: Black Ash/Sand	23-27432	Pass	-
Hotspot 7 Retest	HS7-4	-	06/04/23	Made Ground: Black Ash/Sand	23-27432	Pass	-
Hotspot 8	Post-HS8-1	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Fail	Failed to meet TPH, Sent for disposal
Hotspot 8	Post-HS8-2	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Fail	Failed to meet TPH, Sent for disposal
Hotspot 8	Post-HS8-3	-	22/09/22	Made Ground: Black Ash/Sand	22-86075	Pass	-
Hotspot 9	Area 4-1	-	27/04/23	Made Ground: Black Ash/Sand	23-31376	Fail	Failed Asbestos, Sent for disposal

Table 8-2: Hotspot Sides Verification

Hotspot	Location	Depth (m)	Date Sampled	Material Description	Report Number	Pass/Fail	Comments
HS216-C/1	Hotspot 1	2.7	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-

Hotspot	Location	Depth (m)	Date Sampled	Material Description	Report Number	Pass/Fail	Comments
HS216-C/2	Hotspot 1	2.7	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-N/1	Hotspot 1	1.6	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-N/2	Hotspot 1	2.7	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-E/1	Hotspot 1	1.6	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-E/2	Hotspot 1	2.7	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-S/1	Hotspot 1	1.6	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-S/2	Hotspot 1	2.7	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-W/1	Hotspot 1	1.6	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS216-W/2	Hotspot 1	2.7	08/06/22	Made Ground: Black Ash/Sand	22-64244	Pass	-
HS3-C	Hotspot 3	0.5	09/06/22	Made Ground: Black Ash/Sand	22-64224	Pass	-
HS3-N	Hotspot 3	0.5	09/06/22	Made Ground: Black Ash/Sand	22-64224	Pass	-
HS3-E	Hotspot 3	0.5	09/06/22	Made Ground: Black Ash/Sand	22-64224	Pass	-
HS3-S	Hotspot 3	0.5	09/06/22	Made Ground: Black Ash/Sand	22-64224	Pass	-
HS3-W	Hotspot 3	0.5	09/06/22	Made Ground: Black Ash/Sand	22-64224	Pass	-
HS4-C	Hotspot 4	-	14/07/22	Made Ground: Black Ash/Sand	22-72007	Pass	-
HS4-N	Hotspot 4	-	14/07/22	Made Ground: Black Ash/Sand	22-72007	Pass	-
HS4-E	Hotspot 4	-	14/07/22	Made Ground: Black Ash/Sand	22-72007	Pass	-
HS4-S	Hotspot 4	-	14/07/22	Made Ground: Black Ash/Sand	22-72007	Pass	-
HS4-W	Hotspot 4	-	14/07/22	Made Ground: Black Ash/Sand	22-72007	Pass	-
HS7-C	Hotspot 7	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Pass	-
HS7-N	Hotspot 7	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Pass	-
HS7-E	Hotspot 7	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Pass	-
HS7-S	Hotspot 7	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Pass	-
HS7-W	Hotspot 7	-	12/09/22	Made Ground: Black Ash/Sand	22-83661	Pass	-
HS8-C	Hotspot 8	-	14/10/22	Made Ground: Black Ash/Sand	22-82423	Pass	-

Hotspot	Location	Depth (m)	Date Sampled	Material Description	Report Number	Pass/Fail	Comments
HS8-N	Hotspot 8	-	14/10/22	Made Ground: Black Ash/Sand	22-82423	Pass	-
HS8-E	Hotspot 8	-	14/10/22	Made Ground: Black Ash/Sand	22-82423	Pass	-
HS8-S	Hotspot 8	-	14/10/22	Made Ground: Black Ash/Sand	22-82423	Pass	-
HS8-W	Hotspot 8	-	14/10/22	Made Ground: Black Ash/Sand	22-82423	Pass	-
HS9-B	Hotspot 9	-	19/05/23	Made Ground: Black Ash/Sand	23-35126	Pass	-
HS9-N	Hotspot 9	-	19/05/23	Made Ground: Black Ash/Sand	23-35126	Pass	-
HS9-E	Hotspot 9	-	19/05/23	Made Ground: Black Ash/Sand	23-35126	Pass	-
HS9-S	Hotspot 9	-	19/05/23	Made Ground: Black Ash/Sand	23-35126	Pass	-
HS9-W	Hotspot 9	-	19/05/23	Made Ground: Black Ash/Sand	23-35126	Pass	-
HS2	Hotspot 2	-	05/06/23	Made Ground: Black Ash/Sand	23-37728	Pass	-
HS2-S	Hotspot 2	-	05/06/23	Natural: Brown Clay	23-37730	Pass	-

9 ENVIRONMENTAL MONITORING

9.1 Dust Suppression

9.1.1 Dust suppression measures were applied onsite during the works when required.

9.1.2 Dust monitoring carried out for the duration of the works. The results of the monitoring indicate that dust has not significantly impacted the surrounding commercial and residential properties and no complaints were received.

9.1.3 The results of the dust monitoring have been appended to this report.

9.2 Noise Monitoring

9.2.1 Noise monitoring was carried out onsite throughout the works by Cirrus Research Plc.

9.2.2 The results of the monitoring indicate that noise levels did not exceed the required limits and has not significantly impacted the surrounding commercial and residential properties. One complaint was received regarding noise generated by the rolling dynamic compaction. Noise monitoring was on-going and the local resident was assured the noise was below the threshold.

9.2.3 The results of the noise monitoring have been appended to this report.

9.3 Vibration monitoring

9.3.1 Vibration monitoring measures have been carried out throughout the duration of the works.

9.3.2 The rolling dynamic compaction technique utilised in the early stages of the earthworks was carried out across the site with works in close proximity to adjacent residential properties to the south. As a results of complaints from the RDC vibration, the vibration monitor was set up in back gardens and areas close to residents to provide confidence to residents the vibration wasn't operating at harmful levels.

9.3.3 The results of the vibration monitoring have been appended to this report.

10 SETTLEMENT MONITORING

10.1 Introduction

10.1.1 A total of 11 rod settlement gauges (RSG) points have been installed across the site and a further 4 vibrating wire piezometers (VWP) have been installed alongside RSG5, RSG7, RSG8 and RSG10.

10.1.2 They have been installed in areas of made ground to monitor the immediate settlement, the primary, consolidation settlement and secondary, creep settlement over the duration of the works and the up to a minimum of 6 months after the works.

10.2 Rod Settlement Gauges

10.2.1 The cumulative settlement for RSG-02 – RSG-11 has been plotted against time, the graphs for these have been appended to this report.

10.2.2 The geotechnical design report presents settlement predictions based on a 2m embankment imposing 42kPa on the existing made ground; giving total predicted Primary Settlement of 40mm, with an additional self-weight settlement (based on maximum fill thickness) of 10mm. This indicates a total anticipated settlement of 50mm. The GDR indicates a rate of settlement of 25mm in the first 6 months and then over the 6 months after construction, residual settlement should be less than 25mm.

10.2.3 The RSGs where fill has been placed on residual made ground, RSG3, RSG4, RSG5, RSG6 and RSG7, have been in place for between 9 and 10 months and the fill is close to or exceeds 2m, the cumulative settlement to date is between 21mm and 33mm. Where fill is placed on natural glacial soils RSG2, settlement to date is significantly less (13mm for 2.662m placed fill).

10.2.4 No fill has been placed in the areas of RSG3, RSG4, RSG5, RSG6 and RSG7 since October 2022 and all have recorded cumulative settlement to plateau, the graphs have been appended to this report.

10.2.5 RSG8, which is in an area where the made ground at the base of the placed fill is recorded as soft organic clay by the nearest exploratory hole log, has recorded 20mm of settlement with 1.047m of placed fill after 8 months. For this formation material the GDR indicates that primary settlement of the order of 30mm will be 90% complete after 3 months where fill thickness is 2m. Based on the thickness of fill placed up to 8 months,

approximately 52% of the 2m upon which the calculations are based, the recorded cumulative settlement would be expected to be approximately 15.7mm after 3 months. The recorded cumulative settlement recorded at this location is 17mm after 6 months, which is in line with the predicted settlement presented in the GDR.

10.2.6 At the location of RSG8 the total thickness of fill is 3.02m. With majority of the fill (1.96m) placed between April and May 2023 it is considered that consolidation will still be taking place for the next 3 months in line with the predicted settlement in the GDR.

10.2.7 RSG11 is in an area where the final fill has only just been completed with 1m of fill placed over the final month on site, the area has received a total thickness of fill of 1.4m. The recorded settlement in this area is currently 5.4mm and the expected settlement after 6 months is expected to be 8mm. It is considered that consolidation will still be taking place for the next 3 months in line with the predicted settlement in the GDR.

10.2.8 On the basis of the settlement recorded to date and by comparison with the predicted settlements presented in the Hydrock GDR, we consider the recorded settlements to be generally aligned with the predictions and recommend continuing monitoring for RSG2, RSG8, RSG9, RSG10 and RSG11 on a bi-weekly basis to confirm the settlement continues as predicted.

10.2.9 The calculations are based on assumed parameters for the basal material, and given the variability across the site, it is not unreasonable for the actual parameters to vary slightly from those assumed in the calculations.

10.2.10 For RSG3, RSG4, RSG5, RSG6 and RSG7 90% consolidation settlement is considered to have been reached.

10.3 Vibrating Wire Piezometers

10.3.1 The vibrating wire piezometers (VWP) were installed in August 2023 following the start of the land raising, primarily focused around the major fill area to the southeast of the site. The locations are shown on drawing VHEJ808-1001 Settlement and Vibration Monitoring.

10.3.2 During the programmed land raising works, VWP1, VWP2, and VWP4 data loggers were water damaged and data was not recorded between November 2022 and April 2023. The same VWPs were damaged again over the month of May 2023 and data for the earthworks starting in April 2023, was limited to the end of May 2023 and June 2023.

10.3.3 The data collected from VWP-01 has been logged against time and is shown in appendix J. The data shows a sharp drop in measured pore water pressure after the first week followed by steadying of pressure over the next ten months. This VWP is installed within an area of fill where the ground is predominantly granular and there is no nearby natural clay, the granular and more permeable nature of the material would help to dissipate pore water pressure relatively quickly, as shown on the plotted graph.

10.3.4 The data collected from VWP-02 has been logged against time and is shown in appendix J. VWP 2 is installed within an area of fill where the natural clay was encountered shallower than the bottom of the dig level. This shallow clay is considered to have a low permeability and would prevent the pore water pressure from dissipating quickly, this can be seen by the steady increase in pore water pressure over the filling period. There is no downward trend seen in this area and it is recommended that monitoring continue until a downward trend is seen and levelled out.

10.3.5 The data collected from VWP-03 has been logged against time and is shown in appendix J. VWP3 is installed within the deeper areas of fill, where approximately 3m of fill was placed, the natural material below is a soft organic clay. The data plotted for this graph shows an increase, as incident with the first few layers of fill, followed by a slow and steady fall over the next 8 months. When works recommence after the winter break, the data logger shows an increase in pore water pressure. Whilst the material used is a granular ash material the natural clay formation would prevent a quick fall in pore water pressure and as shown on the graph, a slow fall can be seen.

10.3.6 The data collected from VWP-04 has been logged against time and is shown in appendix J. In mid-August 2 layers of fill were placed around VWP4, the data shown on the graph aligns with this, as a slight increase in pore water pressure and then followed by a fall over the next month. In the following mid-September to mid-October a further 2.5m of fill was added to this area again increasing the pore water pressure. However, due to the damaged logger data was not recorded in this area until June 2023, when the final layers of fill were being put into place, therefore a fall in pore water pressure is not shown on the graph.

10.3.7 At this time, due to the final layers being placed recently and the early damage to the loggers, the recommendation is to continue monitoring in all of the data loggers to demonstrate that pore water pressure will dissipate further, closer to the original hydrostatic pressure that would have been present prior to the land raising works.

11 ABSTRACTION WELL AND CULVERT REPAIR

11.1 Abstraction Well

11.1.1 VHE were appointed to locate and decommission a historical groundwater abstraction well. The location of the identified abstraction well is shown in drawing VHEJ808-404 Abstraction Well AB.

11.1.2 Hydrock technical design note 15220-HYD-XX-ZZ-RP-GE-0009 Water Well Borehole Decommissioning, indicated that a historical borehole SD70NE389 in the southeastern area of the site, located at E: 376330 and N: 407550, was present on site and in need of decommissioning when found. This borehole was expected to have a depth of 71.9m.

11.1.3 VHE excavated a 10m x 10m area around the coordinates of borehole SD70NE389, no borehole could be located. However, when trial pitting on the western side of site, a suspected historical borehole was observed feature and a subsequent excavation down to 4m bgl was carried out to investigate the feature. This well identified as a well was found to be infilled at 4.25m and stretch deeper than expected.

11.1.4 M&J Drilling Services Ltd were appointed to carry out the decommissioning of the well. Initially the feature was drilled down to 16mbgl to locate the base of the well. 0.55 Tonnes of grout, the well was back filled to approximately 4m below final finished level. The drillers logs have been appended to this report.

11.2 Culvert repair

11.2.1 During the turnover earthworks, a depression in the fill was identified near the culvert. Works were ceased in this area an excavation down to the culvert to inspect and investigate the cause of the depression. A 3m section of the culvert was cracked.

11.2.2 A 3100mm section of cracked clay pipe was replaced with a 275 diameter HDPE pipe connected at both ends of the culvert with band sealing couplings. Details of the culvert repair are shown in drawing VHEJ808-001 Culvert Repair.

12 CONCLUSIONS

12.1 Summary of Findings

12.1.1 After a review of the nuclear density gauge, sand replacement test, core cutters and plate load test results for the site, in conjunction with a comparison to the agreed earthworks specification, it can be concluded that the works have been completed in accordance with the specification and agreed amendments.

12.1.2 The remediation objectives are considered to have been met and there are no residual unacceptable risks to end users associated with soil contamination.

12.1.3 There was no unacceptable risk to controlled water / groundwater identified prior to commencement of the earthworks. Chemical sampling has proven that the overall contaminant loading has decreased. Therefore, it is considered that there is no significant residual risk to controlled waters.

12.1.4 This report should be included in the Health and Safety file for the site to ensure future maintenance which could penetrate the cover system can be carried out safely with due consideration for residual soil contamination beneath the engineered cover system.

13 REFERENCES

In addition to the specific references cited in the text, the following references have been referred to in the production of this report, where relevant to the defined project objectives.

1. Specification for Highways Works Volume 1;

    - Table 6/1: (11/05) Acceptable Earthworks Materials: Classification and Compaction Requirements
    - Table 6/2: (05/04) Grading Requirements for Acceptable Earthworks Materials
    - Table 6/4: Method Compaction for Earthworks Materials: Plant and Methods (Method 1 to Method 6)

2. BRITISH STANDARDS INSTITUTION. 1981. Code of practice for earthworks. *BS 6031.* BSI London.

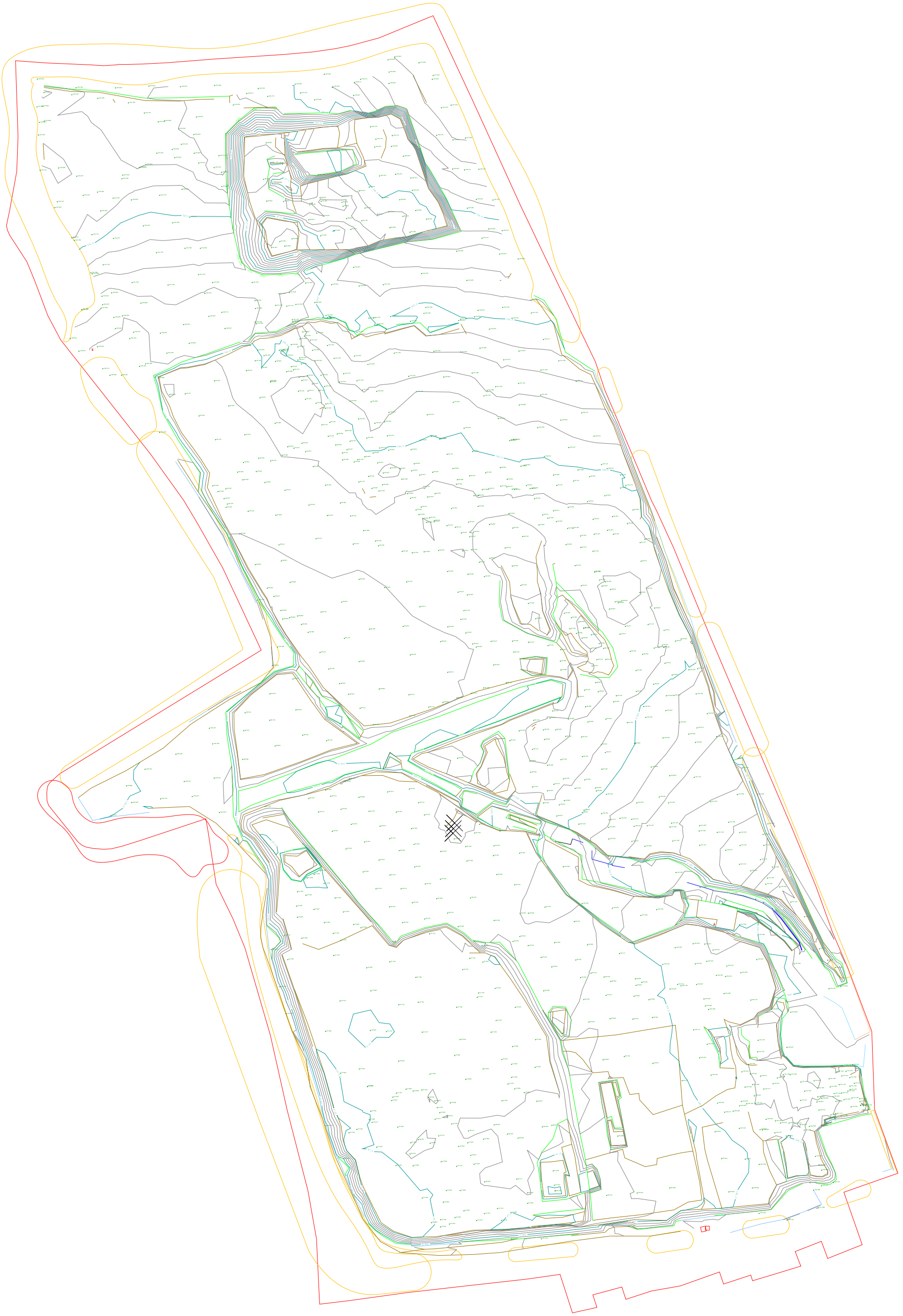
3. BRITISH STANDARDS INSTITUTION. 1990. Method of tests for soils for civil engineering purposes. *BS 1377. Parts 1 - 9.* BSI, London.

4. BRITISH STANDARDS INSTITUTION. 1999. Code of practice for Site Investigations. *BS 5930.* BSI, London.

5. BRITISH STANDARDS INSTITUTION. 2001. Code of Practice for Investigation of Potentially Contaminated sites. *BS 10175.* BSI, London.

6. The River Basin Districts Typology Standards and Groundwater Threshold Values. 2015. Schedule 5: Threshold Values for Groundwater.

DRAWINGS



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- 1m Contours
- 500mm Contours
- Top of Batter
- Bottom of Batter
- Kerb
- Fence
- Found Piles
- Spot Levels

Rev	Date	Drawn	Description	Ch'k'd

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Client: Harworth

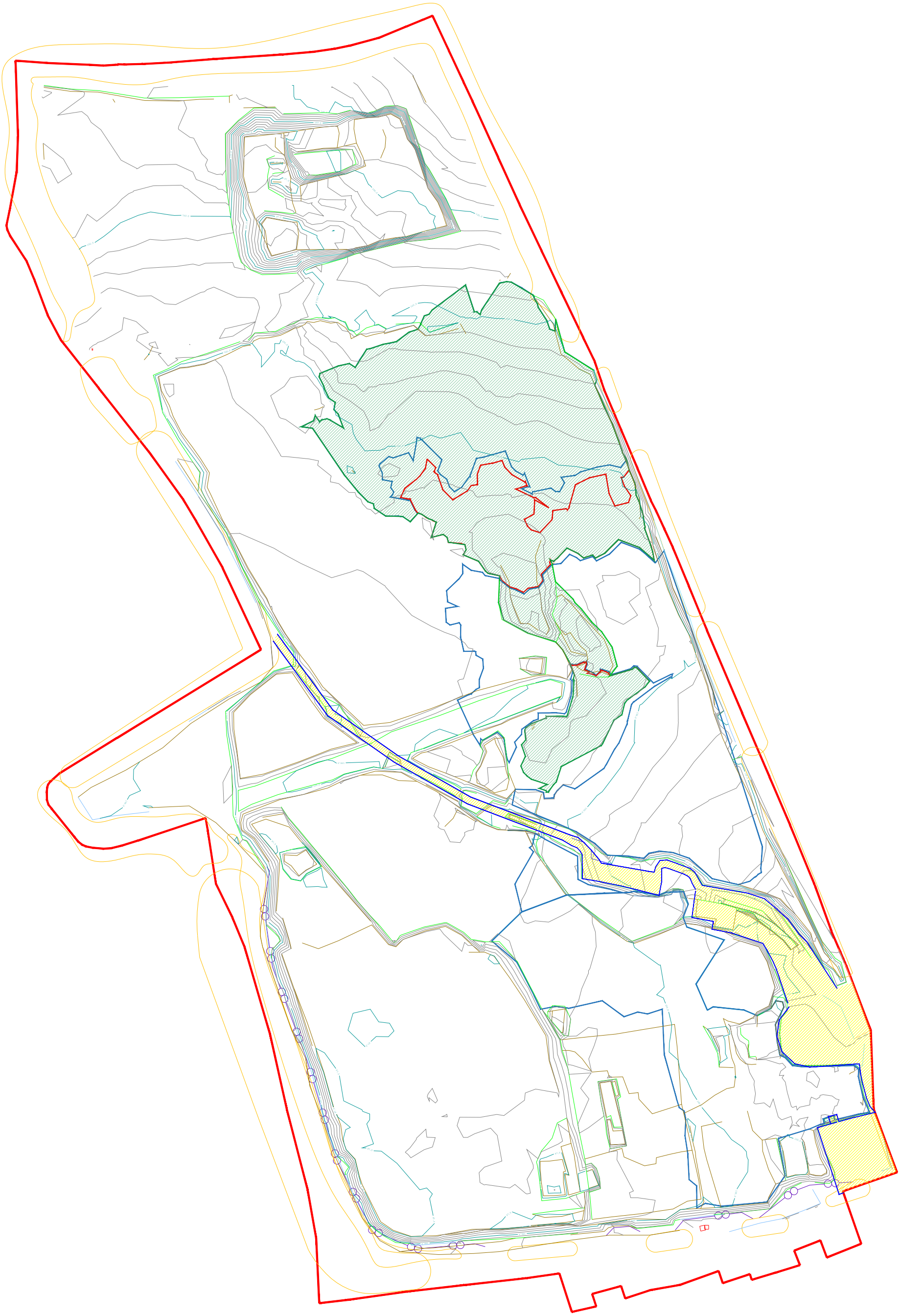
Site: Stopes Road, Bolton

Title: VHEJ808-101 Base of Excavation

Surveyed	TC	Drawn	TC
Chk.	SG	Date	07/06/2023

Scale: NTS [A3 Sheet]
CAD File: VHEJ808-101 Base of Excavation

Job Ref: J808 Stopes Road
Rev:



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- 1m Contours
- 500mm Contours
- Top of Batter
- Bottom of Batter
- Kerb
- Fence
- VHE Standoff Constraints area, see drawing VHEJ808-401 for more detail
- Areas where natural clay was found before excavation could be fully completed to design BOD Levels
- Areas where peat was found on top of clay and excavation was not fully completed due to the level of natural clay
- Areas where peat has been found and removed
- Areas where peat has been found and removed deeper than the design BOD Level
- Area of suspected peat from Hydrock issued drawing 15220-HYD-XX-XX-DR-G-6001 REV P3.0 Ground Improvement Strategy
- Area of suspected Organics from Hydrock issued drawing 15220-HYD-XX-XX-DR-G-6001 REV P3.0 Ground Improvement Strategy

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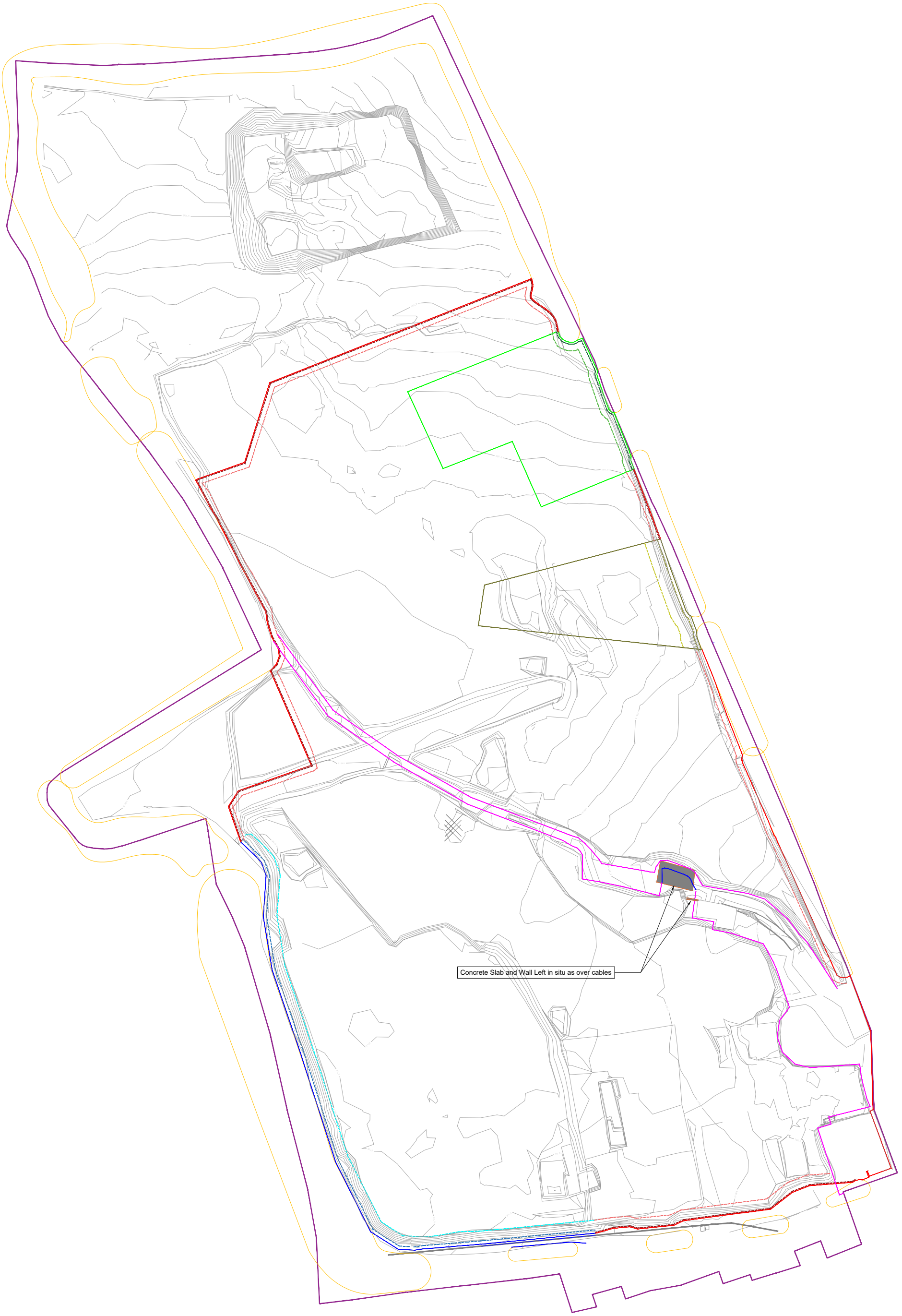
Site: Stopes Road, Bolton

Title: VHEJ808-102 Materials Impacting Base of Excavation

Surveyed	TC	Drawn	TC
Chk.	SG/PD	Date	07/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-102 Materials Impacting Base
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- Tree Protection Area's
- 3m Dig Tree Protection Boundary
- 3m Dig Contracted 1m Standoff, Top of Batter
- 3m dig 1:1 Batter from Standoff to Bottom Batter
- 1.5m Dig Tree Protection Boundary
- 1.5m Dig Contracted 0.3m Stand off, Top of Batter
- 1.5m dig 1:1 Batter from Standoff to Bottom Batter
- 4m Dig Tree Protection Boundary
- 4m Dig Contracted 1m Standoff, Top of Batter
- 4m dig 1:1 Batter from Standoff to Bottom Batter
- 3m Dig Tree Protection Boundary
- 3m Dig Contracted 1m Standoff, Top of Batter
- 3m dig 1:1 Batter from Standoff to Bottom Batter
- Constraints Standoff Area See VHEJ808-401 for more detail
- Base of Excavation Detail, See VHEJ808-101 for more detail

Rev	Date	Drawn	Description	Ch'k'd

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Client: Harworth

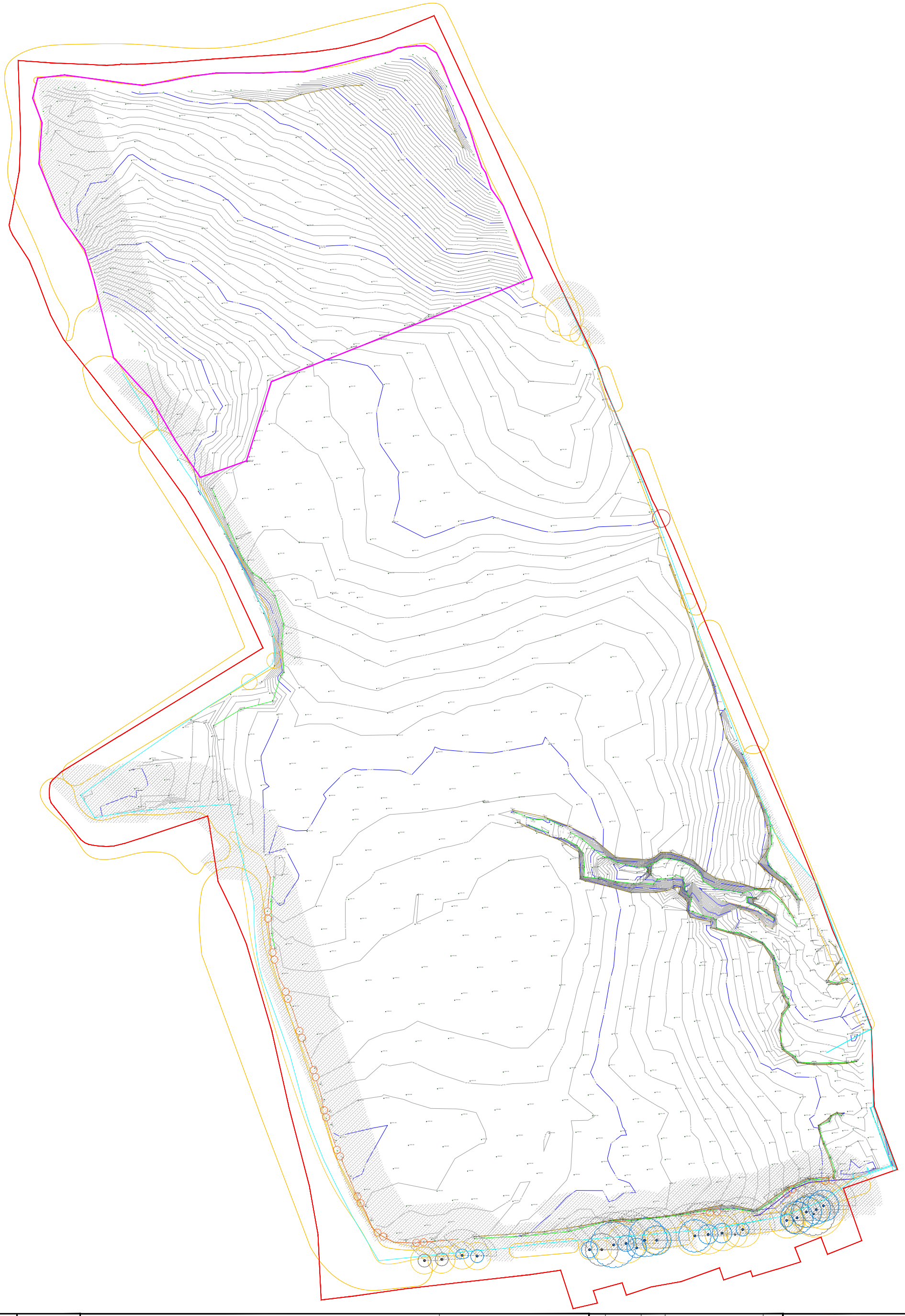
Site: Stopes Road
Bolton

Title: VHEJ808-103 Base of Excavation
Standoffs and Batters

Surveyed	TC	Drawn	TC
Chk.	SG	Date	13/06/2023

Scale: NTS [A3 Sheet]
CAD File: VHEJ808-103 Base of Excavation

Job Ref: J808 Stopes Road
Rev:



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- Top of Batter
- Bottom of Batter
- 1m Contours
- 0.1m Contours
- POS Boundary topped with topsoil, no 150mm running 6F2 layer
- As Built Tree Protection fencing see drawing VHEJ808-1402 for more detail
- Palisade Fence and other boundary details

+ 101.42 Surveyed Spot Level

From C-16417-HYD-XX-XX-DR-C-0100_P05_ Proposed Plateau Level

- Tree Protection Area's
- Tree Shadows

Rev	Date	Drawn	Description	Ch'k'd

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Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-202 Finished Level As-Built

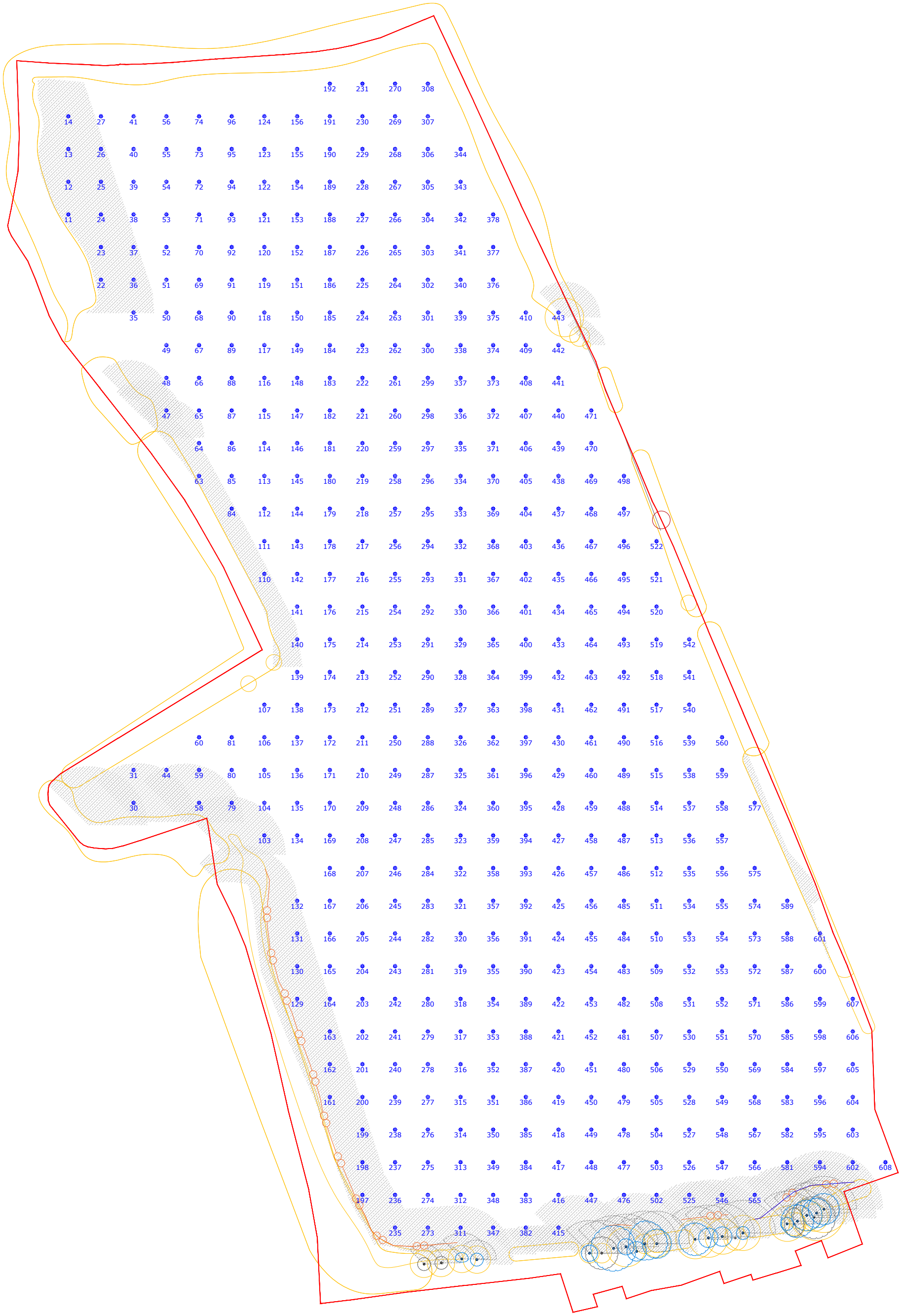
Surveyed	TC	Drawn	TC
Chk.	PD/SG	Date	12/06/2023

Scale: NTS [A3 Sheet]

CAD File: VHEJ808-201 Finished Levels

Job Ref: J808 Stopes Road

Rev:



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BSI REGISTERED FIRM

Approx Direction of North

Legend

Site Boundary

313 10m Grid Reference for Level Comparison

From C-16417-HYD-XX-XX-DR-C-0100_P05_Proposed Plateau Level

Tree Protection Area's

Tree Shadows

See Excel File VHEJ808-203 Level Comparisons for Level comparisons between VHEJ808-201 and VHEJ808-1101 for proof the finished As-Built Levels comply with Specification of ±50mm

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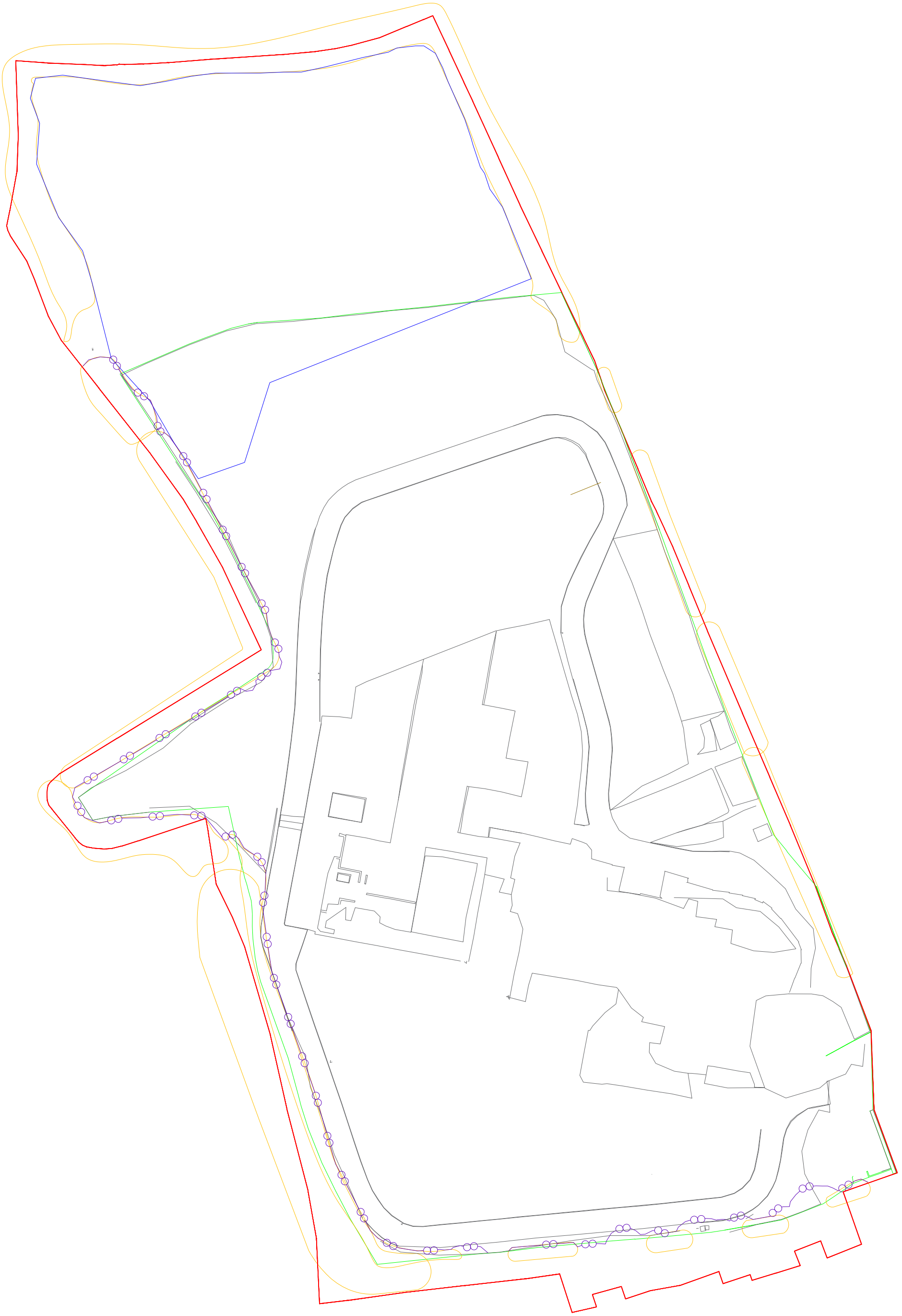
Site: Stopes Road, Bolton

Title: VHEJ808-202 Level Comparison 10m Grid

Surveyed	TC	Drawn	TC
Chk.	PD/SG	Date	12/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-202 Level Comparison
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- Site Perimeter (Fence)
- Given Tree Protection Fencing from Tyler Grange Tree Protection Plan
- Tree Protection Area's
- POS
- Original Ground Level Survey Detail see VHEJ808-1301 for more detail

Rev	Date	Drawn	Description	Ch'k'd
A	25/05/23	TC	OGL Detail	

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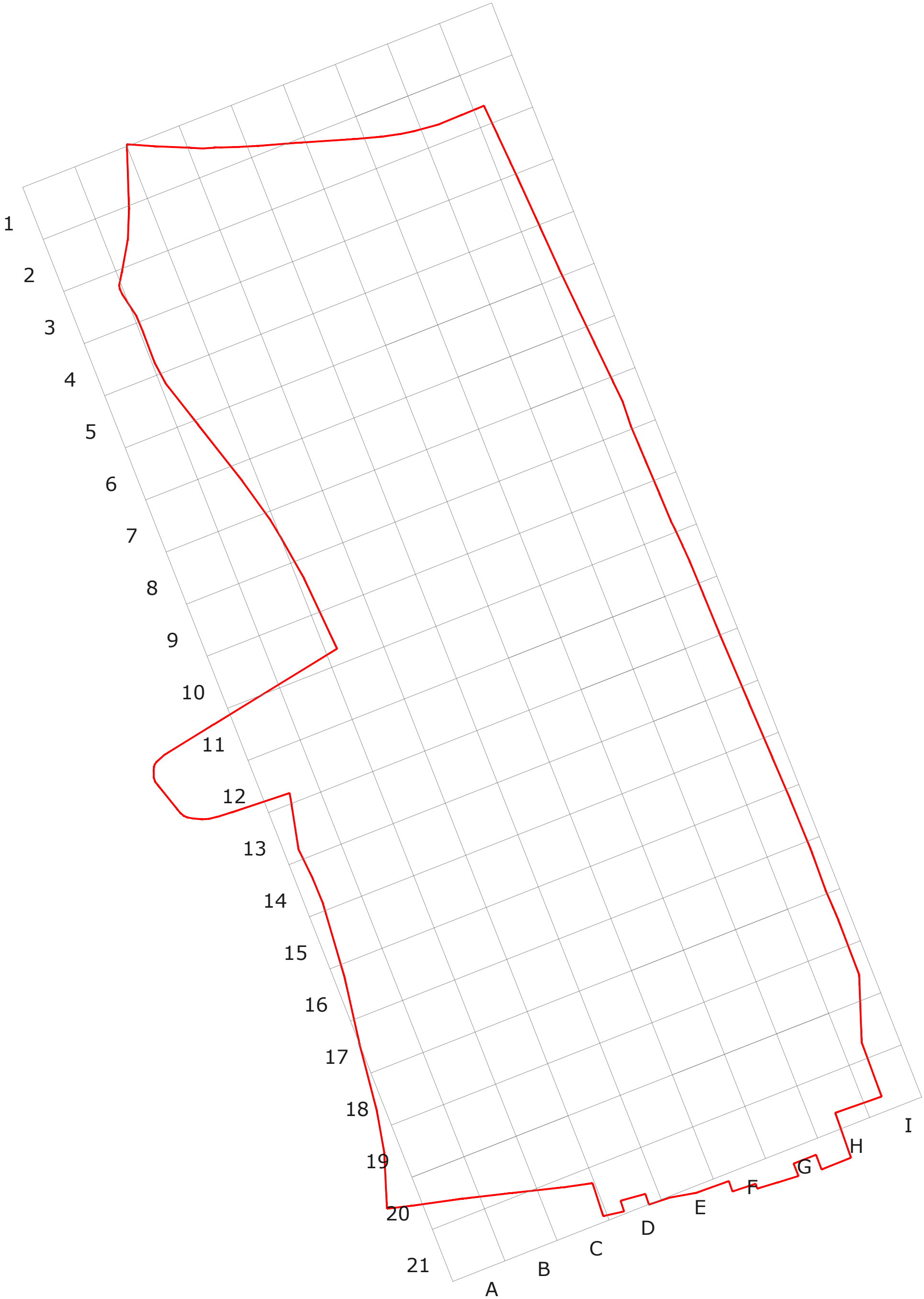
Site: Stopes Road, Bolton

Title: VHEJ808-301 Site Boundaries

Surveyed	TC	Drawn	TC
Chk.	PD/SG	Date	24/05/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-301 Site Boundaries
Job Ref	J808 Stopes Road	Rev	REVA



Note
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BSI REGISTERED FIRM

Approx Direction of North

Legend

Site Boundary

20m Grids with Given references

Testing Grids used for referencing Nuclear Density Gauge Tests (NDGs) and Sand Replacement Tests (SRTs)

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
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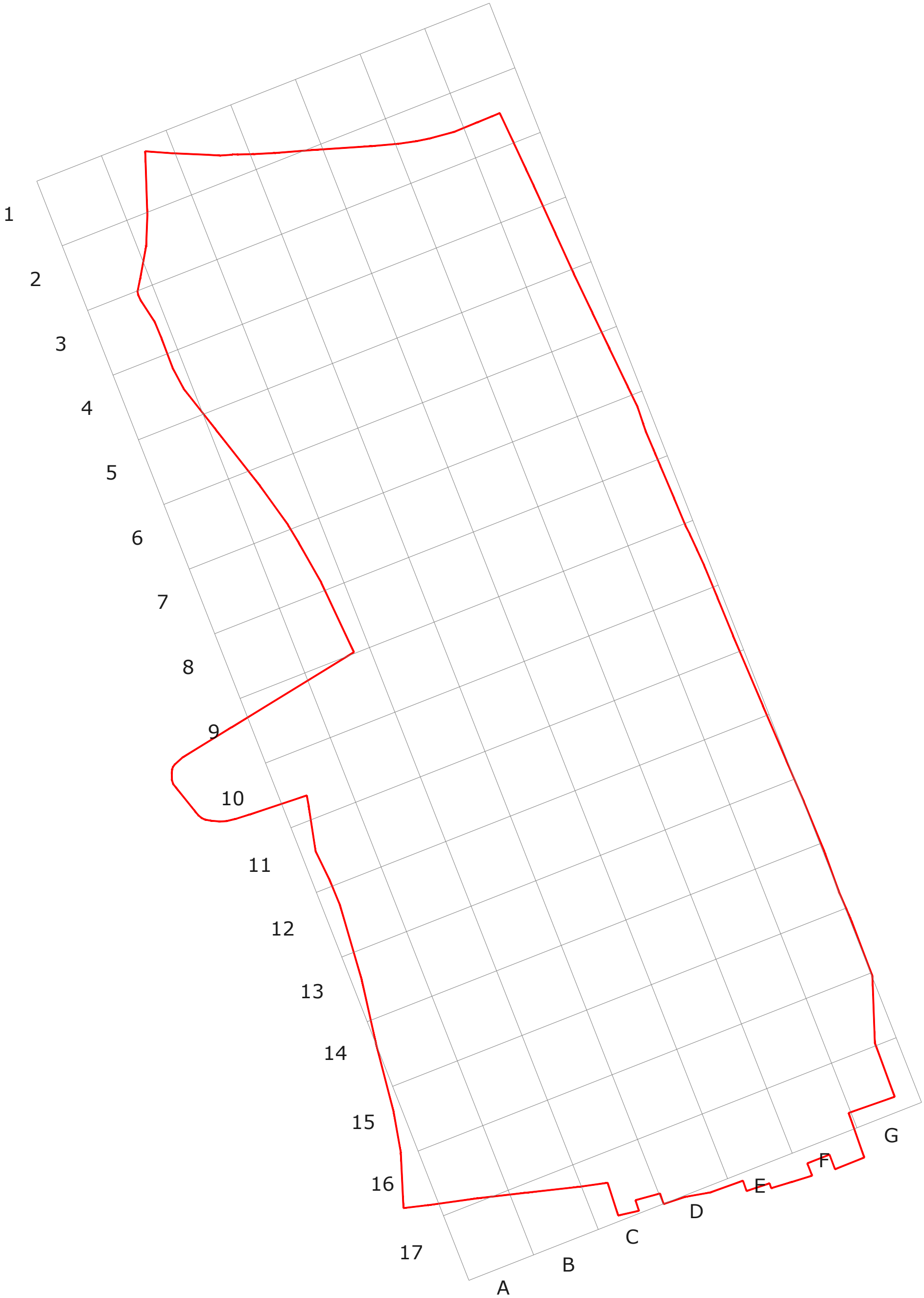
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-302 Site Boundary on 20m Grid

Surveyed	TC	Drawn	TC
Chk.	RH	Date	01/12/2022
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-302 Site Boundary on 2
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

Legend

Site Boundary

25m Grids with Given references

Testing Grid used for pre-classification trial pits and any additional trial pits, see drawing VHEJ808-501 Trial Pits.

Rev	Date	Drawn	Description	Ch'k'd

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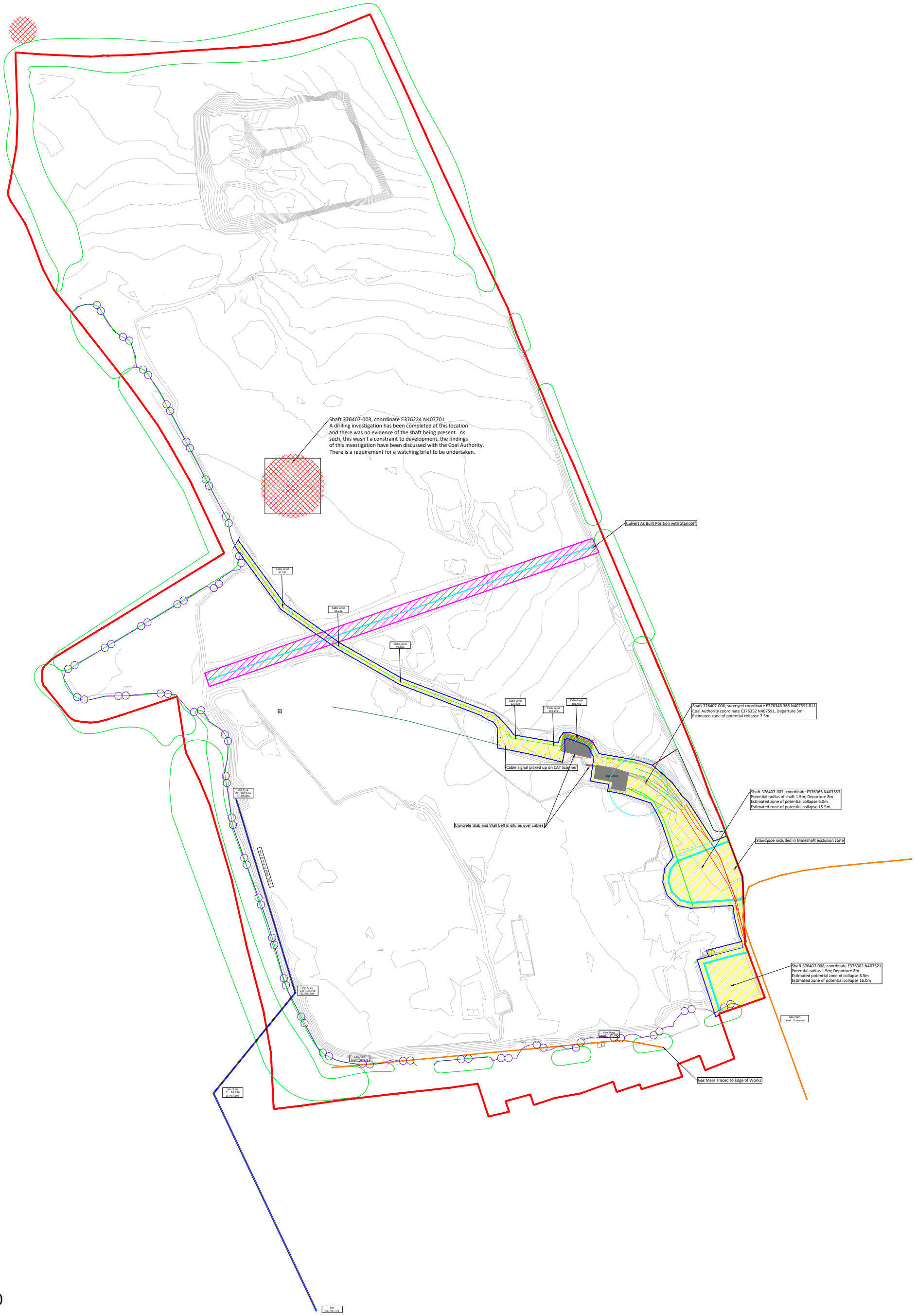
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-303 Site Boundary on 25m Grid

Surveyed	TC	Drawn	TC
Chk.	RH	Date	01/12/2022
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-303 Site Boundary on 2
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- 2.3m easement from found Constraints
- Live Cable Locations from Hydrock issued Existing Contrains Masterplan
- Proved dead cable running west across site confirmed by VHE
- Found Electric Cables
- Located Drainage Pipe
- Located Gas Main
- Investigation Trench with VAC EX
- 07/06/2023 Base of Excavation Detail - See VHEJ808-101
- Culvert Location
- Tree Protection Fencing
- Found and Grouted Abstraction Well
- Existing Manhole Location with available details
- Tree Protection Areas
- Easement from Mineshaft areas not to be excavated
- Area to be remediated. For detailed sections refer to Dwg VHEJ808-006
- VHE No Dig Area
- Culvert Standoff
- Telegraph Pole Standoff

Rev	Date	Drawn	Description	Ch'k'd
C	03/05/23	TC	Added Abstraction well and Fence	
B	03/05/23	TC	Amended Area Standoff + Legend	
A	25/04/23	TC	Amended Area Standoff	

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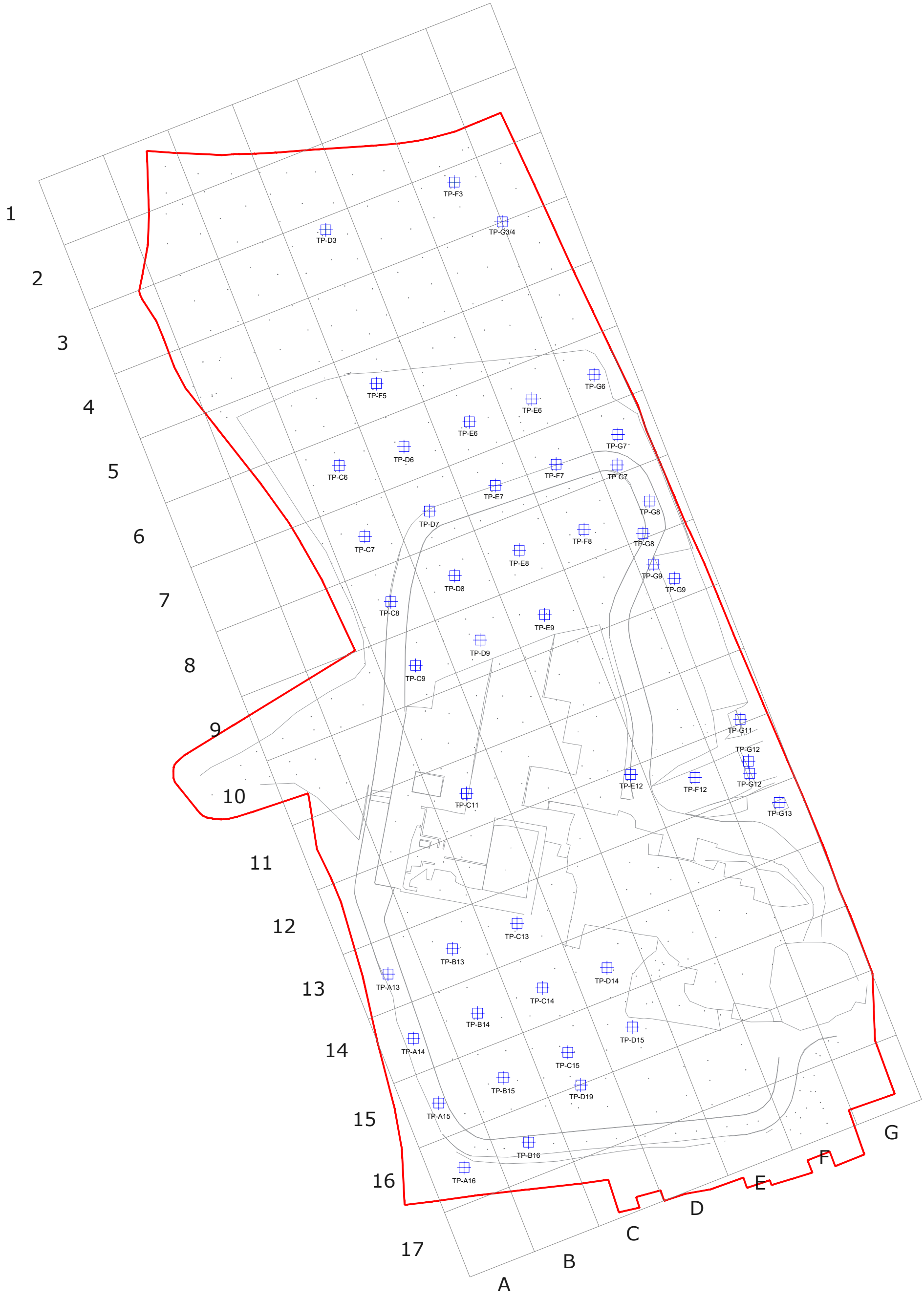
Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-401 Excavation Constriants

Surveyed	TC	Drawn	TC
Chk.	SG	Date	25/04/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-401 Excavation Constr
Job Ref	J808 Stopes Road	Rev	D



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- 25m Grids with Given references
- Trial Pit Location with Chemical Sample Taken
- OGL Detail

Rev	Date	Drawn	Description	Ch'k'd

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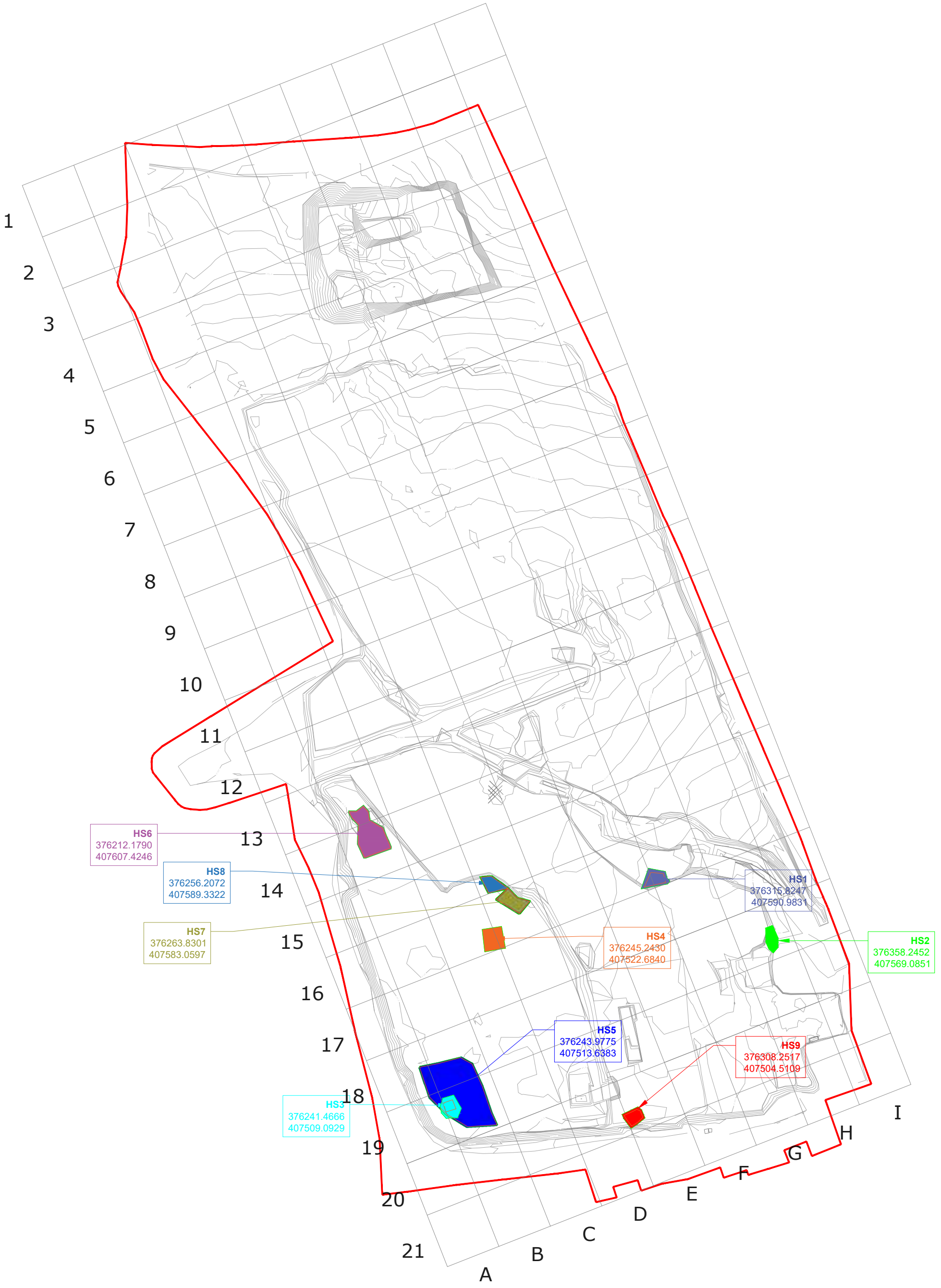
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-501 Trial Pits and Chemical Samples

Surveyed	TC	Drawn	TC
Chk.	RH	Date	01/12/2022
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-501 Trial Pits
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- Base of Excavation Detail
- Top of Batter Hotspot Dig
- Bottom of Batter Hotspot Dig
- XREF Base of Excavation Background

Rev	Date	Drawn	Description	Ch'k'd
A	30/05/23	TC	Addition of HS9 and 2	--

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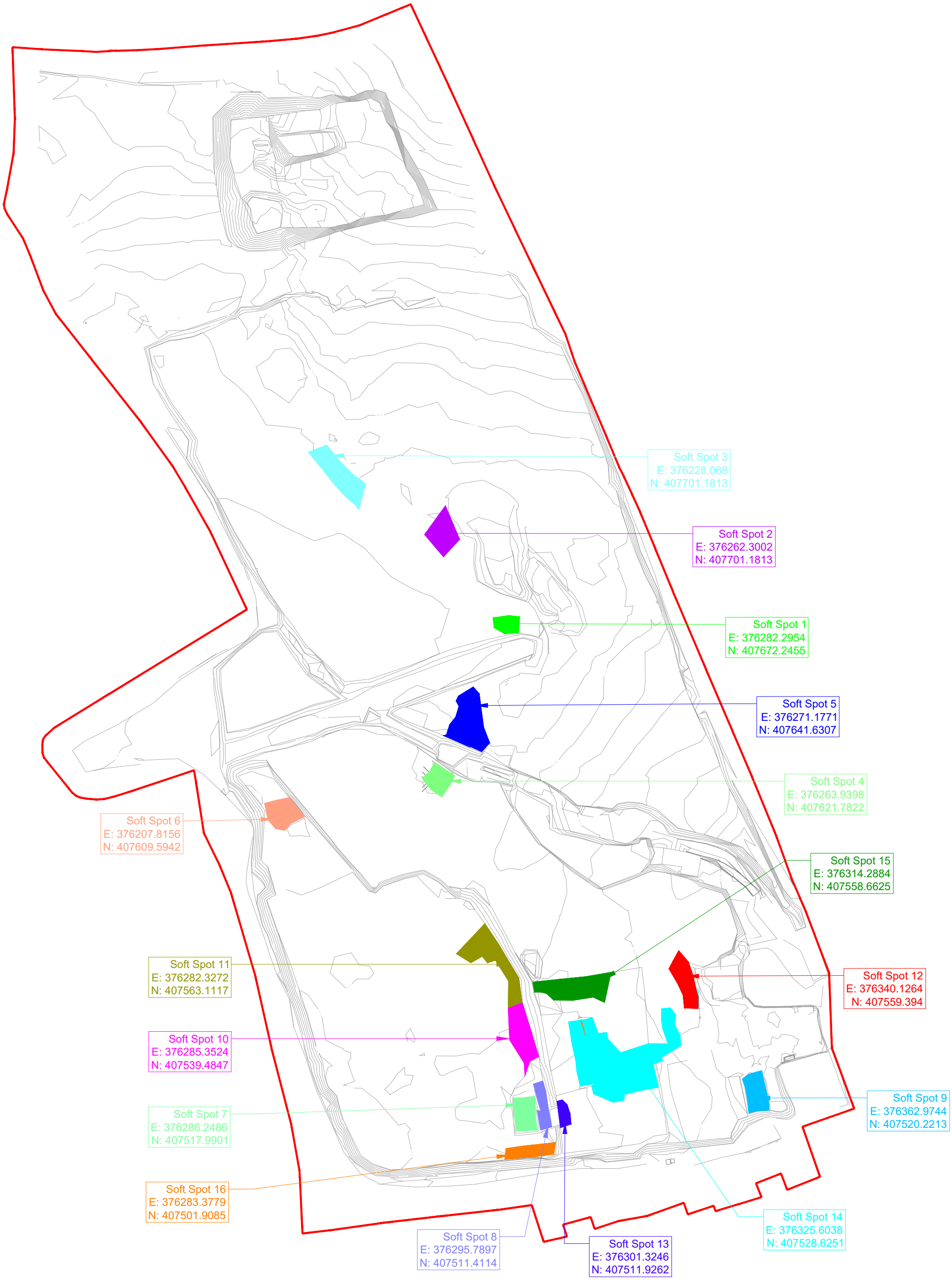
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-601 Hot Spots

Surveyed	TC	Drawn	TC
Chk.	SG/PD	Date	30/05/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-601 Hot Spots
Job Ref	J808 Stopes Road	Rev	A



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- XREF Base of Excavation Background

Rev	Date	Drawn	Description	Ch'k'd

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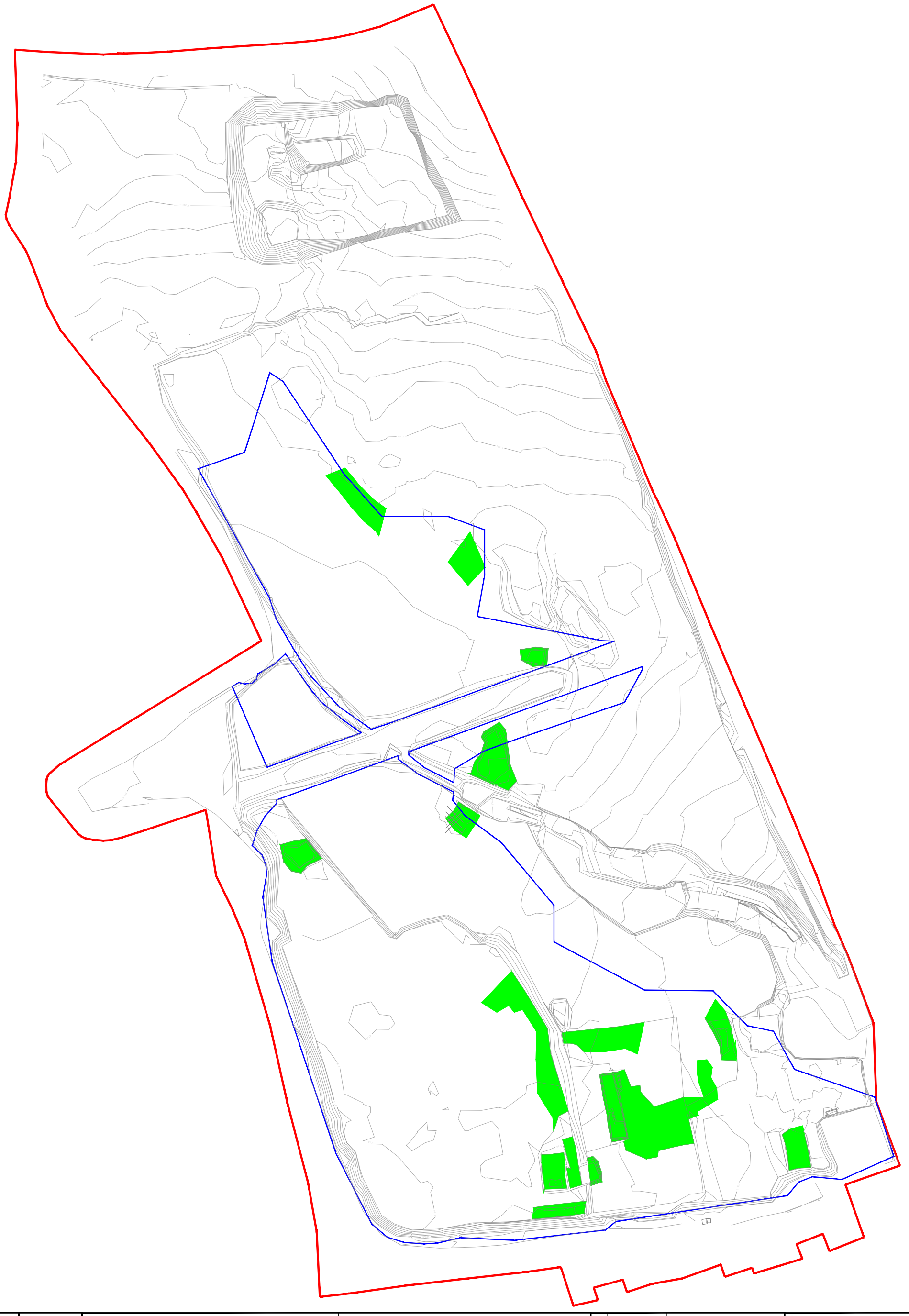
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-701 Soft Spots

Surveyed	TC	Drawn	TC
Chk.	SG	Date	07/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-701 Soft Spots
Job Ref	J808 Stopes Road	Rev	0



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- XREF Base of Excavation Background
- Contracted RDC Areas
- Soft Spot Location from Drawing VHEJ808-701 Soft Spots

Rev	Date	Drawn	Description	Ch'k'd
A	07/06/23	TC	New Base of Excavation	SG

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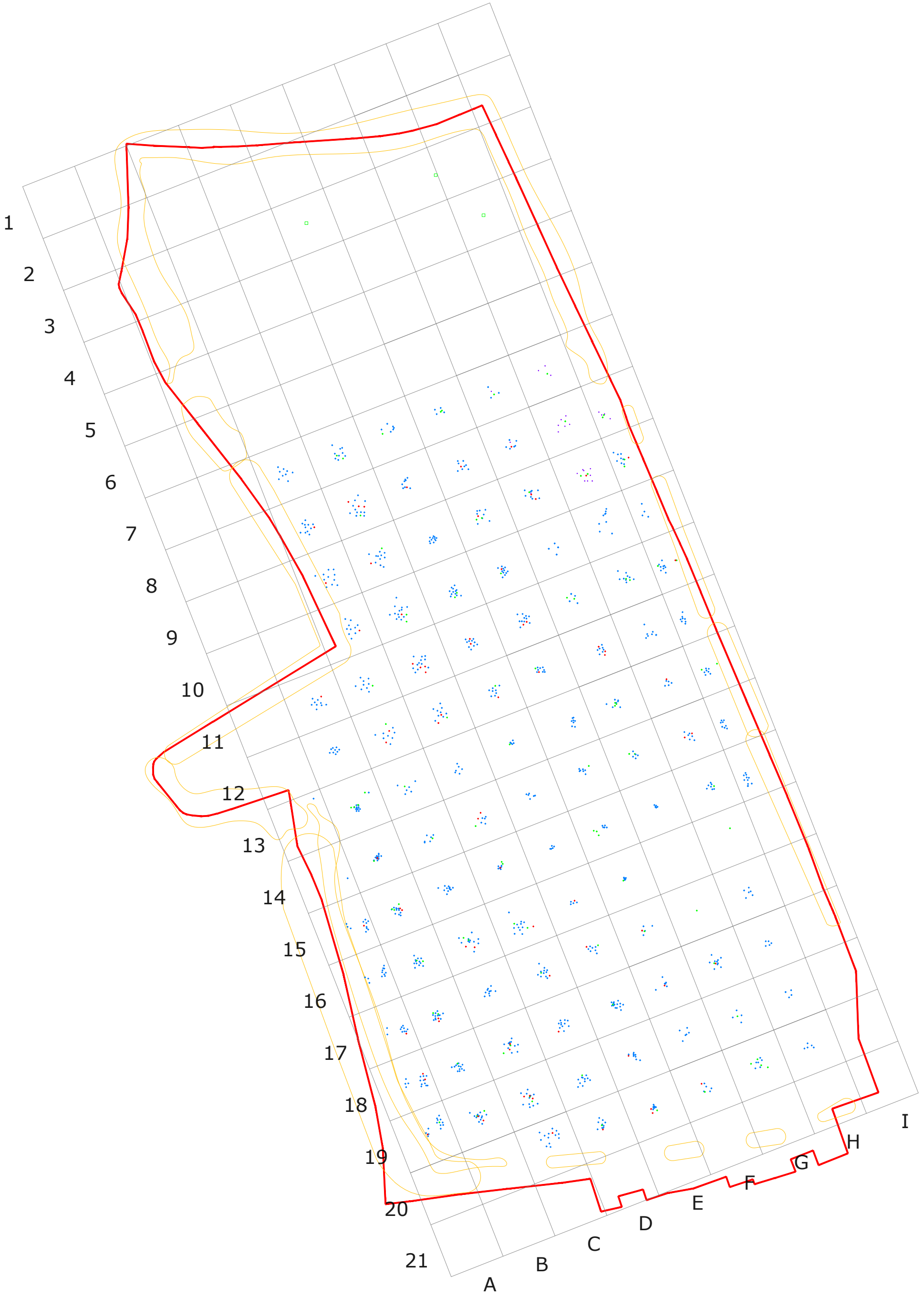
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-702 Soft Spots on RDC Areas

Surveyed	TC	Drawn	TC
Chk.	SG	Date	07/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-701 Soft Spots
Job Ref	J808 Stopes Road	Rev	0



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- 20m Grids with Given references
- Tree Protection Areas
- Sand Replacement Test Location
- Nuclear Density Gauge Test Location
- Plate Bearing Test Location
- Core Cutter Test Location
- Hand Shear Vane

Rev	Date	Drawn	Description	Ch'k'd
A	08/06/23	TC	Addition of Revisit Testing	SG

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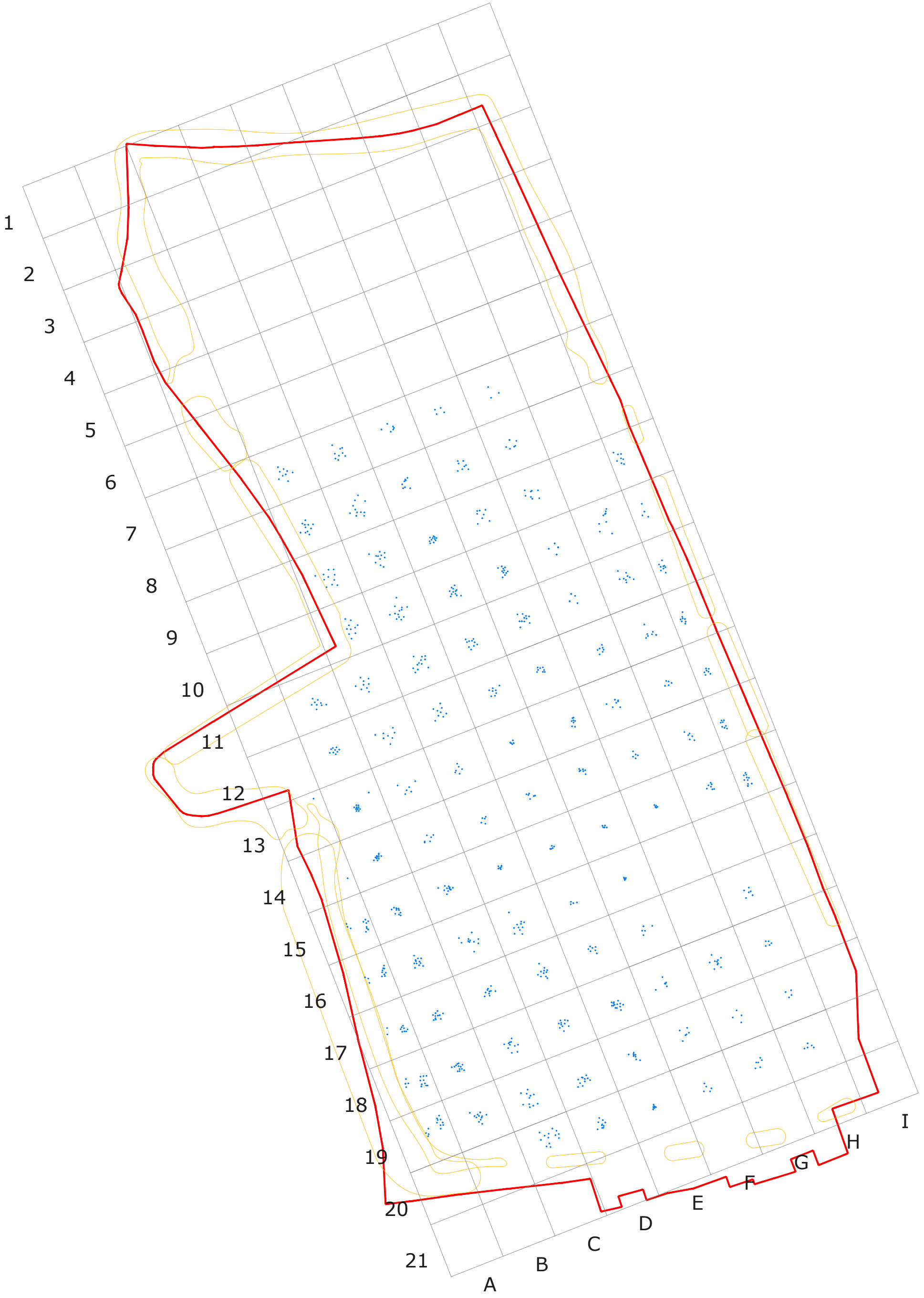
Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-801 Master Insitu Testing Locations

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-801 Master Insitu Testi
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- 20m Grids with Given references
- Tree Protection Areas
- Nuclear Density Gauge Test Location

Rev	Date	Drawn	Description	Ch'k'd
A	08/06/23	TC	Addition of Revisit Testing	SG

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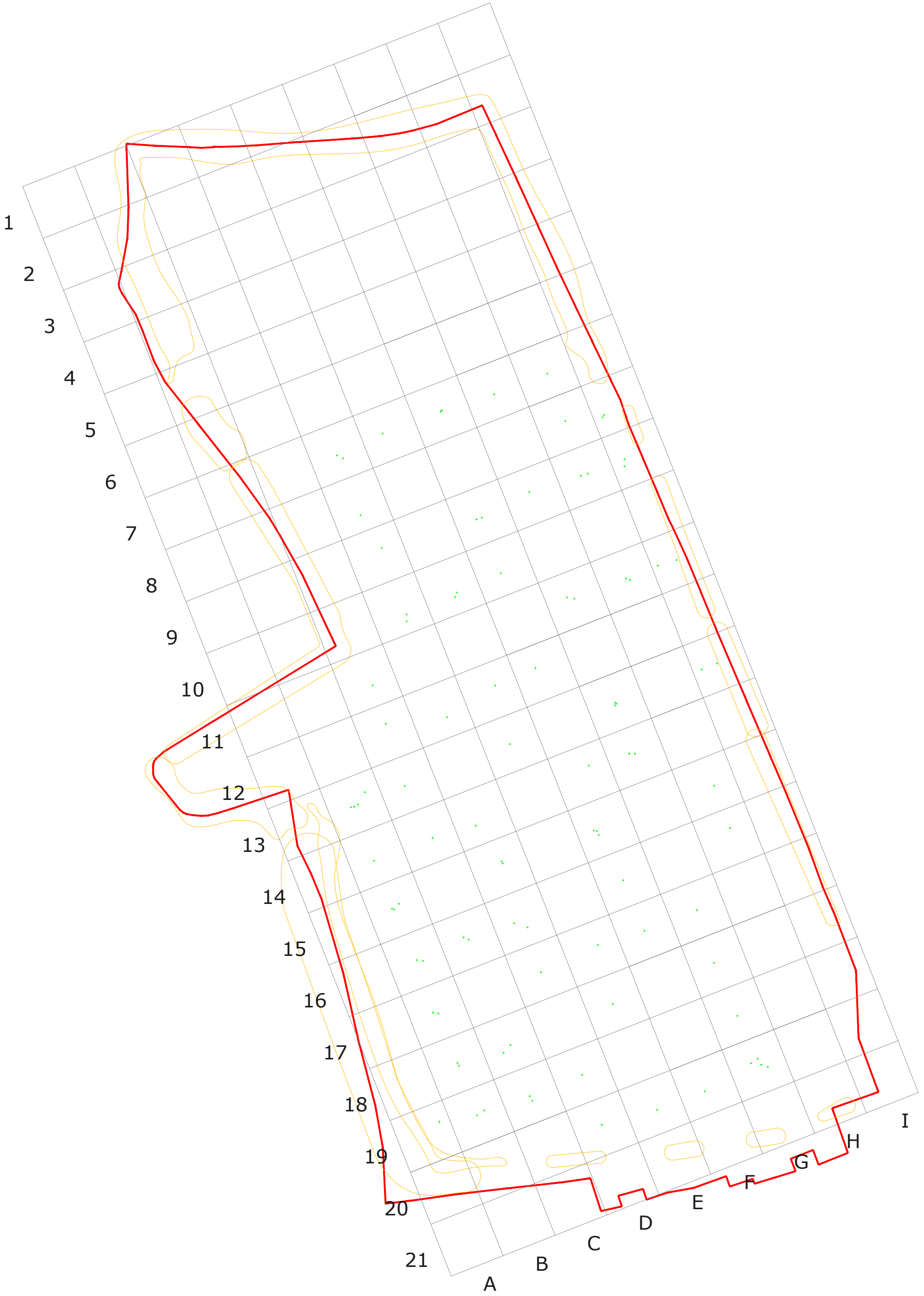
Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-802 Nuclear Density Gauge Testing Locations

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-801 Master Insitu Testi
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- 20m Grids with Given references
- Tree Protection Areas
- Plate Bearing Test Location

Rev	Date	Drawn	Description	Ch'k'd
A	08/06/23	TC	Addition of Revisit Testing	SG

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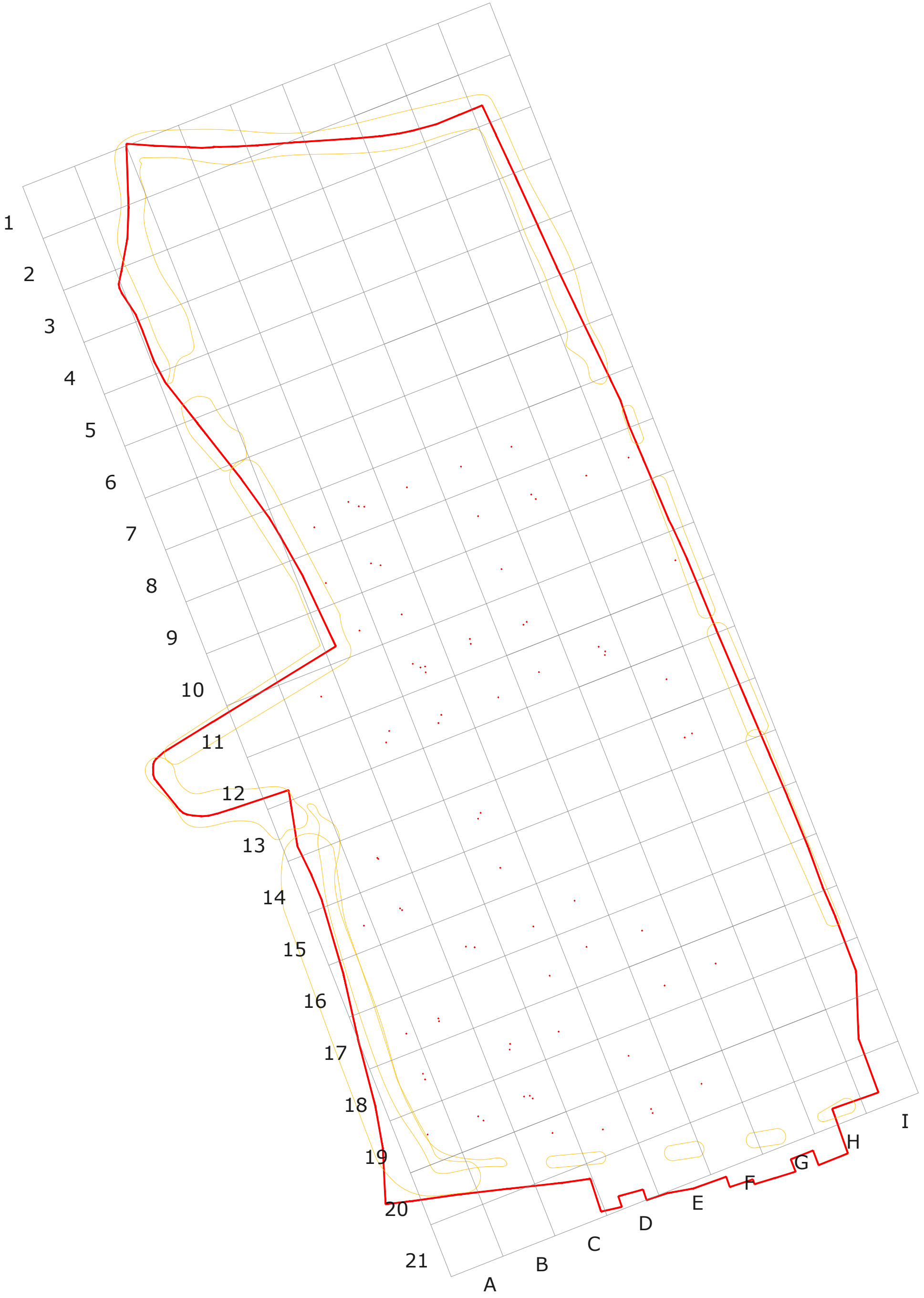
Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-803 PLate Bearing Tests
Testing Locations

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-801 Master Insitu Testi
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- 20m Grids with Given references
- Tree Protection Areas
- Sand Replacement Test Location

Rev	Date	Drawn	Description	Ch'k'd
A	08/06/23	TC	Addition of Revisit Testing	SG

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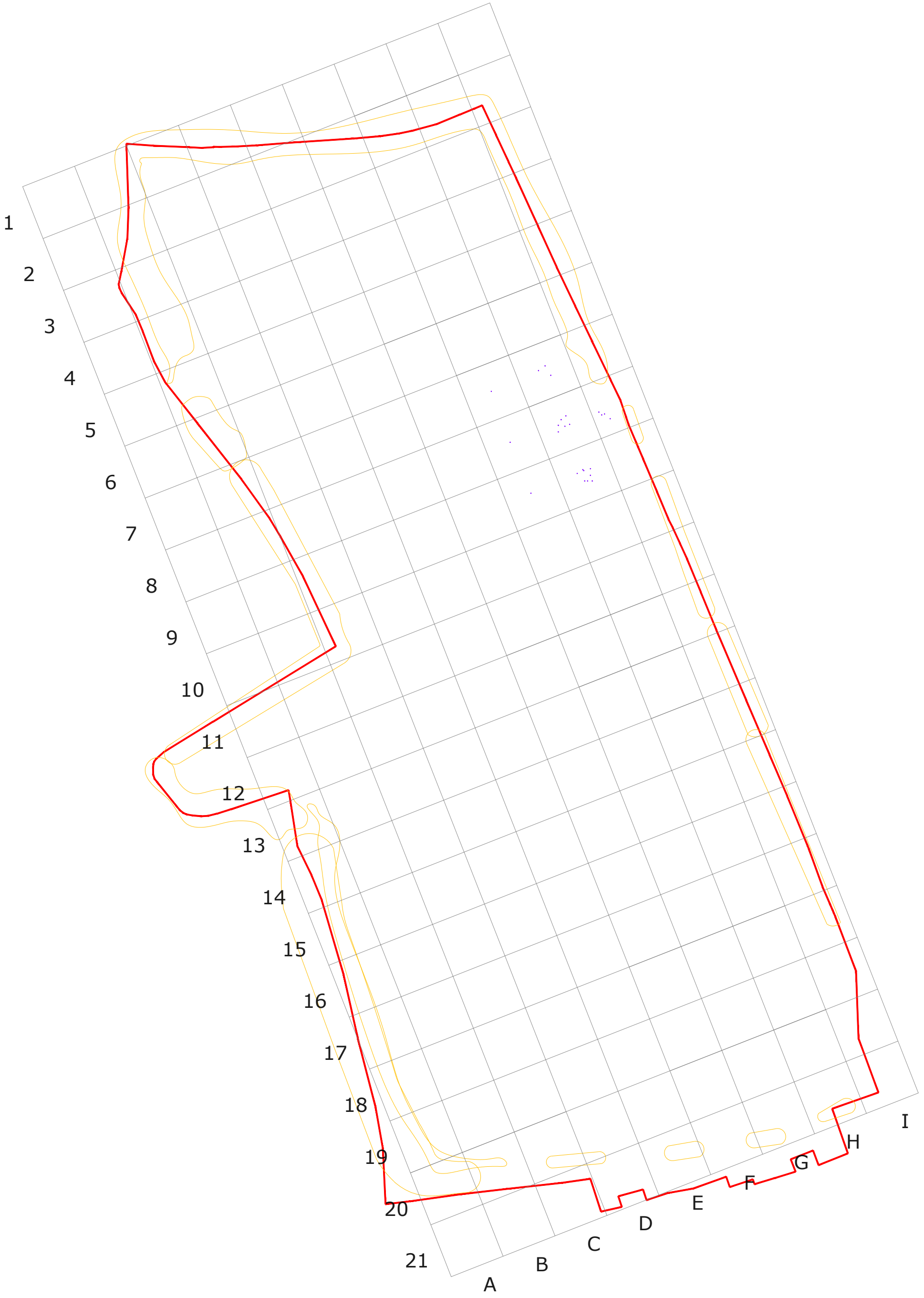
Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-803 Sand Replacemment Test Testing Locations

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-801 Master Insitu Testi
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- 20m Grids with Given references
- Tree Protection Areas
- Core Cutter Test Location

Rev	Date	Drawn	Description	Ch'k'd
A	08/06/23	TC	Addition of Revisit Testing	SG

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Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-802 Core Cutter Testing Locations

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-801 Master Insitu Testi
Job Ref	J808 Stopes Road	Rev	

HS6
Area: 153m²
Volume: 116m³

HS8
Area: 38m²
Volume: 17m³

HS5
Area: 453m³
Volume: 124m³

HS9
Area: 38m³
Volume: 7m³

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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- XREF Base of Excavation Background
- Top of Batter Hotspot Dig
- Bottom of Batter Hotspot Dig
- Materials treated by Mchale Contracts and Plant Environmental LLP then used as fill
- Materials taken off site not used as fill

Rev	Date	Drawn	Description	Ch'k'd
A	07/06/23	TC	Addition of Hotspot 9	SG

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Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-901 Found Asbestps

Surveyed	TC	Drawn	TC
Chk.	SG	Date	07/06/2023

Scale: NTS [A3 Sheet]
CAD File: VHEJ808-901 Found Asbestos

Job Ref: J808 Stopes Road
Rev: A

Placed Hotspot 7
Placed as a singular layer @3.18m below finished level.
Volume: 165m³
Area: 560m²

Placed Hotspots 5 and 6
Placed as a singular layer @2.95m below finished level.
Volume: 242m³
Area: 849m²

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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- Current Fill Levels Detail
- Areas of Placed Asbestos treated by MCP
- Reuse of Hydrocarbon impacted materials following volatilization and confirmed successfully delineated after resampling

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
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Client: Harworth

Site: Stopes Road
Bolton

Title: VHEJ808-902 HS5, HS6 and HS9 placed and treated soils

Surveyed	TC	Drawn	TC
Chk.	SG/PD	Date	13/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-902 HS5 and HS6 plac
Job Ref	J808 Stopes Road	Rev	

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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- OGL Detail
- Settlement Rod Location

Settlement Rod data available in Excel Sheet VHEJ808-1002 RSG Settlement Data

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
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F: 01226 320260

Client: Harworth

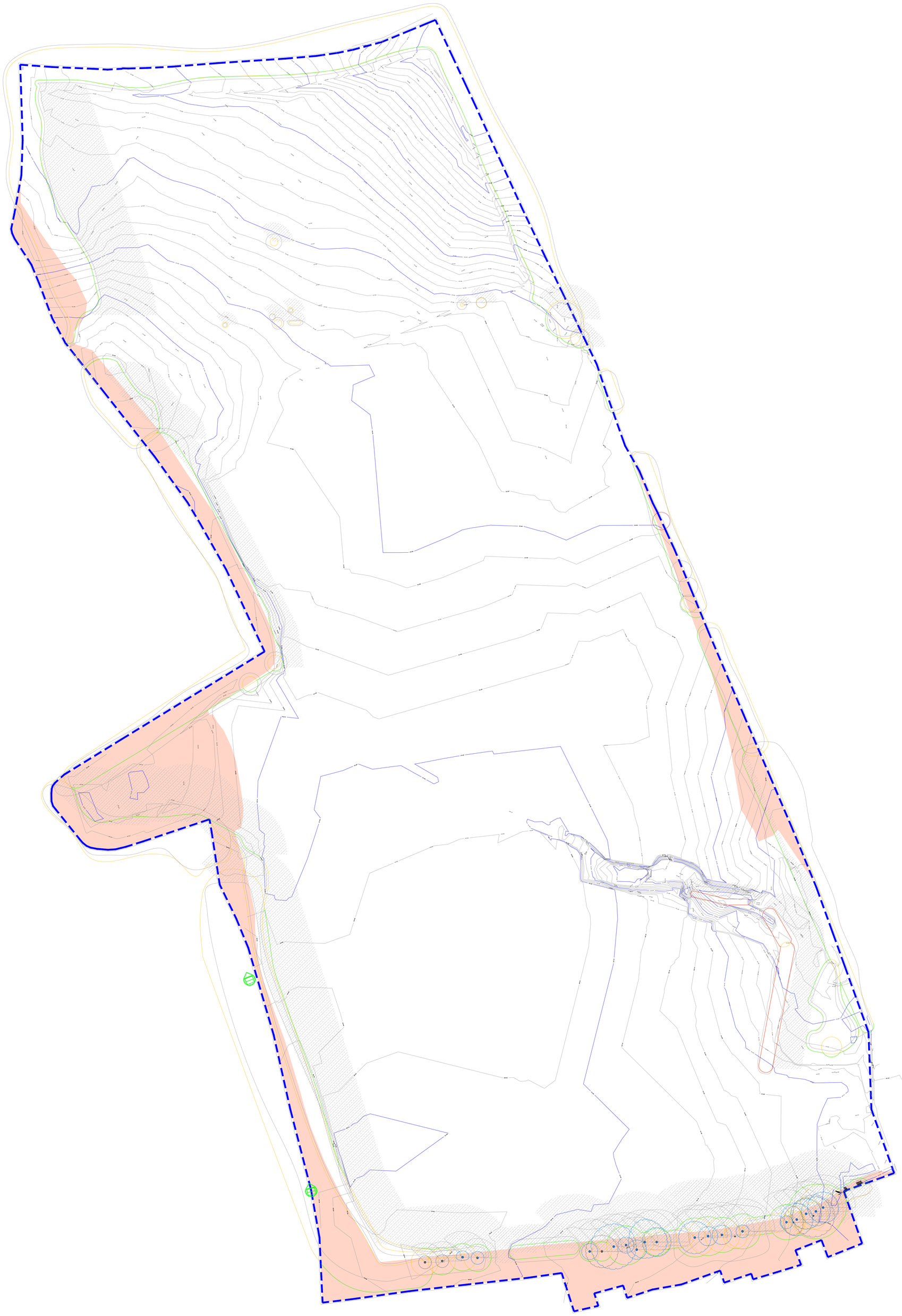
Site: Stopes Road
Bolton

Title: VHEJ808-1001 Settlement and Vibration Monitoring

Surveyed	TC	Drawn	TC
Chk.	RH	Date	01/12/2022

Scale [A3 Sheet]: NTS
CAD File: VHEJ808-1001 Settlement and Vib

Job Ref: J808 Stopes Road
Rev:



Legend

- Site Boundary
- 1m Contours
- 0.2m Contours
- Site Boundary
- Tree Shadow

N

Approx Direction of North

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BSI REGISTERED FIRM

Rev	Date	Drawn	Description	Ch'k'd
D	12/06/2023	TC	Updated Area OF Constraints	
C	27/04/2023	TC	Updated Area OF Constraints	
B	27/04/2023	TC	Updated Area OF Constraints	
A	09/02/2023	JW	Included Areas Of Constraint	Ch'k'd

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S35 2PH

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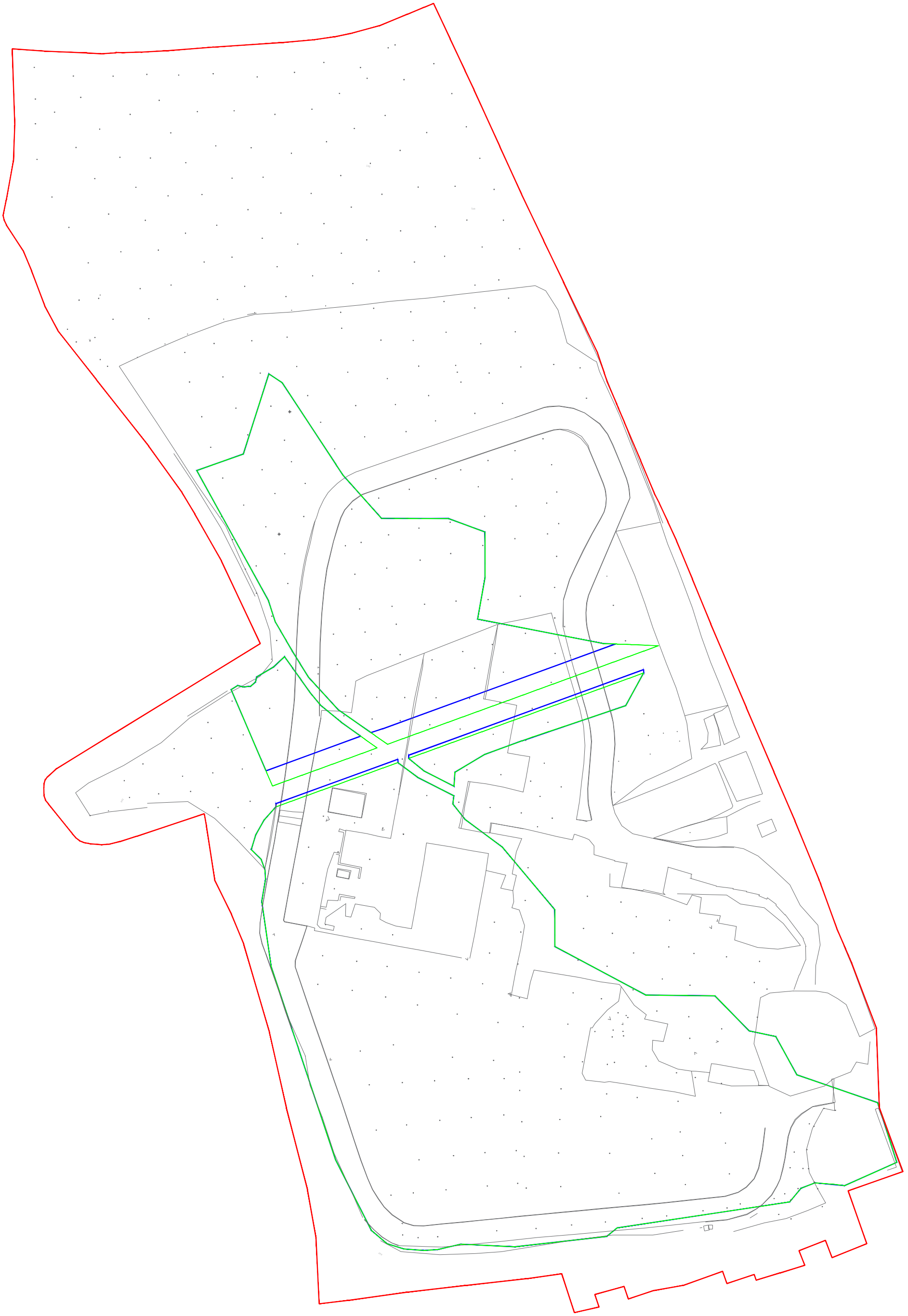
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808 - 1101 Proposed Plataeu Levels

Surveyed	--	Drawn	TC
Chk.	SG/IP	Date	12/06/2023
Scale [A0 Sheet]	1/500	CAD file	J808 - Proposed Plataeu Levels.dwg
Drawing Status	Preliminary		
Job Ref	808	Rev	C



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Amended RDC boundary
- RDC boundary
- OGL Detail
- Site Boundary

Rev	Date	Drawn	Description	Ch'k'd

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F: 01226 320260

Client: Harworth

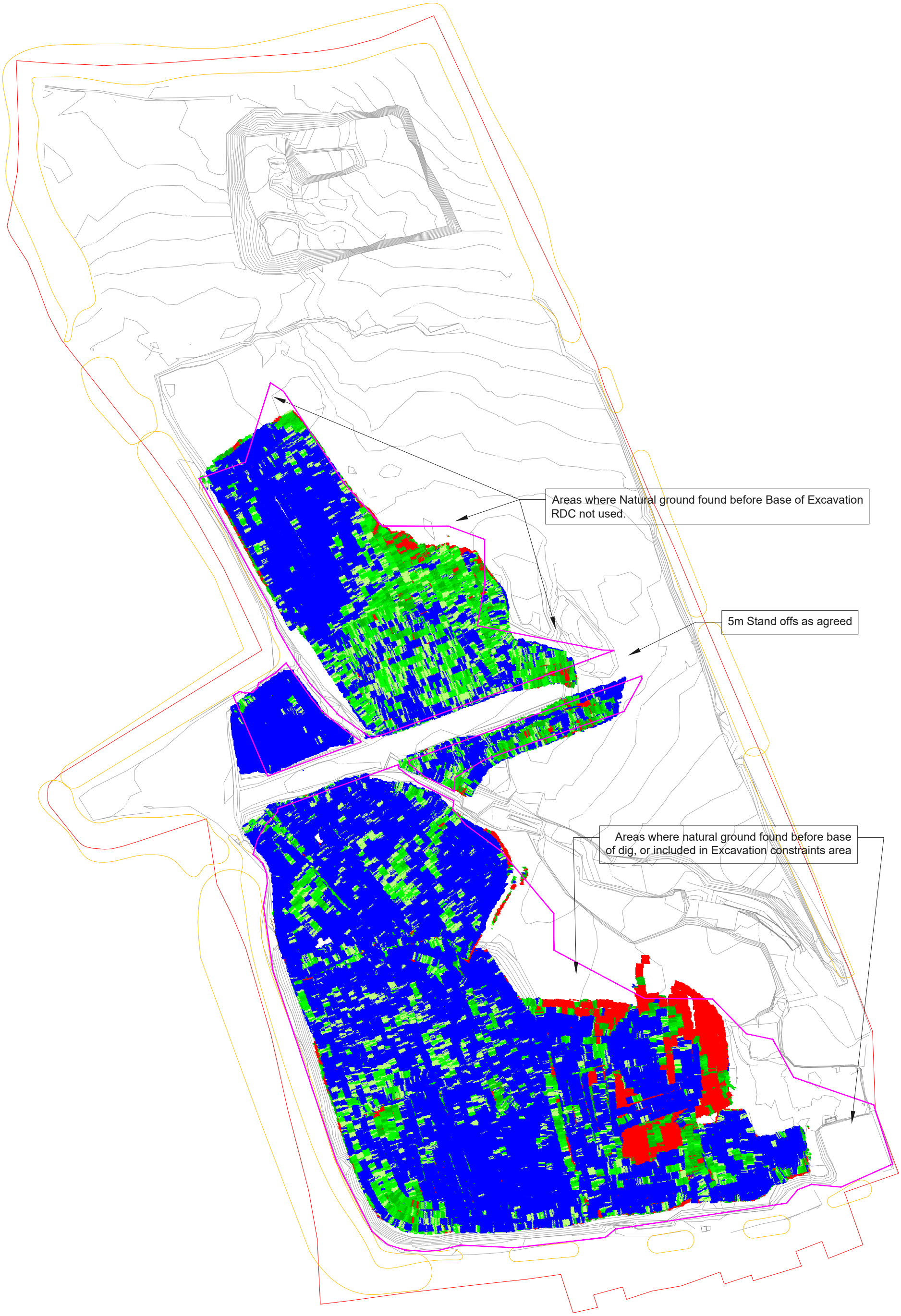
Site: Stopes Road, Bolton

Title: VHEJ808-1201 RDC Areas

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023

Scale [A3 Sheet]: NTS
CAD File: VHEJ0808-1201 RDC Areas

Job Ref: J808 Stopes Road
Rev: 0



Note
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Approx Direction of North

Legend

- Site Boundary
- Adjusted RDC Areas from drawing VHEJ808-1201 RDC Areas
- XREF Base of Excavation Background
- Tree Protection Barrier

Rev	Date	Drawn	Description	Ch'k'd

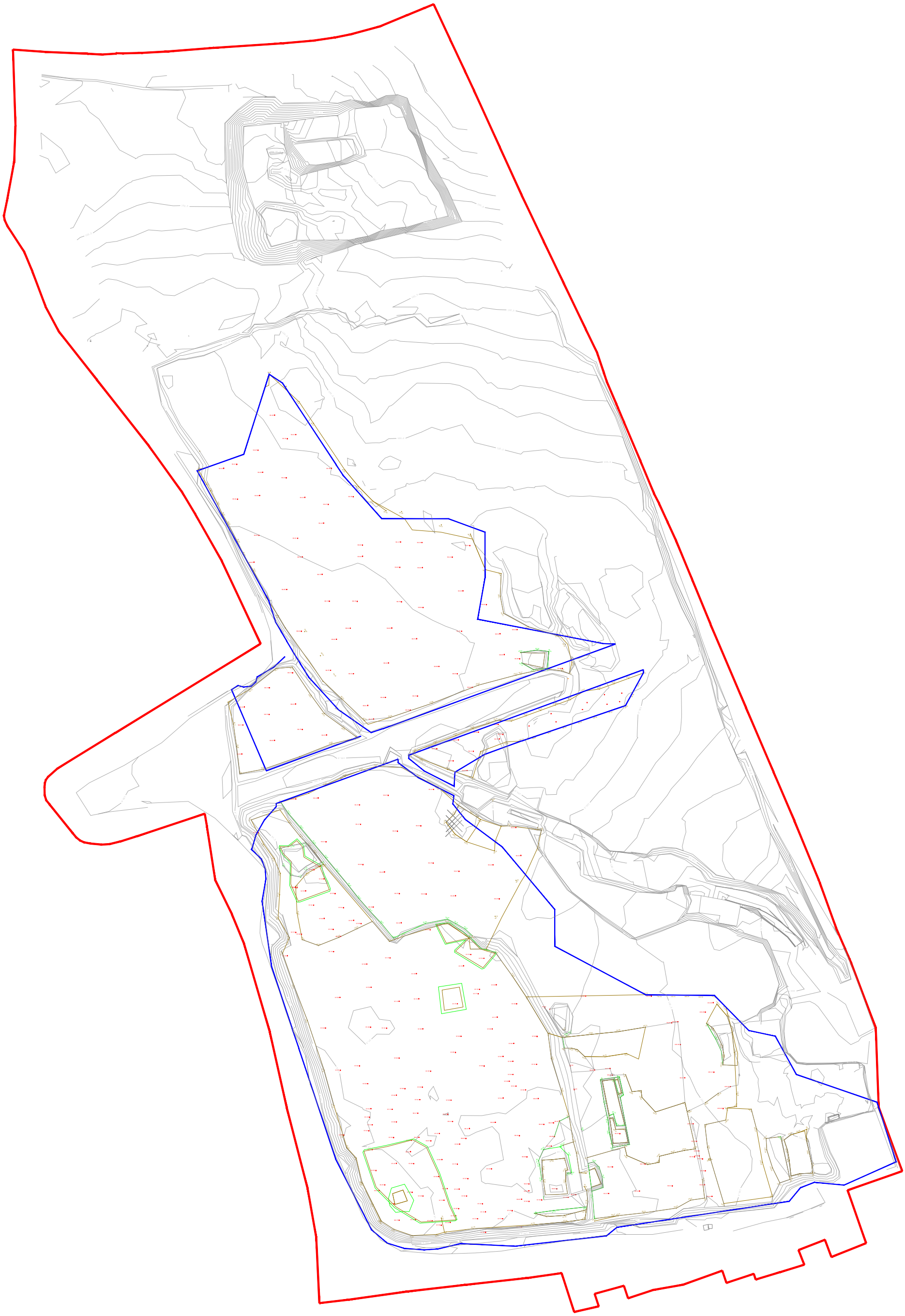
VHE CONSTRUCTION PLC
WHALEY ROAD
BARUGH
BARNSLEY
S75 1HT
E: enquiries@vhe.co.uk
W: www.vhe.co.uk
T: 01226 320150
F: 01226 320260

Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-1202 Smiths' RDC Survey

Surveyed	TC	Drawn	TC
Chk.	RH	Date	01/12/2022
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-1202 Smiths' RDC Surv
Job Ref	J808 Stopes Road	Rev	



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Approx Direction of North

Legend

- Site Boundary
- Adjusted RDC Areas
- Bottom of Batters
- Top of Batter
- 97.95 ✳ Spot Levels

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
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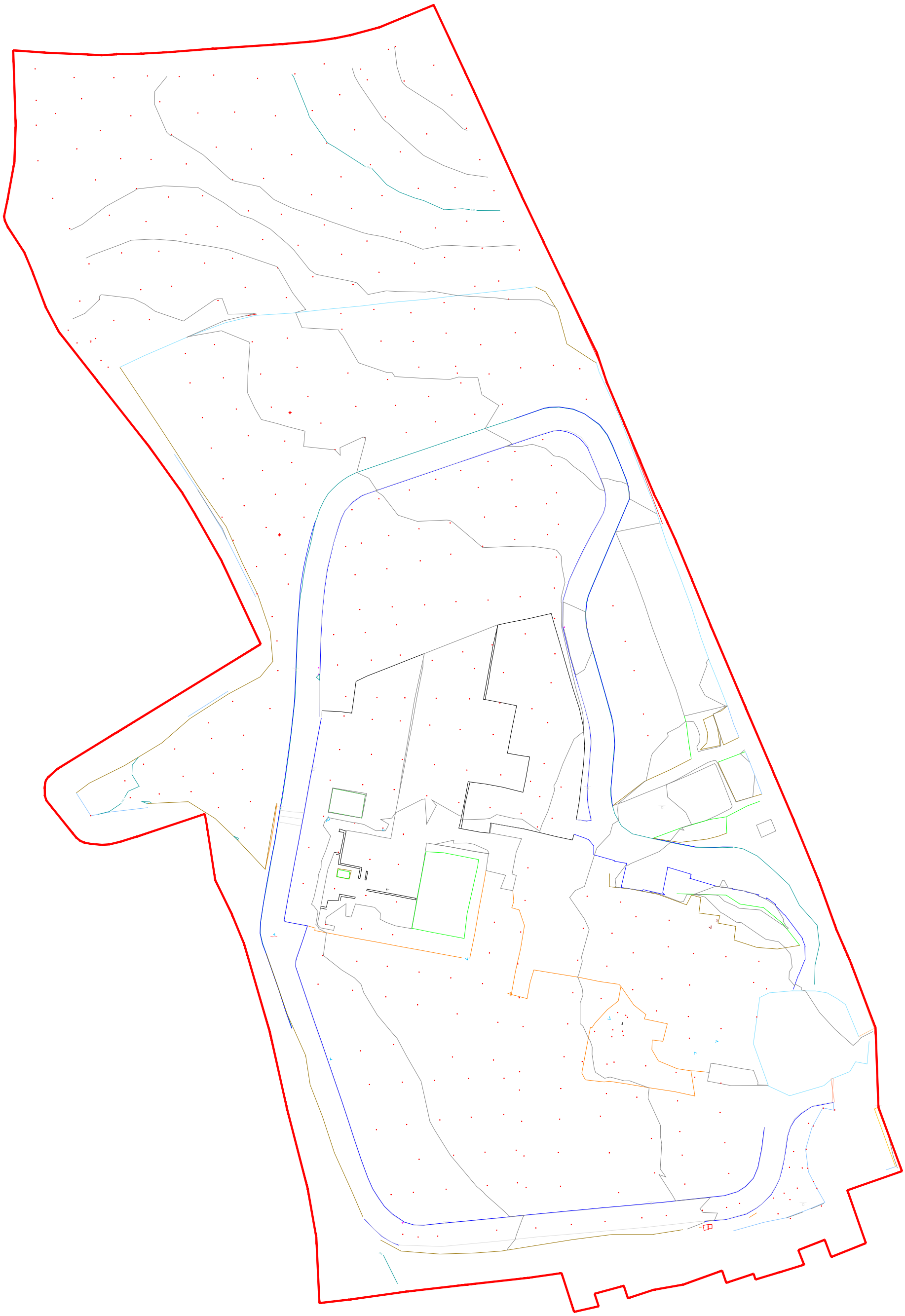
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-1203 Post RDC Levels

Surveyed	TC	Drawn	TC
Chk.	SG	Date	08/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-1303 RDC Areas
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- Fence
- Concrete
- Kerb
- Block Paving
- Road
- Tar
- Top of Batter
- 1m Contours
- 5m Contours
- Spot Level with given AOD

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
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Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-1301 Original Ground Level

Surveyed	GD	Drawn	TC
Chk.	RH	Date	01/12/2022

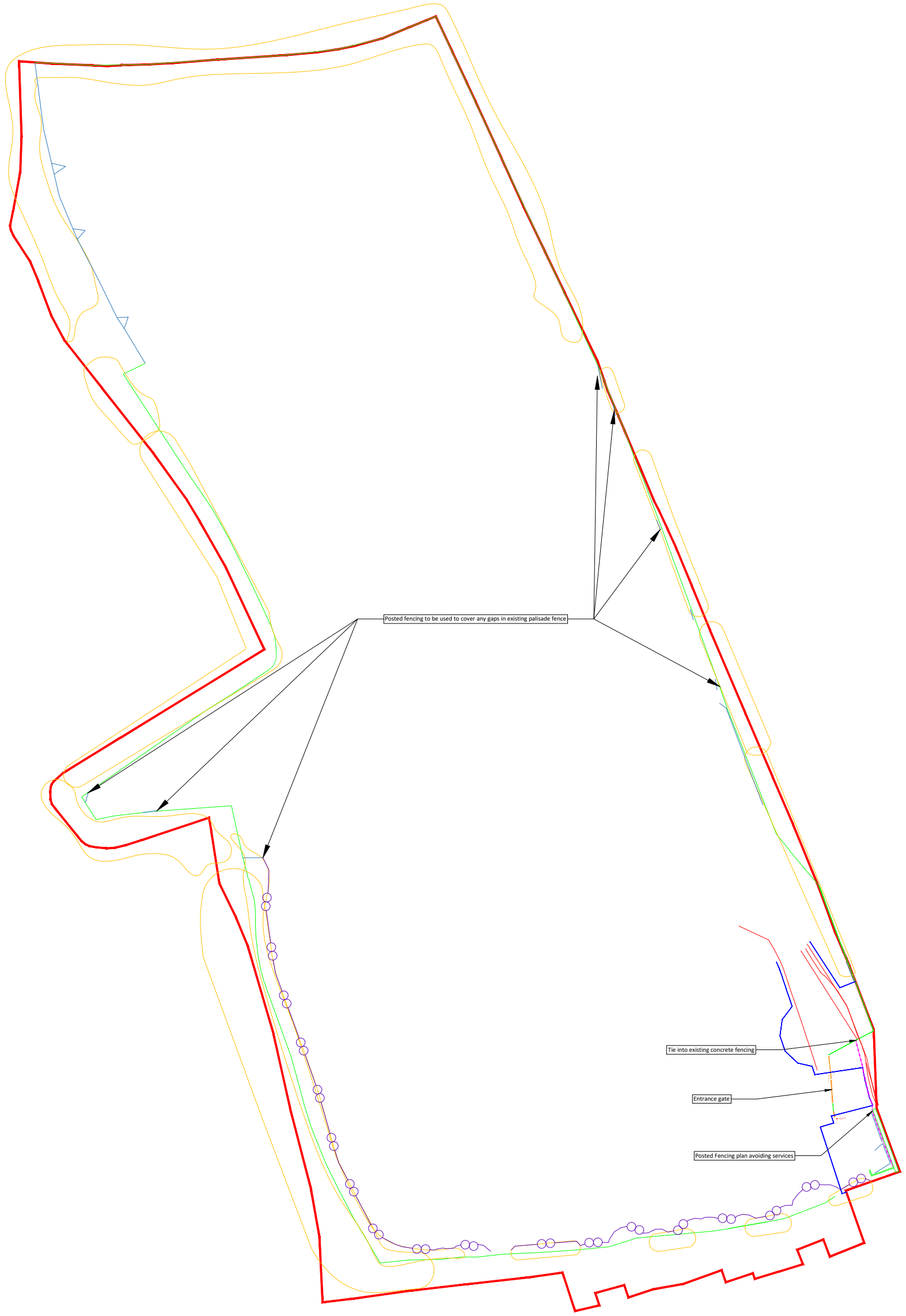
Scale [A3 Sheet]: NTS

CAD File: VHEJ808-1301 Original Ground

Job Ref: J808 Stopes Road

Rev:

10 20 30 40 50 60 70 80 90 100



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- Existing Walls, Chain link fencing and Palisade Fence
- Given Tree Protection Fencing from Tyler Grange Tree Protection Plan
- Posted Fencing Plan, 40m
- Existing Heras Fencing Owned by VHE, 224m, 64 Panels
- Standoff Area, see VHEJ808-401 For Details
- Electric Cables

Rev	Date	Drawn	Description	Ch'k'd

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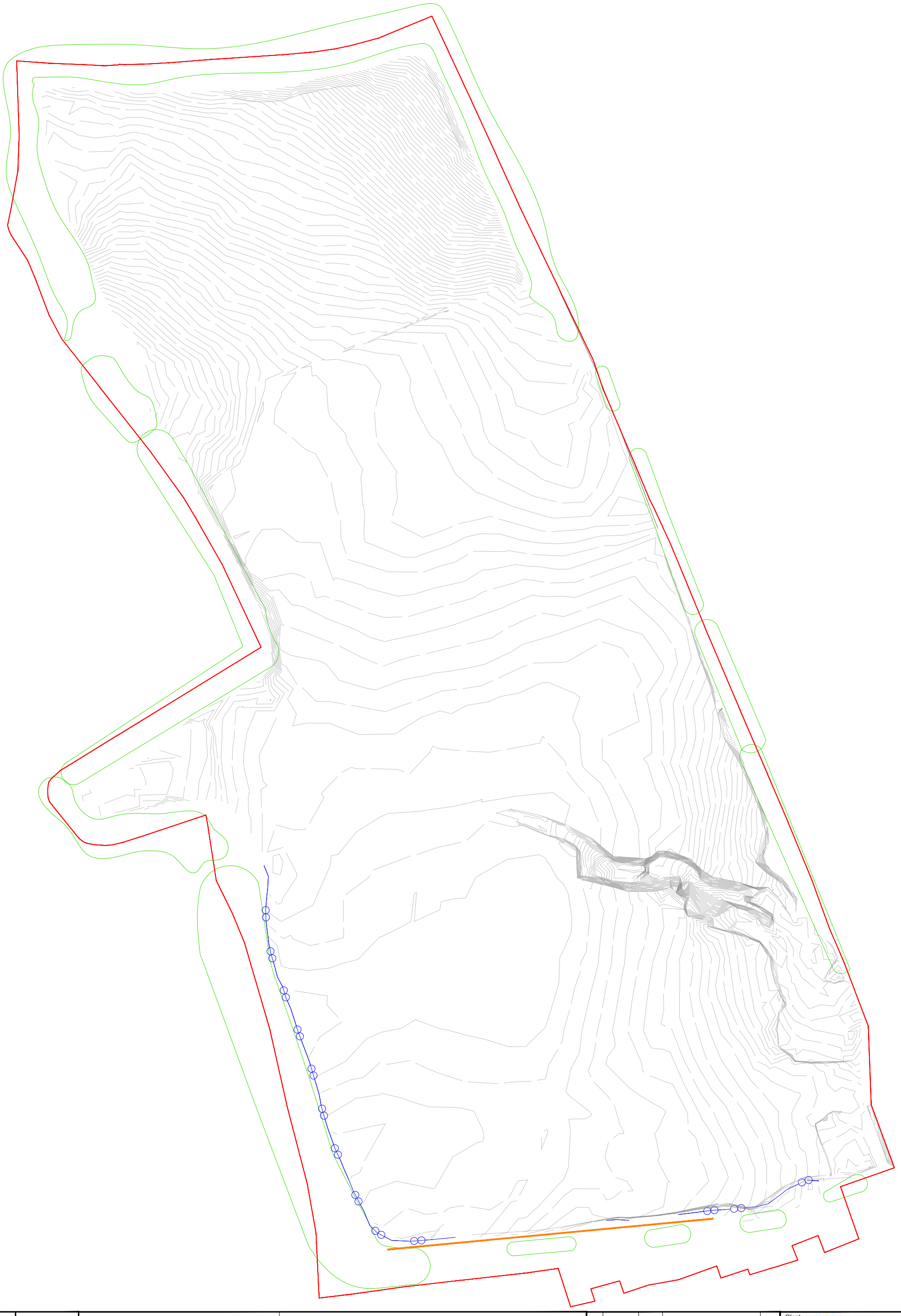
Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-1401 Fencing

Surveyed	TC	Drawn	TC
Chk.	SG	Date	06/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-301 Site Boundaries
Job Ref	J808 Stopes Road	Rev	



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BSI REGISTERED FIRM

Approx Direction of North

LEGEND

- Site Boundary
- Tree Protection Barrier Fencing As-Built
- Tree Protection Area's
- Gas Main
- Finished Ground Level Details see drawing VHEJ808-201

Tree Protection Fencing offset due to Medium pressure Gas Main.

Rev	Date	Drawn	Description	Ch'k'd
A	25/05/23	TC	OGL Detail	

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F: 01226 320260

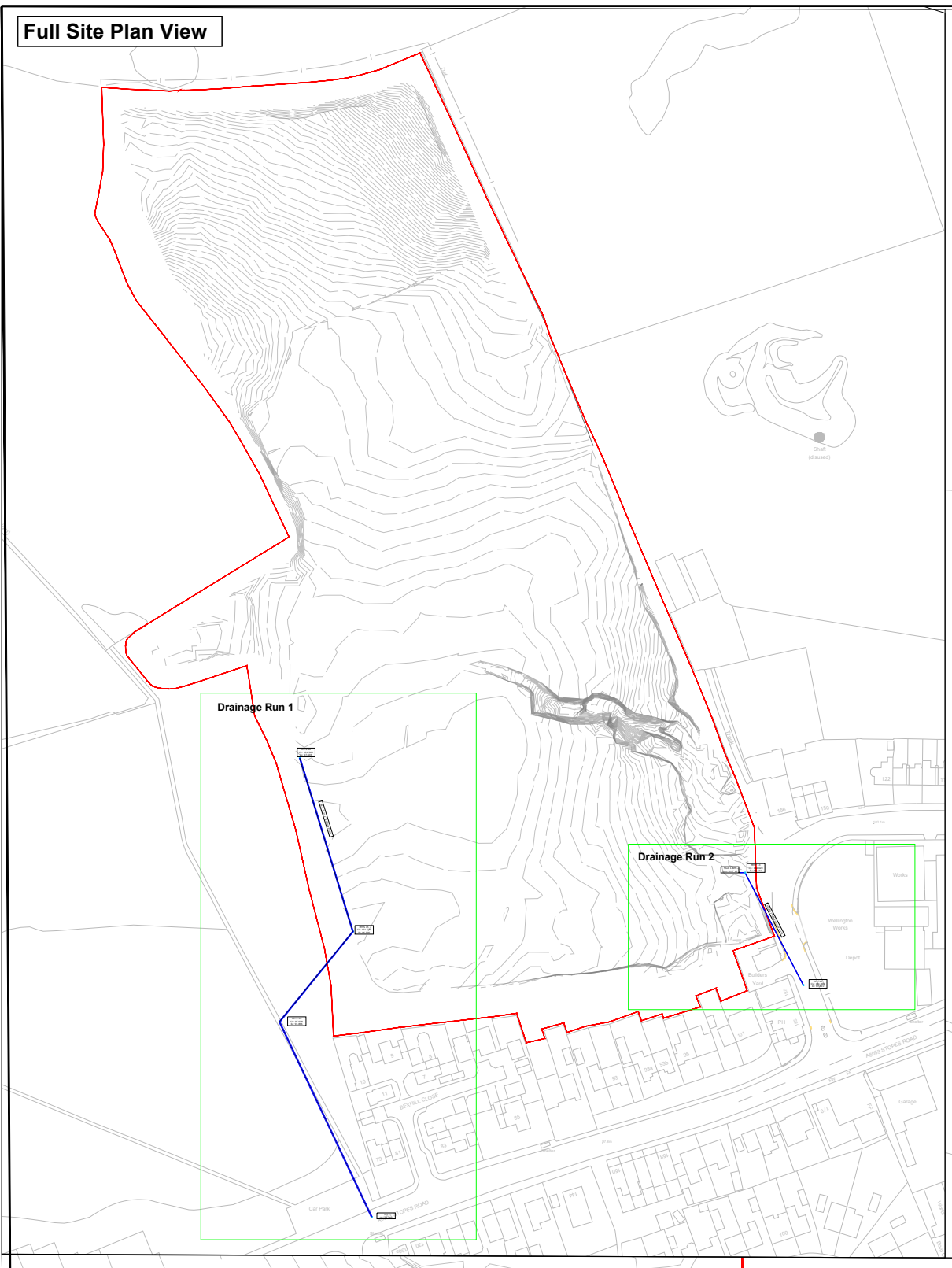
Client: Harworth

Site: Stopes Road, Bolton

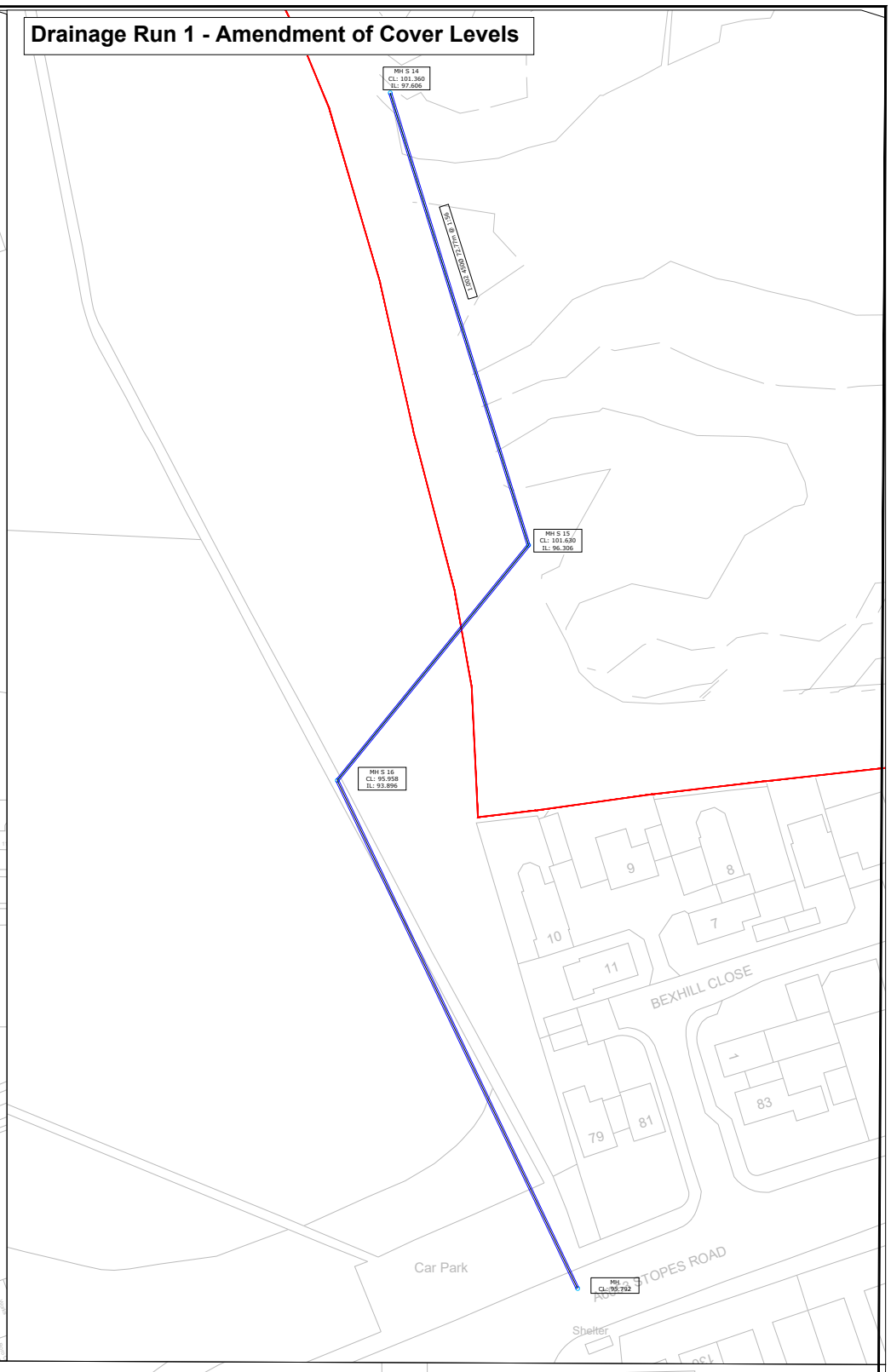
Title: VHEJ808-1402 Tree Protection Fencing As-Built

Surveyed	TC	Drawn	TC
Chk.	PD/SG	Date	12/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-301 Site Boundaries
Job Ref	J808 Stopes Road	Rev	REVA

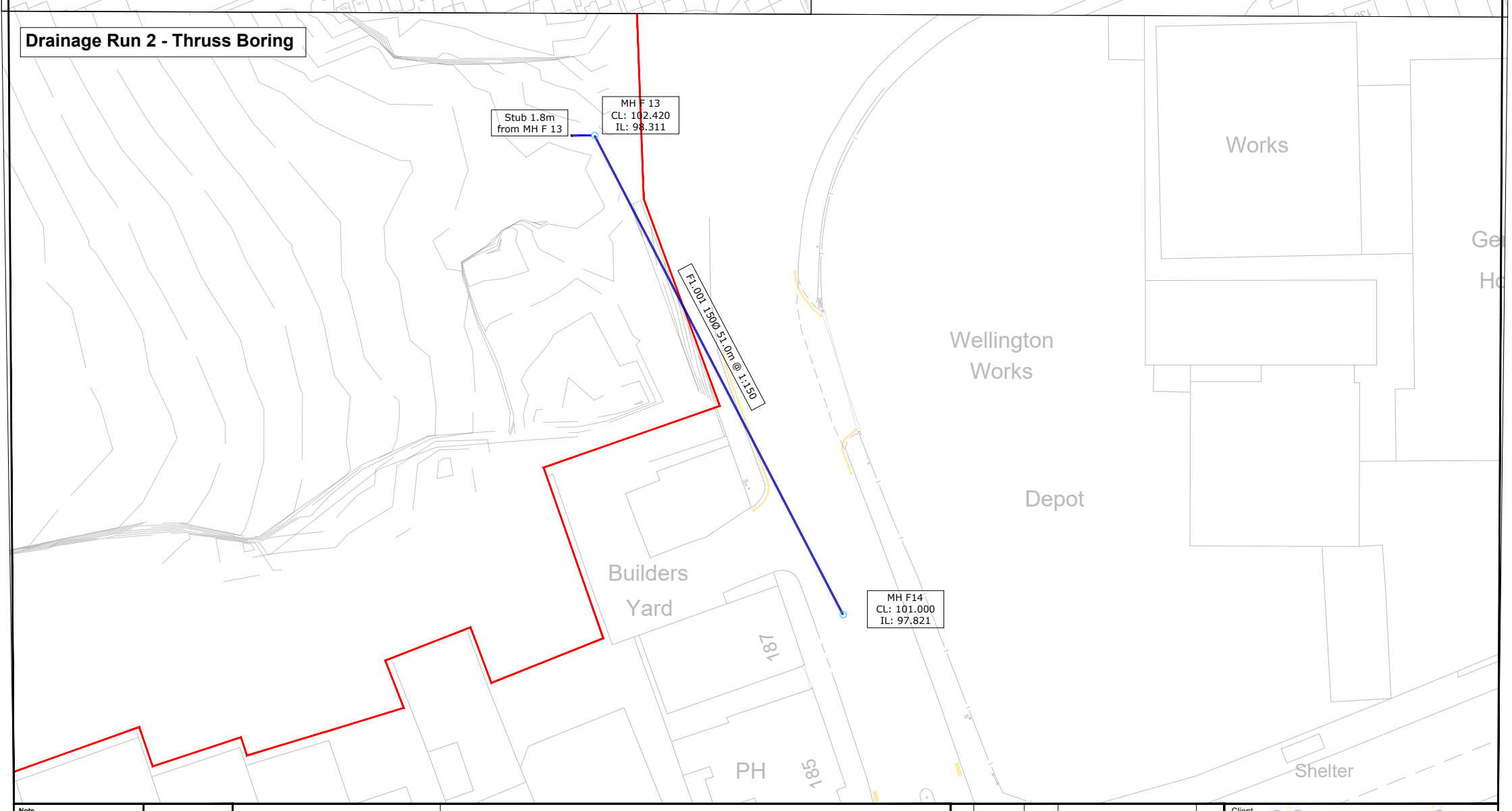
Full Site Plan View



Drainage Run 1 - Amendment of Cover Levels



Drainage Run 2 - Thruss Boring



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Approx Direction of North

Legend

- Manhole
- Surrounding Detail
- Site Boundary
- Centre of Run
- Diameter of Drainage Run

Surrounding Details Taken from VHEJ808-201 and Finished House builders plan

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
WHALEY ROAD
BARUGH
BARNSLEY
S75 1HT
E: enquiries@vhe.co.uk
W: www.vhe.co.uk
T: 01226 320150
F: 01226 320260

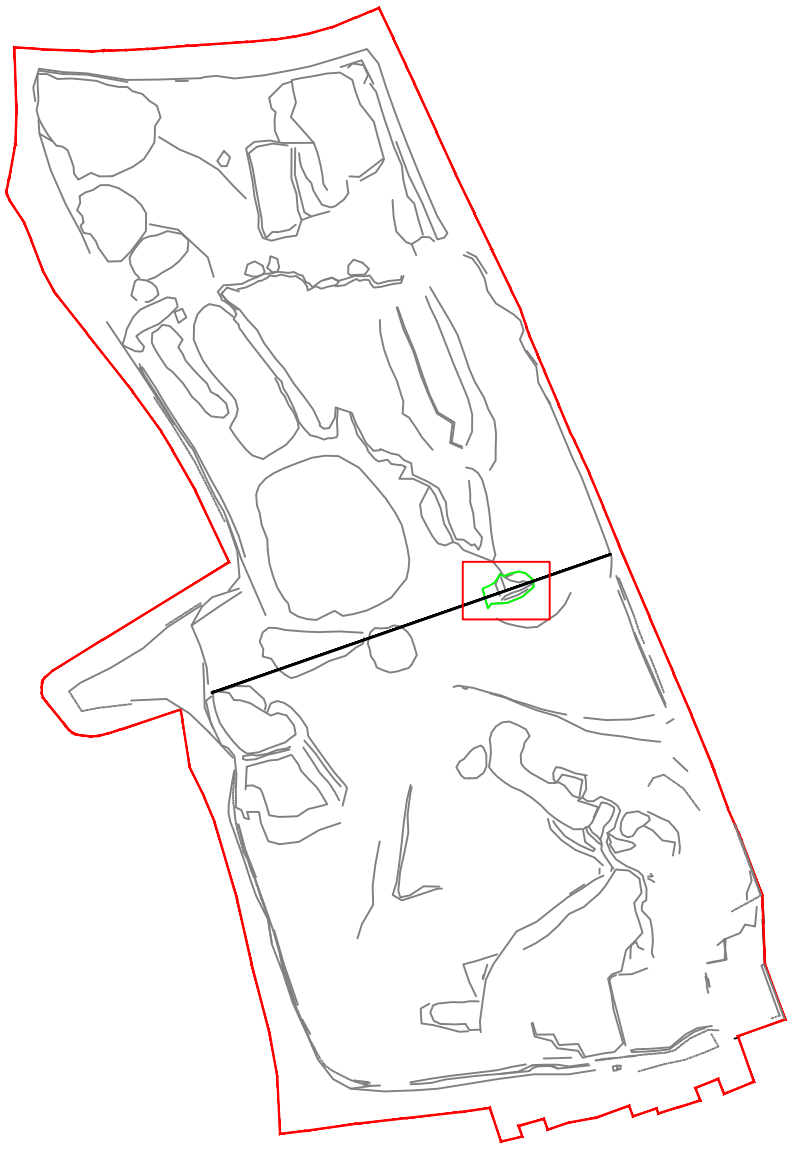
Client: Harworth

Site: Stopes Road, Bolton

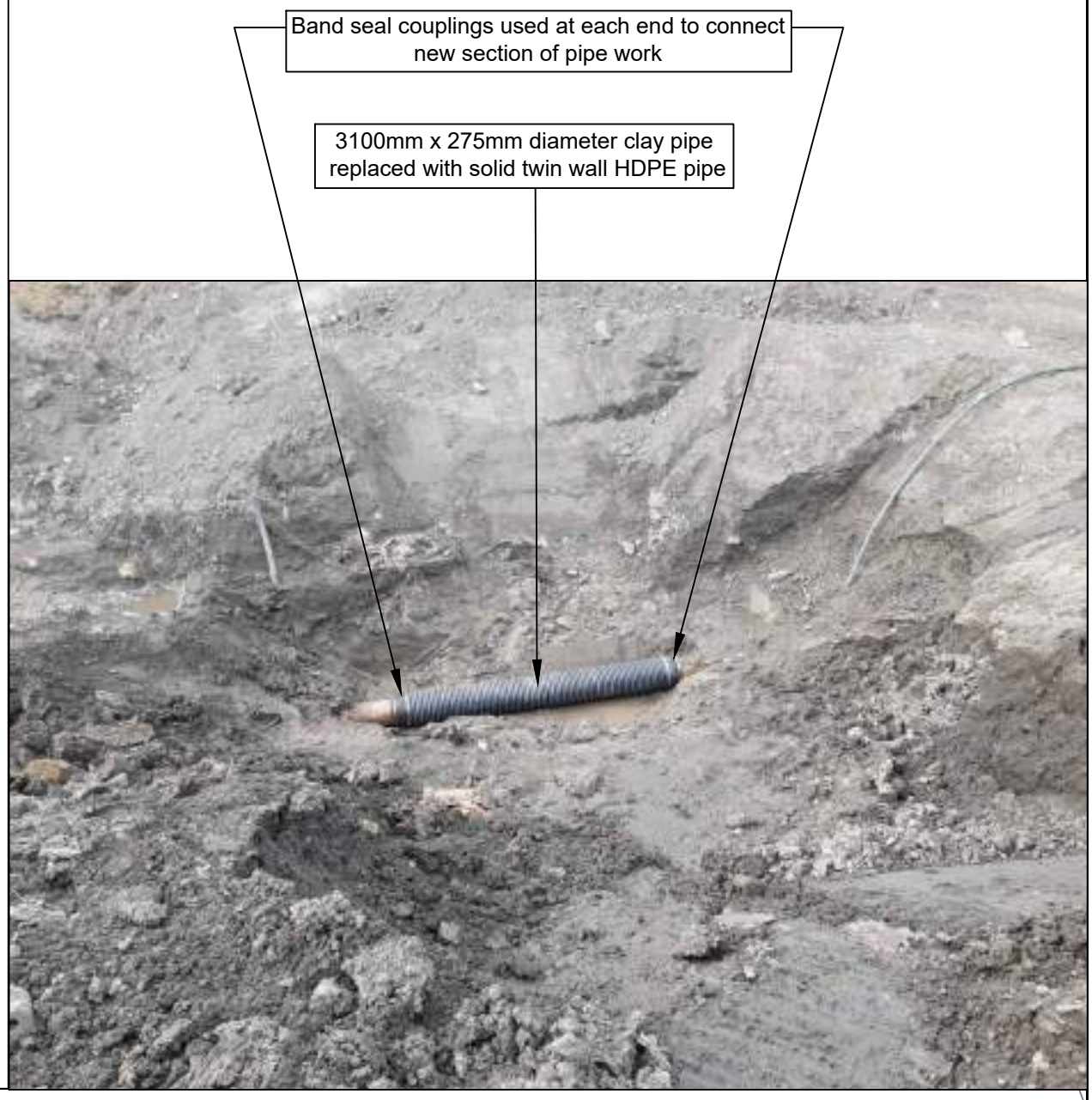
Title: VHEJ808-1501 Drainage As-Built

Surveyed	TC	Drawn	TC
Chk.	PD/SG	Date	12/06/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-201 Finished Levels
Job Ref	J808 Stopes Road	Rev	

Full Site View



Insitu Photograph



Plan View

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BSI REGISTERED FIRM

Approx Direction of North

Legend

- Site Boundary
- Existing Culvert
- Replaced Culvert Stretch
- Week 49 Full Site Survey Batter Detail
- Area Excavated for Culvert Inspection and Repair

Rev	Date	Drawn	Description	Ch'k'd

VHE CONSTRUCTION PLC
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BARNSLEY
S75 1HT
E: enquiries@vhe.co.uk
W: www.vhe.co.uk
T: 01226 320150
F: 01226 320260

Client: Harworth

Site: Stopes Road, Bolton

Title: VHEJ808-011 Culvert Repair

Surveyed	TC	Drawn	TC
Chk.	SG	Date	09/05/2023
Scale [A3 Sheet]	NTS	CAD File	VHEJ808-011 Culvert Repair
Job Ref	J808 Stopes Road	Rev	

Alan Wood & Partners

Photographic Log

Photograph No. 1

Trial pitting and breaking of hard standing begins.

Photograph No. 2

Bulk sample collection from trial pits along the south of the site.

Photograph No. 3

Paving removal through the centre of the site.

Photograph No. 4

Fuel tank removal and bunded storage area.

Photograph No. 5

Abstraction well on the western side of site found while trial pitting.

Photograph No. 6

Stockpiling of hard stadnign ready for screening and crushing.

Photograph No. 7

Start of excavation in the northwest of site

Photograph No. 8

Base of the excavation in the north of the site.

Photograph No. 9

Stockpiled materials have been separated into material types.

Photograph No. 10

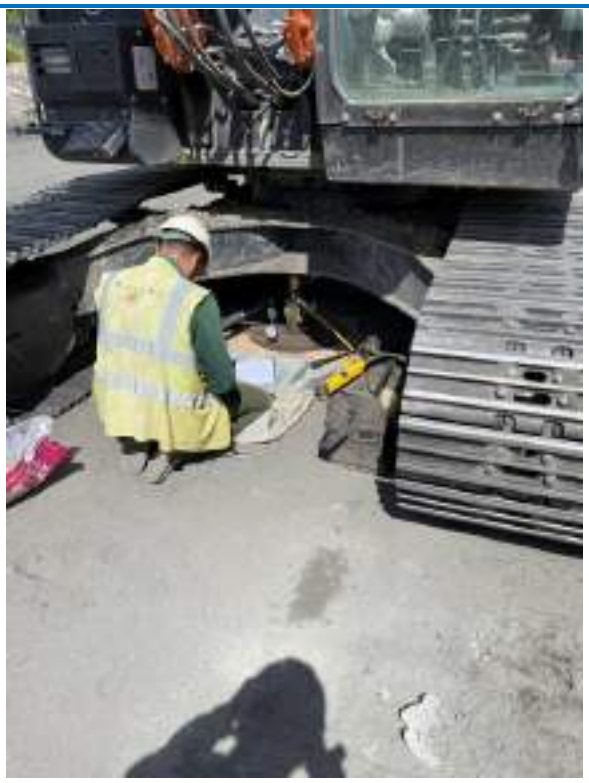
Topsoil strip in the POS to the north.

Photograph No. 11

Excavation of materials in the northwest has progressed ready to start the RDC.

Photograph No. 12

CPT rig was trialied and proved unfruitful.



Photograph No. 13

Dual cycle plate tests being carried out in the formation.

Photograph No. 14

RDC trials began in the northwestern section of the site.

Photograph No. 15
RDC commences in the north of the site.

Photograph No. 16

First layers are being placed in the north of the site.

Photograph No. 17

RDC Formation in area 2B proofrolled ready for RDC.

Photograph No. 18

Layers being compacted using a smooth drum roller in the north of the site.

Photograph No. 19

Hotspot 5 - Asbestos sheeting found in the south of the site.

Photograph No. 20

Excavation works being carried out on the south of site.

Photograph No. 21

Final layer being compacted in the northwest of the site.

Photograph No. 22

Natural clay found in the RDC areas.

Photograph No. 23

RDC works in the southwest of the site.

Photograph No. 24

The crushing and screening works commence.

Photograph No. 25

Formation in the south of the site RDCd and ready for back filling.

Photograph No. 26

Excavation of former relic structures in south of the site.

Photograph No. 27

Layers being compacted and testing locations marked out in the south of the site.

Photograph No. 28

NDG testing in grid square D18 Layer 3.

Photograph No. 29

Exposing natural clat in the RDC area.

Photograph No. 30

Natural clay exposed in RDC area 3 and 4.

Photograph No. 31

Mine shaft treatment begins on shaft006.

Photograph No. 32

Excavation works started along the eastern boundary.

Photograph No. 33

Preparations for the abstraction well grouting.

Photograph No. 34

Peat removed and base of peat scraped to expose the natural clay underneath.

Photograph No. 35

Natural clay base of excavation in the north eastern section of the site.

Photograph No. 36

Back filling of POS with unsuitable fill.

Photograph No. 37

Backfilling in the centre of the site complete.

Photograph No. 38

6F2 capping layer being placed on the eastern side of the site.

Photograph No. 39

The excavation between the root protection/fence line stand off and the high voltage cable standoff.

Photograph No. 40

6F2 being compacted in the south eastern section of the site.

Photograph No. 41

Northern side of the site has the capping layer on and is now finished.

Photograph No. 42

Finished surface in the west and south

Photograph No. 43

Entrance way excavated down to the natural clay.

Photograph No. 44

Finished surface in the entrance way.

Photograph No. 45

Finished surface to the north and topsoil replaced on the POS.

APPENDIX A

VHE Method Statement

Method Statement

Activity/Title:	Backfill of excavations

This method statement is to be read in conjunction with the following site Risk Assessments:
RA026 - 360° Excavator Tracked
RA029 – Self Propelled Roller
RA030 – Dozer (with or without towed roller)
RA032 – Articulated Dump Truck

STAFF
Foreman
Plant Operators
Banksman
Geotechnical Tester
Environmental Engineer

PLANT

1 x D5 Dozer
2 x 24t/29tExcavator
3 x 30t/25t ADT
1 x BW219 Roller
1 x BW120 Roller

GENERAL REQUIREMENTS

The Site Foreman will ensure all personnel involved in the works are suitably trained, competent and experienced to carry out the work and that all equipment & plant to be used is suitable, tested, calibrated and inspected prior to commencing work.

All operatives will undergo a full VHE induction including the site Covid 19 plan and risk assessment, and receive other relevant information when first arriving on site and prior to commencing work on any activates.

All visitors to site will be expected to make an appointment prior to visiting the site.

All personnel employed on this site shall be equipped with the relevant PPE. The minimum requirements for site operation are; hard hats, fluorescent vest/jackets and safety footwear. Ear and eye protection will be available as necessary. Gloves must be work if physical contact with soils is made.

Daily briefing, which will include a Covid 19 reminder, will be delivered each morning prior to commencing work.

A programme task briefings and toolbox talks will be developed and presented to the Team at regular intervals, of not less than weekly, to ensure that all personnel are aware of the site conditions, changes to the working methods and risks associated with them.

PREAMBLE

Following the excavation of RDC (Rolling Dynamic Compaction) areas on site and RDC works, material must be backfilled. The excavated made ground will be used to backfill the general fill areas up to the new formation levels (underside of crush running layer). Compaction trials on the material have been conducted which are detailed below.

On site compaction trials were undertaken on the two material types identified arising from the excavation works to confirm the compaction requirements. Four trial areas, two for each type of backfill material (black

ashy fill and Type 1 MOT material) were constructed, a minimum of 20m long by 5m wide. Each pad consisted of three 275mm layers. Each layer was compacted with the amount of passes of the 219 roller detailed in the table below.

Compaction Trail Pad Details

Material Type	Layer Thickness	Number of Passes
Black Ashy Fill	3 x 275mm layers	4
Black Ashy Fill	3 x 275mm layers	6
Type 1 MOT	3 x 275mm layers	4
Type 1 MOT	3 x 275mm layers	6

All geotechnical samples have been classified as either a 1A, 2A or 2C material. The table below show the compaction requirements for this material lifted from the Hydrock Earthworks Requirements drawing (15220-HYD-XX-XX-DR-G-6003).

Compaction Requirements

Material Type	Compaction Method	Roller	Layer thickness	Number of passes
1A	SHW Table 6/4 Method 2	BOMAG 219	275mm	4
2A	SHW Table 6/4 Method 1	BOMAG 219	275mm	4
2C	SHW Table 6/4 Method 2	BOMAG 219	275mm	4

Each trial bed was then compliance tested by the use of a series of in-situ density tests using a nuclear density meter and Sand Replacement Density tests. These would confirm that the minimum requirement of 95% compaction has been achieved and will allow the air void percentage to be calculated.

Backfilling Method

Compaction trial results showed that **6 passes with the 219 roller** reported the lowest percentage of air voids at 2.9%.

Backfilling of RDC areas 1 and 2 will be undertaken by filling with material excavated from area 3 which will be reinstated in 275mm layers which will receive 6 passes with the 219 roller. Area 3 will be backfilled with material directly from area 4 and also from the stockpiled fills from areas 1 and 2. Finally, area 4 will be backfilled with the stockpiled arisings from areas 1 and 2. The area of the site not within the RDC area will be overturned to 1.5m and reinstated using the end-product system of 6 passes of the BW219 roller on layers of 275mm soils – see Sketches 1-5 below

Testing

In-situ compaction tests are to be conducted at different rates, as detailed it the table below.

Test	Frequency
Nuclear Density Gauge - NDG	1 NDG per layer per 20m x 20m grid square (at 175 to 200mm below surface)
Sand Replacement Density - SRD	1 SRD for every 10 NDG's (Calibration)
Dual Cycle Plate Load Test	Base of formation, every 1m of fill and at finish ground level. One per 40m x 40m grid square.

Settlement monitoring

11 no Rod settlement gauges will be positioned on the reduced level formation, as detailed on Hydrock Drawing 15220-HYDROC-XX-XX-DRG-6002 – Rev P1, with the plates (and Vibrating Wire Piezometers

(VWP – 4no) – installed by Geotron Ltd) being housed within 900mm dia manhole rings for protection against the backfill earthworks.

The area immediately around each manhole ring will be compacted in 125mm layers with 10 passes of a smaller BW120 roller. The inside of the manhole rings will be backfilled with self-compacting sands around the plastic sheathing protecting the RSG rods and the piezo wires.

Ongoing testing of both the RSG's and VWP's is detailed on the Hydrock drawing – see below.

SETTLEMENT GAUGE MONITORING FREQUENCY		
Period	Minimum Monitoring Frequency	Comments
Before Placement of Fill	3 Rounds of survey to establish base readings immediately after installation of Settlement Plates	Determination of base line ground level.
During Fill Placement	Daily before start of filling.	Assessment of Immediate Settlement.
	Before and after any rod extension added to settlement plate.	Accurate measurement of any extension rod.
Month 0 to 3	Weekly	Assessment of commencement of Primary Settlement and on-going primary settlement.
Month 3 to 6	Every two weeks	Profile of Primary Settlement, compared to model settlement curves.
After Month 6	If required	Further monitoring may be required based on progress of settlement.

On-site moisture level testing

Daily on site moisture content tests will be performed three times a day by an Environmental Engineer to ascertain if the natural moisture content of the material is between ±2% or ±3% (depending on material type) of the Optimal Moisture Content (OMC). This will be used to dictate whether moisture needs to be added to the material.

This will be done by taking a sample of the material and measuring the natural weight, before drying the material out completely using an oven/industrial microwave and measuring the dry weight. The moisture content can then be calculated.

General Requirements

On completion of the fills to the agreed finished level profile, a **150mm sacrificial layer of granular fills** (recycled concrete and asphalt from site hardstanding arisings) will be spread over the entire development area.

If required, dust suppression will be operated by the means of a towed water bowser fitted with a deflector spray, to reduce dust emissions.

Daily safety checks are to be carried out by the plant operators and recorded on file by the Works Supervisor. If any faults are noticed the machines will be taken out of use until repaired by a competent person.

CHANGES AND AMENDMENTS

VHE Construction plc reserves the right to alter/amend, in consultation with the Principal Designer and/or the Client, the Method of Working as a result of on-going operations.

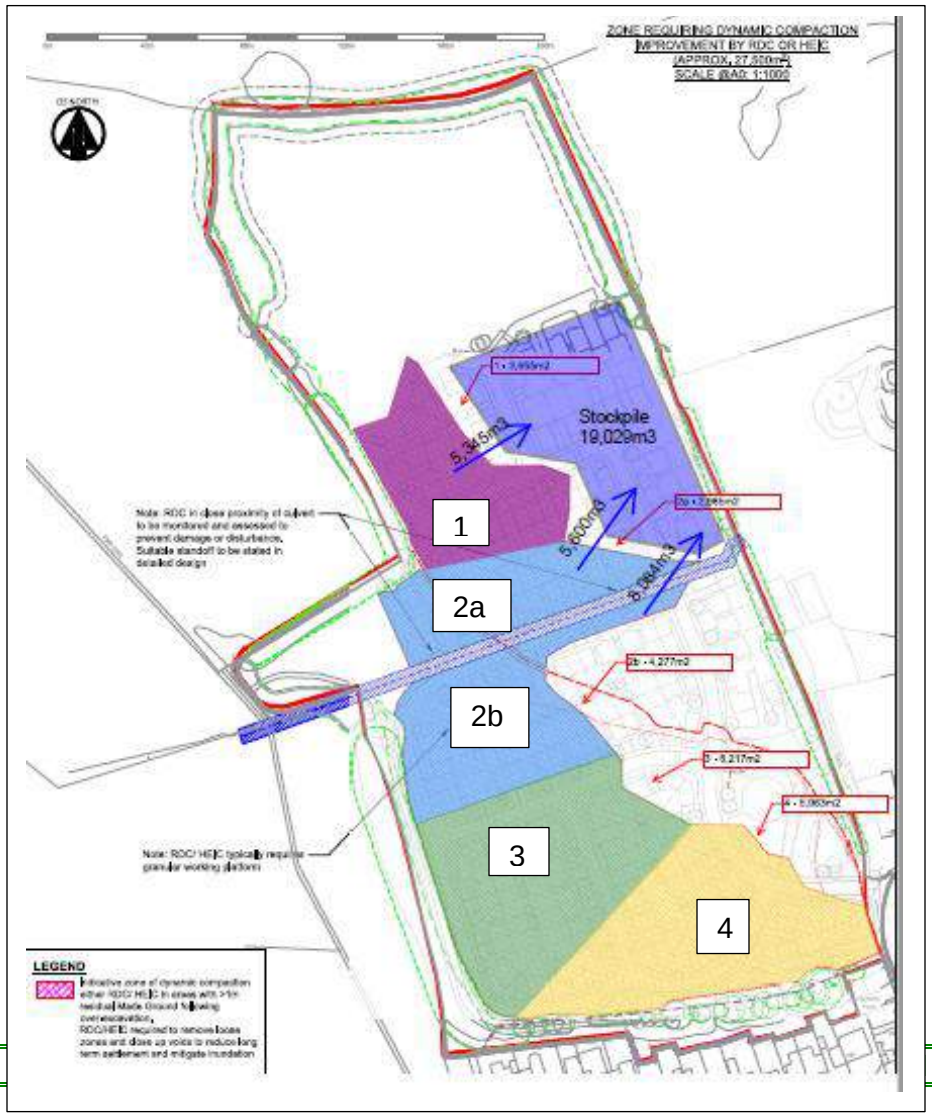
This method and associated risk assessment are considered to be live documents and amendments should be made to reflect any required changes to the working procedure.

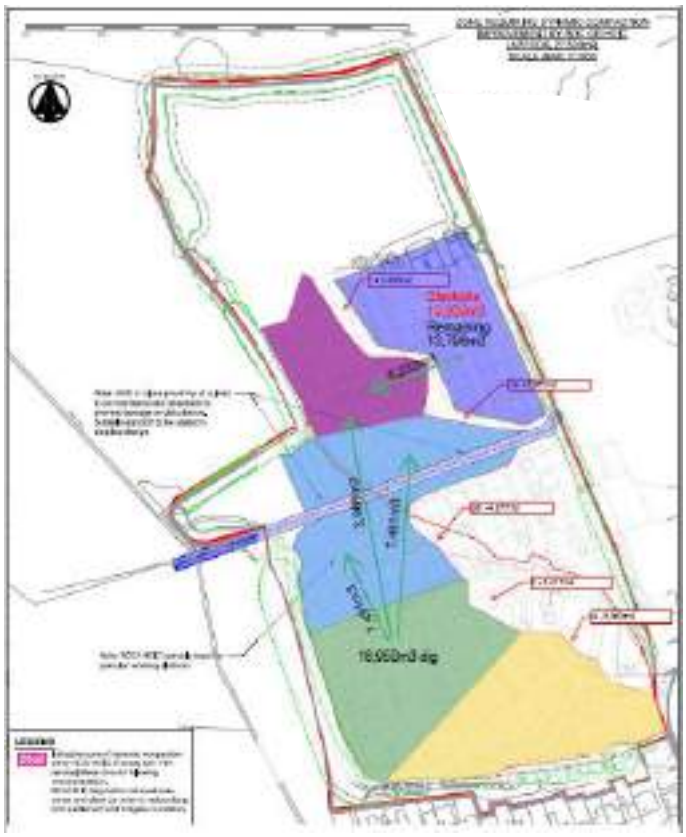
Any unplanned activity considered to be low risk can be addressed by using an Unplanned Risk Assessment. Any medium to high risk activities will need to be fully reviewed and this document amended

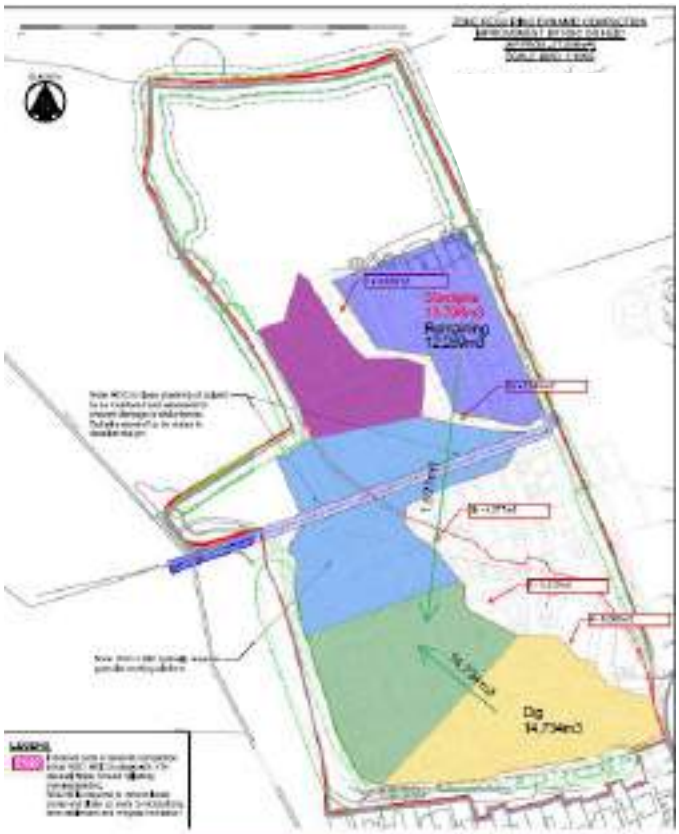
Prepared by:	Seb Gledhill
Approved by:	R Hargreaves (Project Manager)

CF 6.1 Appendix D

Sketches detailing cut / fill volumes in RDC Areas 1 – 4 and outside of RDC Areas



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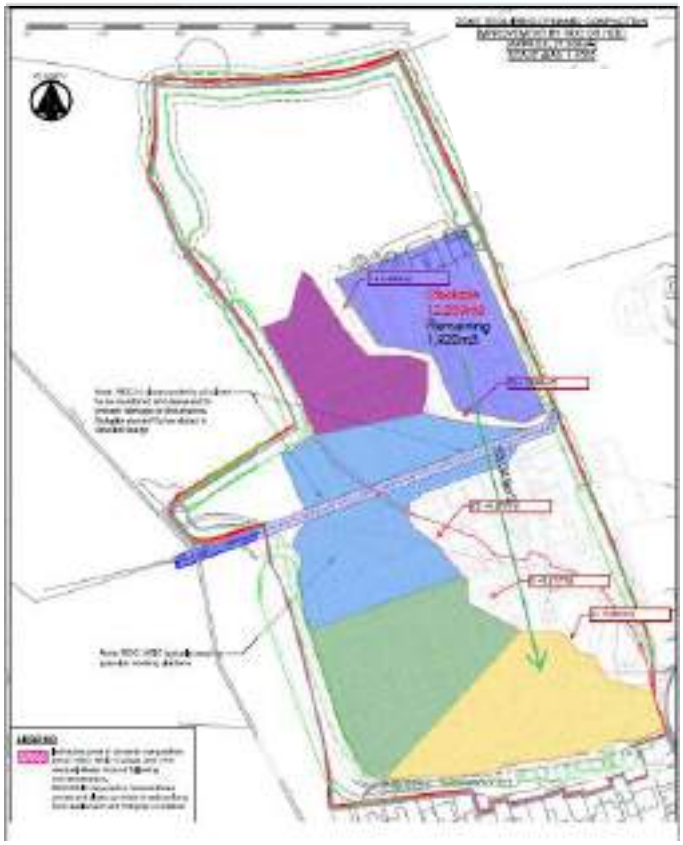
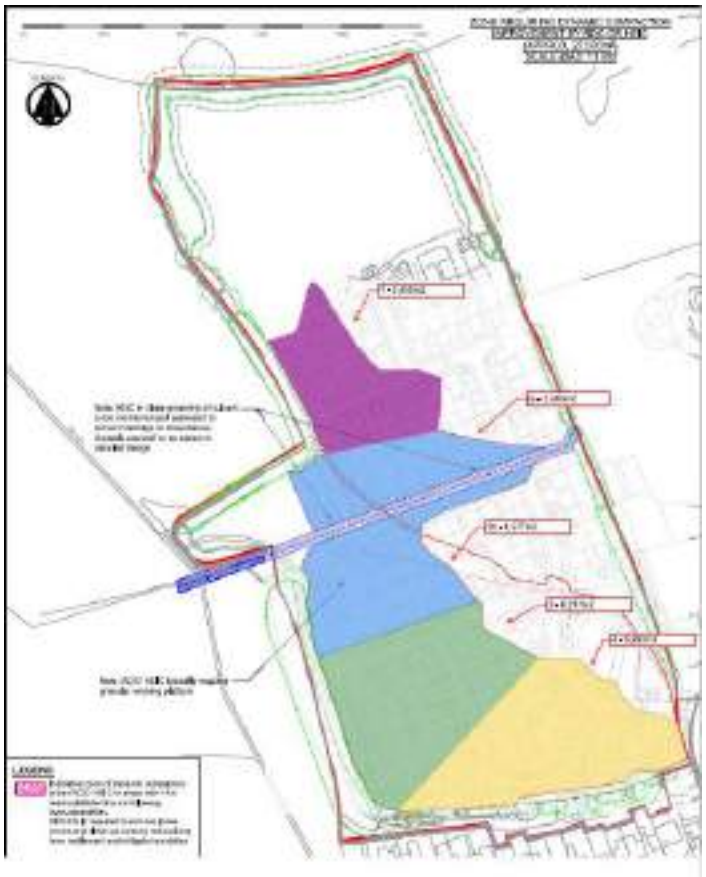
14,734m3





APPENDIX B

VHE Trial Pit Logs

Trial Pit Record

Trial Pit Number	**TP-D8**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.1 - 0.4	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse, sub-angular and angular sandstone.	1x chem, 1x geo	0.1 - 0.4
0.4 - 1.5	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone.		

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Wet and cloudy
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-D15**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**01/06/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse sub-angular concrete, tarmac and sandstone.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 1.0	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to coarse sub-angular concrete, brick and clinker.	1x geotech, 1x chemical	0.3 - 1.0
1.0 - 2.7	MADE GROUND	Dark brown-black gravelly SAND. Gravel is fine to coarse sub-angular brick, clinker and concrete.	1x geotech, 1x chemical	1.0 - 2.7
2.7 - 4.0	MADE GROUND	Orange gravelly SAND. Gravel is fine to coarse angular and sub-angular brick and clinker.	1x geotech, 1x chemical	2.7 - 4.0

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Dry and sunny with scattered clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-D9**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**5/26/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.1 - 0.4	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse, sub-angular and angular sandstone.		
0.4 - 1.2	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone.		
1.2 - 1.5	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone. **This material seemed fined and quite cohesive - almost silt-like.**	1x chem, 1x geo	1.2 - 1.5

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Wet and cloudy
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-D14**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**30/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Grey-black sandy GRAVEL. Gravel is fine to coarse sub-angular sandstone, brick and clinker.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 0.7	MADE GROUND	Black gravelly SAND. Gravel is fine to medium sub-angular sandstone and brick.	1x geotech, 1x chemical	0.3 - 0.7
0.7 - 1.6	MADE GROUND	Orange and black gravelly SAND. Gravel is fine to coarse, sub-angular brick, sandstone and clinker.	1x geotech, 1x chemical	0.7 - 1.6
1.6 - 2.3	MADE GROUND	Orange-black gravelly SAND. Gravel is sub-angular fine to coarse brick.	1x geotech, 1x chemical	1.6 - 2.3
2.3 - 3.0	MADE GROUND	Orange and black gravelly SAND. Gravel is fine to coarse, sub-angular brick, sandstone and clinker.		
3.0 - 4.0	MADE GROUND	Black and yellow soft CLAY.	1x geotech, 1x chemical	3.0 - 4.0

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-E9**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.1 - 0.4	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse, sub-angular and angular sandstone.	1x chem, 1x geo	0.1 - 0.4
0.4 - 1.5	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone.		

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Wet and cloudy
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-E6**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**6/17/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 1.1	MADE GROUND	Grey very gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete and sandstone.	1x chem, 1x geo	0 - 1.1
1.1 - 1.5	NATURAL	Yellow-brown firm CLAY		

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-E7**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**6/17/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.5	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.5 - 1.5	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse, sub-angular and angular sandstone.	1x chem, 1x geo	0.5 - 1.5

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-E8**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.1 - 0.4	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse, sub-angular and angular sandstone.		
0.4 - 1.3	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone and brick.		
1.3 - 1.5	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone. **This material seems finer and more cohesive than the above layer.**	1x chem, 1x geo	0.1 - 0.4

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Wet and cloudy
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-F7**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**6/17/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.4	MADE GROUND	Grey gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, concrete and sandstone.		
0.4 - 1.2	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, concrete and sandstone.	1x chem, 1x geo	0.4 - 1.2
1.2 - 1.5	NATURAL	Yellow-brown firm CLAY		

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-A13**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**06/06/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse sub-angular concrete, tarmac and sandstone.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 3.2	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium sub-angular and sub-rounded clinker, concrete and brick.	3x geotech, 3x chemical	0.3 - 3.2
3.2 - 4.0	MADE GROUND	Black and brown gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, clinker and concrete.	1x geotech, 1x chemical	3.2 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Dry and sunny with scattered clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-A14**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**06/06/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse sub-angular concrete, tarmac and sandstone.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 3.4	MADE GROUND	Grey and black slightly gravelly SAND. Gravel is fine to medium sub-rounded concrete and brick.	3x geotech, 3x chemical	0.3 - 3.4
3.4 - 4.0	MADE GROUND	Grey/brown/black clayey gravelly SAND. Gravel is fine to coarse sub-angular brick, clinker and concrete.	1x geotech, 1x chemical	3.4 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Dry and sunny with scattered clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-A15**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**06/06/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.2	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse sub-angular concrete, tarmac and sandstone.	1x geotech, 1x chemical	0.1 - 0.2
0.2 - 1.3	MADE GROUND	Dark grey gravelly cobbly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete, brick and clinker. Cobbles are sub-angular concrete.	1x geotech, 1x chemical	0.2 - 1.3
1.3 - 2.6	MADE GROUND	Dark grey sandy gravelly COBBLES. Gravel is fine to coarse sub-angular concrete and brick. Cobbles are sub-angular concrete.		
2.6 - 3.3	MADE GROUND	Black gravelly SAND. Gravel is fine to medium sub-angular clinker, sandstone and brick.	1x geotech, 1x chemical	2.6 - 3.3
3.3 - 4.0	MADE GROUND	Black and yellow-brown sandy gravelly CLAY. Gravel is fine to coarse brick, sandstone concrete at clinker. Water at 3.5 m.	1x geotech, 1x chemical	3.3 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

Groundwater encountered at 3.5 m. This was likely only perched water and there wasn't much.

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Dry and sunny with scattered clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-A16**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**06/06/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse sub-angular concrete, tarmac and sandstone.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 2.8	MADE GROUND	Dark grey gravelly cobbly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete, brick and clinker. Cobbles are sub-angular concrete.	3x geotech, 3x chemical	0.3 - 2.8
2.8 - 3.4	MADE GROUND	Black gravelly SAND. Gravel is fine to medium sub-angular and sub-rounded concrete, brick, sandstone, slag and clinker.	1x geotech, 1x chemical	2.8 - 3.4
3.4 - 4.0	MADE GROUND	Grey/brown/black clayey gravelly SAND. Gravel is fine to coarse sub-angular brick, clinker and concrete.	1x geotech, 1x chemical	3.4 - 4.0

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Dry and sunny with scattered clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-B13**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**31/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 2.0	MADE GROUND	Grey gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, concrete, sandstone and clinker.	2x geotech, 2x chemical	0.1 - 2.0
2.0 - 2.8	MADE GROUND	Black gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, concrete, sandstone and clinker.	1x geotech, 1x chemical	2.0 - 2.8
2.8 - 4.0	MADE GROUND	Black/yellow/grey clayey gravelly SAND. Gravel is fine to coarse sub-angular brick and clinker.	1x geotech, 1x chemical	2.8 - 4.0

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Light rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-B14**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**30/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 1.0	MADE GROUND	Dark grey slightly gravelly SAND. Gravel is fine to coarse sub-angular sandstone.	1x geotech, 1x chemical	0.1 - 1.0
1.0 - 1.7	MADE GROUND	Dark brown slightly gravelly SAND. Gravel is fine to coarse sub-angular sandstone.	1x geotech, 1x chemical	1.0 - 1.7
1.7 - 3.0	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded sandstone, brick and clinker.	1x geotech, 1x chemical	1.7 - 3.0
3.0 - 4.0	MADE GROUND	Black/grey/mottled yellow clayey sandy GRAVEL. Gravel is fine to coarse sub-angular clinker, mudstone, coal - a mix of gravel types.	1x geotech, 1x chemical	3.0 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-B15**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**31/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.8	MADE GROUND	Black gravelly cobbly SAND. Gravel is fine to coarse sub-angular concrete, brick and clinker. Cobbles are sub-angular concrete.	1x geotech, 1x chemical	0.1 - 0.8
0.8 - 2.0	MADE GROUND	Black gravelly cobbly SAND. Gravel is fine to coarse sub-angular concrete, brick and clinker. Cobbles are sub-angular concrete. This layer had sporadic pieces of yellow-brown clay and was much cobblier than the above layer.	1x geotech, 1x chemical	0.8 - 2.0
2.0 - 3.5	MADE GROUND	Black and orange-brown sandy gravelly COBBLES. Gravel is fine to coarse sub-angular brick, concrete and clinker. Cobbles are sub-angular concrete. Lots of plastic and industrial waste such as bottles, steel, pipe, wire in this layer. There was also white slay-like material at 2.2 m.	1x geotech, 1x chemical	2.0 - 3.5
3.5 - 4.0	MADE GROUND	Black/yellow/grey clayey gravelly SAND. Gravel is fine to coarse sub-angular brick and clinker.	1x geotech, 1x chemical	3.5 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Light rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-B16**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**31/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 3.0	MADE GROUND	Grey-black gravelly cobbly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, concrete and clinker. Cobbles are sub-angular concrete.	3x geotech, 3x chemical	0.1 - 3.0
3.0 - 4.0	MADE GROUND	Black/yellow/grey clayey gravelly SAND. Gravel is fine to coarse sub-angular brick and clinker.	1x geotech, 1x chemical	3.0 - 4.0

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Light rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-C6**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**6/17/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.3	MADE GROUND	Grey gravelly SAND. Gravel is fine to medium sub-angular concrete and sandstone.		
0.3 - 1.5	MADE GROUND	Dark grey and brown gravelly cobbly SAND. Gravel is fine to coarse sub-angular brick, concrete and sandstone. Cobbles are sub-angular concrete and brick.	1x chem, 1x geo	0.3 - 1.5

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-C7**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 1.0	MADE GROUND	Grey/dark grey SAND and GRAVEL and COBBLES. Gravel is fine to coarse, sub-angular concrete and sandstone. Cobbles are sub-angular concrete and brick.		
1.0 - 1.2	MADE GROUND	Orange and grey gravelly CLAY. Gravel is fine to coarse sub-angular brick.	1x chem, 1x geo	1.0 - 1.2
1.2 - 1.5	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone.		

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny with a few clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-C8**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**6/23/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.6	MADE GROUND	Grey gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, concrete and sandstone.	1x chem, 1x geo	0 - 0.6
0.6 - 1.5	MADE GROUND	Dark grey slightly clayey gravelly cobbly SAND. Gravel is fine to coarse angular and sub-angular brick, concrete and sandstone. Cobbles are sub-angular concrete.		

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-C9**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.1 - 0.4	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse, sub-angular and angular sandstone.		
0.4 - 1.5	MADE GROUND	Dark grey gravelly SAND. Gravel is fine to medium, sub-angular sandstone. **This material seemed fined and quite cohesive - almost silt-like.**	1x chem, 1x geo	0.4 - 1.5

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny with a few clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-C11**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**6/23/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.7	MADE GROUND	Light brown gravelly SAND. Gravel is fine to coarse sub-angular sandstone.		
0.7 - 4.4	MADE GROUND	Dark grey gravelly cobbly SAND. Gravel is fine to coarse sub-angular brick, concrete and clinker. Cobbles are sub-angular concrete. A vertical pipe was found at 0.9 m and ran beyond the depth of excavation.	1x chem, 1x geo	0.7 - 1.5

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-C13**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**30/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Grey-black sandy GRAVEL. Gravel is fine to coarse sub-angular sandstone, brick and clinker.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 0.8	MADE GROUND	Dark grey gravelly cobbly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete and brick. Cobbles are sub-angular concrete.	1x geotech, 1x chemical	0.3 - 0.8
0.8 - 1.0	MADE GROUND	Brown well compacted concrete layer.		
1.0 - 2.0	MADE GROUND	Black and orange gravelly SAND. Gravel is fine to coarse sub-angular brick, concrete, sandstone and clinker.	1x geotech, 1x chemical	1.0 - 2.0
2.0 - 4.0	MADE GROUND	Black/grey/yellow gravelly cobbly SAND. Gravel is fine to coarse sub-angular concrete, brick, clinker and sandstone. Cobbles are sub-angular concrete and brick.	1x geotech, 1x chemical	2.0 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-C14**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**30/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.5	MADE GROUND	Grey-black sandy GRAVEL. Gravel is fine to coarse sub-angular sandstone, brick and clinker.	1x geotech, 1x chemical	0.1 - 0.5
0.5 - 1.0	MADE GROUND	Black gravelly SAND. Gravel is fine to medium sub-angular sandstone and brick.	1x geotech, 1x chemical	0.5 - 1.0
1.0 - 1.7	MADE GROUND	Black sandy gravelly COBBLES. Gravel is fine to coarse sub-angular concrete and brick. Cobbles are sub-angular concrete.		
1.7 - 2.0	MADE GROUND	Black gravelly SAND. Gravel is fine to medium sub-angular and sub-rounded brick, clinker and sandstone.	1x geotech, 1x chemical	1.7 - 2.0
2.0 - 2.4	MADE GROUND	Grey/orange/brown gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, clinker and sandstone.	1x geotech, 1x chemical	2.0 - 2.4
2.4 - 4.0	MADE GROUND	Orange gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded brick, clinker and sandstone.	1x geotech, 1x chemical	2.4 - 4.0

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Rain and cloud
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

Trial Pit Record

Trial Pit Number	**TP-C15**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**01/06/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.1	MADE GROUND	Tarmac layer		
0.1 - 0.3	MADE GROUND	Yellow-brown sandy GRAVEL. Gravel is fine to coarse sub-angular concrete, tarmac and sandstone.	1x geotech, 1x chemical	0.1 - 0.3
0.3 - 2.0	MADE GROUND	Dark grey gravelly cobbly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete, brick and clinker. Cobbles are sub-angular concrete.	2x geotech, 2x chemical	0.3 - 2.0
2.0 - 3.2	MADE GROUND	Black gravelly cobbly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete, brick and clinker. Cobbles are sub-angular concrete.	1x geotech, 1x chemical	2.0 - 3.2
3.2 - 4.0	MADE GROUND	Black and brown gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded concrete, brick and clinker.	1x geotech, 1x chemical	3.2 - 4.0

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Dry and sunny with scattered clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-D6**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.3	MADE GROUND	Grey slightly gravelly SAND. Gravel is fine and sub-angular concrete.		
0.3 - 0.8	MADE GROUND	Grey sandy gravelly COBBLES. Gravel is fine to coarse, sub-angular concrete and cobbles are sub-angular concrete.		
0.8 - 1.5	MADE GROUND	Black gravelly cobbly SAND. Gravel is fine to coarse, sub-angular and sub-rounded brick, concrete and sandstone. Cobbles are subangular concrete. **Material very ashy.**	1x chem, 1x geo	0.8 - 1.5

Photographic Record

Description:	Pre-classification of the material

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Wet and cloudy
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Trial Pit Record

Trial Pit Number	**TP-D7**
Project Name:	**Stopes Road**
VHE Project No:	**808**
Date:	**26/05/2022**
Logged by:	**M.Mains**
Coordinates:	
Client:	

VHE Construction plc.
Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT
Company No: 1457182
Office : 01226 320150

Depth (m):	Strata Encountered		Sample Details:	Sample Depth (m):
0 - 0.6	MADE GROUND	Grey/dark grey SAND and GRAVEL and COBBLES. Gravel is fine to coarse, sub-angular concrete and sandstone. Cobbles are sub-angular concrete and brick.	1x chem, 1x geo	0 - 0.6
0.6 - 1.3	MADE GROUND	Dark grey sandy GRAVEL. Gravel is fine to coarse, sub-angular and sub-rounded brick and sandstone.		
1.3 - 1.5	NATURAL	Yellow and black firm CLAY.		

Photographic Record

Groundwater Record

No groundwater encountered

Trial Pit Information:

Dimension (approx):	1.2 m x 3 m
Excavation Method	13T Excavator
Weather:	Sunny with a few clouds
Breaking Out:	Not required
Trial Pit Stability:	Stable
Backfill:	Upon Completion arisings were backfilled and in reverse order.
Contamination evidence:	None
Trial Pit End:	Trial pit terminated at excavation turnover depth.

Description:	Pre-classification of the material

APPENDIX C

Geotechnical Certificates

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/1
Date of Issue 02 July 2022
Page 1 of 26

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

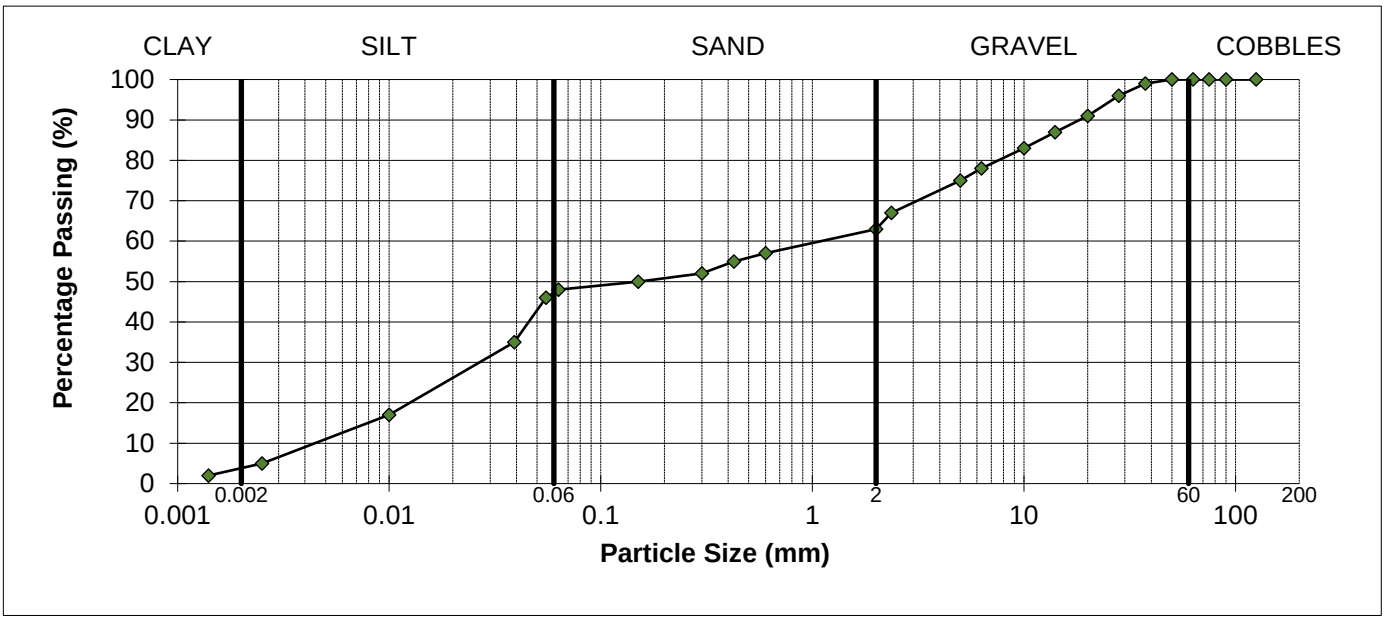
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD6-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112660	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	67	
90	100		2	63	
75	100		0.6	57	
63	100		0.425	55	
50	100		0.3	52	
37.5	99		0.15	50	
28	96		0.063	48	
20	91		0.055	46	
14	87		0.039	35	
10	83		0.01	17	
6.3	78		0.0025	5	
5	75		0.0014	2	



REMARKS
As received moisture content = 22%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

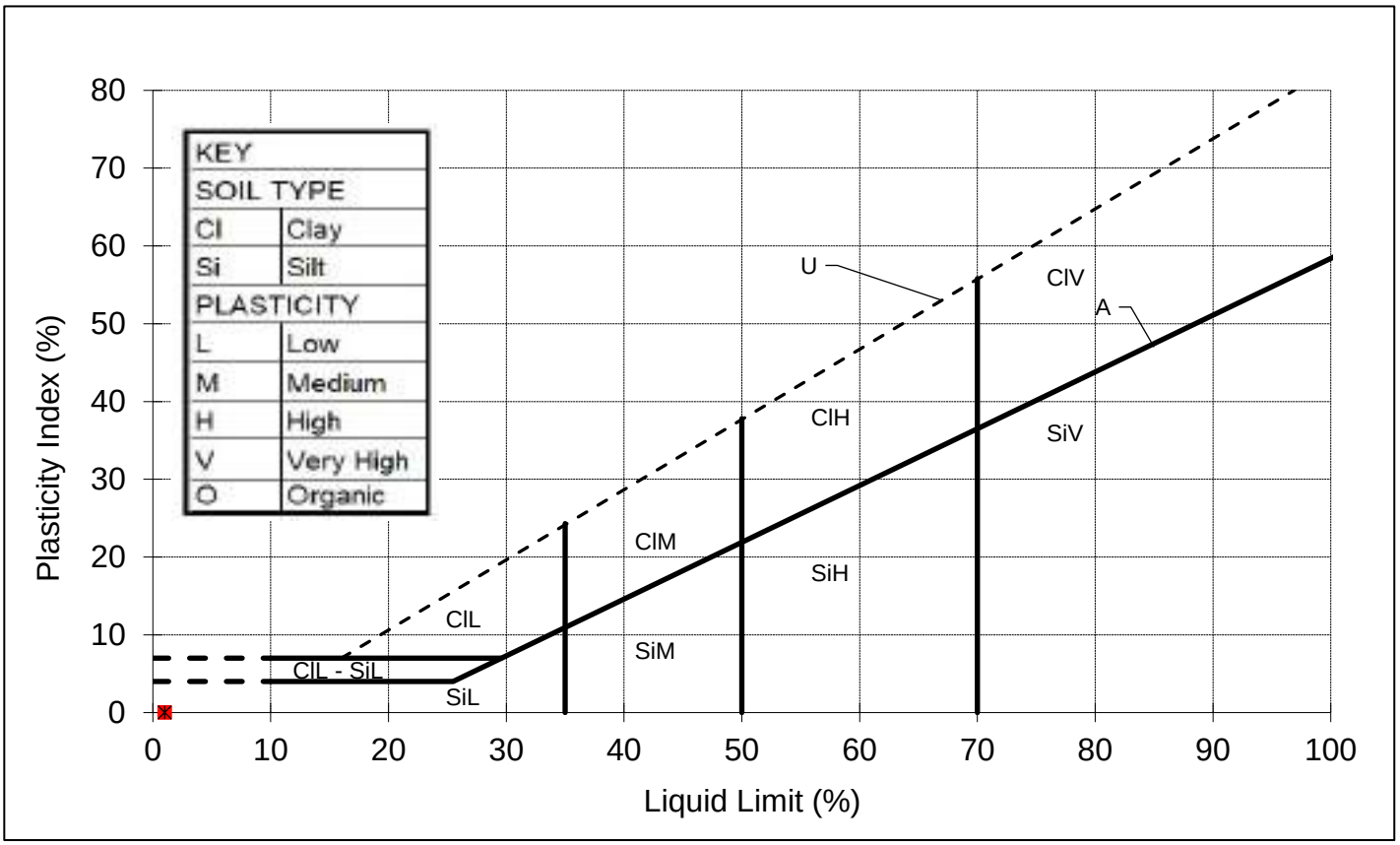
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD6-1	DATE SAMPLED	26-May-22
SAMPLE No.	112660	DATE RECEIVED	31-May-22
DATE TESTED	16-May-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
22	N/A	Non Plastic	N/A	55



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 02-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

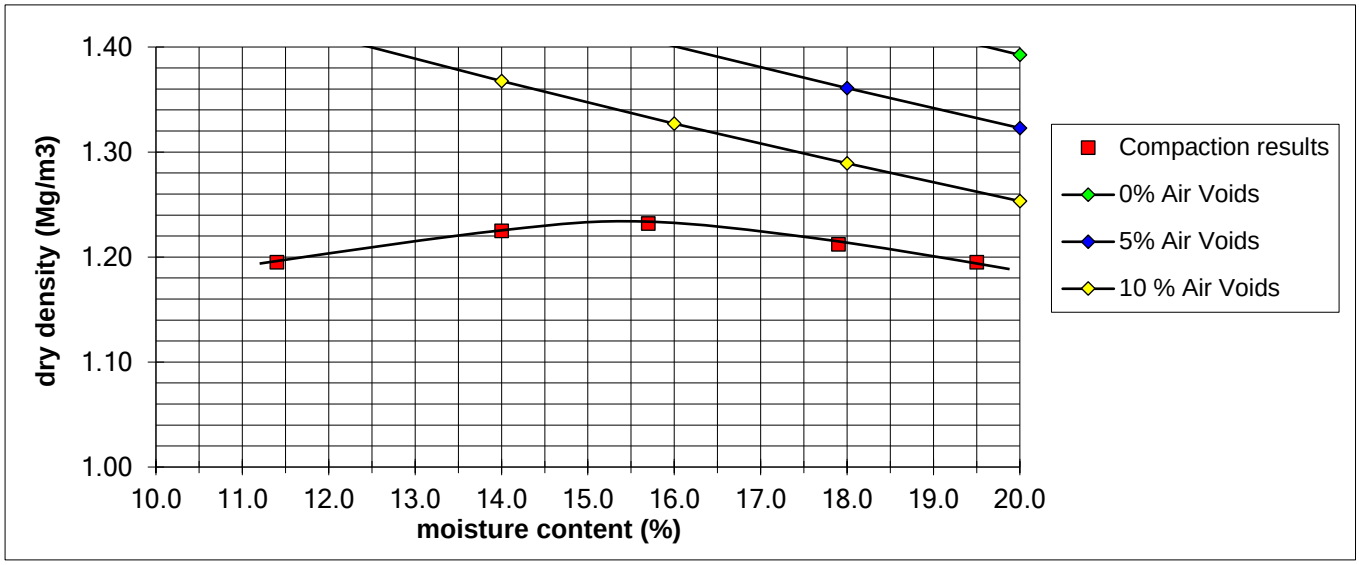
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD6-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112660	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.4	1.195
2		14.0	1.225
3		15.7	1.232
4		17.9	1.212
5		19.5	1.195
	Optimum	15.0	
	Maximum		1.23
	Particle Density	1.93 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 1%
Percentage of material retained on 20mm sieve = 9%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

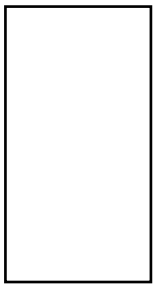
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD6-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112660	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	22	%
BULK DENSITY	1.43	Mg/m3
DRY DENSITY	1.18	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 02-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

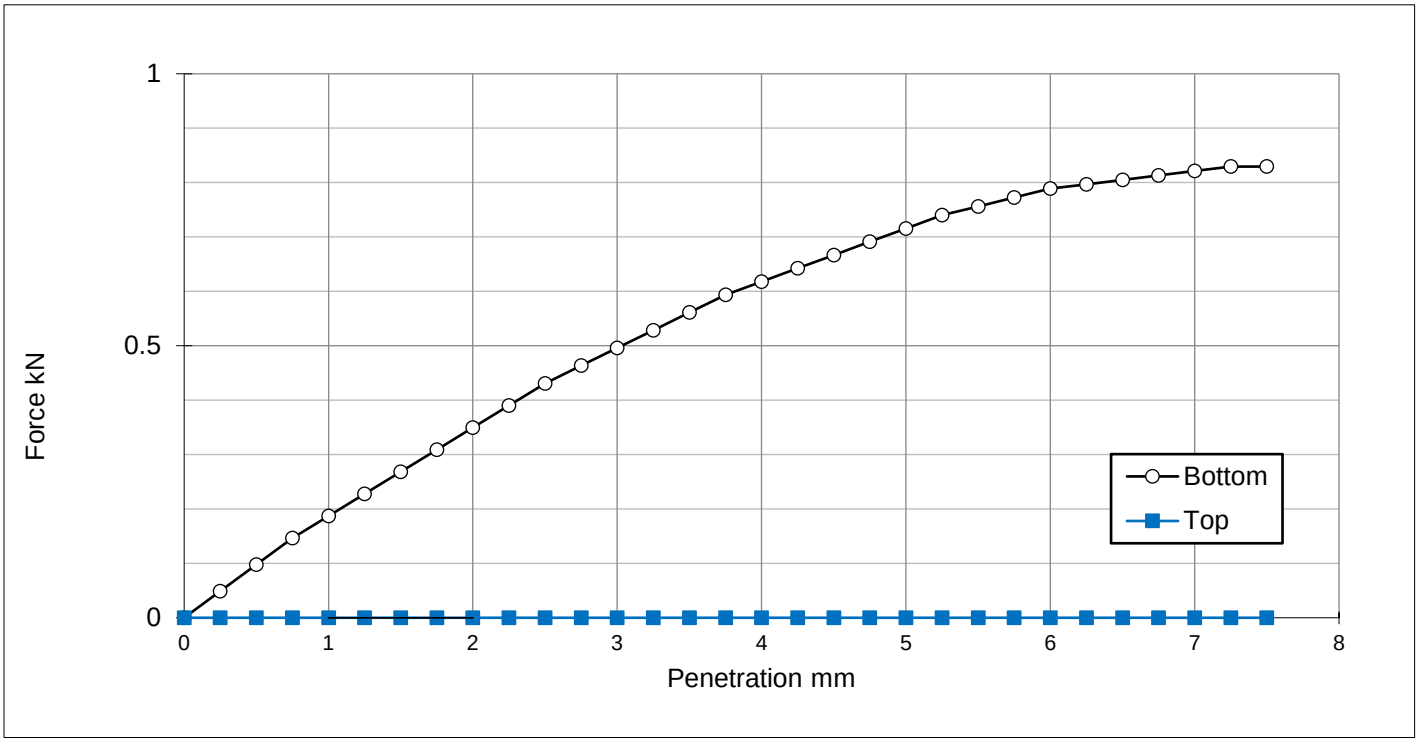
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD6-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112660	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		9 %			
BULK DENSITY	1.43 Mg/m3	MOISTURE CONTENT	22 %	DRY DENSITY	1.18 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	22	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 02-Jul-22

M U R R A Y R I X
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

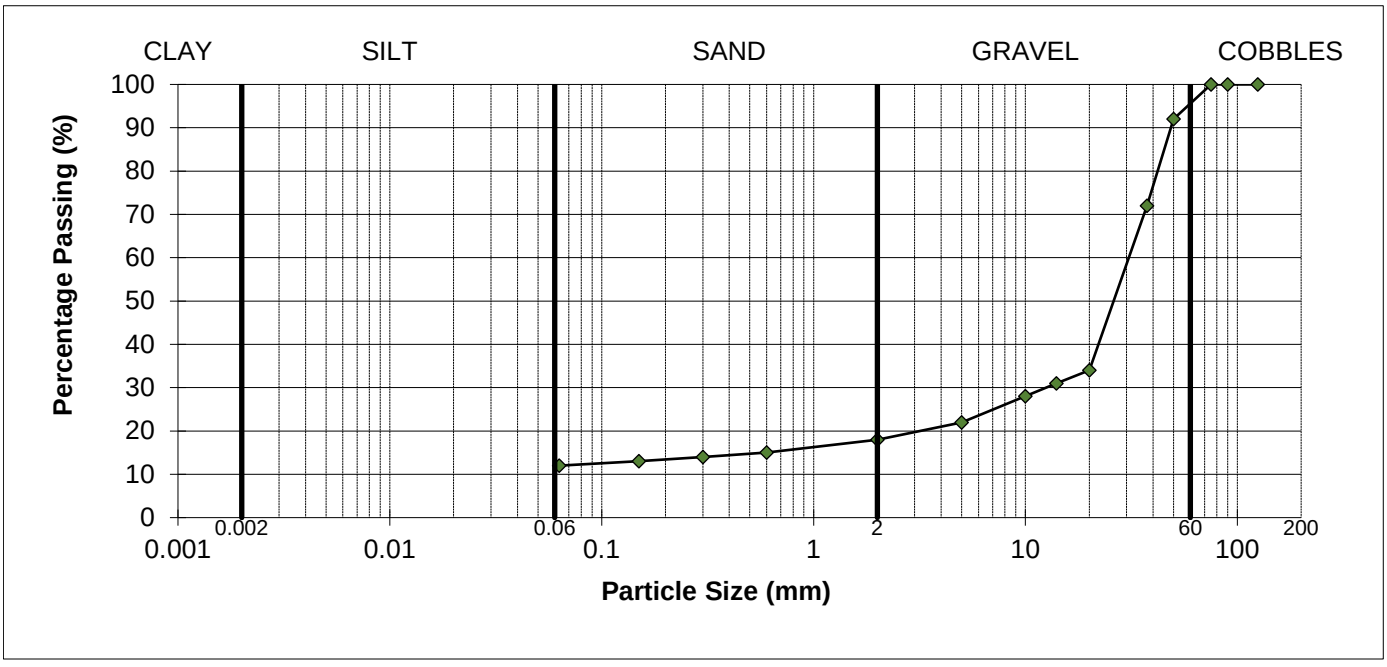
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD8-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112661	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	28	
90	100		5	22	
75	100		2	18	
50	92		0.6	15	
37.5	72		0.3	14	
20	34		0.15	13	
14	31		0.063	12	



REMARKS
As received moisture content = 4.7%, Uniformity coefficient = >10

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

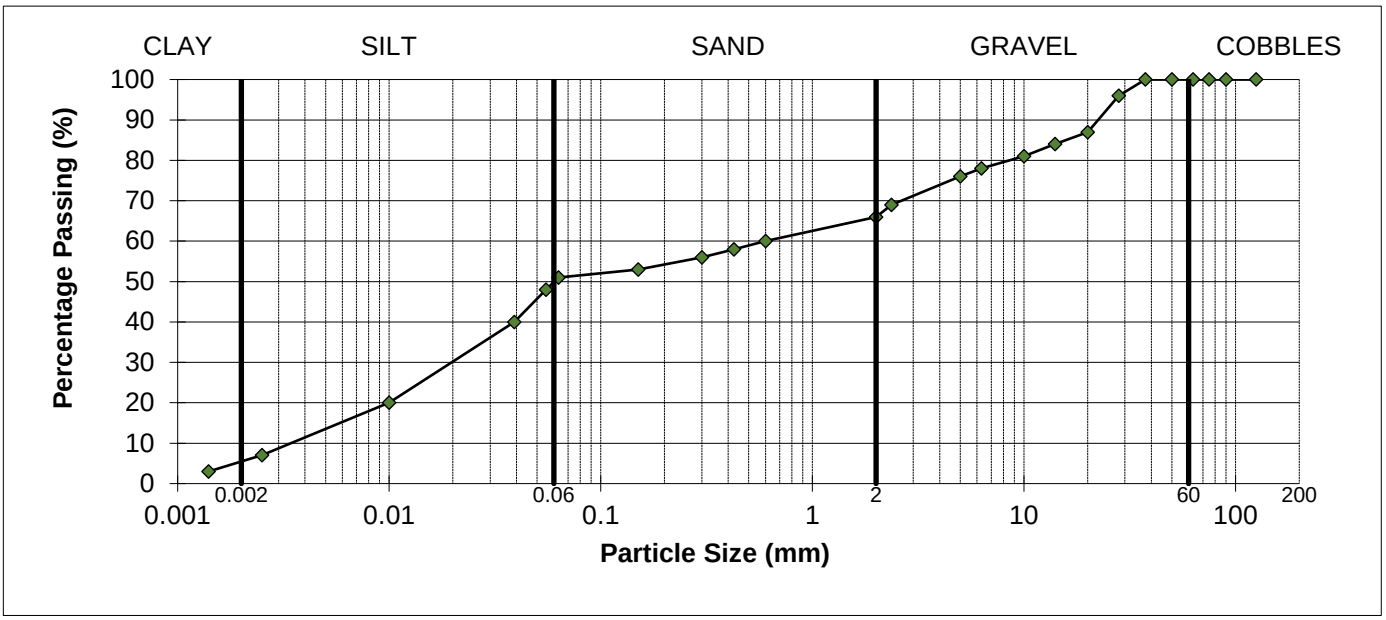
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPE8-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112662	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	69	
90	100		2	66	
75	100		0.6	60	
63	100		0.425	58	
50	100		0.3	56	
37.5	100		0.15	53	
28	96		0.063	51	
20	87		0.055	48	
14	84		0.039	40	
10	81		0.01	20	
6.3	78		0.0025	7	
5	76		0.0014	3	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

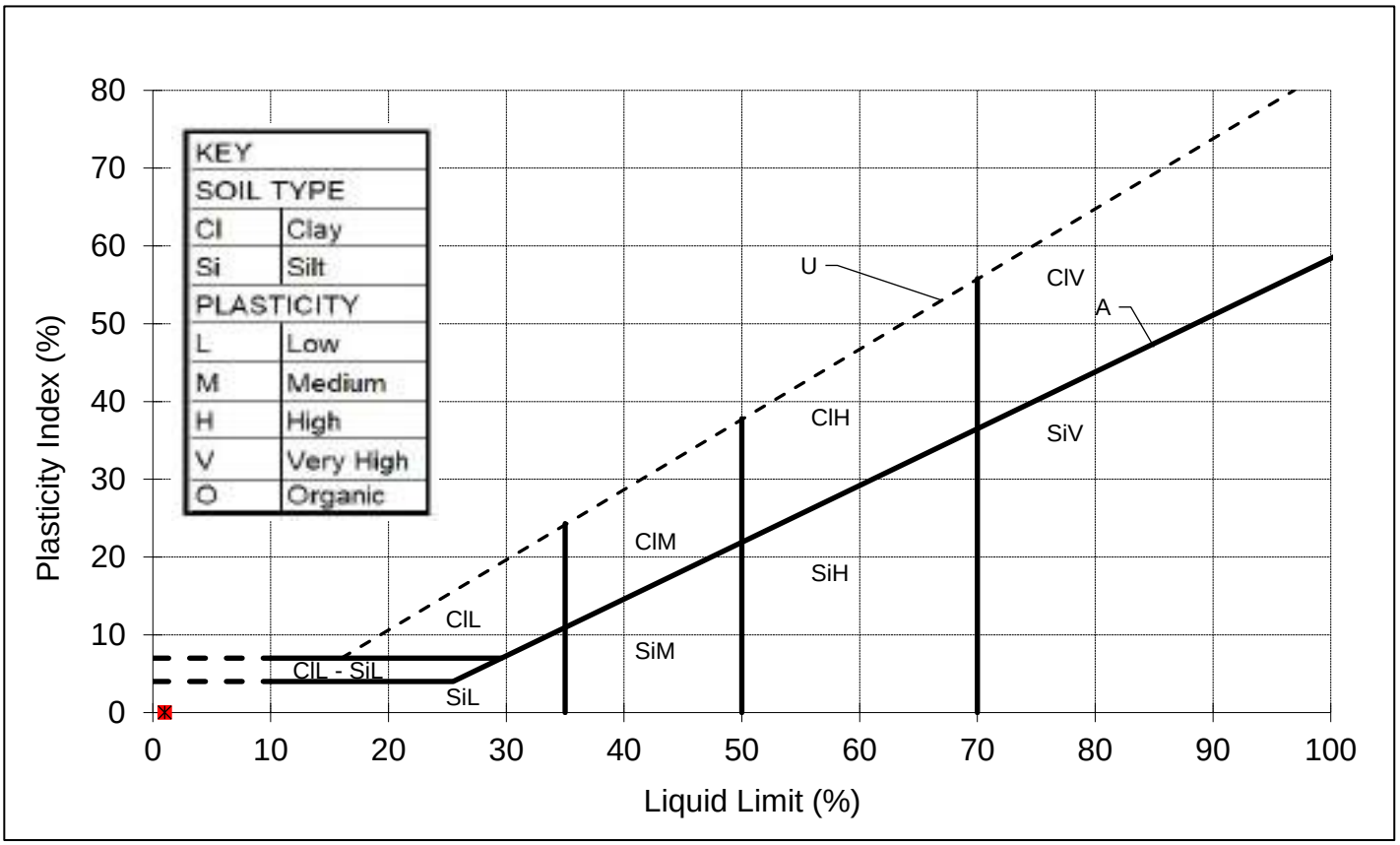
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPE8-1	DATE SAMPLED	26-May-22
SAMPLE No.	112662	DATE RECEIVED	31-May-22
DATE TESTED	16-May-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	58



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 02-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
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TEL 0161 475 0870

TEST CERTIFICATE

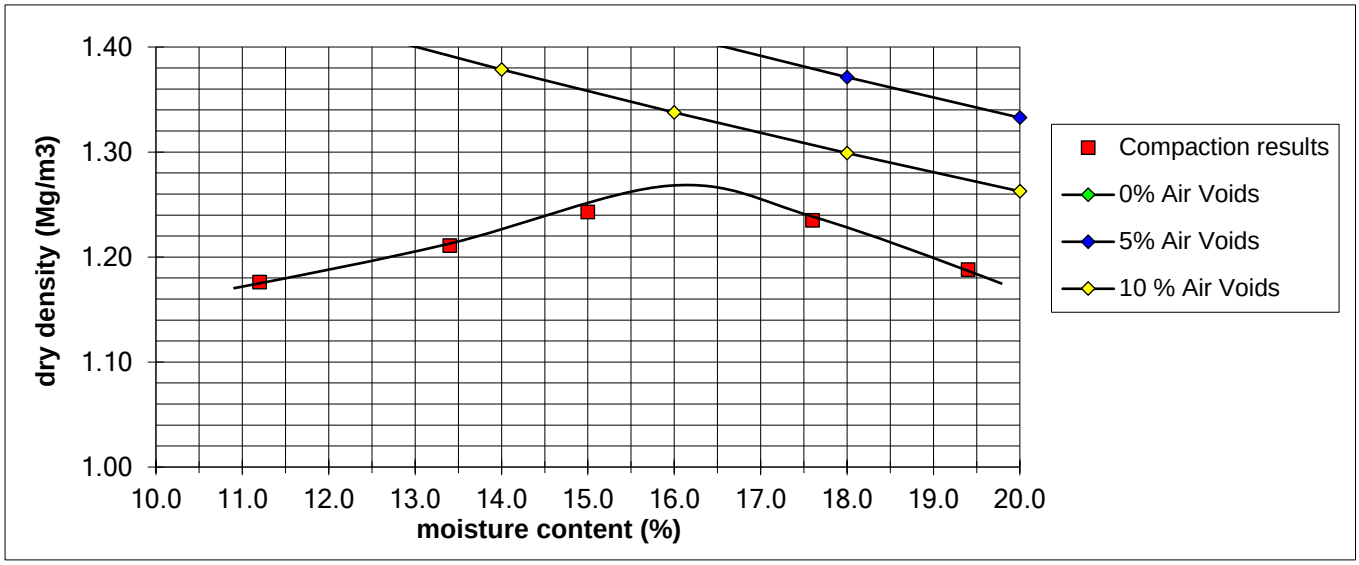
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPE8-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112662	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.2	1.176
2		13.4	1.211
3		15.0	1.243
4		17.6	1.235
5		19.4	1.188
	Optimum	16.0	
	Maximum		1.27
	Particle Density	1.95 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 13%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

M U R R A Y R I X

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TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

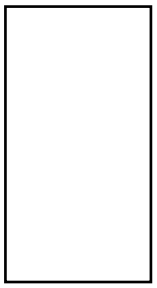
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPE8-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112662	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	21	%
BULK DENSITY	1.37	Mg/m3
DRY DENSITY	1.13	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 02-Jul-22

MURRAY RIX

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TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

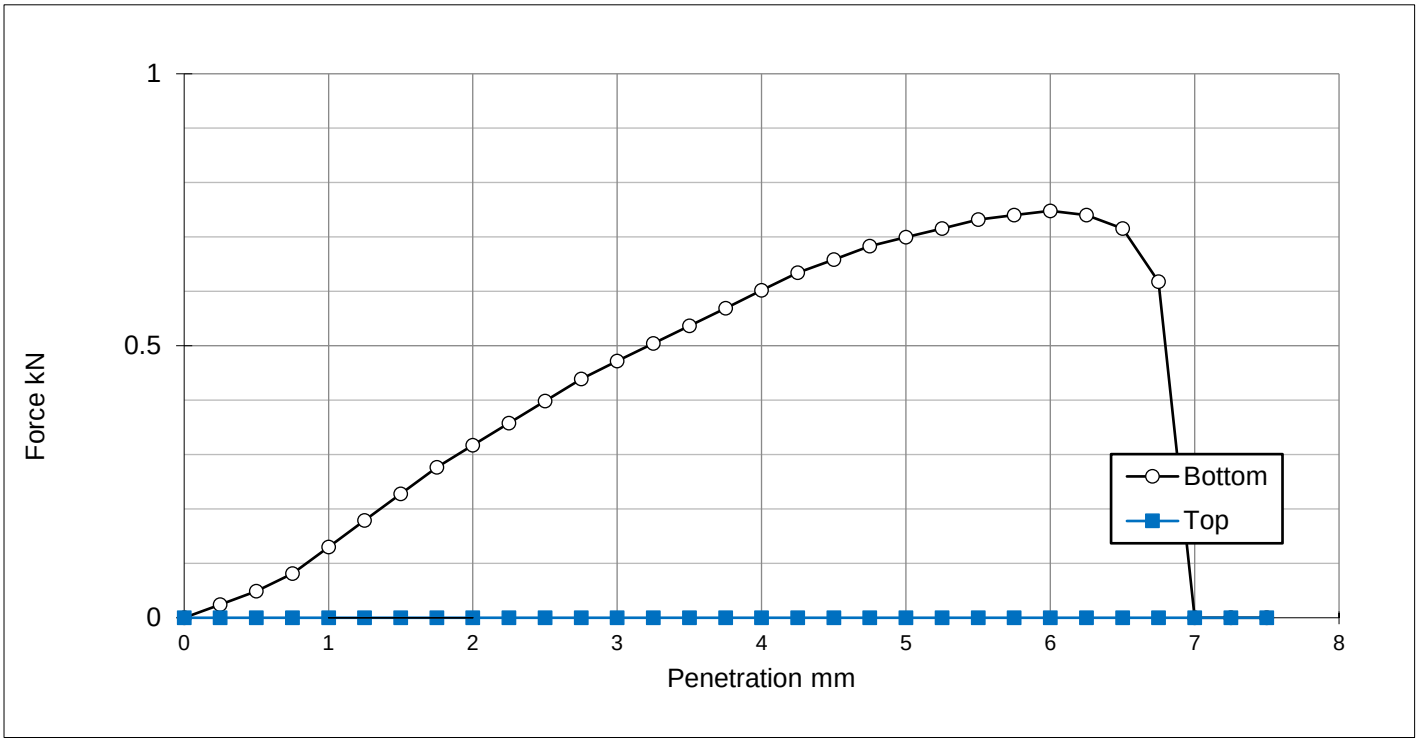
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPE8-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112662	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		13 %			
BULK DENSITY	1.37 Mg/m3	MOISTURE CONTENT	21 %	DRY DENSITY	1.13 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE		ORIGIN CORRECTION		FINAL MOISTURE CONTENT	
Top	N/A %	Top	N/A mm	Top	N/A %
Bottom	3.5 %	Bottom	N/A mm	Bottom	21 %

REMARKS
Sample sheared at 6mm penetration

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 02-Jul-22

M U R R A Y R I X

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TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

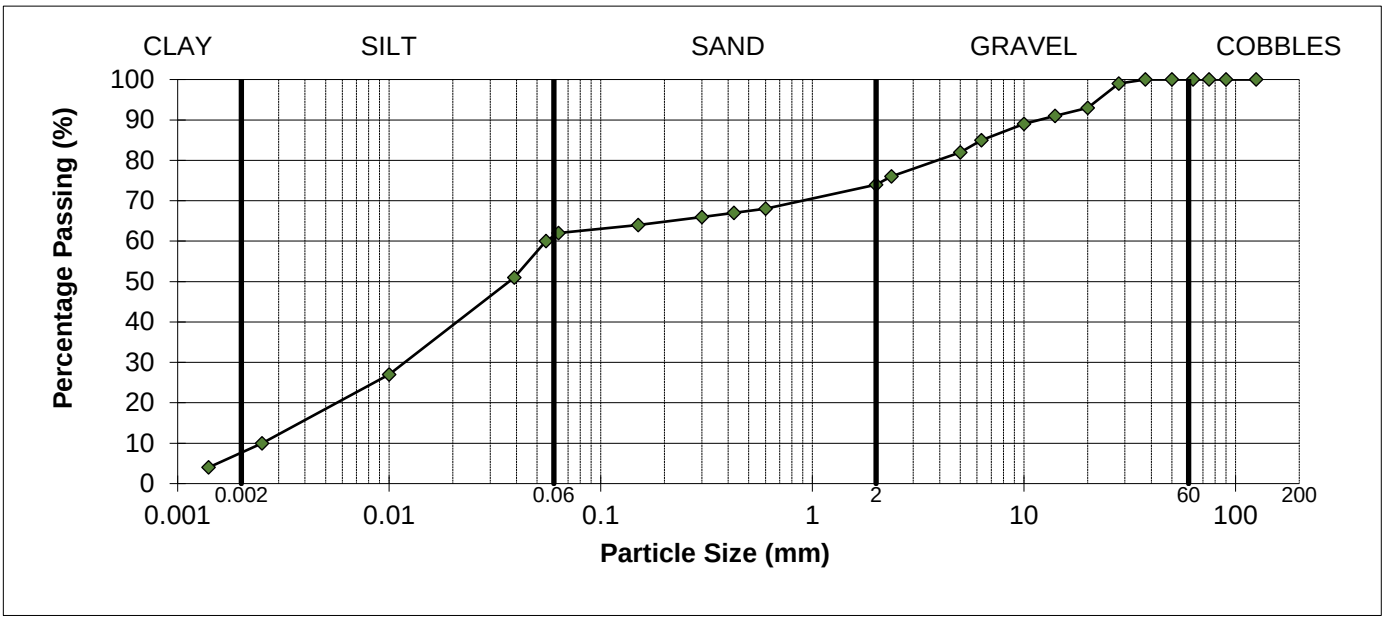
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112663	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	76	
90	100		2	74	
75	100		0.6	68	
63	100		0.425	67	
50	100		0.3	66	
37.5	100		0.15	64	
28	99		0.063	62	
20	93		0.055	60	
14	91		0.039	51	
10	89		0.01	27	
6.3	85		0.0025	10	
5	82		0.0014	4	



REMARKS
As received moisture content = 24%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

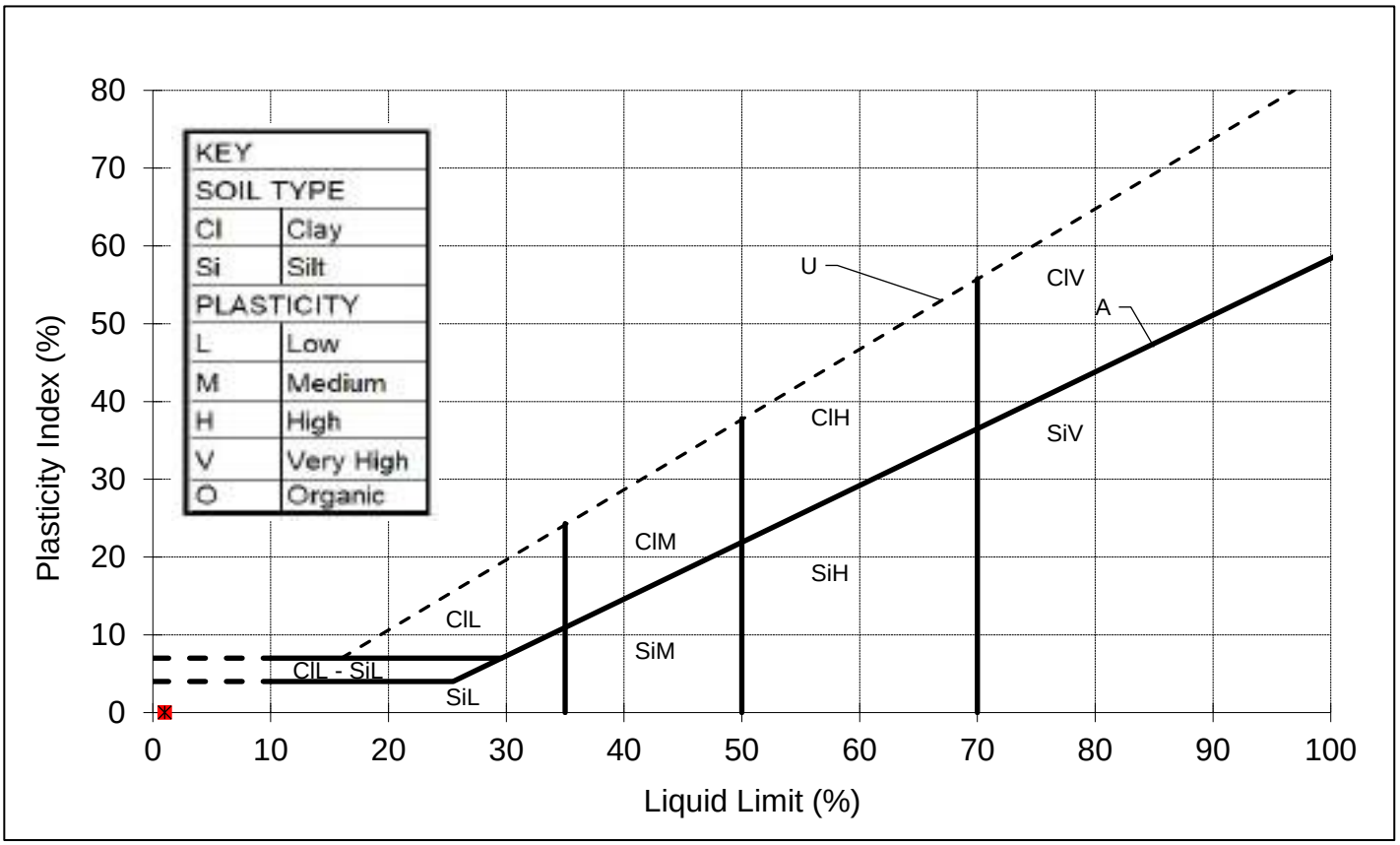
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC9-1	DATE SAMPLED	26-May-22
SAMPLE No.	112663	DATE RECEIVED	31-May-22
DATE TESTED	16-May-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 02-Jul-22

M U R R A Y R I X

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TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

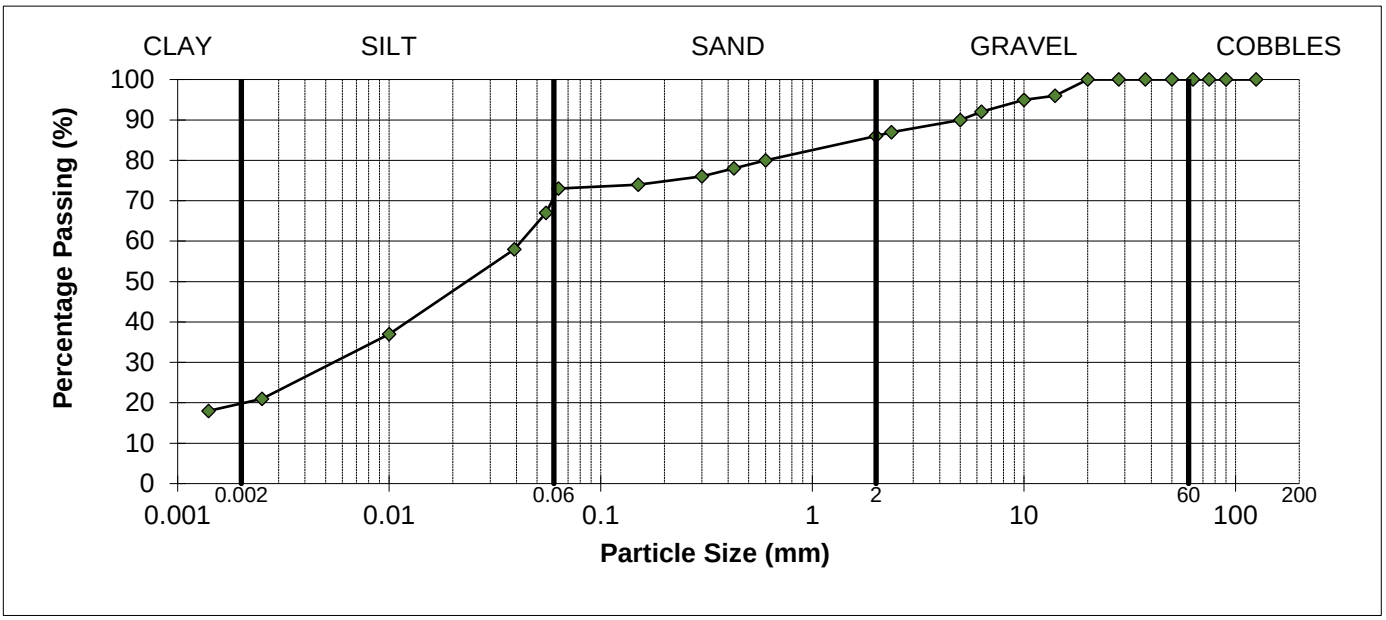
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC7-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112664	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	87	
90	100		2	86	
75	100		0.6	80	
63	100		0.425	78	
50	100		0.3	76	
37.5	100		0.15	74	
28	100		0.063	73	
20	100		0.055	67	
14	96		0.039	58	
10	95		0.01	37	
6.3	92		0.0025	21	
5	90		0.0014	18	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

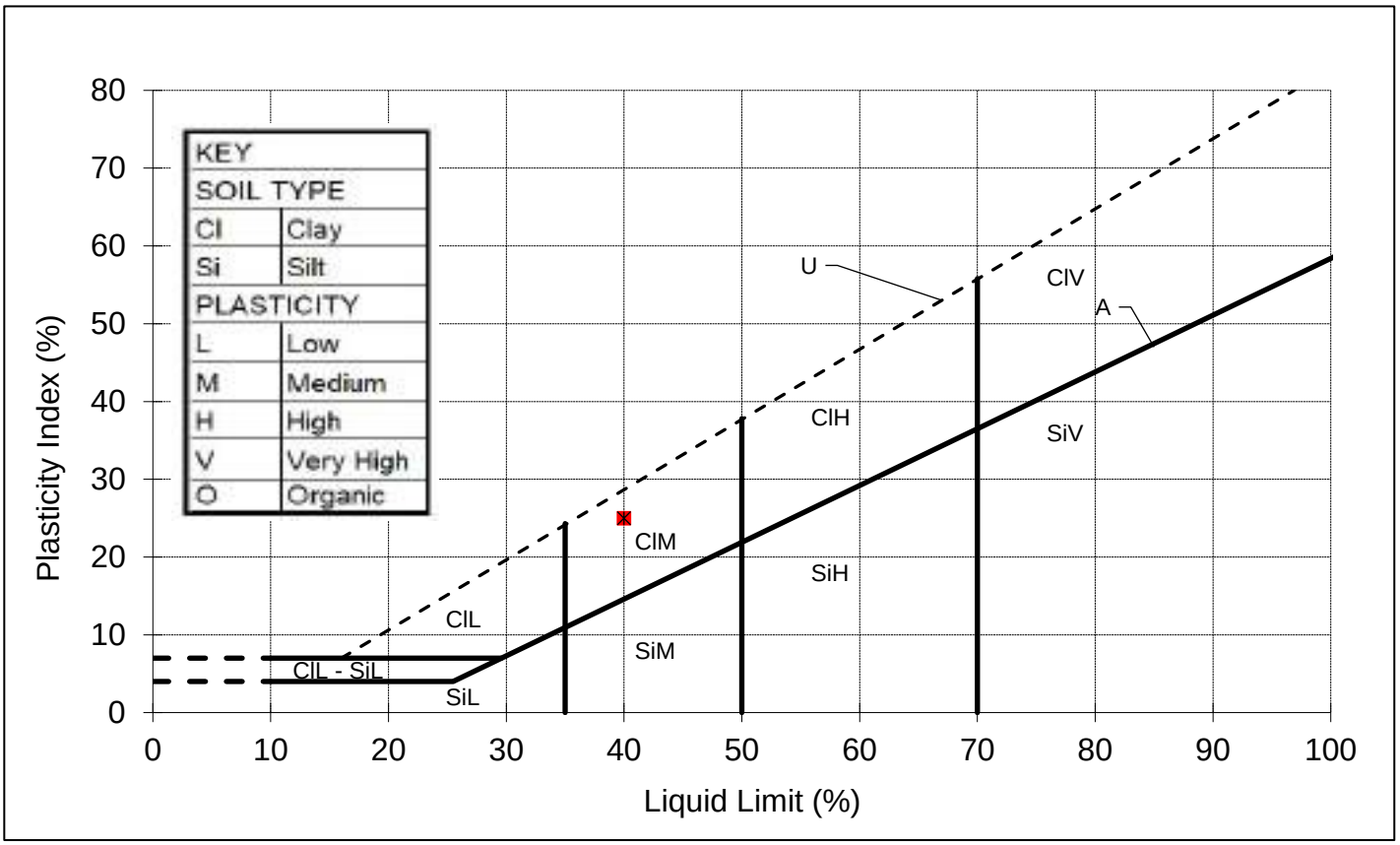
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC7-1	DATE SAMPLED	26-May-22
SAMPLE No.	112664	DATE RECEIVED	31-May-22
DATE TESTED	16-May-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	40	15	25	78



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 02-Jul-22

form omcram

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

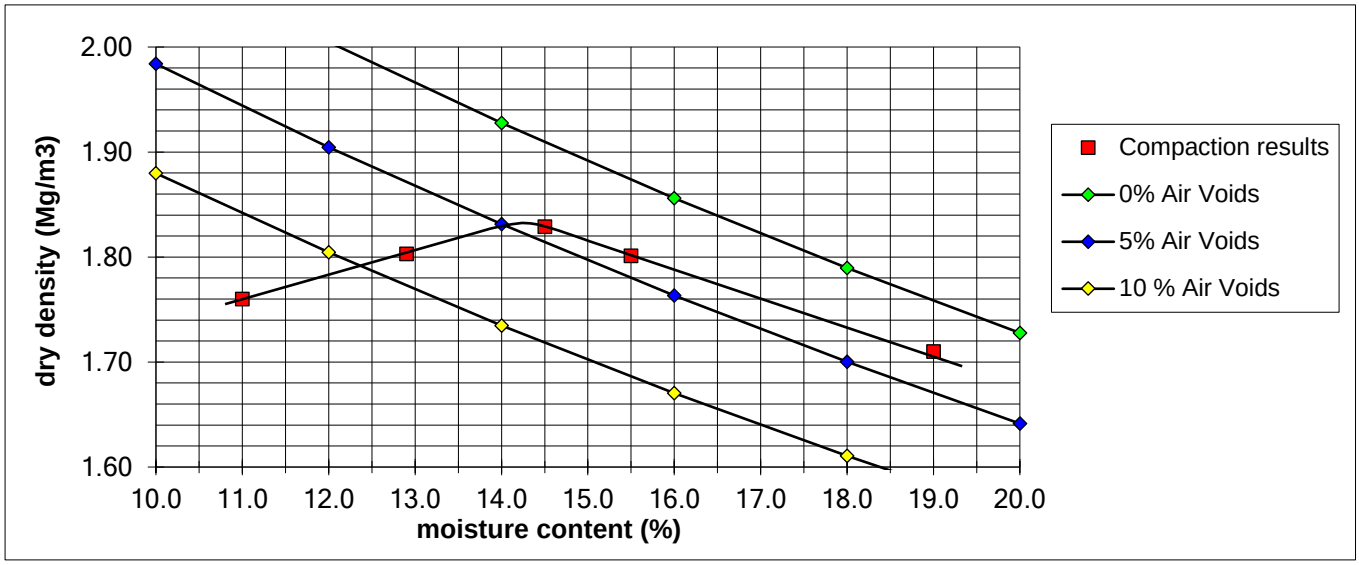
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC7-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112664	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.0	1.760
2		12.9	1.803
3		14.5	1.829
4		15.5	1.801
5		19.0	1.710
	Optimum	14.0	
	Maximum		1.83
	Particle Density	2.64 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 13%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

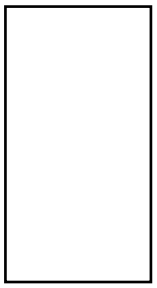
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC7-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112664	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	18	%
BULK DENSITY	2.02	Mg/m3
DRY DENSITY	1.71	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
200	20	1.51	239.5	120

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer,

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 02-Jul-22

MURRAY RIX

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TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

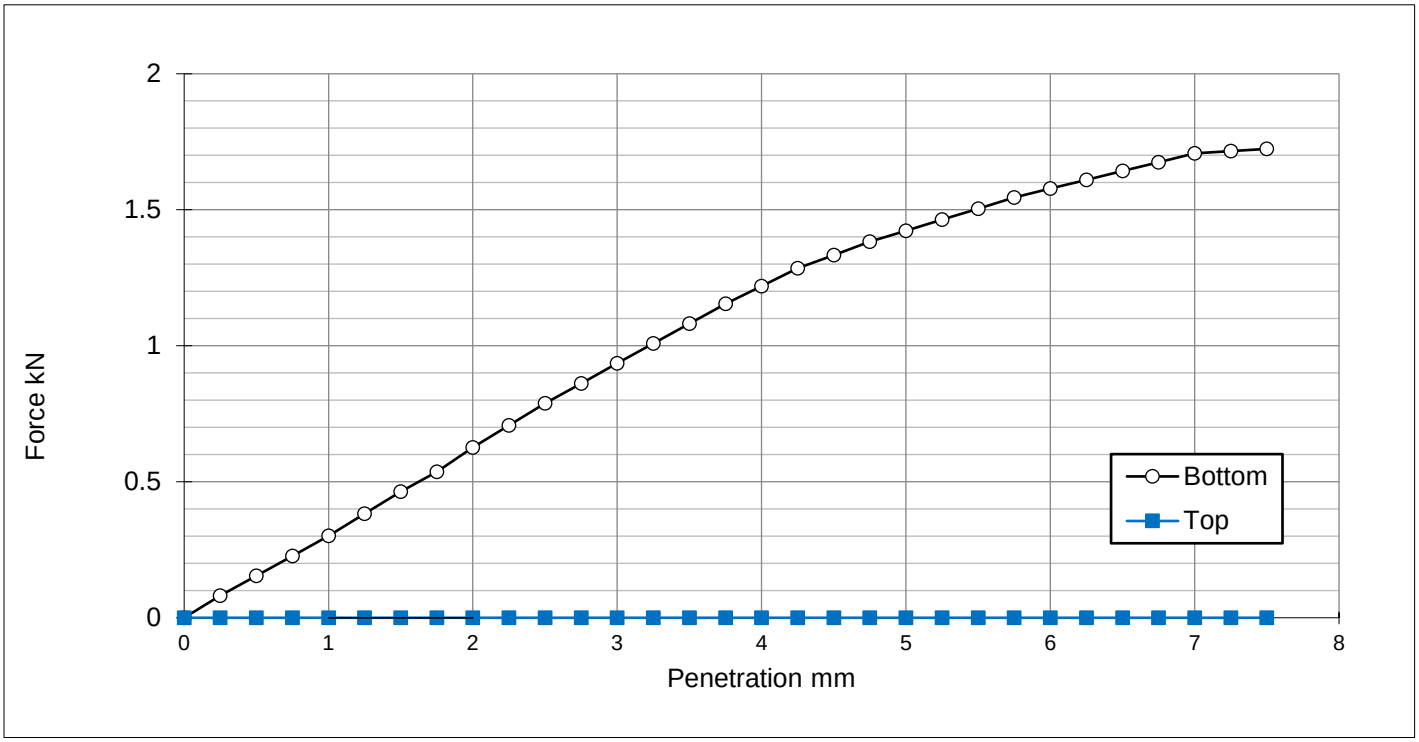
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPC9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112664	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	2.02 Mg/m3	MOISTURE CONTENT	18 %	DRY DENSITY	1.71 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE			ORIGIN CORRECTION			FINAL MOISTURE CONTENT		
Top	N/A	%	Top	N/A	mm	Top	N/A	%
Bottom	7.1	%	Bottom	N/A	mm	Bottom	18	%

REMARKS
Sample sheared at 6mm penetration

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 02-Jul-22

M U R R A Y R I X
ANDREW HOUSE, HADFIELD STREET,
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UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

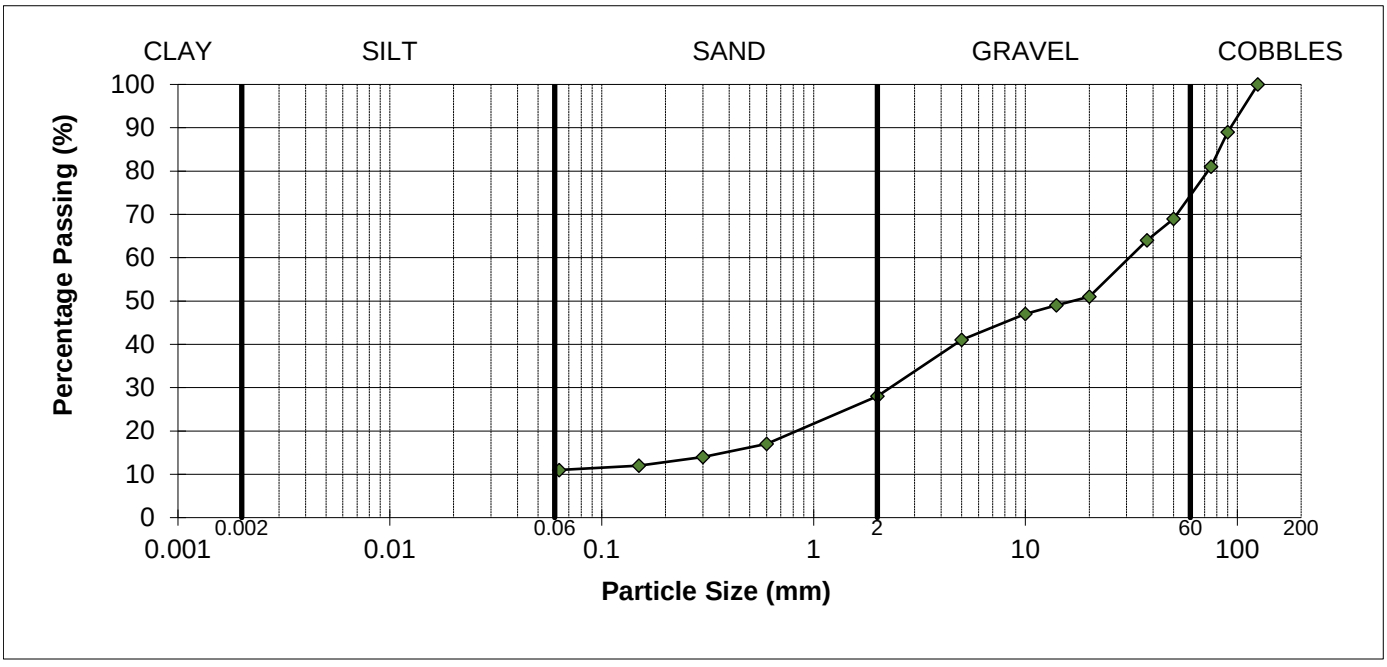
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD7-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112665	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	47	
90	89		5	41	
75	81		2	28	
50	69		0.6	17	
37.5	64		0.3	14	
20	51		0.15	12	
14	49		0.063	11	



REMARKS
As received moisture content = 11%, Uniformity coefficient = >10

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

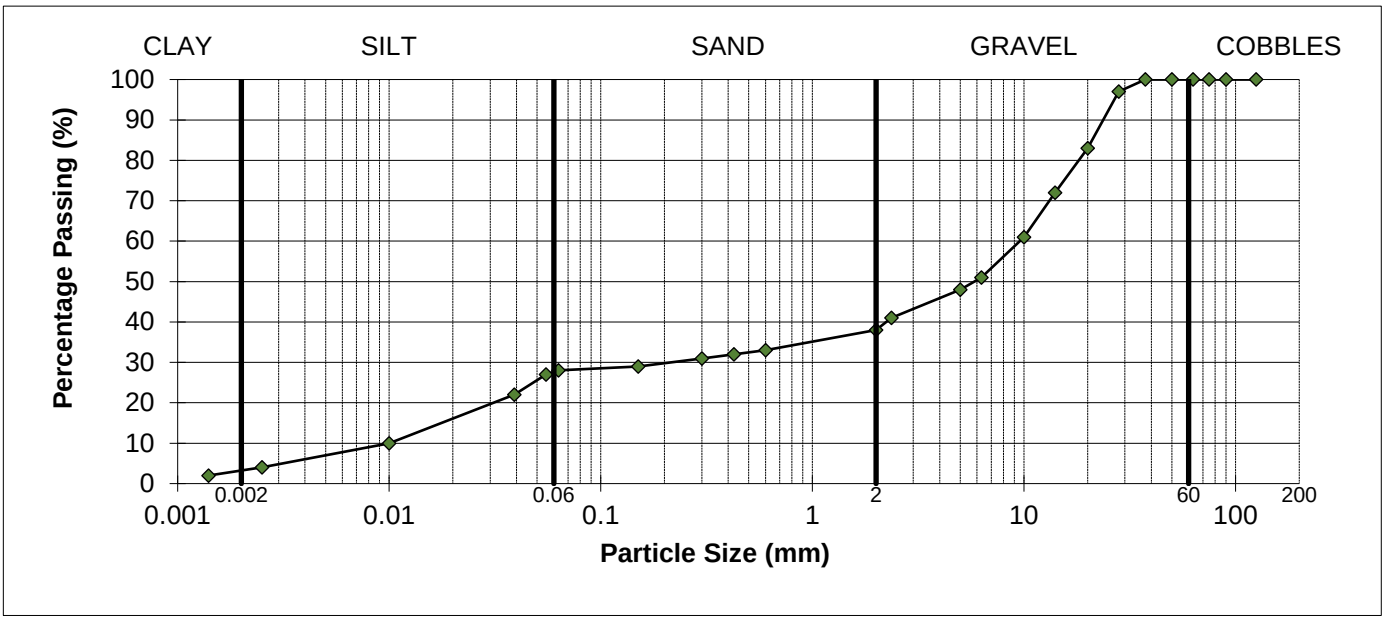
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112666	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	41	
90	100		2	38	
75	100		0.6	33	
63	100		0.425	32	
50	100		0.3	31	
37.5	100		0.15	29	
28	97		0.063	28	
20	83		0.055	27	
14	72		0.039	22	
10	61		0.01	10	
6.3	51		0.0025	4	
5	48		0.0014	2	



REMARKS
As received moisture content = 21%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

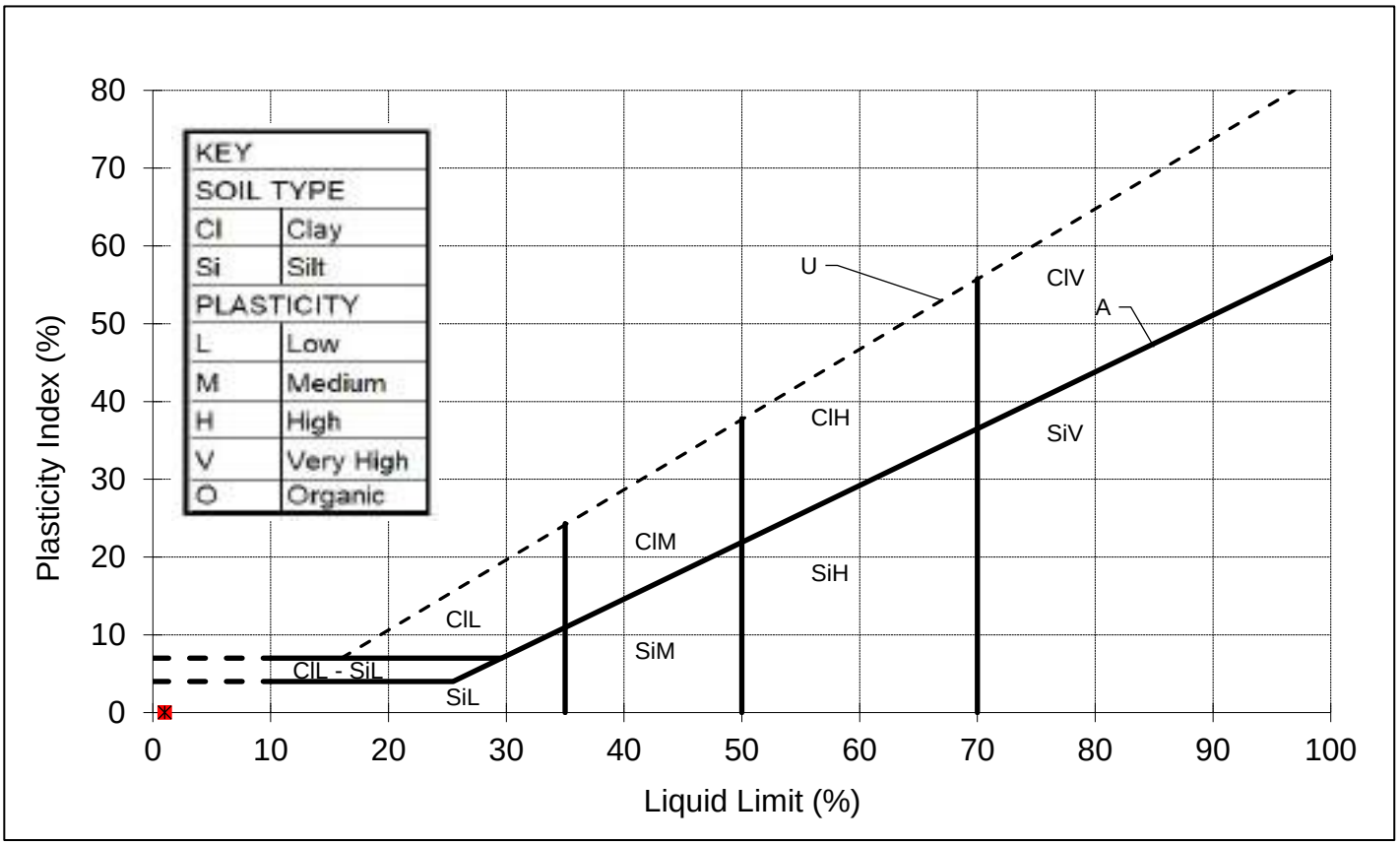
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD9-1	DATE SAMPLED	26-May-22
SAMPLE No.	112666	DATE RECEIVED	31-May-22
DATE TESTED	16-May-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	N/A	Non Plastic	N/A	32



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 02-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

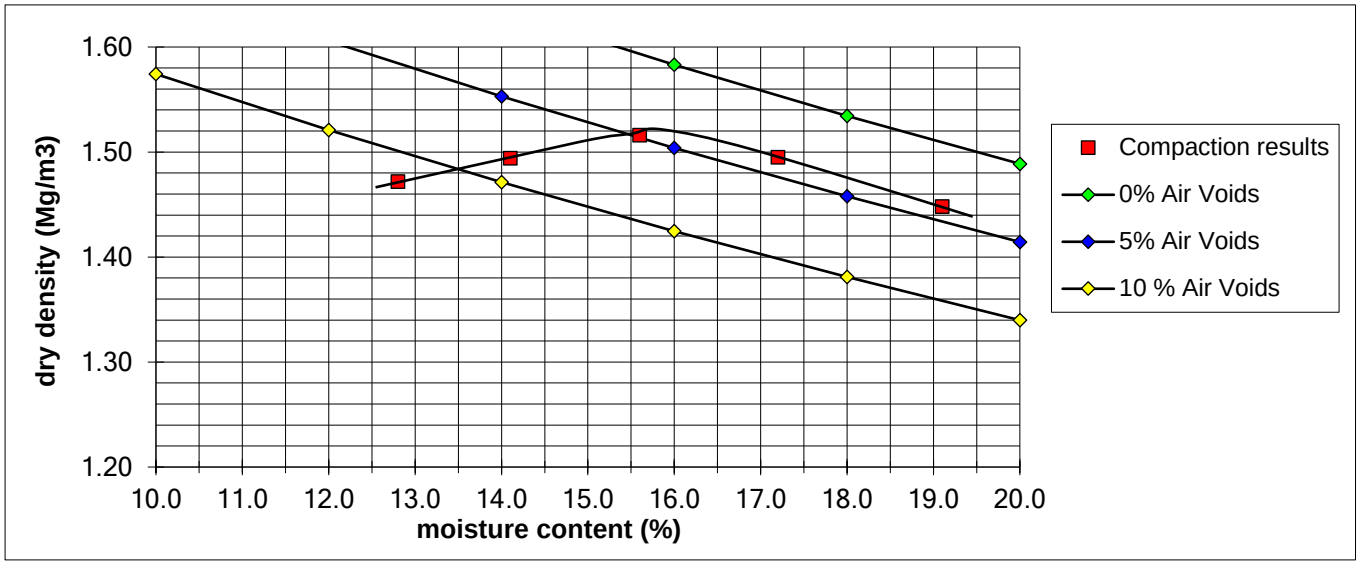
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112666	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.8	1.472
2		14.1	1.494
3		15.6	1.516
4		17.2	1.495
5		19.1	1.448
	Optimum	16.0	
	Maximum		1.52
	Particle Density	2.12 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

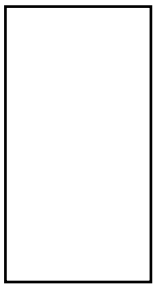
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112666	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	22	%
BULK DENSITY	1.68	Mg/m3
DRY DENSITY	1.38	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 02-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

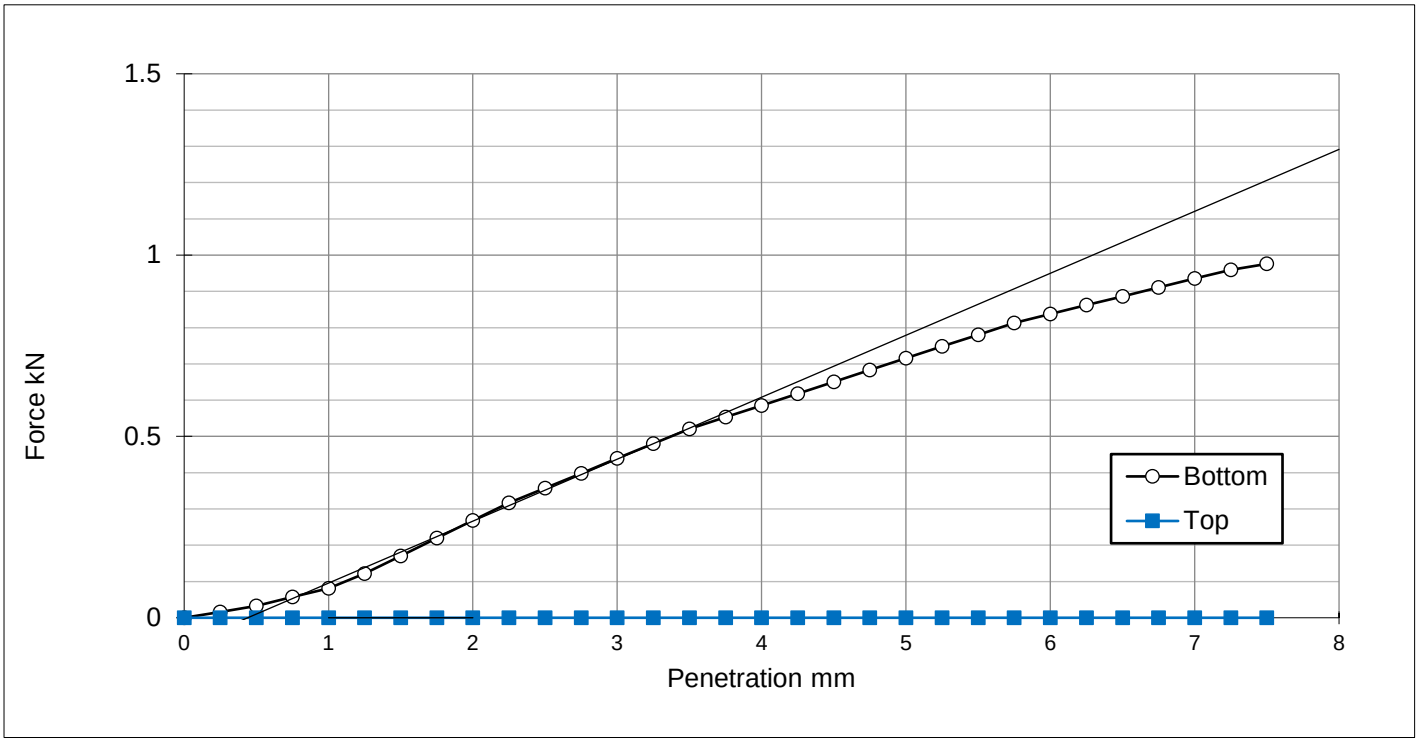
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPD9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112666	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		17 %			
BULK DENSITY	1.68 Mg/m3	MOISTURE CONTENT	22 %	DRY DENSITY	1.38 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE			ORIGIN CORRECTION			FINAL MOISTURE CONTENT		
Top	N/A	%	Top	N/A	mm	Top	N/A	%
Bottom	3.9	%	Bottom	N/A	mm	Bottom	22	%

REMARKS
Sample sheared at 6mm penetration

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 02-Jul-22

M U R R A Y R I X
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

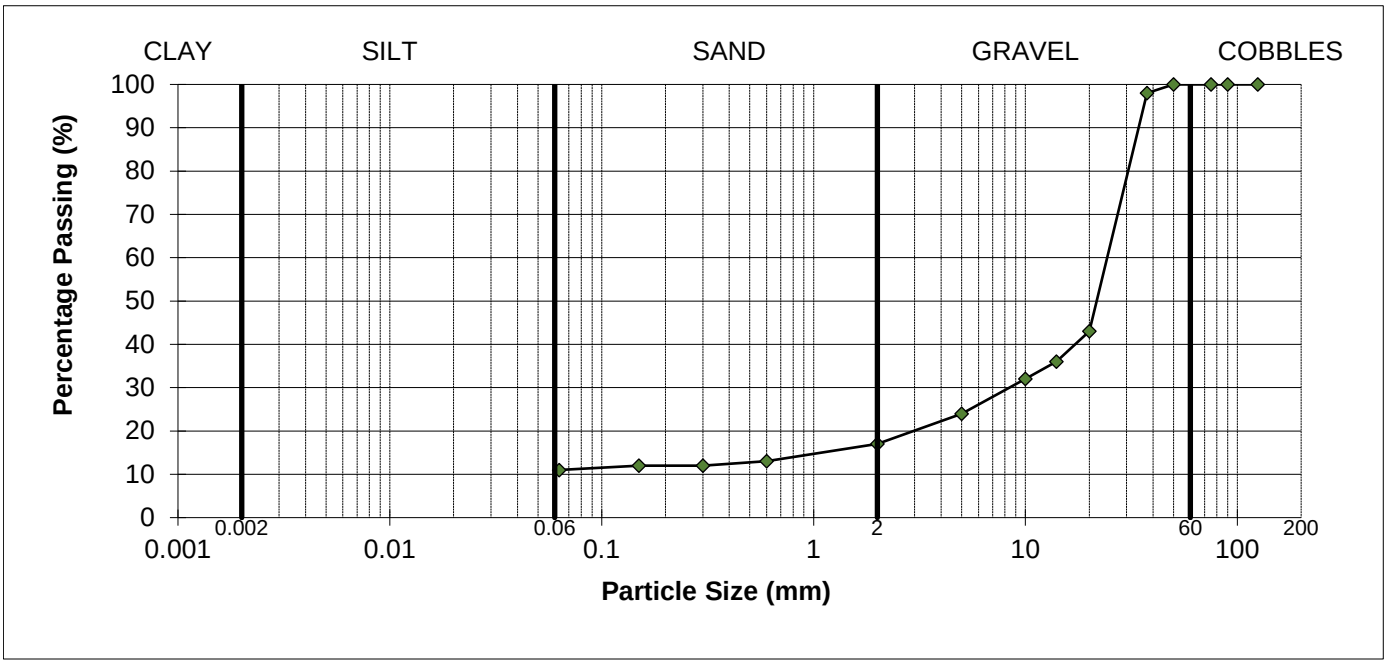
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/1

SAMPLE LABEL	TPE9-1	DATE SAMPLED	26-May-22
LAB SAMPLE No	112667	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	32	
90	100		5	24	
75	100		2	17	
50	100		0.6	13	
37.5	98		0.3	12	
20	43		0.15	12	
14	36		0.063	11	



REMARKS
As received moisture content = 4.3%, Uniformity coefficient = >10

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 02-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/2
Date of Issue 14 July 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

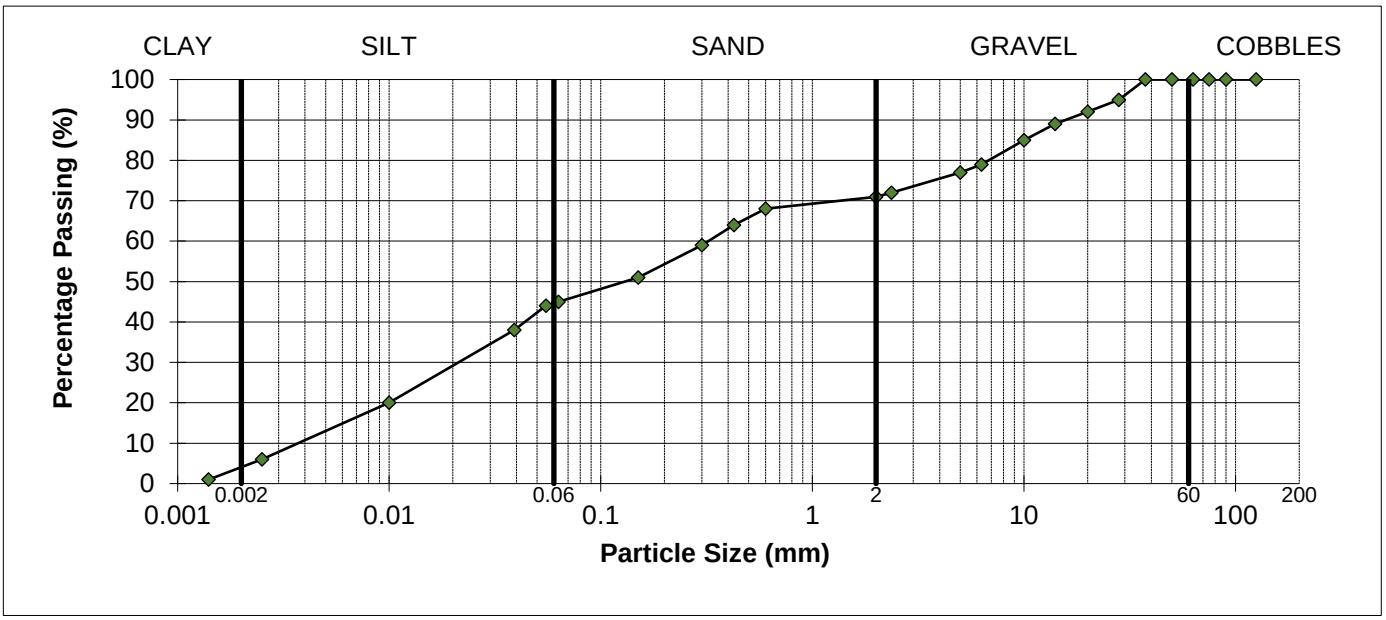
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-1	DATE SAMPLED	30-May-22
LAB SAMPLE No	112668	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	71	
75	100		0.6	68	
63	100		0.425	64	
50	100		0.3	59	
37.5	100		0.15	51	
28	95		0.063	45	
20	92		0.055	44	
14	89		0.039	38	
10	85		0.01	20	
6.3	79		0.0025	6	
5	77		0.0014	1	



REMARKS
As received moisture content = 21%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

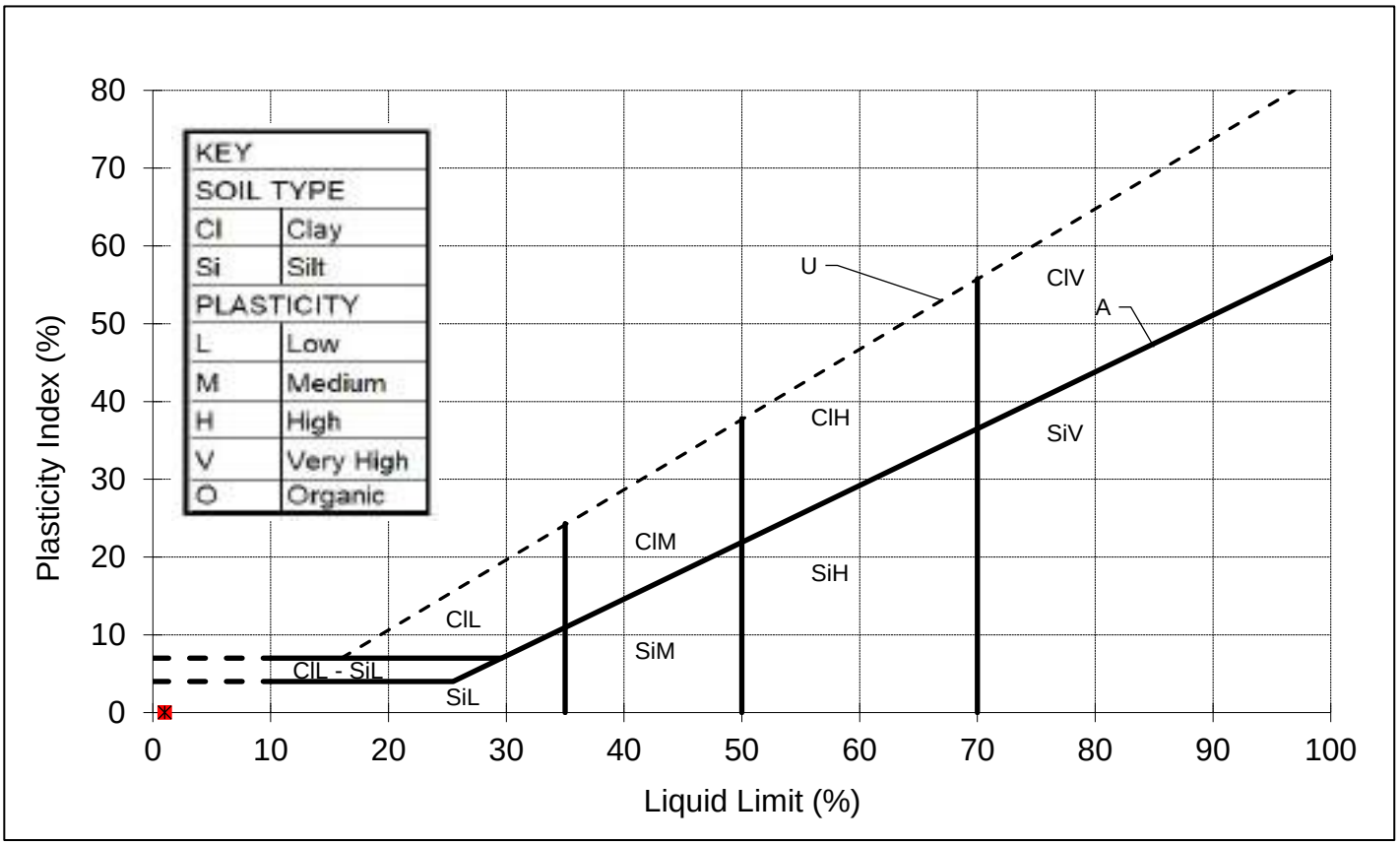
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-1	DATE SAMPLED	30-May-22
SAMPLE No.	112668	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	64



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

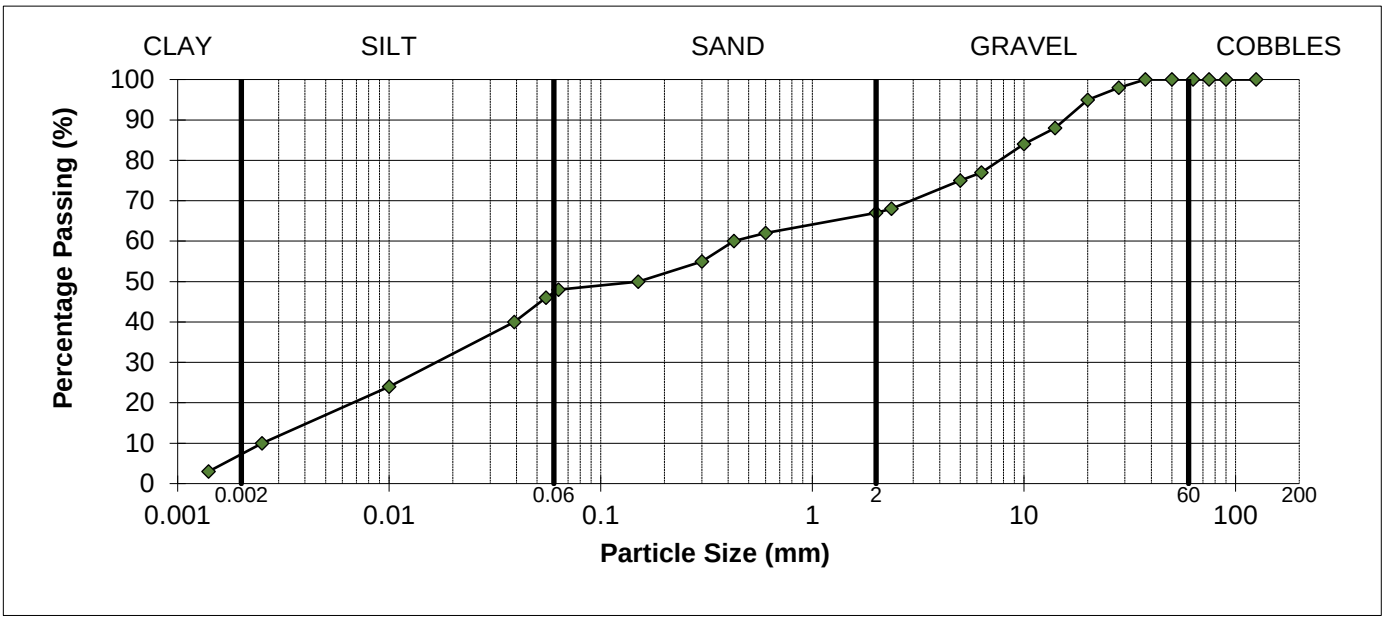
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112669	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	67	
75	100		0.6	62	
63	100		0.425	60	
50	100		0.3	55	
37.5	100		0.15	50	
28	98		0.063	48	
20	95		0.055	46	
14	88		0.039	40	
10	84		0.01	24	
6.3	77		0.0025	10	
5	75		0.0014	3	



REMARKS
As received moisture content = 25%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

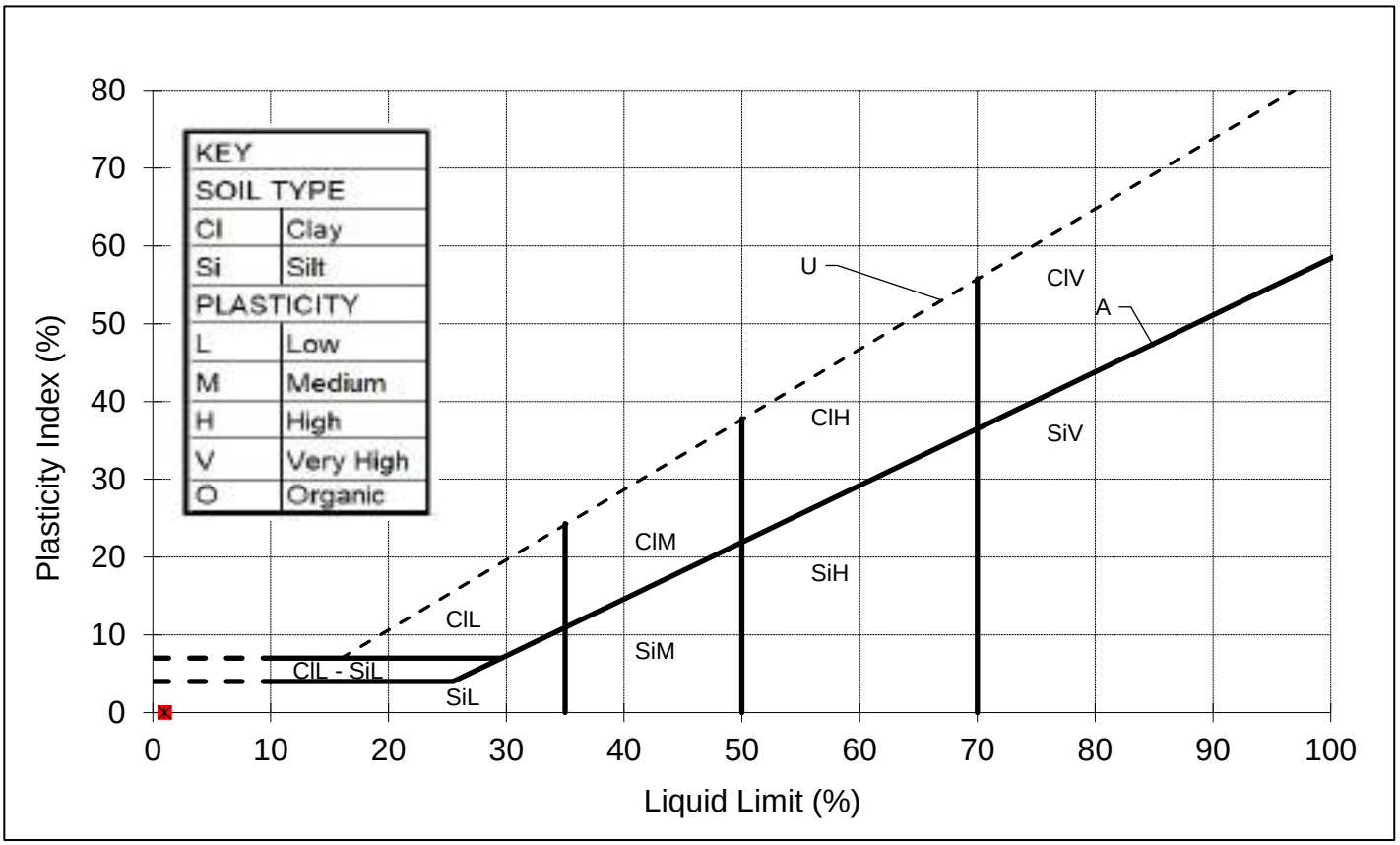
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-2	DATE SAMPLED	30-May-22
SAMPLE No.	112669	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25	N/A	Non Plastic	N/A	60



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

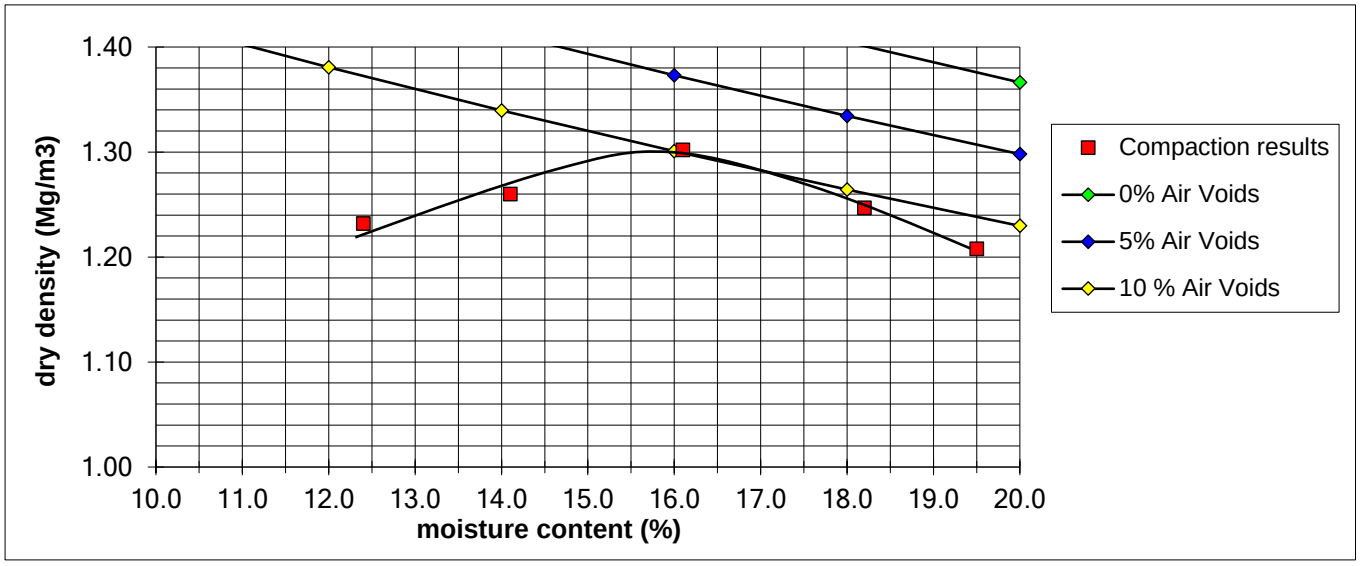
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112669	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.4	1.232
2		14.1	1.260
3		16.1	1.302
4		18.2	1.247
5		19.5	1.208
	Optimum	16.0	
	Maximum		1.30
	Particle Density	1.88 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 5%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

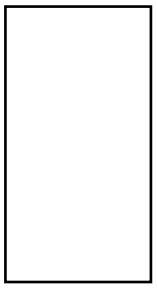
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112669	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	24	%
BULK DENSITY	1.39	Mg/m3
DRY DENSITY	1.12	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

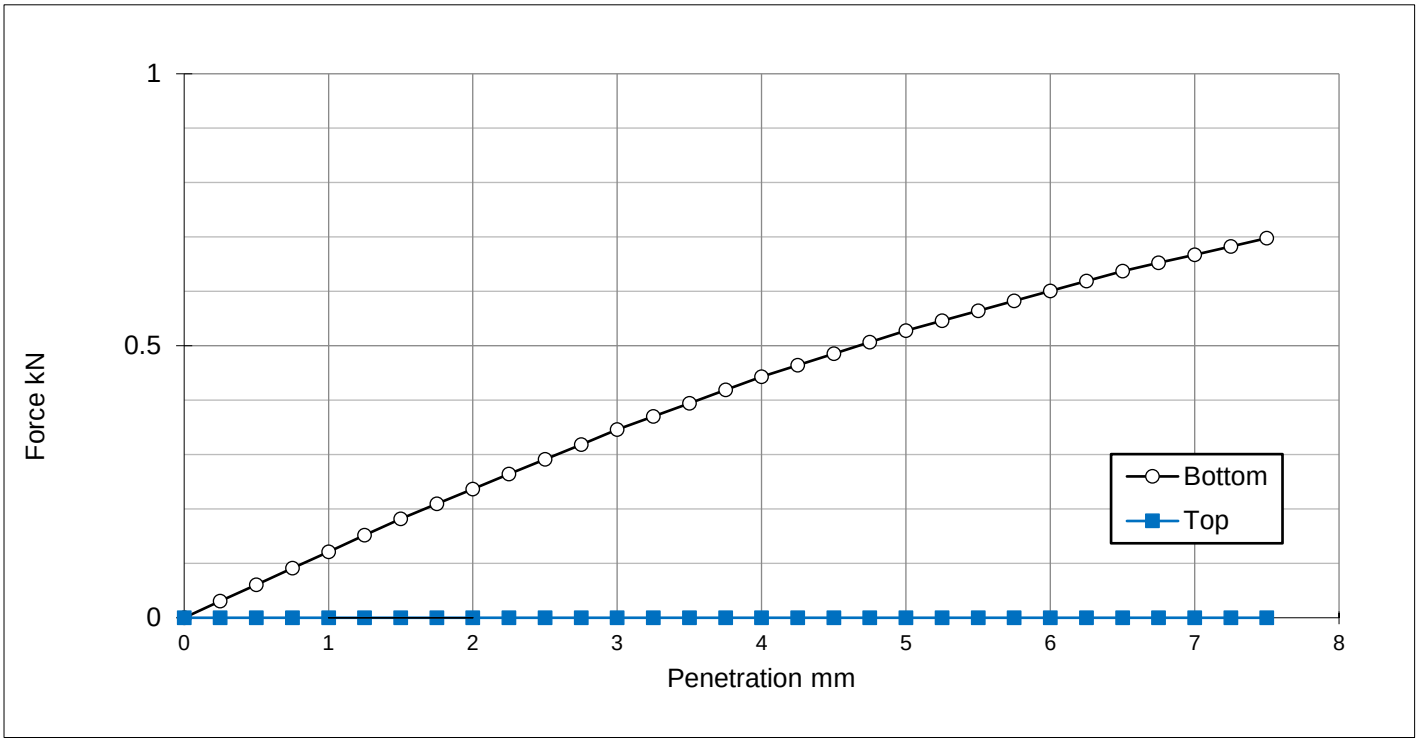
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112669	DATE RECEIVED	31-May-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		5 %			
BULK DENSITY	1.39 Mg/m3	MOISTURE CONTENT	24 %	DRY DENSITY	1.12 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	24	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

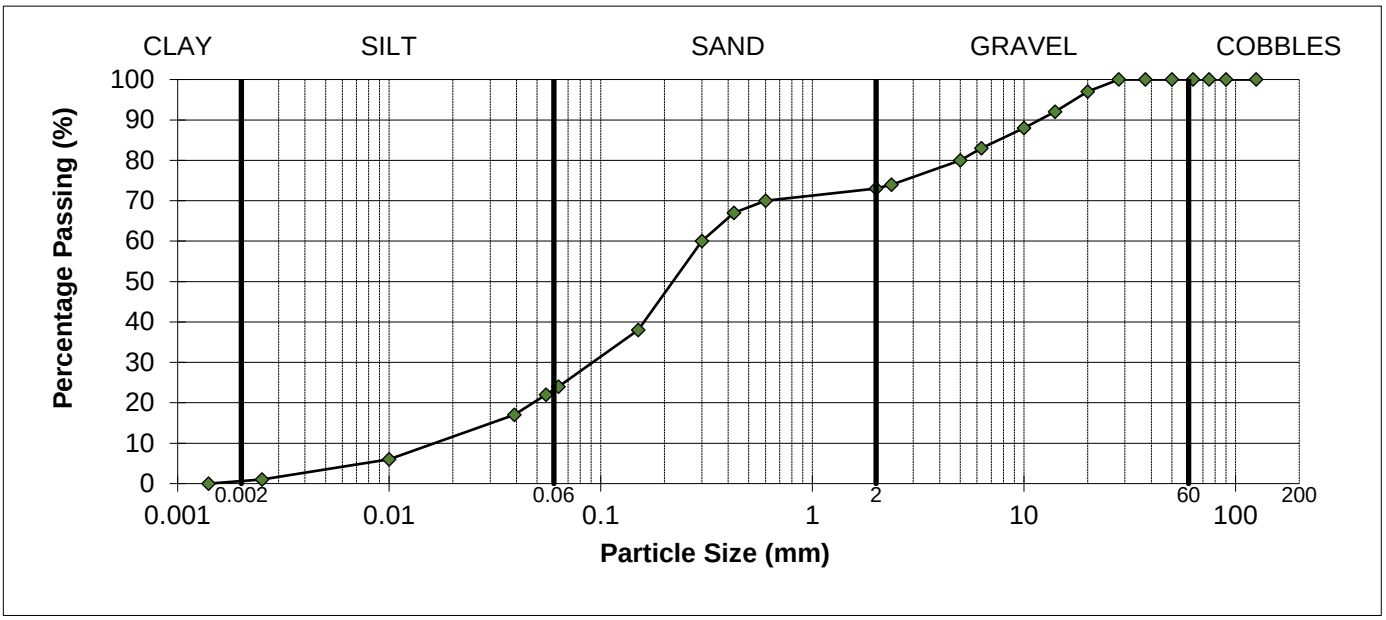
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112670	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	74	
90	100		2	73	
75	100		0.6	70	
63	100		0.425	67	
50	100		0.3	60	
37.5	100		0.15	38	
28	100		0.063	24	
20	97		0.055	22	
14	92		0.039	17	
10	88		0.01	6	
6.3	83		0.0025	1	
5	80		0.0014	0	



REMARKS
As received moisture content = 19%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

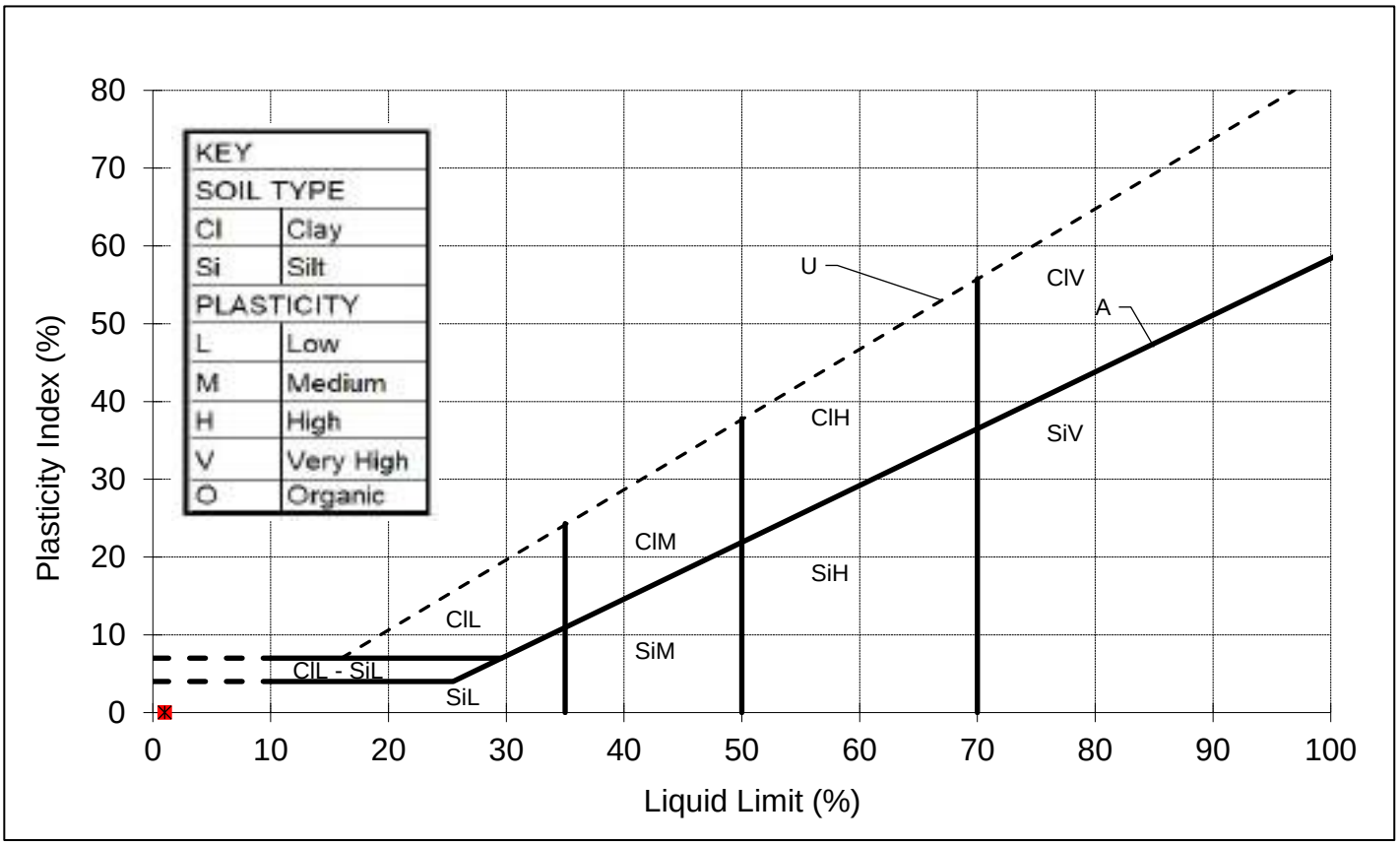
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-3	DATE SAMPLED	30-May-22
SAMPLE No.	112670	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

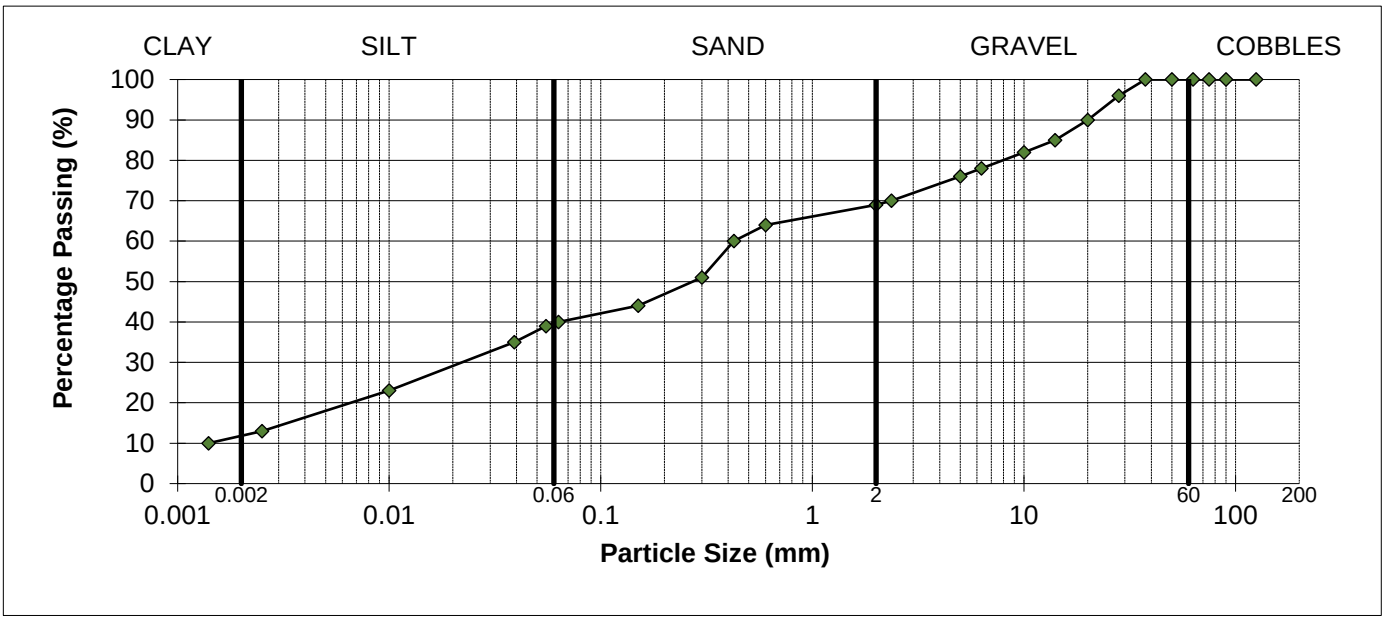
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112671	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	70	
90	100		2	69	
75	100		0.6	64	
63	100		0.425	60	
50	100		0.3	51	
37.5	100		0.15	44	
28	96		0.063	40	
20	90		0.055	39	
14	85		0.039	35	
10	82		0.01	23	
6.3	78		0.0025	13	
5	76		0.0014	10	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

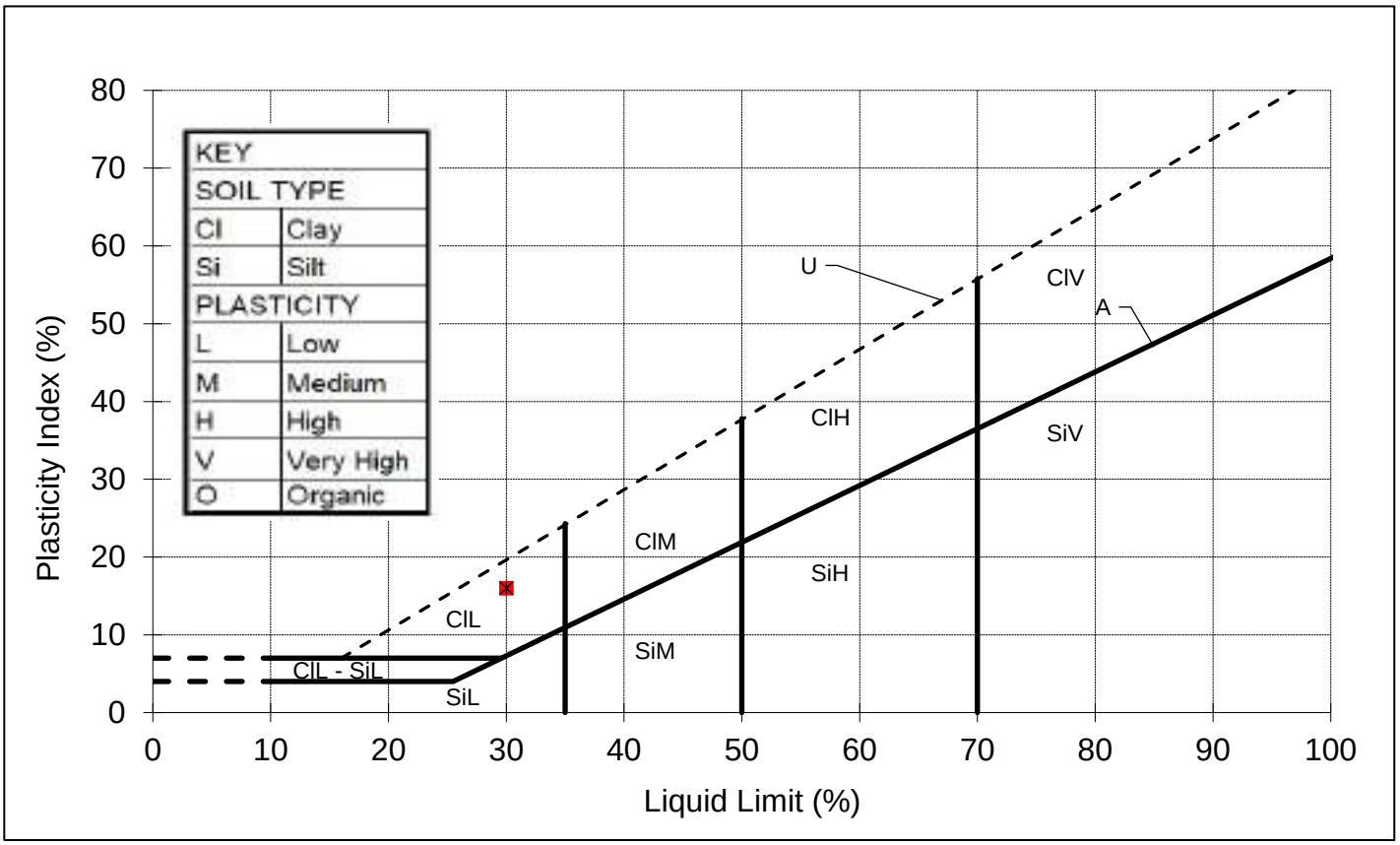
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-4	DATE SAMPLED	30-May-22
SAMPLE No.	112671	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	30	14	16	60



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

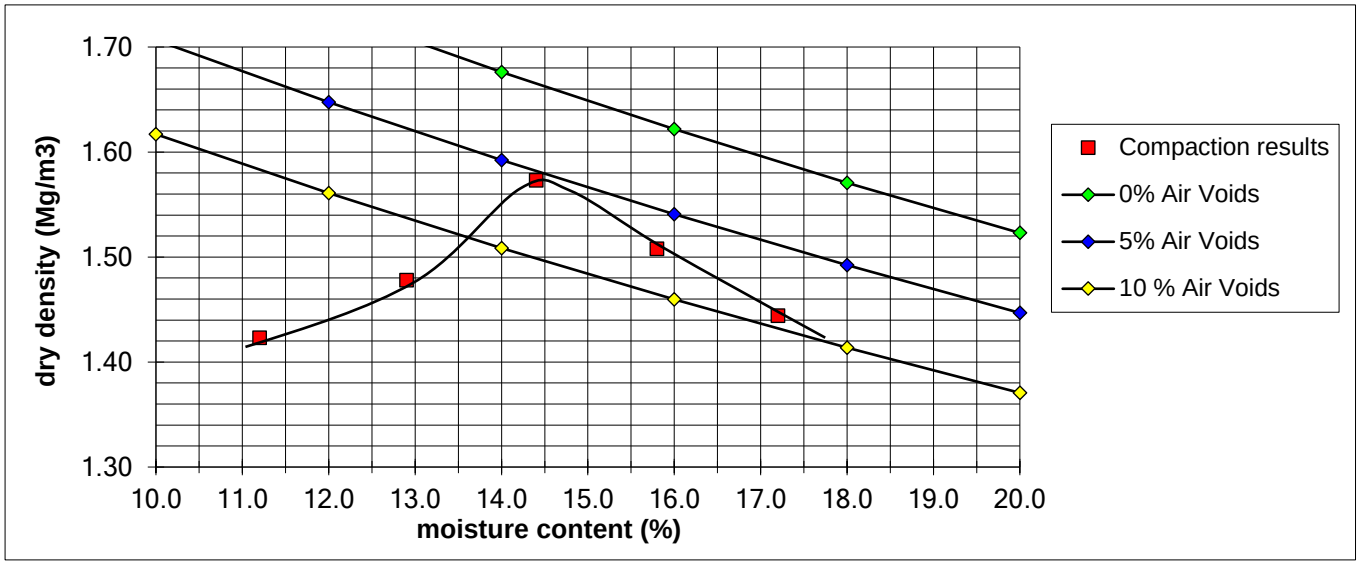
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112671	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.2	1.423
2		12.9	1.478
3		14.4	1.573
4		15.8	1.508
5		17.2	1.444
	Optimum	14.0	
	Maximum		1.57
	Particle Density	2.19 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

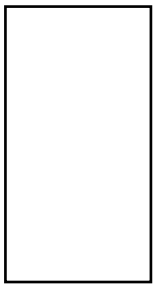
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112671	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	19	%
BULK DENSITY	1.68	Mg/m3
DRY DENSITY	1.42	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
200	20	1.49	147.9	74

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer,

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

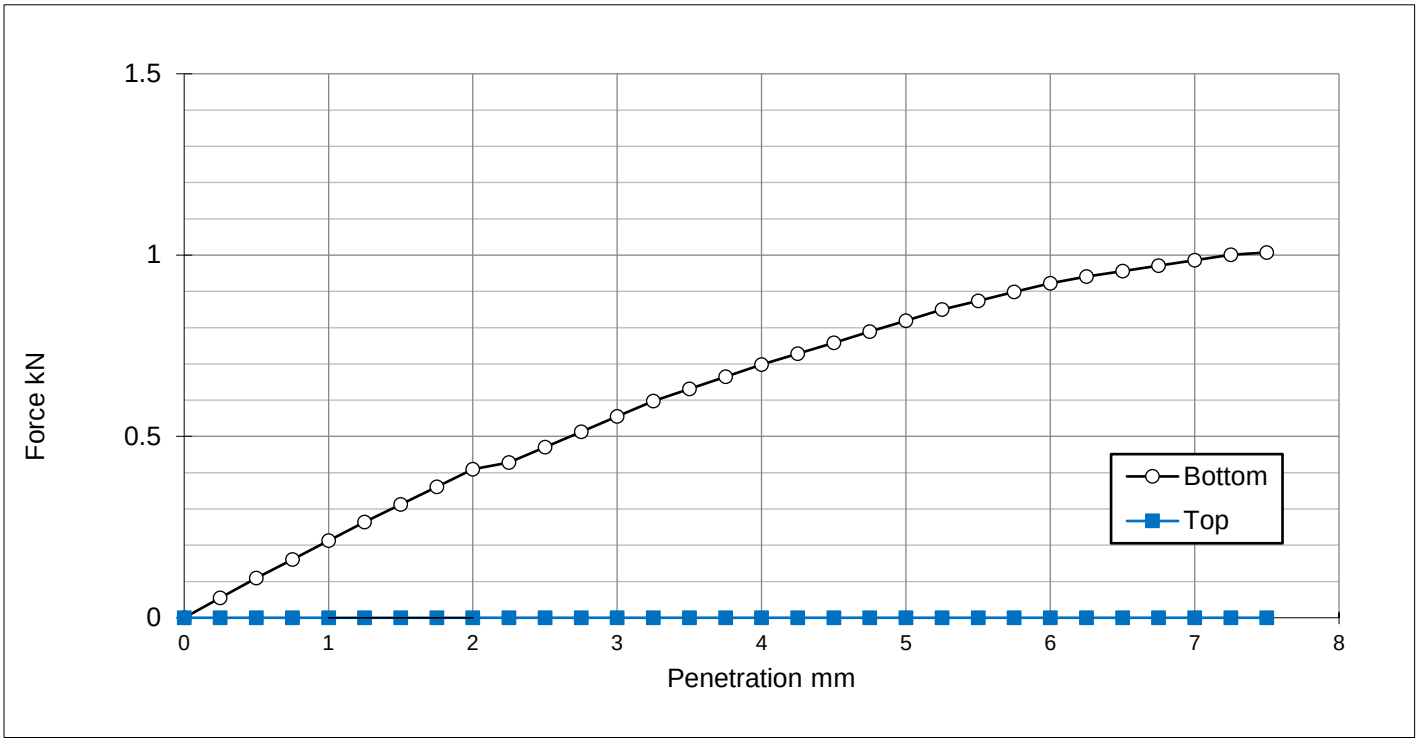
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPB14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112671	DATE RECEIVED	31-May-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		10 %			
BULK DENSITY	1.68 Mg/m3	MOISTURE CONTENT	19 %	DRY DENSITY	1.42 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.1	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	19	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

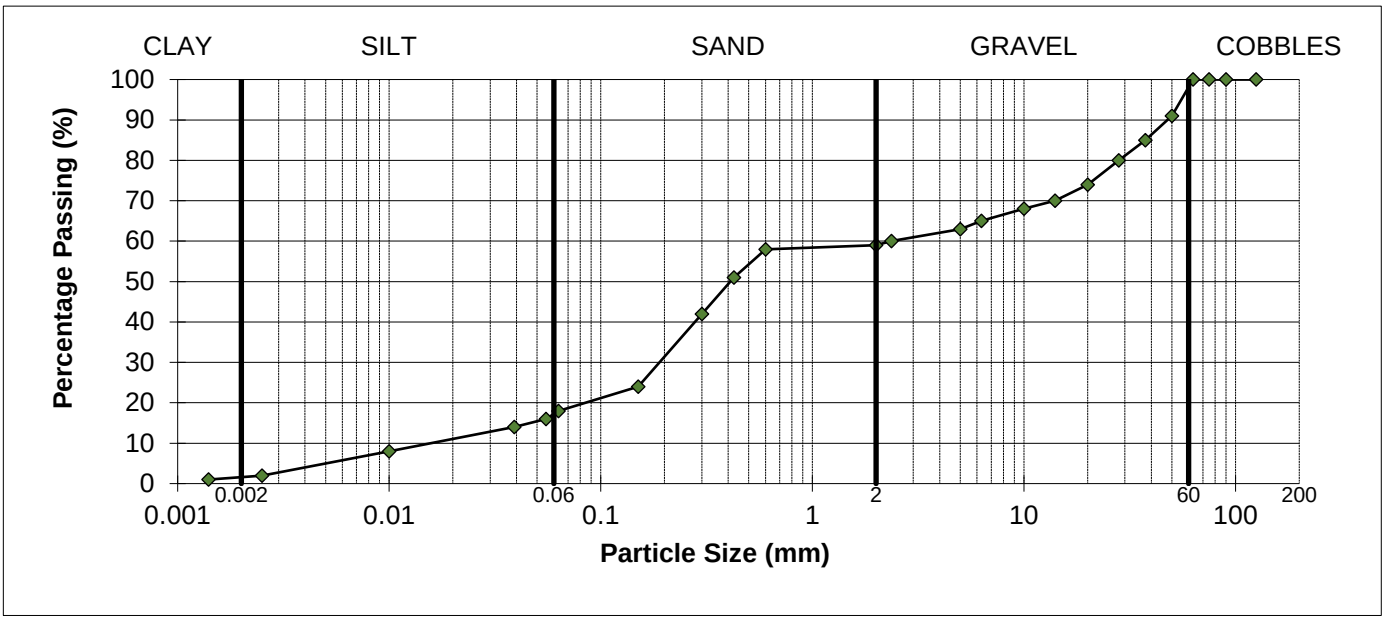
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-1	DATE SAMPLED	30-May-22
LAB SAMPLE No	112672	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	60	
90	100		2	59	
75	100		0.6	58	
63	100		0.425	51	
50	91		0.3	42	
37.5	85		0.15	24	
28	80		0.063	18	
20	74		0.055	16	
14	70		0.039	14	
10	68		0.01	8	
6.3	65		0.0025	2	
5	63		0.0014	1	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

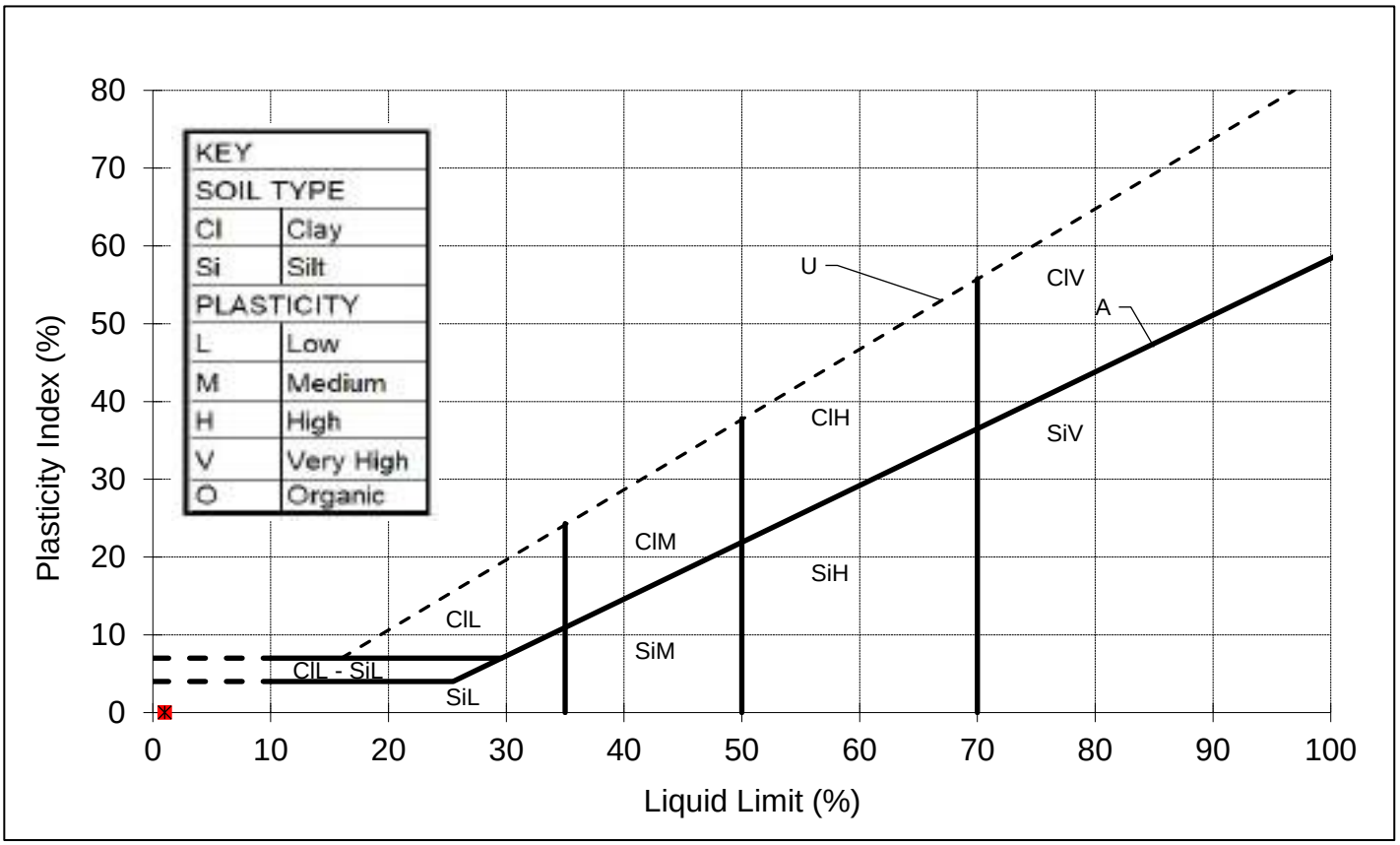
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-1	DATE SAMPLED	30-May-22
SAMPLE No.	112672	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	51



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

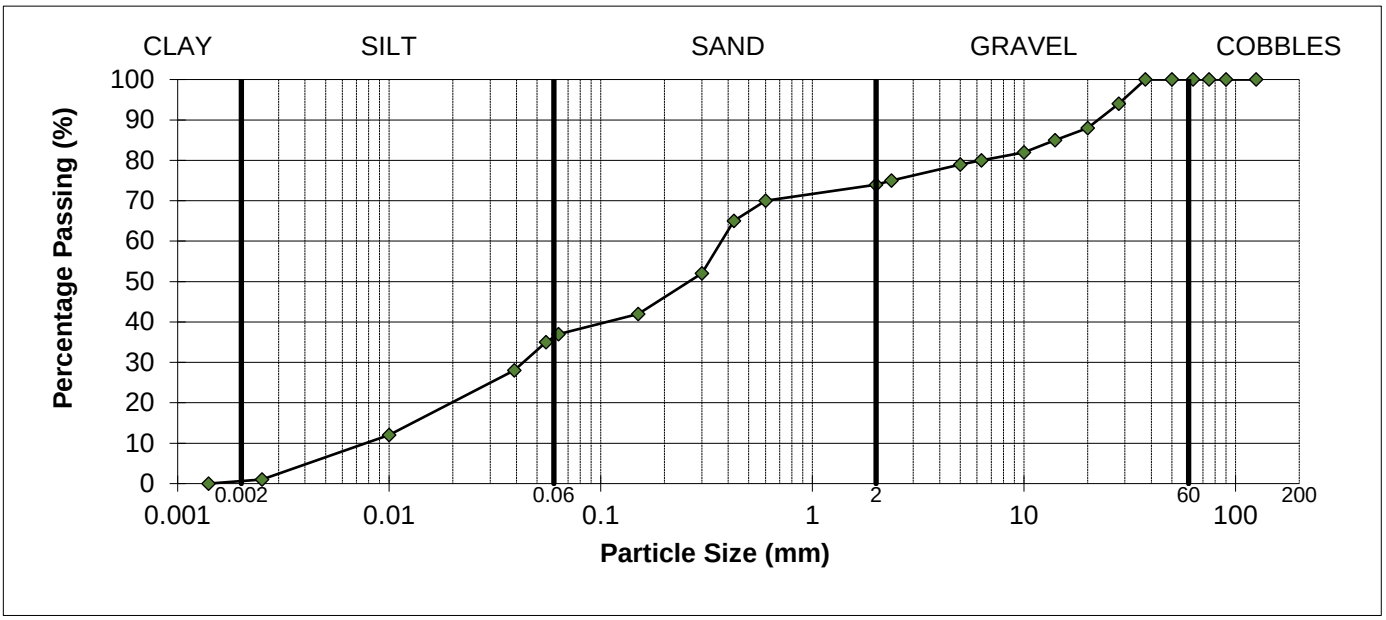
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112673	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	74	
75	100		0.6	70	
63	100		0.425	65	
50	100		0.3	52	
37.5	100		0.15	42	
28	94		0.063	37	
20	88		0.055	35	
14	85		0.039	28	
10	82		0.01	12	
6.3	80		0.0025	1	
5	79		0.0014	0	



REMARKS
As received moisture content = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

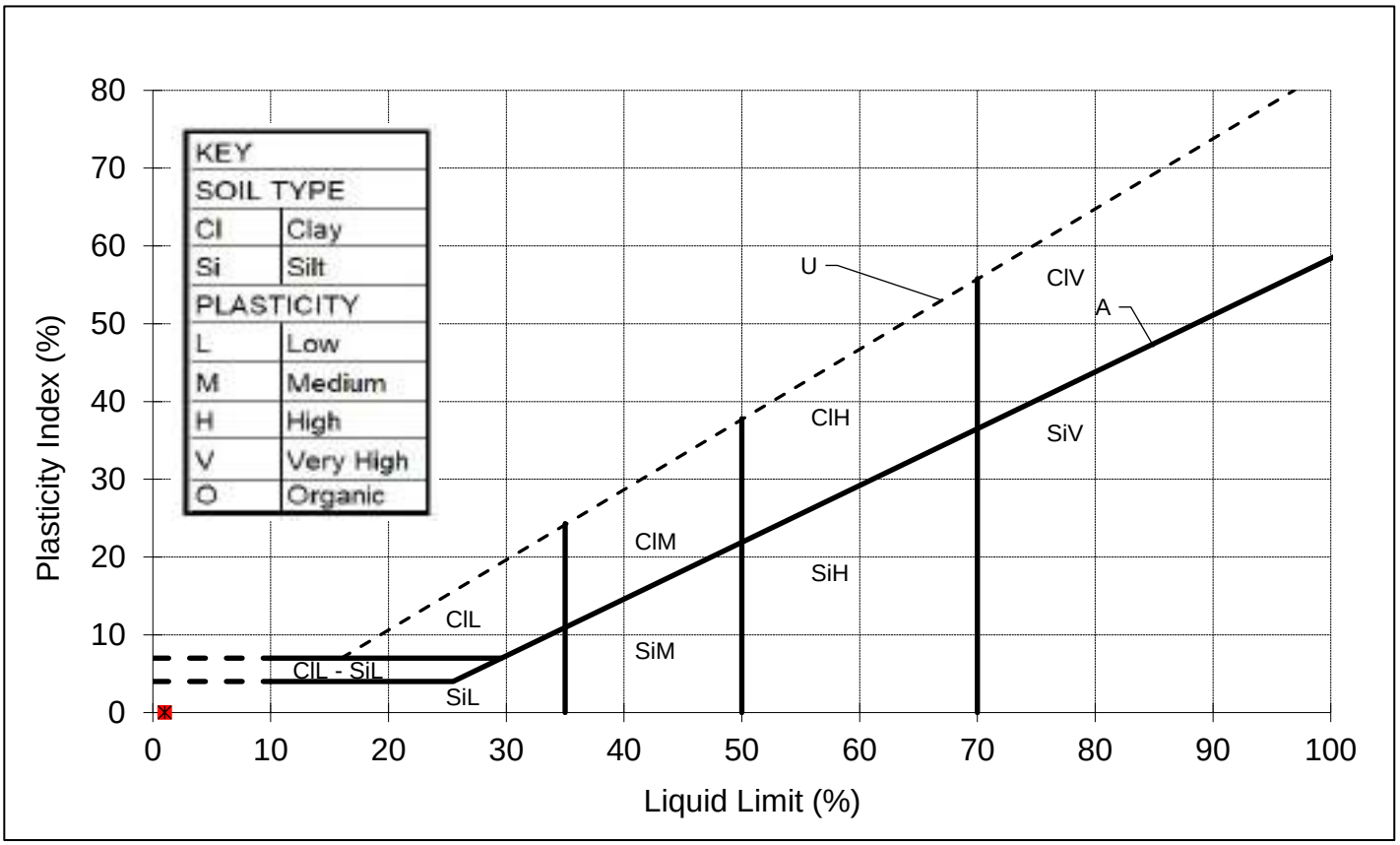
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-2	DATE SAMPLED	30-May-22
SAMPLE No.	112673	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16	N/A	Non Plastic	N/A	65



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

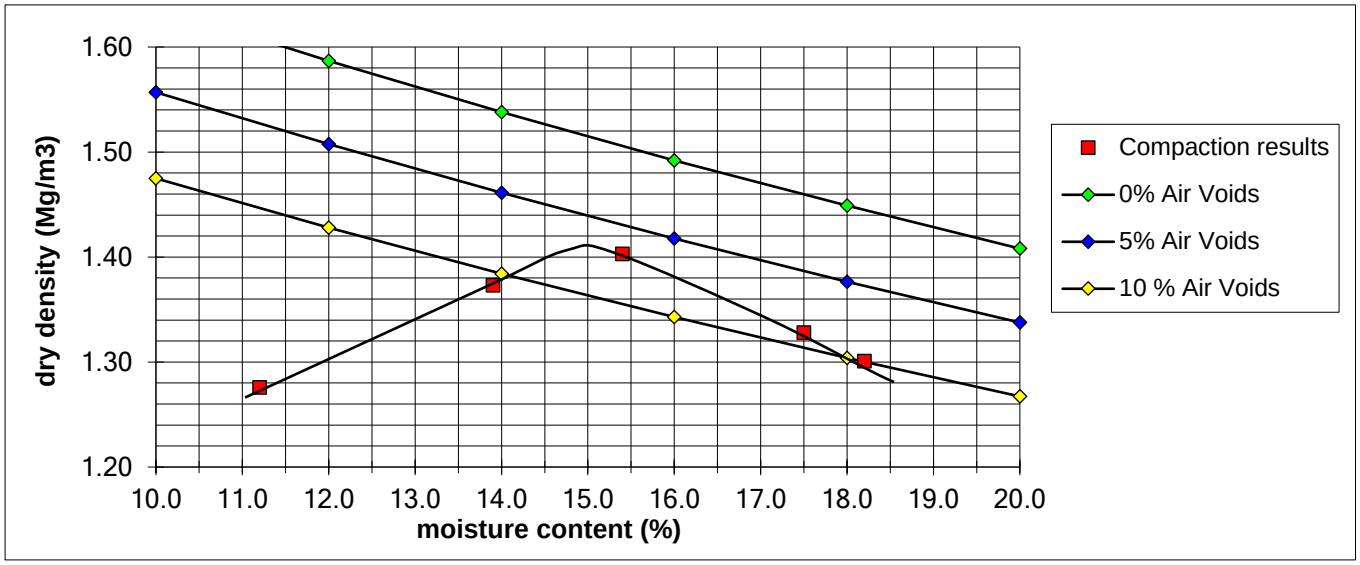
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112673	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.2	1.276
2		13.9	1.373
3		15.4	1.403
4		17.5	1.328
5		18.2	1.301
	Optimum	15.0	
	Maximum		1.41
	Particle Density	1.96 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

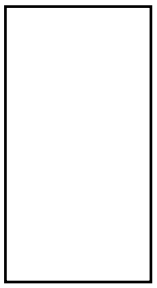
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112673	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	16	%
BULK DENSITY	1.59	Mg/m3
DRY DENSITY	1.37	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	NN/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

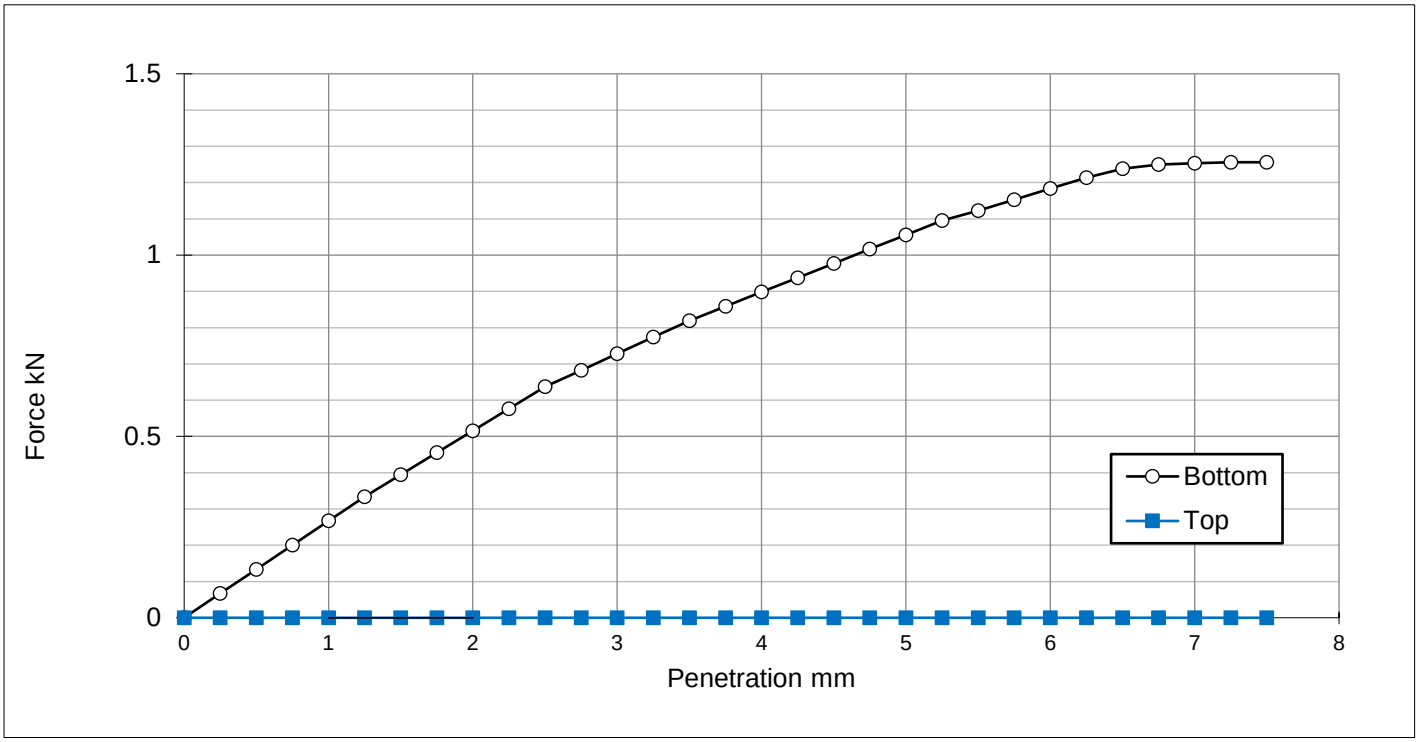
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112673	DATE RECEIVED	31-May-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		12 %			
BULK DENSITY	1.59 Mg/m3	MOISTURE CONTENT	16 %	DRY DENSITY	1.37 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	5.3	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	16	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

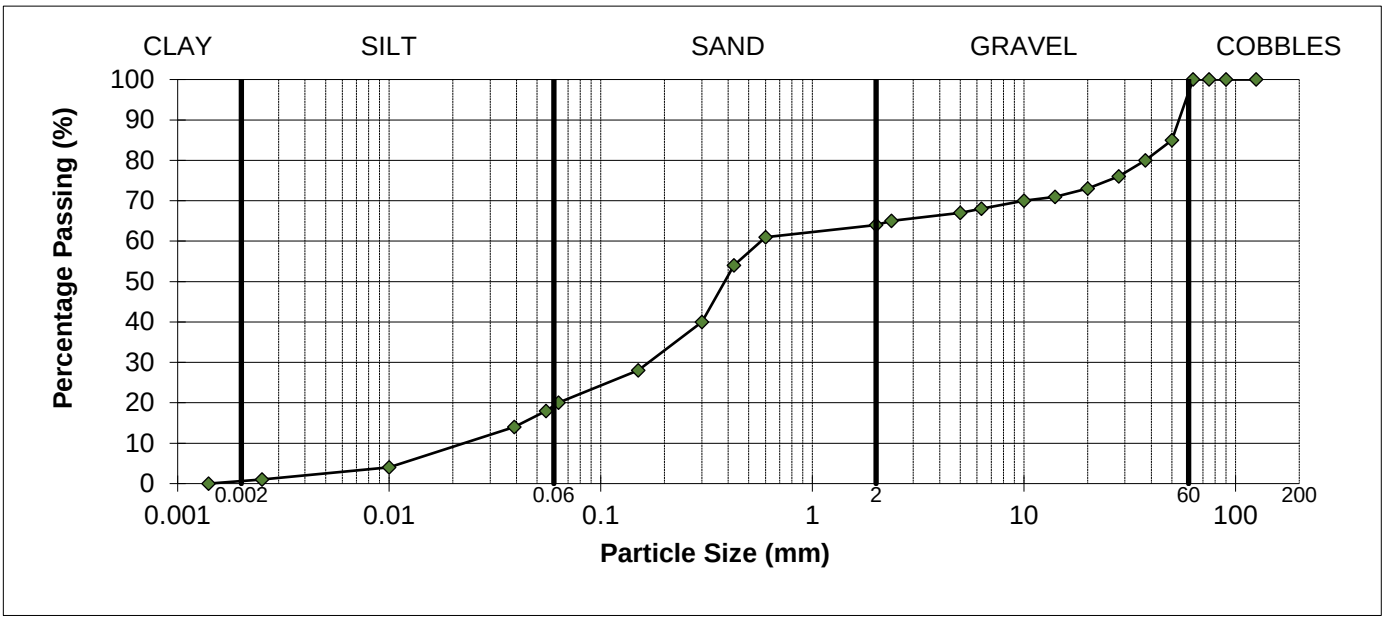
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112674	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	65	
90	100		2	64	
75	100		0.6	61	
63	100		0.425	54	
50	85		0.3	40	
37.5	80		0.15	28	
28	76		0.063	20	
20	73		0.055	18	
14	71		0.039	14	
10	70		0.01	4	
6.3	68		0.0025	1	
5	67		0.0014	0	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

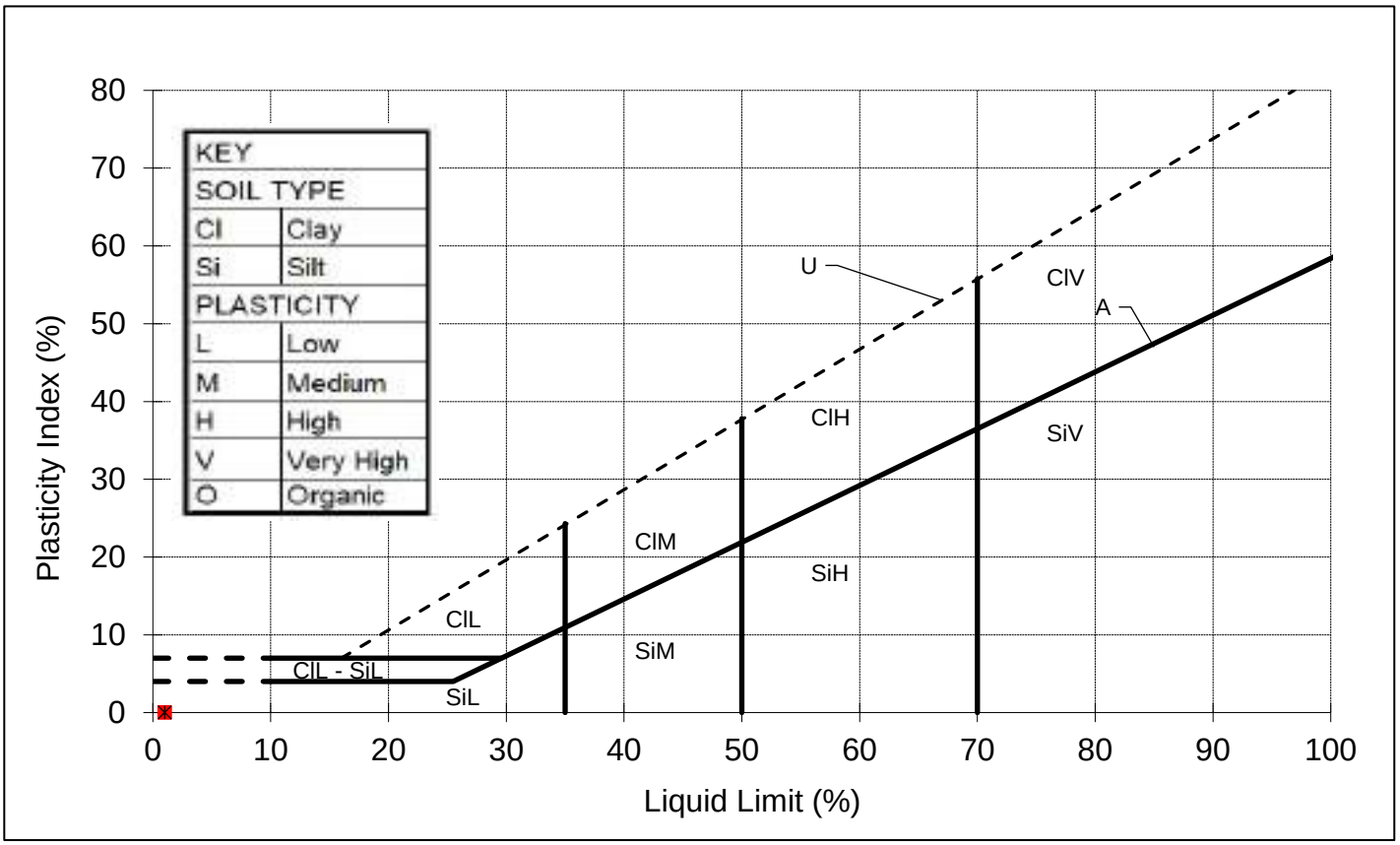
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-3	DATE SAMPLED	30-May-22
SAMPLE No.	112674	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	54



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

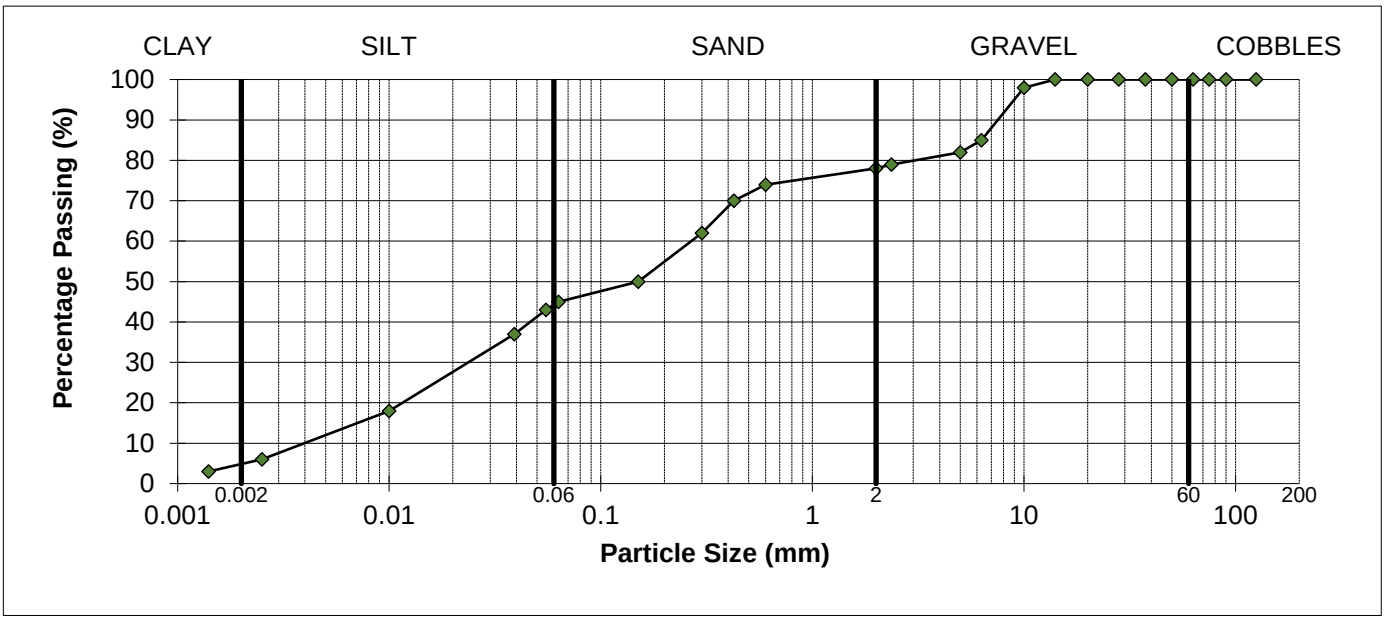
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112675	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	79	
90	100		2	78	
75	100		0.6	74	
63	100		0.425	70	
50	100		0.3	62	
37.5	100		0.15	50	
28	100		0.063	45	
20	100		0.055	43	
14	100		0.039	37	
10	98		0.01	18	
6.3	85		0.0025	6	
5	82		0.0014	3	



REMARKS
As received moisture content = 14%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

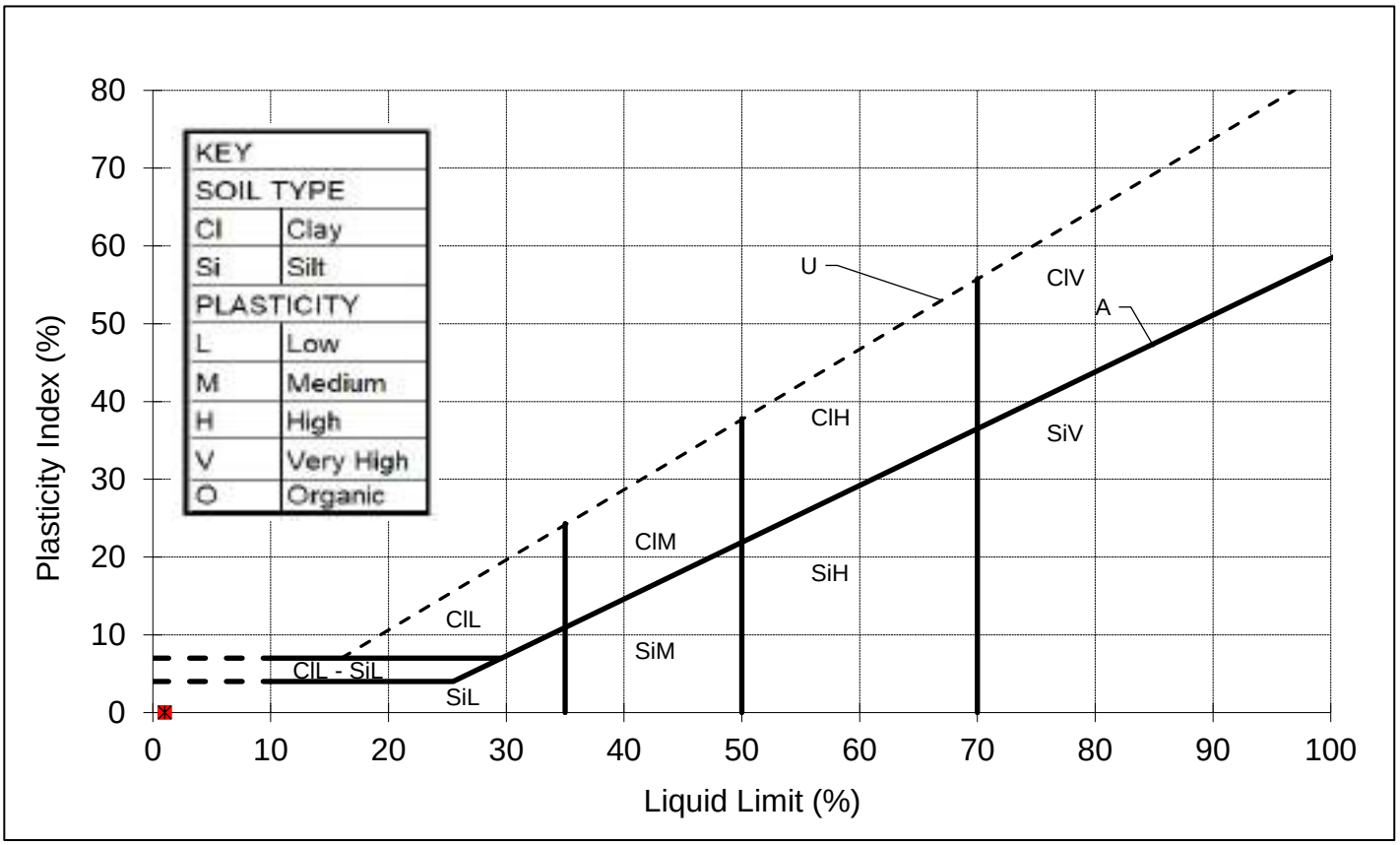
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-4	DATE SAMPLED	30-May-22
SAMPLE No.	112675	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	N/A	Non Plastic	N/A	70



REMARKS

Sample tested after wet sieving. Sample did contain some plastic material but was found to be non plastic

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

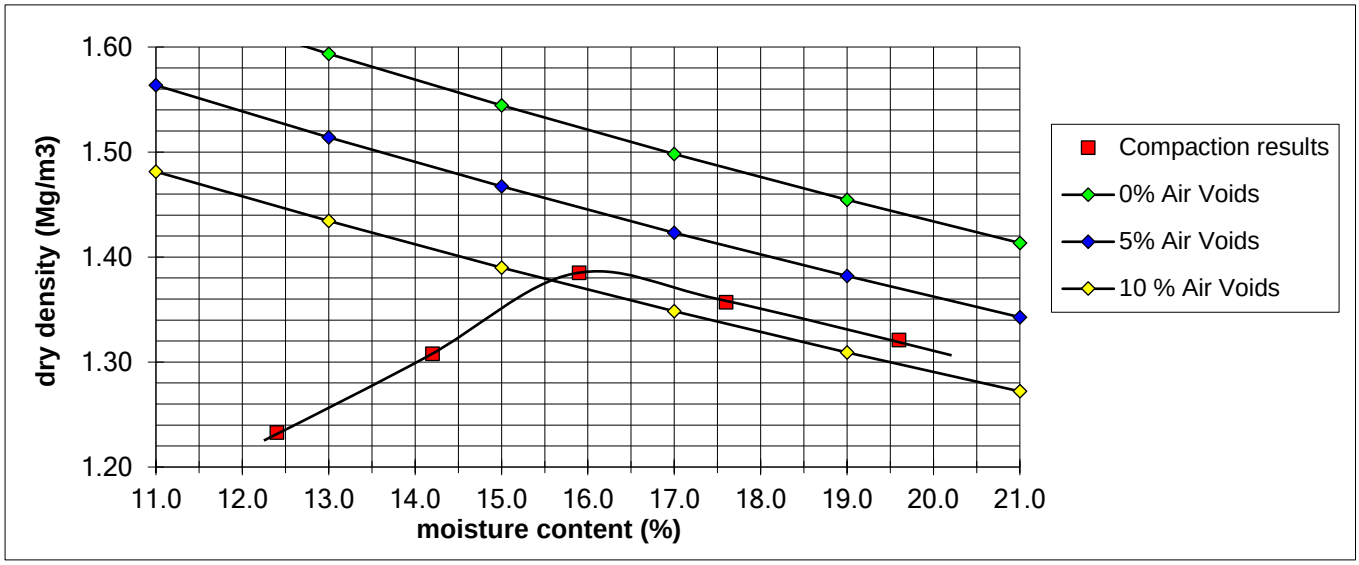
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112675	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.4	1.233
2		14.2	1.308
3		15.9	1.385
4		17.6	1.357
5		19.6	1.321
	Optimum	16.0	
	Maximum		1.38
	Particle Density	2.01 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

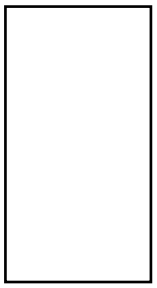
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112675	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	14	%
BULK DENSITY	1.45	Mg/m3
DRY DENSITY	1.27	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	NN/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

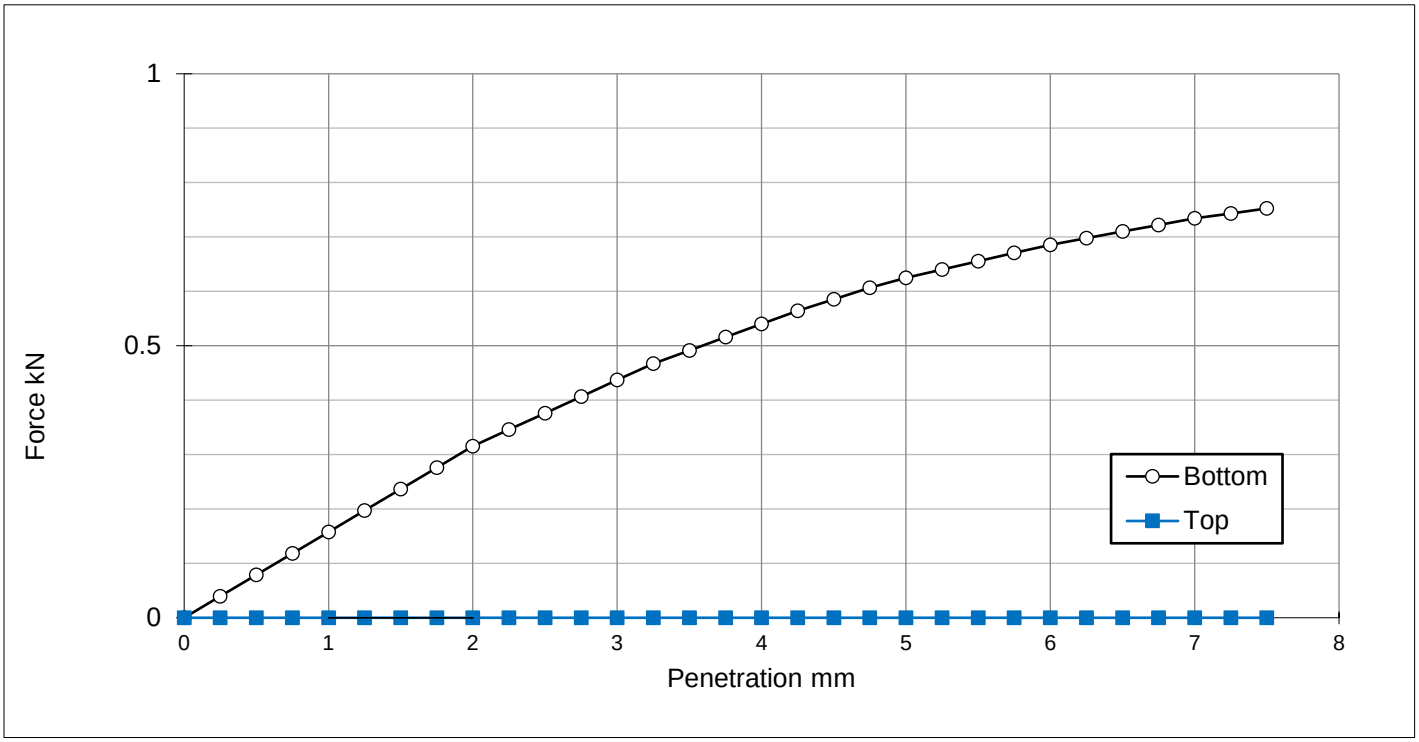
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112675	DATE RECEIVED	31-May-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.45 Mg/m3	MOISTURE CONTENT	14 %	DRY DENSITY	1.27 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.1	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	14	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

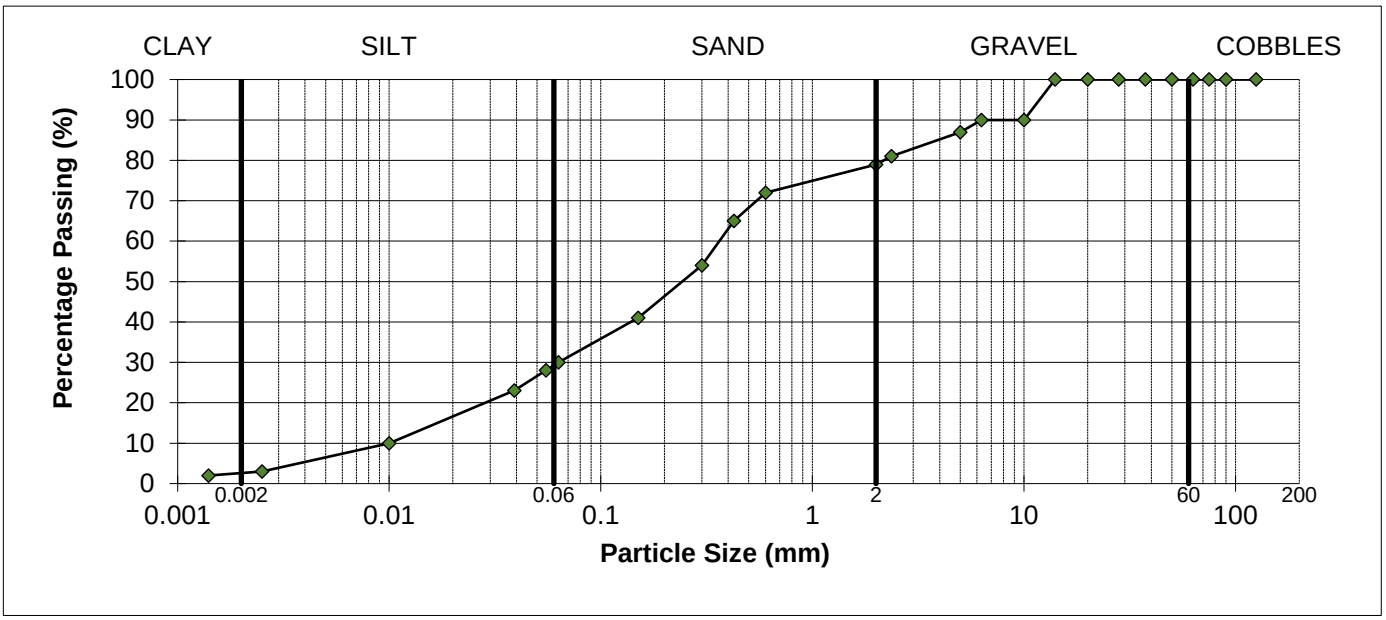
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112676	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	81	
90	100		2	79	
75	100		0.6	72	
63	100		0.425	65	
50	100		0.3	54	
37.5	100		0.15	41	
28	100		0.063	30	
20	100		0.055	28	
14	100		0.039	23	
10	90		0.01	10	
6.3	90		0.0025	3	
5	87		0.0014	2	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

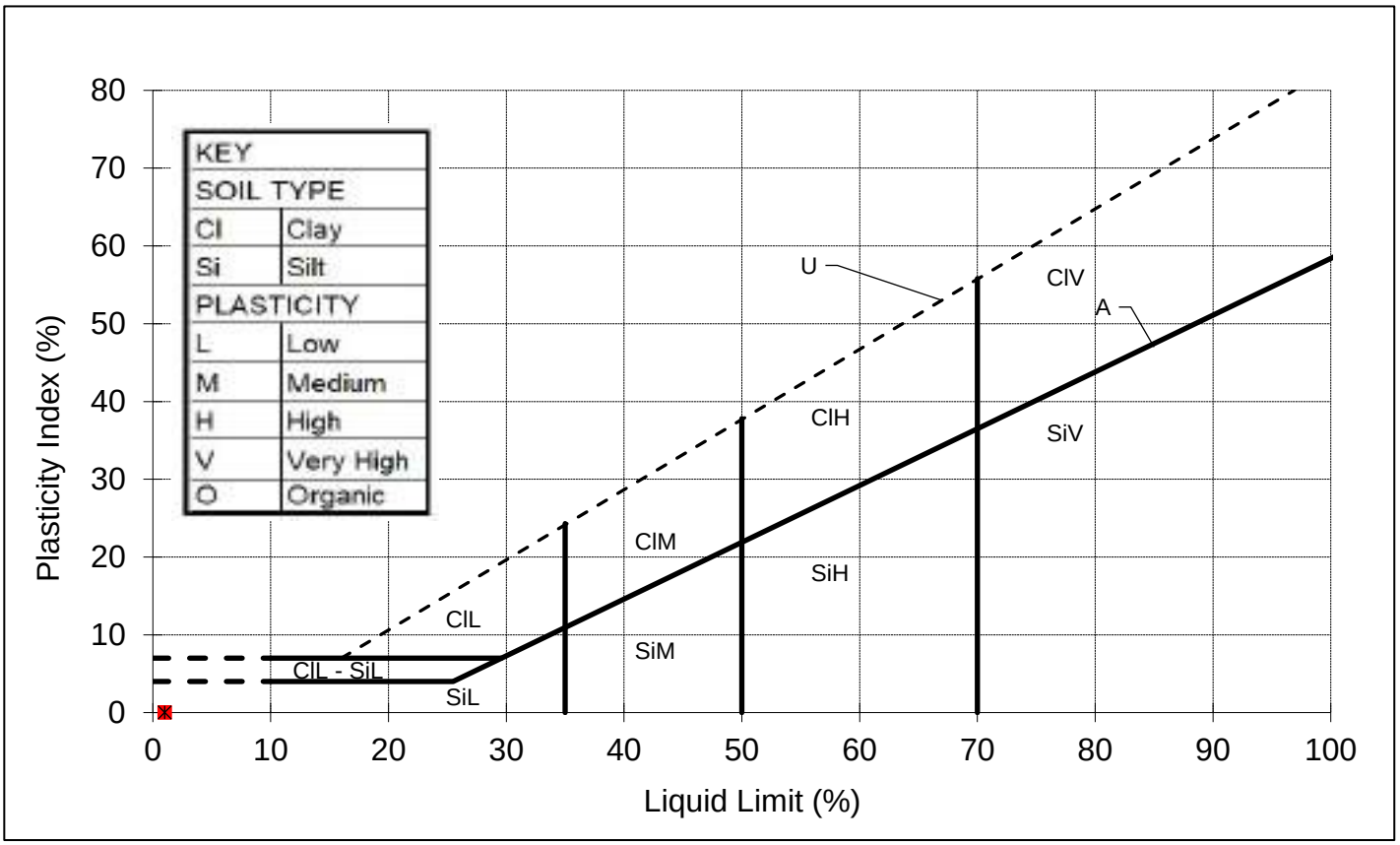
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-5	DATE SAMPLED	30-May-22
SAMPLE No.	112676	DATE RECEIVED	31-May-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	65



REMARKS

Sample tested after wet sieving. Sample did contain some plastic material but was found to be non plastic

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

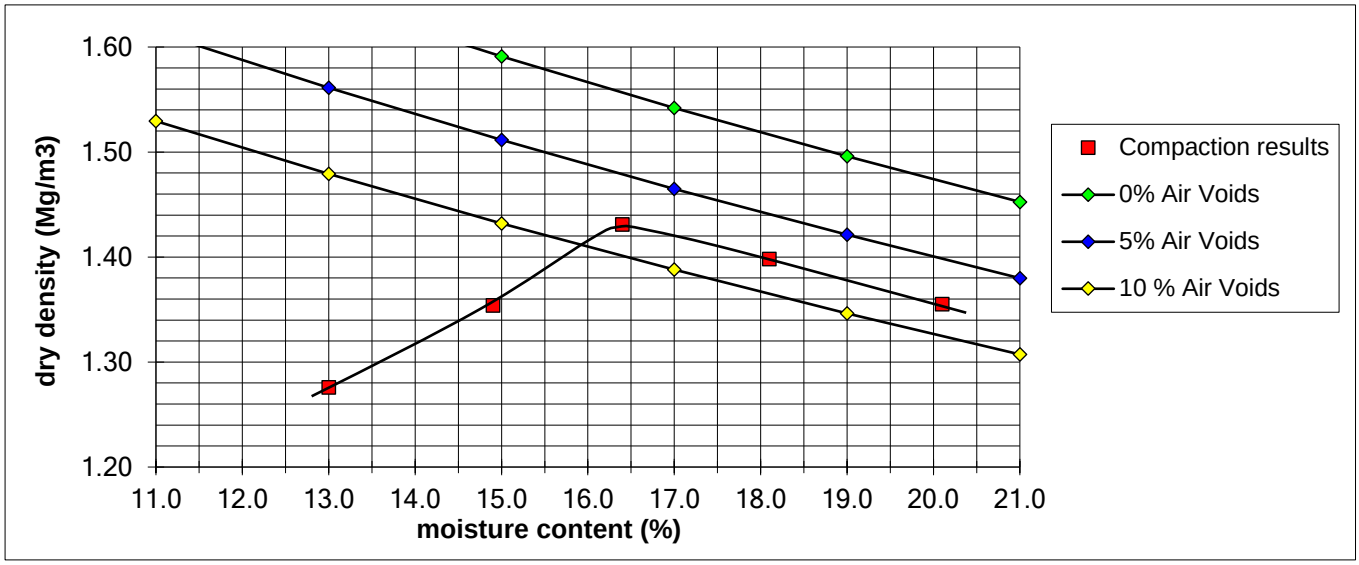
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112676	DATE RECEIVED	31-May-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		13.0	1.276
2		14.9	1.354
3		16.4	1.431
4		18.1	1.398
5		20.1	1.355
	Optimum	16.0	
	Maximum		1.43
	Particle Density	2.09 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

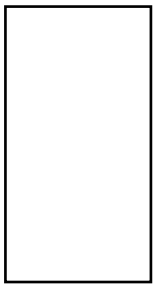
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112676	DATE RECEIVED	31-May-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	17	%
BULK DENSITY	1.49	Mg/m3
DRY DENSITY	1.27	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	NN/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

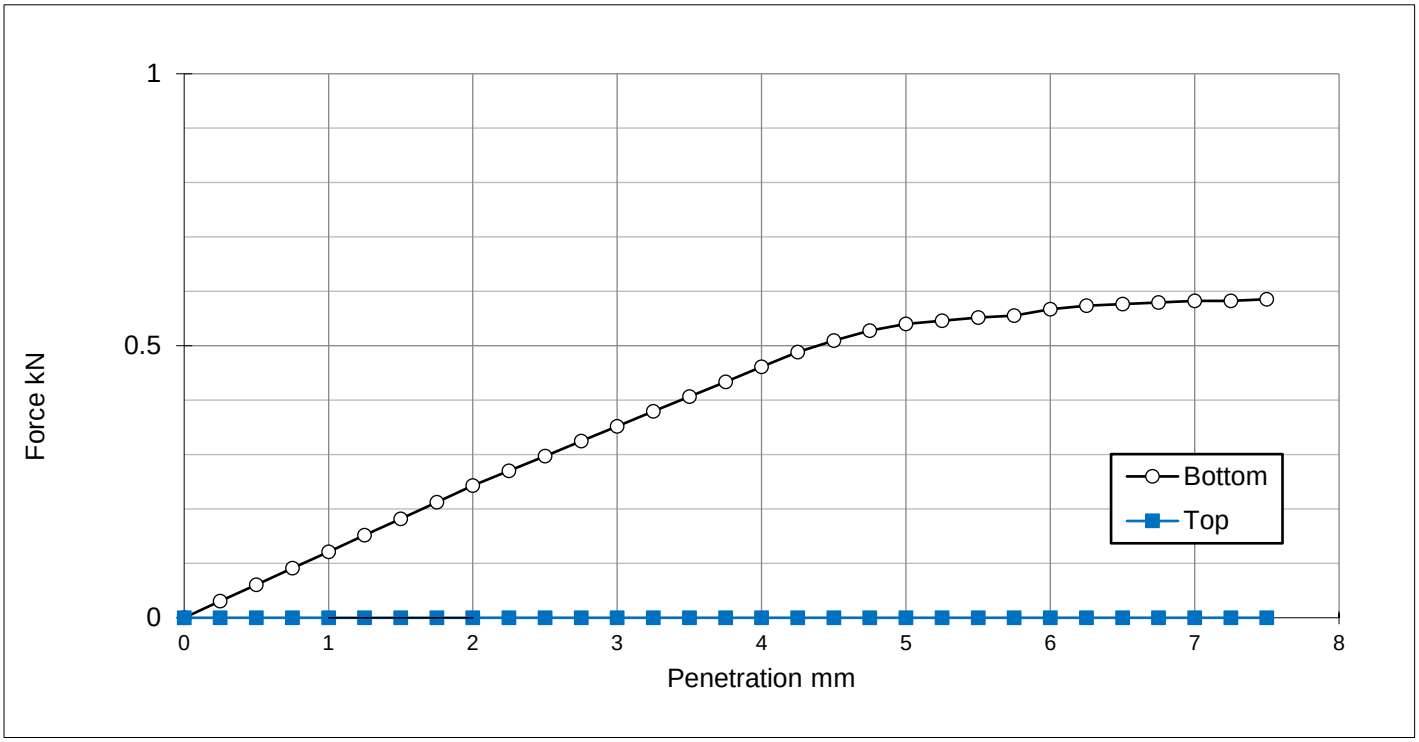
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112676	DATE RECEIVED	31-May-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.49 Mg/m3	MOISTURE CONTENT	17 %	DRY DENSITY	1.27 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.7	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	17	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

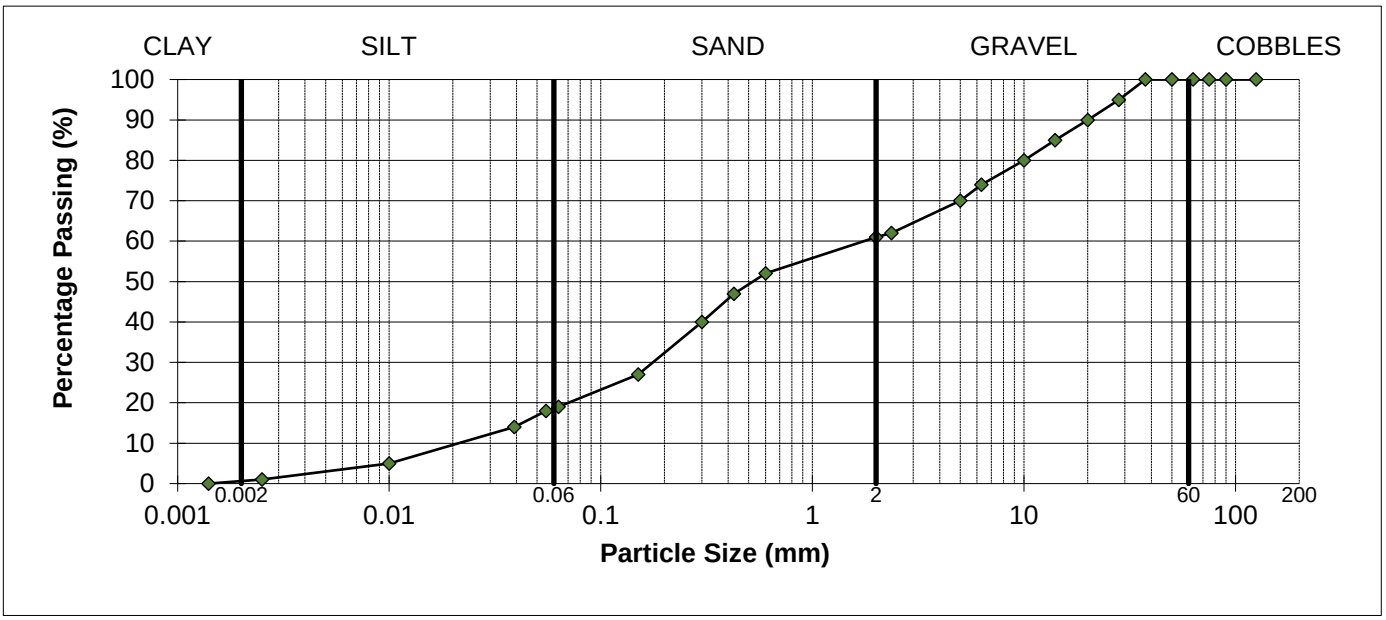
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-1	DATE SAMPLED	30-May-22
LAB SAMPLE No	112774	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	62	
90	100		2	61	
75	100		0.6	52	
63	100		0.425	47	
50	100		0.3	40	
37.5	100		0.15	27	
28	95		0.063	19	
20	90		0.055	18	
14	85		0.039	14	
10	80		0.01	5	
6.3	74		0.0025	1	
5	70		0.0014	0	



REMARKS
As received moisture content = 25%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

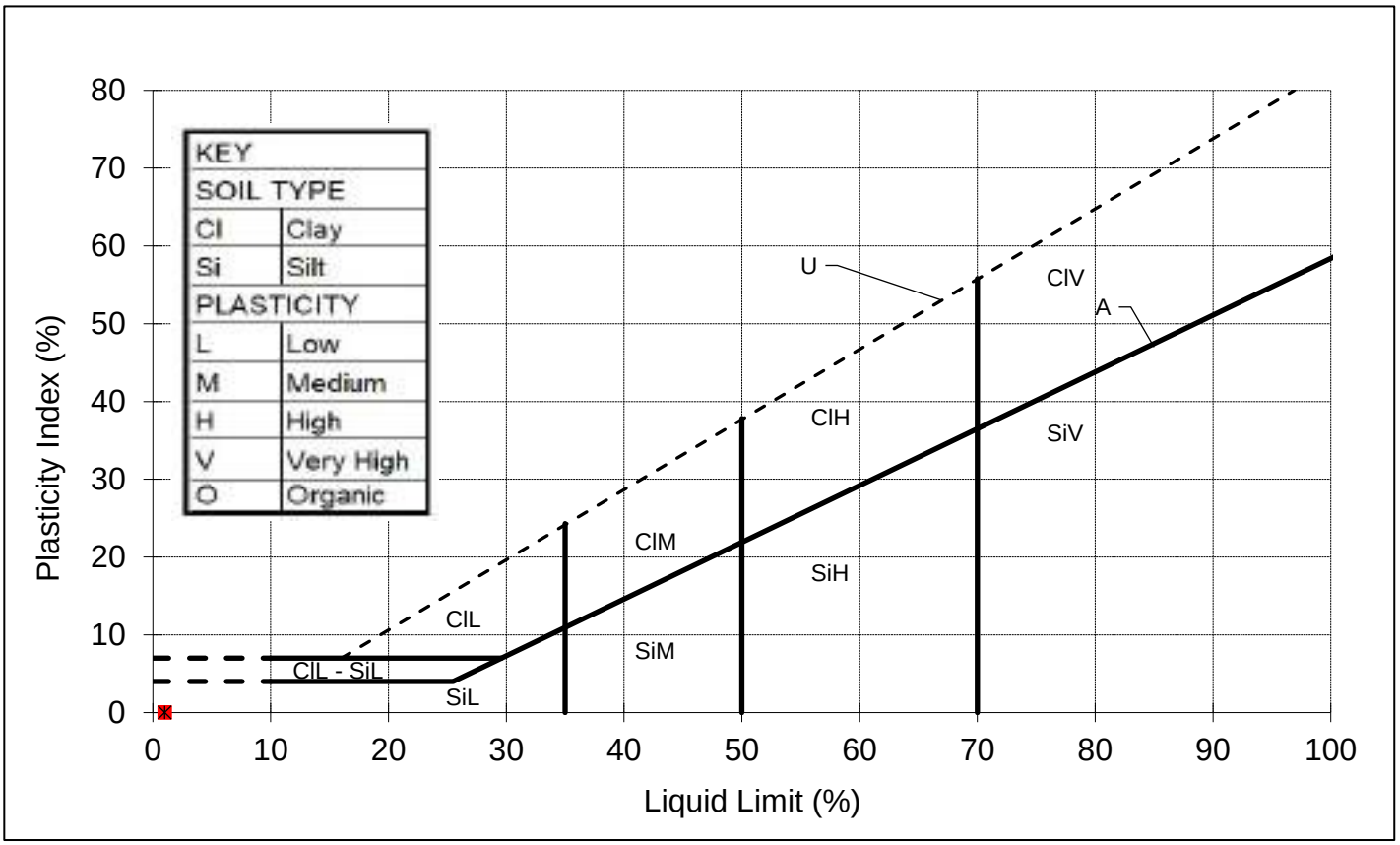
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-1	DATE SAMPLED	30-May-22
SAMPLE No.	112774	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25	N/A	Non Plastic	N/A	47



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

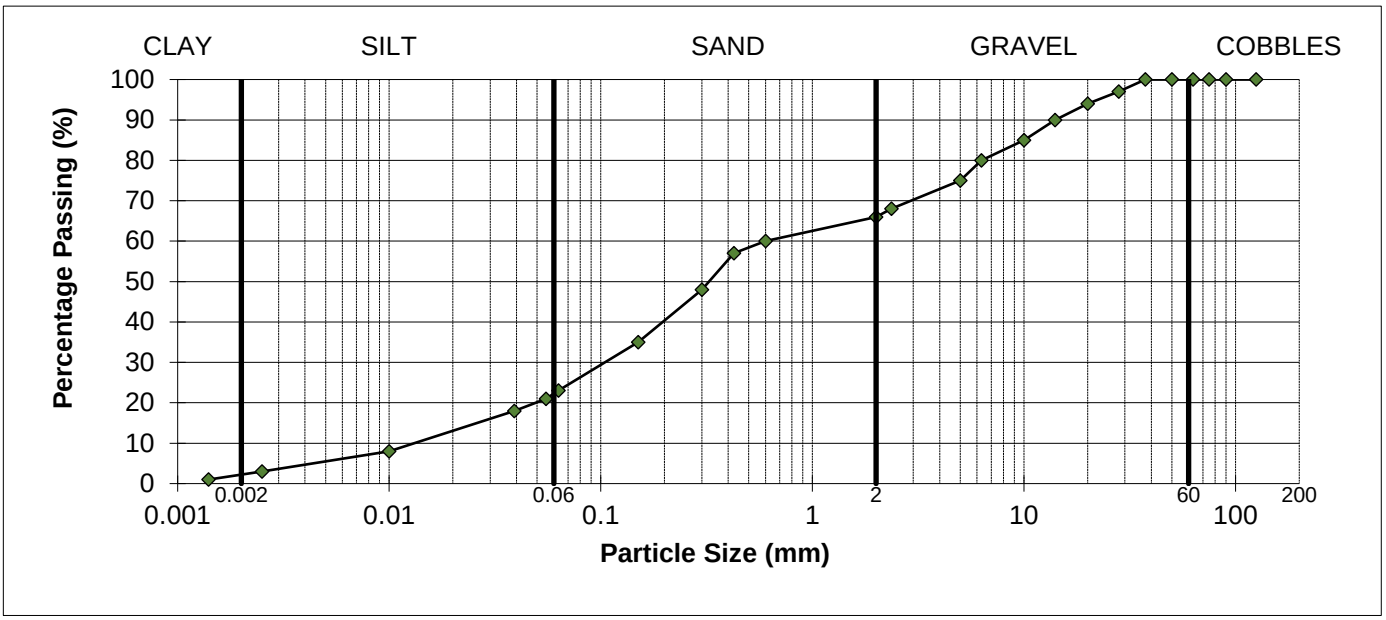
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112775	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	66	
75	100		0.6	60	
63	100		0.425	57	
50	100		0.3	48	
37.5	100		0.15	35	
28	97		0.063	23	
20	94		0.055	21	
14	90		0.039	18	
10	85		0.01	8	
6.3	80		0.0025	3	
5	75		0.0014	1	



REMARKS
As received moisture content = 30%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

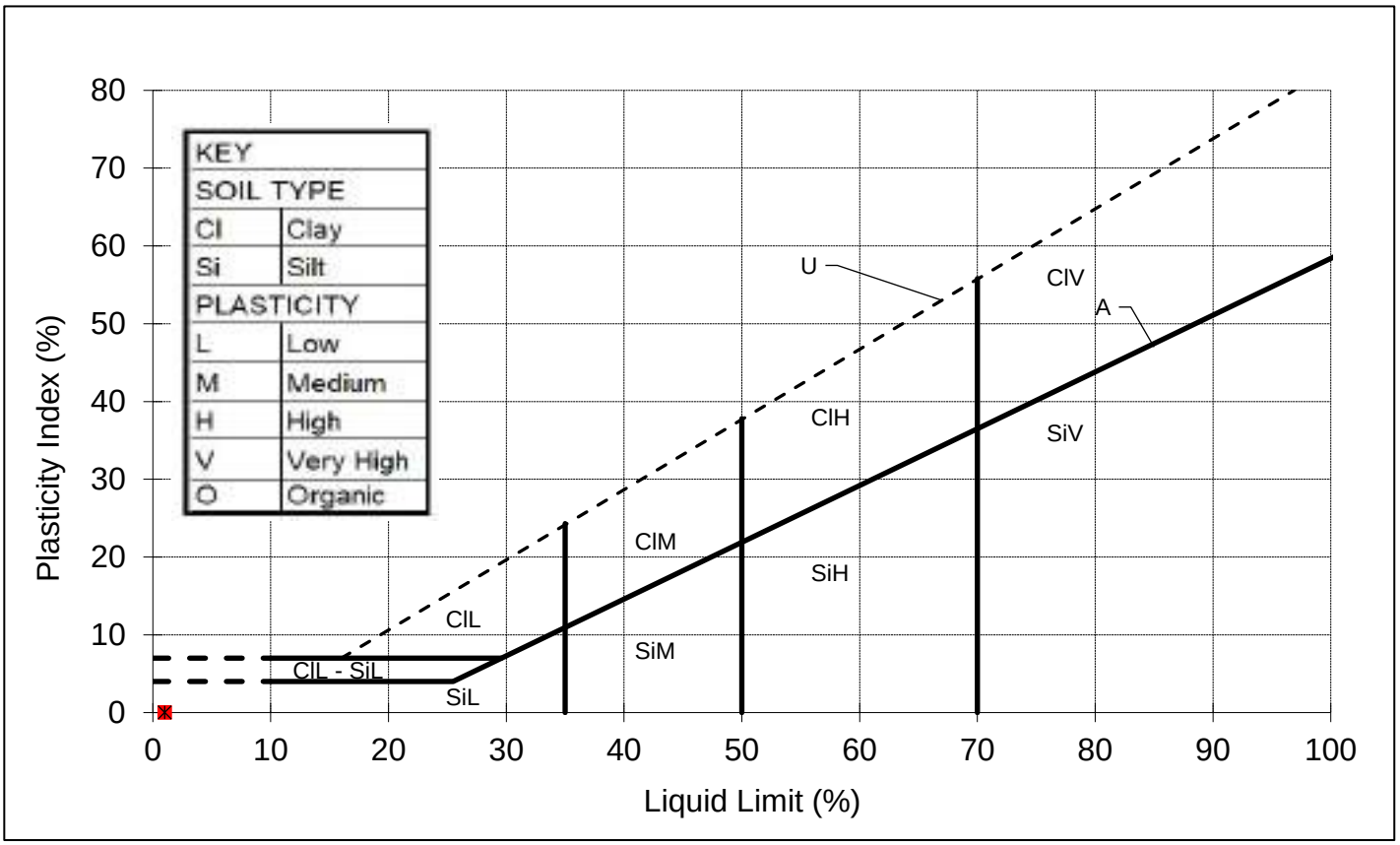
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-2	DATE SAMPLED	30-May-22
SAMPLE No.	112775	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
30	N/A	Non Plastic	N/A	57



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

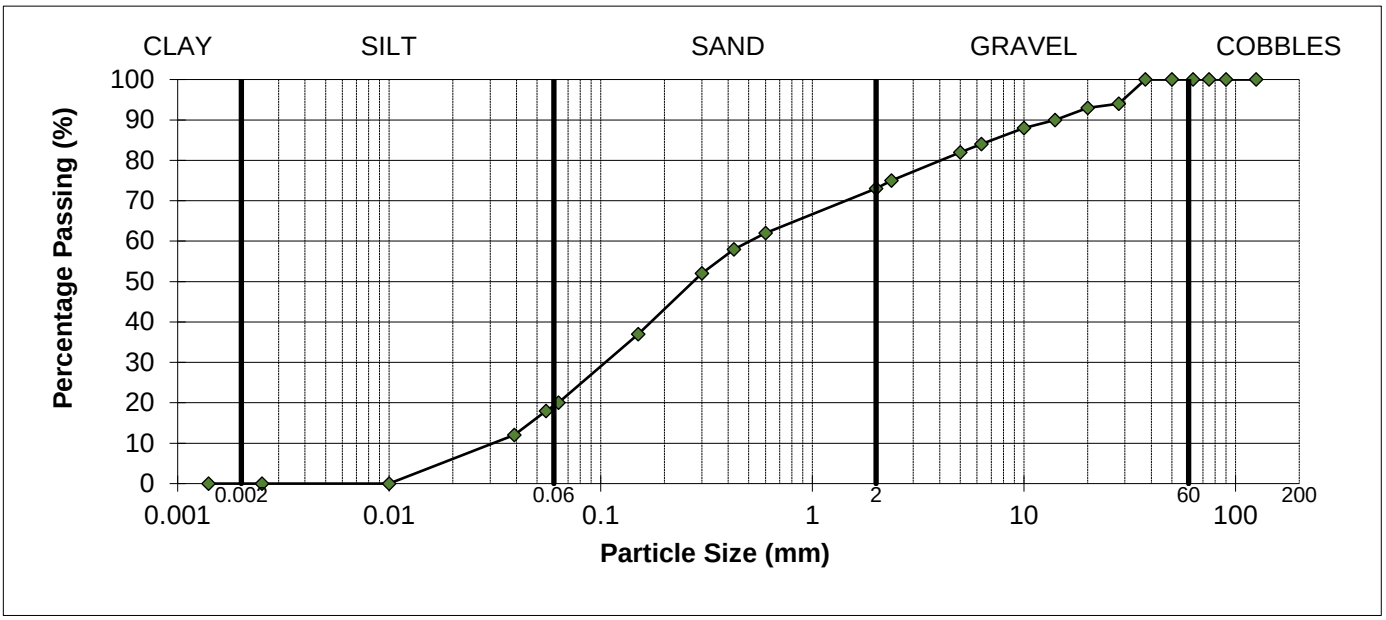
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112776	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	73	
75	100		0.6	62	
63	100		0.425	58	
50	100		0.3	52	
37.5	100		0.15	37	
28	94		0.063	20	
20	93		0.055	18	
14	90		0.039	12	
10	88		0.01	0	
6.3	84		0.0025	0	
5	82		0.0014	0	



REMARKS
As received moisture content = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

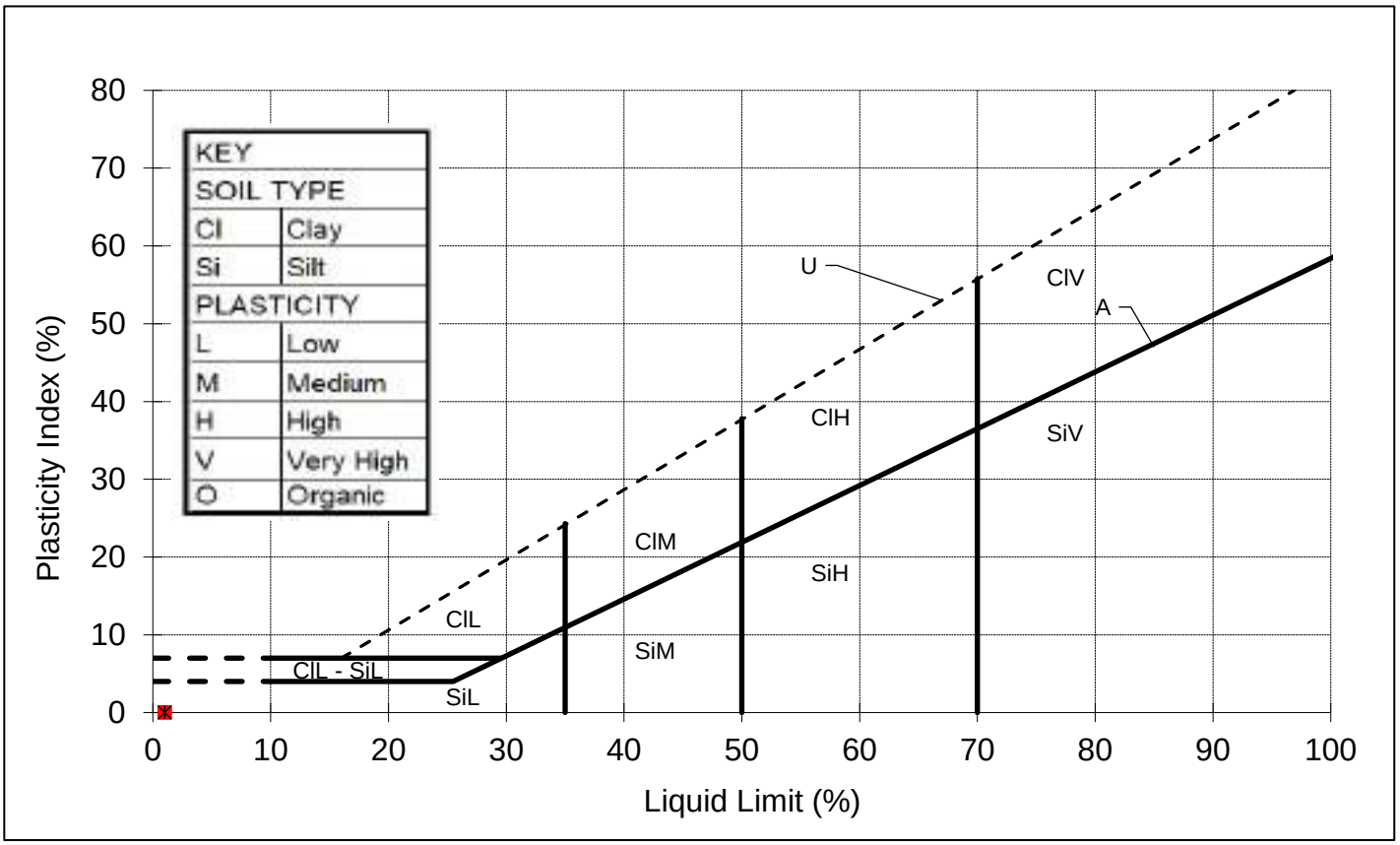
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-3	DATE SAMPLED	30-May-22
SAMPLE No.	112776	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12	N/A	Non Plastic	N/A	58



REMARKS

Sample tested after wet sieving. Sample did contain some plastic material but was found to be non plastic

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

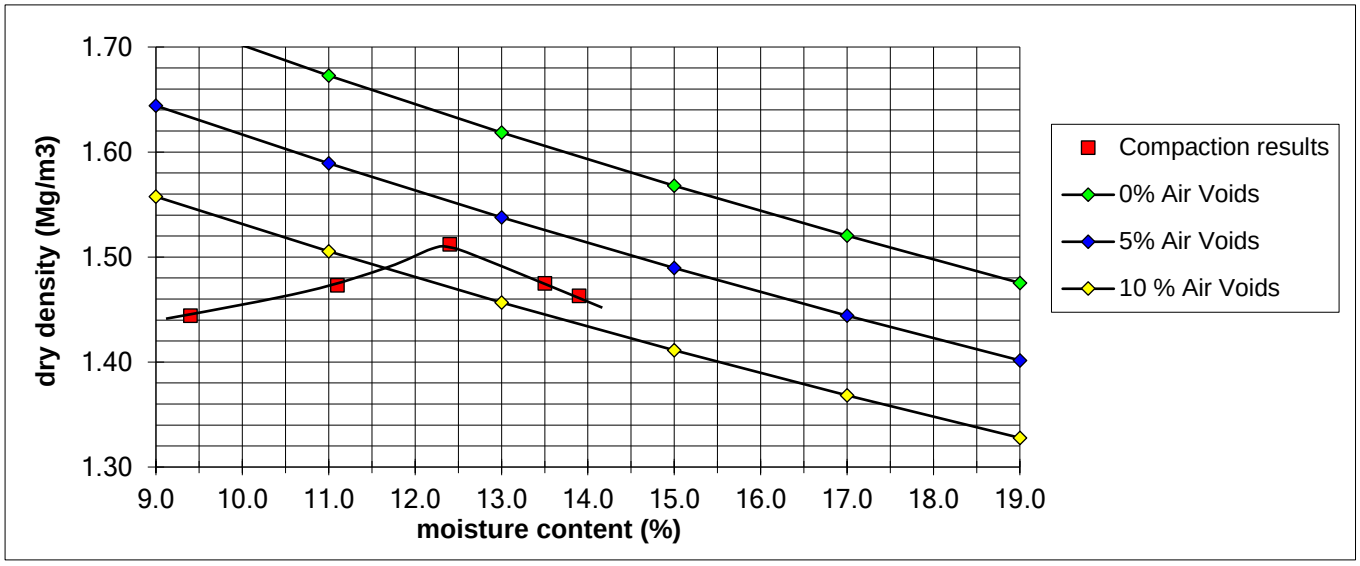
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112776	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		9.4	1.444
2		11.1	1.473
3		12.4	1.512
4		13.5	1.475
5		13.9	1.463
	Optimum	12.0	
	Maximum		1.51
	Particle Density	2.05 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 7%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

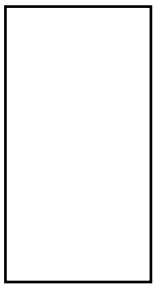
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112776	DATE RECEIVED	01-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	13	%
BULK DENSITY	1.69	Mg/m3
DRY DENSITY	1.50	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	NN/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

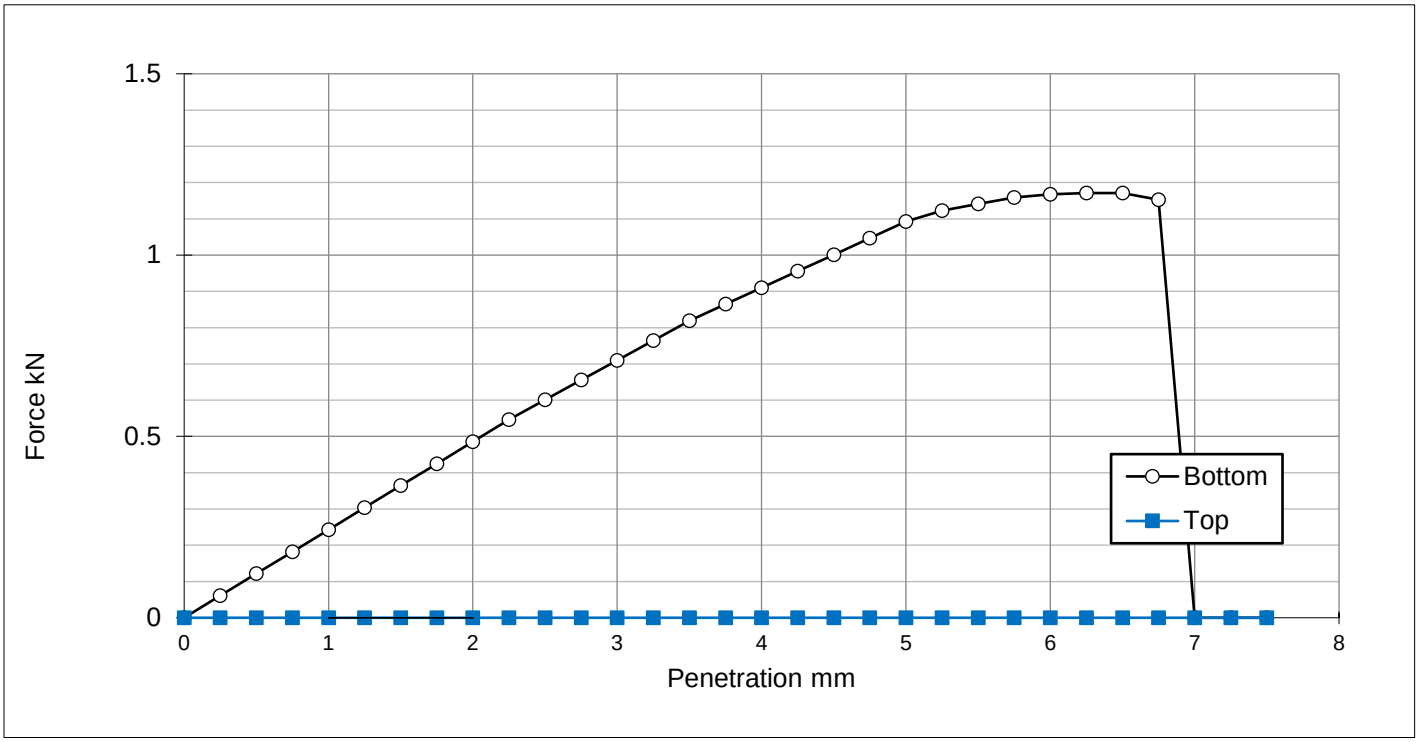
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112776	DATE RECEIVED	01-Jun-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		7 %			
BULK DENSITY	1.69 Mg/m3	MOISTURE CONTENT	12 %	DRY DENSITY	1.50 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	5.5	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	12	%

REMARKS
Sample sheared at 6.50mm penetration

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

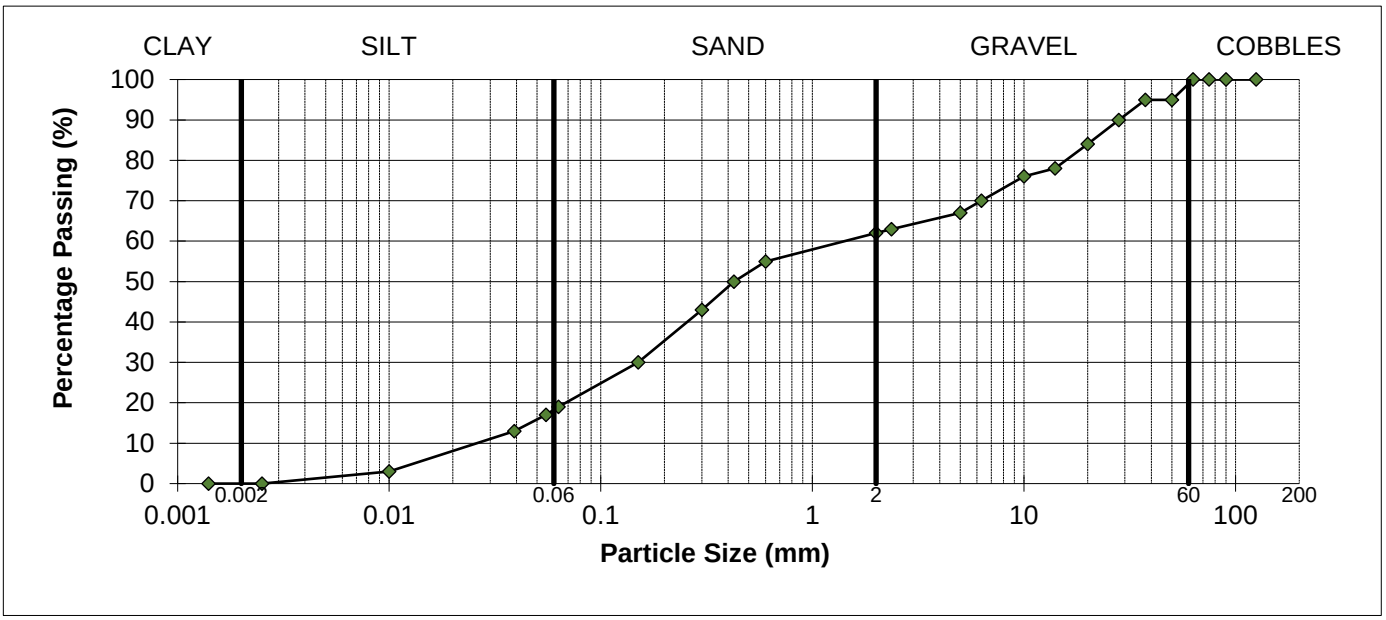
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112777	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	63	
90	100		2	62	
75	100		0.6	55	
63	100		0.425	50	
50	95		0.3	43	
37.5	95		0.15	30	
28	90		0.063	19	
20	84		0.055	17	
14	78		0.039	13	
10	76		0.01	3	
6.3	70		0.0025	0	
5	67		0.0014	0	



REMARKS
As received moisture content = 23%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

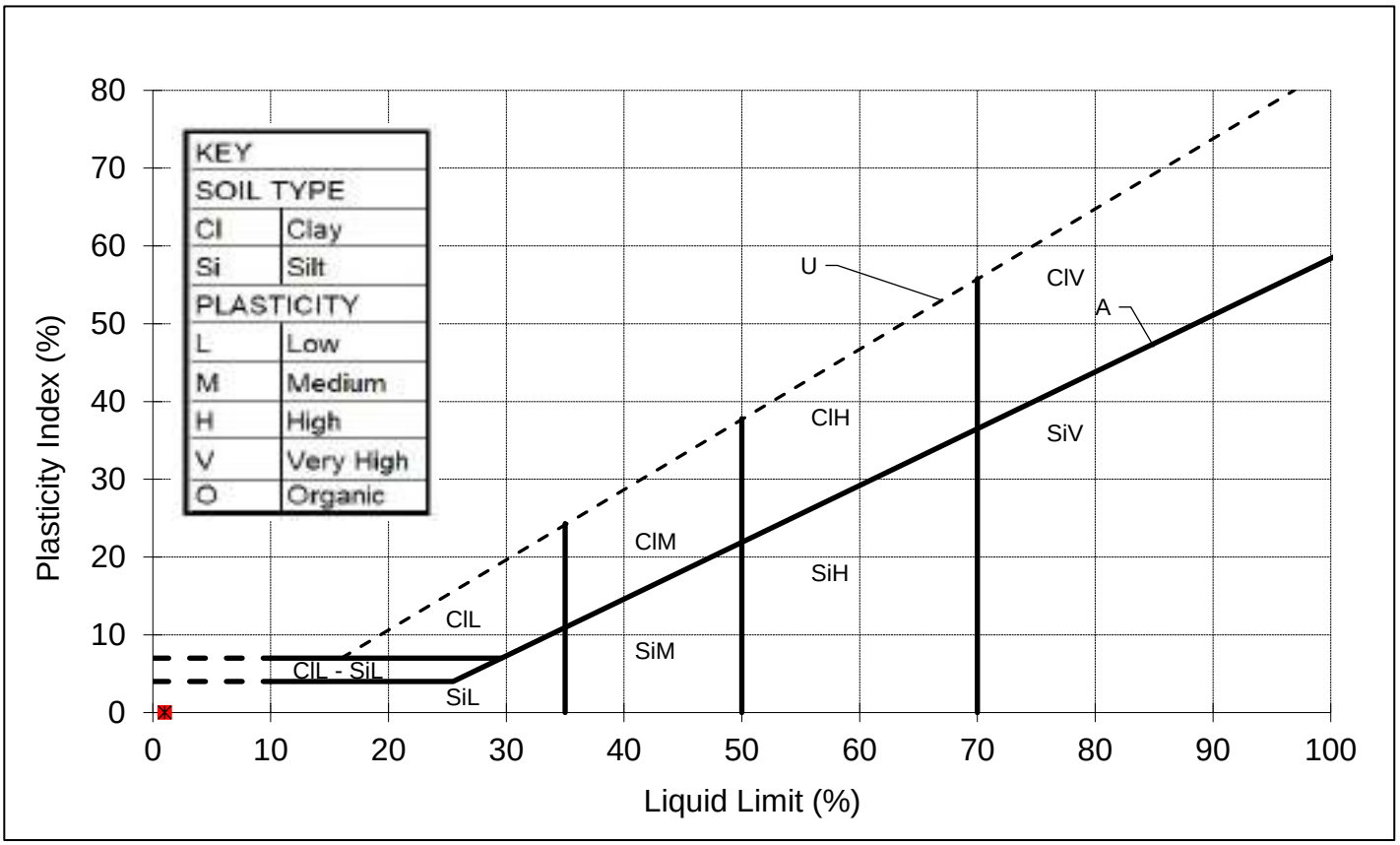
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-4	DATE SAMPLED	30-May-22
SAMPLE No.	112777	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23	N/A	Non Plastic	N/A	50



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

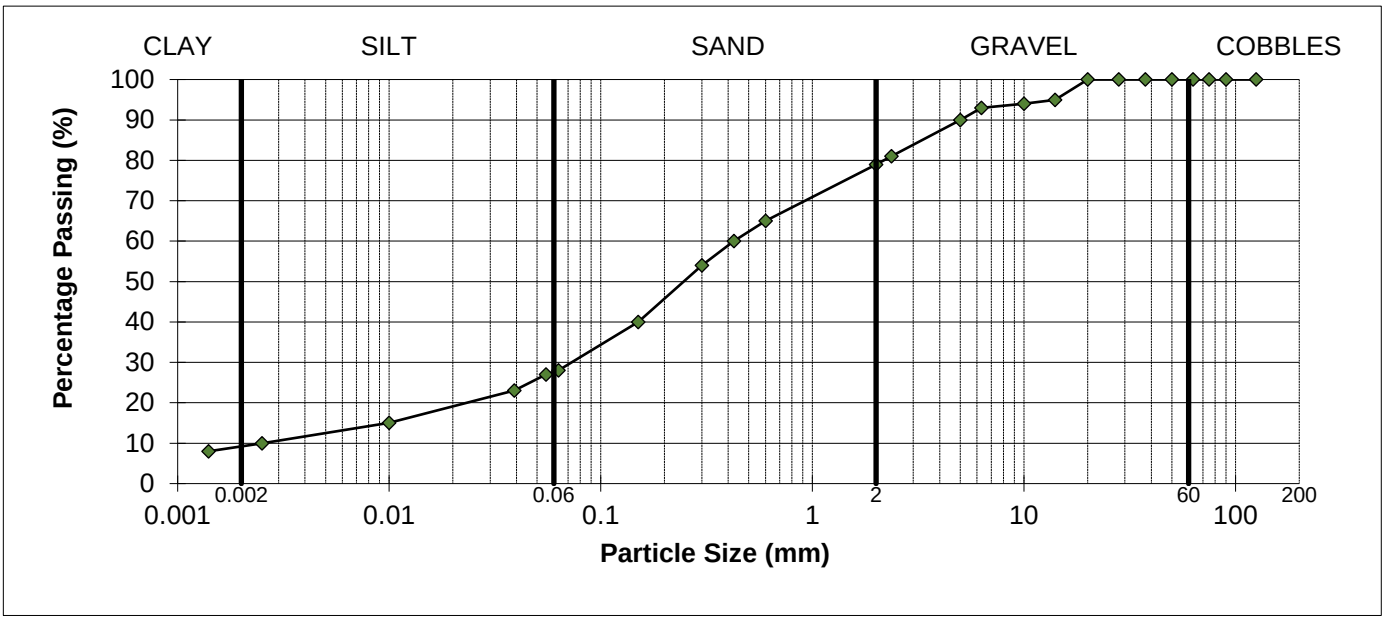
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112778	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	81	
90	100		2	79	
75	100		0.6	65	
63	100		0.425	60	
50	100		0.3	54	
37.5	100		0.15	40	
28	100		0.063	28	
20	100		0.055	27	
14	95		0.039	23	
10	94		0.01	15	
6.3	93		0.0025	10	
5	90		0.0014	8	



REMARKS
As received moisture content = 15%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

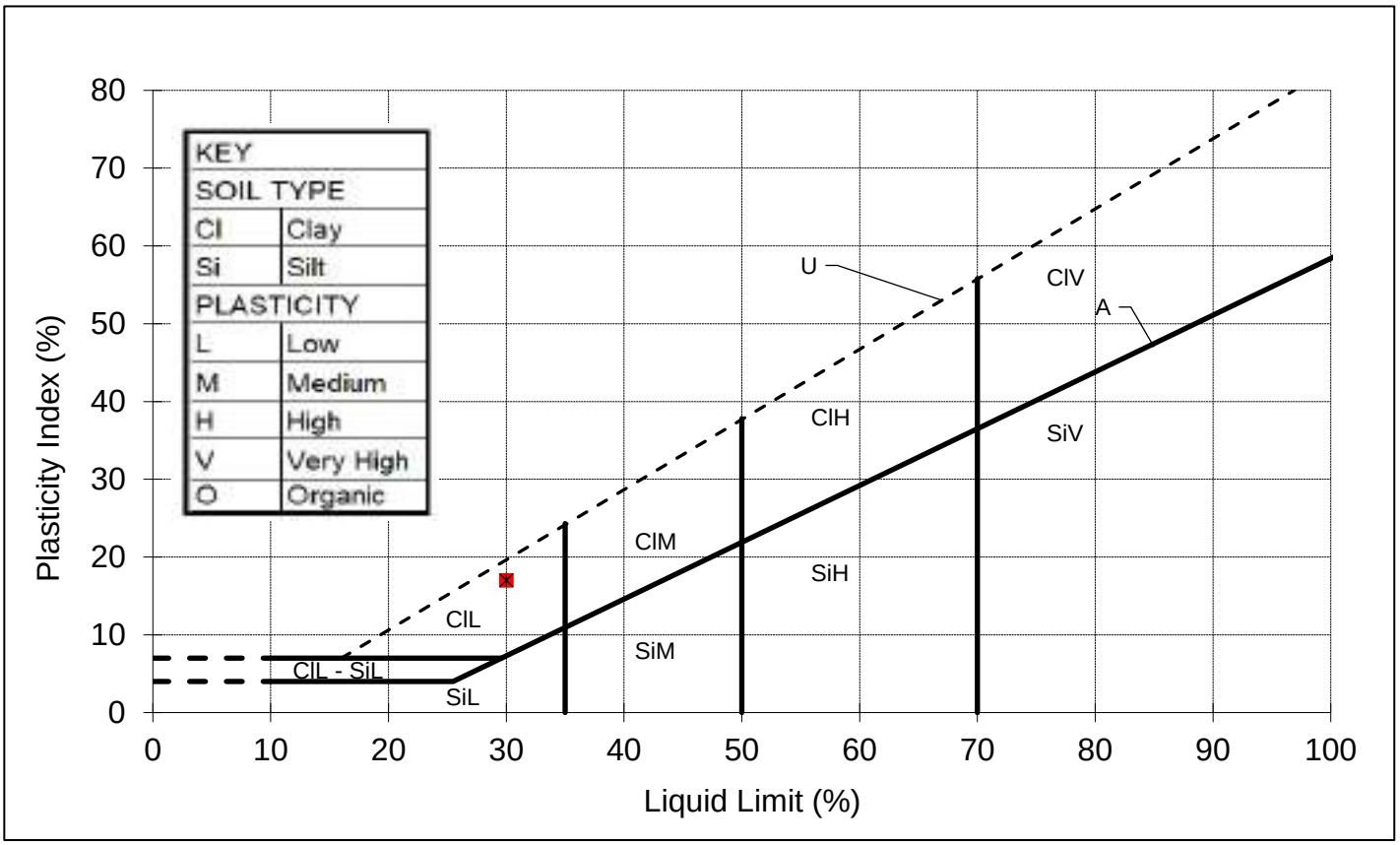
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-5	DATE SAMPLED	30-May-22
SAMPLE No.	112778	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15	30	13	17	60



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

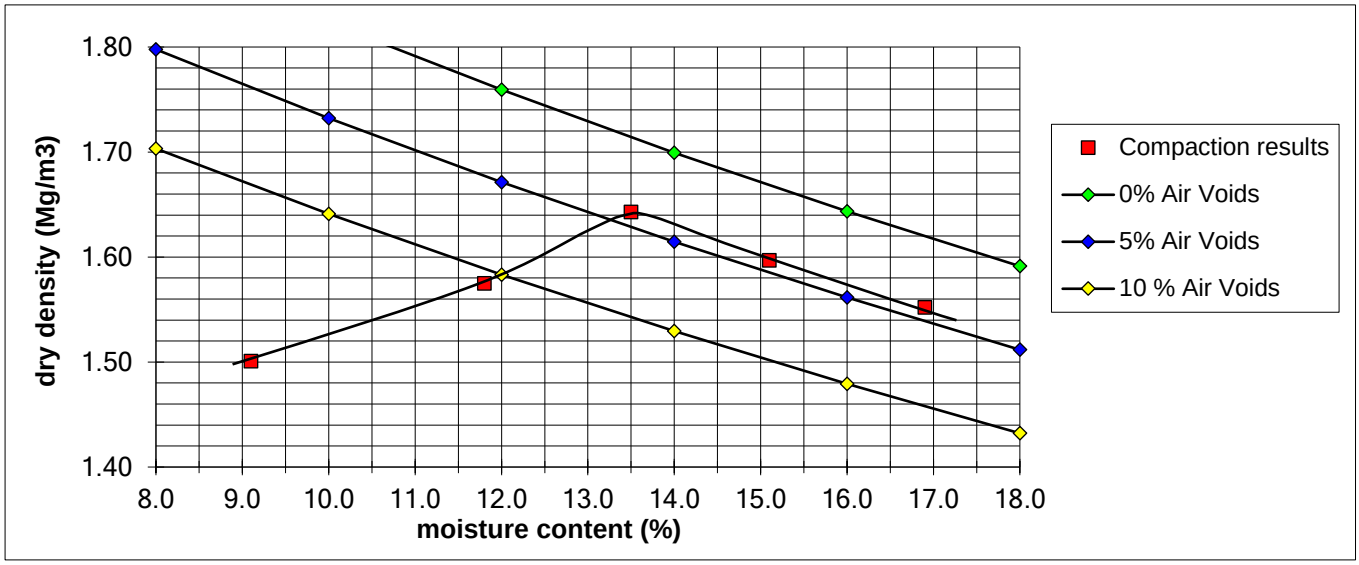
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112778	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		9.1	1.501
2		11.8	1.575
3		13.5	1.643
4		15.1	1.597
5		16.9	1.552
	Optimum	14.0	
	Maximum		1.64
	Particle Density	2.23 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

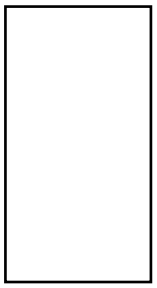
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112778	DATE RECEIVED	01-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	15	%
BULK DENSITY	1.83	Mg/m3
DRY DENSITY	1.60	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
200	20	1.48	213.3	107

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer,

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

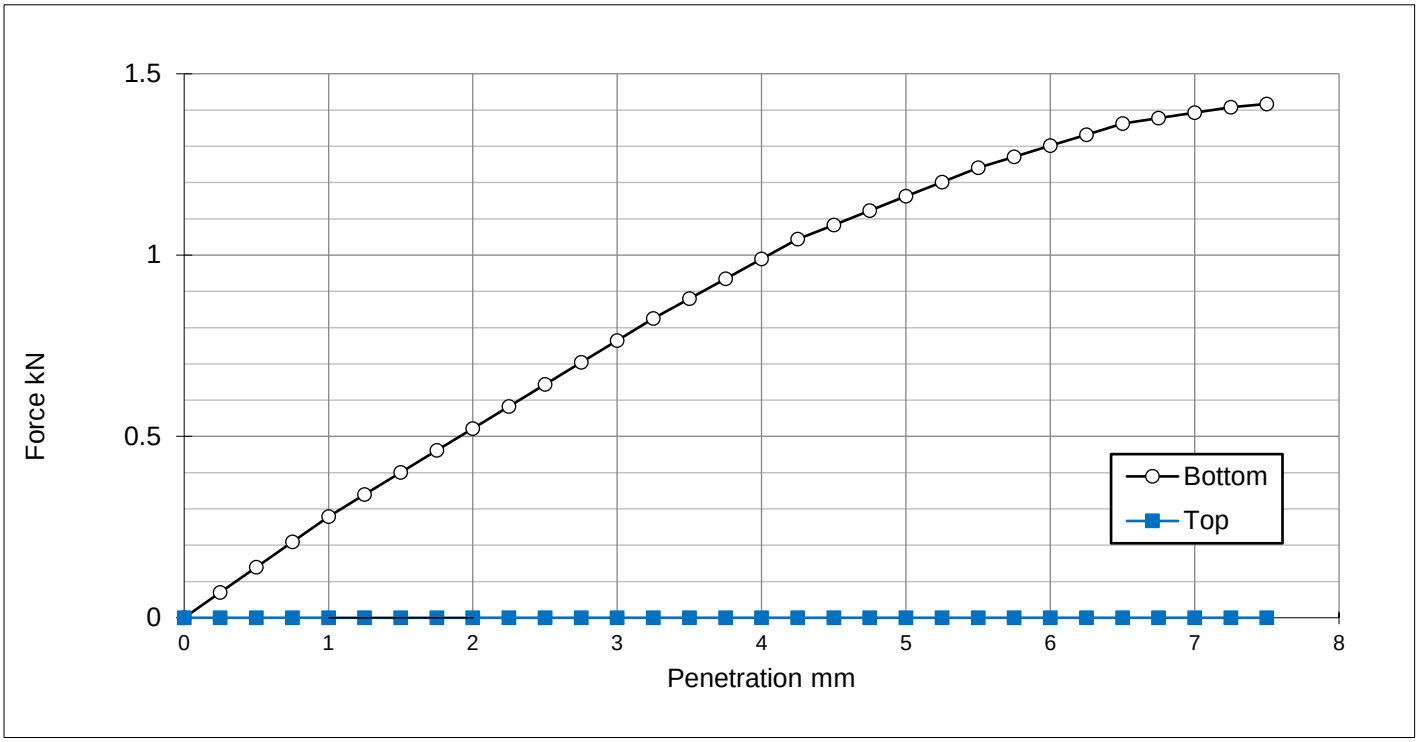
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPD14-5	DATE SAMPLED	30-May-22
LAB SAMPLE No	112778	DATE RECEIVED	01-Jun-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.83 Mg/m3	MOISTURE CONTENT	15 %	DRY DENSITY	1.60 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	5.8	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	15	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

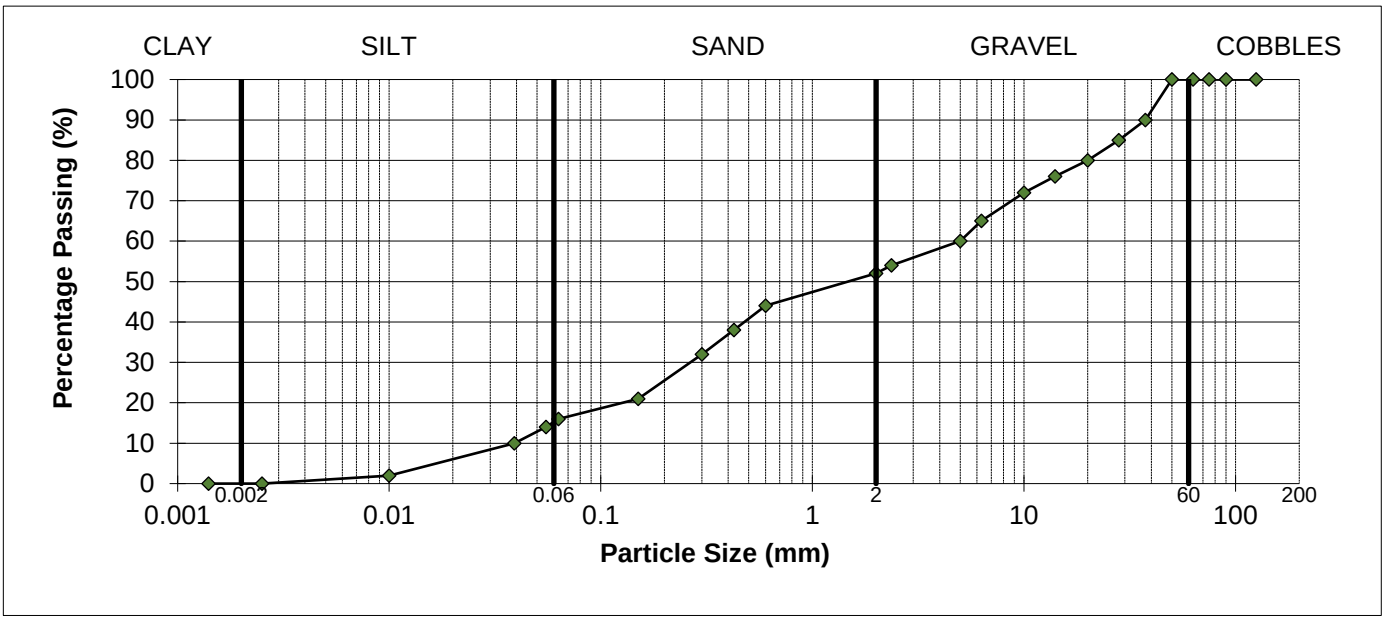
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-1	DATE SAMPLED	30-May-22
LAB SAMPLE No	112779	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	54	
90	100		2	52	
75	100		0.6	44	
63	100		0.425	38	
50	100		0.3	32	
37.5	90		0.15	21	
28	85		0.063	16	
20	80		0.055	14	
14	76		0.039	10	
10	72		0.01	2	
6.3	65		0.0025	0	
5	60		0.0014	0	



REMARKS
As received moisture content = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

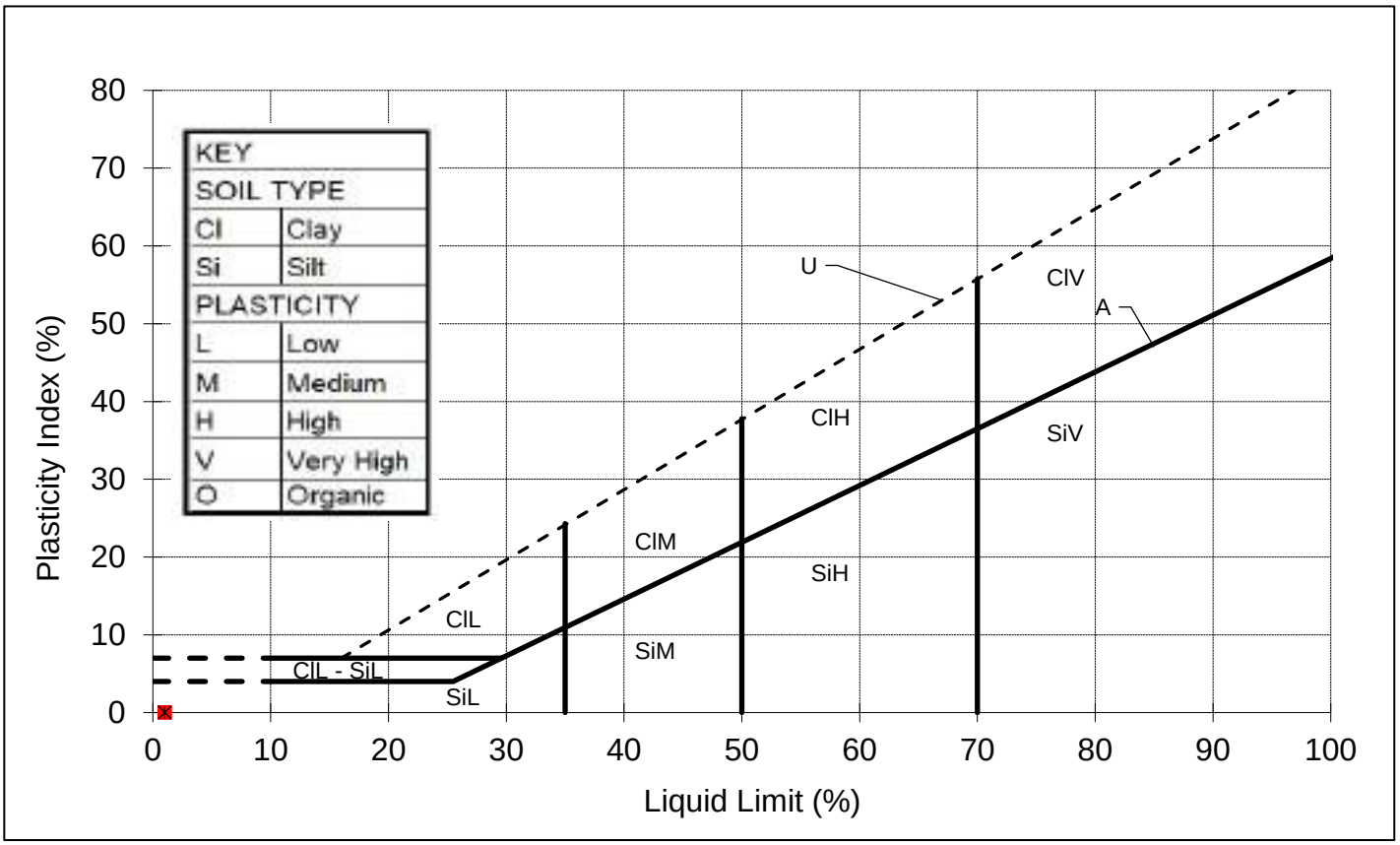
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-1	DATE SAMPLED	30-May-22
SAMPLE No.	112779	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16	N/A	Non Plastic	N/A	38



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

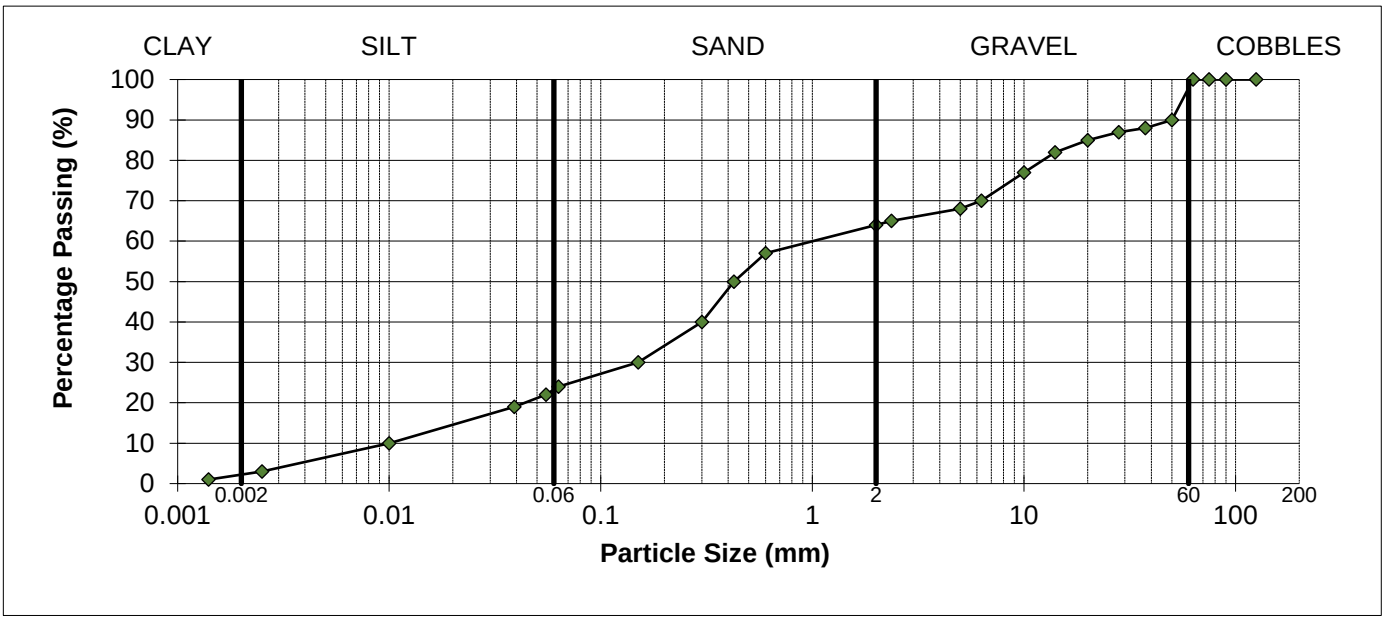
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112901	DATE RECEIVED	06-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	65	
90	100		2	64	
75	100		0.6	57	
63	100		0.425	50	
50	90		0.3	40	
37.5	88		0.15	30	
28	87		0.063	24	
20	85		0.055	22	
14	82		0.039	19	
10	77		0.01	10	
6.3	70		0.0025	3	
5	68		0.0014	1	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

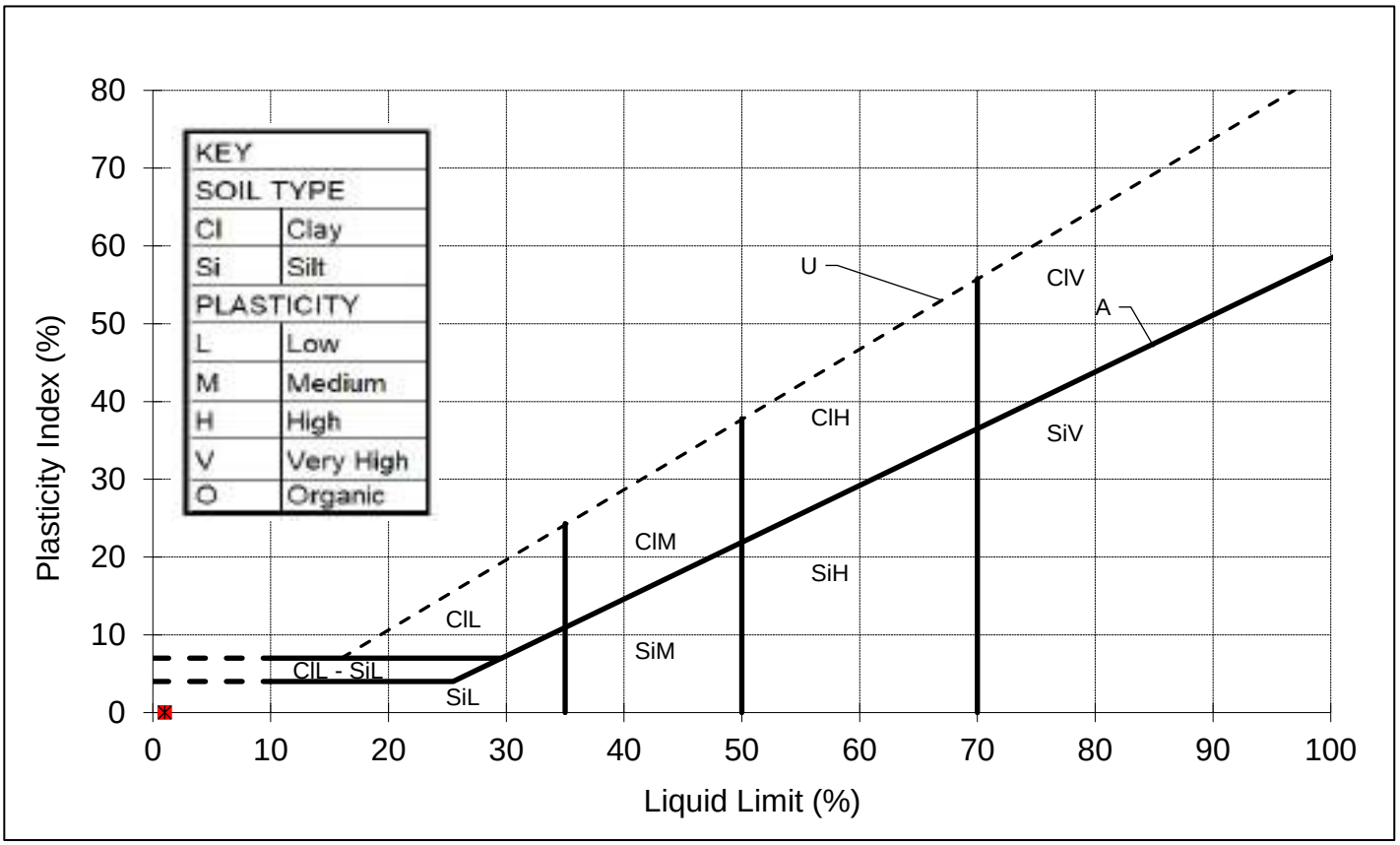
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-2	DATE SAMPLED	30-May-22
SAMPLE No.	112901	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	50



REMARKS

Sample tested after wet sieving. Sample did contain some plastic material but was found to be non plastic

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

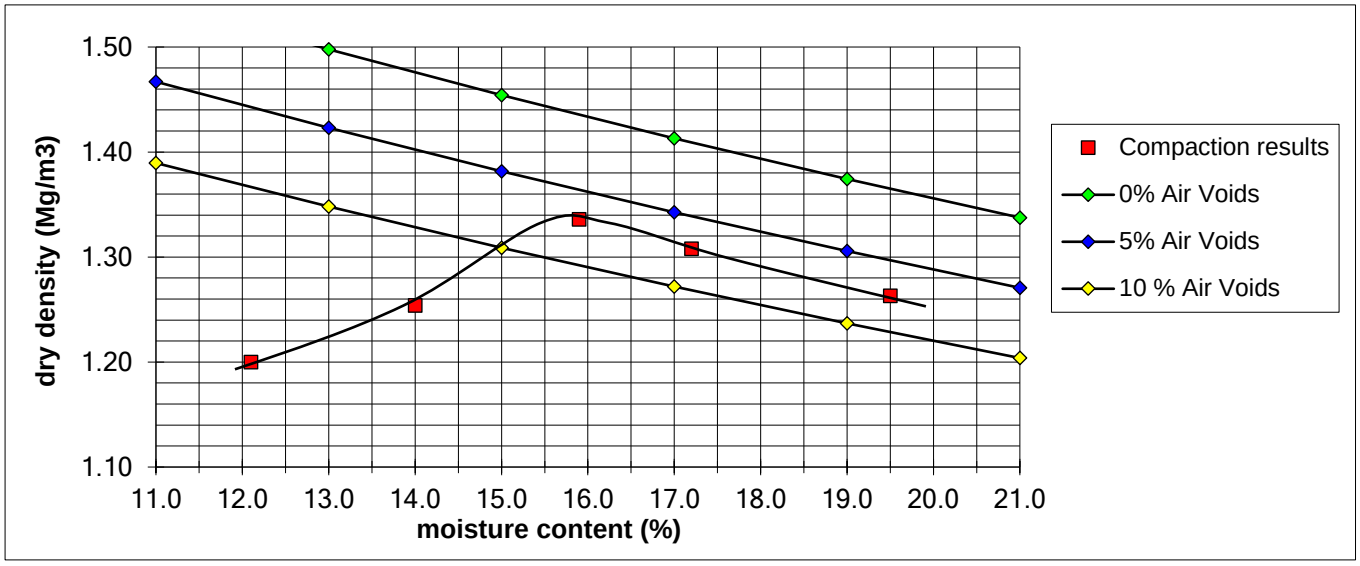
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112901	DATE RECEIVED	06-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.1	1.200
2		14.0	1.254
3		15.9	1.336
4		17.2	1.308
5		19.5	1.263
	Optimum	16.0	
	Maximum		1.34
	Particle Density	1.86 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 12%
Percentage of material retained on 20mm sieve = 15%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

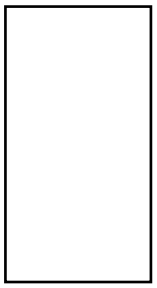
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112901	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	17	%
BULK DENSITY	1.51	Mg/m3
DRY DENSITY	1.30	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	NN/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

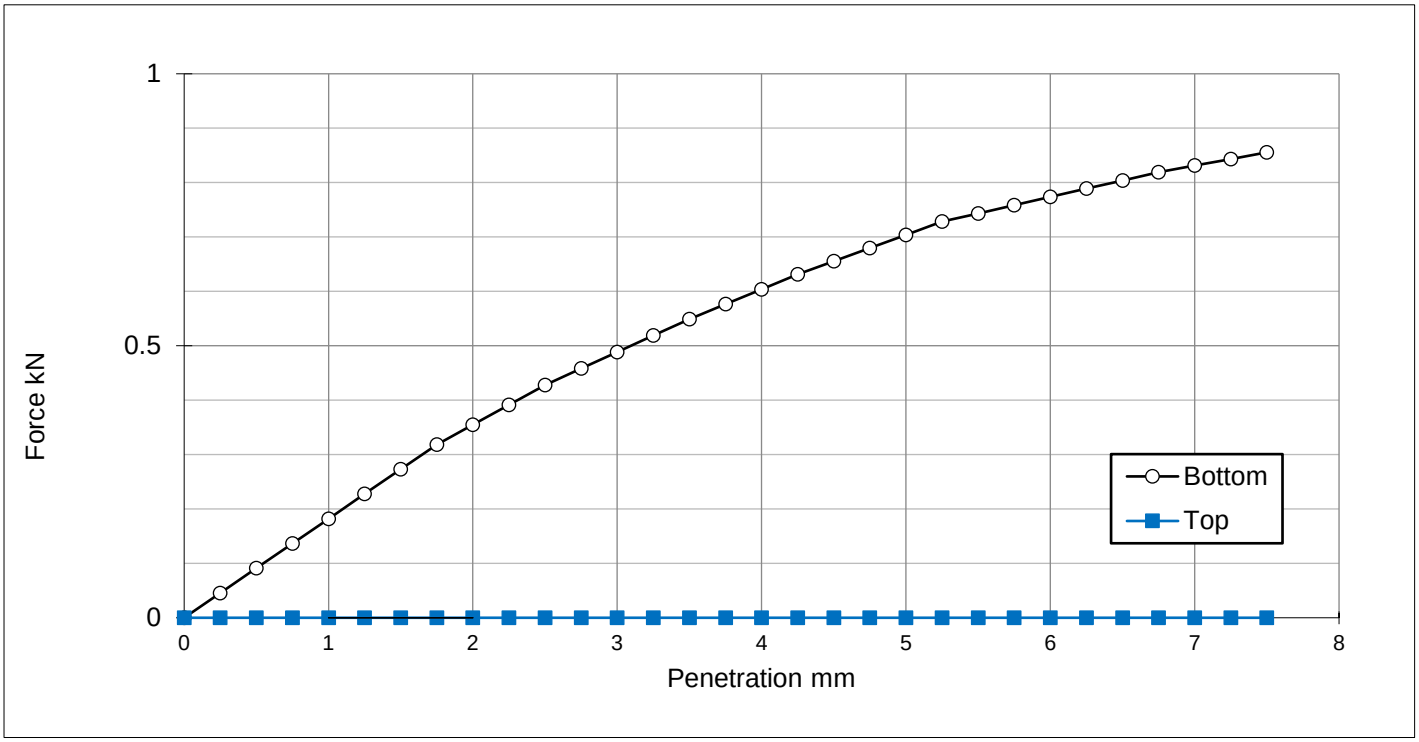
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-2	DATE SAMPLED	30-May-22
LAB SAMPLE No	112901	DATE RECEIVED	06-Jun-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		15 %			
BULK DENSITY	1.51 Mg/m3	MOISTURE CONTENT	17 %	DRY DENSITY	1.30 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.5	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	17	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

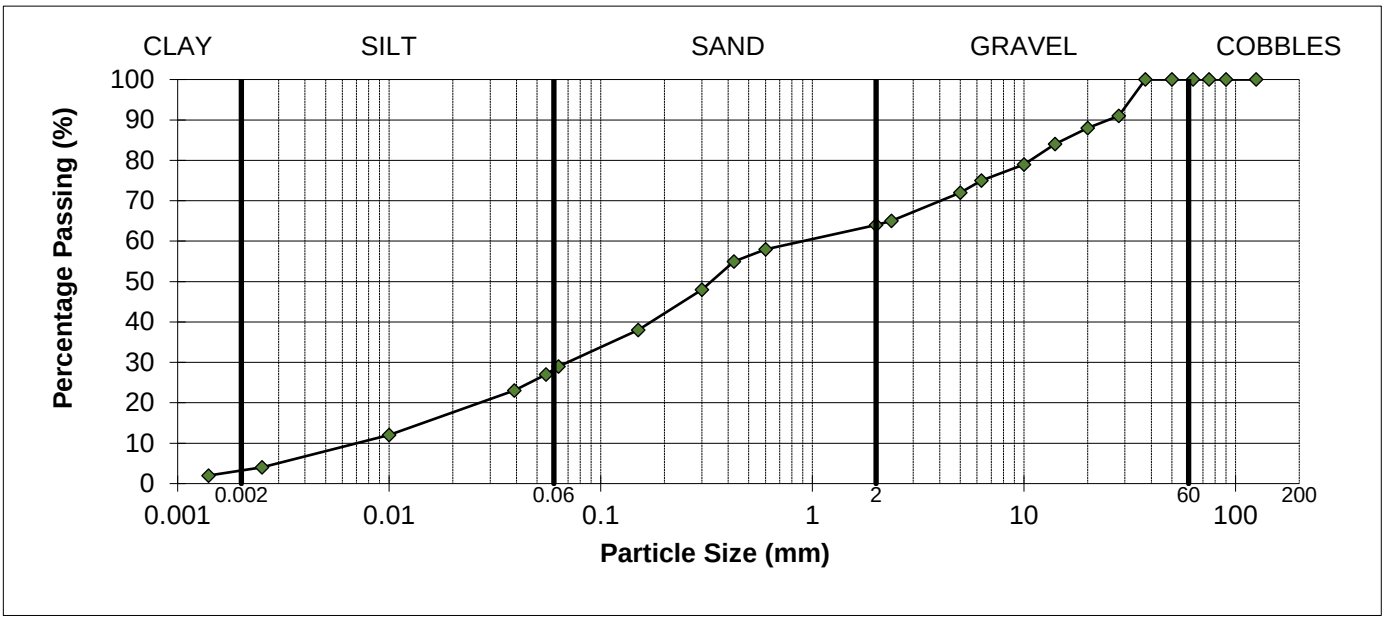
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-3	DATE SAMPLED	30-May-22
LAB SAMPLE No	112780	DATE RECEIVED	01-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	65	
90	100		2	64	
75	100		0.6	58	
63	100		0.425	55	
50	100		0.3	48	
37.5	100		0.15	38	
28	91		0.063	29	
20	88		0.055	27	
14	84		0.039	23	
10	79		0.01	12	
6.3	75		0.0025	4	
5	72		0.0014	2	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

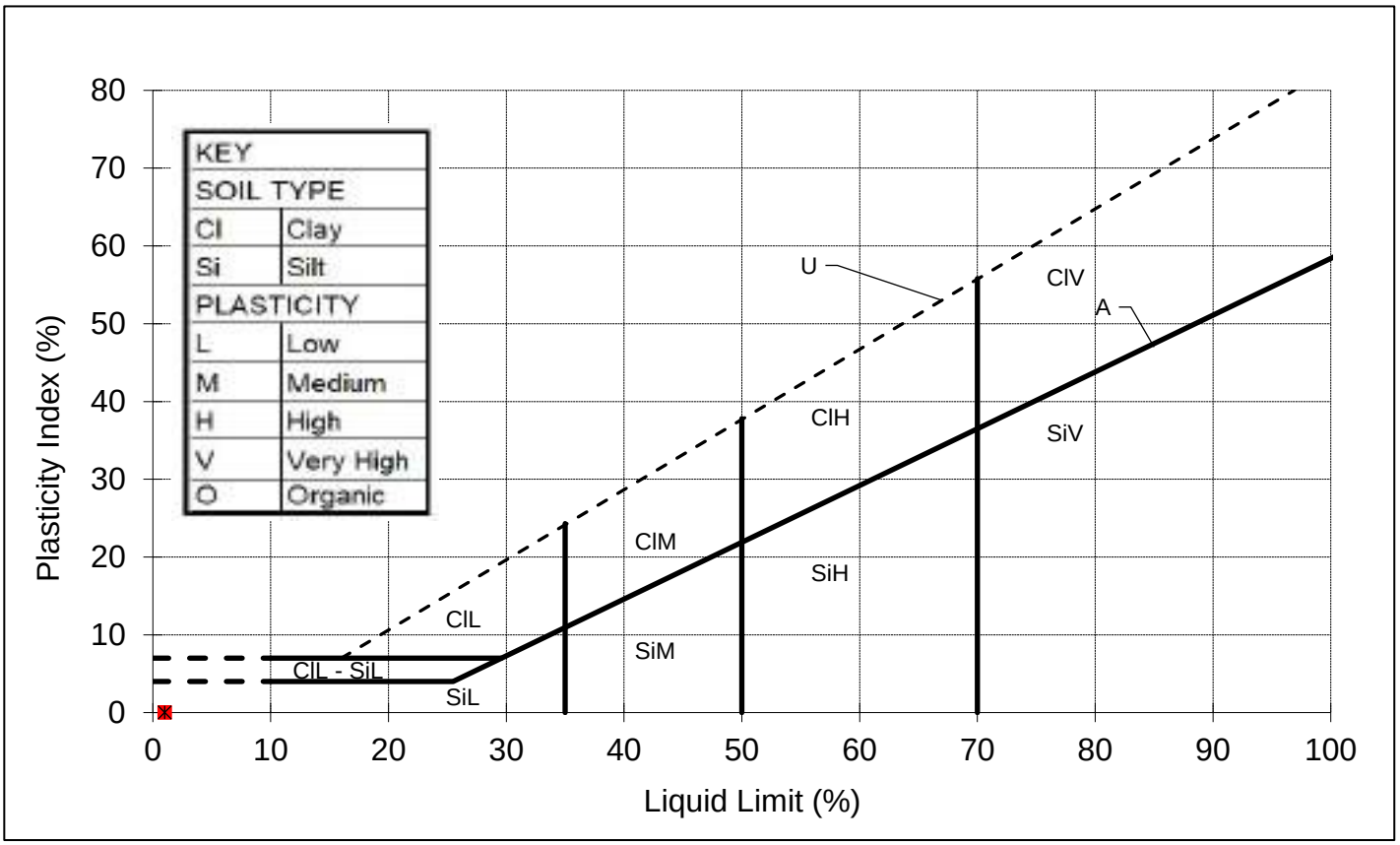
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-3	DATE SAMPLED	30-May-22
SAMPLE No.	112780	DATE RECEIVED	01-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	55



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

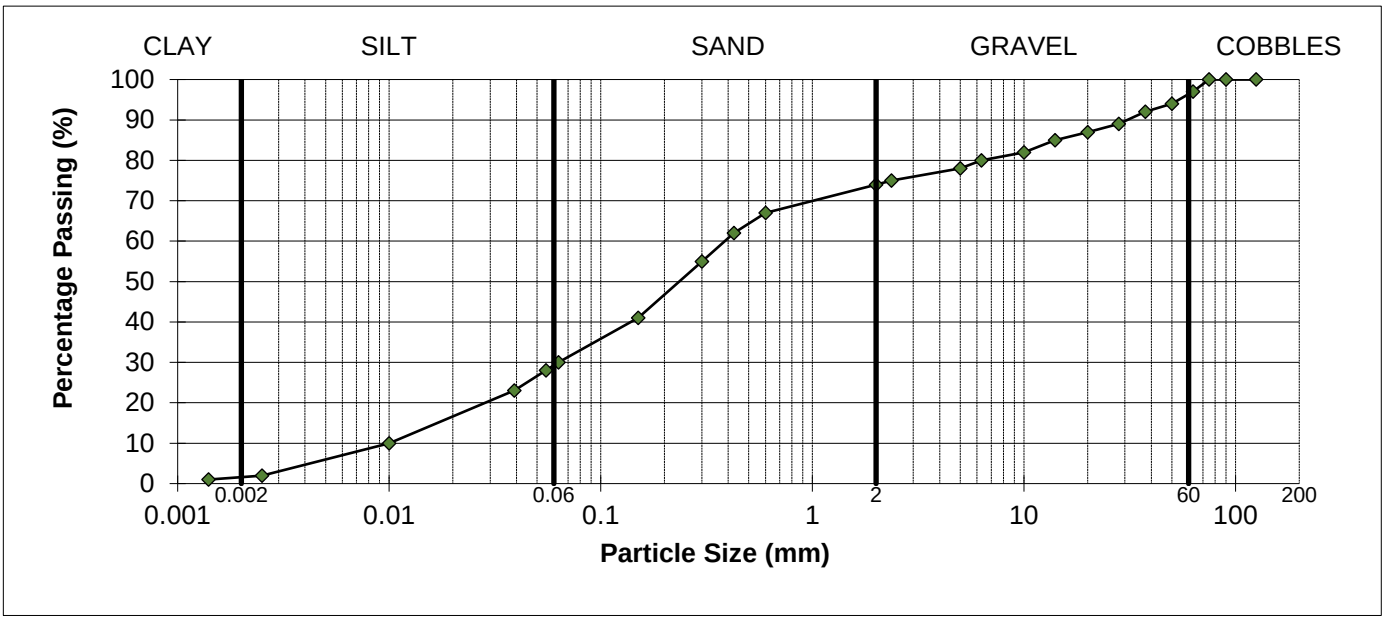
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112902	DATE RECEIVED	06-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	74	
75	100		0.6	67	
63	97		0.425	62	
50	94		0.3	55	
37.5	92		0.15	41	
28	89		0.063	30	
20	87		0.055	28	
14	85		0.039	23	
10	82		0.01	10	
6.3	80		0.0025	2	
5	78		0.0014	1	



REMARKS
As received moisture content = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

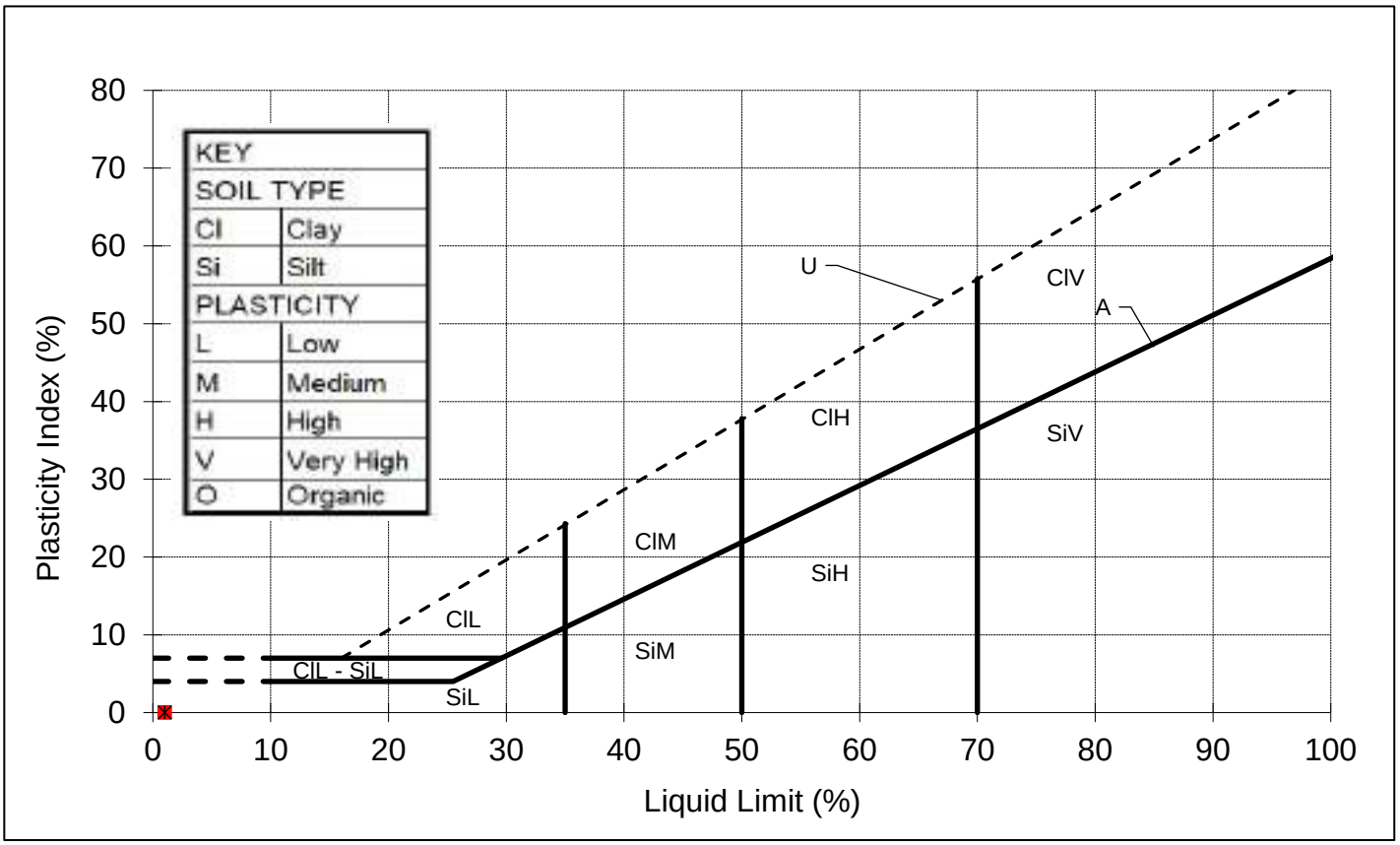
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-4	DATE SAMPLED	30-May-22
SAMPLE No.	112902	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	62



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

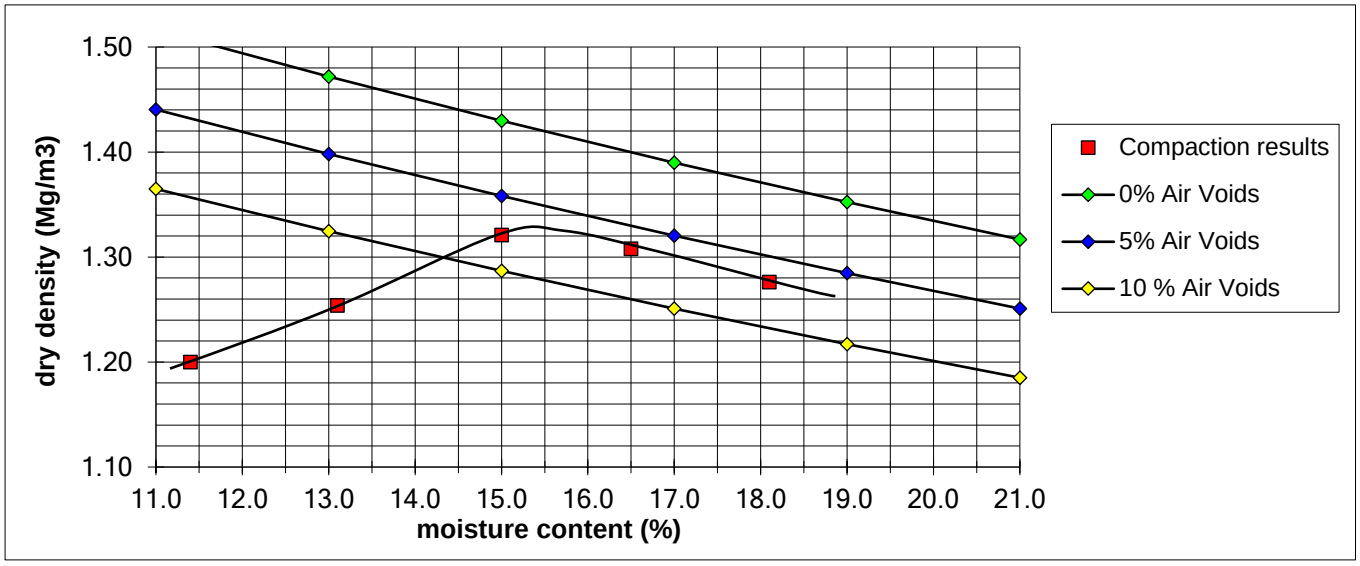
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112902	DATE RECEIVED	06-Jun-22
DATE TESTED	06-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.4	1.200
2		13.1	1.254
3		15.0	1.321
4		16.5	1.308
5		18.1	1.276
	Optimum	15.0	
	Maximum		1.33
	Particle Density	1.82 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 8%
Percentage of material retained on 20mm sieve = 13%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

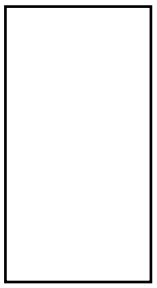
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112902	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	17	%
BULK DENSITY	1.53	Mg/m3
DRY DENSITY	1.31	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

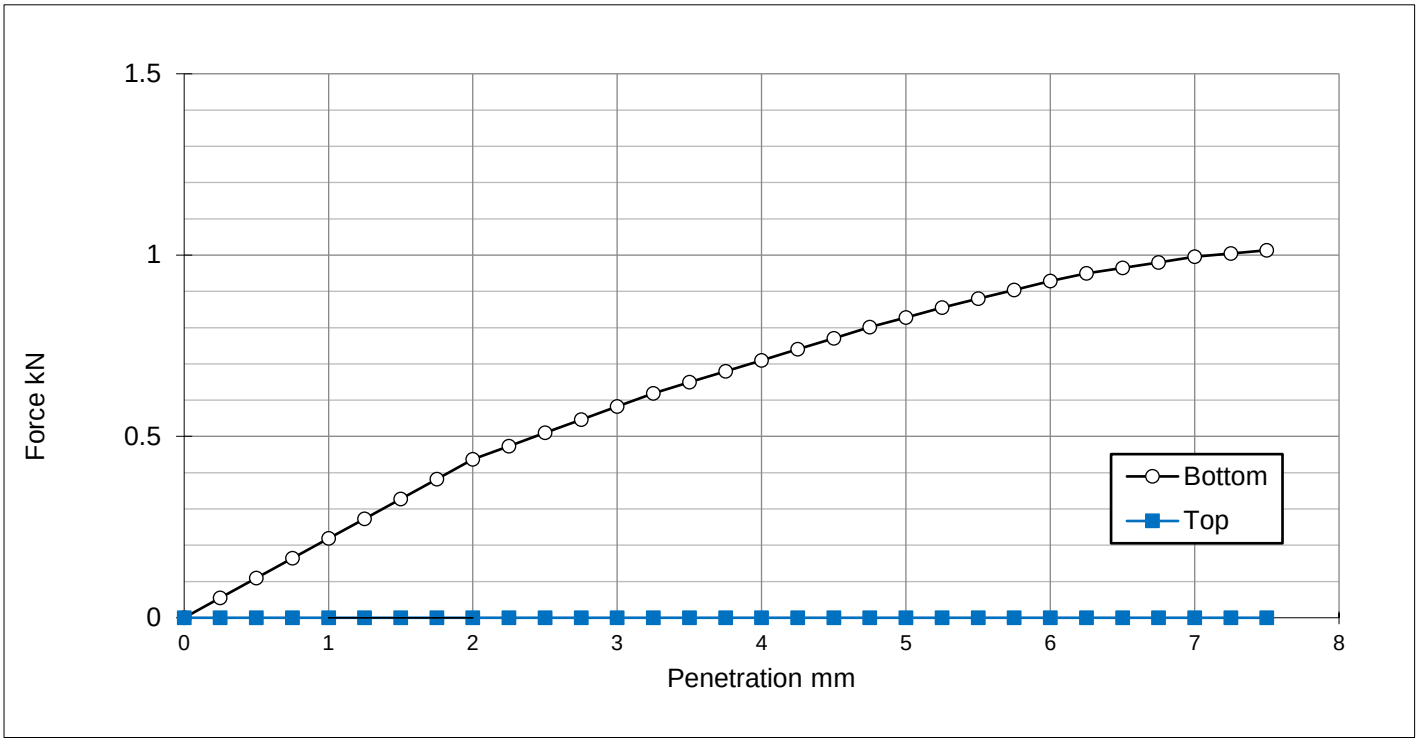
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/2

SAMPLE LABEL	TPC13-4	DATE SAMPLED	30-May-22
LAB SAMPLE No	112902	DATE RECEIVED	06-Jun-22
DATE TESTED	14-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		13 %			
BULK DENSITY	1.53 Mg/m3	MOISTURE CONTENT	17 %	DRY DENSITY	1.31 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.1	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	17	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/3
Date of Issue 14 July 2022
Page 1 of 71

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

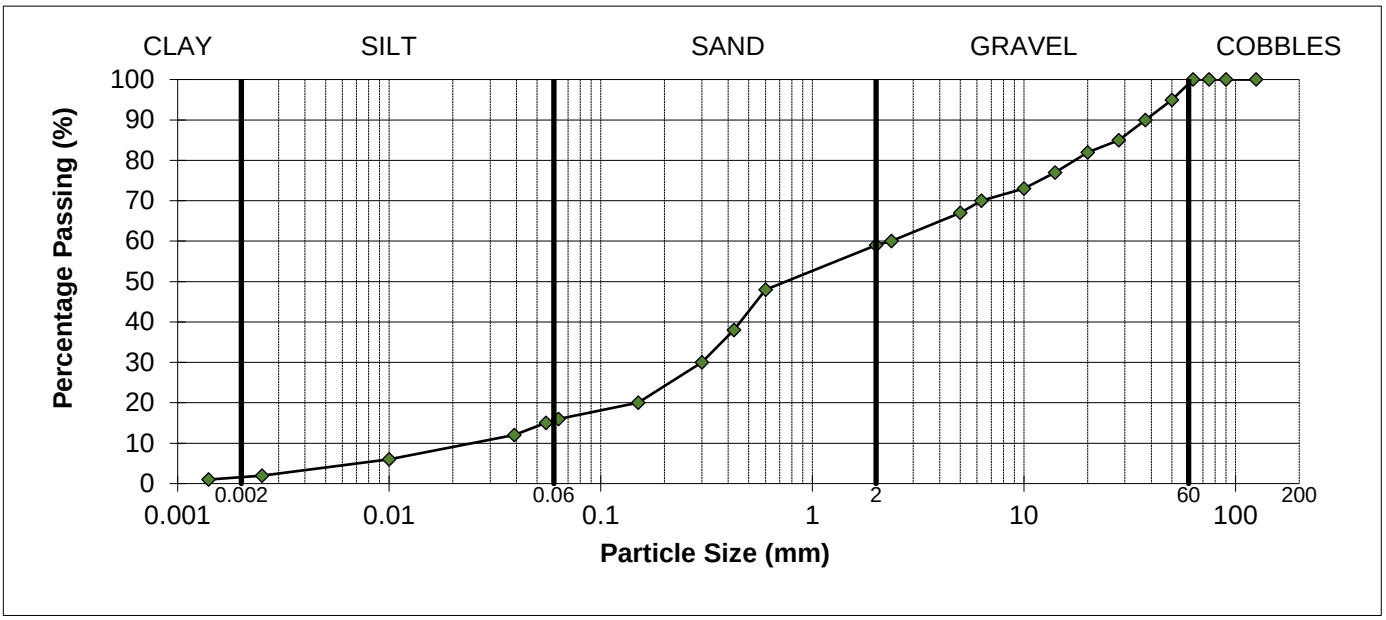
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113214	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	60	
90	100		2	59	
75	100		0.6	48	
63	100		0.425	38	
50	95		0.3	30	
37.5	90		0.15	20	
28	85		0.063	16	
20	82		0.055	15	
14	77		0.039	12	
10	73		0.01	6	
6.3	70		0.0025	2	
5	67		0.0014	1	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

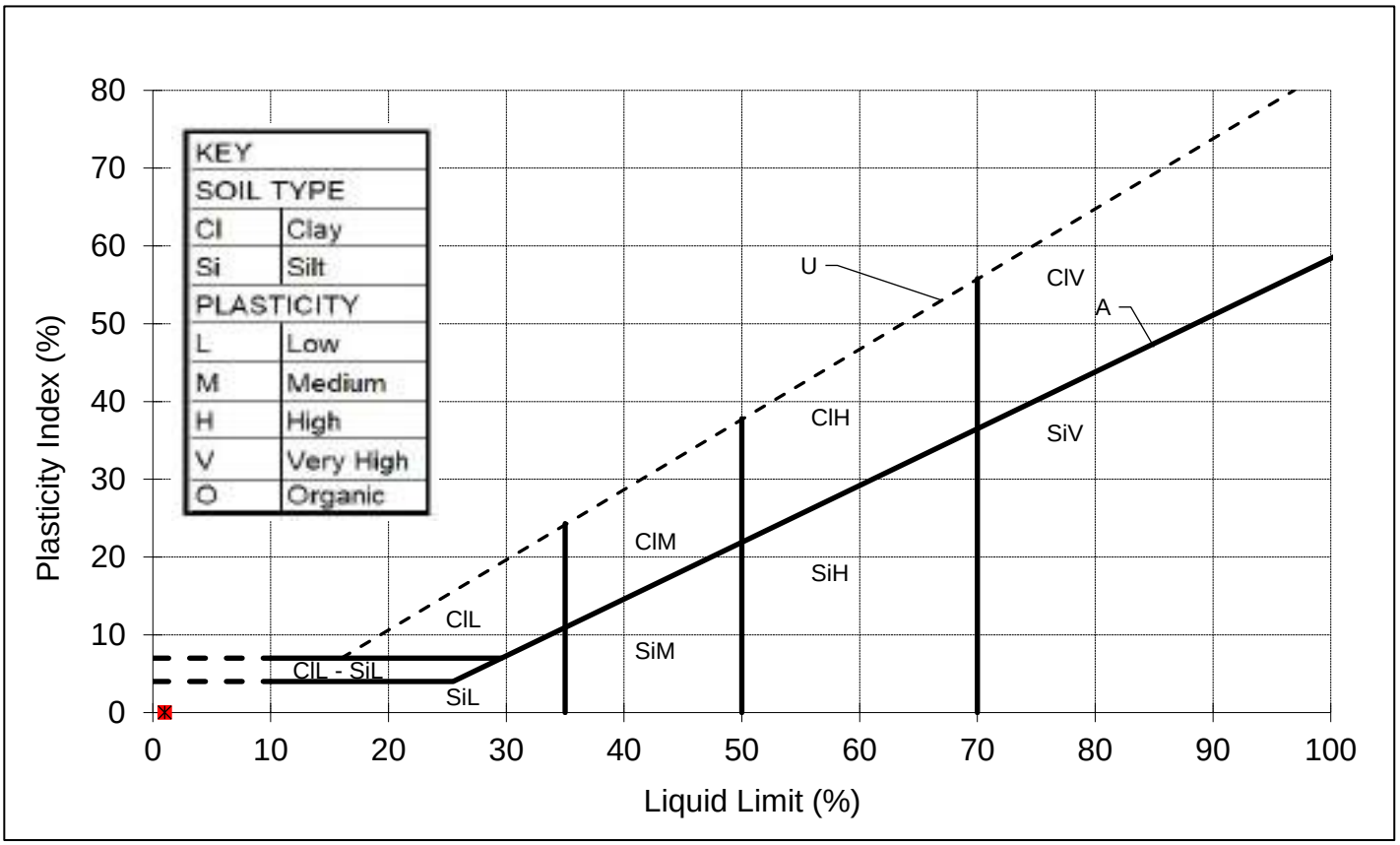
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-1	DATE SAMPLED	06-Jun-22
SAMPLE No.	113214	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	38



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

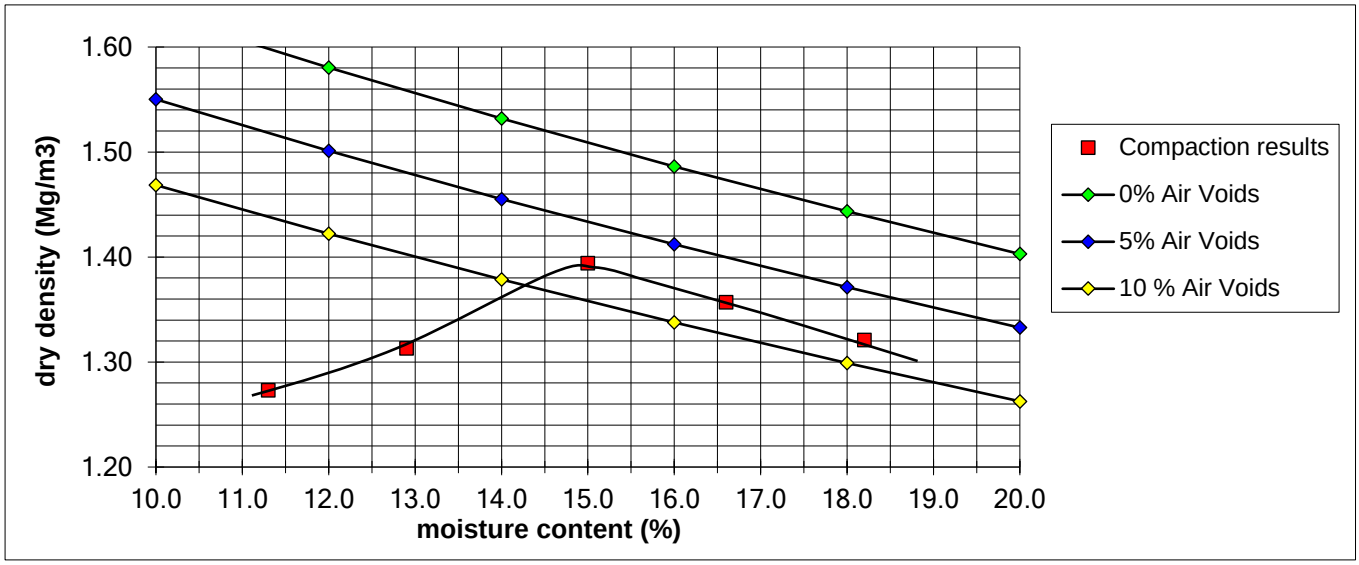
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113214	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.3	1.273
2		12.9	1.313
3		15.0	1.394
4		16.6	1.357
5		18.2	1.321
	Optimum	16.0	
	Maximum		1.30
	Particle Density	1.95 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 10%
Percentage of material retained on 20mm sieve = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

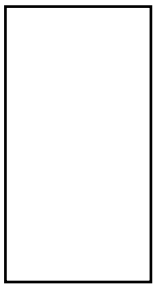
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113214	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	19	%
BULK DENSITY	1.65	Mg/m3
DRY DENSITY	1.39	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

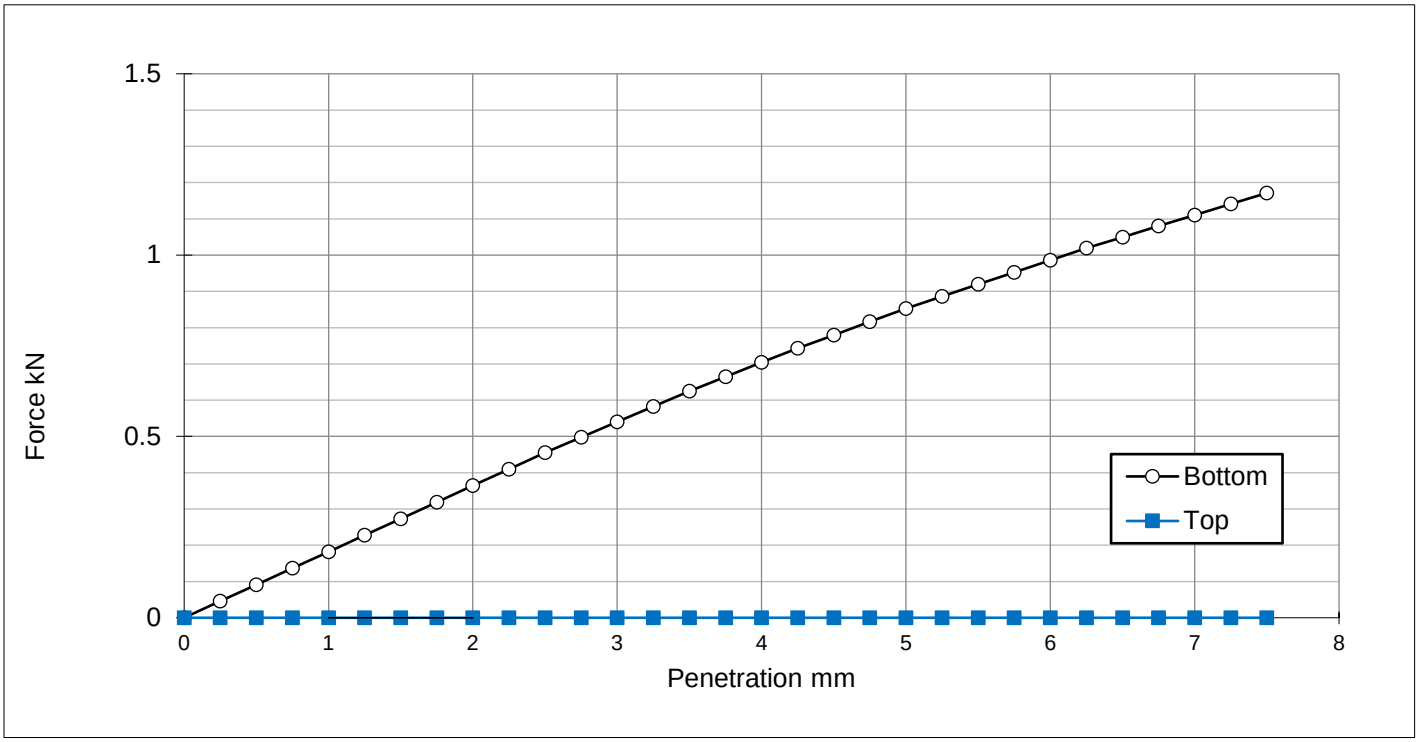
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113214	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		18 %			
BULK DENSITY	1.65 Mg/m3	MOISTURE CONTENT	19 %	DRY DENSITY	1.39 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.3	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	19	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

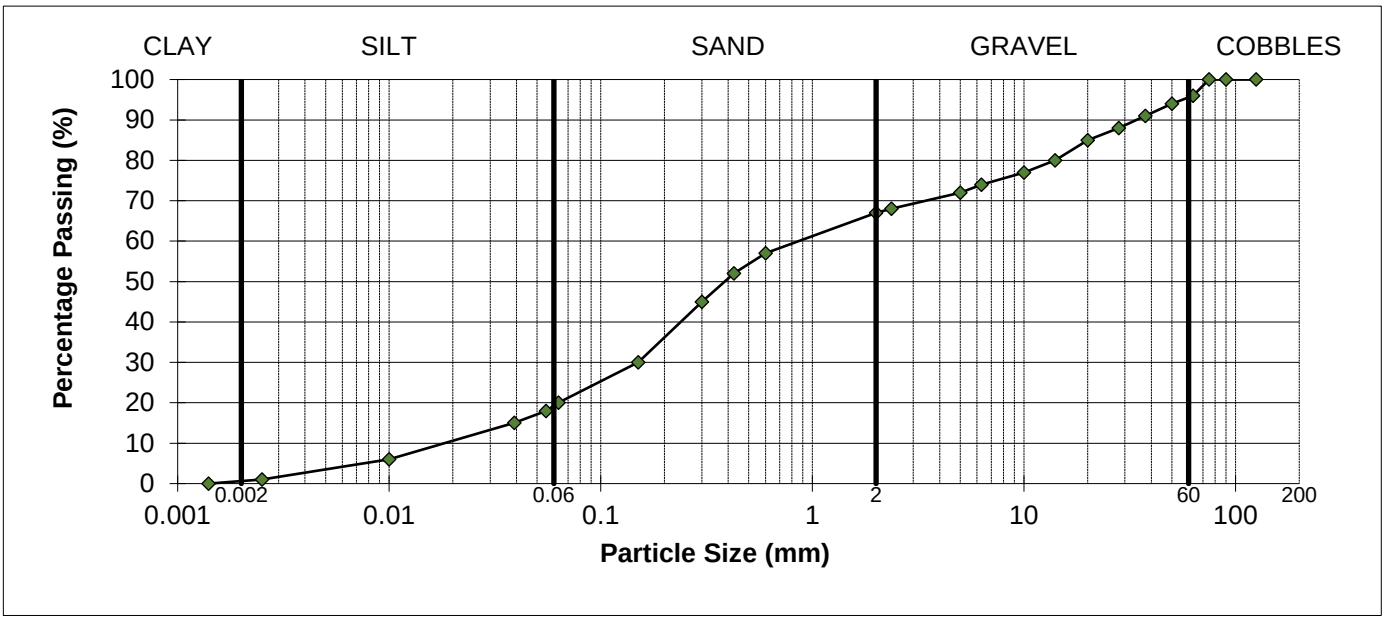
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113215	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	67	
75	100		0.6	57	
63	96		0.425	52	
50	94		0.3	45	
37.5	91		0.15	30	
28	88		0.063	20	
20	85		0.055	18	
14	80		0.039	15	
10	77		0.01	6	
6.3	74		0.0025	1	
5	72		0.0014	0	



REMARKS
As received moisture content = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

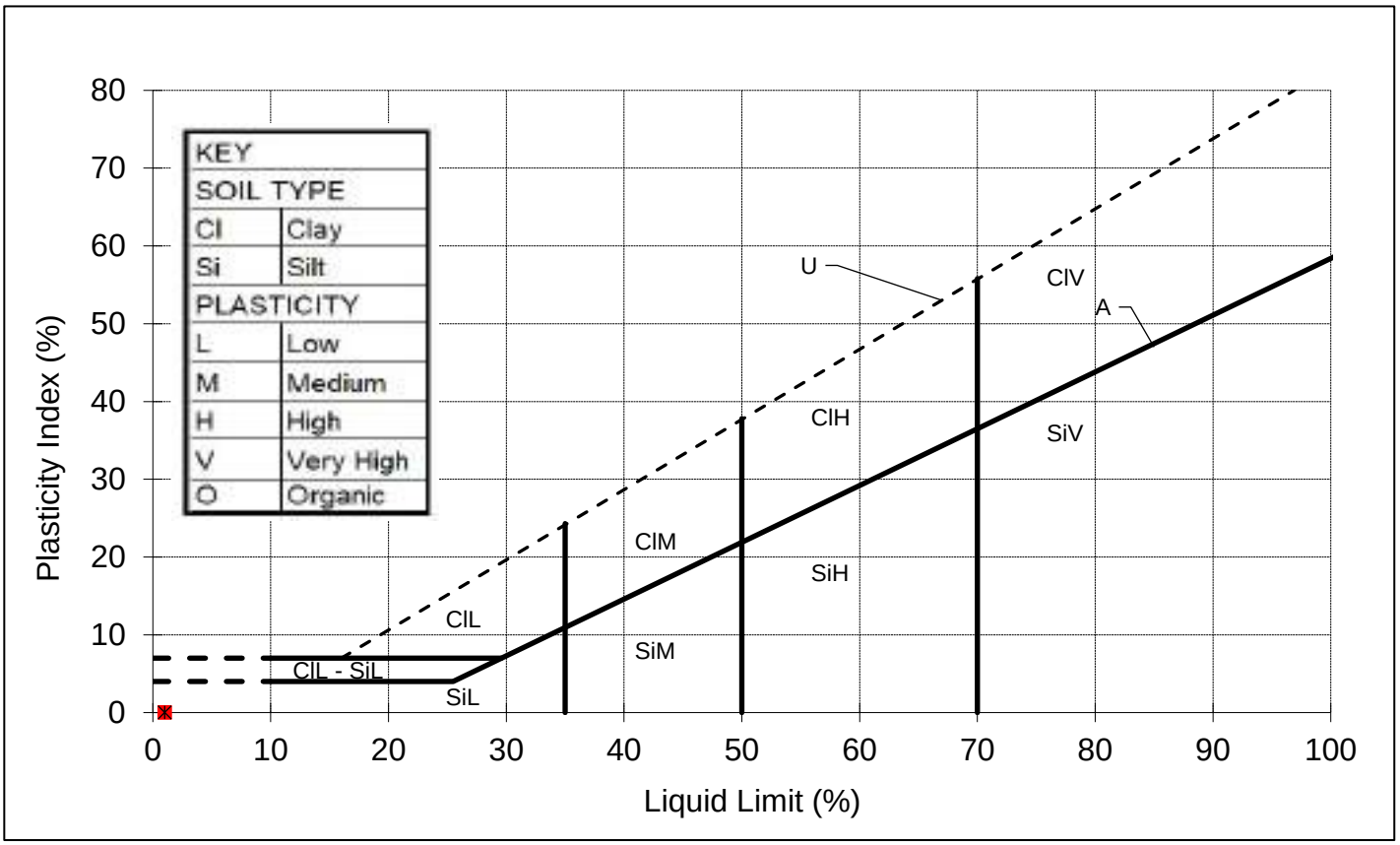
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-2	DATE SAMPLED	06-Jun-22
SAMPLE No.	113215	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16	N/A	Non Plastic	N/A	52



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

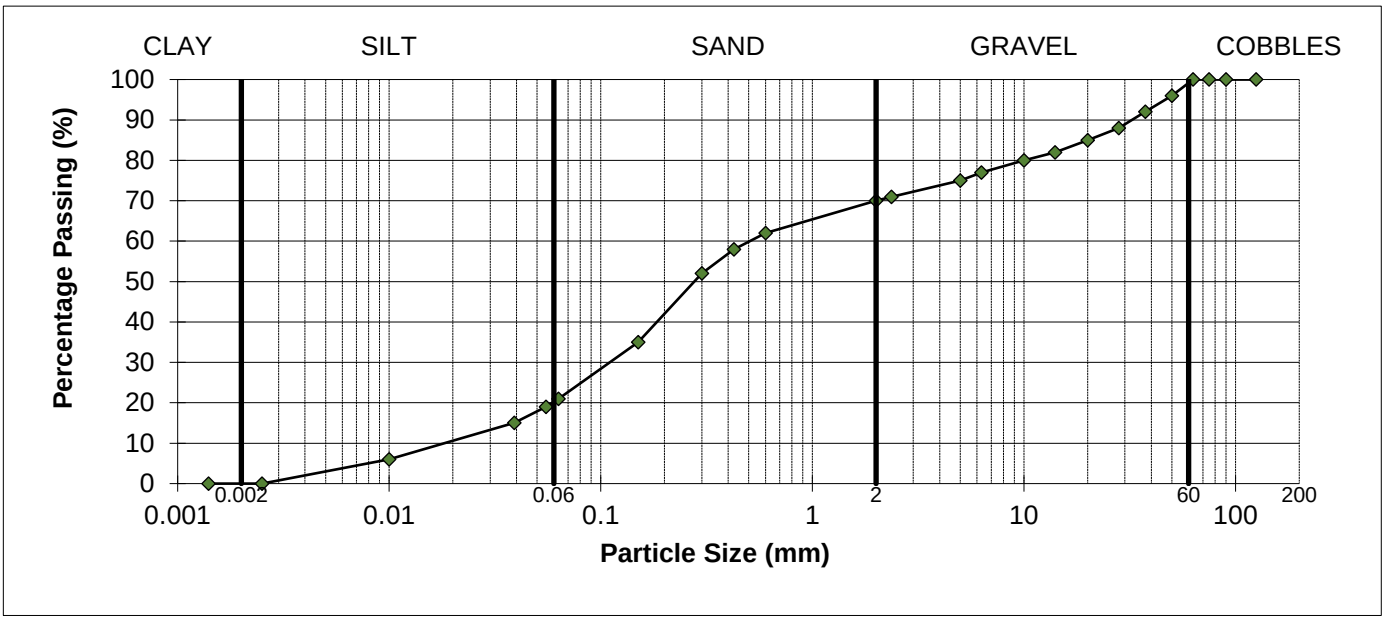
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113216	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	71	
90	100		2	70	
75	100		0.6	62	
63	100		0.425	58	
50	96		0.3	52	
37.5	92		0.15	35	
28	88		0.063	21	
20	85		0.055	19	
14	82		0.039	15	
10	80		0.01	6	
6.3	77		0.0025	0	
5	75		0.0014	0	



REMARKS
As received moisture content = 23%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

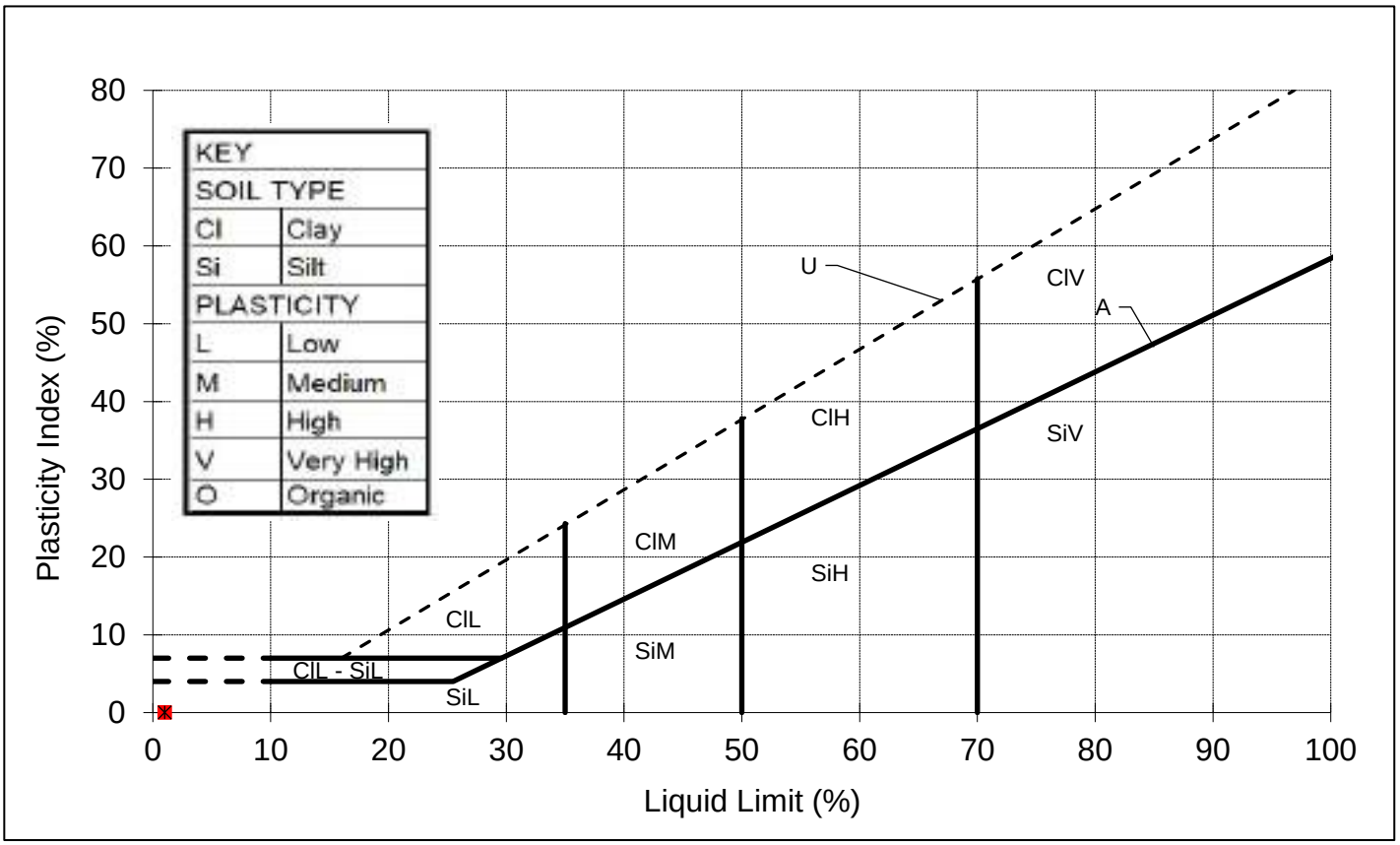
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-3	DATE SAMPLED	06-Jun-22
SAMPLE No.	113216	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23	N/A	Non Plastic	N/A	58



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

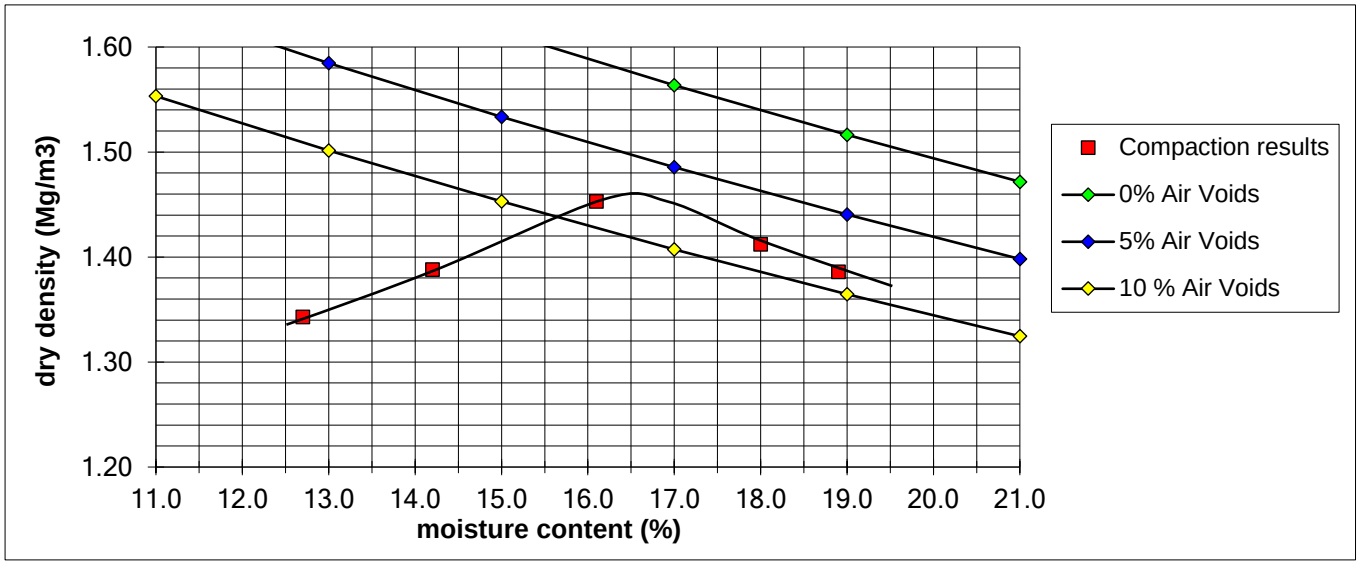
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113216	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.7	1.343
2		14.2	1.388
3		16.1	1.453
4		18.0	1.412
5		18.9	1.386
	Optimum	17.0	
	Maximum		1.46
	Particle Density	2.13 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 8%
Percentage of material retained on 20mm sieve = 15%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

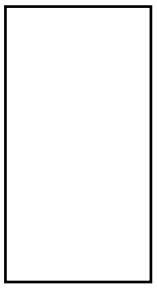
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113216	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	15	%
BULK DENSITY	1.61	Mg/m3
DRY DENSITY	1.41	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

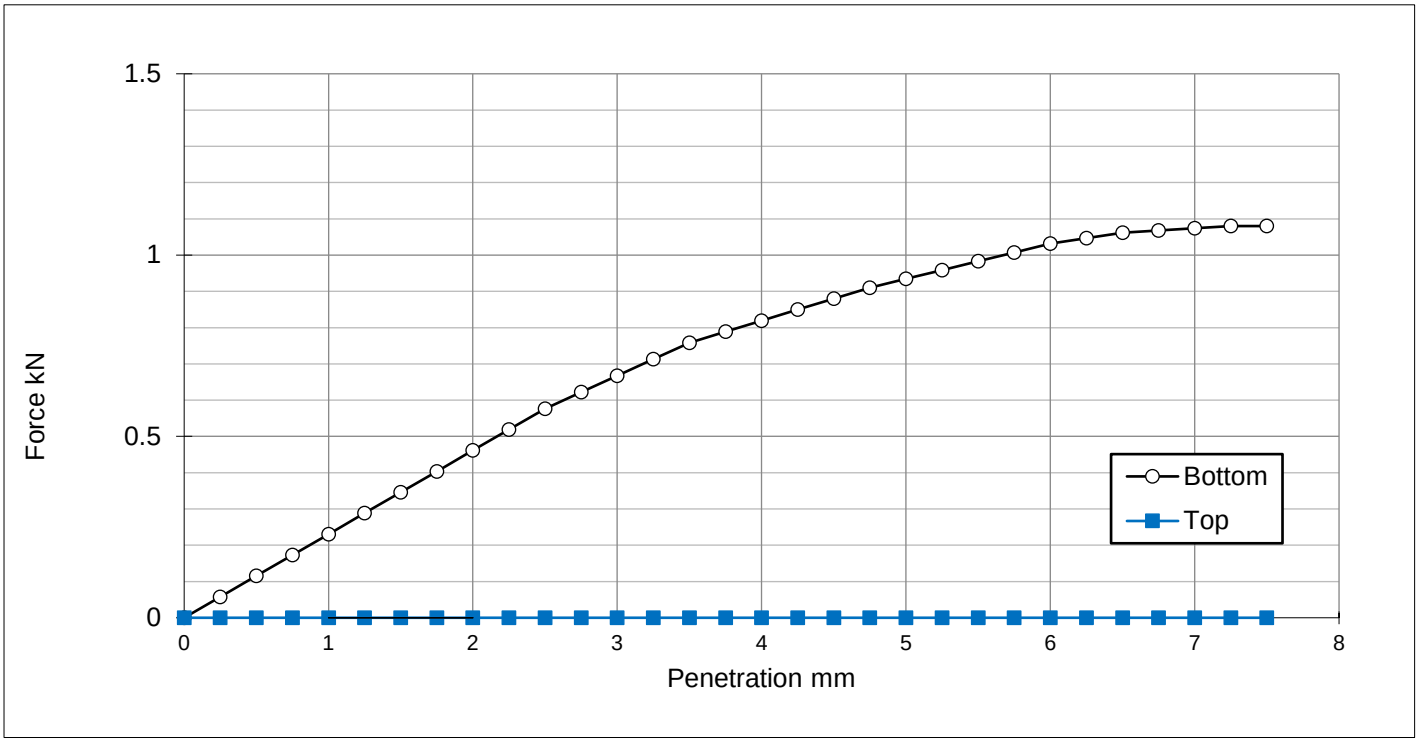
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113216	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		15 %			
BULK DENSITY	1.61 Mg/m3	MOISTURE CONTENT	15 %	DRY DENSITY	1.41 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.7	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	15	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

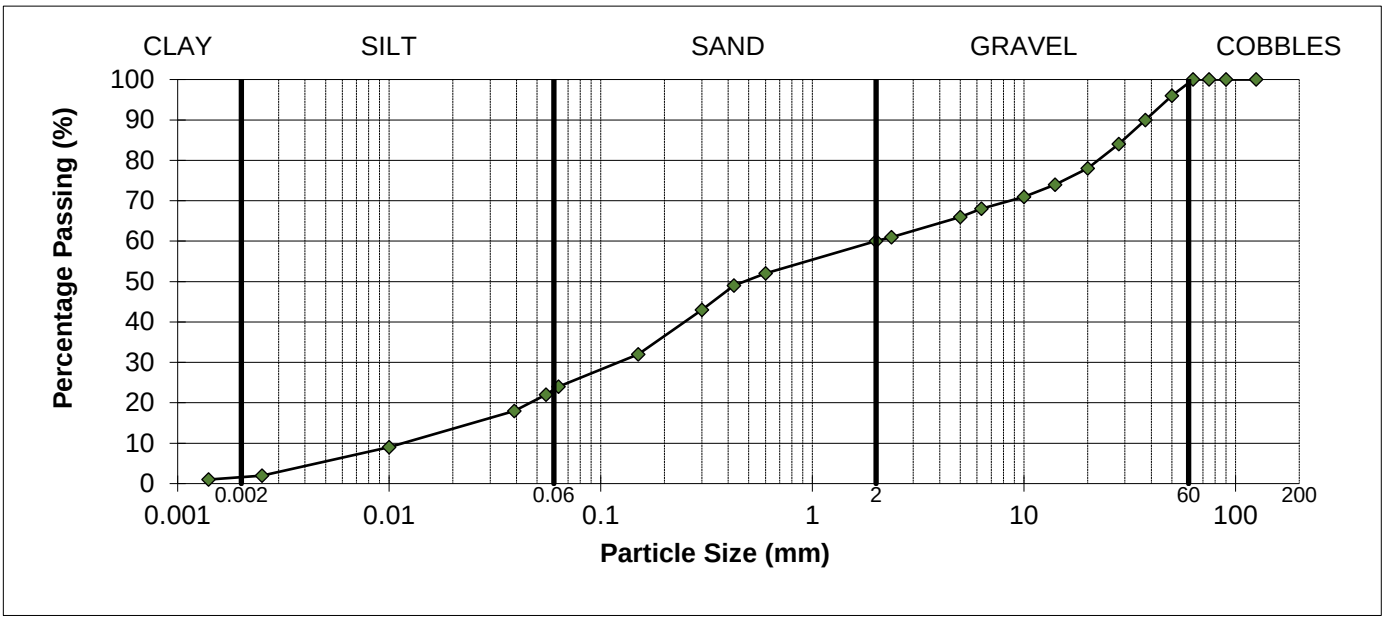
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113217	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	61	
90	100		2	60	
75	100		0.6	52	
63	100		0.425	49	
50	96		0.3	43	
37.5	90		0.15	32	
28	84		0.063	24	
20	78		0.055	22	
14	74		0.039	18	
10	71		0.01	9	
6.3	68		0.0025	2	
5	66		0.0014	1	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

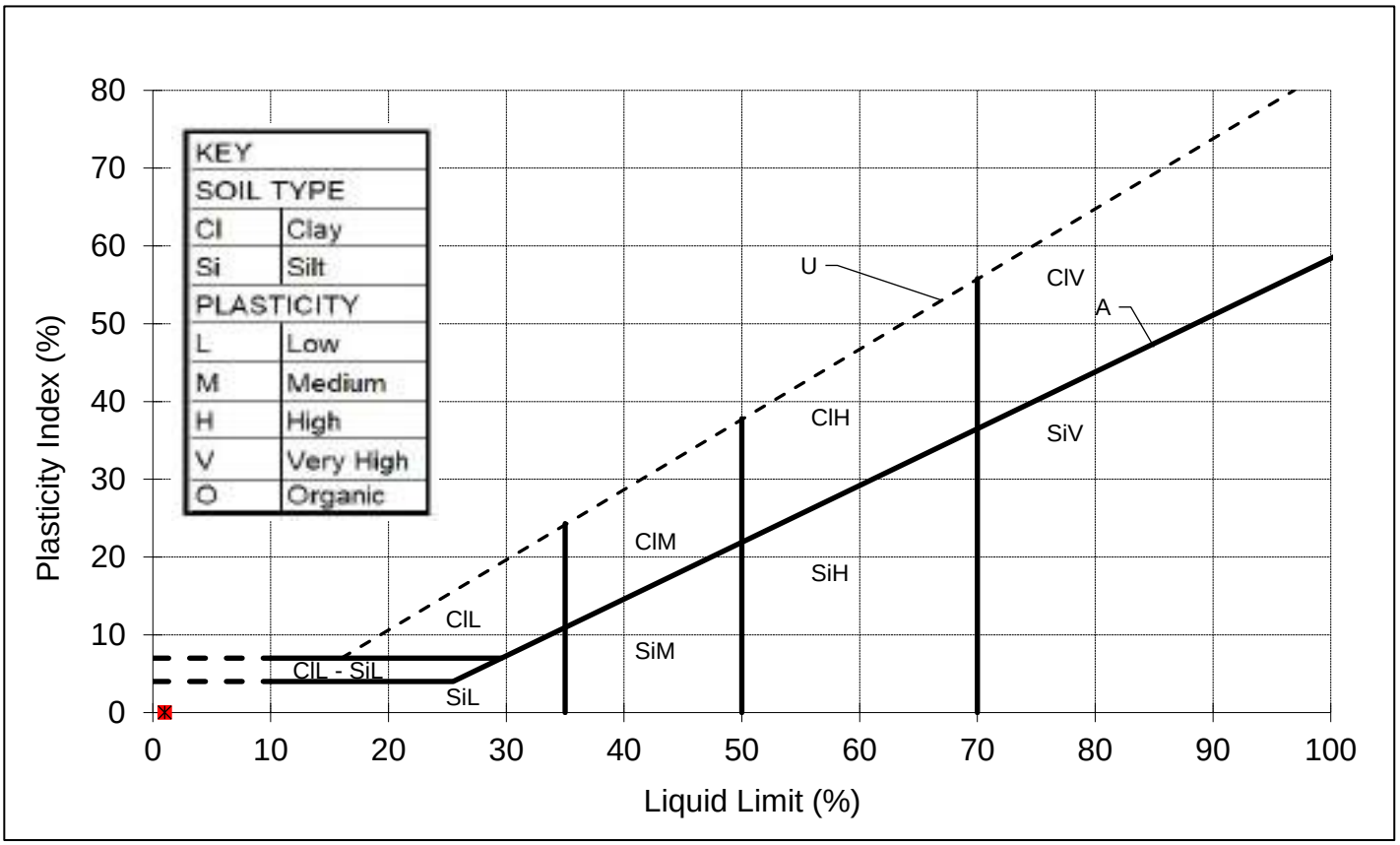
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-4	DATE SAMPLED	06-Jun-22
SAMPLE No.	113217	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	49



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

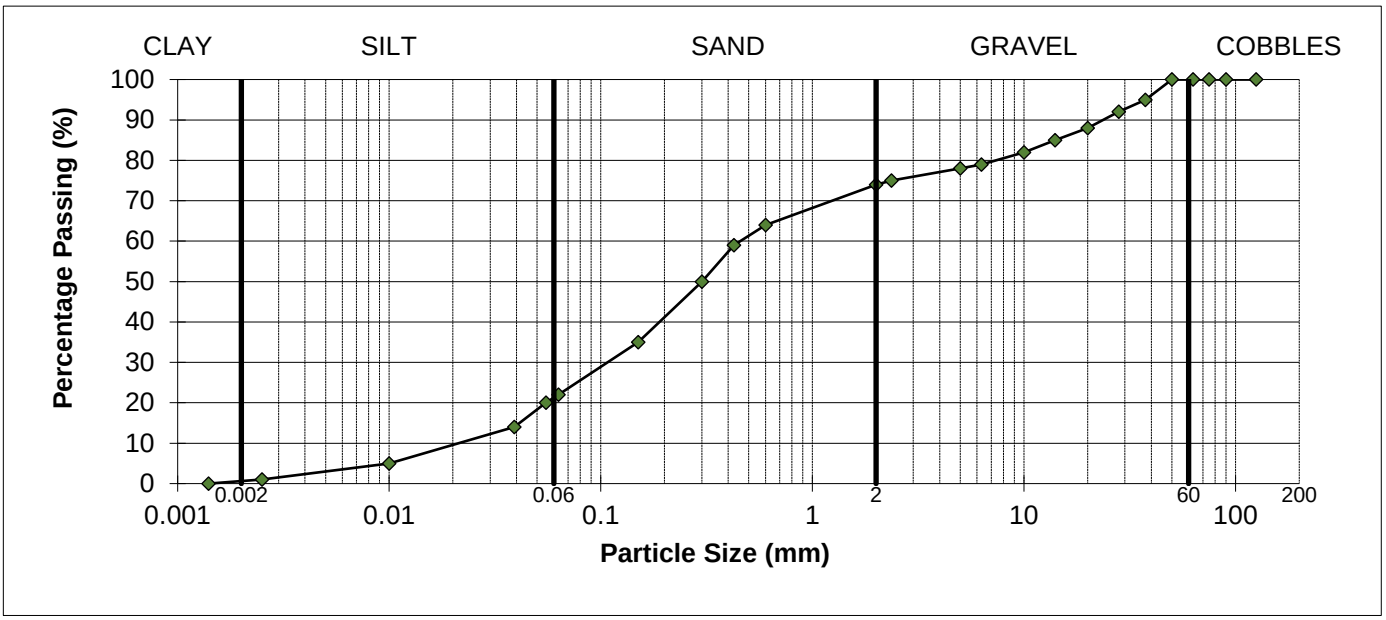
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113218	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	74	
75	100		0.6	64	
63	100		0.425	59	
50	100		0.3	50	
37.5	95		0.15	35	
28	92		0.063	22	
20	88		0.055	20	
14	85		0.039	14	
10	82		0.01	5	
6.3	79		0.0025	1	
5	78		0.0014	0	



REMARKS
As received moisture content = 21%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

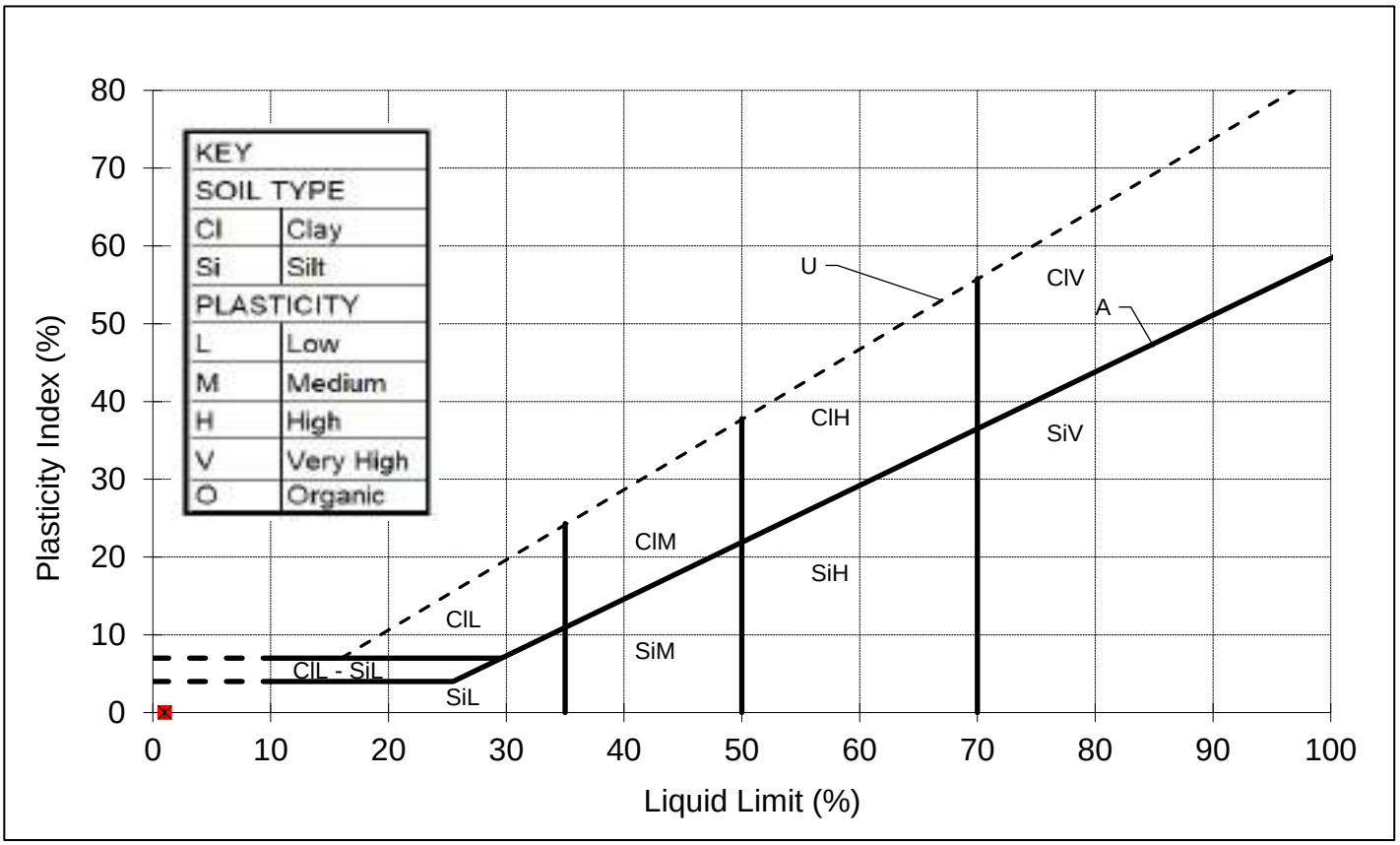
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-5	DATE SAMPLED	06-Jun-22
SAMPLE No.	113218	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	59



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

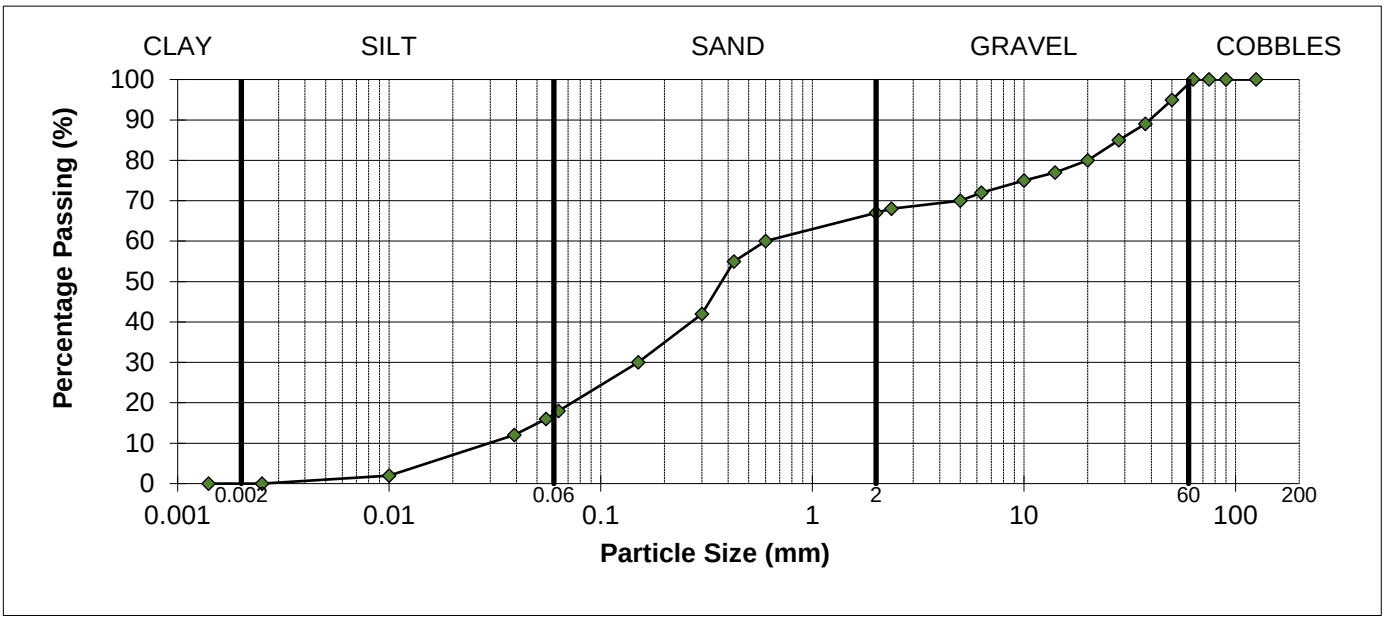
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-6	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113219	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	67	
75	100		0.6	60	
63	100		0.425	55	
50	95		0.3	42	
37.5	89		0.15	30	
28	85		0.063	18	
20	80		0.055	16	
14	77		0.039	12	
10	75		0.01	2	
6.3	72		0.0025	0	
5	70		0.0014	0	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

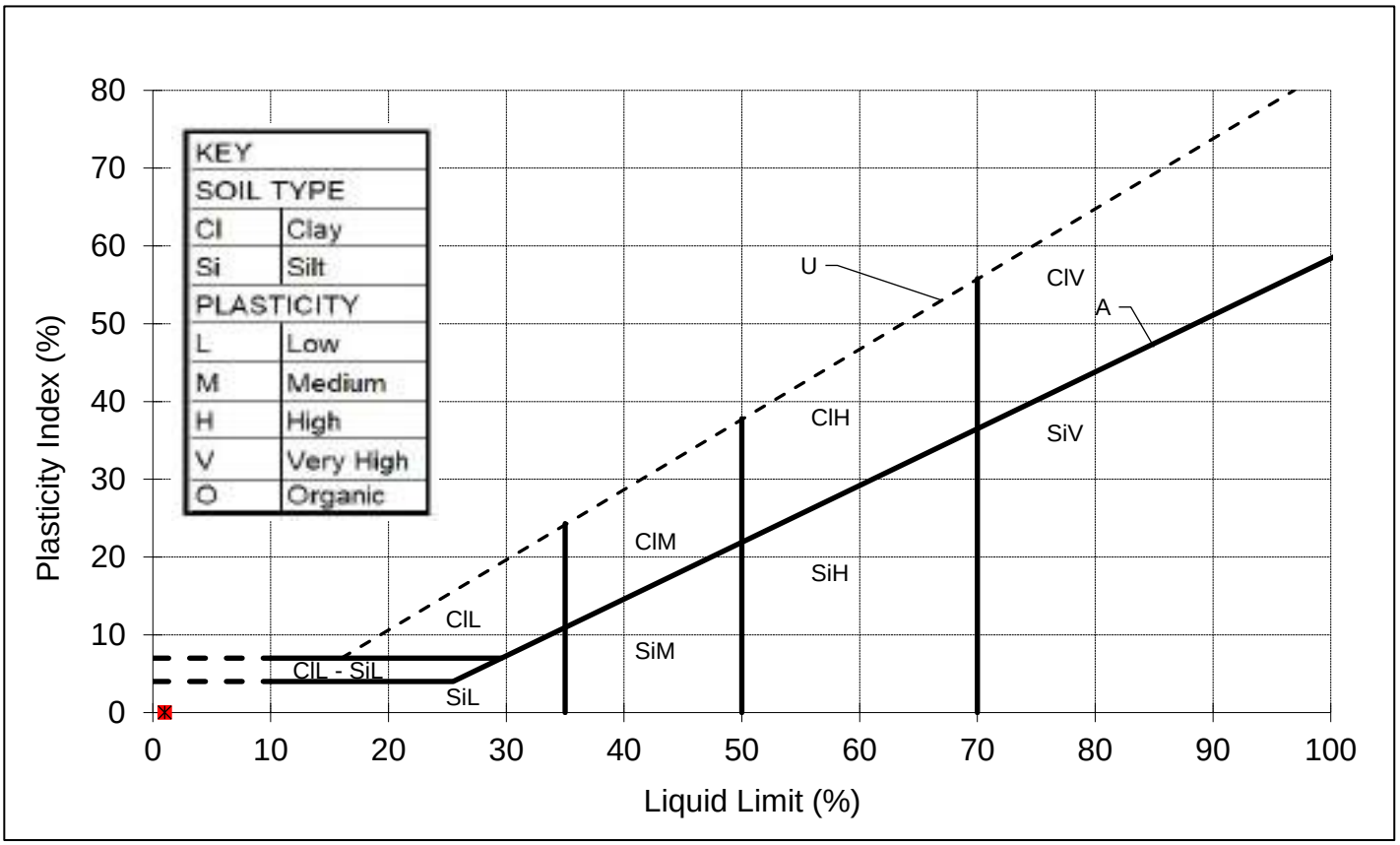
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-6	DATE SAMPLED	06-Jun-22
SAMPLE No.	113219	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	55



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

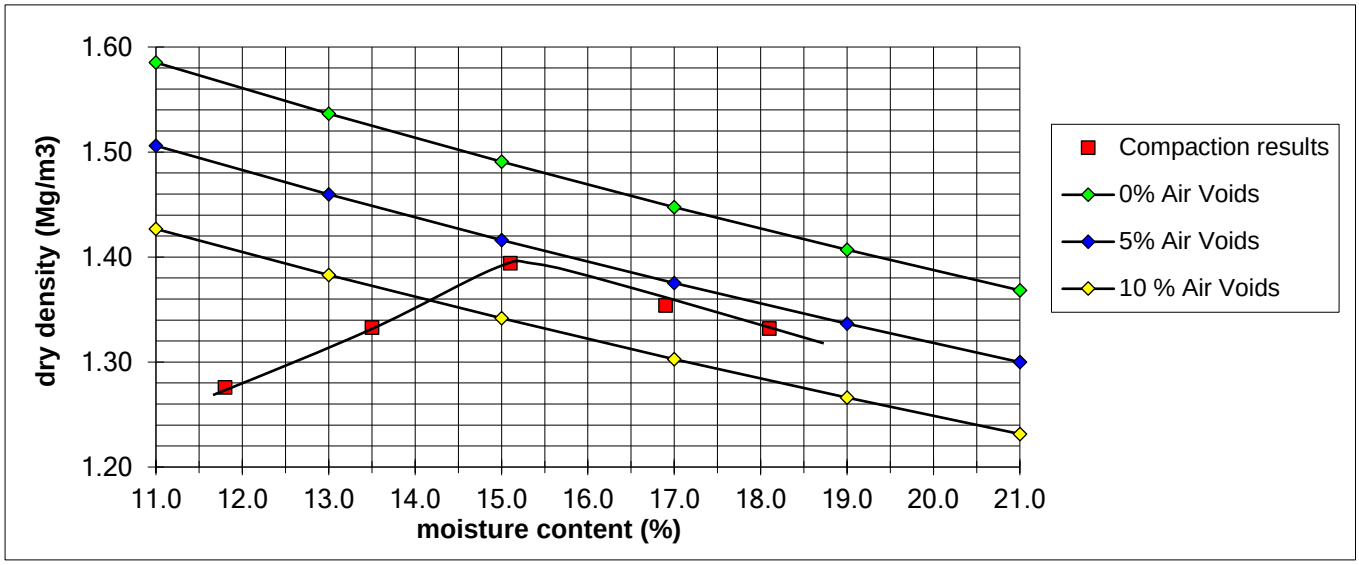
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-6	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113219	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.8	1.276
2		13.5	1.333
3		15.1	1.394
4		16.9	1.354
5		18.1	1.332
	Optimum	15.0	
	Maximum		1.39
	Particle Density	1.92 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 11%
Percentage of material retained on 20mm sieve = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

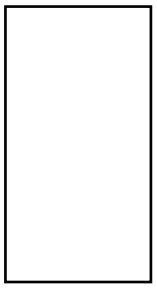
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-6	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113219	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	21	%
BULK DENSITY	1.54	Mg/m3
DRY DENSITY	1.27	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

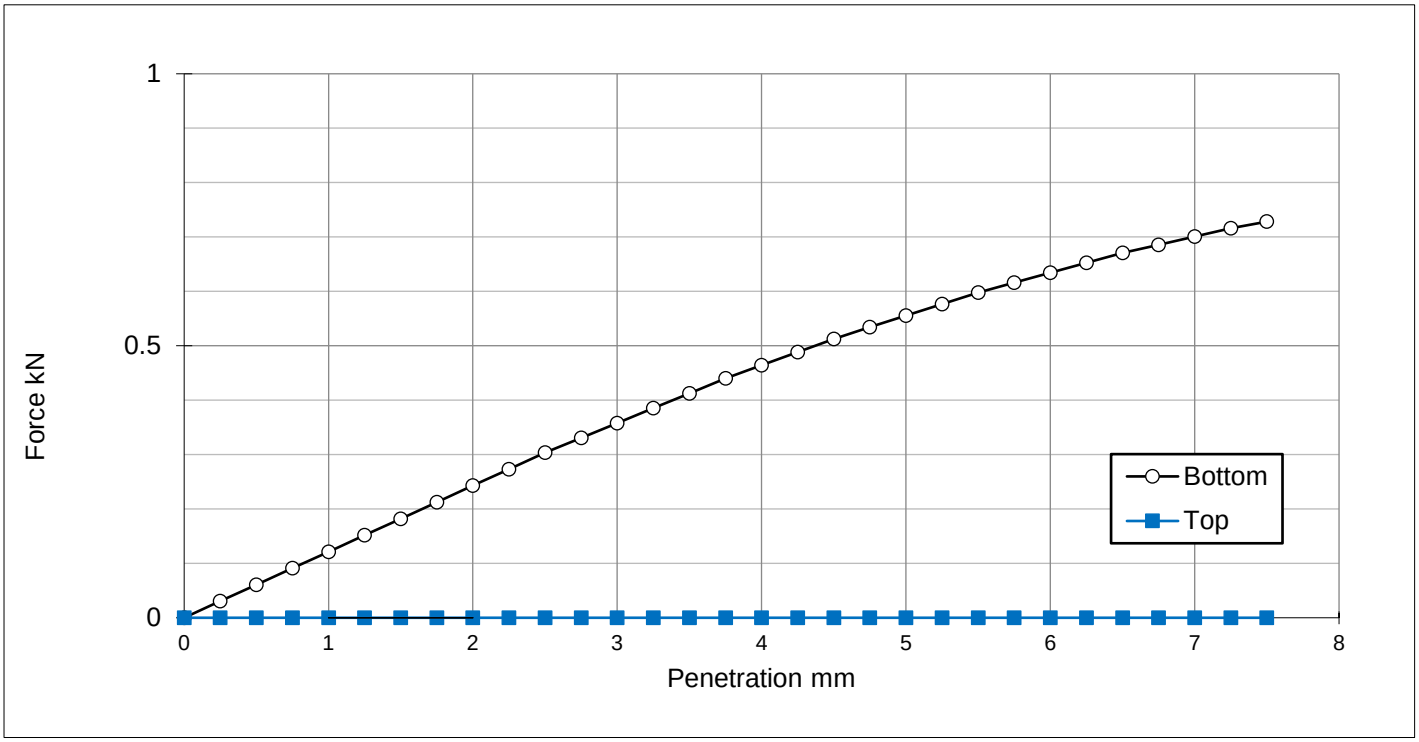
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA16-6	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113219	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		20 %			
BULK DENSITY	1.54 Mg/m3	MOISTURE CONTENT	21 %	DRY DENSITY	1.27 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.8	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	21	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

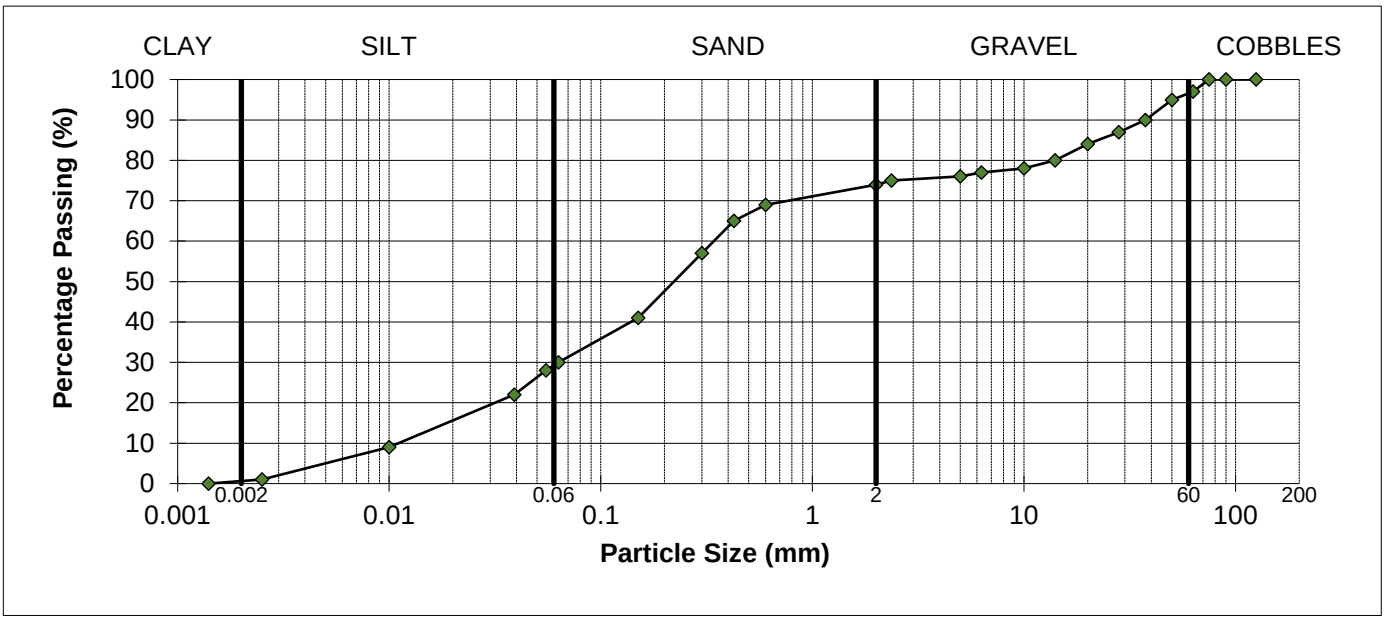
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113055	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	74	
75	100		0.6	69	
63	97		0.425	65	
50	95		0.3	57	
37.5	90		0.15	41	
28	87		0.063	30	
20	84		0.055	28	
14	80		0.039	22	
10	78		0.01	9	
6.3	77		0.0025	1	
5	76		0.0014	0	



REMARKS
As received moisture content = 14%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

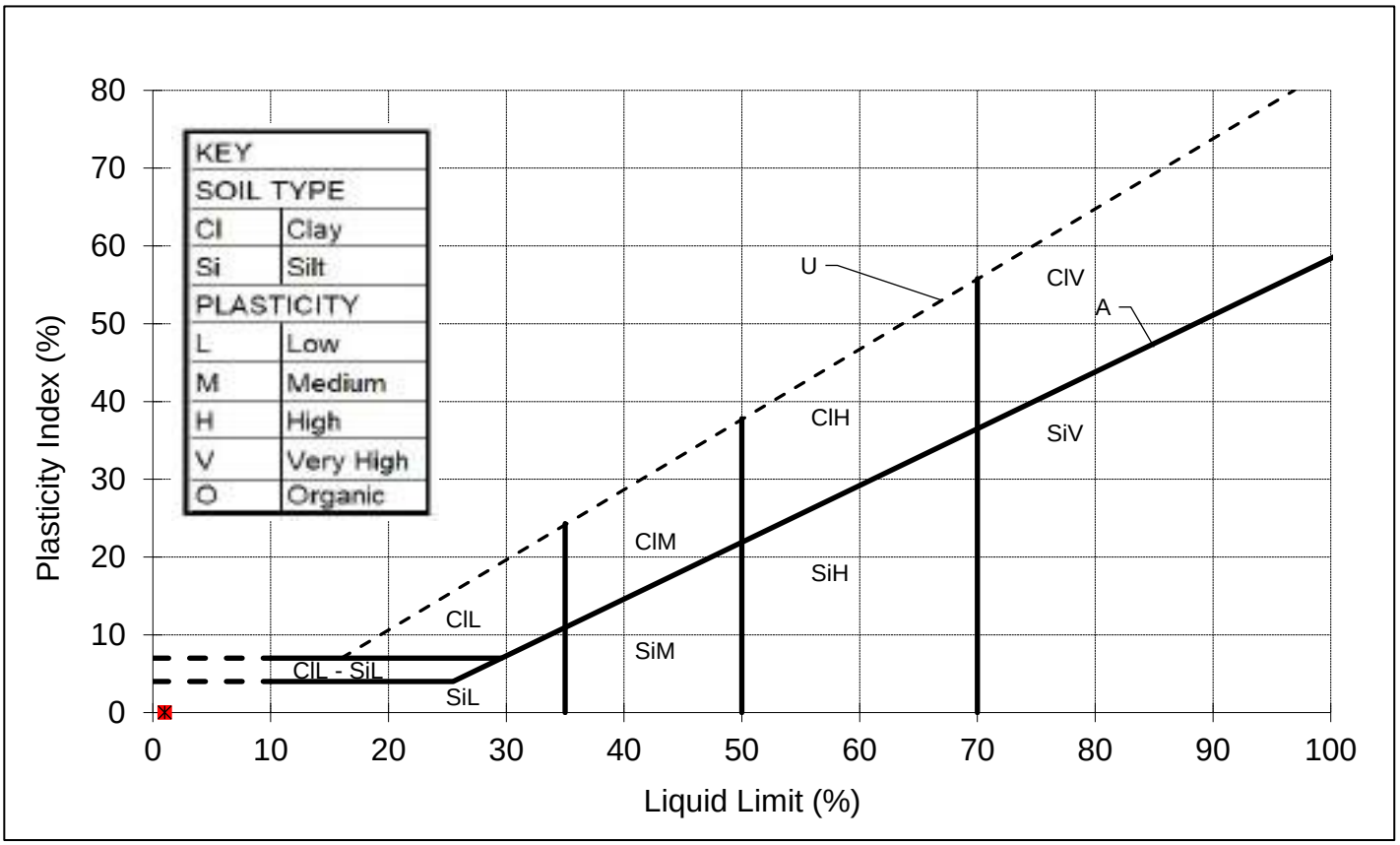
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-1	DATE SAMPLED	06-Jun-22
SAMPLE No.	113055	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	65



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

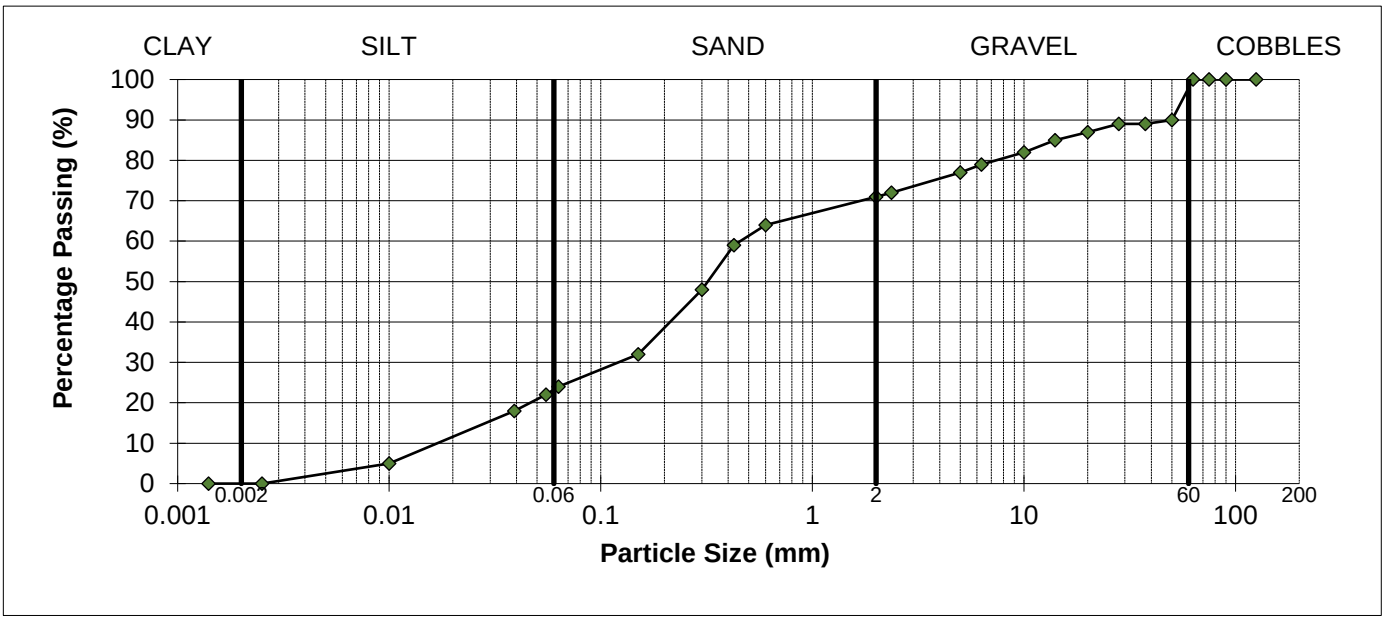
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113056	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	71	
75	100		0.6	64	
63	100		0.425	59	
50	90		0.3	48	
37.5	89		0.15	32	
28	89		0.063	24	
20	87		0.055	22	
14	85		0.039	18	
10	82		0.01	5	
6.3	79		0.0025	0	
5	77		0.0014	0	



REMARKS
As received moisture content = 13%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

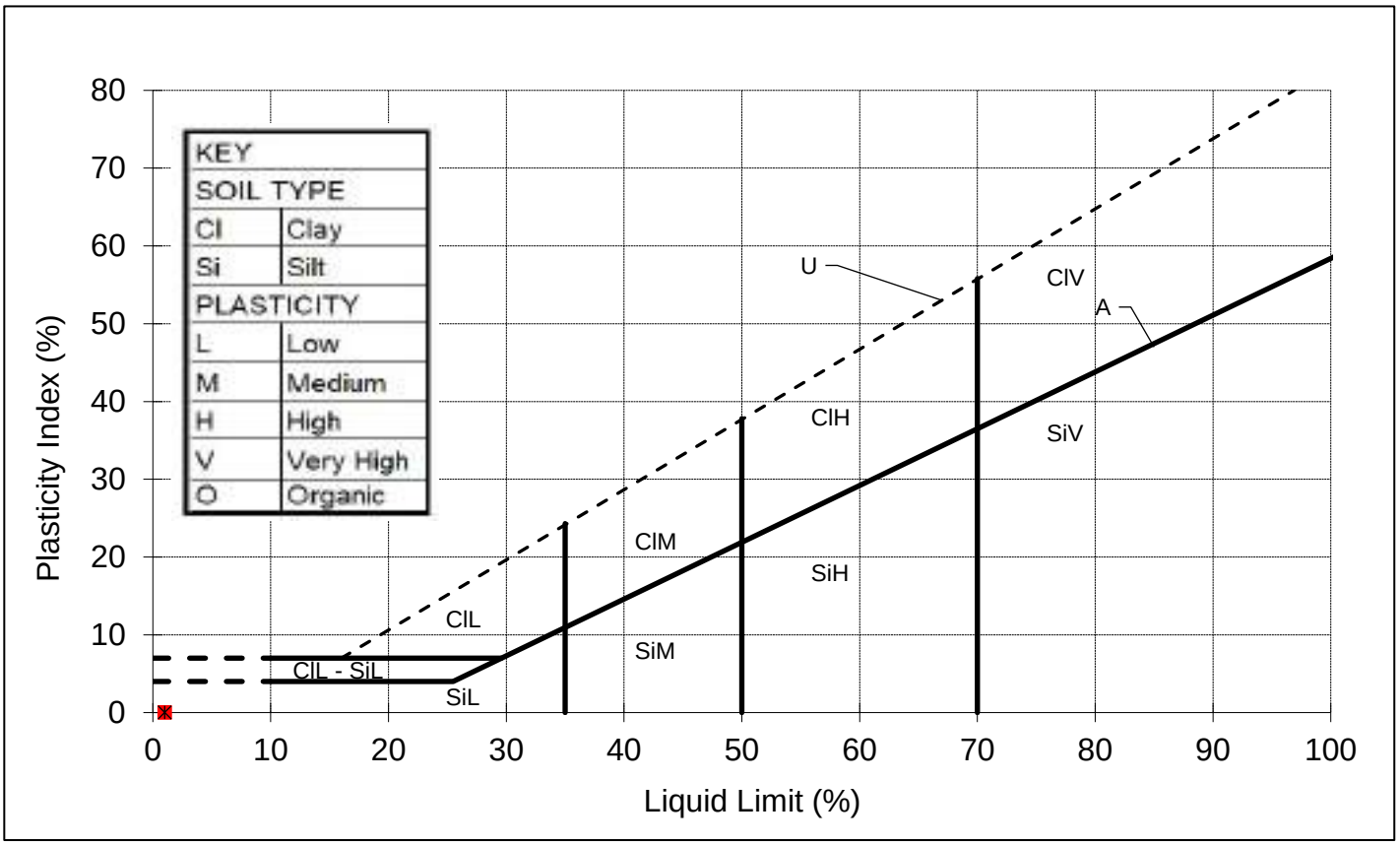
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-2	DATE SAMPLED	06-Jun-22
SAMPLE No.	113056	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	59



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

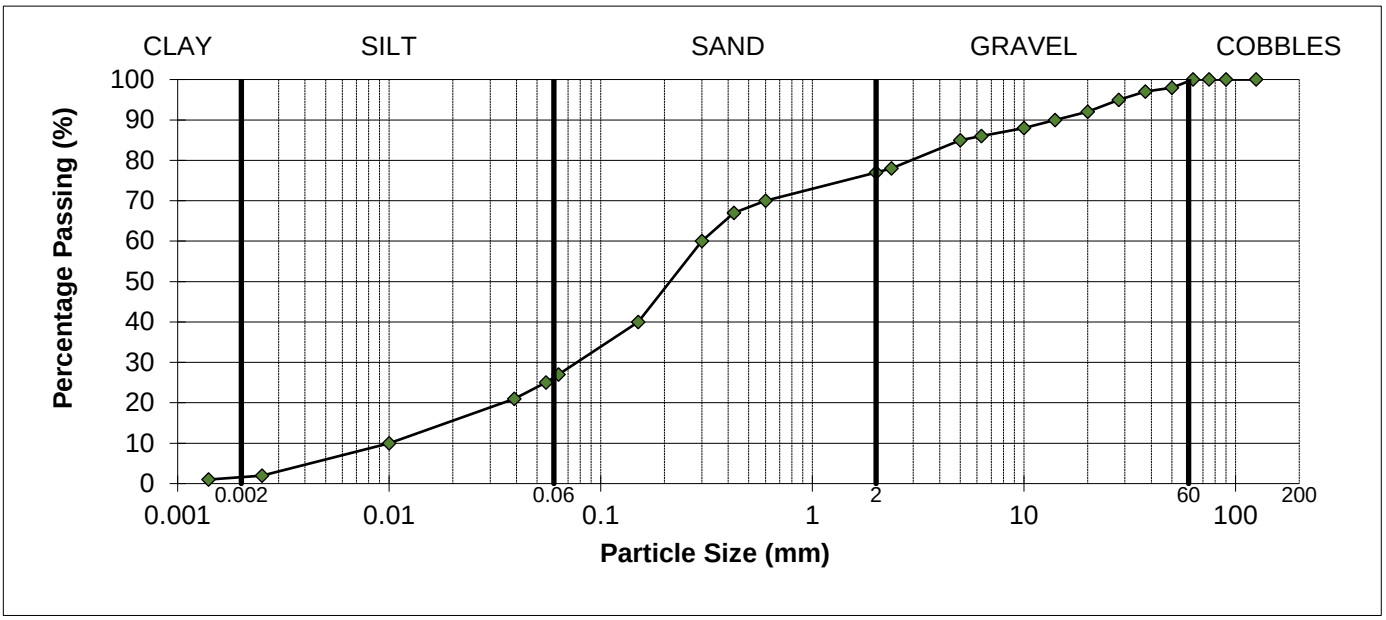
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113212	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	78	
90	100		2	77	
75	100		0.6	70	
63	100		0.425	67	
50	98		0.3	60	
37.5	97		0.15	40	
28	95		0.063	27	
20	92		0.055	25	
14	90		0.039	21	
10	88		0.01	10	
6.3	86		0.0025	2	
5	85		0.0014	1	



REMARKS
As received moisture content = 19%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

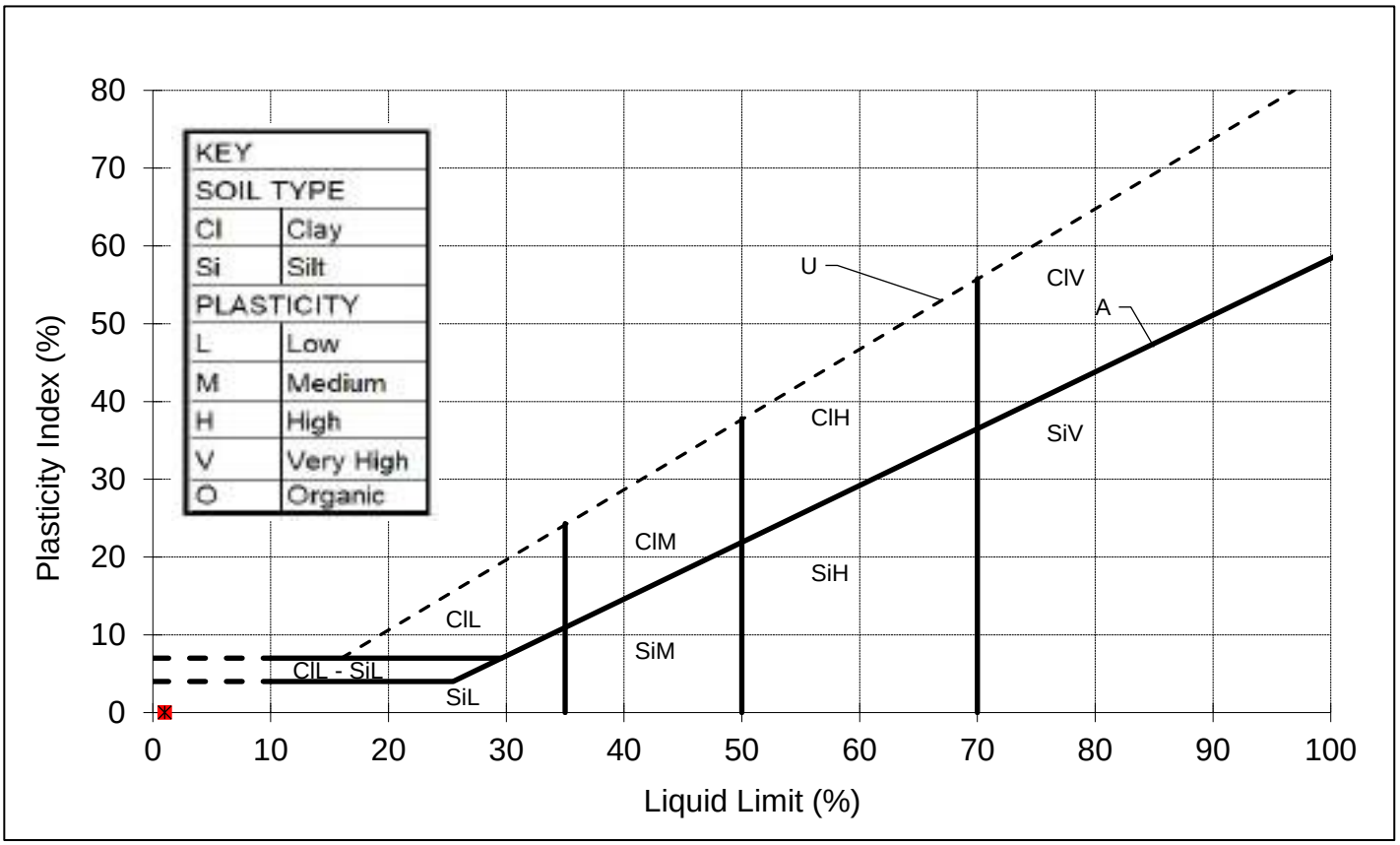
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-3	DATE SAMPLED	06-Jun-22
SAMPLE No.	113212	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

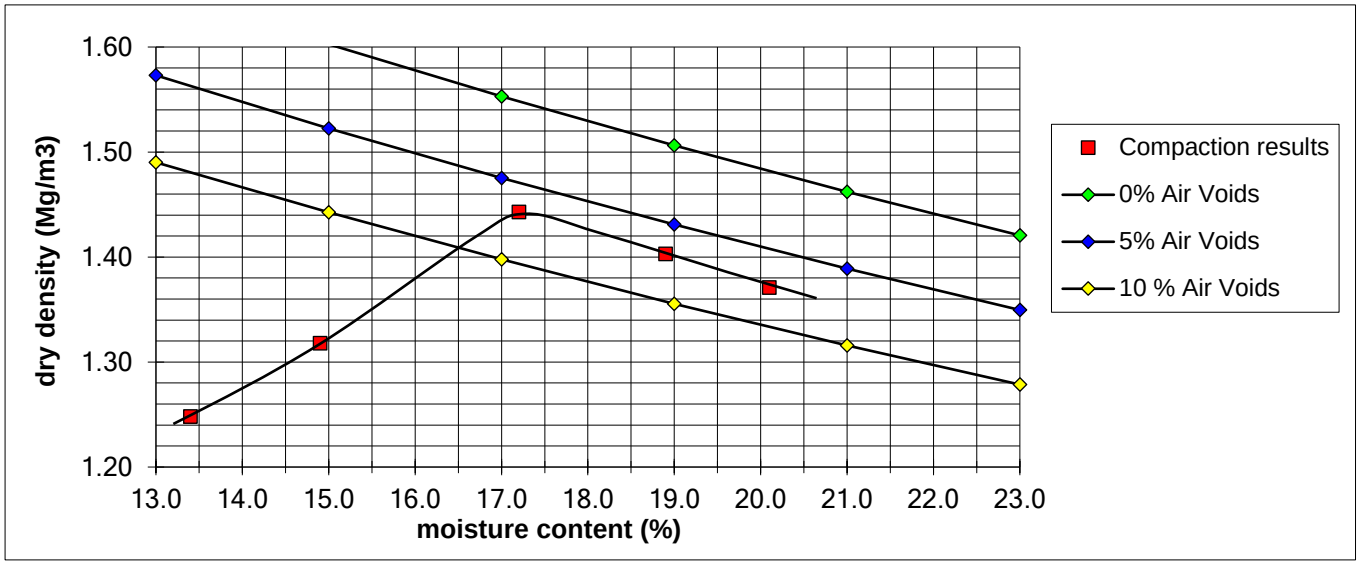
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113212	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		13.4	1.248
2		14.9	1.318
3		17.2	1.443
4		18.9	1.403
5		20.1	1.371
	Optimum	17.0	
	Maximum		1.44
	Particle Density	2.11 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 3%
Percentage of material retained on 20mm sieve = 8%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

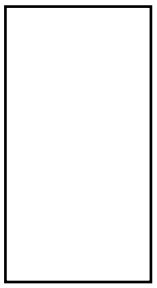
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113212	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	14	%
BULK DENSITY	1.58	Mg/m3
DRY DENSITY	1.39	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

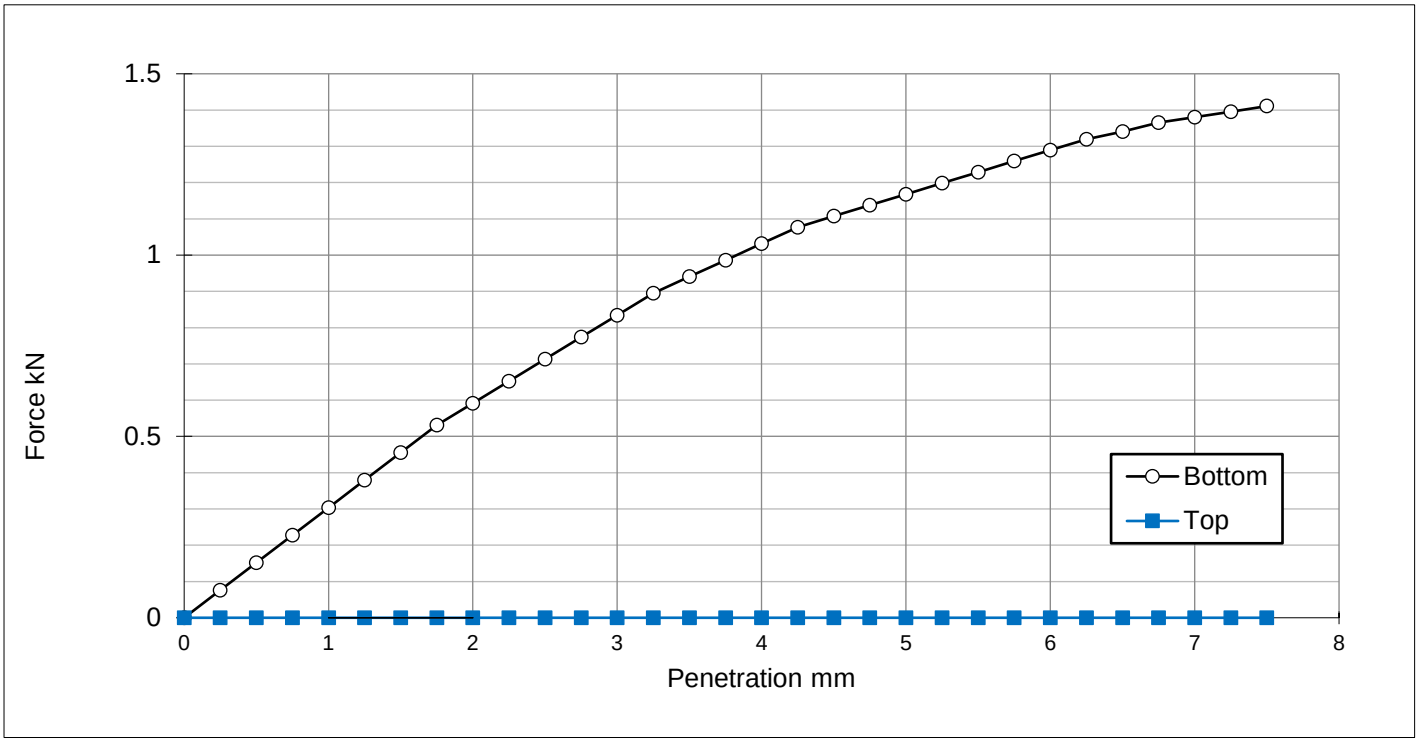
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113212	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		8 %			
BULK DENSITY	1.58 Mg/m3	MOISTURE CONTENT	14 %	DRY DENSITY	1.40 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	5.8	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	14	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

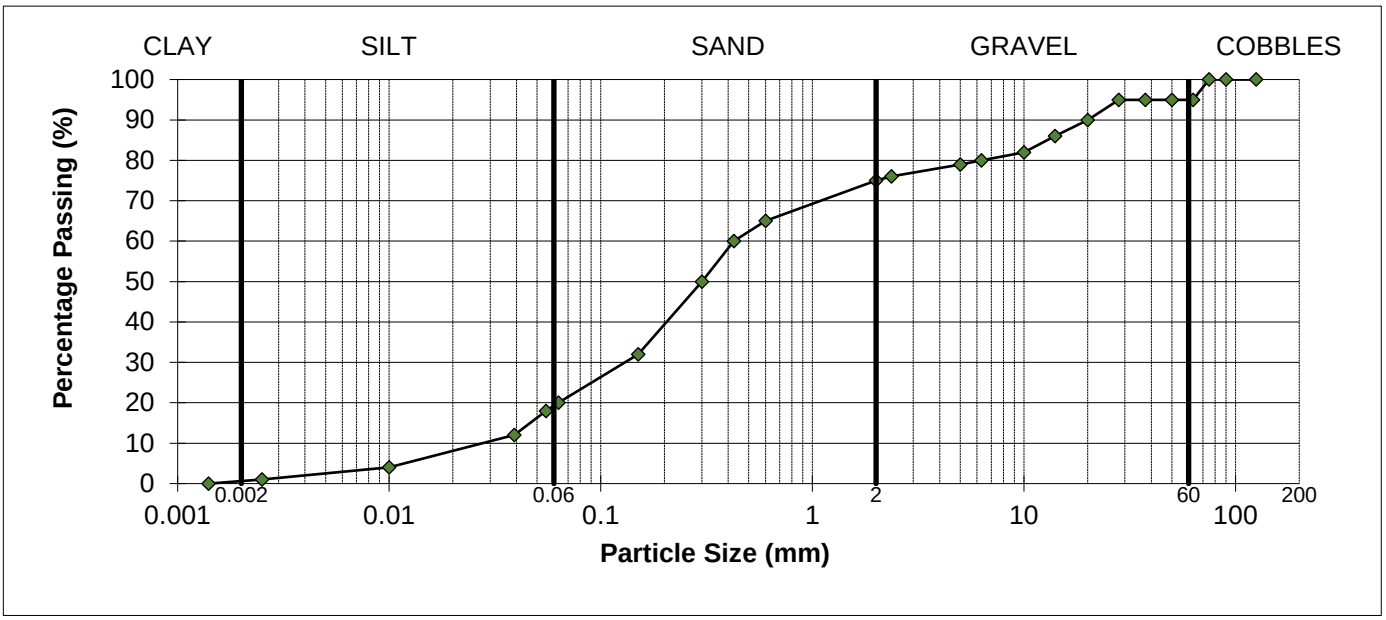
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113213	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	76	
90	100		2	75	
75	100		0.6	65	
63	95		0.425	60	
50	95		0.3	50	
37.5	95		0.15	32	
28	95		0.063	20	
20	90		0.055	18	
14	86		0.039	12	
10	82		0.01	4	
6.3	80		0.0025	1	
5	79		0.0014	0	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

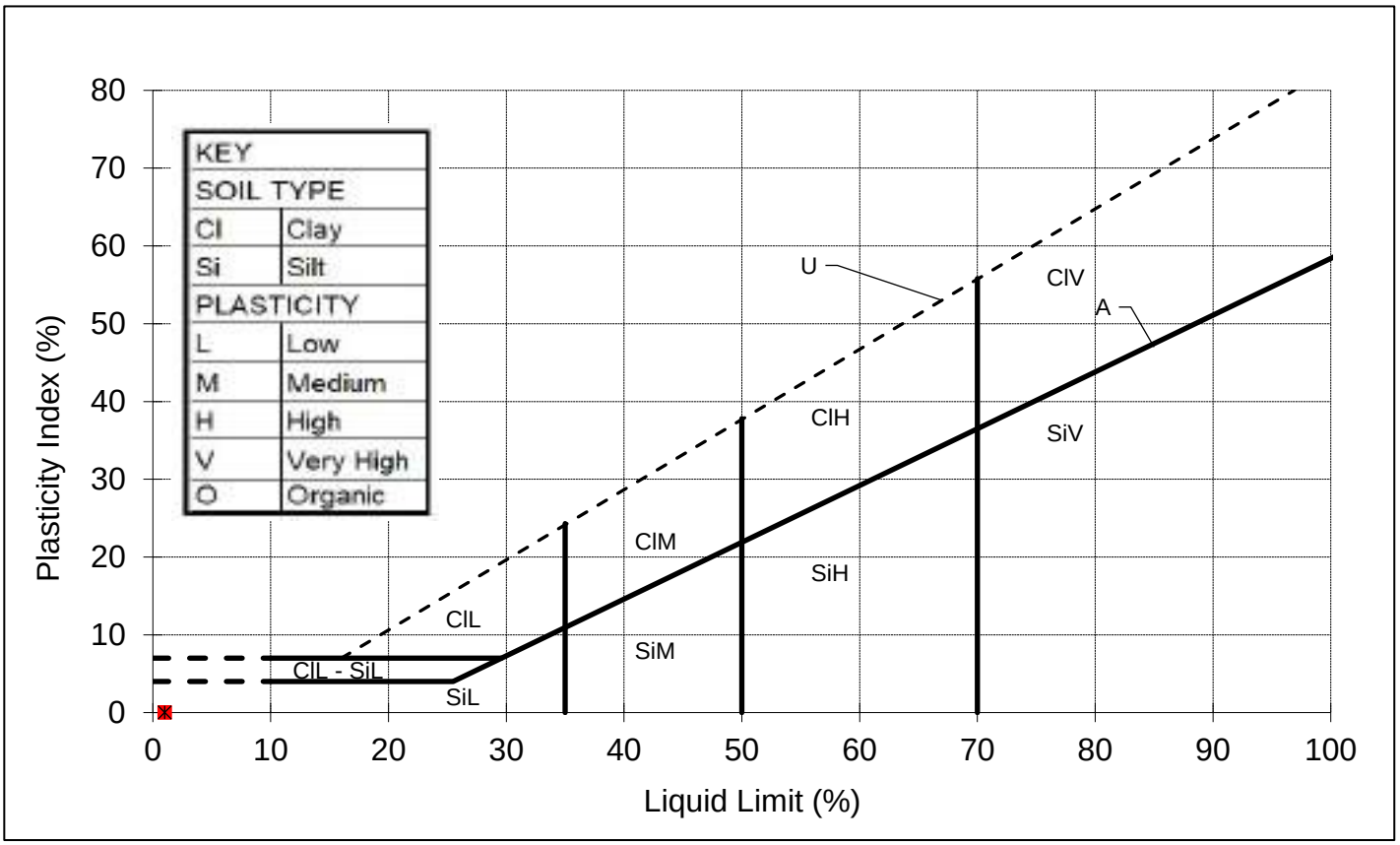
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-4	DATE SAMPLED	06-Jun-22
SAMPLE No.	113213	DATE RECEIVED	14-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	60



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

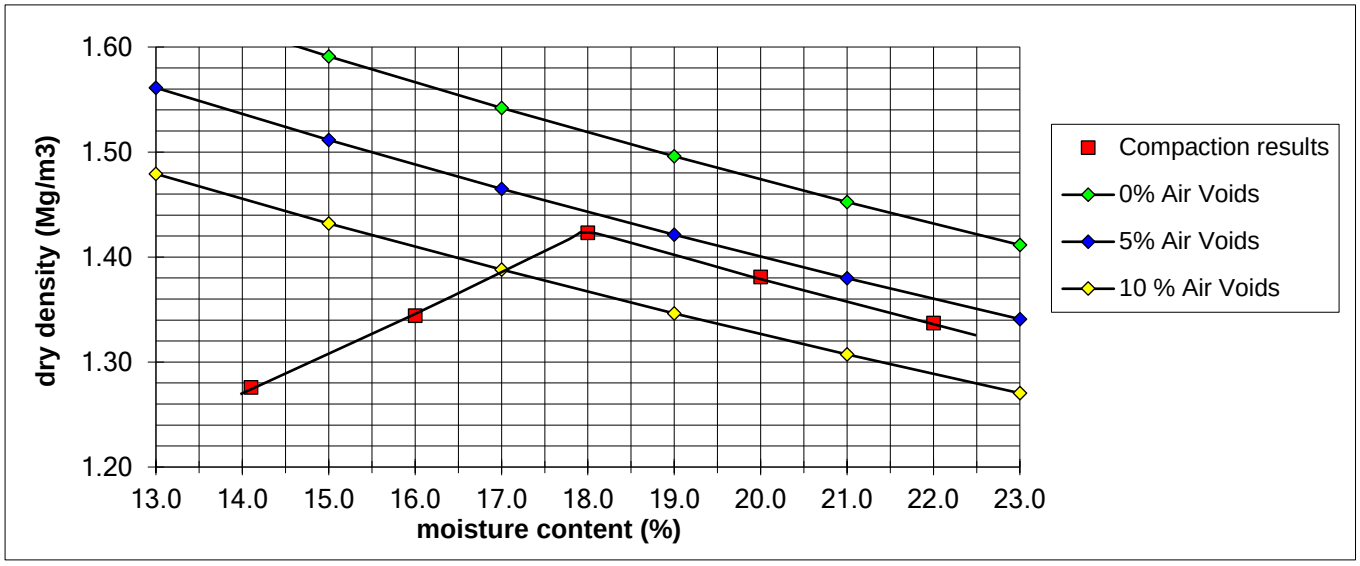
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113213	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		14.1	1.276
2		16.0	1.344
3		18.0	1.423
4		20.0	1.381
5		22.0	1.337
	Optimum	18.0	
	Maximum		1.42
	Particle Density	2.09 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 5%
Percentage of material retained on 20mm sieve = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

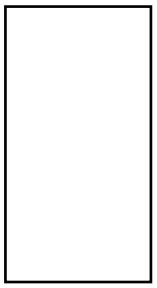
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113213	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	21	%
BULK DENSITY	1.62	Mg/m3
DRY DENSITY	1.34	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

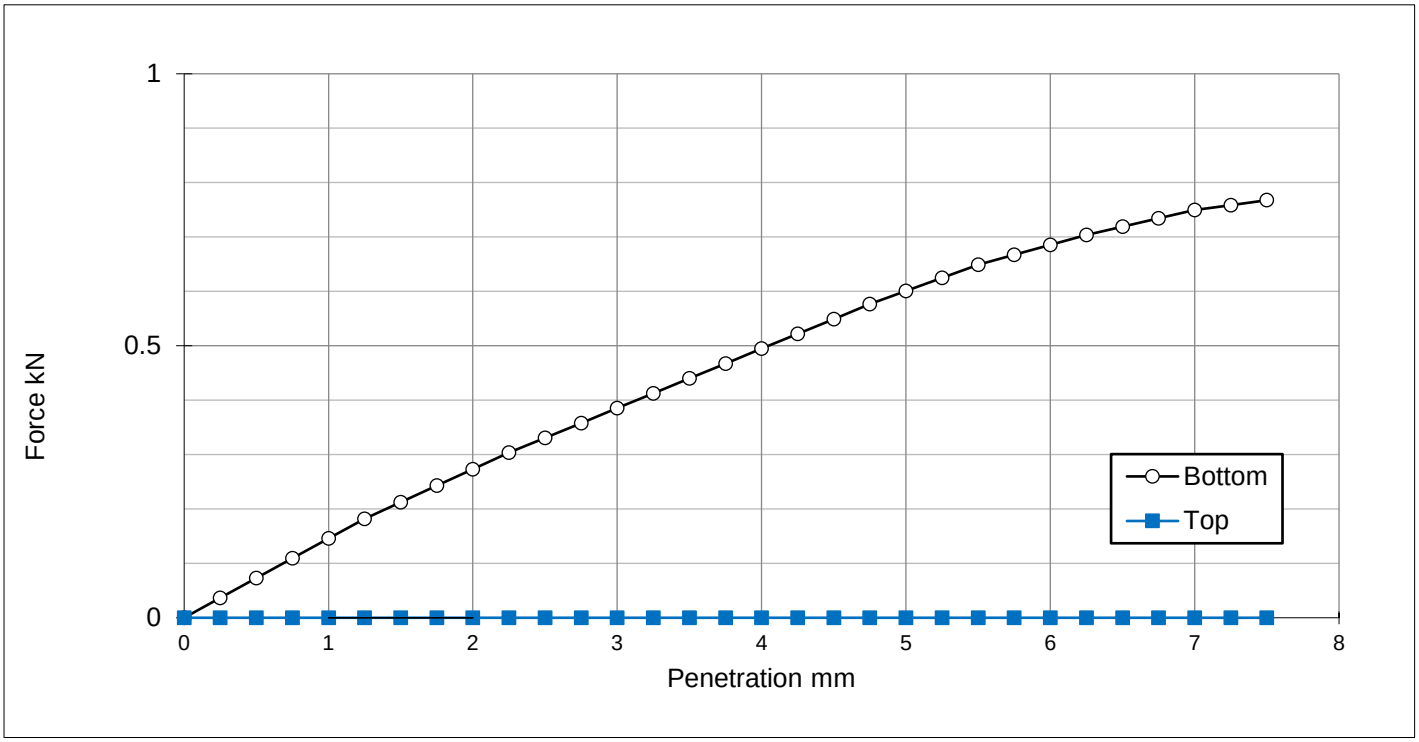
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA15-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113213	DATE RECEIVED	14-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		10 %			
BULK DENSITY	1.61 Mg/m3	MOISTURE CONTENT	21 %	DRY DENSITY	1.33 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.0	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	21	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

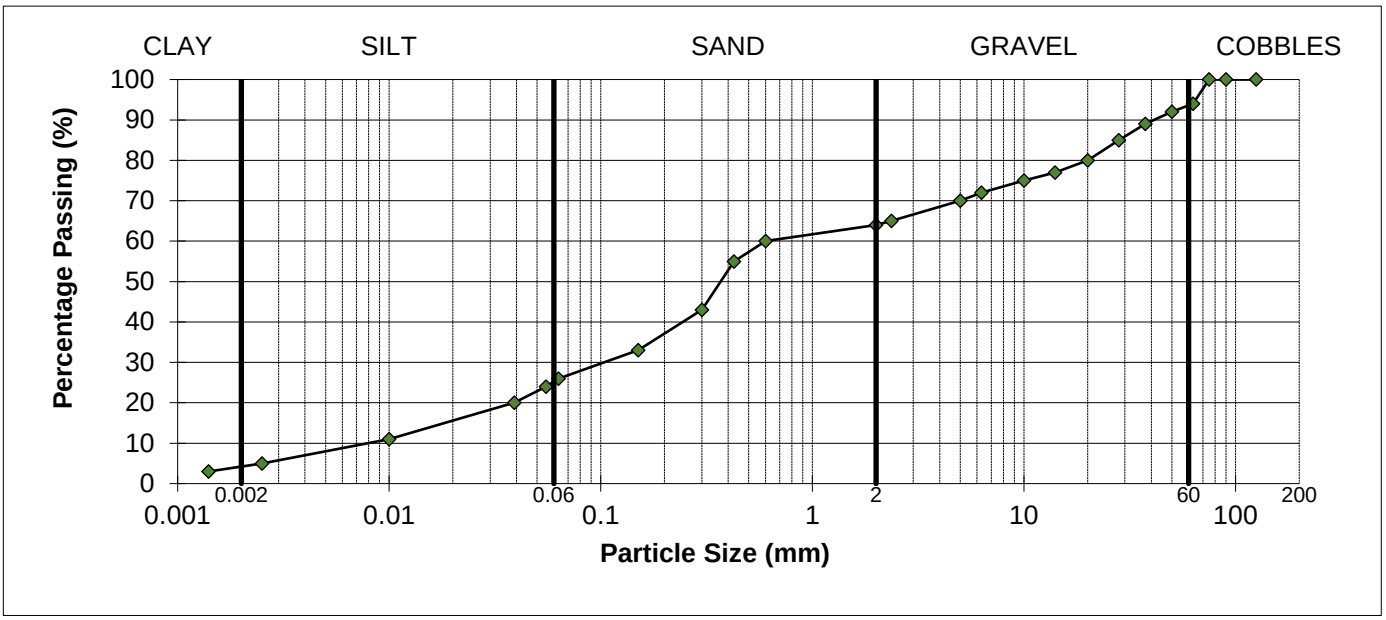
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113063	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	65	
90	100		2	64	
75	100		0.6	60	
63	94		0.425	55	
50	92		0.3	43	
37.5	89		0.15	33	
28	85		0.063	26	
20	80		0.055	24	
14	77		0.039	20	
10	75		0.01	11	
6.3	72		0.0025	5	
5	70		0.0014	3	



REMARKS
As received moisture content = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

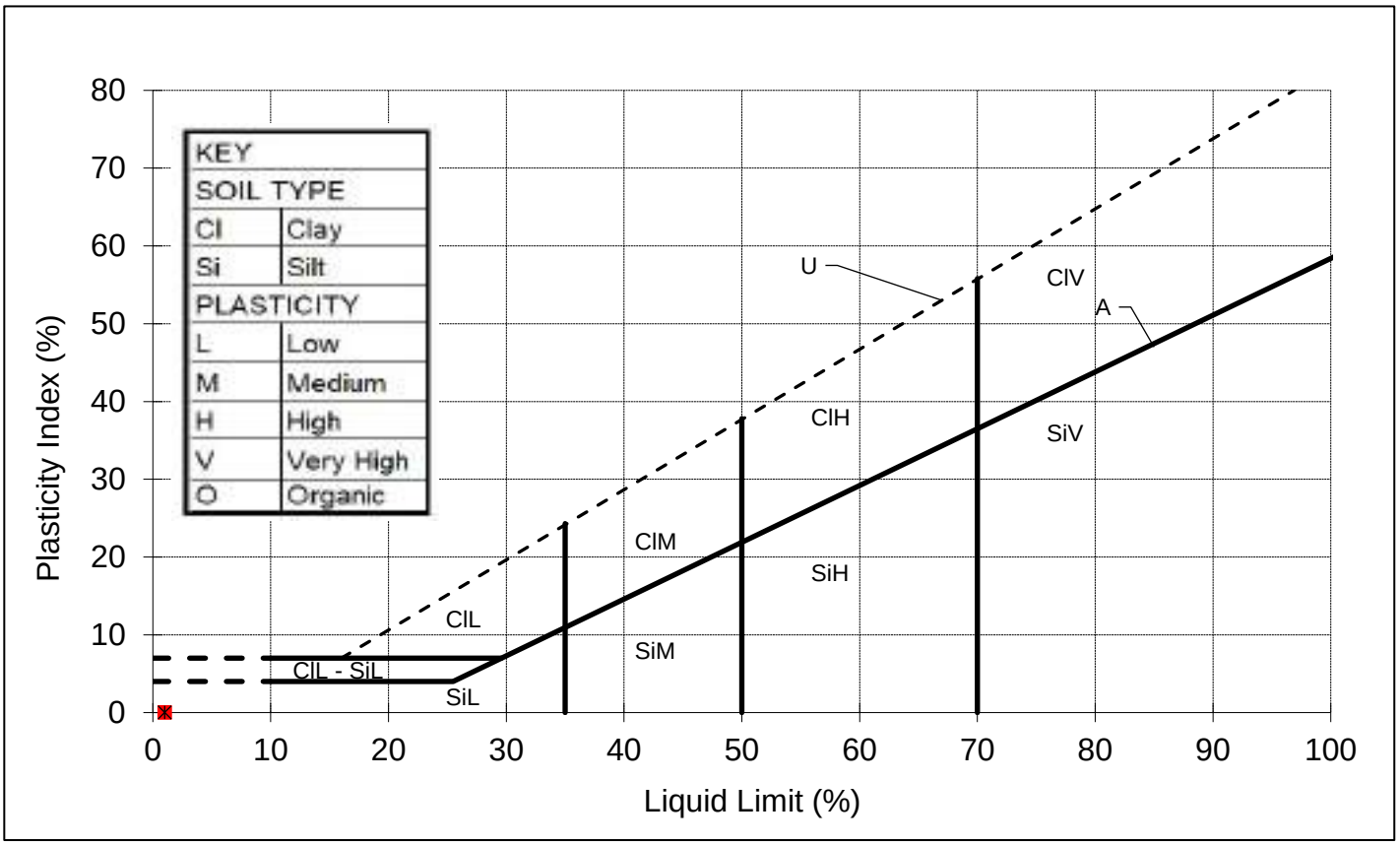
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-1	DATE SAMPLED	06-Jun-22
SAMPLE No.	113063	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12	N/A	Non Plastic	N/A	55



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

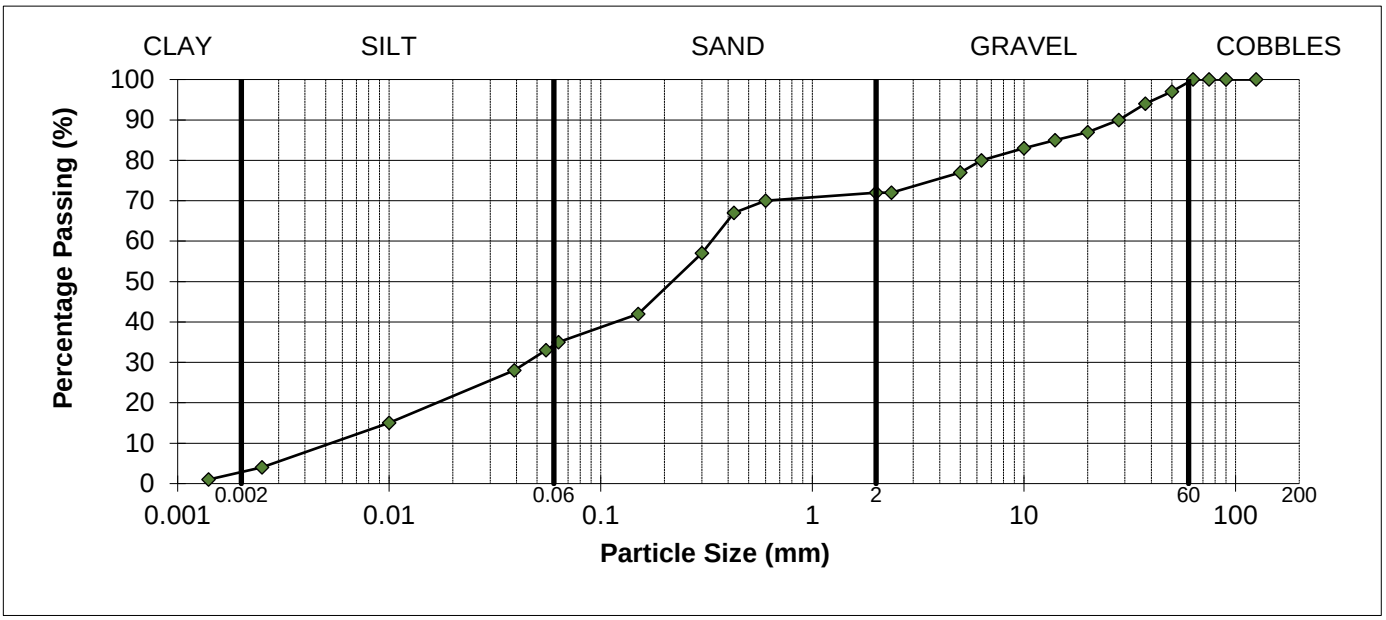
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113064	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	72	
75	100		0.6	70	
63	100		0.425	67	
50	97		0.3	57	
37.5	94		0.15	42	
28	90		0.063	35	
20	87		0.055	33	
14	85		0.039	28	
10	83		0.01	15	
6.3	80		0.0025	4	
5	77		0.0014	1	



REMARKS
As received moisture content = 15%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

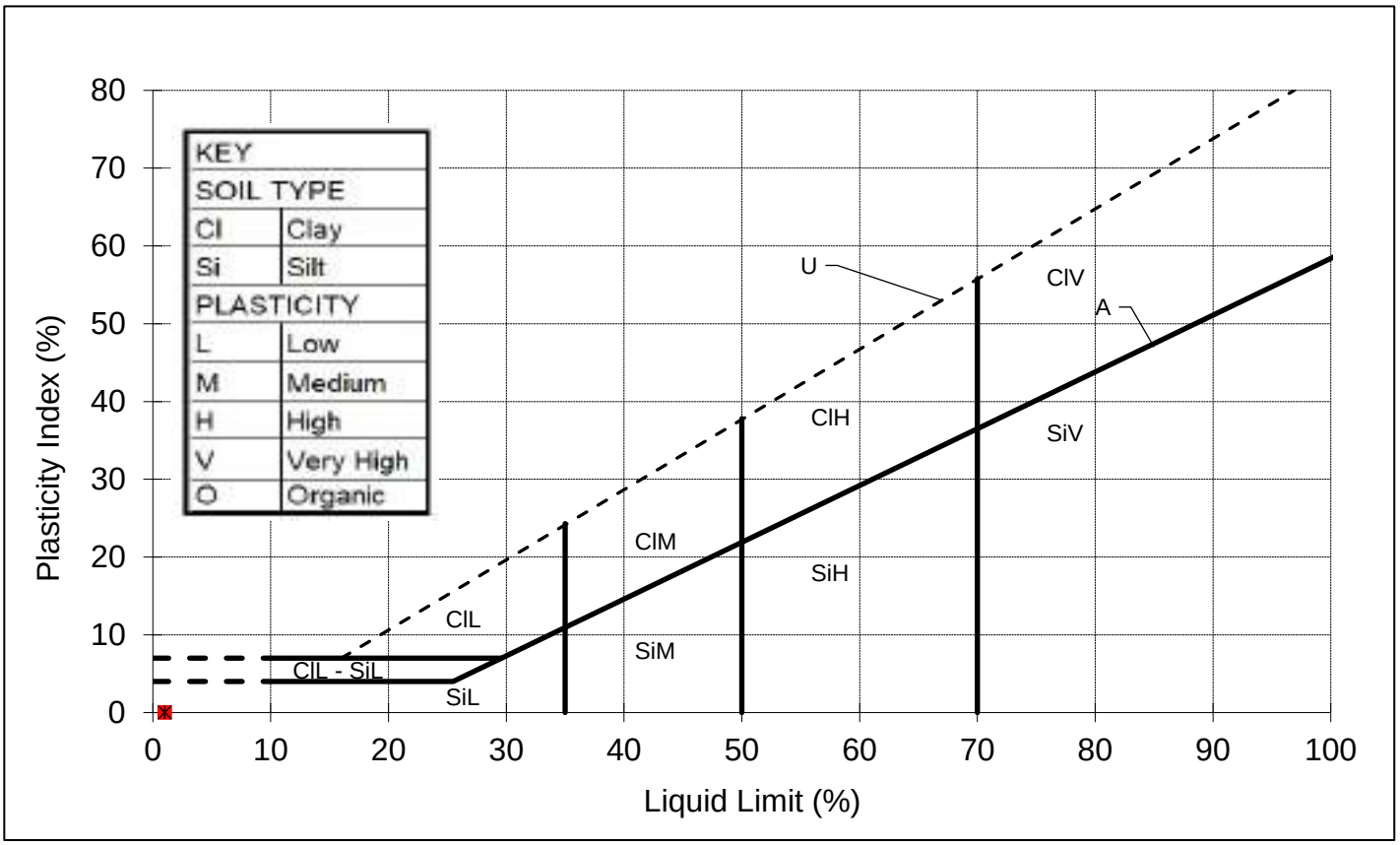
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-2	DATE SAMPLED	06-Jun-22
SAMPLE No.	113064	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

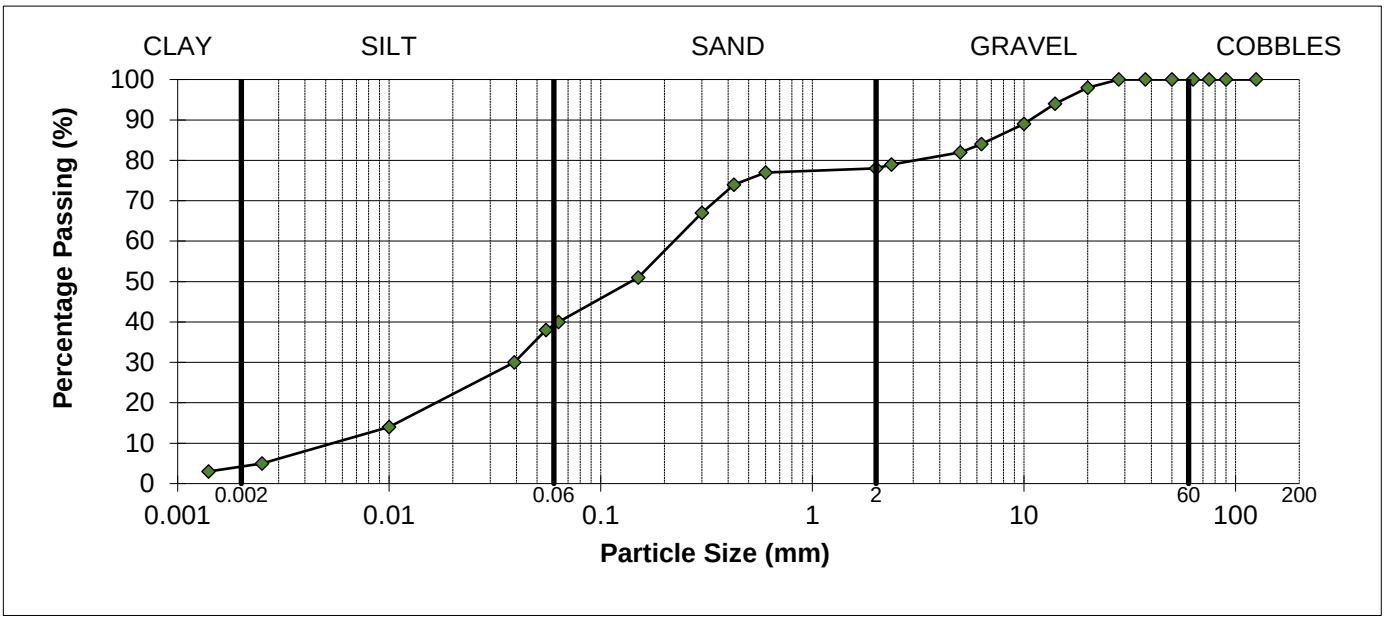
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113065	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	79	
90	100		2	78	
75	100		0.6	77	
63	100		0.425	74	
50	100		0.3	67	
37.5	100		0.15	51	
28	100		0.063	40	
20	98		0.055	38	
14	94		0.039	30	
10	89		0.01	14	
6.3	84		0.0025	5	
5	82		0.0014	3	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

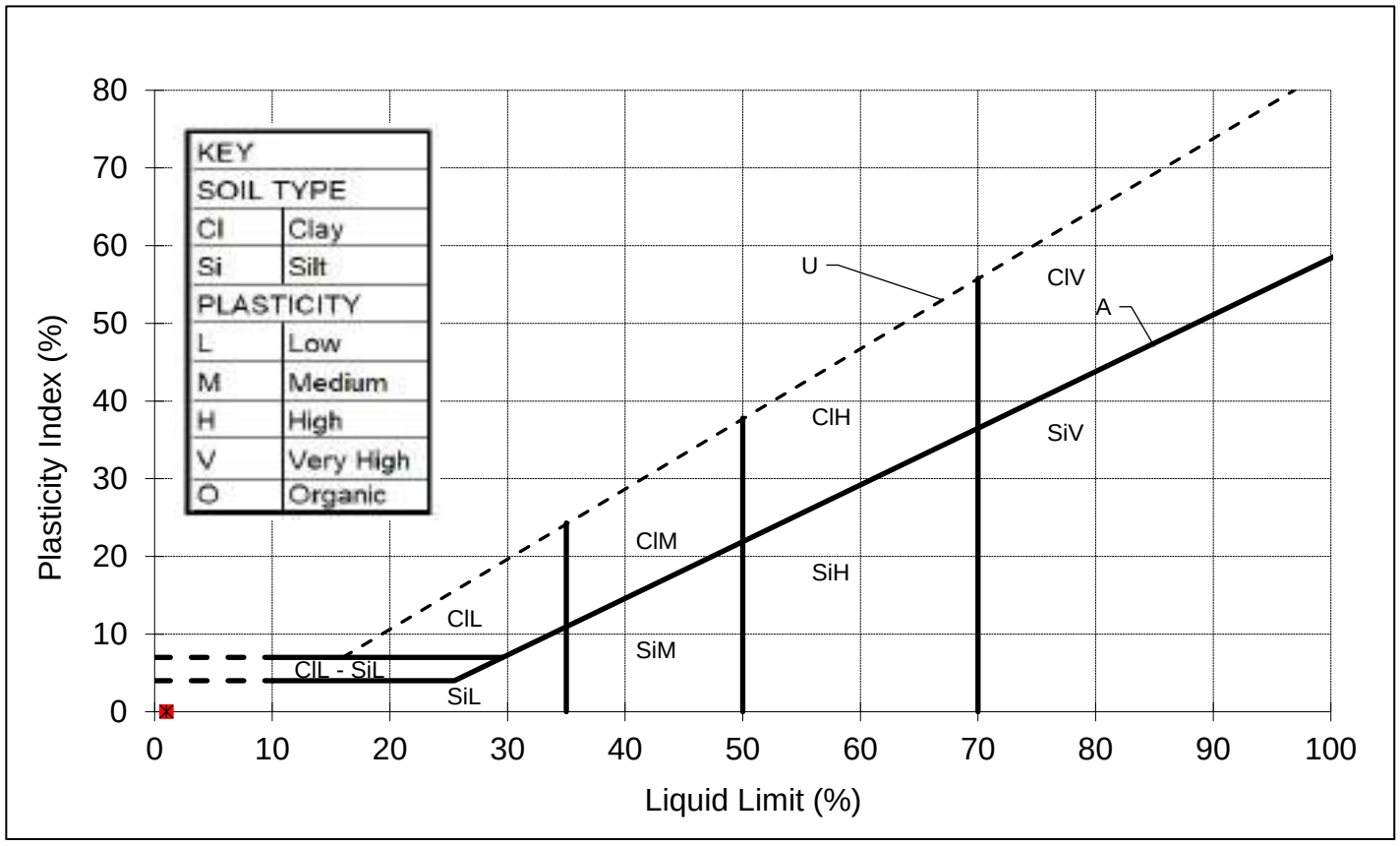
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-3	DATE SAMPLED	06-Jun-22
SAMPLE No.	113065	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	74



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

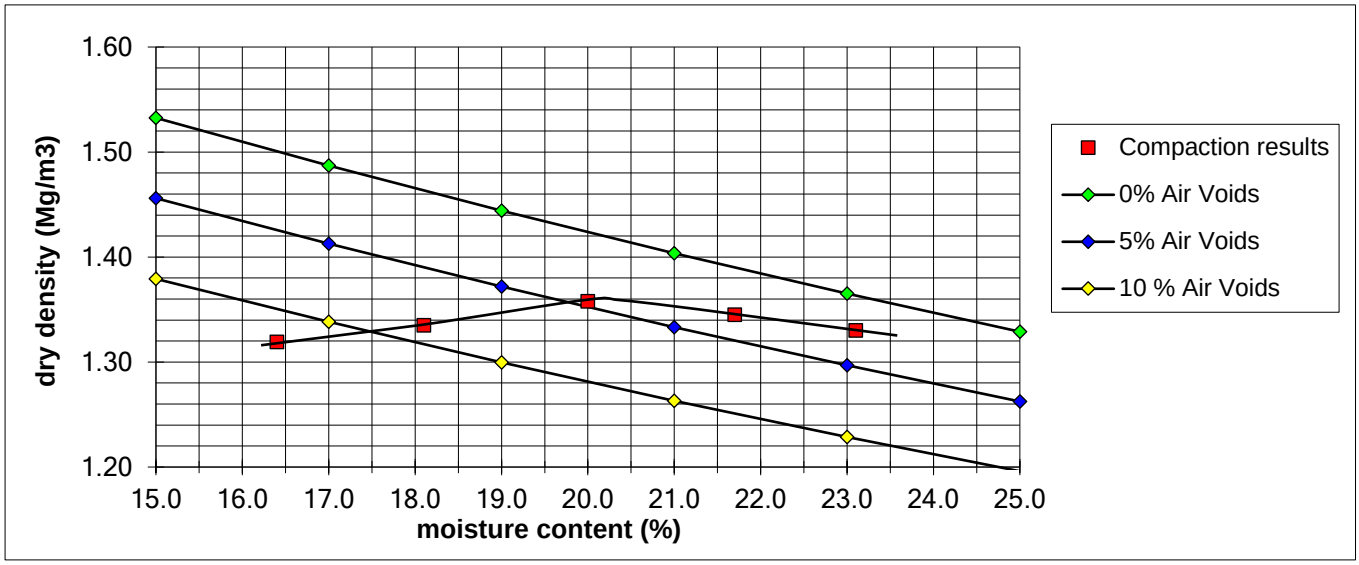
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113065	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number	Moisture Content (%)	Dry Density (Mg/m3)
1	16.4	1.319
2	18.1	1.335
3	20.0	1.358
4	21.7	1.345
5	23.1	1.330
Optimum	20.0	
Maximum		1.36
Particle Density	1.99 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 2%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

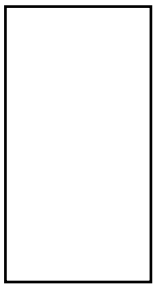
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113065	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	18	%
BULK DENSITY	1.56	Mg/m3
DRY DENSITY	1.32	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

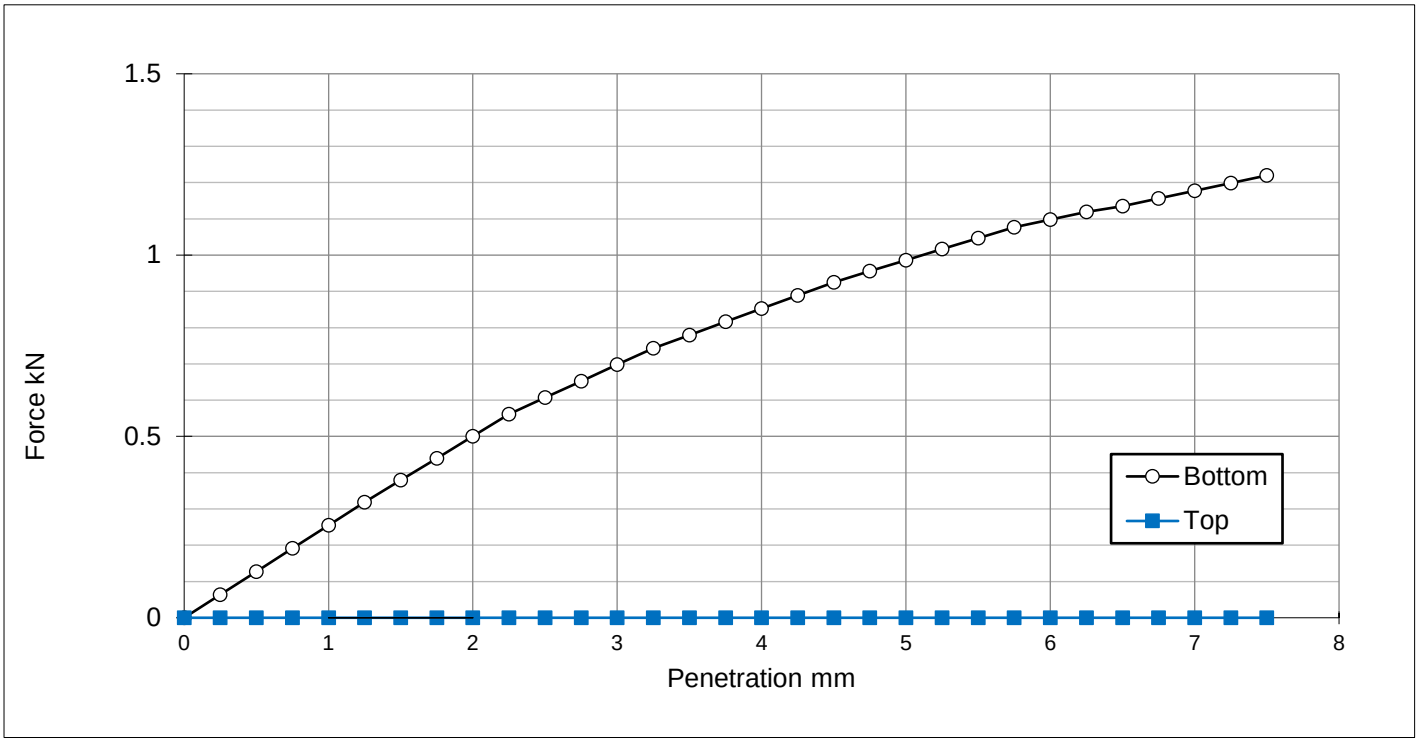
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113065	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		2 %			
BULK DENSITY	1.56 Mg/m3	MOISTURE CONTENT	18 %	DRY DENSITY	1.32 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.9	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	18	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

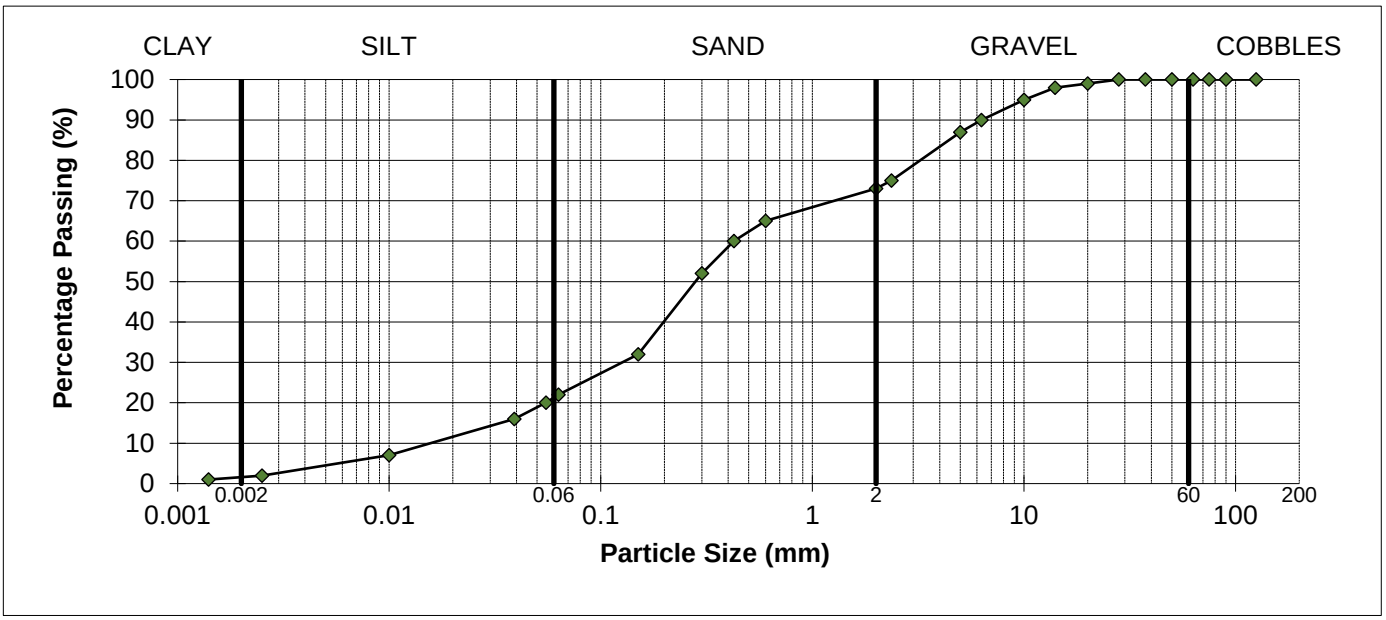
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113066	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	73	
75	100		0.6	65	
63	100		0.425	60	
50	100		0.3	52	
37.5	100		0.15	32	
28	100		0.063	22	
20	99		0.055	20	
14	98		0.039	16	
10	95		0.01	7	
6.3	90		0.0025	2	
5	87		0.0014	1	



REMARKS
As received moisture content = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

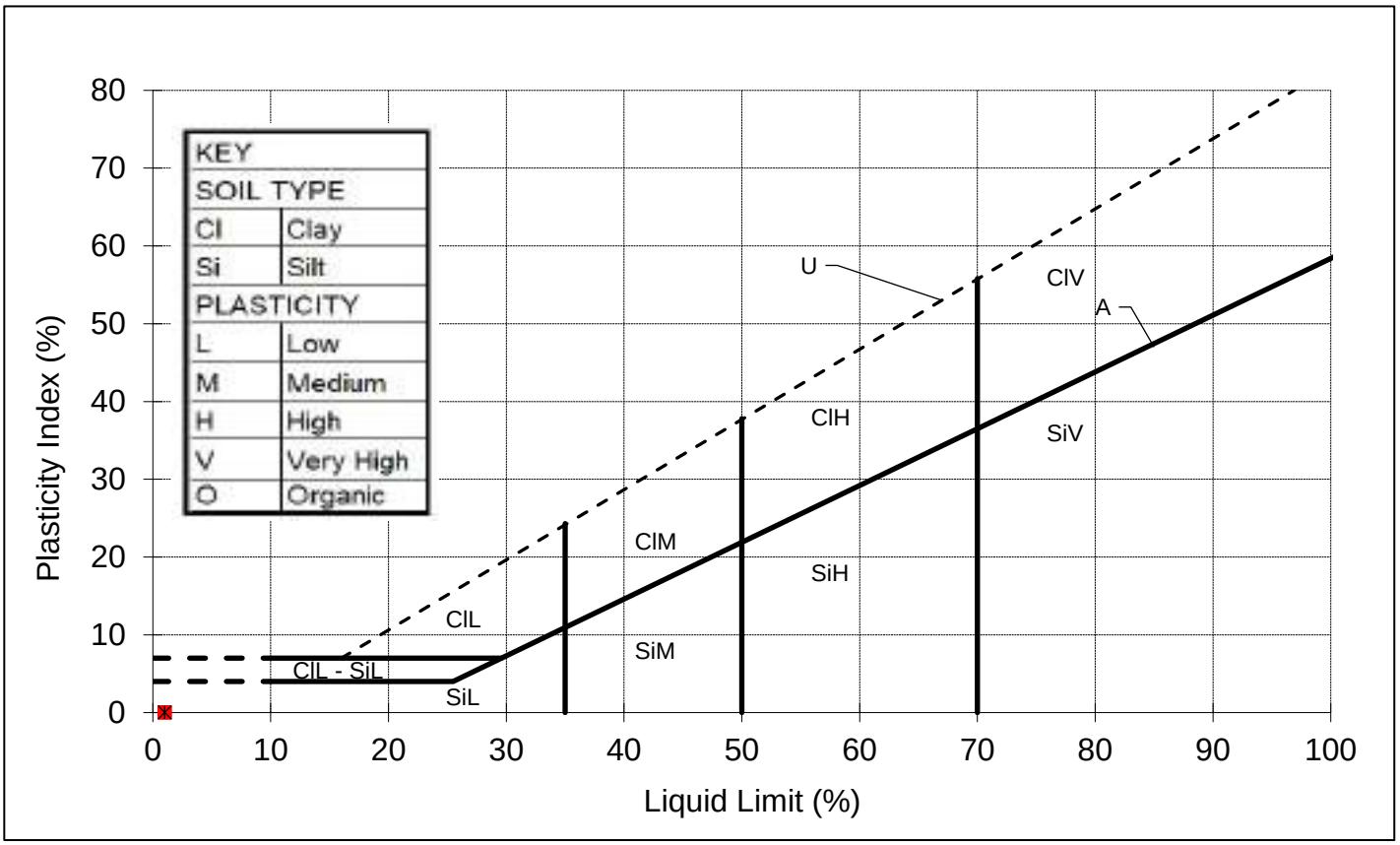
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-4	DATE SAMPLED	06-Jun-22
SAMPLE No.	113066	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12	N/A	Non Plastic	N/A	60



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

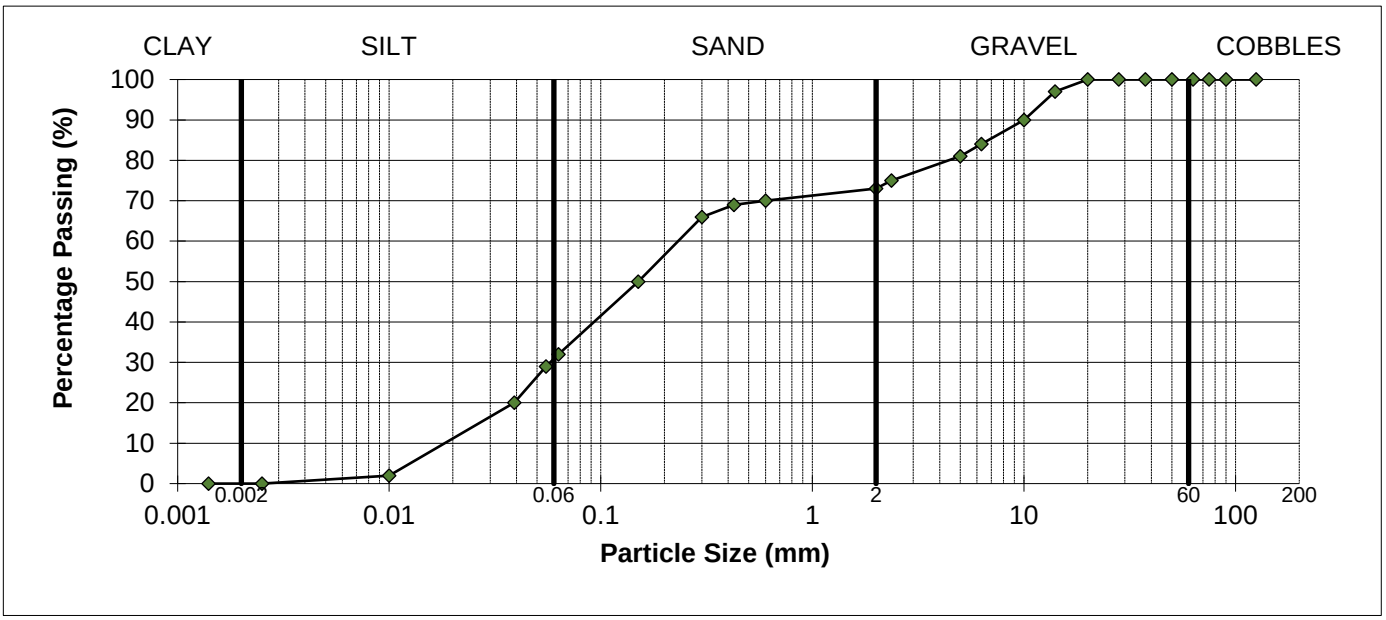
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113067	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	73	
75	100		0.6	70	
63	100		0.425	69	
50	100		0.3	66	
37.5	100		0.15	50	
28	100		0.063	32	
20	100		0.055	29	
14	97		0.039	20	
10	90		0.01	2	
6.3	84		0.0025	0	
5	81		0.0014	0	



REMARKS
As received moisture content = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

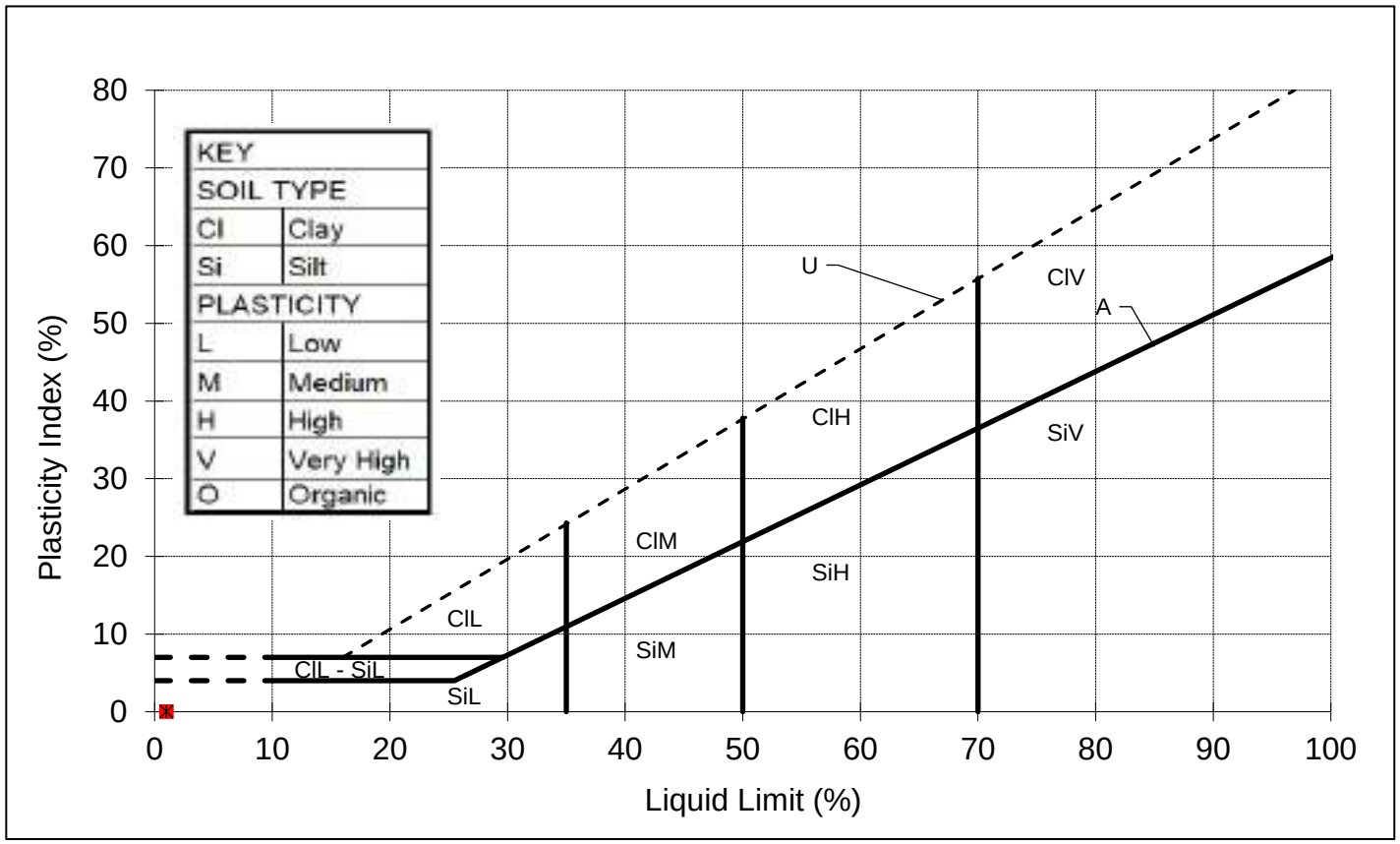
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-5	DATE SAMPLED	06-Jun-22
SAMPLE No.	113067	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16	N/A	Non Plastic	N/A	69



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

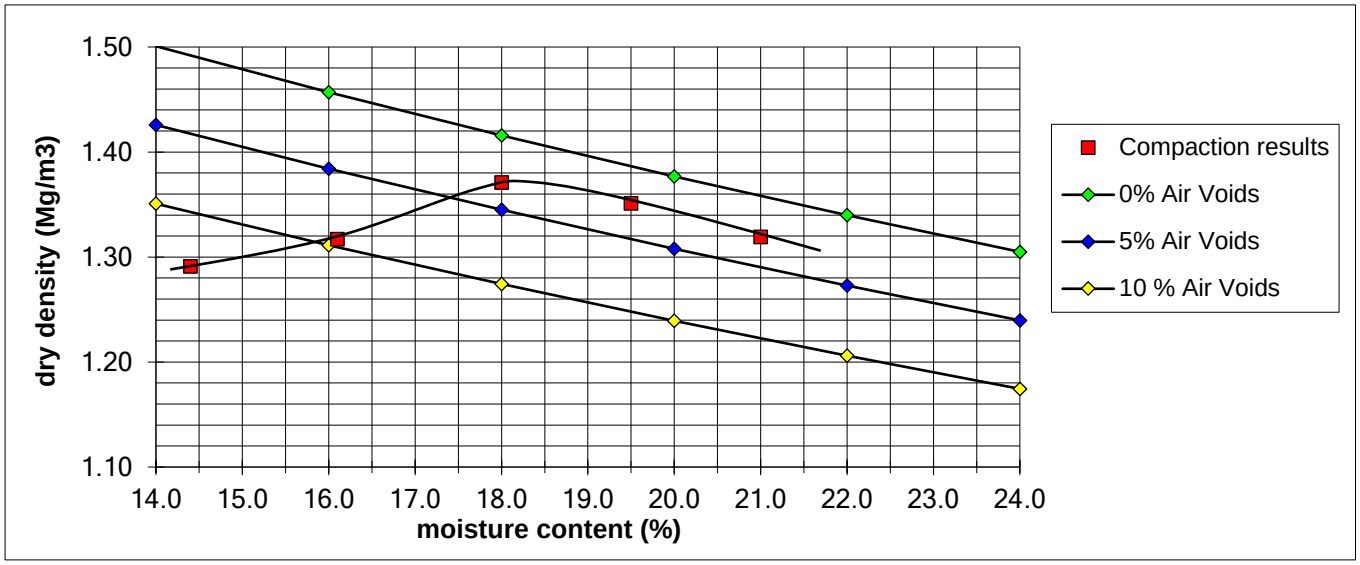
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113067	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		14.4	1.291
2		16.1	1.317
3		18.0	1.371
4		19.5	1.351
5		21.0	1.319
	Optimum	18.0	
	Maximum		1.37
	Particle Density	1.9 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

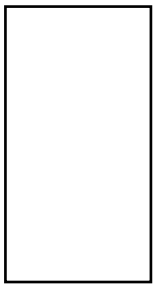
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113067	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	16	%
BULK DENSITY	1.54	Mg/m3
DRY DENSITY	1.32	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

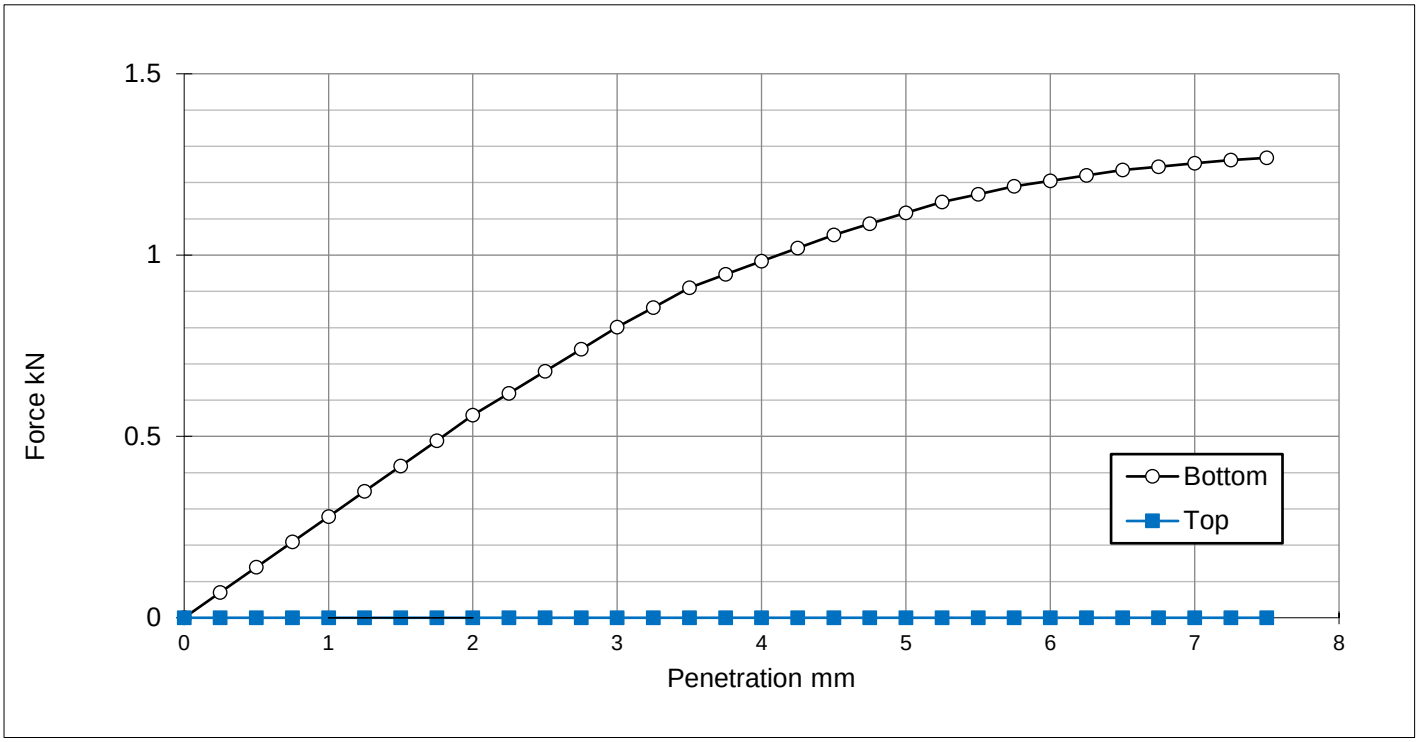
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA14-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113067	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.54 Mg/m3	MOISTURE CONTENT	16 %	DRY DENSITY	1.32 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	5.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	16	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

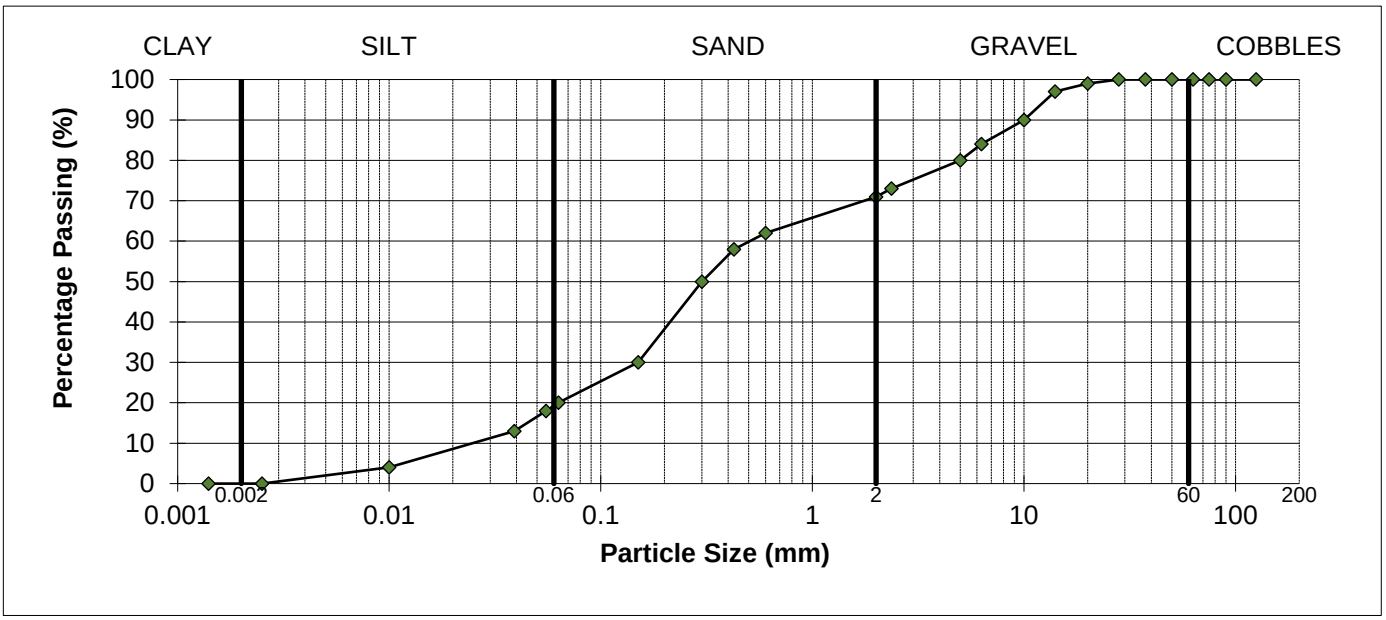
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-1	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113045	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	73	
90	100		2	71	
75	100		0.6	62	
63	100		0.425	58	
50	100		0.3	50	
37.5	100		0.15	30	
28	100		0.063	20	
20	99		0.055	18	
14	97		0.039	13	
10	90		0.01	4	
6.3	84		0.0025	0	
5	80		0.0014	0	



REMARKS
As received moisture content = 11%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

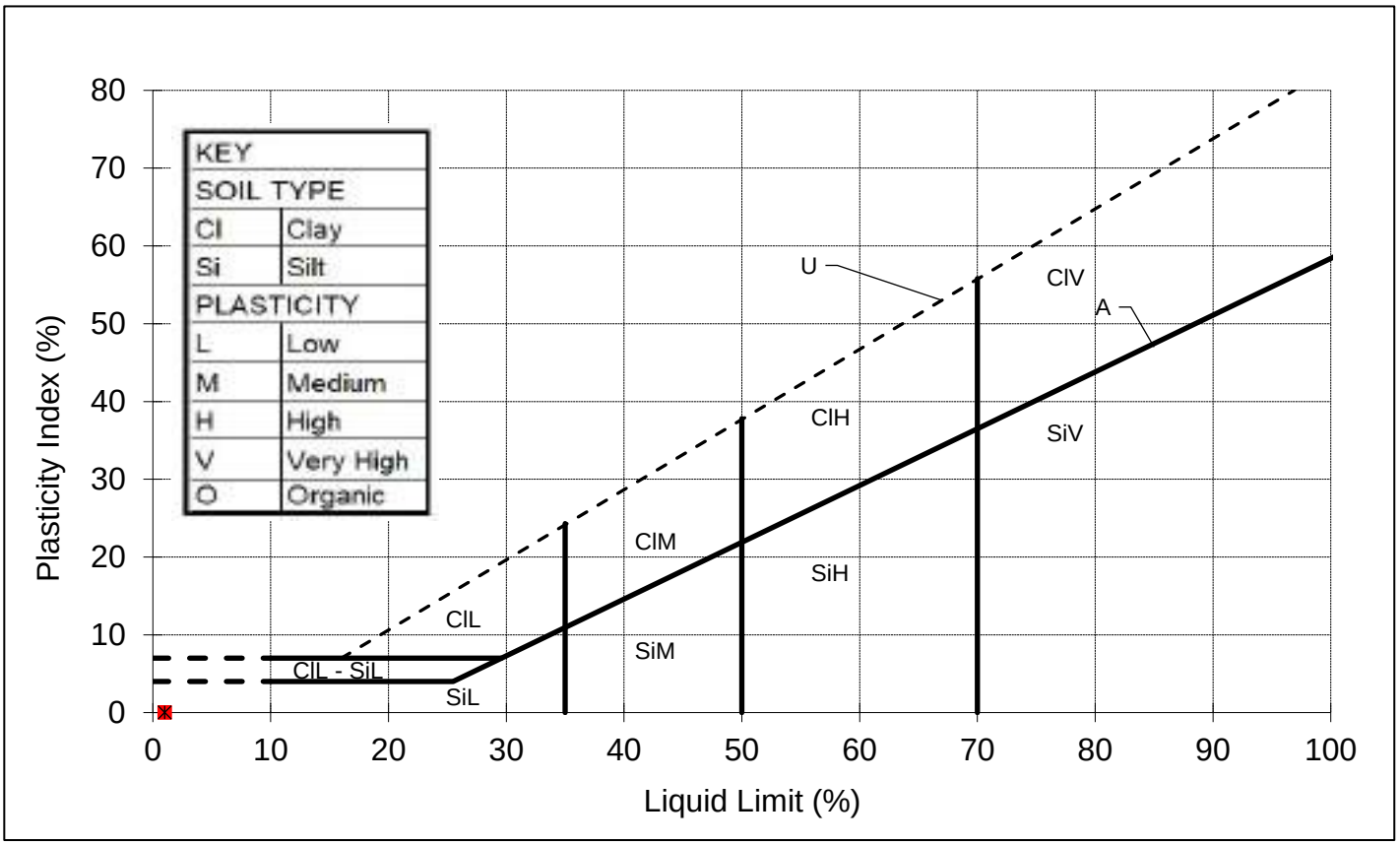
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-1	DATE SAMPLED	06-Jun-22
SAMPLE No.	113045	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
11	N/A	Non Plastic	N/A	58



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

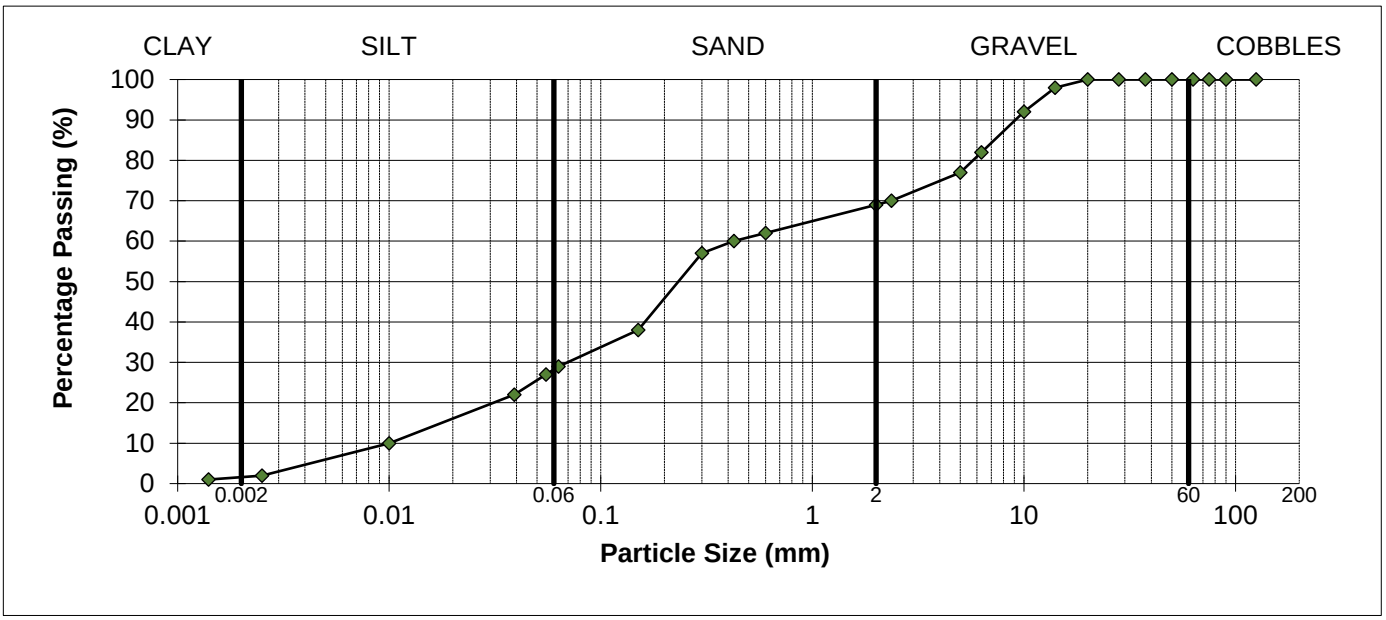
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113046	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	70	
90	100		2	69	
75	100		0.6	62	
63	100		0.425	60	
50	100		0.3	57	
37.5	100		0.15	38	
28	100		0.063	29	
20	100		0.055	27	
14	98		0.039	22	
10	92		0.01	10	
6.3	82		0.0025	2	
5	77		0.0014	1	



REMARKS
As received moisture content = 19%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

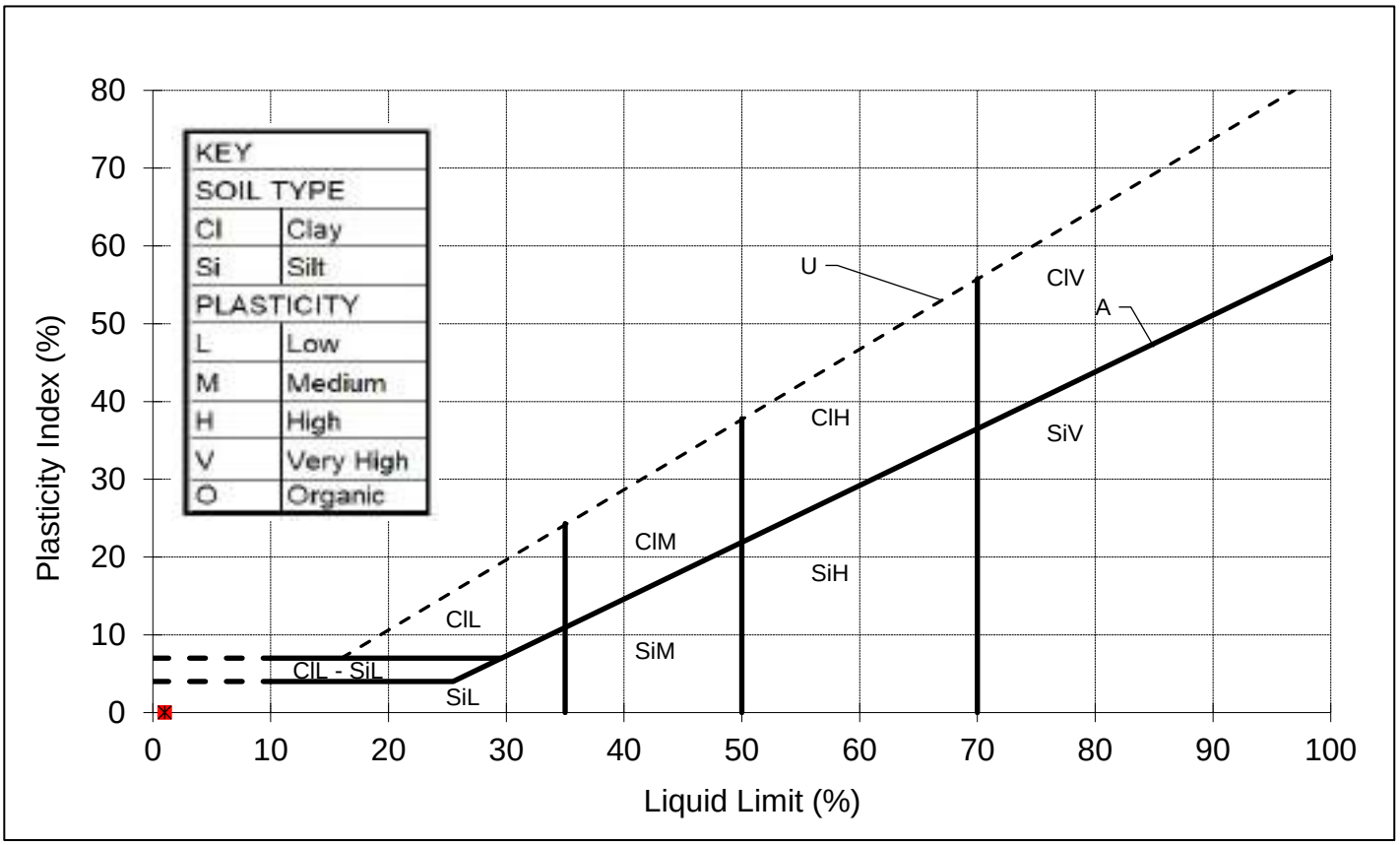
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-2	DATE SAMPLED	06-Jun-22
SAMPLE No.	113046	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19	N/A	Non Plastic	N/A	60



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

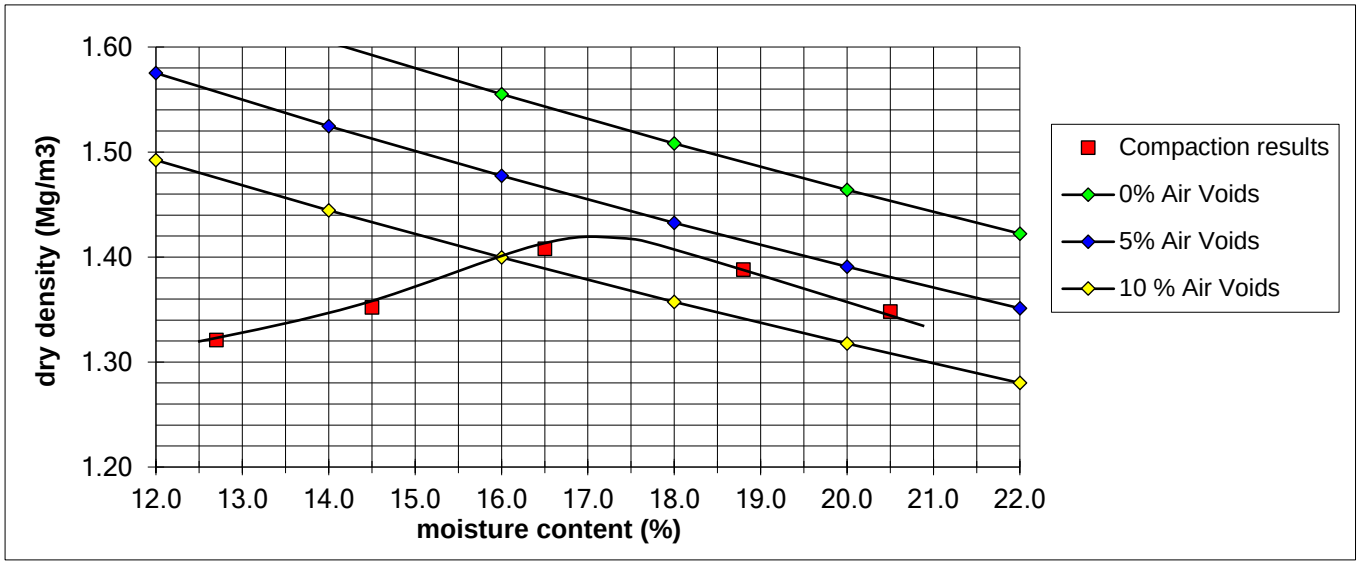
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113046	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.7	1.321
2		14.5	1.352
3		16.5	1.408
4		18.8	1.388
5		20.5	1.348
	Optimum	17.0	
	Maximum		1.42
	Particle Density	2.07 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

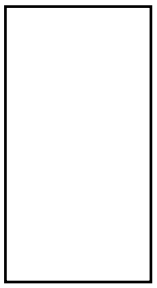
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113046	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	19	%
BULK DENSITY	1.63	Mg/m3
DRY DENSITY	1.37	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

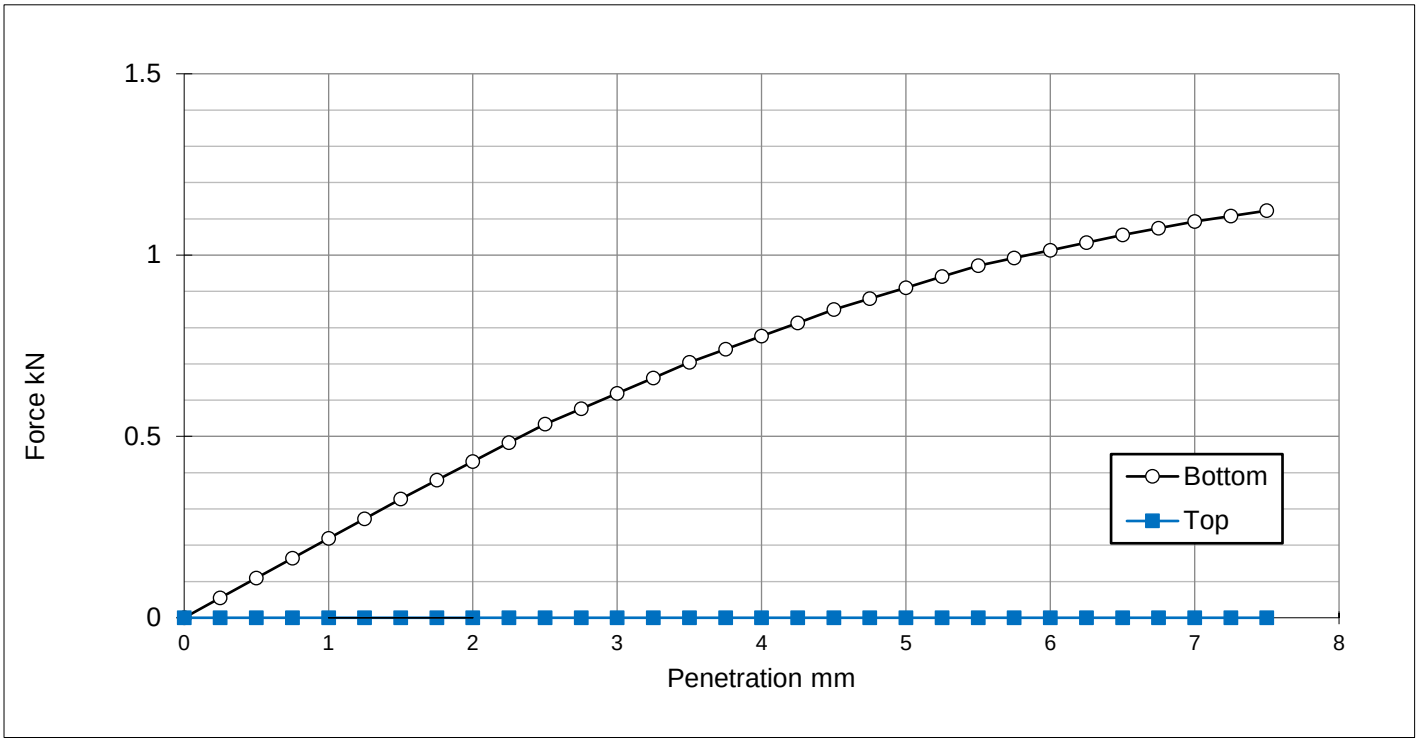
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-2	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113046	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.63 Mg/m3	MOISTURE CONTENT	19 %	DRY DENSITY	1.36 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	19	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

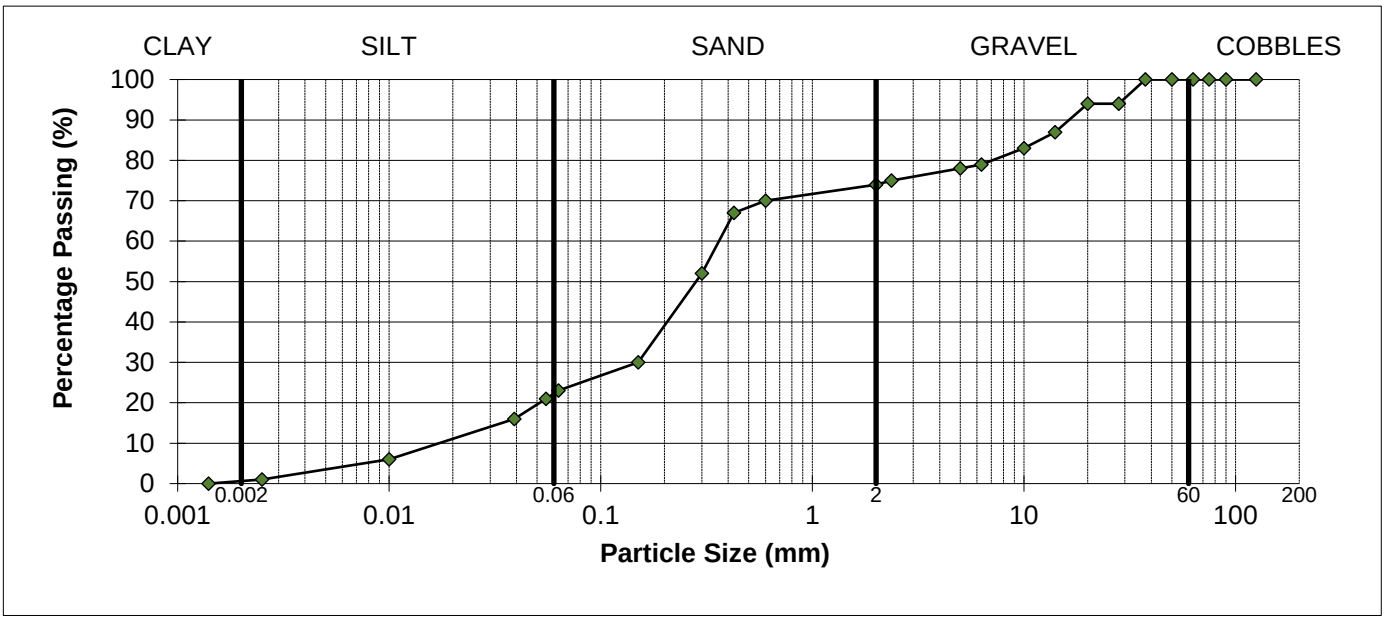
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113047	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	74	
75	100		0.6	70	
63	100		0.425	67	
50	100		0.3	52	
37.5	100		0.15	30	
28	94		0.063	23	
20	94		0.055	21	
14	87		0.039	16	
10	83		0.01	6	
6.3	79		0.0025	1	
5	78		0.0014	0	



REMARKS
As received moisture content = 23%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

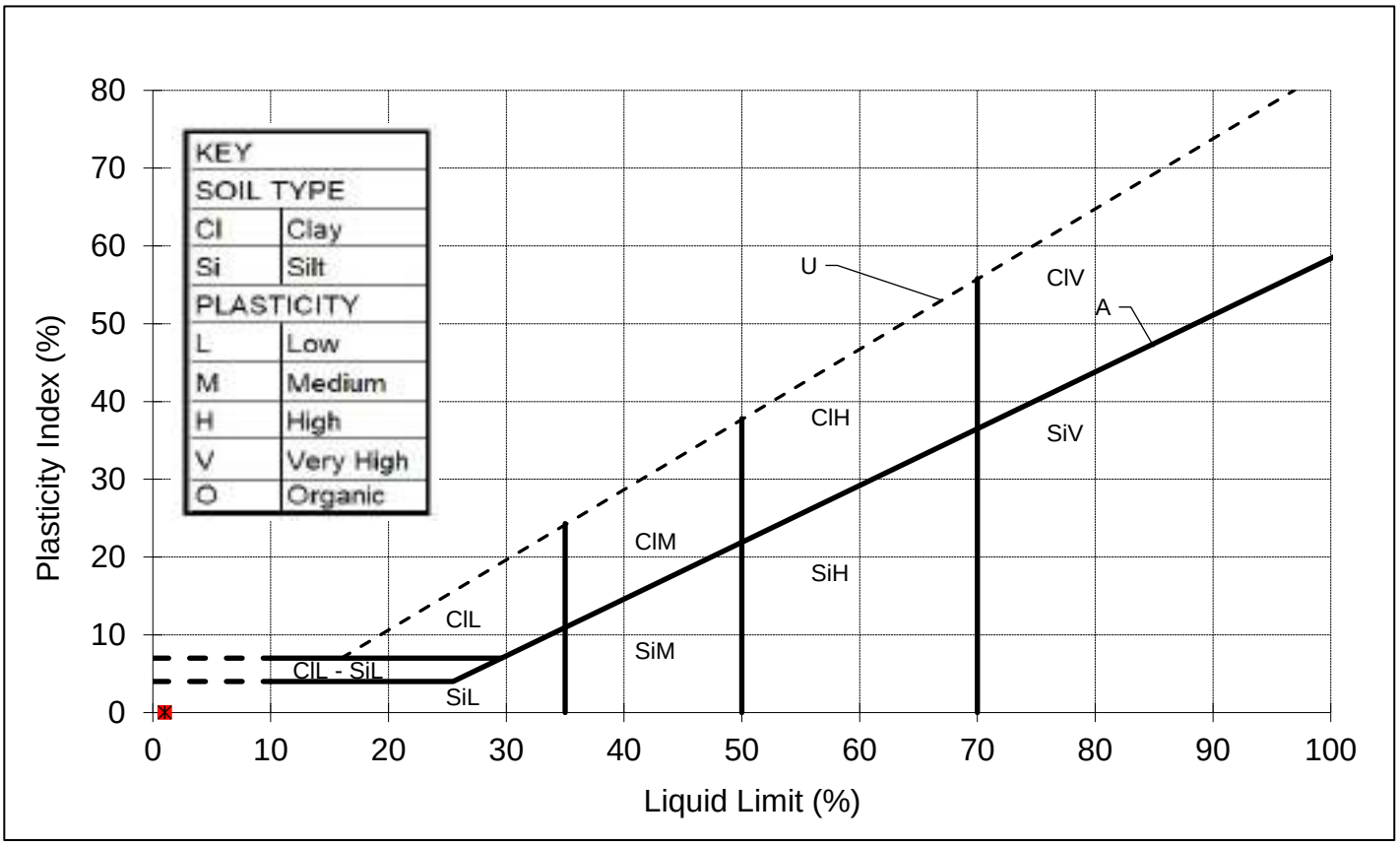
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-3	DATE SAMPLED	06-Jun-22
SAMPLE No.	113047	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

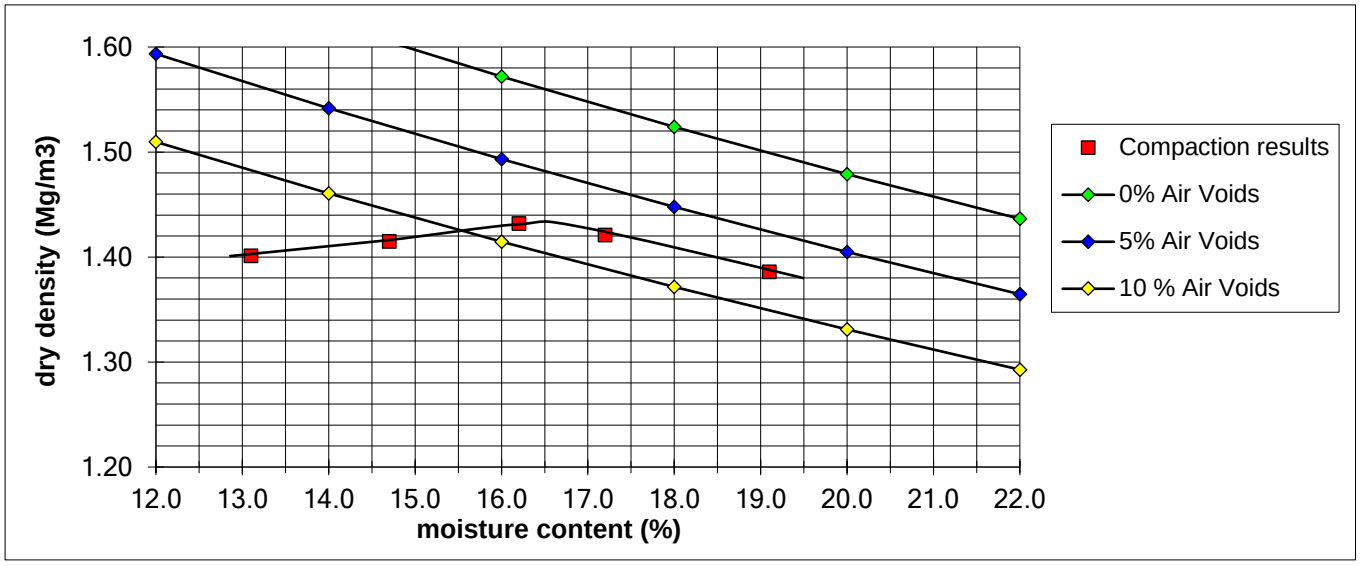
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113047	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		13.1	1.401
2		14.7	1.415
3		16.2	1.432
4		17.2	1.421
5		19.1	1.386
	Optimum	16.0	
	Maximum		1.43
	Particle Density	2.1 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 6%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

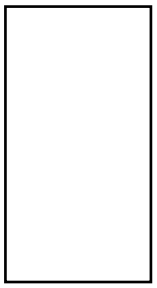
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113047	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	23	%
BULK DENSITY	1.60	Mg/m3
DRY DENSITY	1.31	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

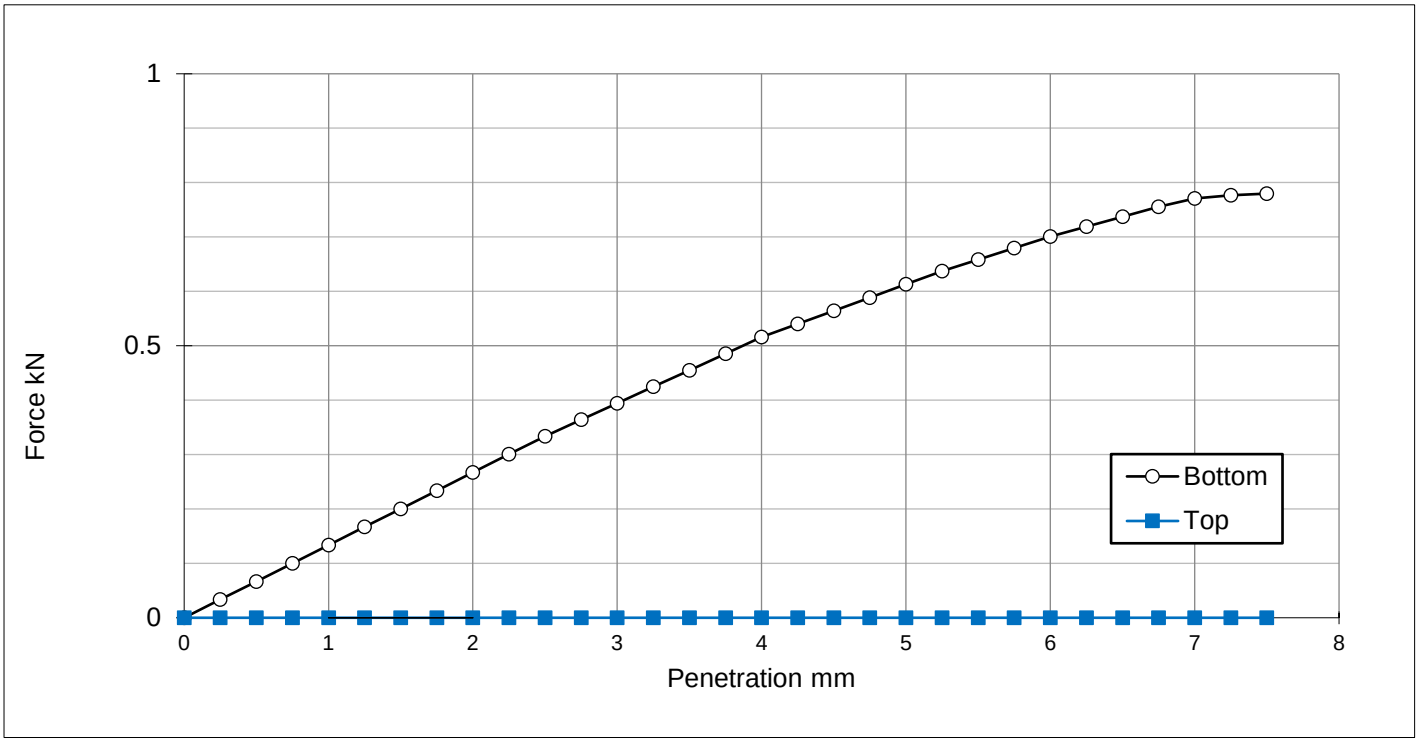
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-3	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113047	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		6 %			
BULK DENSITY	1.60 Mg/m3	MOISTURE CONTENT	23 %	DRY DENSITY	1.30 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.1	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	23	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

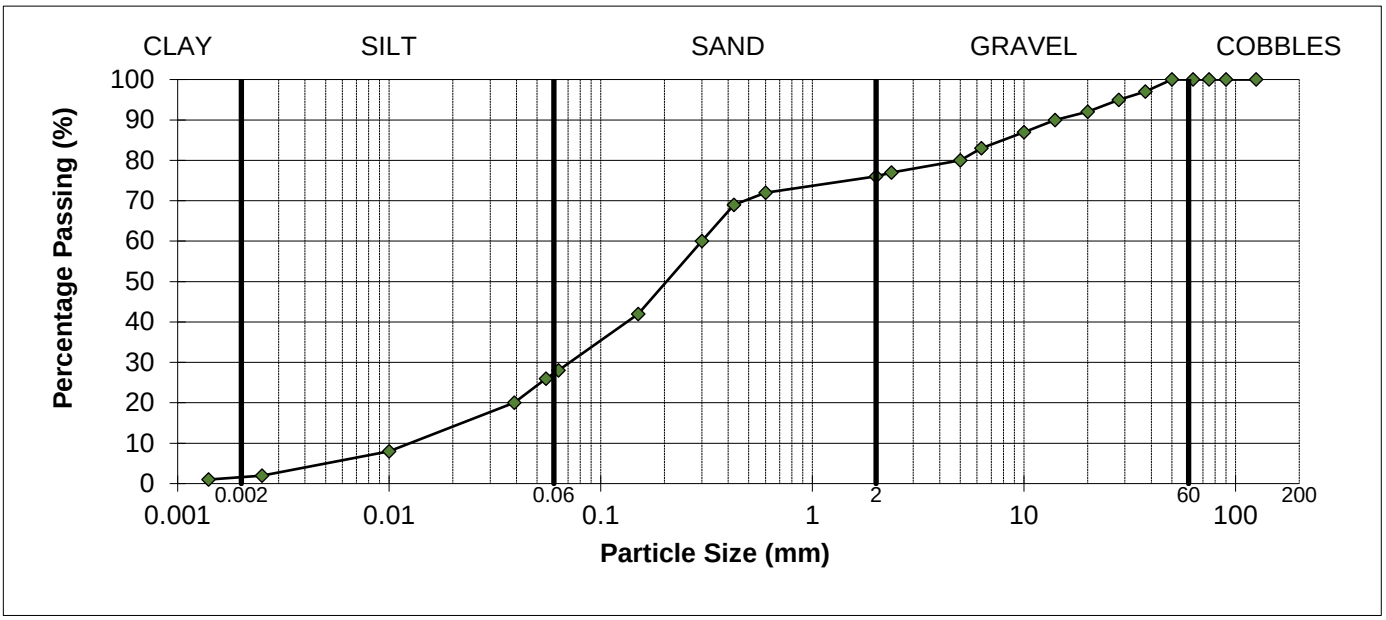
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-4	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113048	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	77	
90	100		2	76	
75	100		0.6	72	
63	100		0.425	69	
50	100		0.3	60	
37.5	97		0.15	42	
28	95		0.063	28	
20	92		0.055	26	
14	90		0.039	20	
10	87		0.01	8	
6.3	83		0.0025	2	
5	80		0.0014	1	



REMARKS
As received moisture content = 21%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

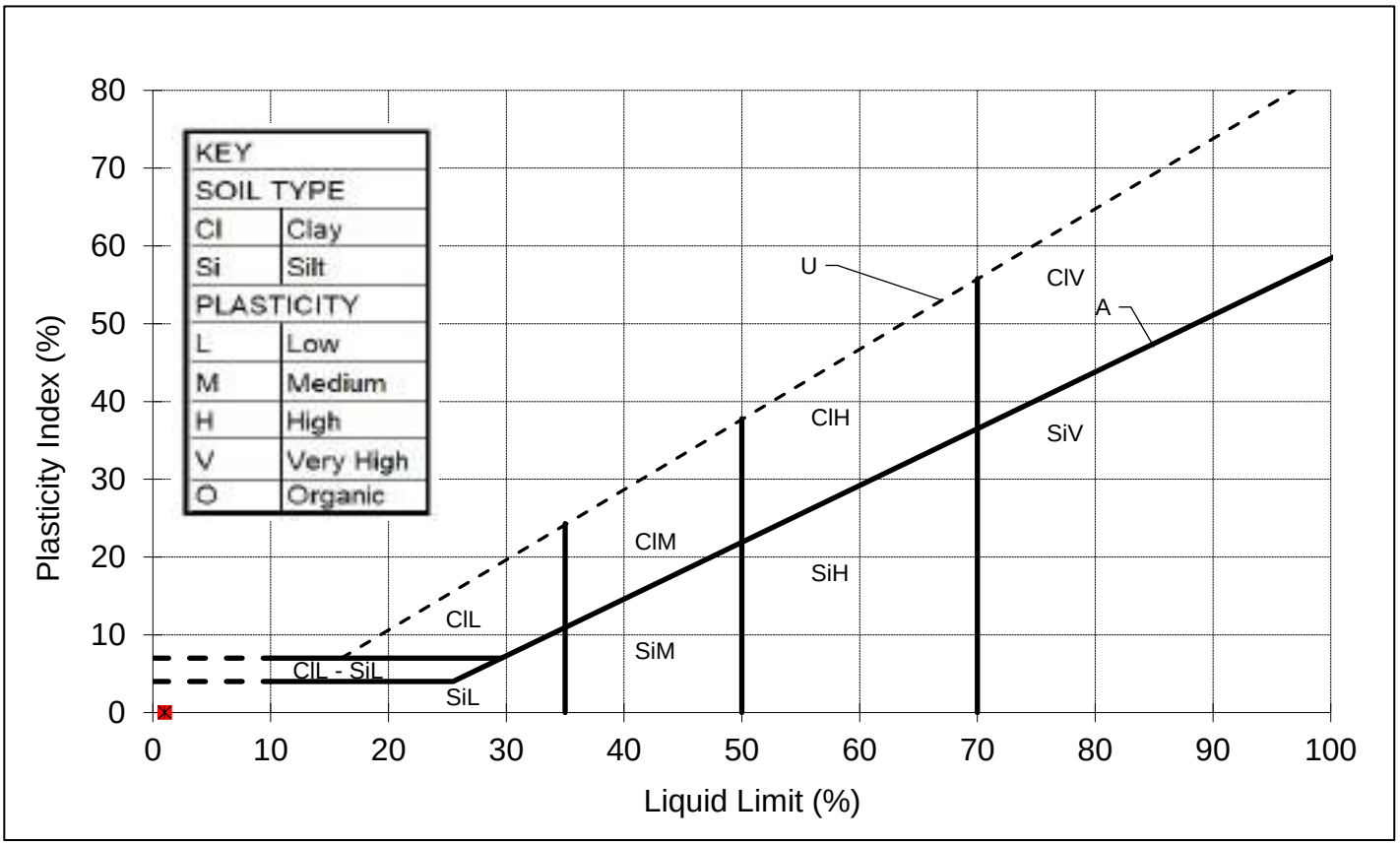
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-4	DATE SAMPLED	06-Jun-22
SAMPLE No.	113048	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	69



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

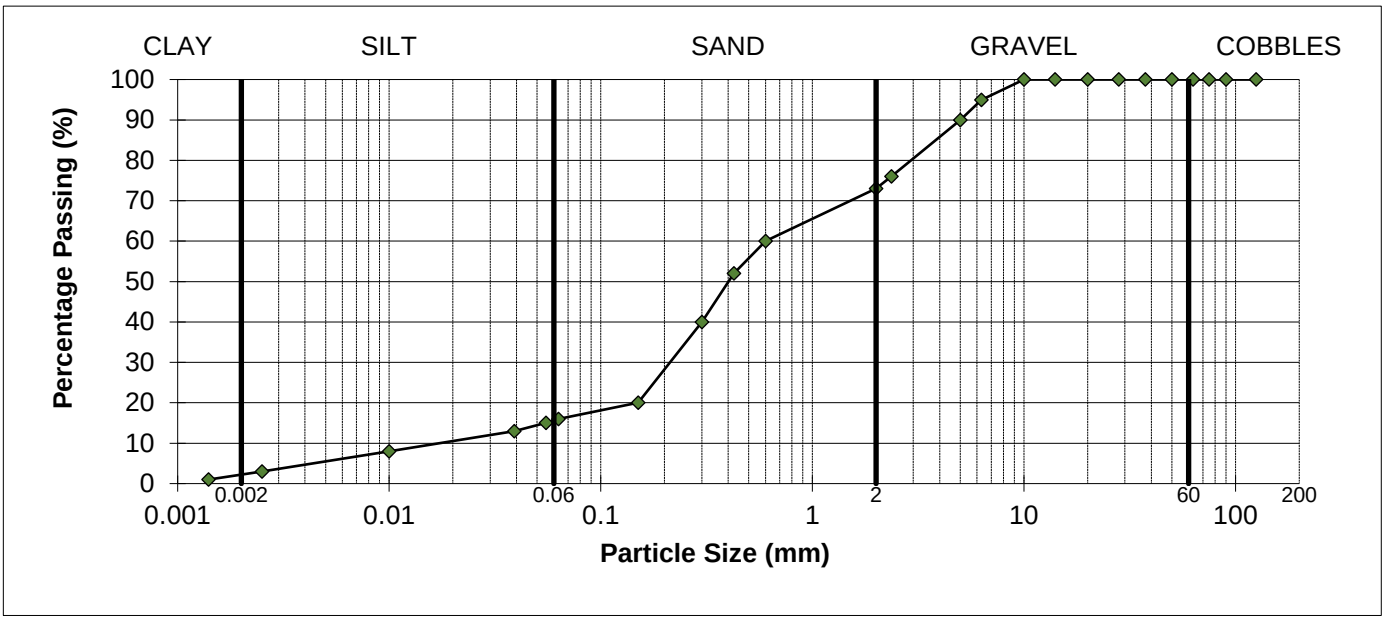
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113049	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	76	
90	100		2	73	
75	100		0.6	60	
63	100		0.425	52	
50	100		0.3	40	
37.5	100		0.15	20	
28	100		0.063	16	
20	100		0.055	15	
14	100		0.039	13	
10	100		0.01	8	
6.3	95		0.0025	3	
5	90		0.0014	1	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

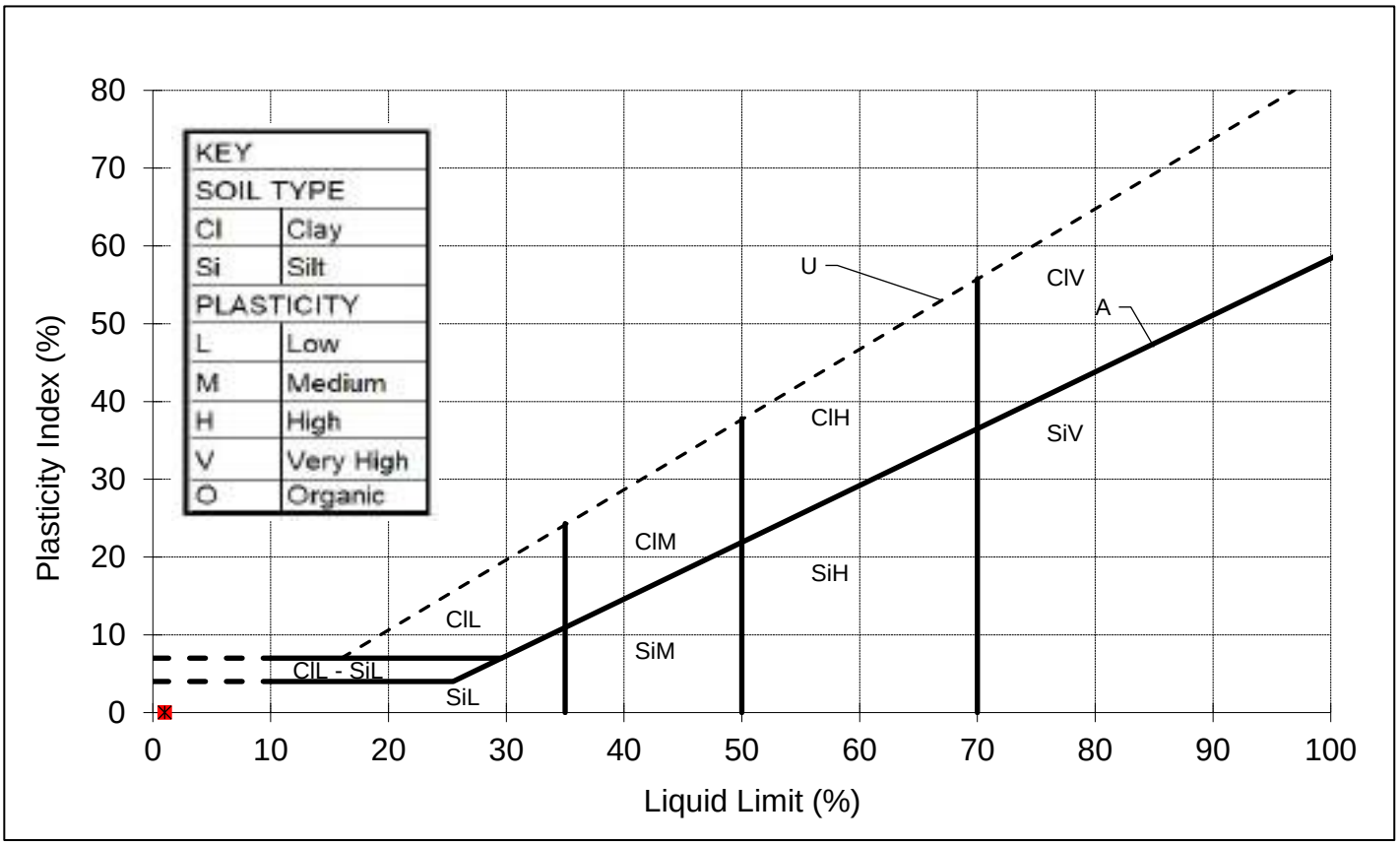
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-5	DATE SAMPLED	06-Jun-22
SAMPLE No.	113049	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	52



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

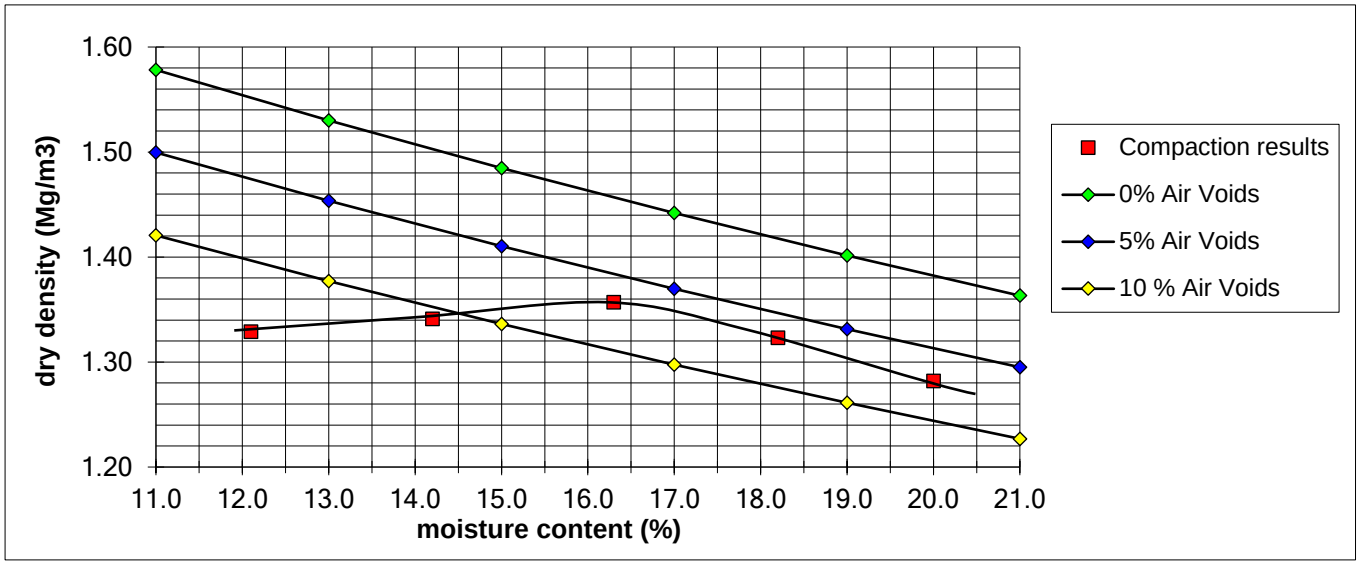
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113049	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.1	1.329
2		14.2	1.341
3		16.3	1.357
4		18.2	1.323
5		20.0	1.282
	Optimum	16.0	
	Maximum		1.35
	Particle Density	1.91 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 14-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

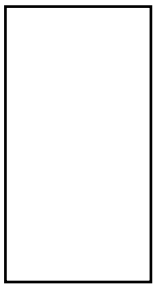
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113049	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	20	%
BULK DENSITY	1.57	Mg/m3
DRY DENSITY	1.31	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 14-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

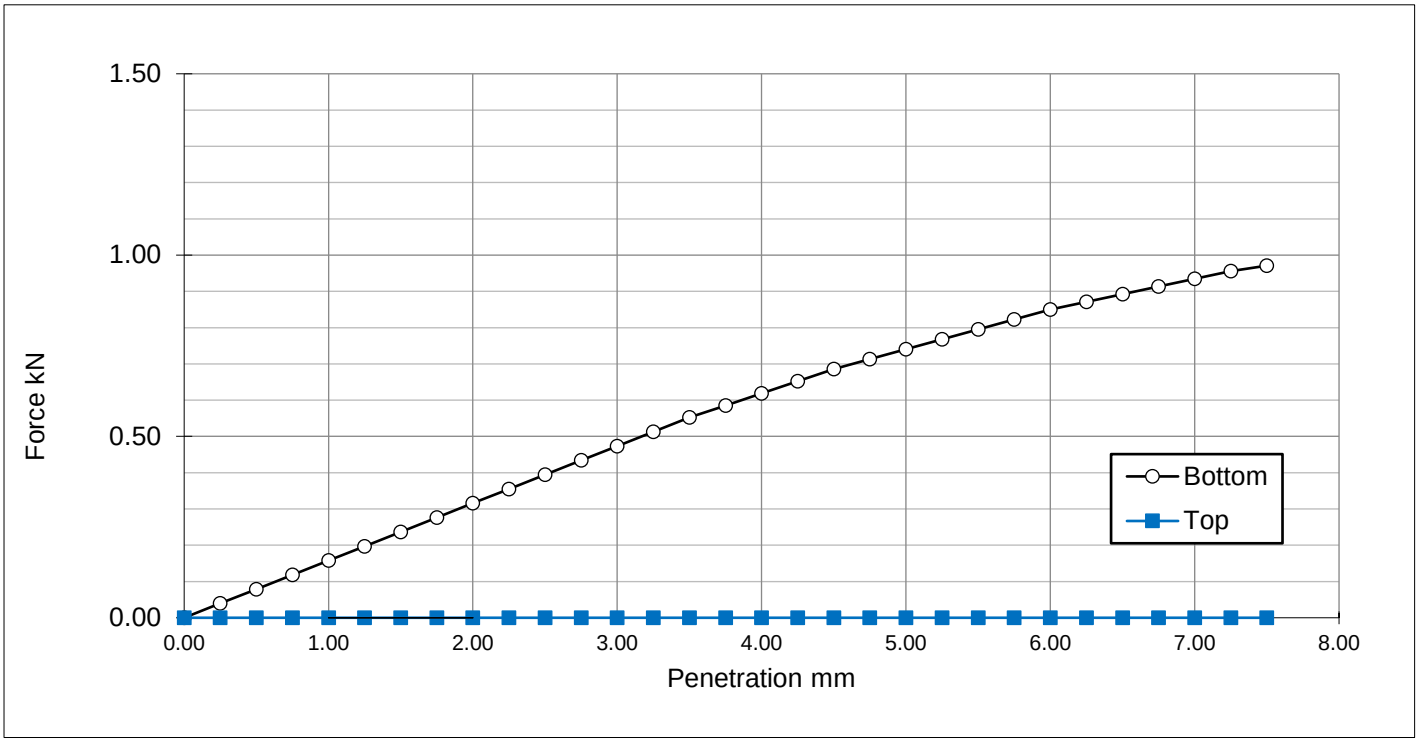
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/3

SAMPLE LABEL	TPA13-5	DATE SAMPLED	06-Jun-22
LAB SAMPLE No	113049	DATE RECEIVED	09-Jun-22
DATE TESTED	28-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	1.57 Mg/m3	MOISTURE CONTENT	20 %	DRY DENSITY	1.31 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.7	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	20	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 14-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/4
Date of Issue 15 July 2022
Page 1 of 43

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

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M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

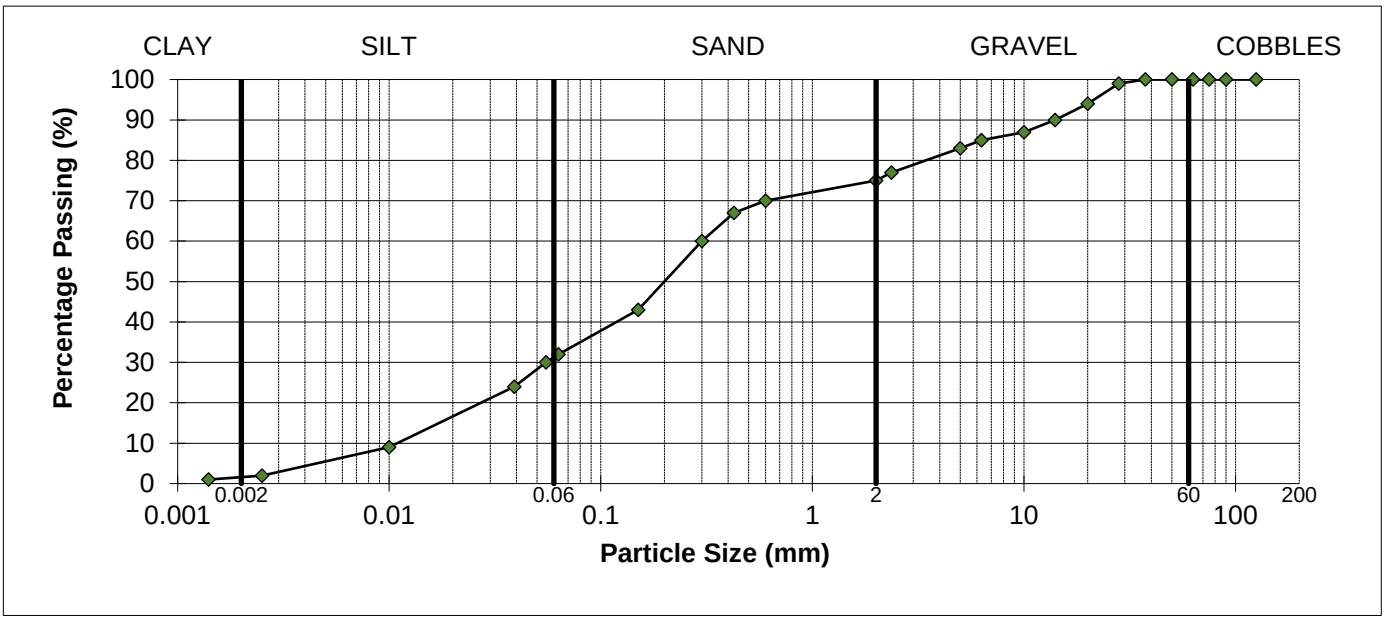
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	112903	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	77	
90	100		2	75	
75	100		0.6	70	
63	100		0.425	67	
50	100		0.3	60	
37.5	100		0.15	43	
28	99		0.063	32	
20	94		0.055	30	
14	90		0.039	24	
10	87		0.01	9	
6.3	85		0.0025	2	
5	83		0.0014	1	



REMARKS
As received moisture content = 14%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

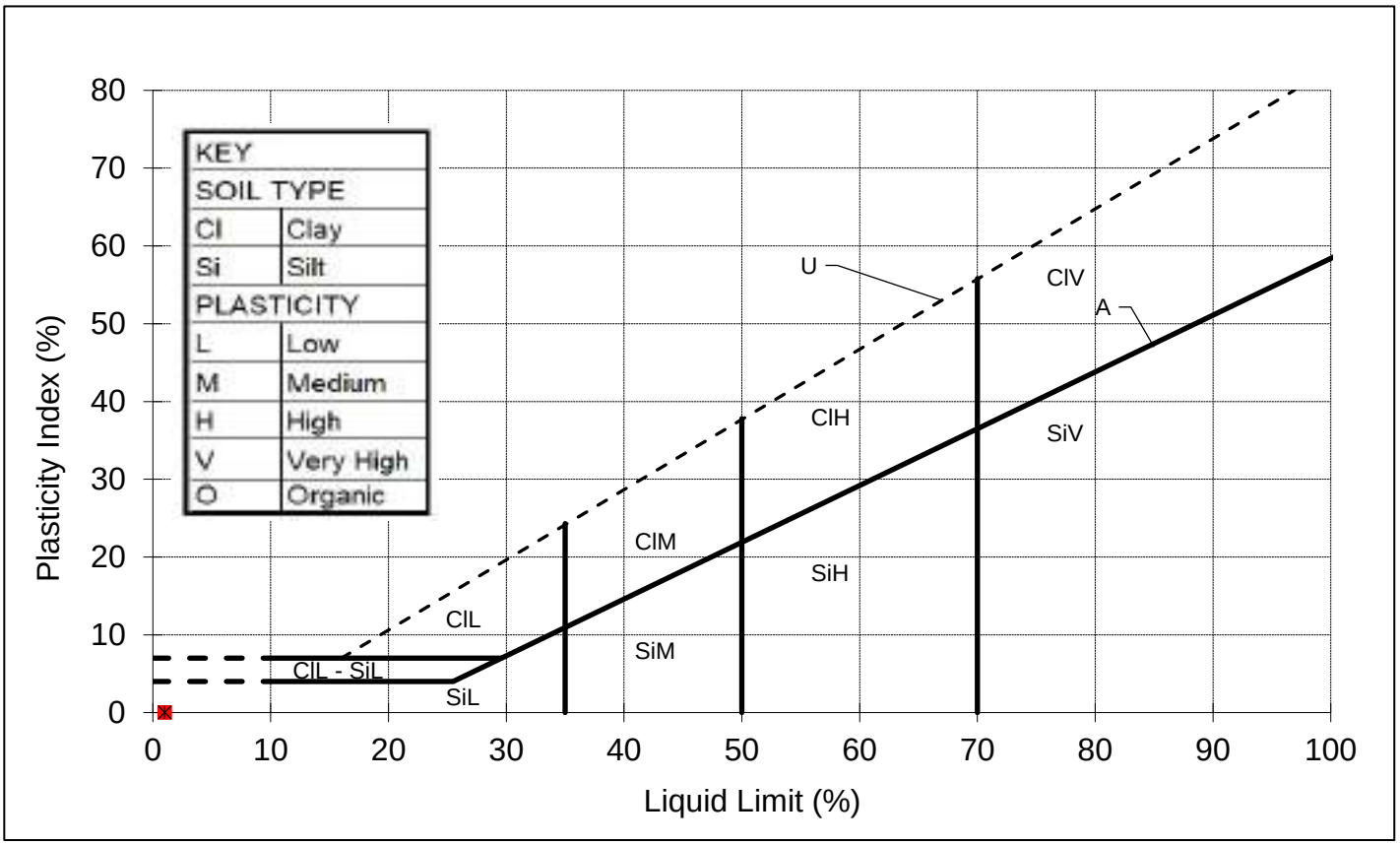
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-1	DATE SAMPLED	31-May-22
SAMPLE No.	112903	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

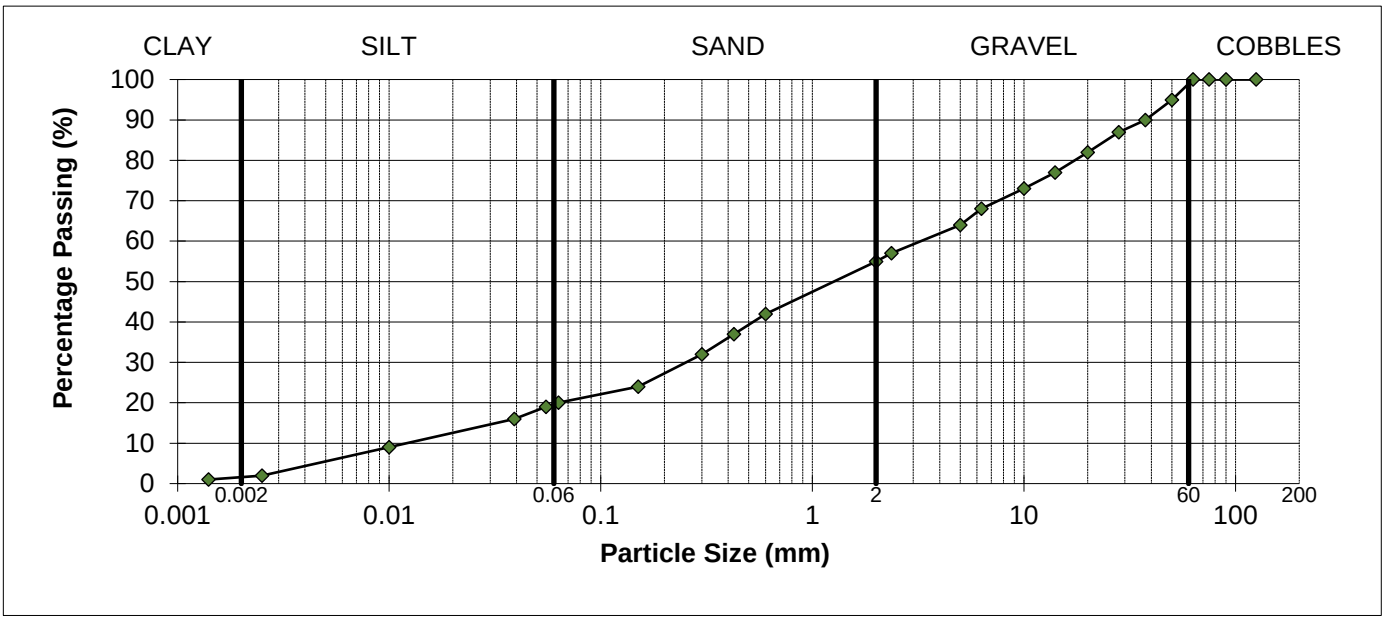
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	112904	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	57	
90	100		2	55	
75	100		0.6	42	
63	100		0.425	37	
50	95		0.3	32	
37.5	90		0.15	24	
28	87		0.063	20	
20	82		0.055	19	
14	77		0.039	16	
10	73		0.01	9	
6.3	68		0.0025	2	
5	64		0.0014	1	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

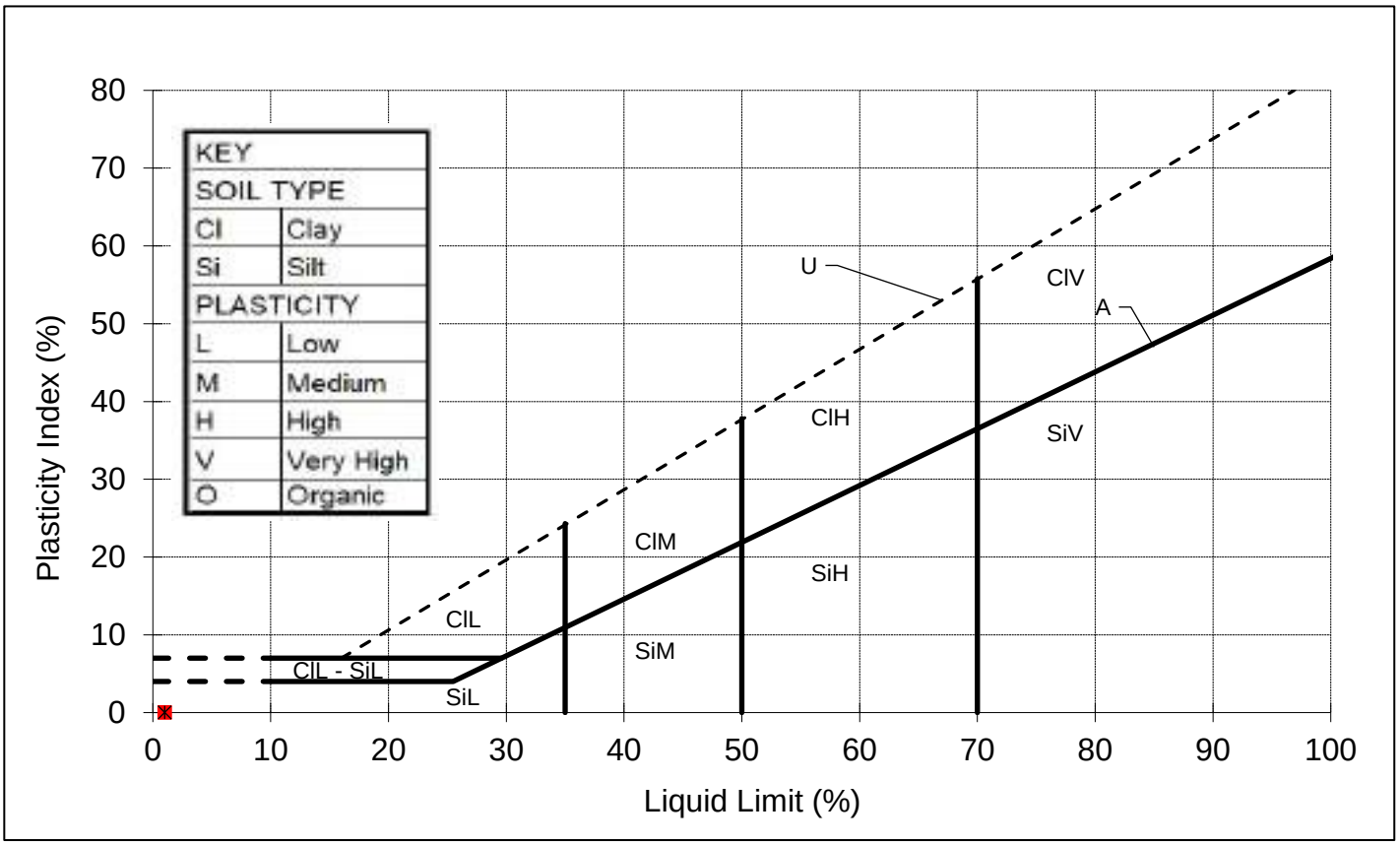
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-2	DATE SAMPLED	31-May-22
SAMPLE No.	112904	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	37



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

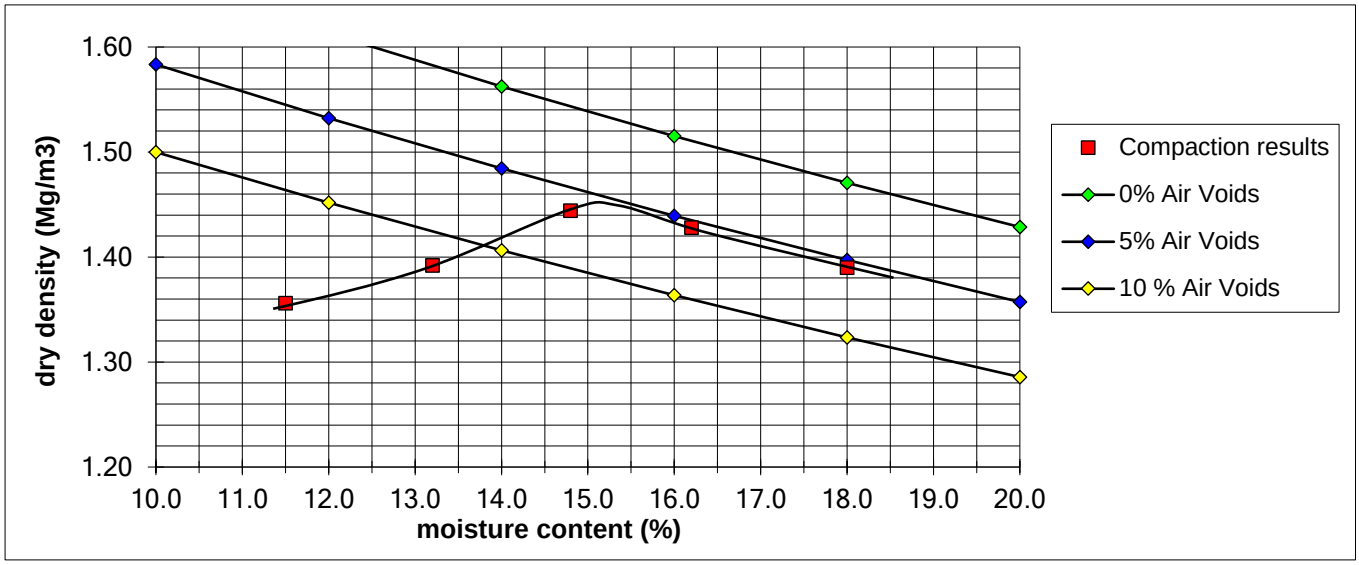
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	112904	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.5	1.356
2		13.2	1.392
3		14.8	1.444
4		16.2	1.428
5		18.0	1.390
	Optimum	15.0	
	Maximum		1.45
	Particle Density	2.00 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 10%
Percentage of material retained on 20mm sieve = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

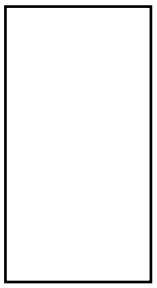
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	112904	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	18	%
BULK DENSITY	1.62	Mg/m3
DRY DENSITY	1.38	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

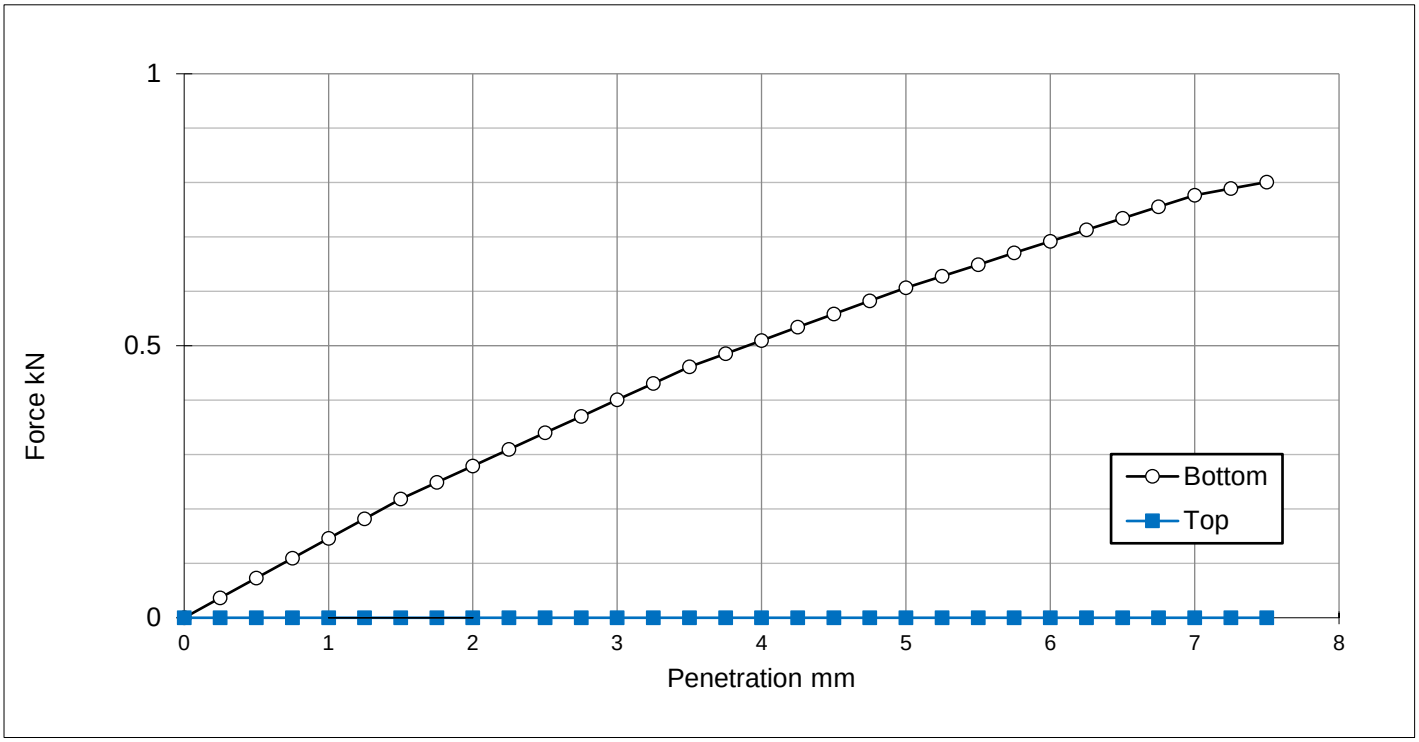
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	112904	DATE RECEIVED	06-Jun-22
DATE TESTED	21-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		18 %			
BULK DENSITY	1.62 Mg/m3	MOISTURE CONTENT	18 %	DRY DENSITY	1.37 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.0	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	18	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

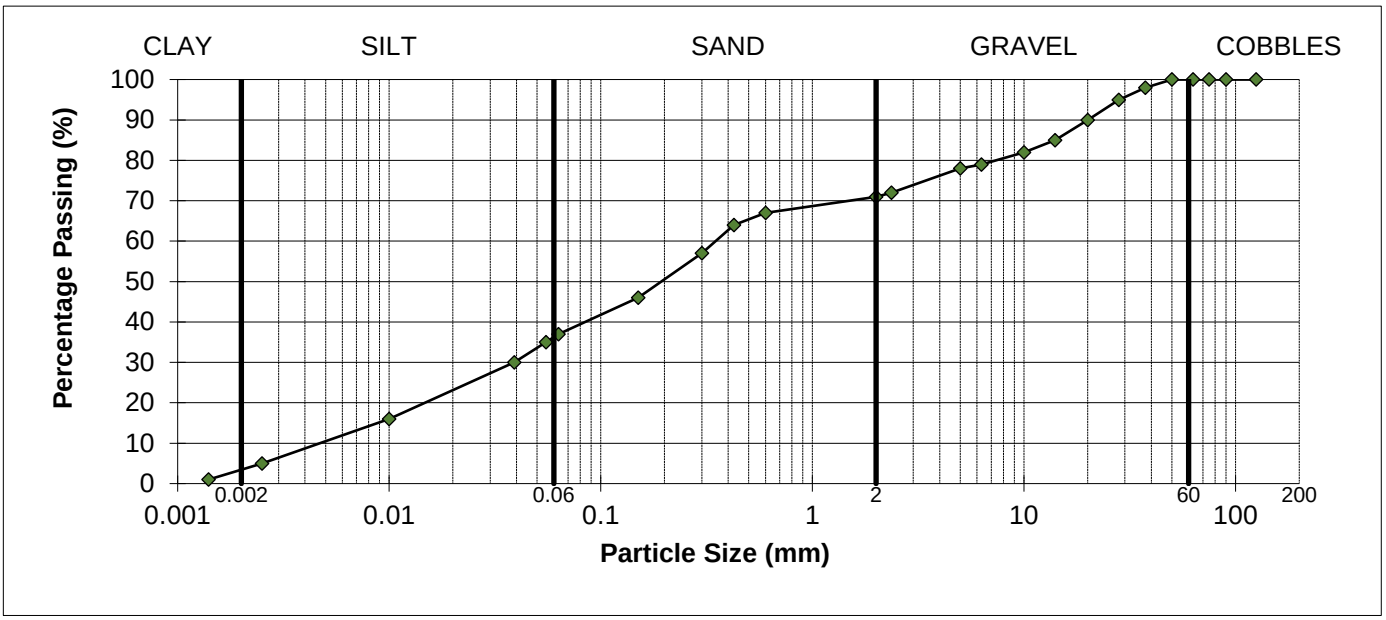
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-3	DATE SAMPLED	31-May-22
LAB SAMPLE No	112905	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	71	
75	100		0.6	67	
63	100		0.425	64	
50	100		0.3	57	
37.5	98		0.15	46	
28	95		0.063	37	
20	90		0.055	35	
14	85		0.039	30	
10	82		0.01	16	
6.3	79		0.0025	5	
5	78		0.0014	1	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

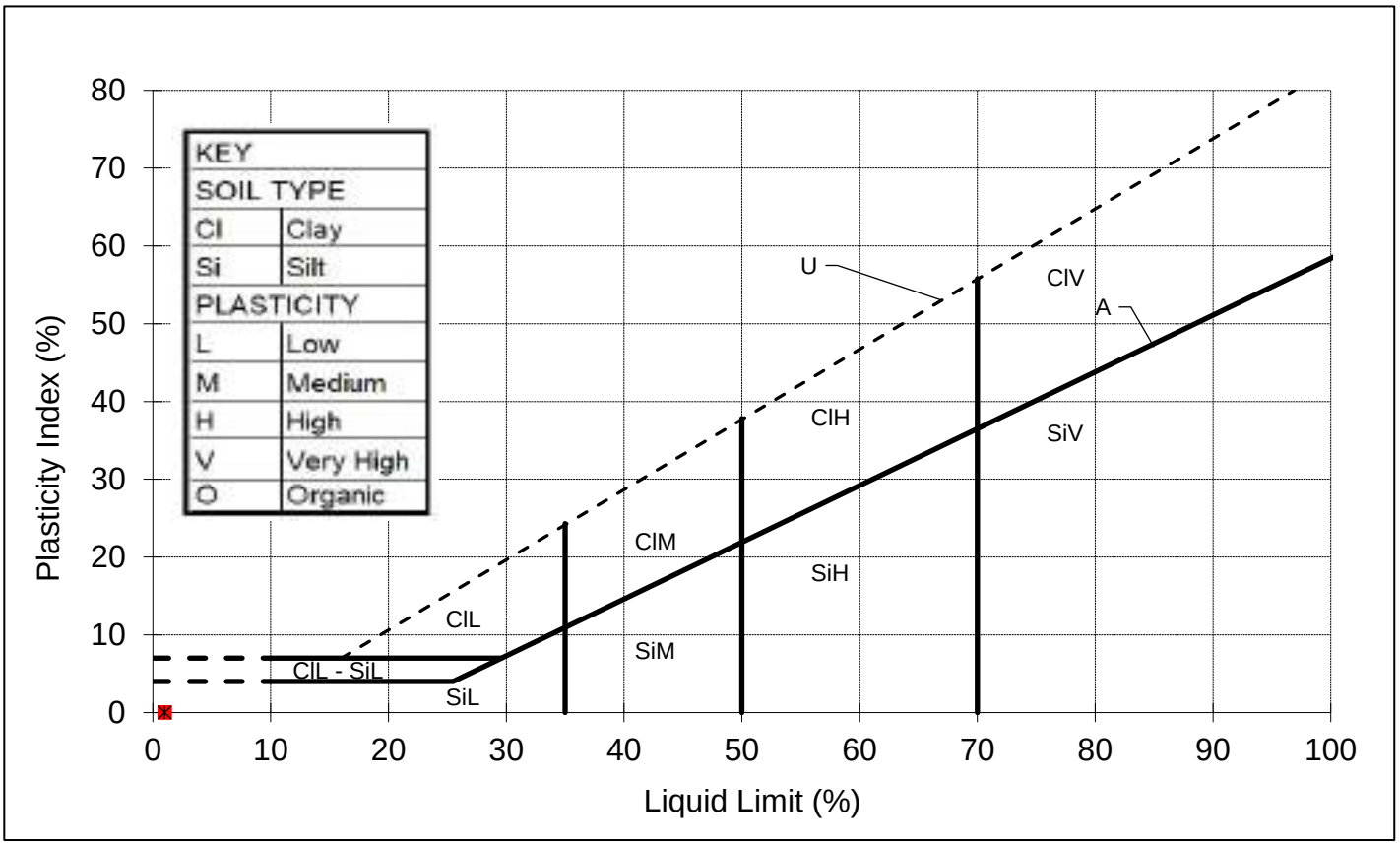
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-3	DATE SAMPLED	31-May-22
SAMPLE No.	112905	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	64



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

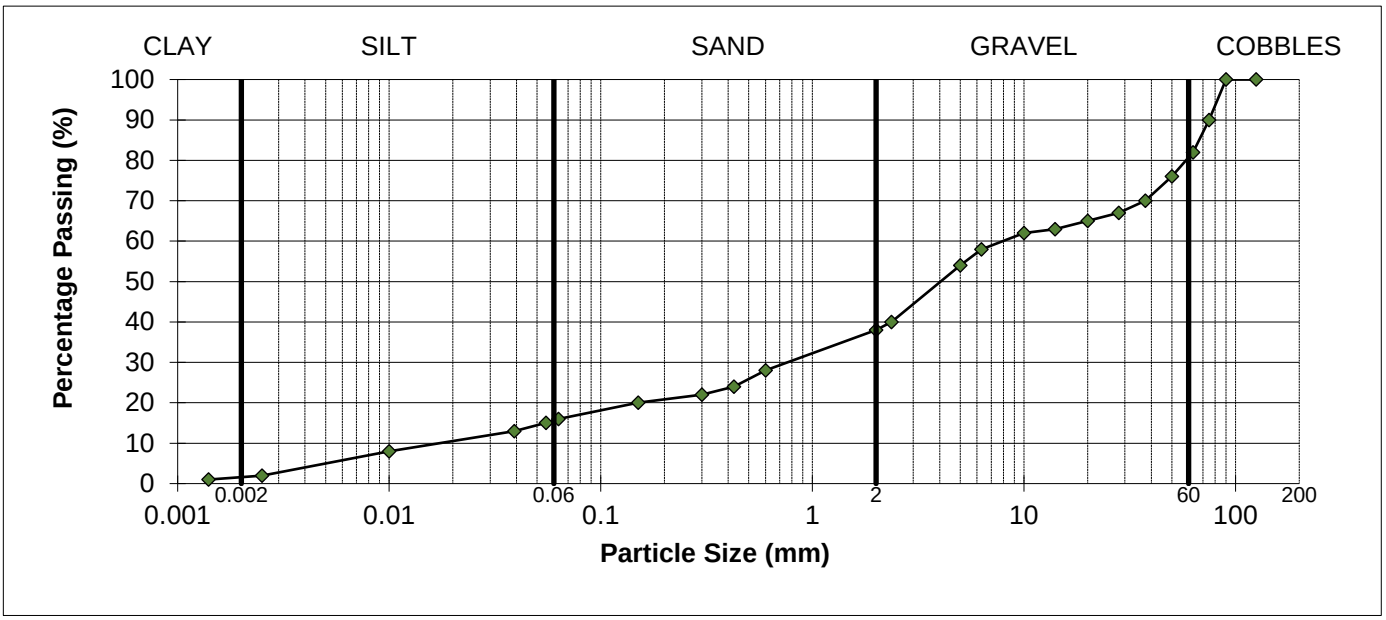
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-4	DATE SAMPLED	31-May-22
LAB SAMPLE No	112906	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	40	
90	100		2	38	
75	90		0.6	28	
63	82		0.425	24	
50	76		0.3	22	
37.5	70		0.15	20	
28	67		0.063	16	
20	65		0.055	15	
14	63		0.039	13	
10	62		0.01	8	
6.3	58		0.0025	2	
5	54		0.0014	1	



REMARKS
As received moisture content = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

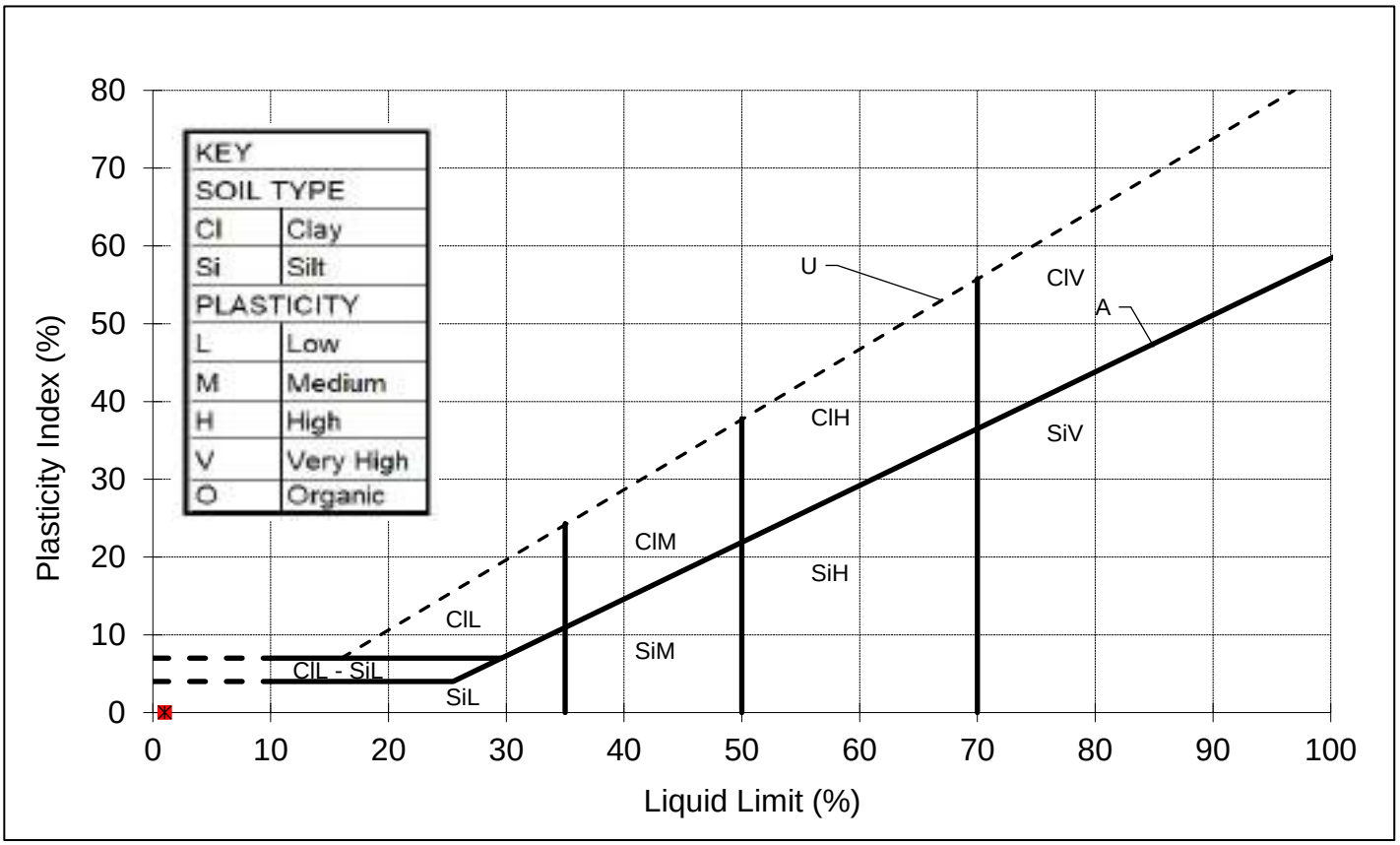
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB13-4	DATE SAMPLED	31-May-22
SAMPLE No.	112906	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12	N/A	Non Plastic	N/A	24



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

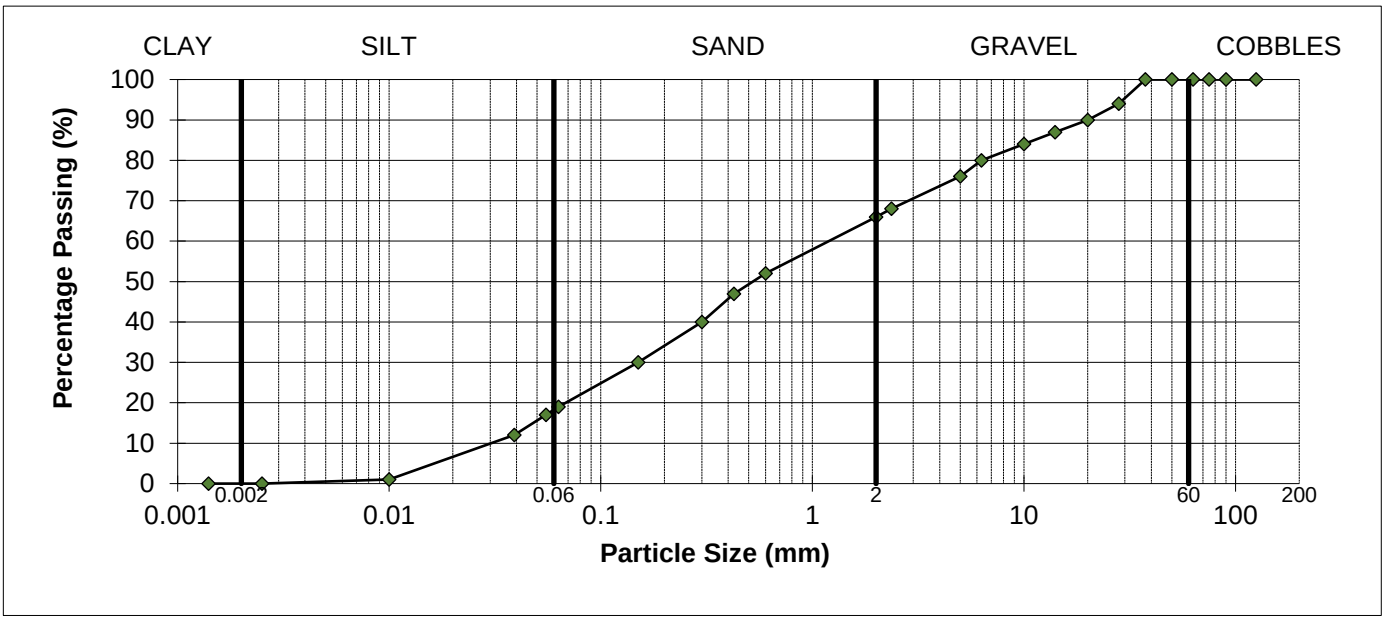
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	113029	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	68	
90	100		2	66	
75	100		0.6	52	
63	100		0.425	47	
50	100		0.3	40	
37.5	100		0.15	30	
28	94		0.063	19	
20	90		0.055	17	
14	87		0.039	12	
10	84		0.01	1	
6.3	80		0.0025	0	
5	76		0.0014	0	



REMARKS
As received moisture content = 19%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

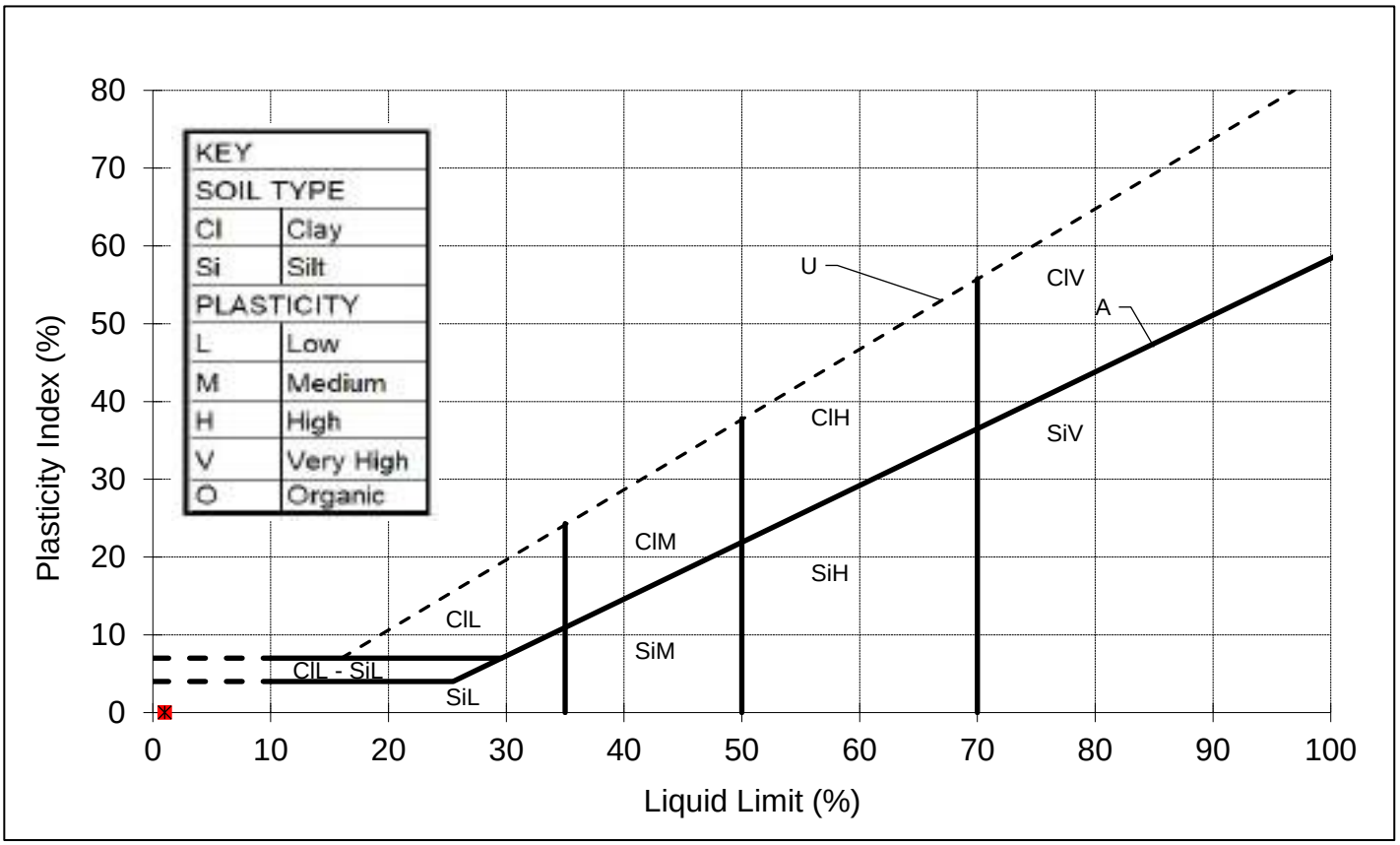
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-1	DATE SAMPLED	31-May-22
SAMPLE No.	113029	DATE RECEIVED	08-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19	N/A	Non Plastic	N/A	47



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

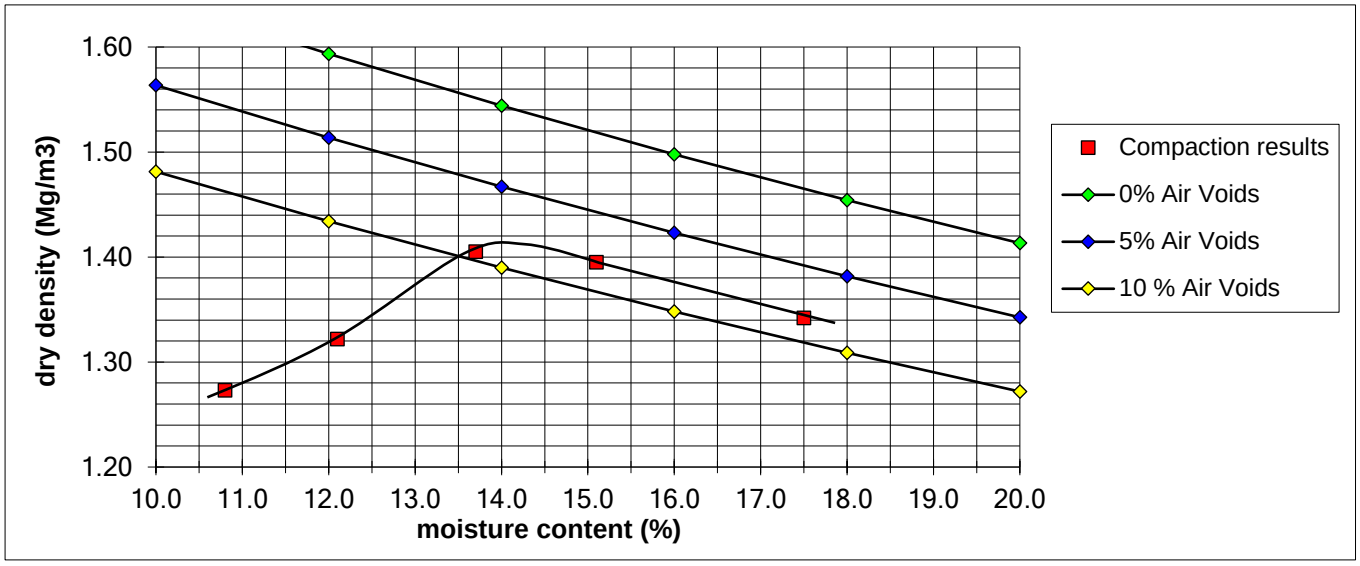
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	113029	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		10.8	1.273
2		12.1	1.322
3		13.7	1.405
4		15.1	1.395
5		17.5	1.342
	Optimum	14.0	
	Maximum		1.41
	Particle Density	1.97 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

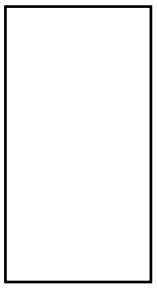
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	113029	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	19	%
BULK DENSITY	1.57	Mg/m3
DRY DENSITY	1.32	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

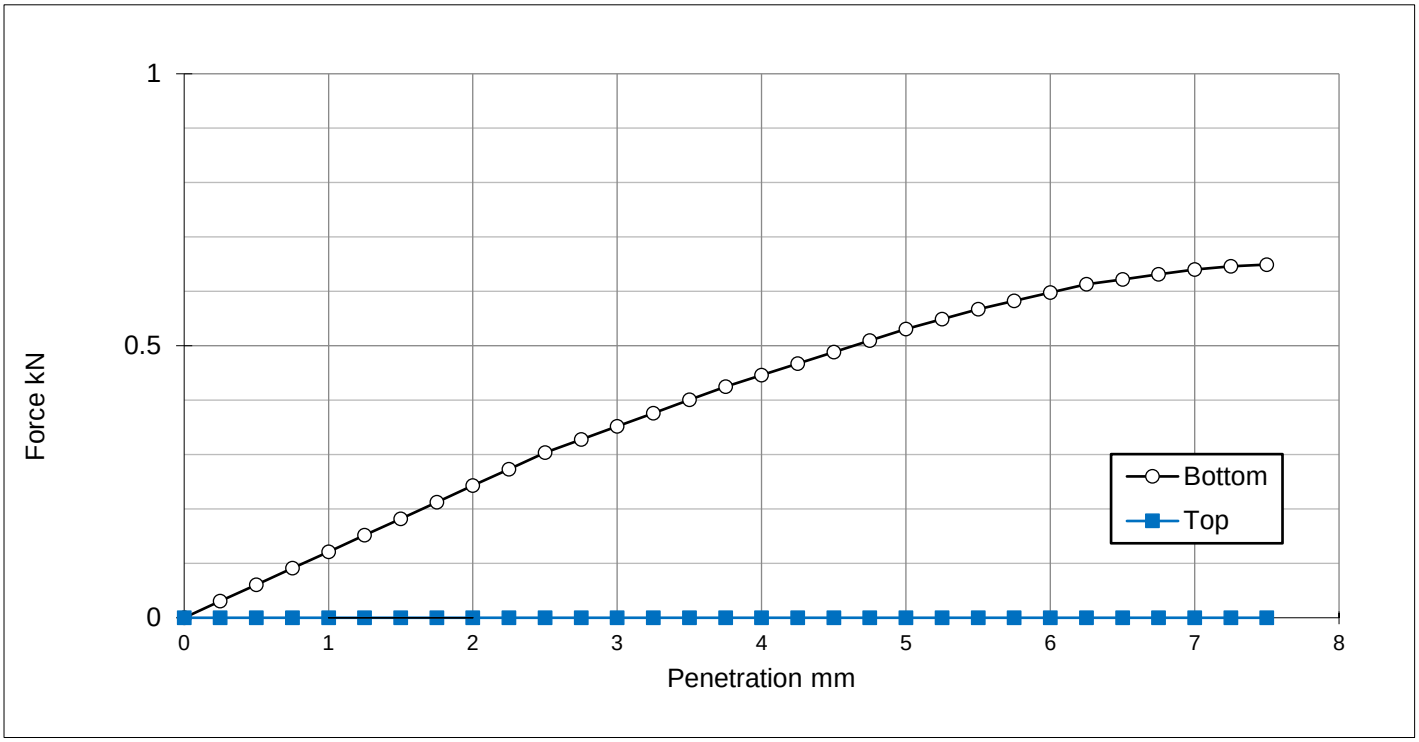
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	113029	DATE RECEIVED	08-Jun-22
DATE TESTED	21-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		18 %			
BULK DENSITY	1.57 Mg/m3	MOISTURE CONTENT	19 %	DRY DENSITY	1.32 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.7	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	19	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

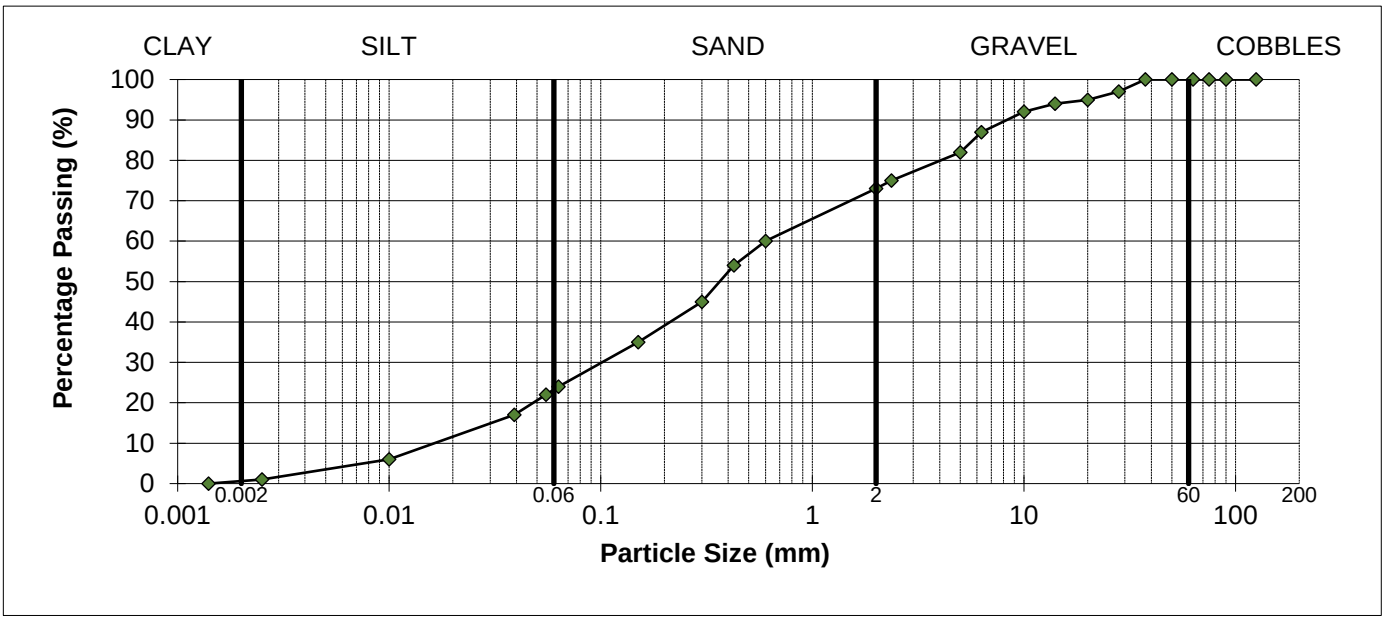
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	113030	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	75	
90	100		2	73	
75	100		0.6	60	
63	100		0.425	54	
50	100		0.3	45	
37.5	100		0.15	35	
28	97		0.063	24	
20	95		0.055	22	
14	94		0.039	17	
10	92		0.01	6	
6.3	87		0.0025	1	
5	82		0.0014	0	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

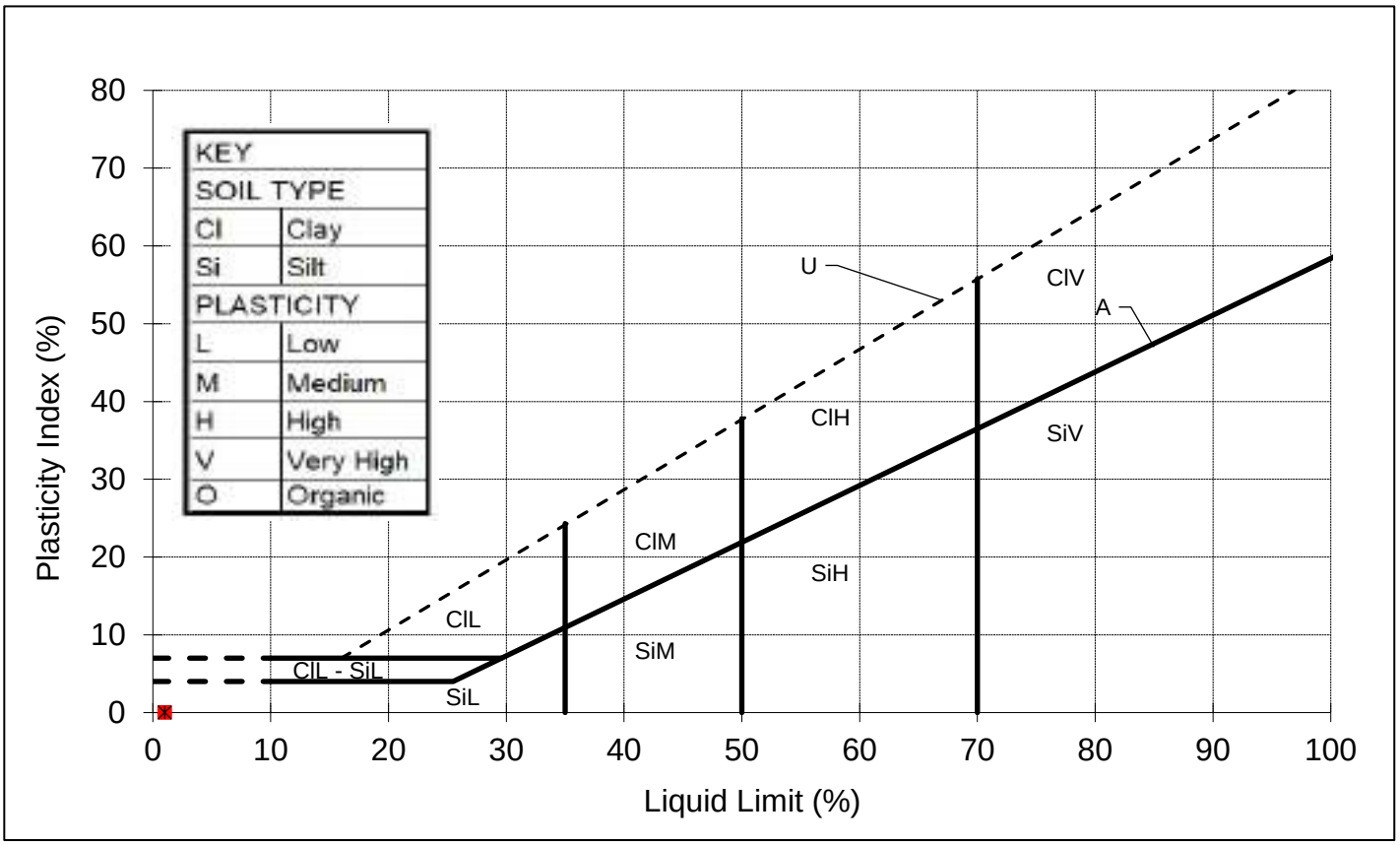
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-2	DATE SAMPLED	31-May-22
SAMPLE No.	113030	DATE RECEIVED	08-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	54



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

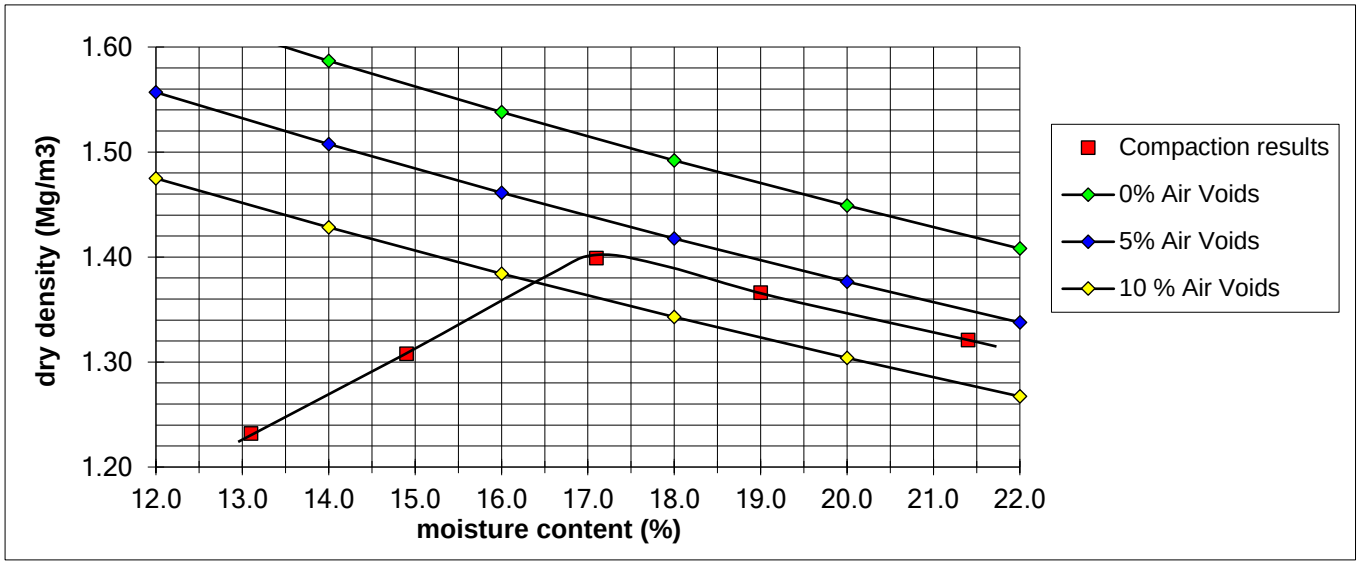
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	113030	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		13.1	1.232
2		14.9	1.308
3		17.1	1.399
4		19.0	1.366
5		21.4	1.321
	Optimum	17.0	
	Maximum		1.40
	Particle Density	2.04 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 5%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

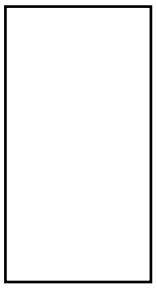
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	113030	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	18	%
BULK DENSITY	1.61	Mg/m3
DRY DENSITY	1.36	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

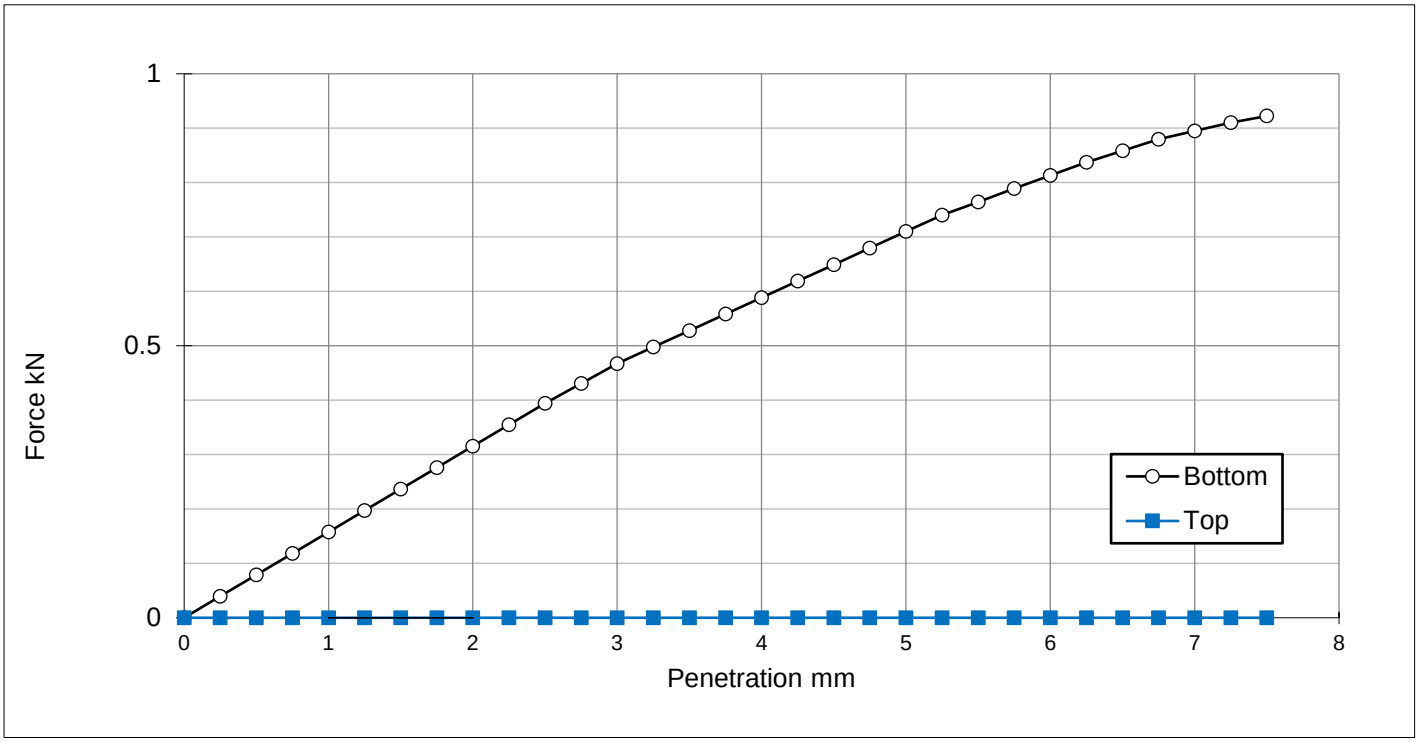
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	113030	DATE RECEIVED	08-Jun-22
DATE TESTED	21-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		5 %			
BULK DENSITY	1.61 Mg/m3	MOISTURE CONTENT	18 %	DRY DENSITY	1.36 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.5	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	18	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

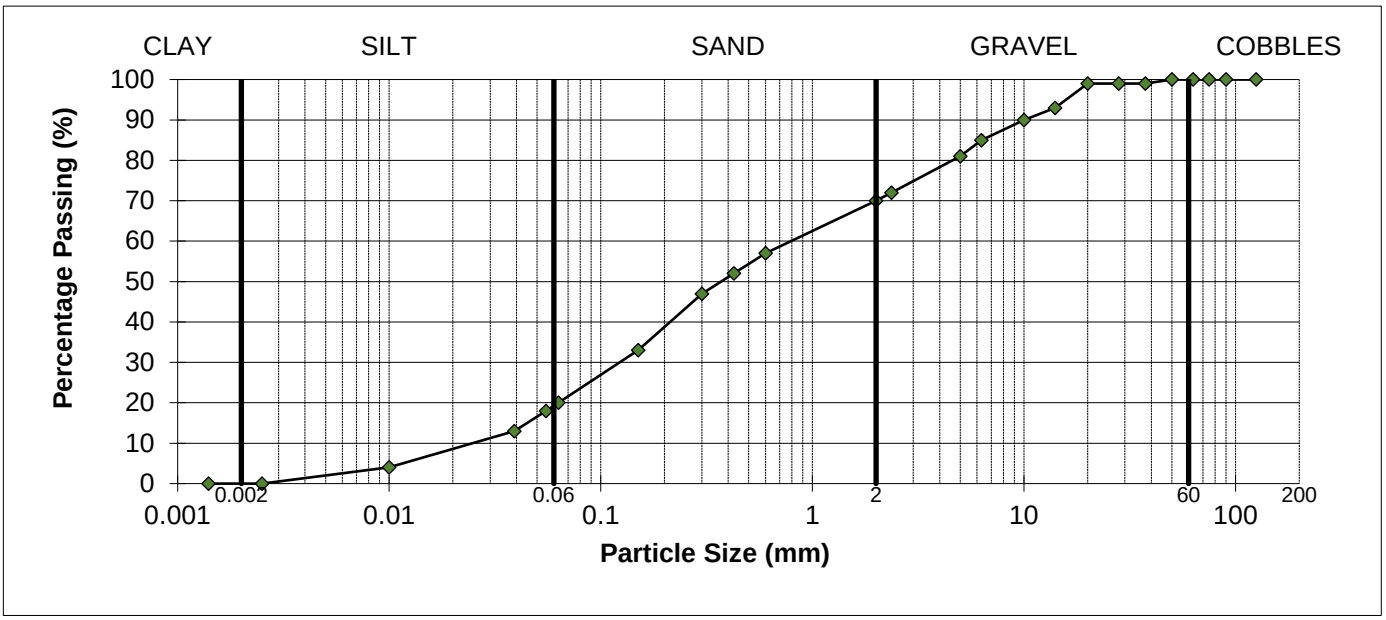
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-3	DATE SAMPLED	31-May-22
LAB SAMPLE No	113031	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	70	
75	100		0.6	57	
63	100		0.425	52	
50	100		0.3	47	
37.5	99		0.15	33	
28	99		0.063	20	
20	99		0.055	18	
14	93		0.039	13	
10	90		0.01	4	
6.3	85		0.0025	0	
5	81		0.0014	0	



REMARKS
As received moisture content = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

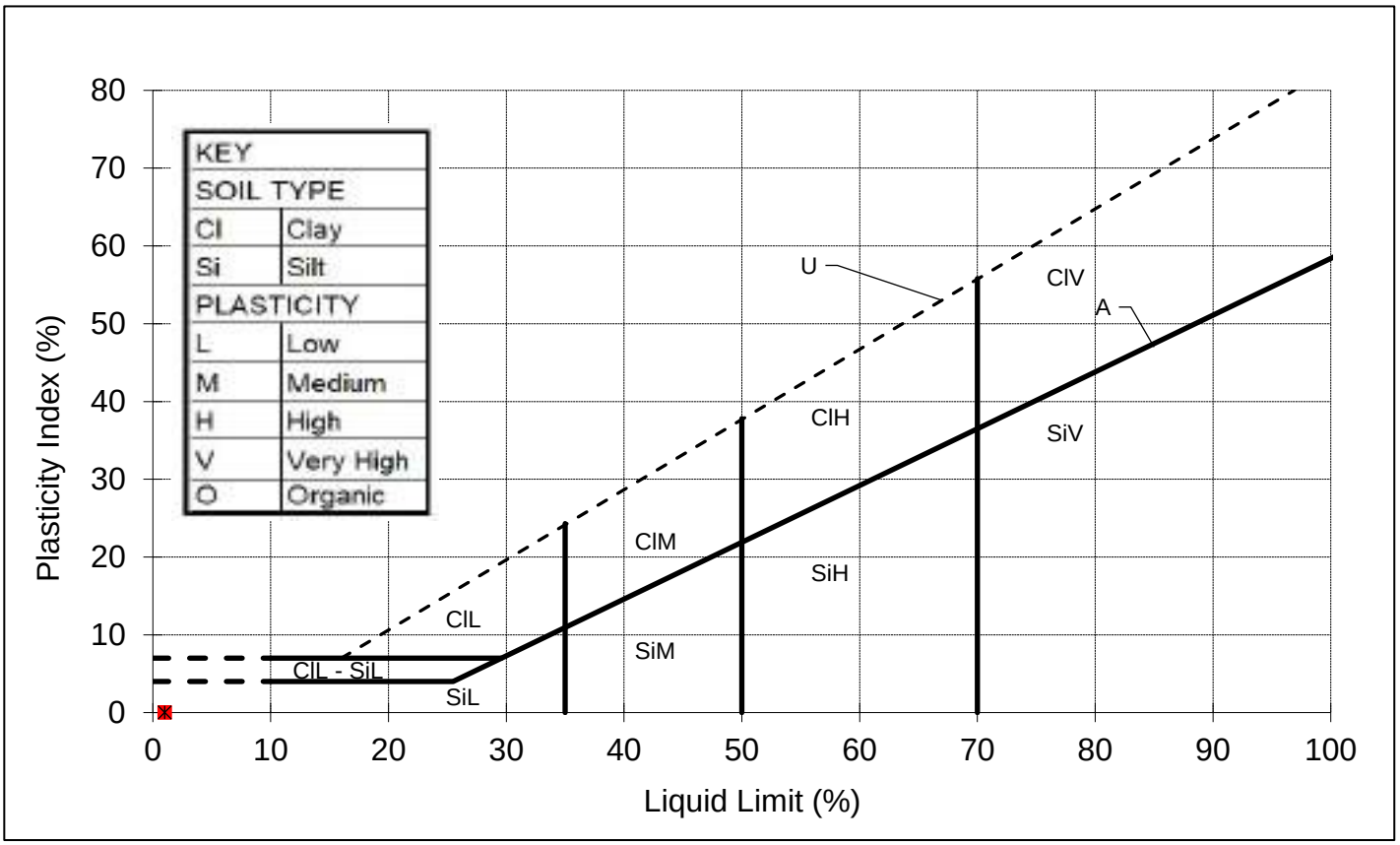
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-3	DATE SAMPLED	31-May-22
SAMPLE No.	113031	DATE RECEIVED	08-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16	N/A	Non Plastic	N/A	52



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

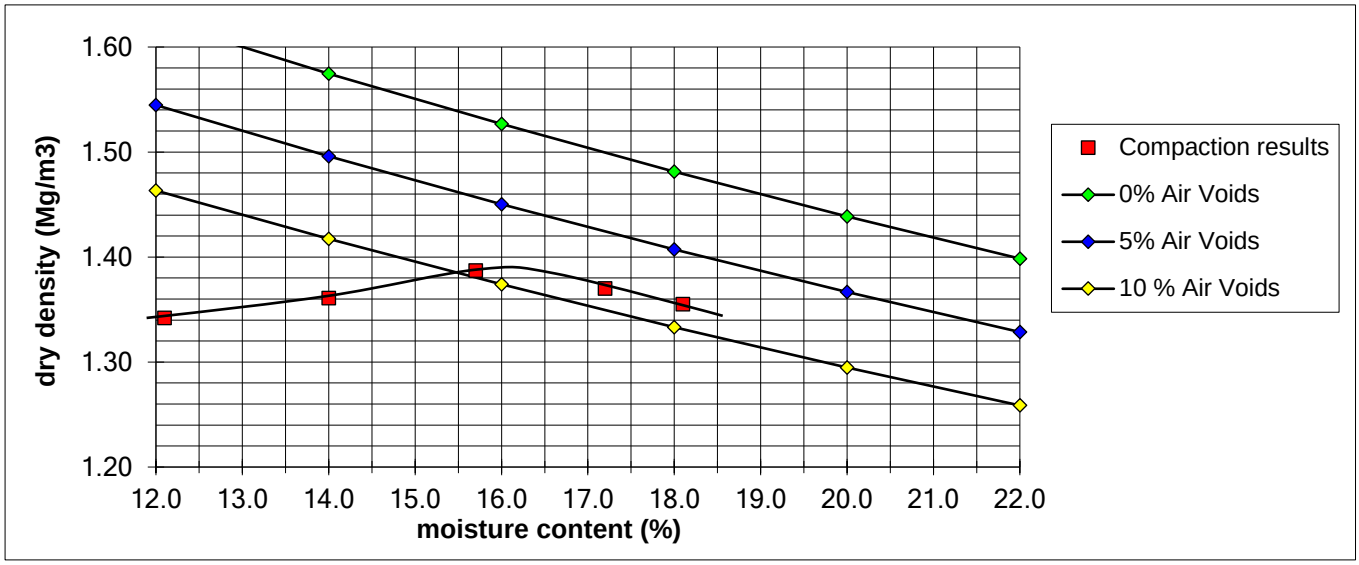
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-3	DATE SAMPLED	31-May-22
LAB SAMPLE No	113031	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		12.1	1.342
2		14.0	1.361
3		15.7	1.387
4		17.2	1.370
5		18.1	1.355
	Optimum	16.0	
	Maximum		1.39
	Particle Density	2.02 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 1%
Percentage of material retained on 20mm sieve = 1%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

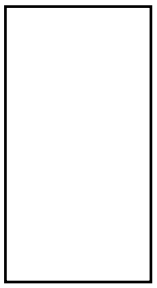
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-3	DATE SAMPLED	31-May-22
LAB SAMPLE No	113031	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	16	%
BULK DENSITY	1.59	Mg/m3
DRY DENSITY	1.37	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

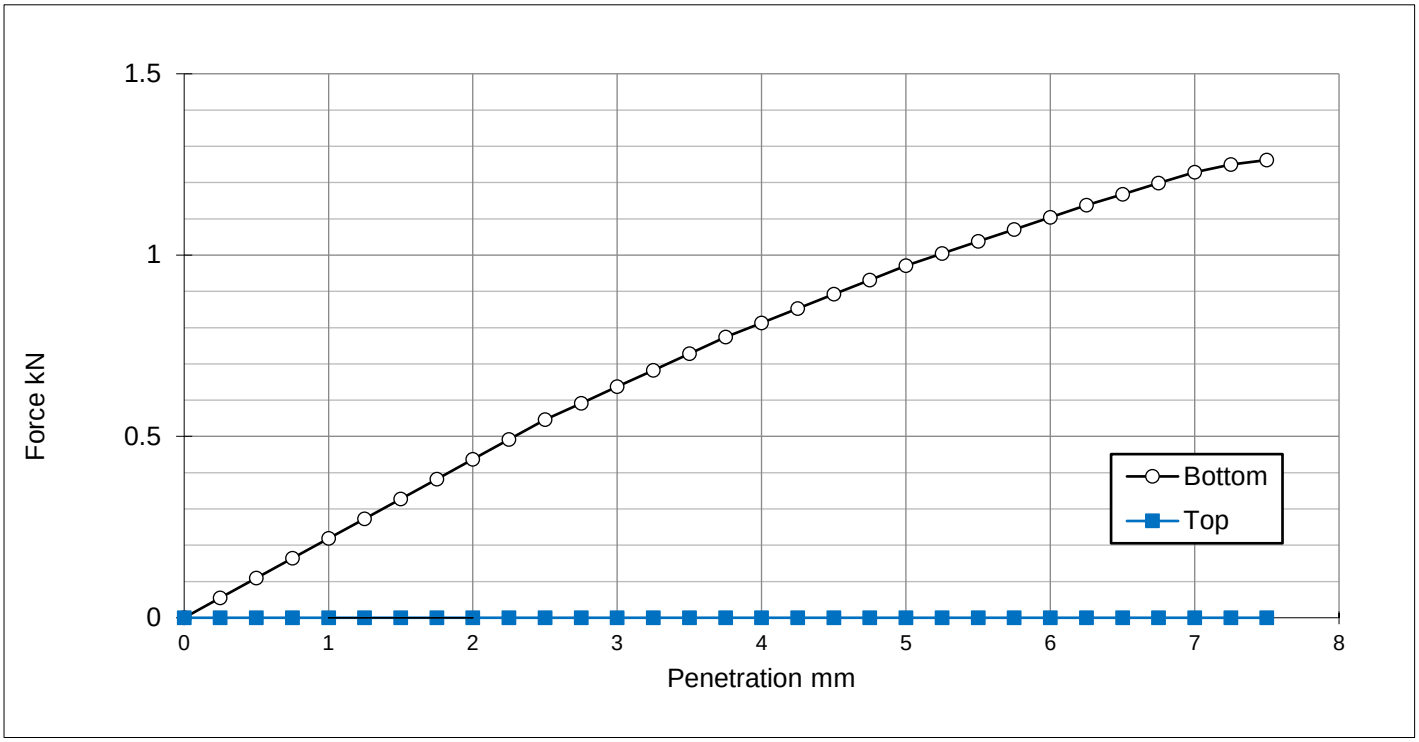
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-3	DATE SAMPLED	31-May-22
LAB SAMPLE No	113031	DATE RECEIVED	08-Jun-22
DATE TESTED	21-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		1 %			
BULK DENSITY	1.59 Mg/m3	MOISTURE CONTENT	16 %	DRY DENSITY	1.37 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	4.9	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	16	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

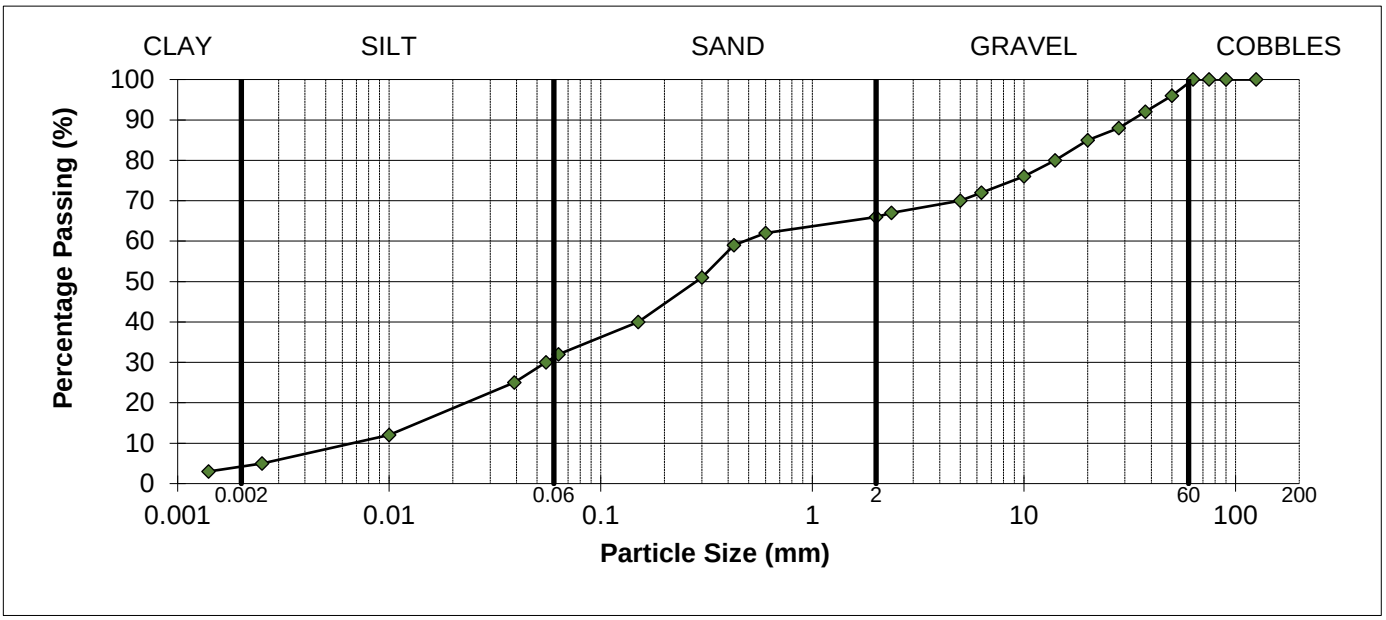
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-4	DATE SAMPLED	31-May-22
LAB SAMPLE No	113032	DATE RECEIVED	08-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	67	
90	100		2	66	
75	100		0.6	62	
63	100		0.425	59	
50	96		0.3	51	
37.5	92		0.15	40	
28	88		0.063	32	
20	85		0.055	30	
14	80		0.039	25	
10	76		0.01	12	
6.3	72		0.0025	5	
5	70		0.0014	3	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

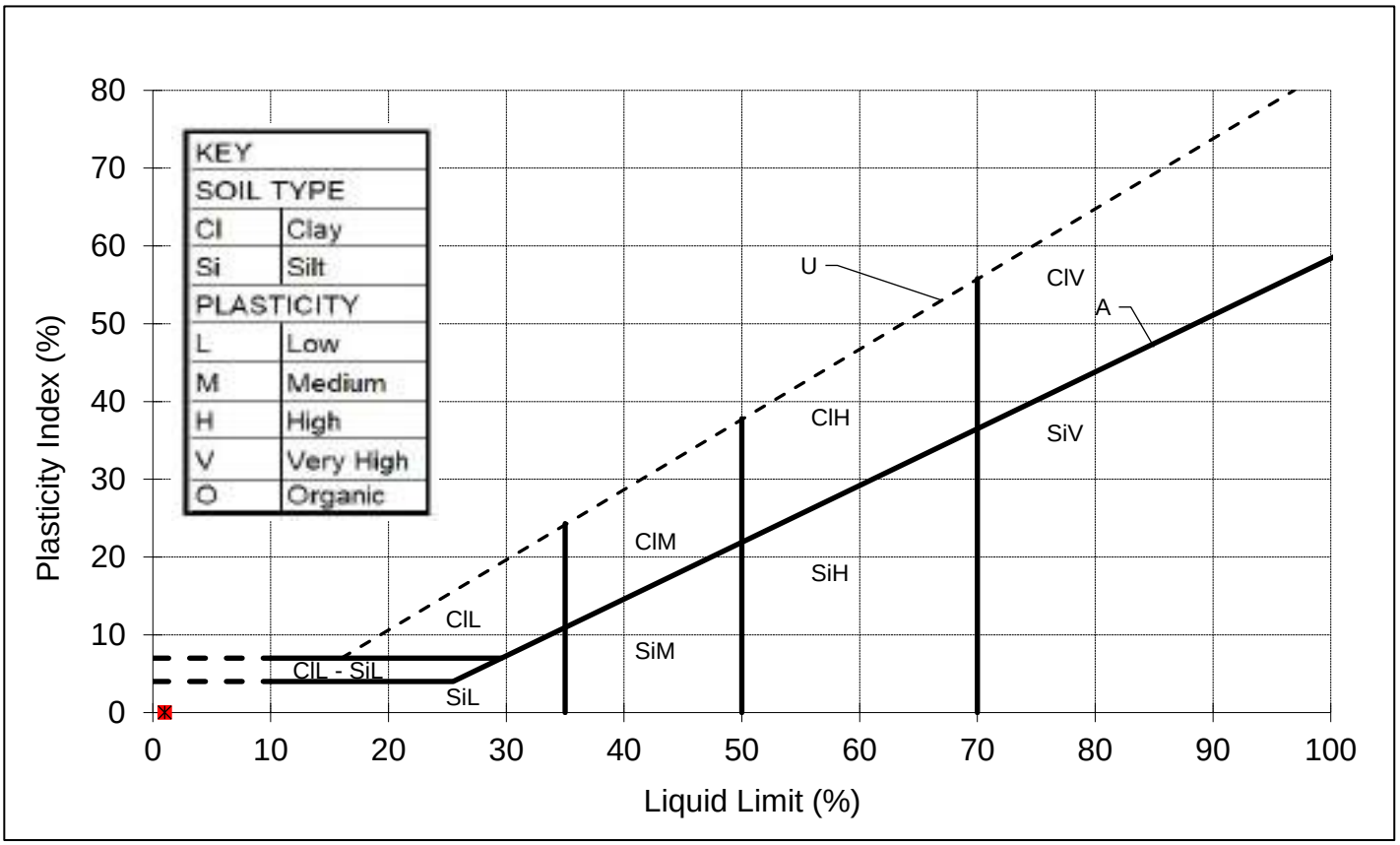
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB15-4	DATE SAMPLED	31-May-22
SAMPLE No.	113032	DATE RECEIVED	08-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	59



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

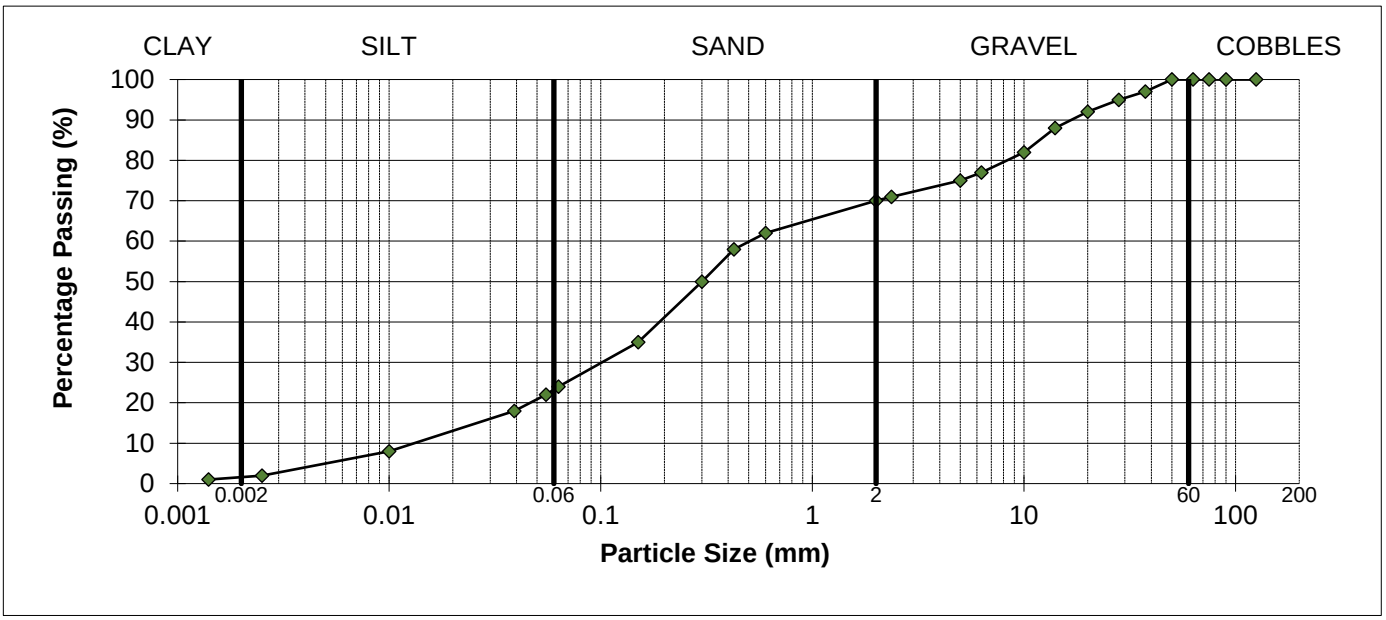
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	112907	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	71	
90	100		2	70	
75	100		0.6	62	
63	100		0.425	58	
50	100		0.3	50	
37.5	97		0.15	35	
28	95		0.063	24	
20	92		0.055	22	
14	88		0.039	18	
10	82		0.01	8	
6.3	77		0.0025	2	
5	75		0.0014	1	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

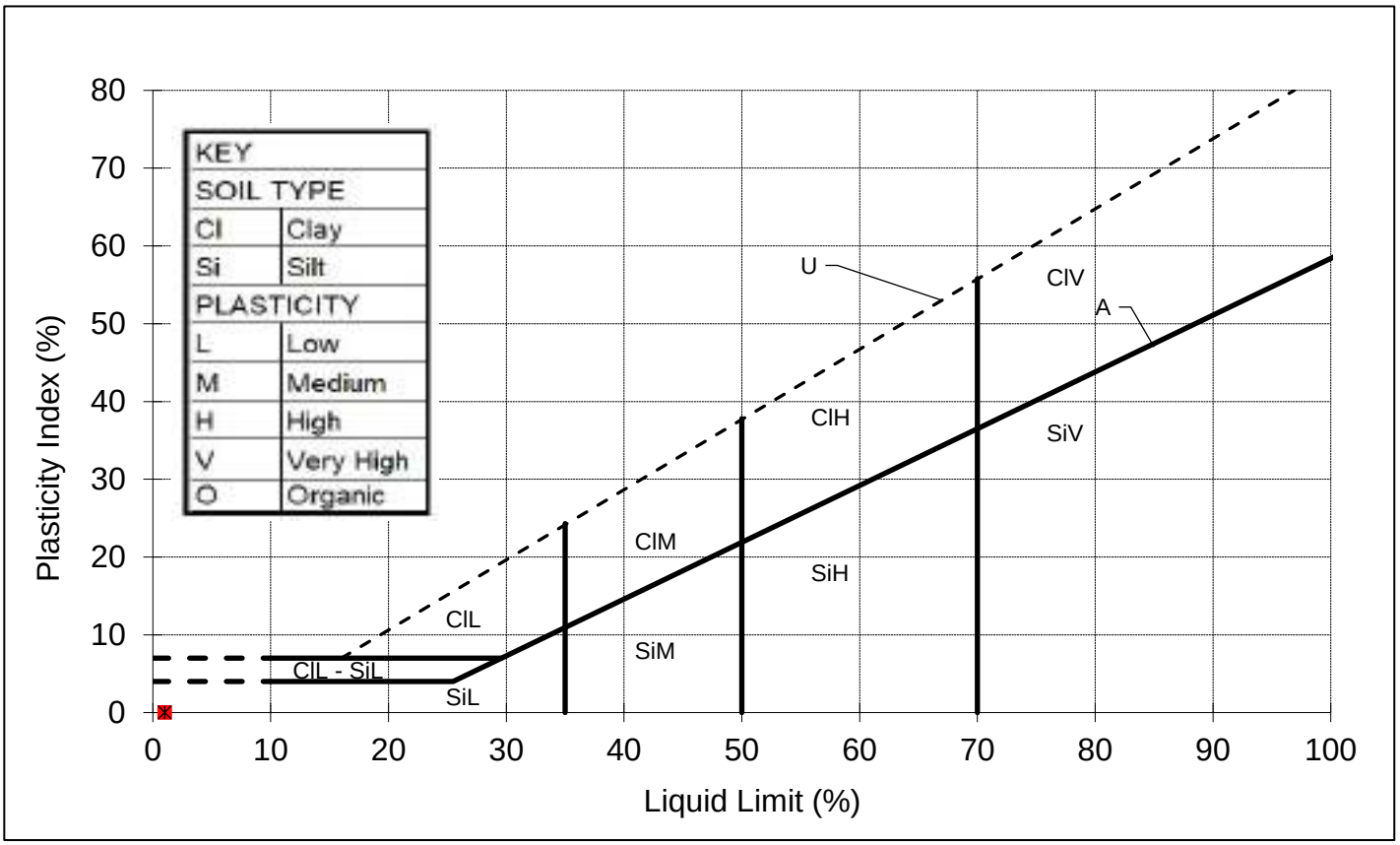
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-1	DATE SAMPLED	31-May-22
SAMPLE No.	112907	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	58



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

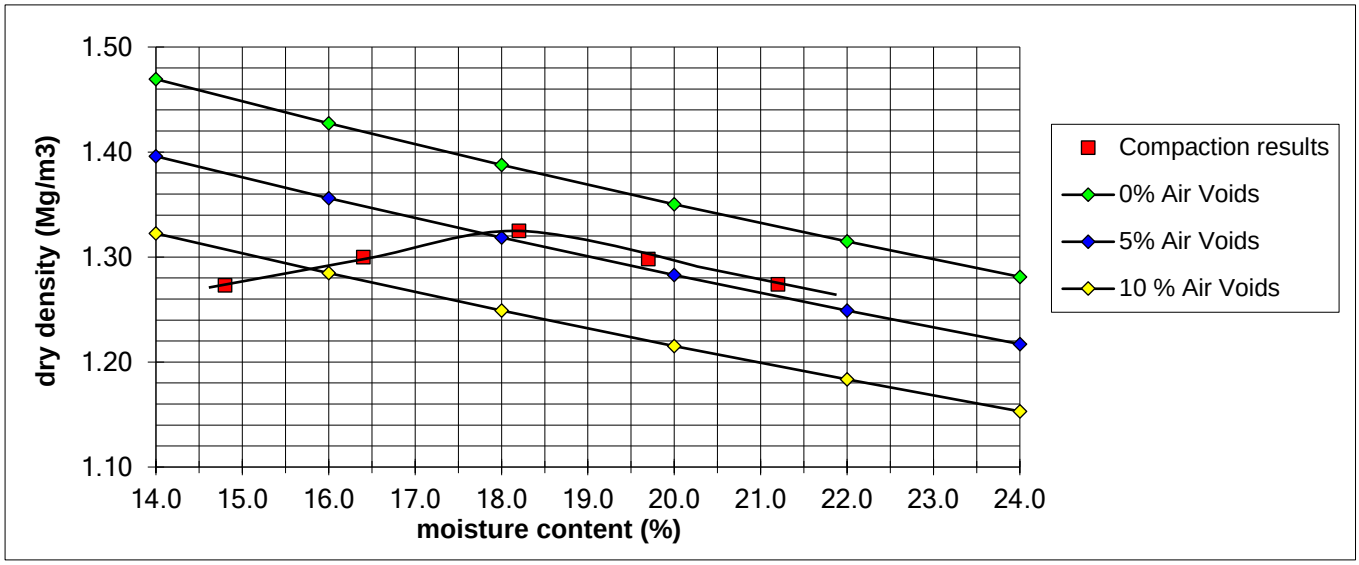
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	112907	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		14.8	1.273
2		16.4	1.300
3		18.2	1.325
4		19.7	1.298
5		21.2	1.274
	Optimum	18.0	
	Maximum		1.32
	Particle Density	1.85 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 3%
Percentage of material retained on 20mm sieve = 8%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

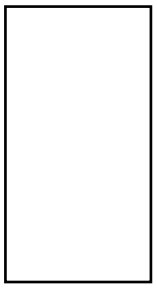
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	112907	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	19	%
BULK DENSITY	1.54	Mg/m3
DRY DENSITY	1.30	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

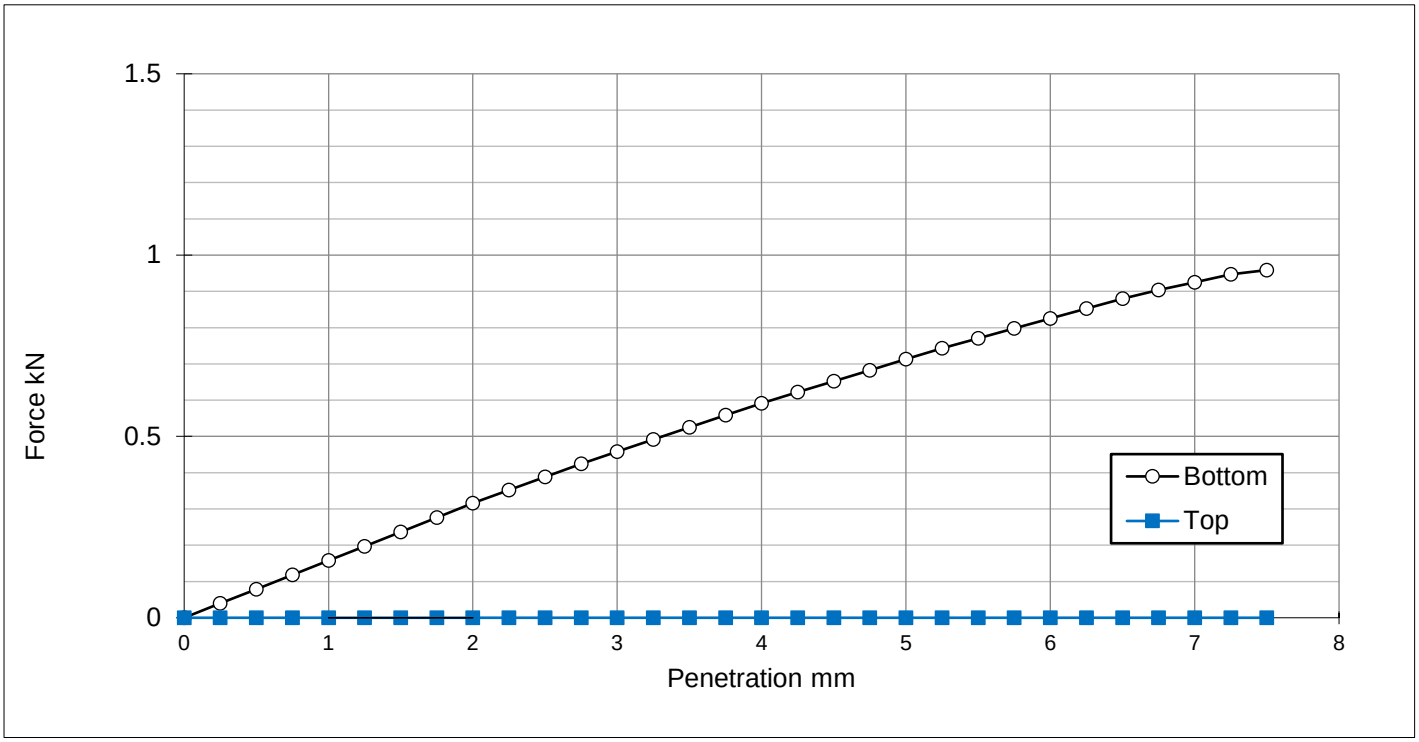
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-1	DATE SAMPLED	31-May-22
LAB SAMPLE No	112907	DATE RECEIVED	06-Jun-22
DATE TESTED	21-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		8 %			
BULK DENSITY	1.54 Mg/m3	MOISTURE CONTENT	19 %	DRY DENSITY	1.29 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	19	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

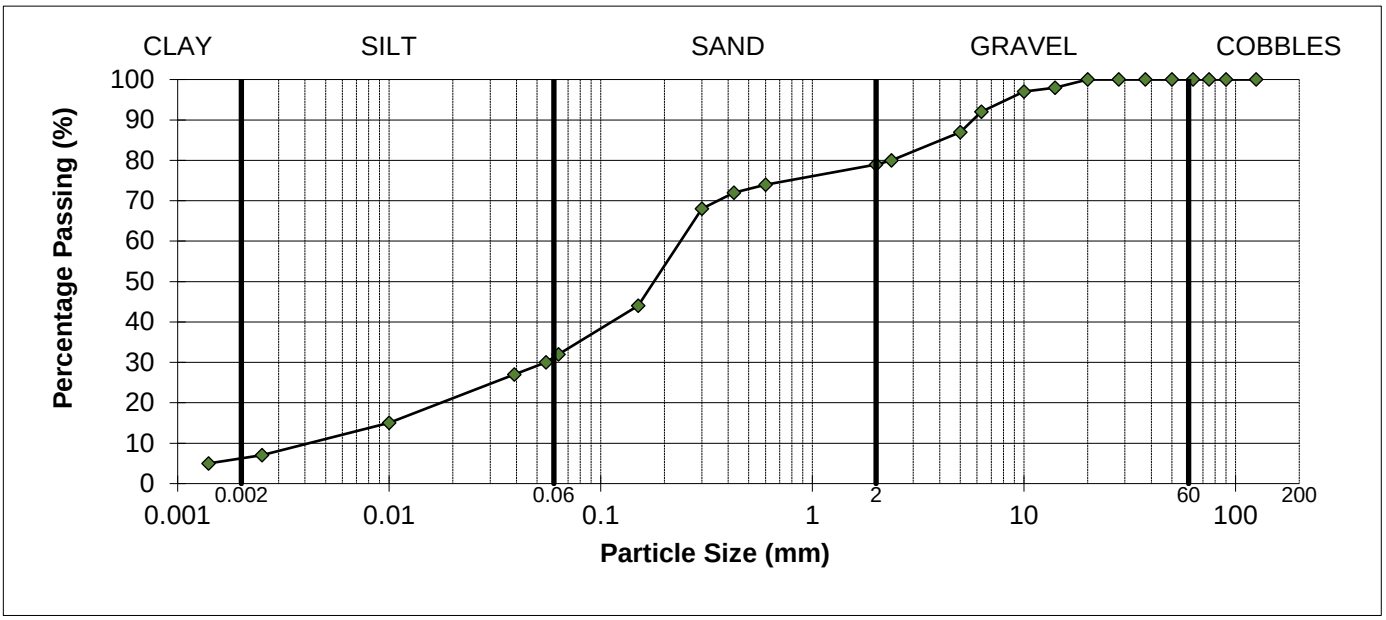
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-2	DATE SAMPLED	31-May-22
LAB SAMPLE No	112908	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	80	
90	100		2	79	
75	100		0.6	74	
63	100		0.425	72	
50	100		0.3	68	
37.5	100		0.15	44	
28	100		0.063	32	
20	100		0.055	30	
14	98		0.039	27	
10	97		0.01	15	
6.3	92		0.0025	7	
5	87		0.0014	5	



REMARKS
As received moisture content = 24%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

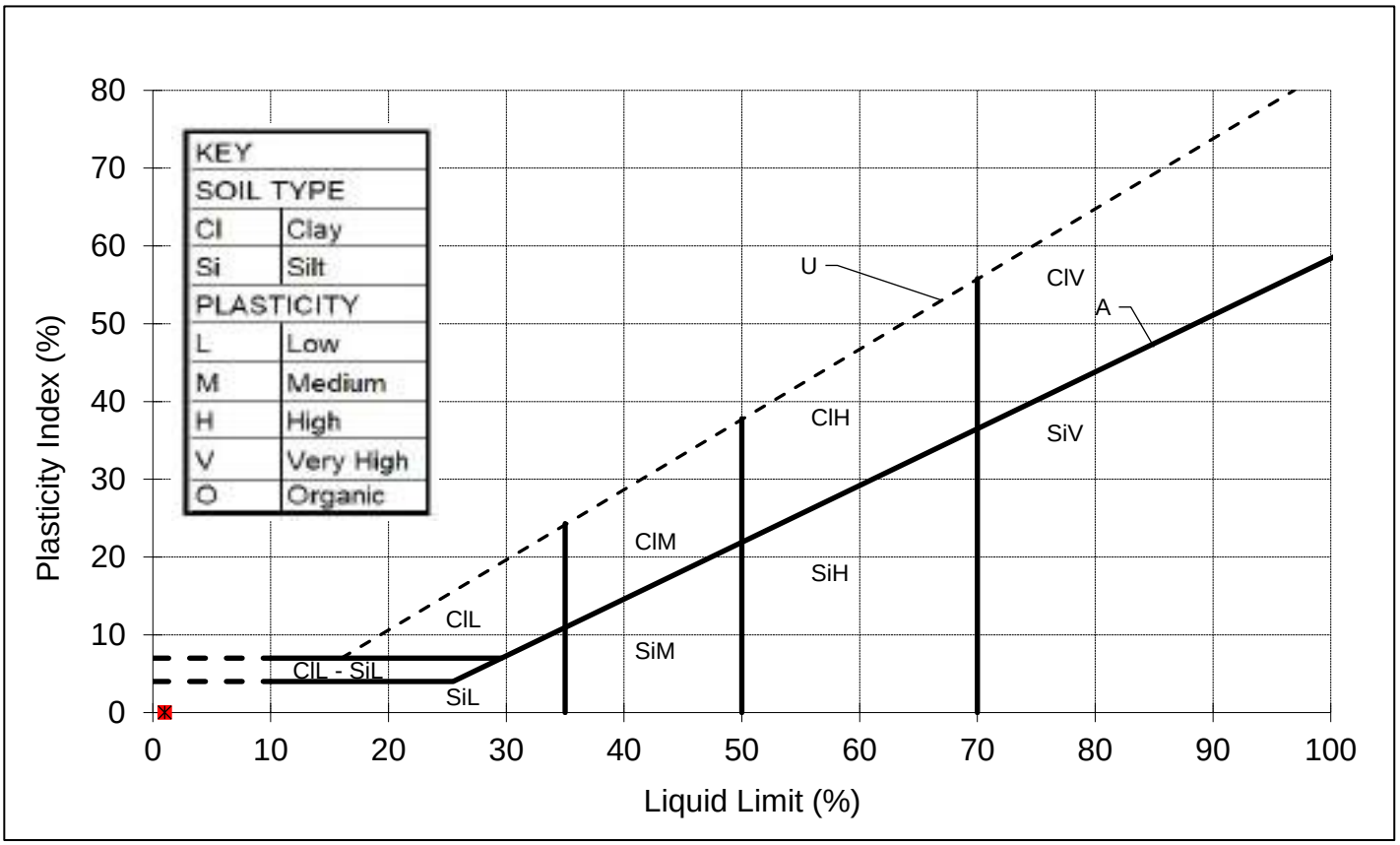
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-2	DATE SAMPLED	31-May-22
SAMPLE No.	112908	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24	N/A	Non Plastic	N/A	72



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

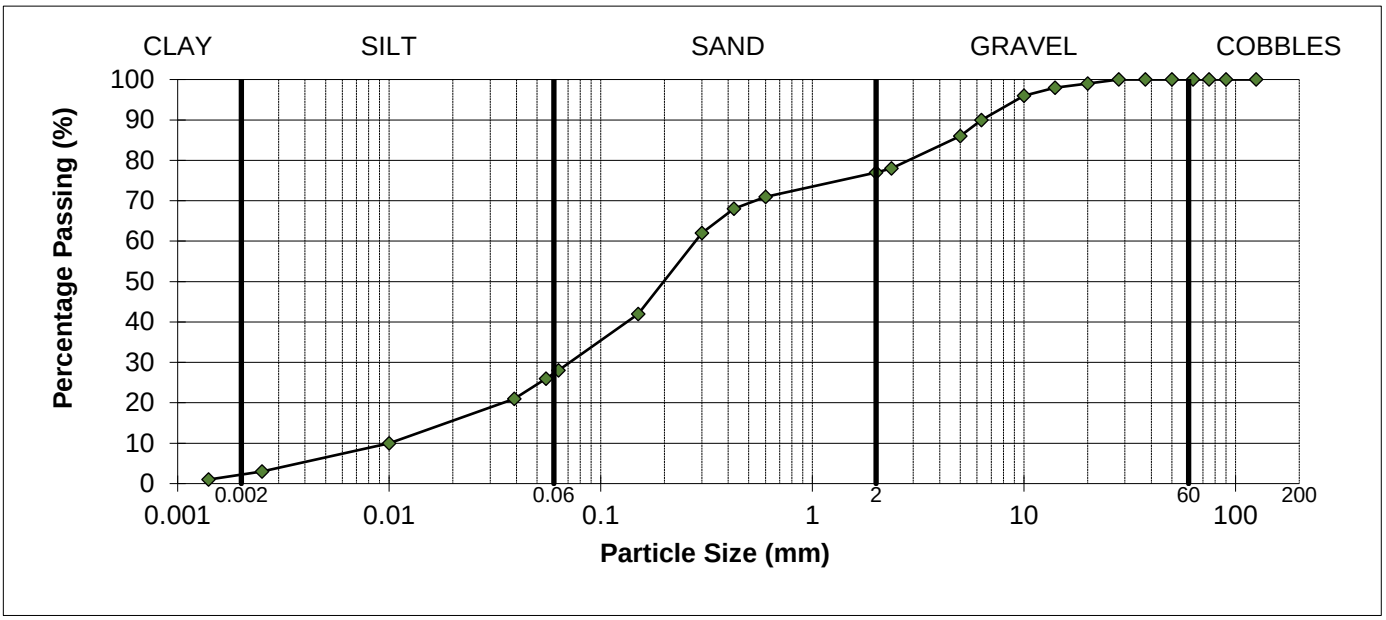
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-3	DATE SAMPLED	31-May-22
LAB SAMPLE No	112909	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	78	
90	100		2	77	
75	100		0.6	71	
63	100		0.425	68	
50	100		0.3	62	
37.5	100		0.15	42	
28	100		0.063	28	
20	99		0.055	26	
14	98		0.039	21	
10	96		0.01	10	
6.3	90		0.0025	3	
5	86		0.0014	1	



REMARKS
As received moisture content = 21%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

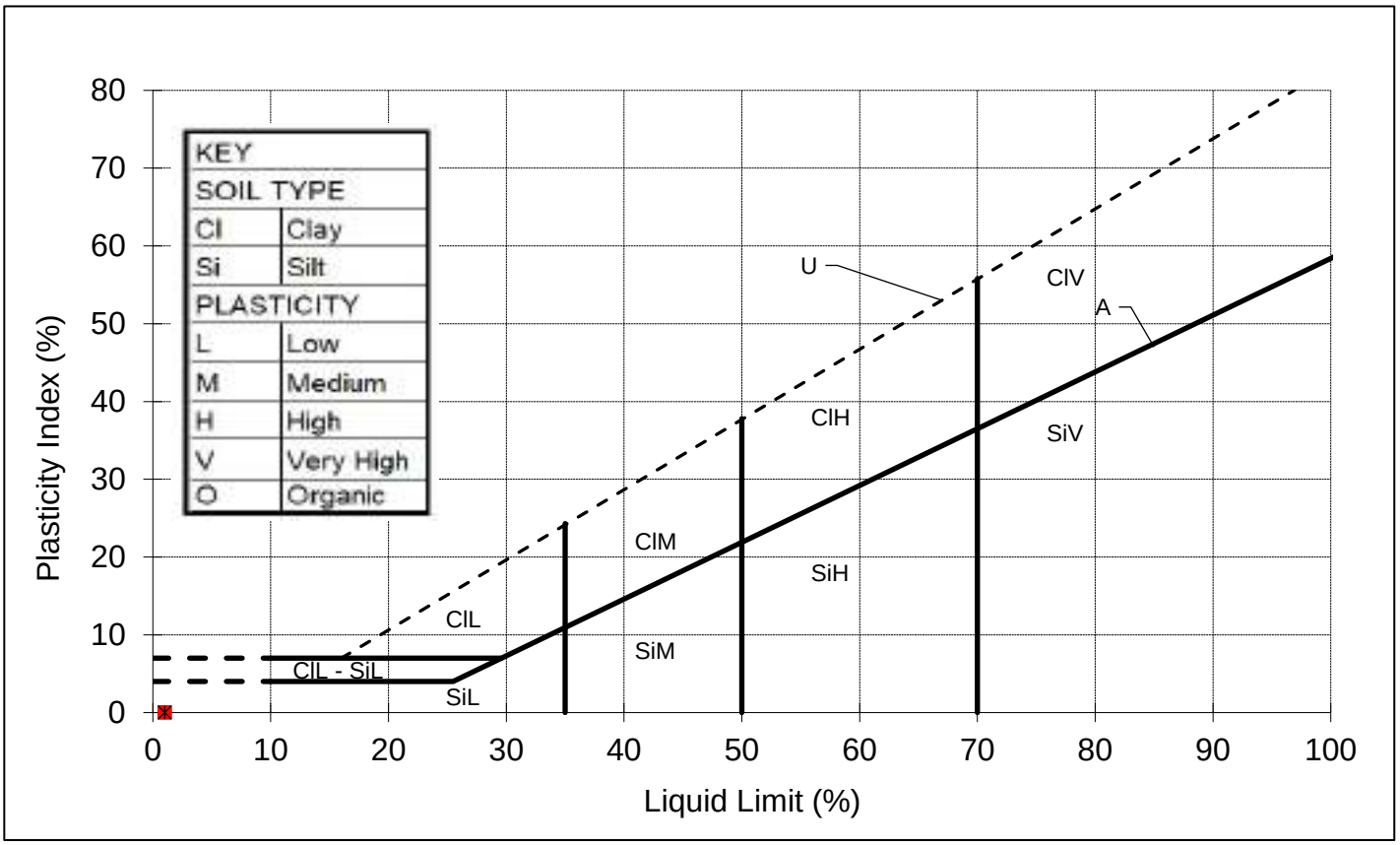
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-3	DATE SAMPLED	31-May-22
SAMPLE No.	112909	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	N/A	Non Plastic	N/A	68



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

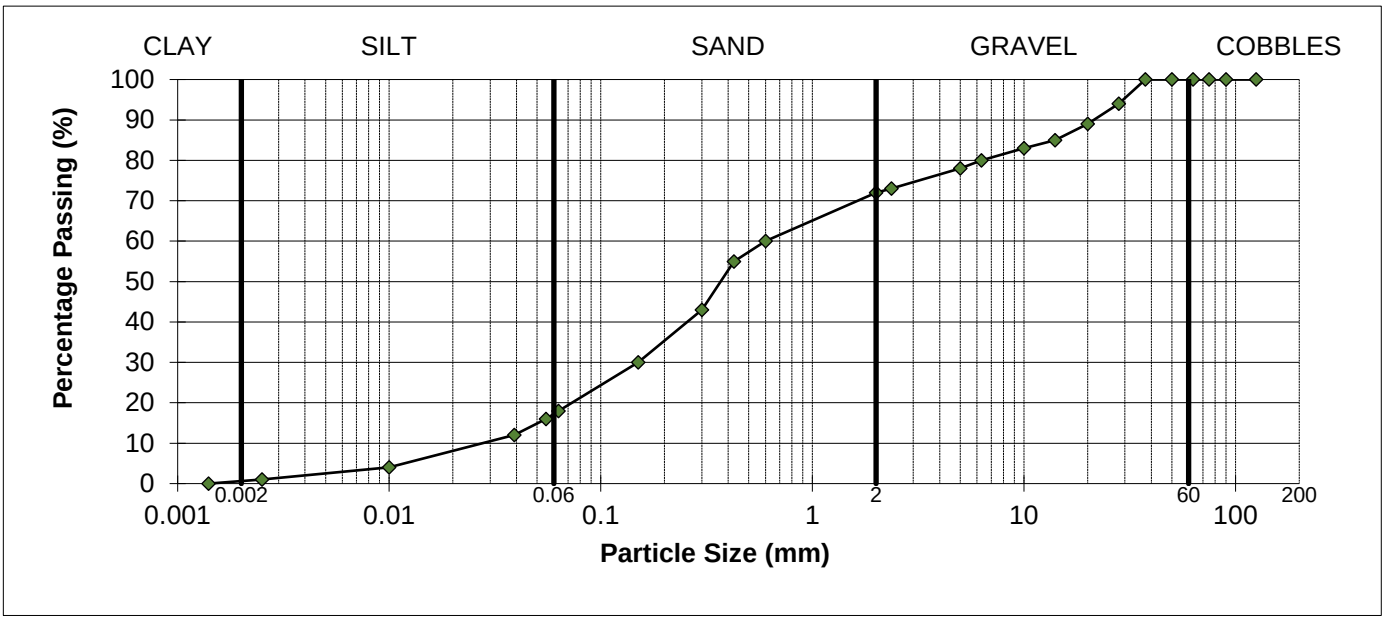
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-4	DATE SAMPLED	31-May-22
LAB SAMPLE No	112910	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	73	
90	100		2	72	
75	100		0.6	60	
63	100		0.425	55	
50	100		0.3	43	
37.5	100		0.15	30	
28	94		0.063	18	
20	89		0.055	16	
14	85		0.039	12	
10	83		0.01	4	
6.3	80		0.0025	1	
5	78		0.0014	0	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

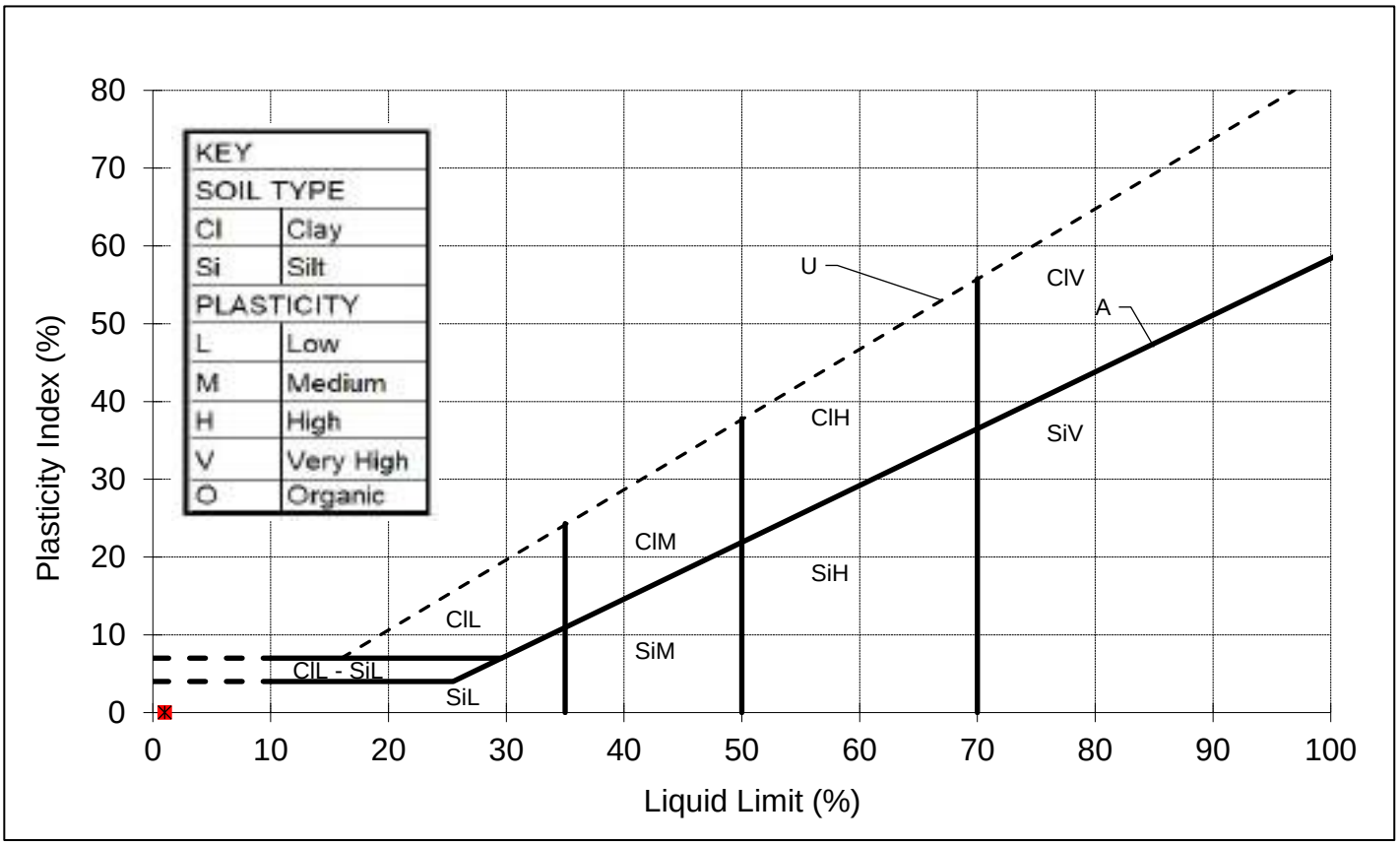
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-4	DATE SAMPLED	31-May-22
SAMPLE No.	112910	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	55



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

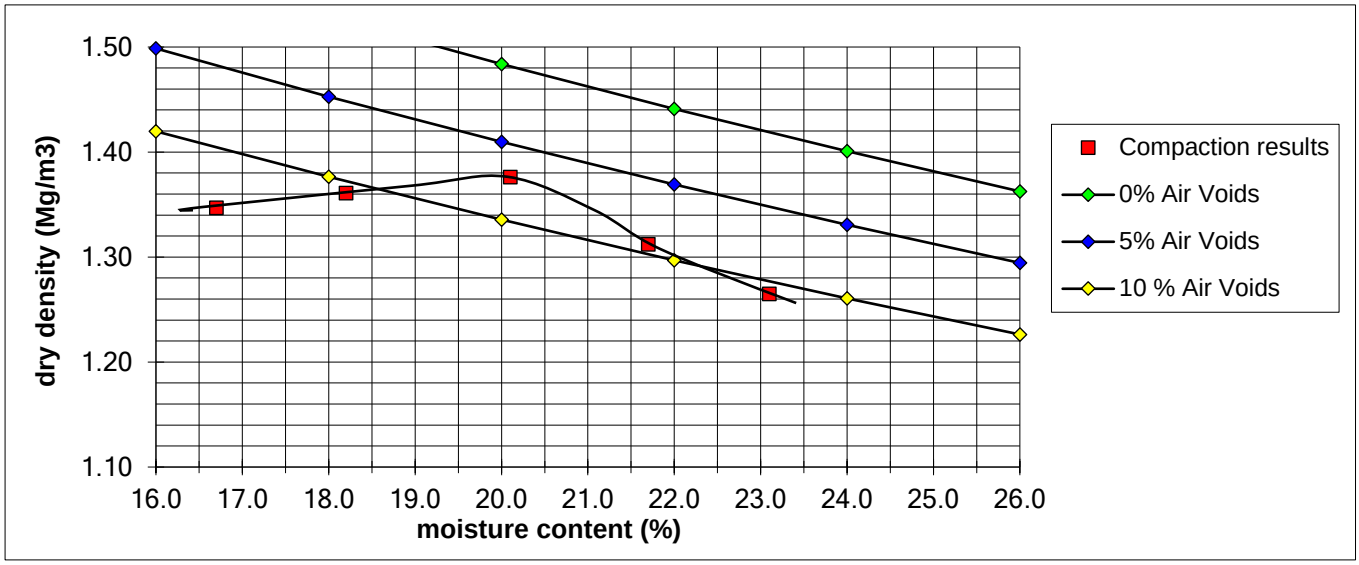
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-4	DATE SAMPLED	31-May-22
LAB SAMPLE No	112910	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		16.7	1.347
2		18.2	1.361
3		20.1	1.376
4		21.7	1.312
5		23.1	1.265
	Optimum	20.0	
	Maximum		1.37
	Particle Density	2.11 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 11%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

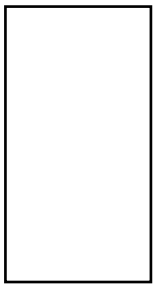
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-4	DATE SAMPLED	31-May-22
LAB SAMPLE No	112910	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	20	%
BULK DENSITY	1.62	Mg/m3
DRY DENSITY	1.35	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

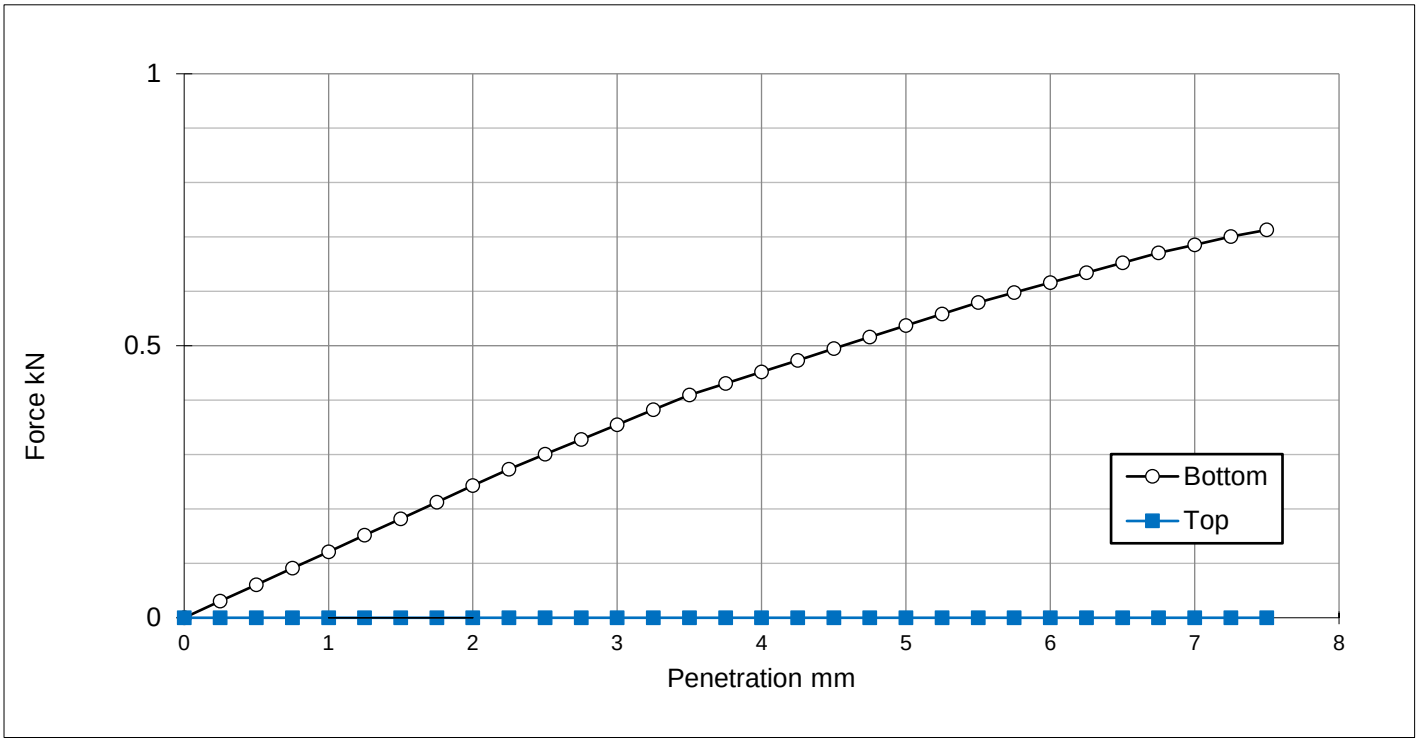
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/4

SAMPLE LABEL	TPB16-4	DATE SAMPLED	31-May-22
LAB SAMPLE No	112910	DATE RECEIVED	06-Jun-22
DATE TESTED	21-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		8 %			
BULK DENSITY	1.62 Mg/m3	MOISTURE CONTENT	20 %	DRY DENSITY	1.35 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.7	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	20	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/5
Date of Issue 15 July 2022
Page 1 of 34

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

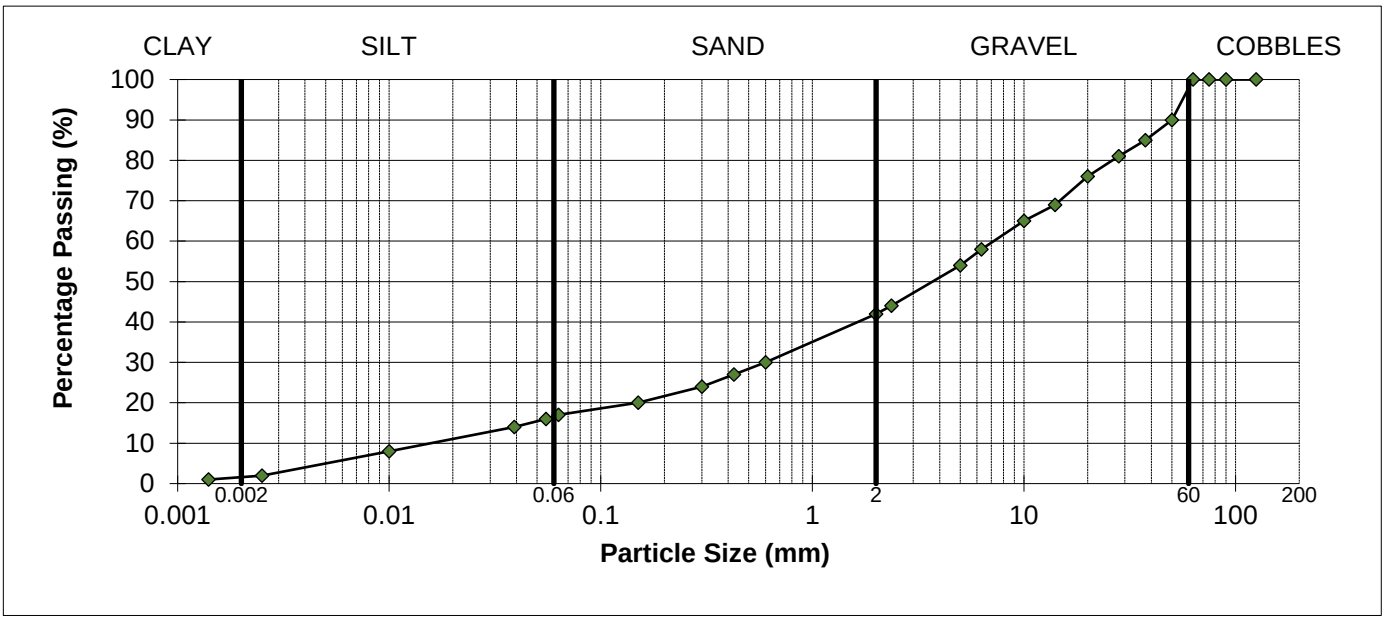
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-1	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113050	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	44	
90	100		2	42	
75	100		0.6	30	
63	100		0.425	27	
50	90		0.3	24	
37.5	85		0.15	20	
28	81		0.063	17	
20	76		0.055	16	
14	69		0.039	14	
10	65		0.01	8	
6.3	58		0.0025	2	
5	54		0.0014	1	



REMARKS
As received moisture content = 14%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

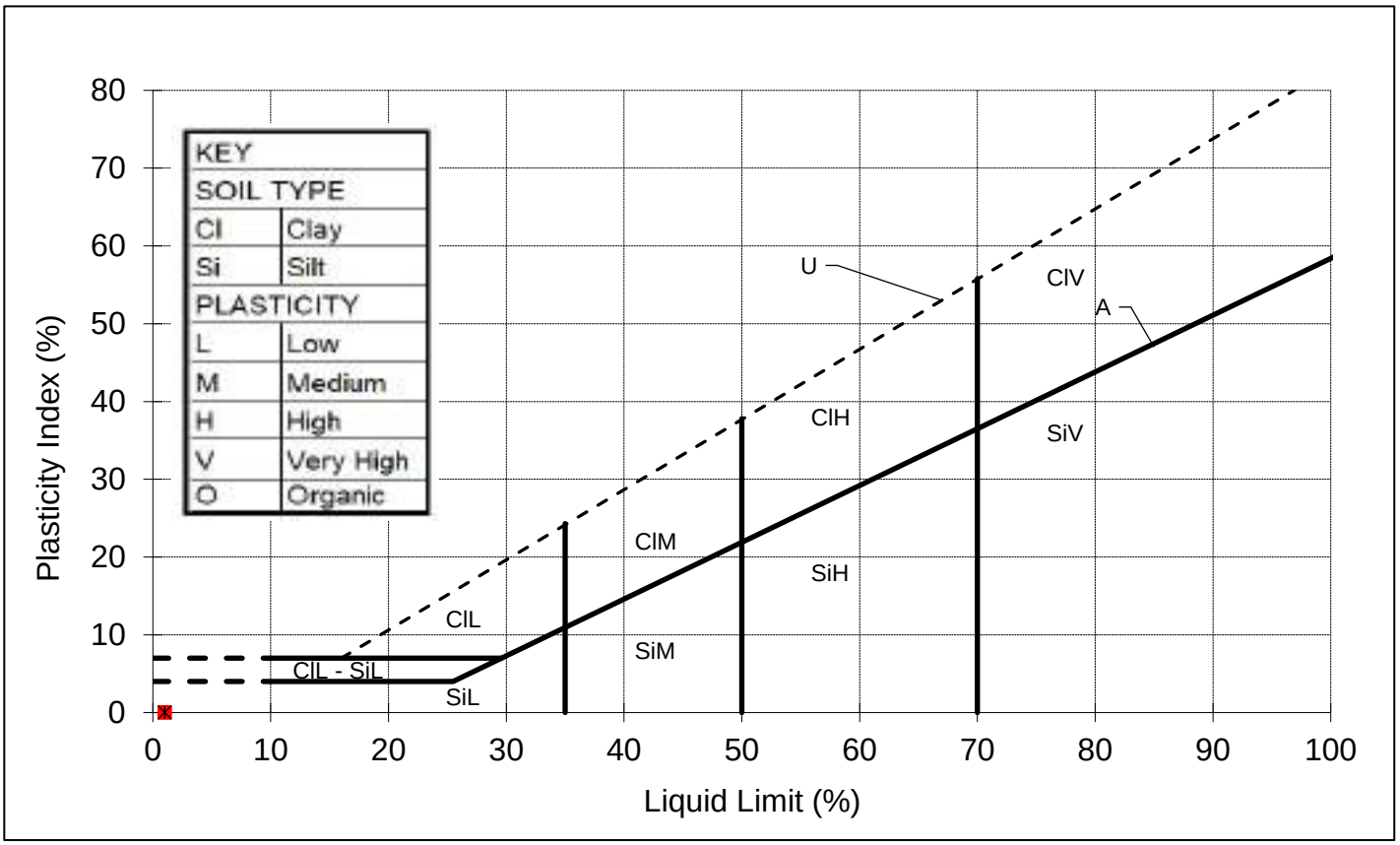
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-1	DATE SAMPLED	01-Jun-22
SAMPLE No.	113050	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	N/A	Non Plastic	N/A	27



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

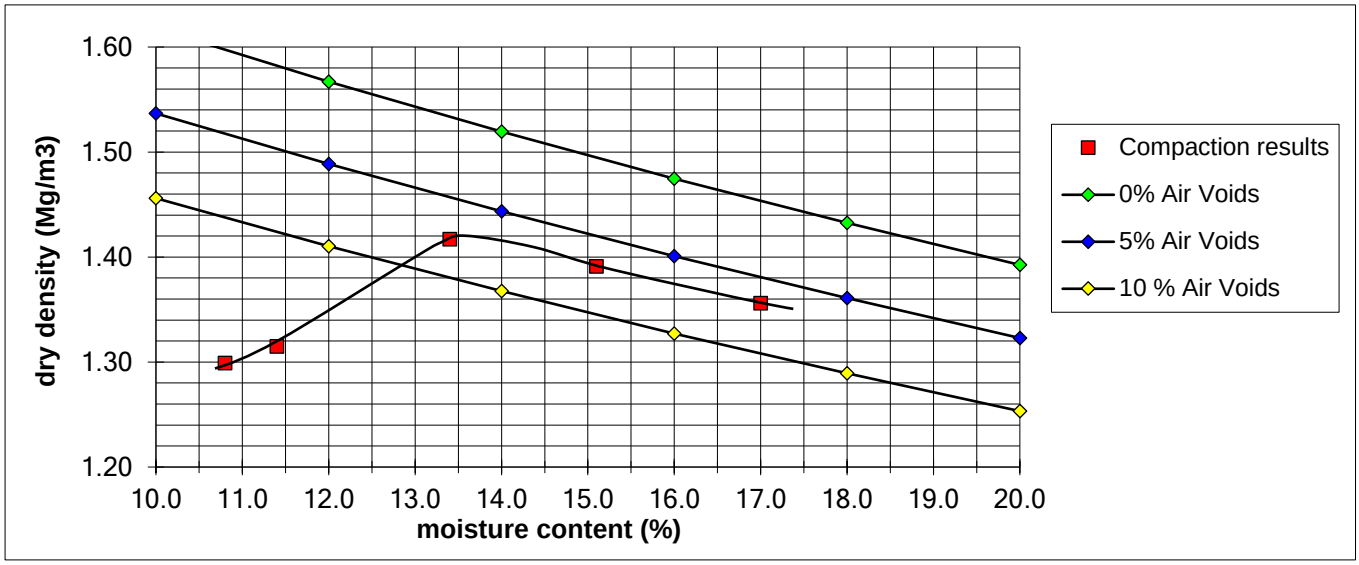
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-1	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113050	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		10.8	1.299
2		11.4	1.315
3		13.4	1.417
4		15.1	1.391
5		17.0	1.356
	Optimum	14.0	
	Maximum		1.42
	Particle Density	1.93 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 15%
Percentage of material retained on 20mm sieve = 24%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

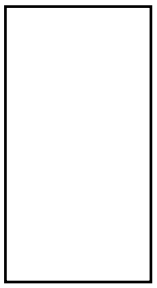
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-1	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113050	DATE RECEIVED	09-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	14	%
BULK DENSITY	1.60	Mg/m3
DRY DENSITY	1.41	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

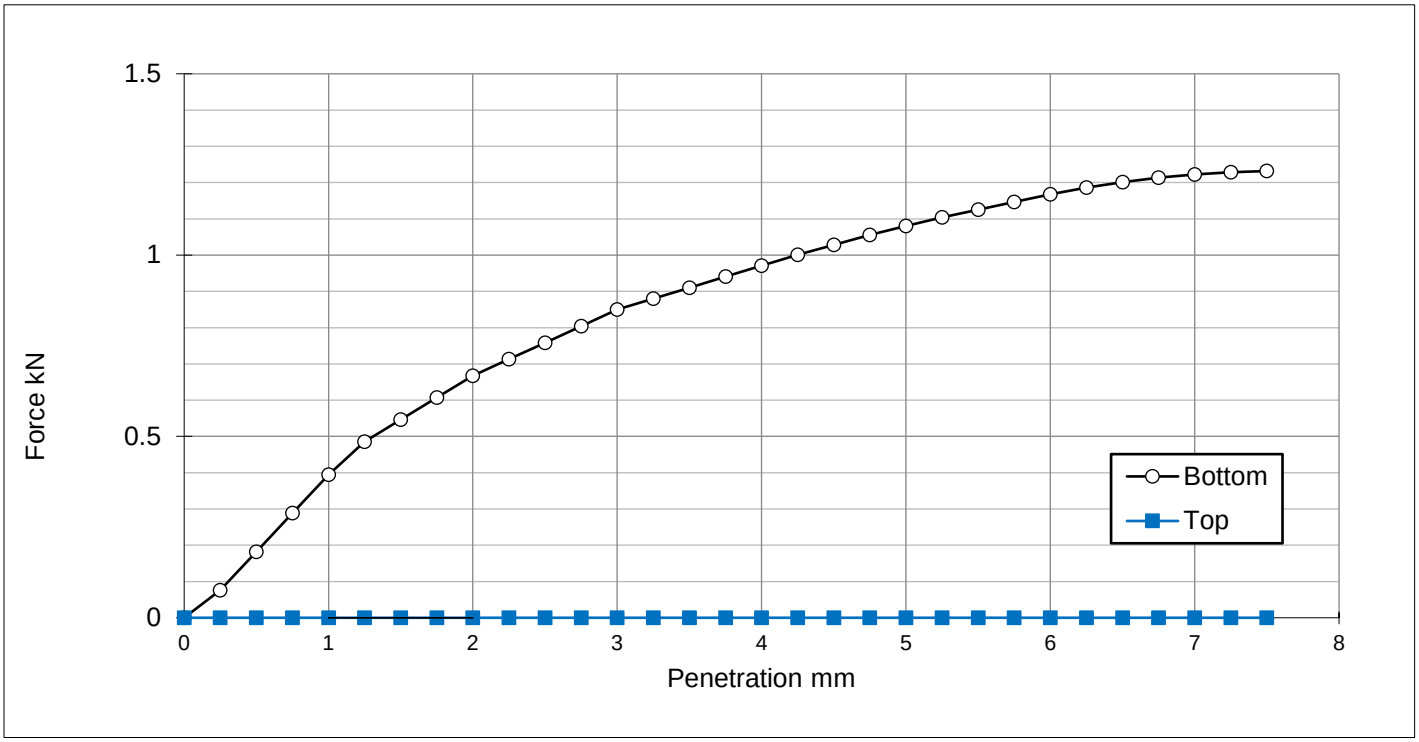
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-1	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113050	DATE RECEIVED	09-Jun-22
DATE TESTED	08-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		24 %			
BULK DENSITY	1.60 Mg/m3	MOISTURE CONTENT	14 %	DRY DENSITY	1.41 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	5.7	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	14	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

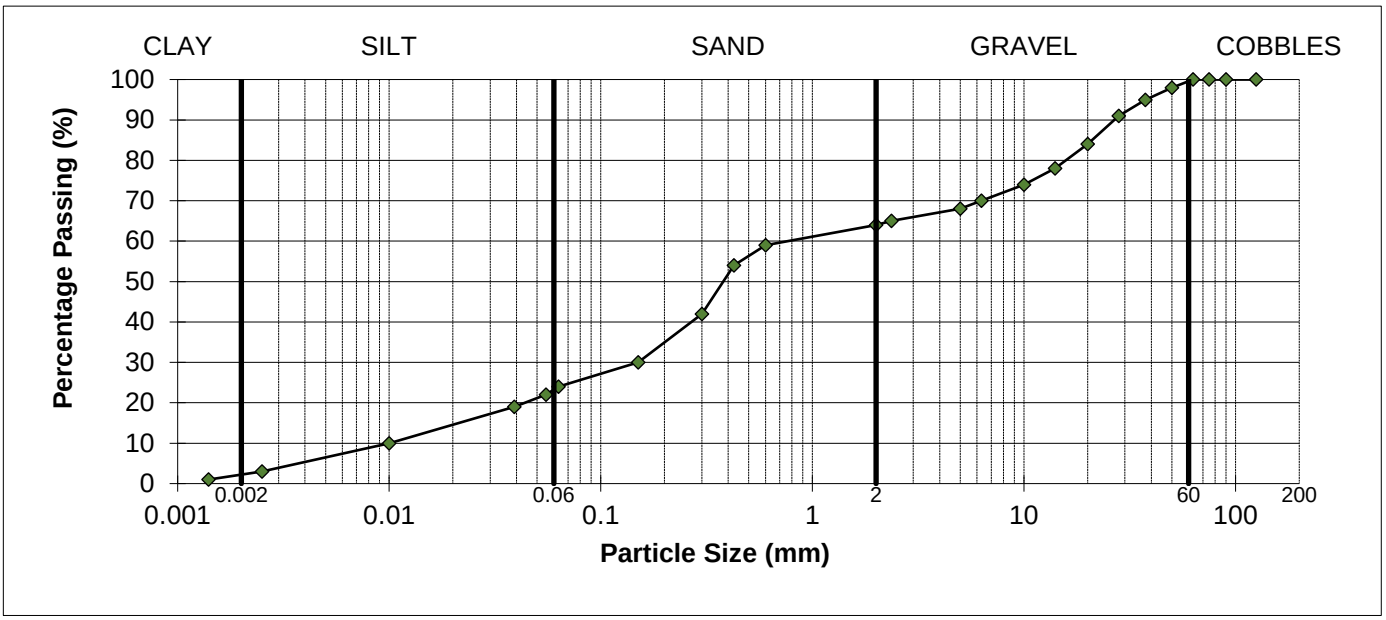
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-2	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113051	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	65	
90	100		2	64	
75	100		0.6	59	
63	100		0.425	54	
50	98		0.3	42	
37.5	95		0.15	30	
28	91		0.063	24	
20	84		0.055	22	
14	78		0.039	19	
10	74		0.01	10	
6.3	70		0.0025	3	
5	68		0.0014	1	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

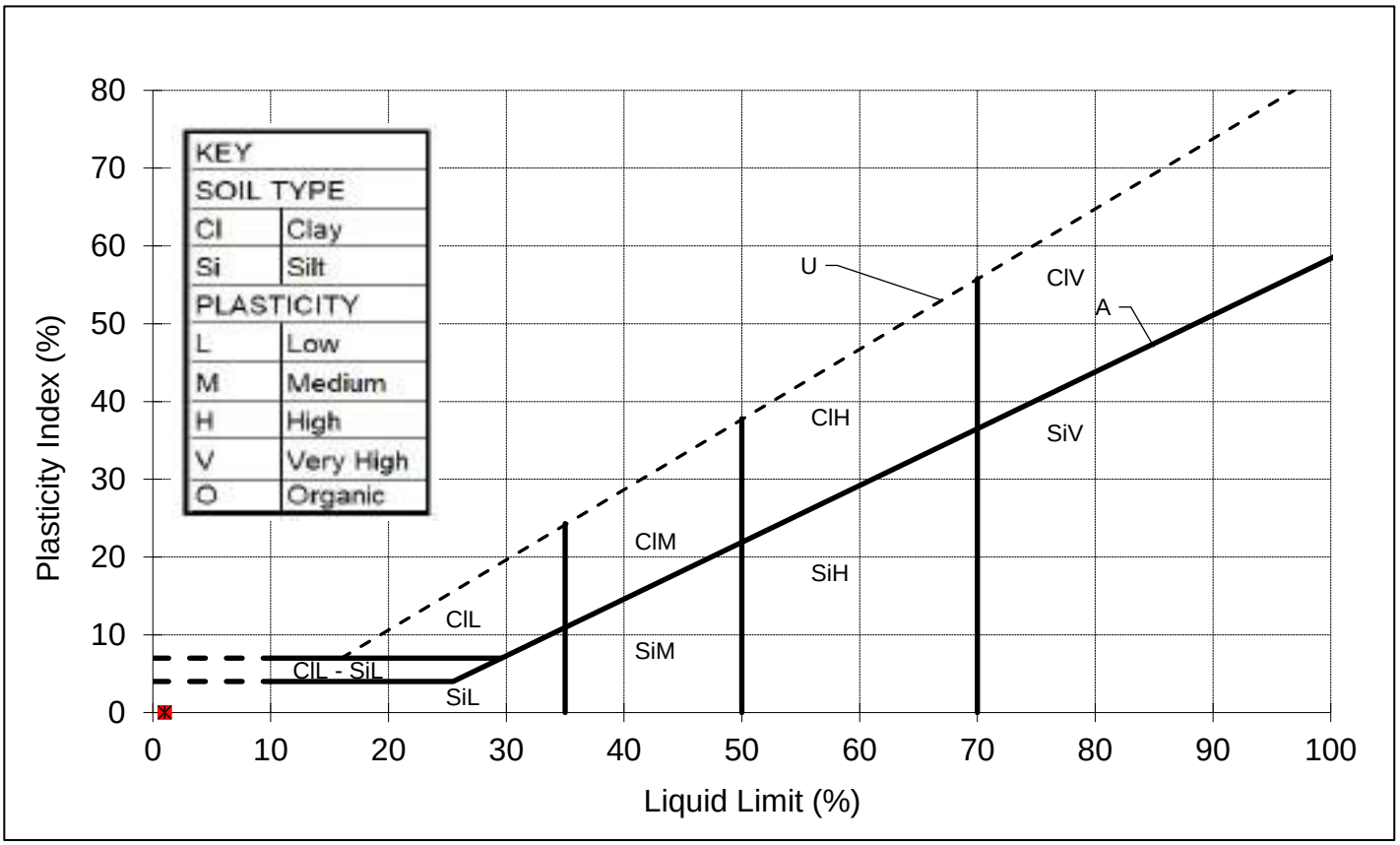
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-2	DATE SAMPLED	01-Jun-22
SAMPLE No.	113051	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	54



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

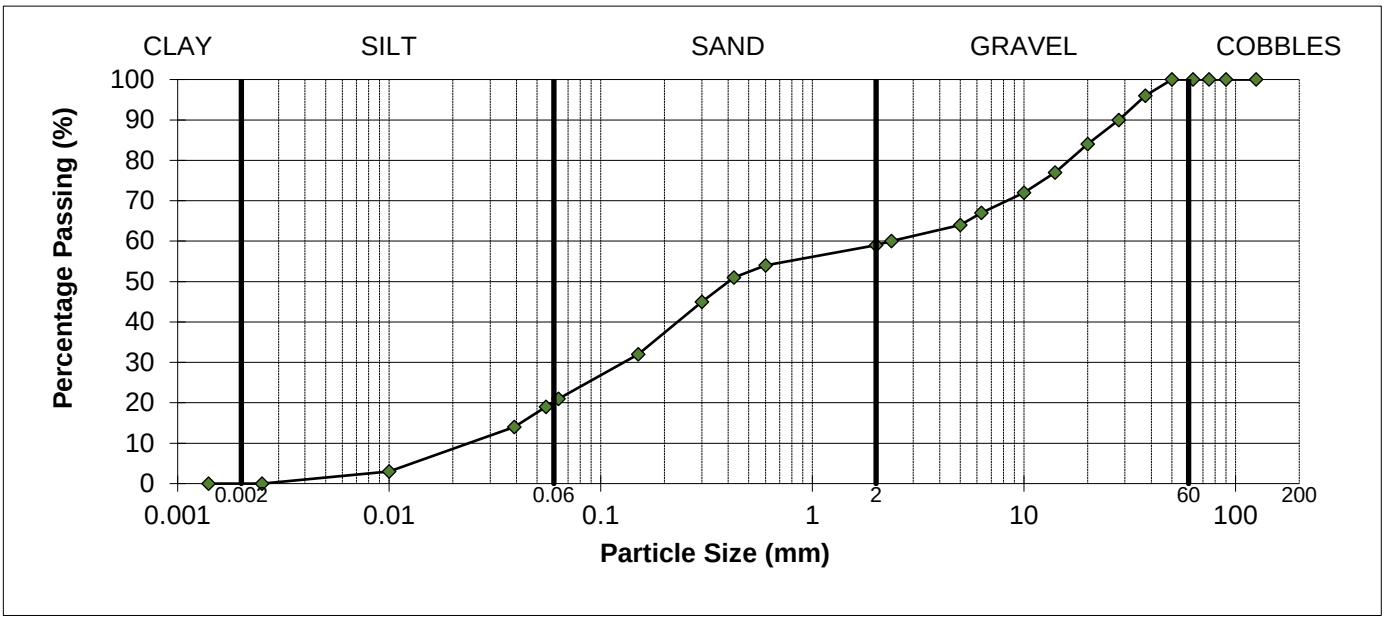
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113052	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	60	
90	100		2	59	
75	100		0.6	54	
63	100		0.425	51	
50	100		0.3	45	
37.5	96		0.15	32	
28	90		0.063	21	
20	84		0.055	19	
14	77		0.039	14	
10	72		0.01	3	
6.3	67		0.0025	0	
5	64		0.0014	0	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

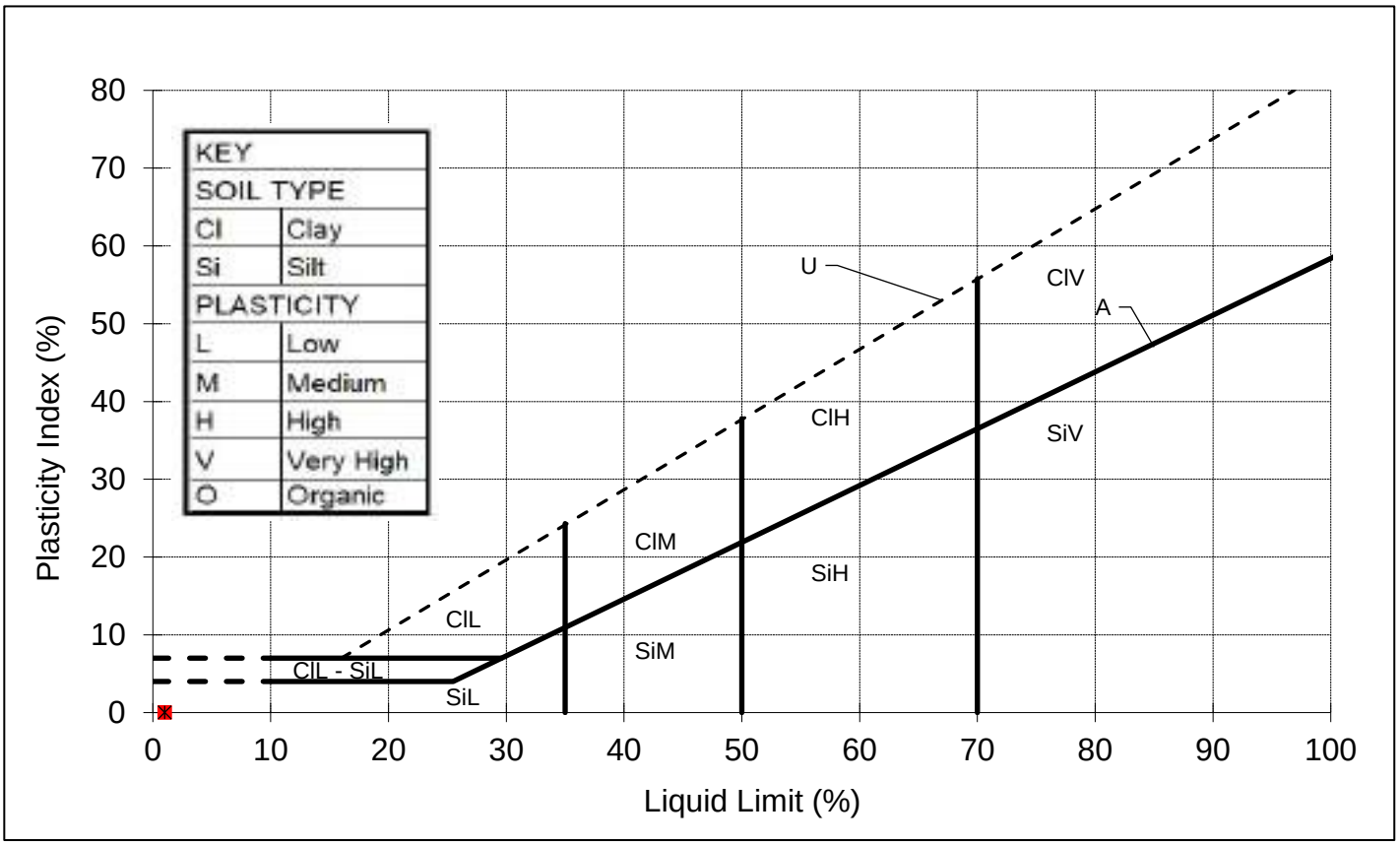
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-3	DATE SAMPLED	01-Jun-22
SAMPLE No.	113052	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	51



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

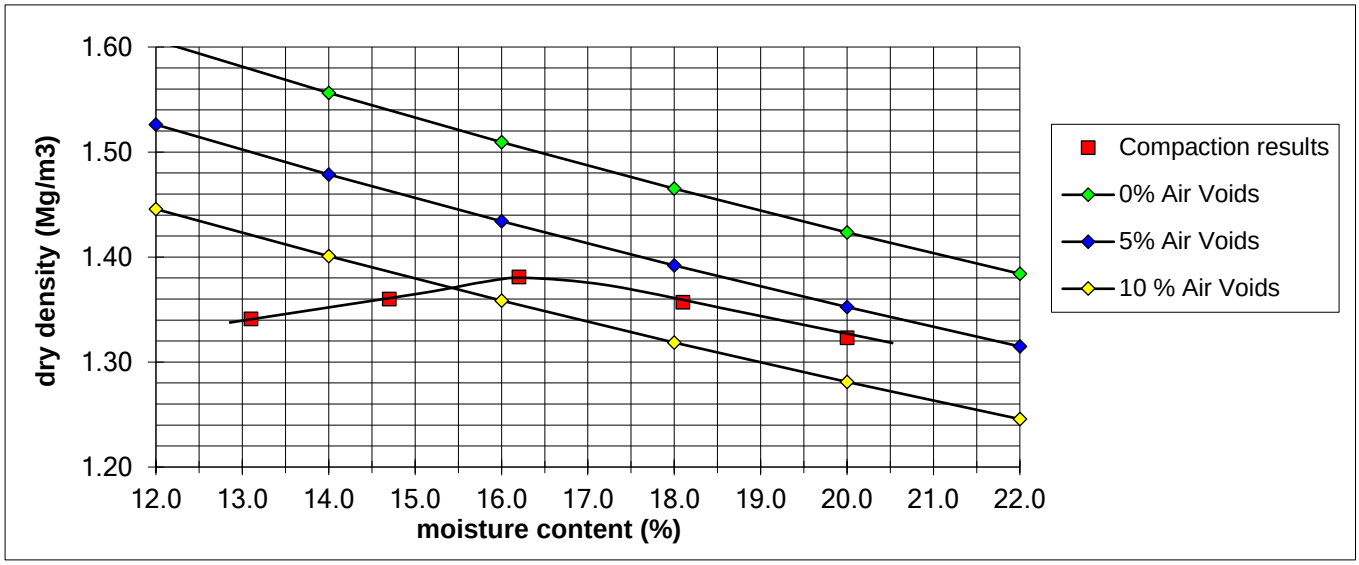
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113052	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		13.1	1.341
2		14.7	1.360
3		16.2	1.381
4		18.1	1.357
5		20.0	1.323
	Optimum	16.0	
	Maximum		1.38
	Particle Density	1.99 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 4%
Percentage of material retained on 20mm sieve = 16%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

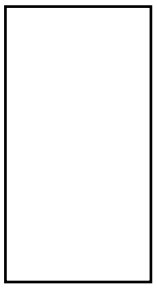
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113052	DATE RECEIVED	09-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	17	%
BULK DENSITY	1.60	Mg/m3
DRY DENSITY	1.37	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

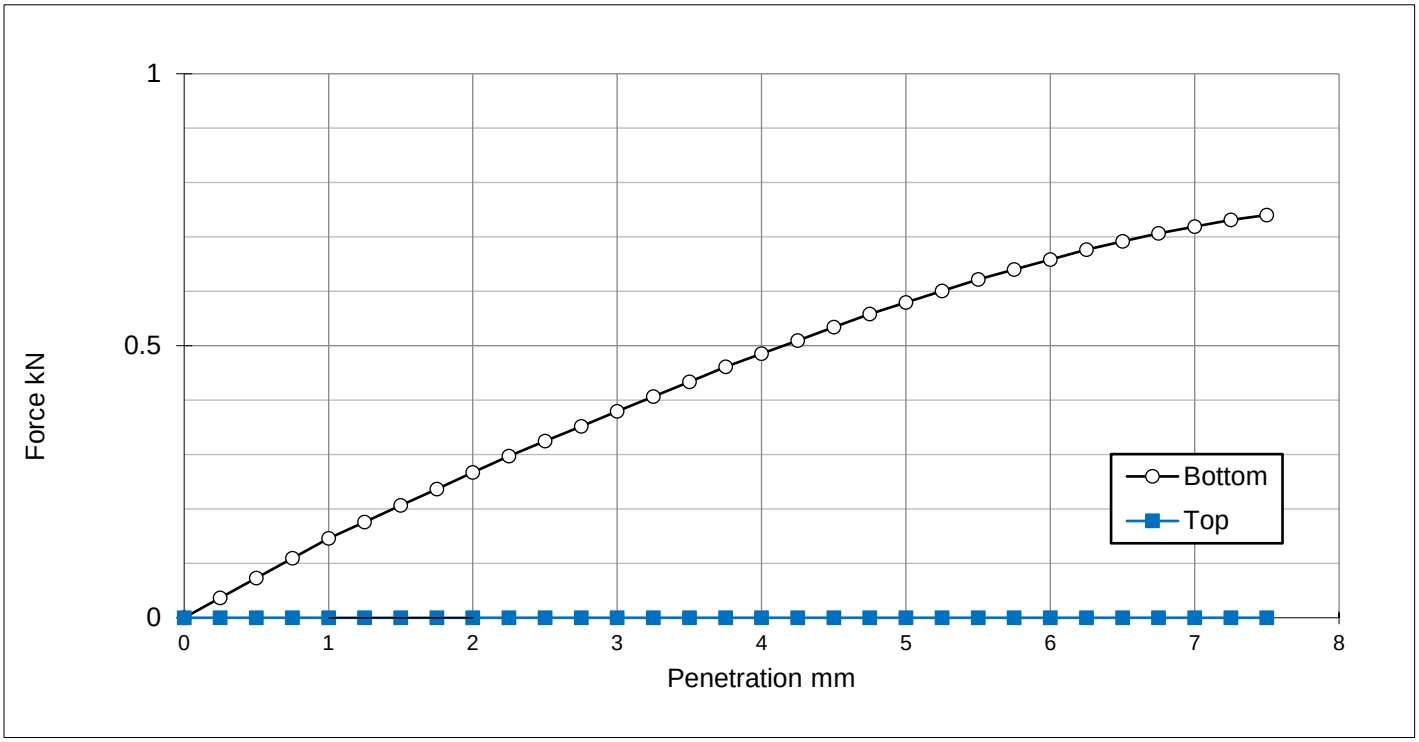
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113052	DATE RECEIVED	09-Jun-22
DATE TESTED	08-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		16 %			
BULK DENSITY	1.60 Mg/m3	MOISTURE CONTENT	17 %	DRY DENSITY	1.37 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.9	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	17	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

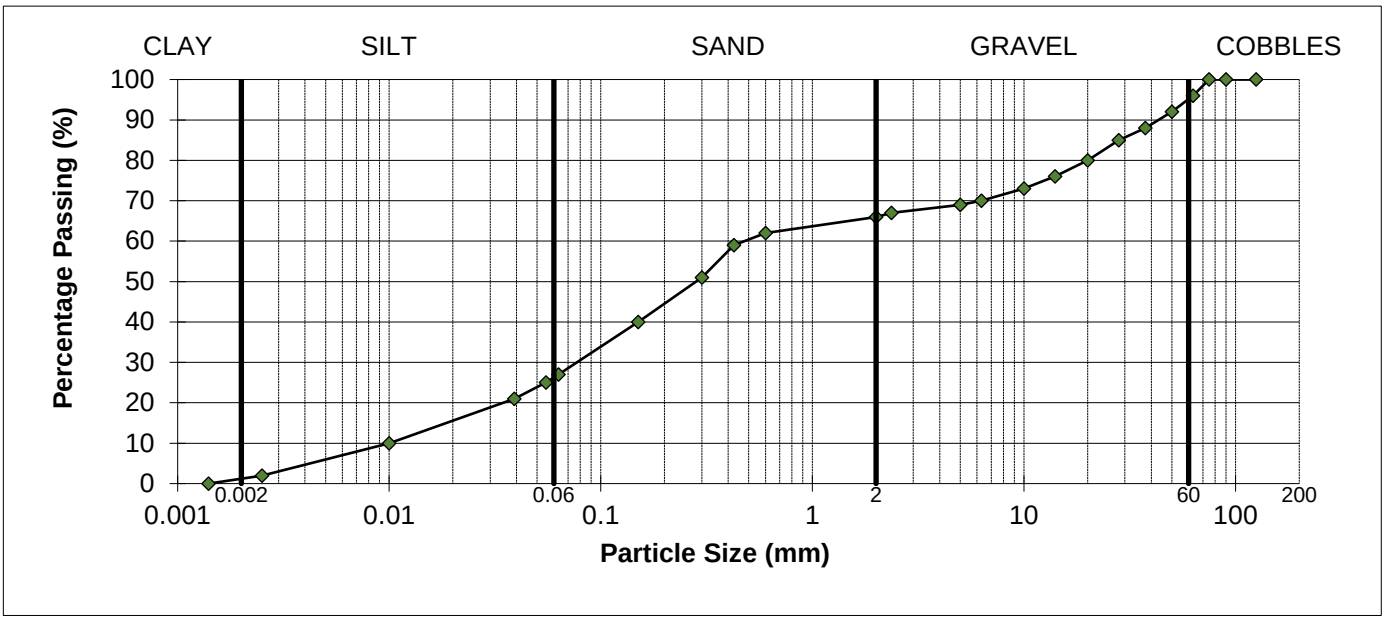
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-4	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113053	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	67	
90	100		2	66	
75	100		0.6	62	
63	96		0.425	59	
50	92		0.3	51	
37.5	88		0.15	40	
28	85		0.063	27	
20	80		0.055	25	
14	76		0.039	21	
10	73		0.01	10	
6.3	70		0.0025	2	
5	69		0.0014	0	



REMARKS
As received moisture content = 19%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

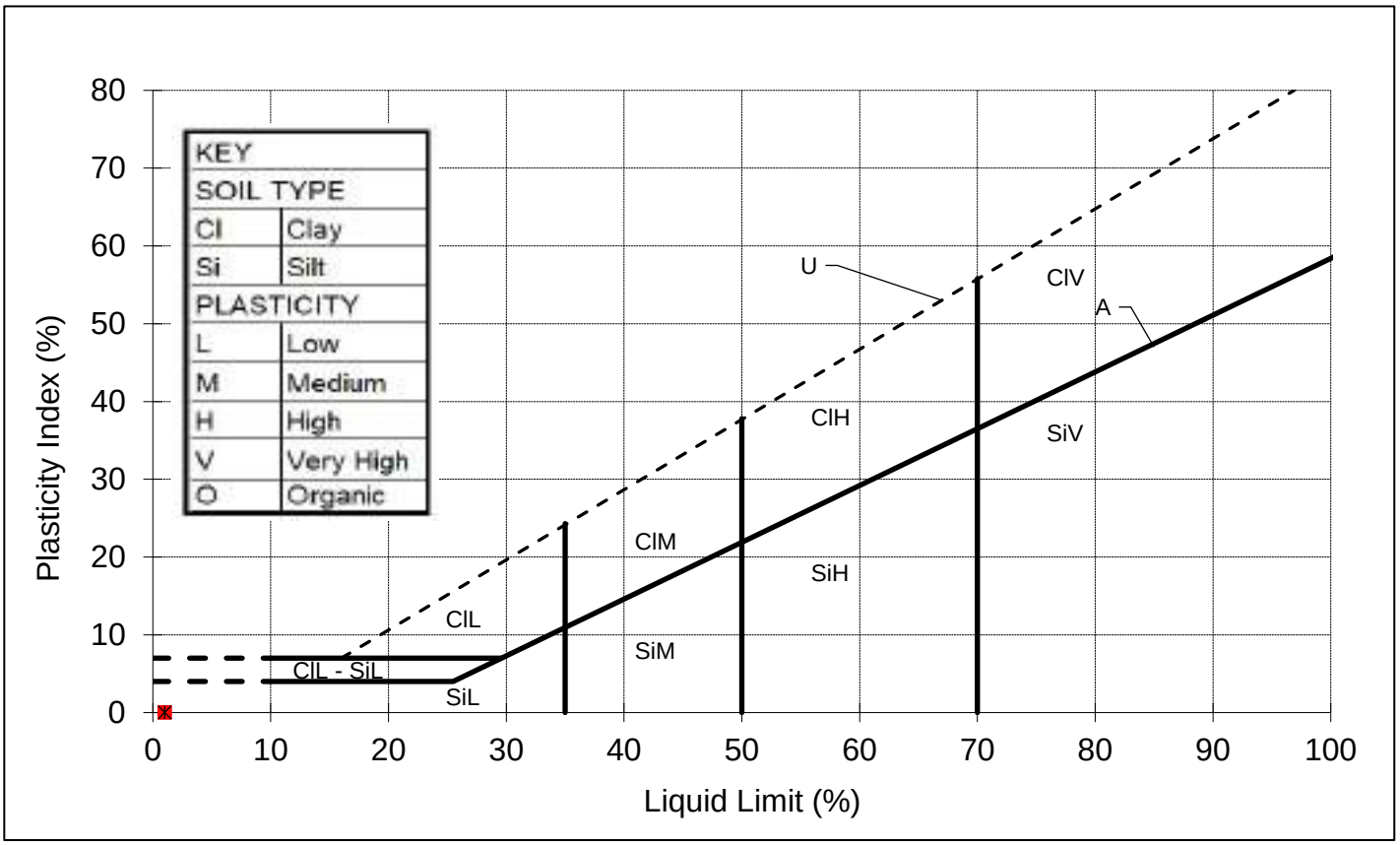
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-4	DATE SAMPLED	01-Jun-22
SAMPLE No.	113053	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19	N/A	Non Plastic	N/A	59



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

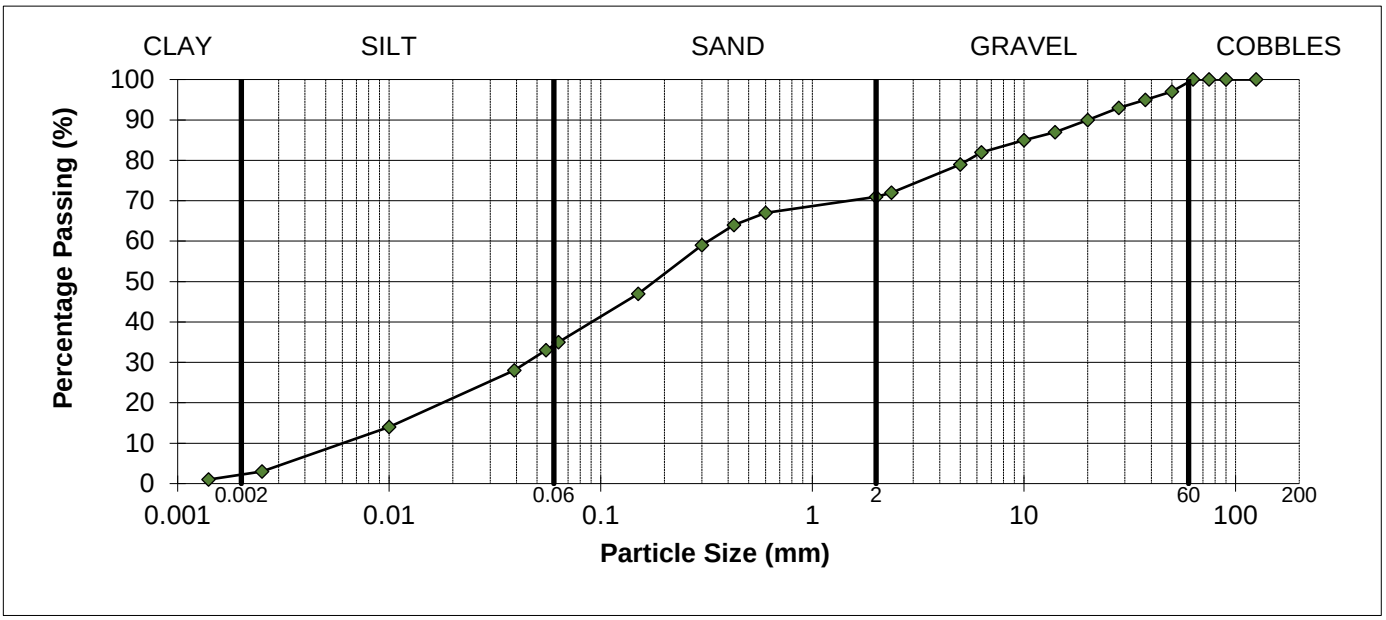
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-5	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113054	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	72	
90	100		2	71	
75	100		0.6	67	
63	100		0.425	64	
50	97		0.3	59	
37.5	95		0.15	47	
28	93		0.063	35	
20	90		0.055	33	
14	87		0.039	28	
10	85		0.01	14	
6.3	82		0.0025	3	
5	79		0.0014	1	



REMARKS
As received moisture content = 15%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

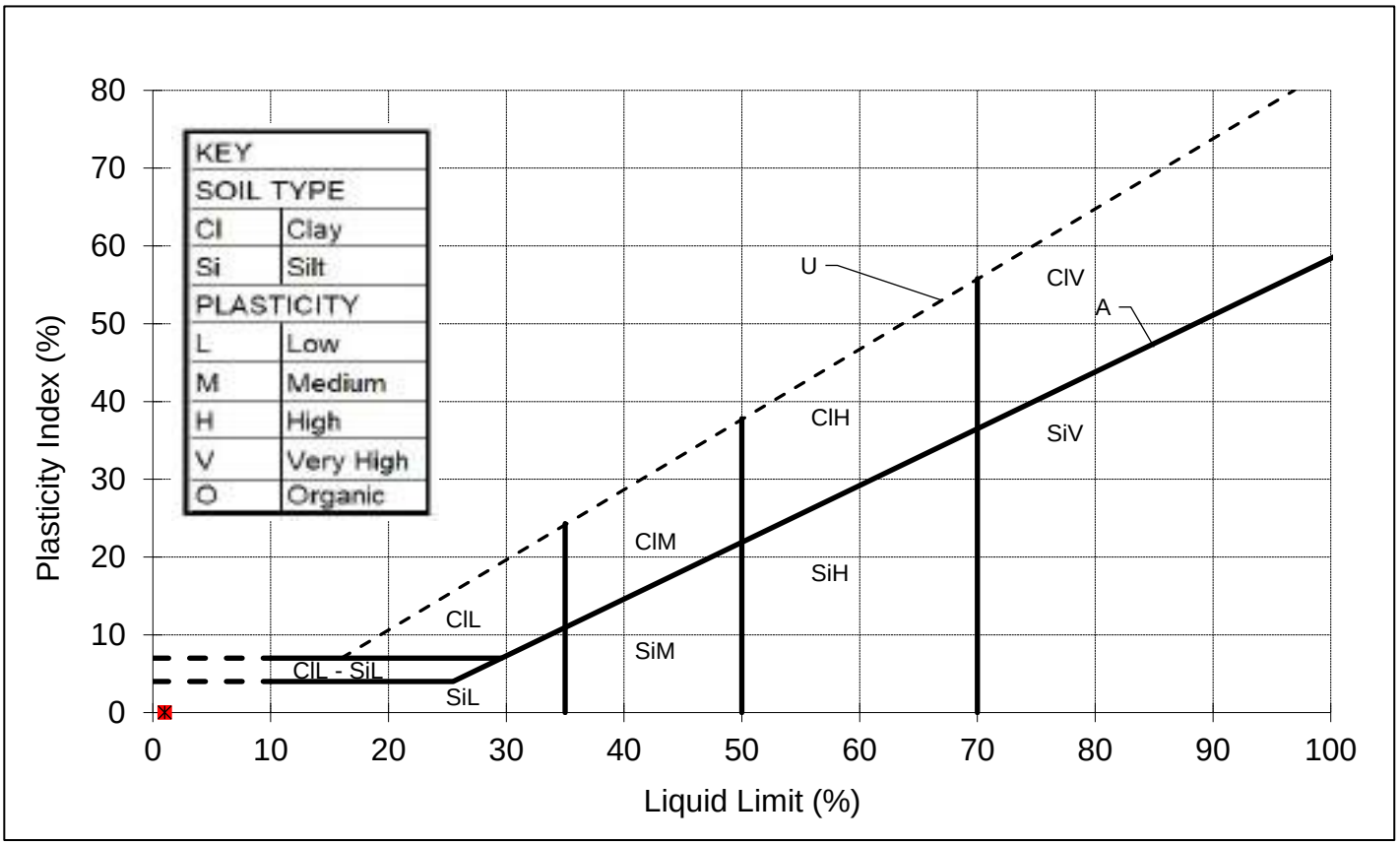
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-5	DATE SAMPLED	01-Jun-22
SAMPLE No.	113054	DATE RECEIVED	09-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15	N/A	Non Plastic	N/A	64



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

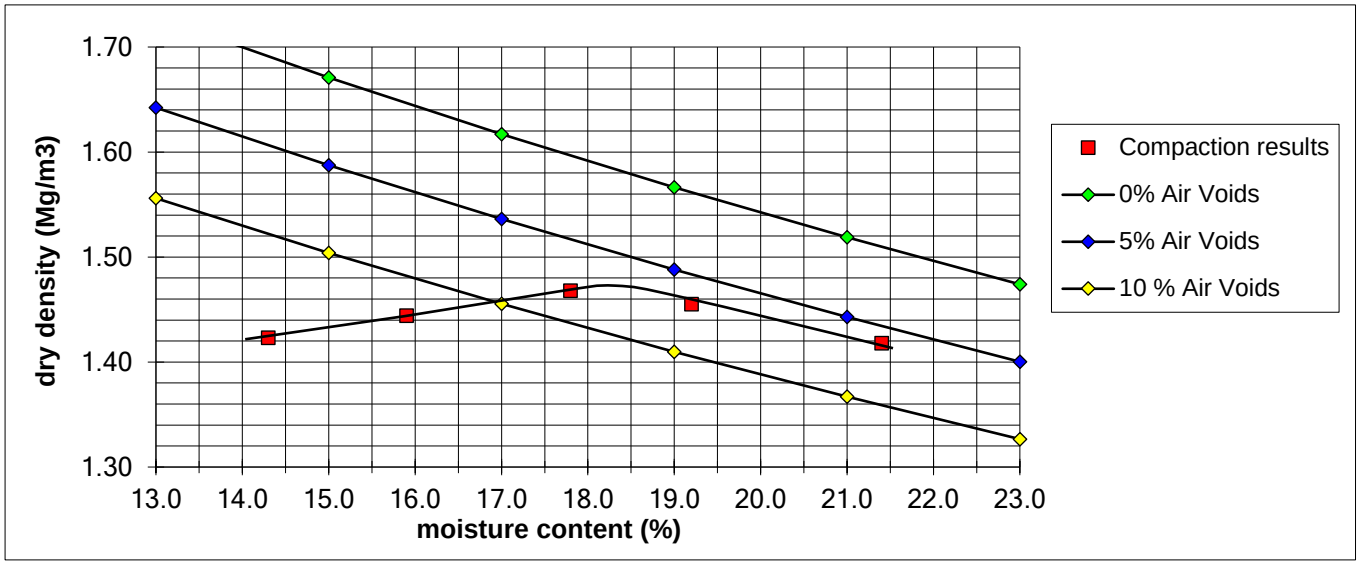
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-5	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113054	DATE RECEIVED	09-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		14.3	1.423
2		15.9	1.444
3		17.8	1.468
4		19.2	1.455
5		21.4	1.418
	Optimum	18.0	
	Maximum		1.47
	Particle Density	2.23 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 5%
Percentage of material retained on 20mm sieve = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

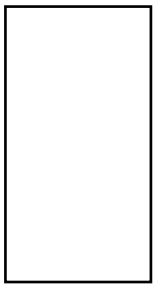
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-5	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113054	DATE RECEIVED	09-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	15	%
BULK DENSITY	1.64	Mg/m3
DRY DENSITY	1.43	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

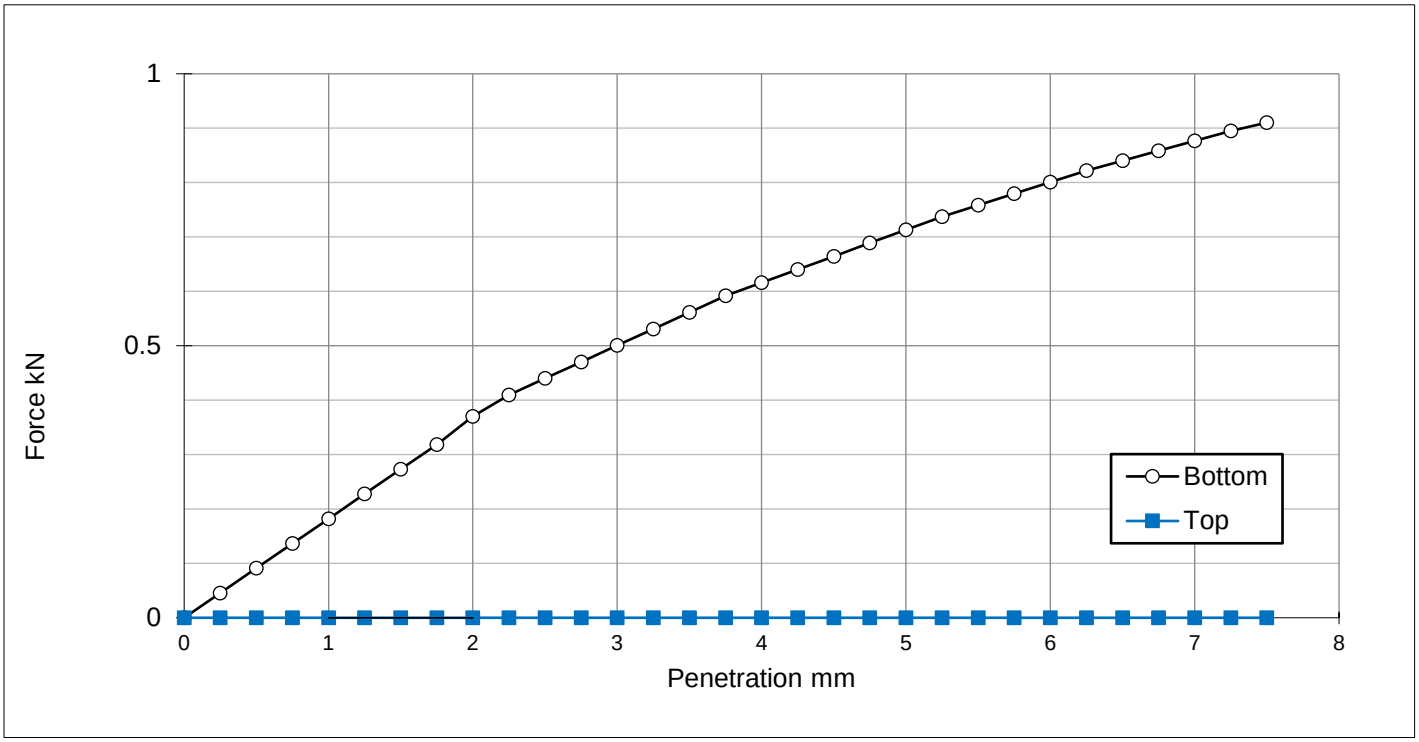
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPC15-5	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113054	DATE RECEIVED	09-Jun-22
DATE TESTED	08-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		10 %			
BULK DENSITY	1.64 Mg/m3	MOISTURE CONTENT	15 %	DRY DENSITY	1.43 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	15	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

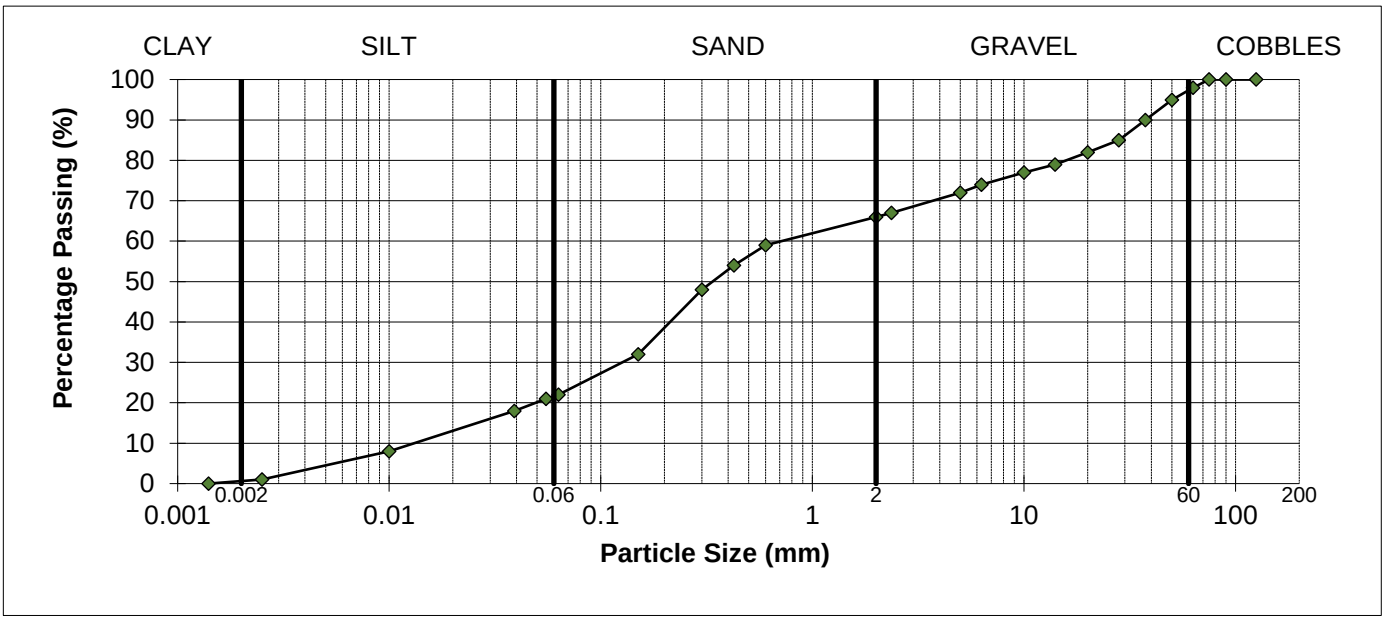
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-1	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113033	DATE RECEIVED	06-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	67	
90	100		2	66	
75	100		0.6	59	
63	98		0.425	54	
50	95		0.3	48	
37.5	90		0.15	32	
28	85		0.063	22	
20	82		0.055	21	
14	79		0.039	18	
10	77		0.01	8	
6.3	74		0.0025	1	
5	72		0.0014	0	



REMARKS
As received moisture content = 20%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

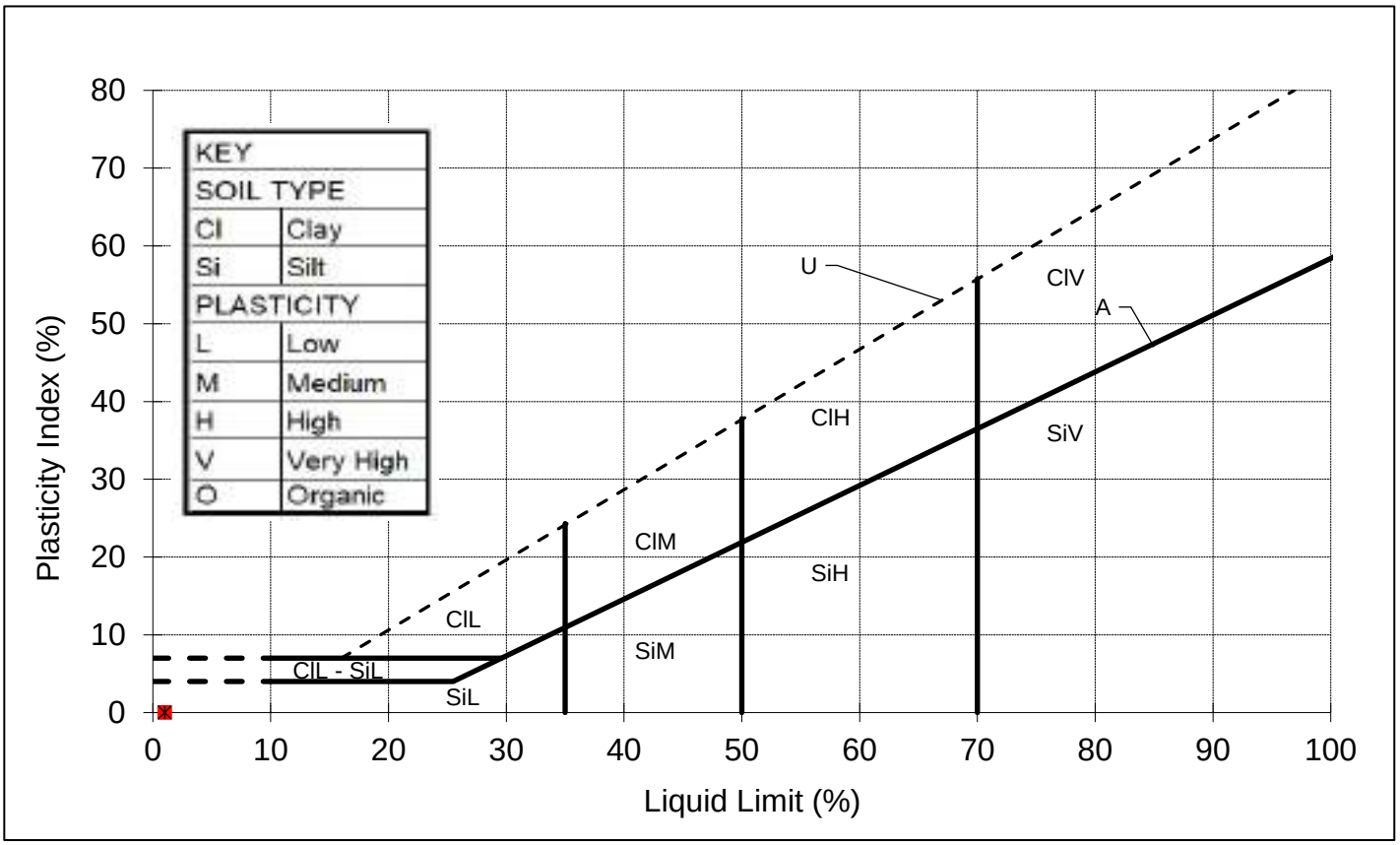
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-1	DATE SAMPLED	01-Jun-22
SAMPLE No.	113033	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20	N/A	Non Plastic	N/A	54



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

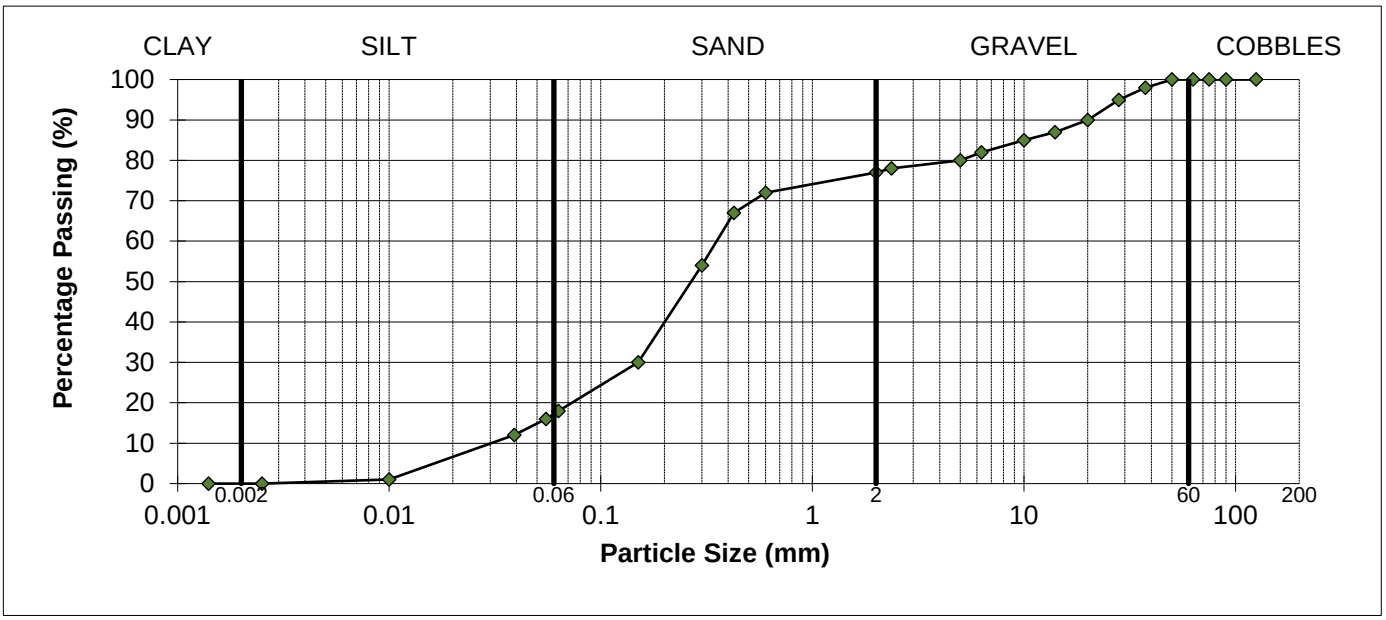
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-2	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113034	DATE RECEIVED	06-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	78	
90	100		2	77	
75	100		0.6	72	
63	100		0.425	67	
50	100		0.3	54	
37.5	98		0.15	30	
28	95		0.063	18	
20	90		0.055	16	
14	87		0.039	12	
10	85		0.01	1	
6.3	82		0.0025	0	
5	80		0.0014	0	



REMARKS
As received moisture content = 23%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

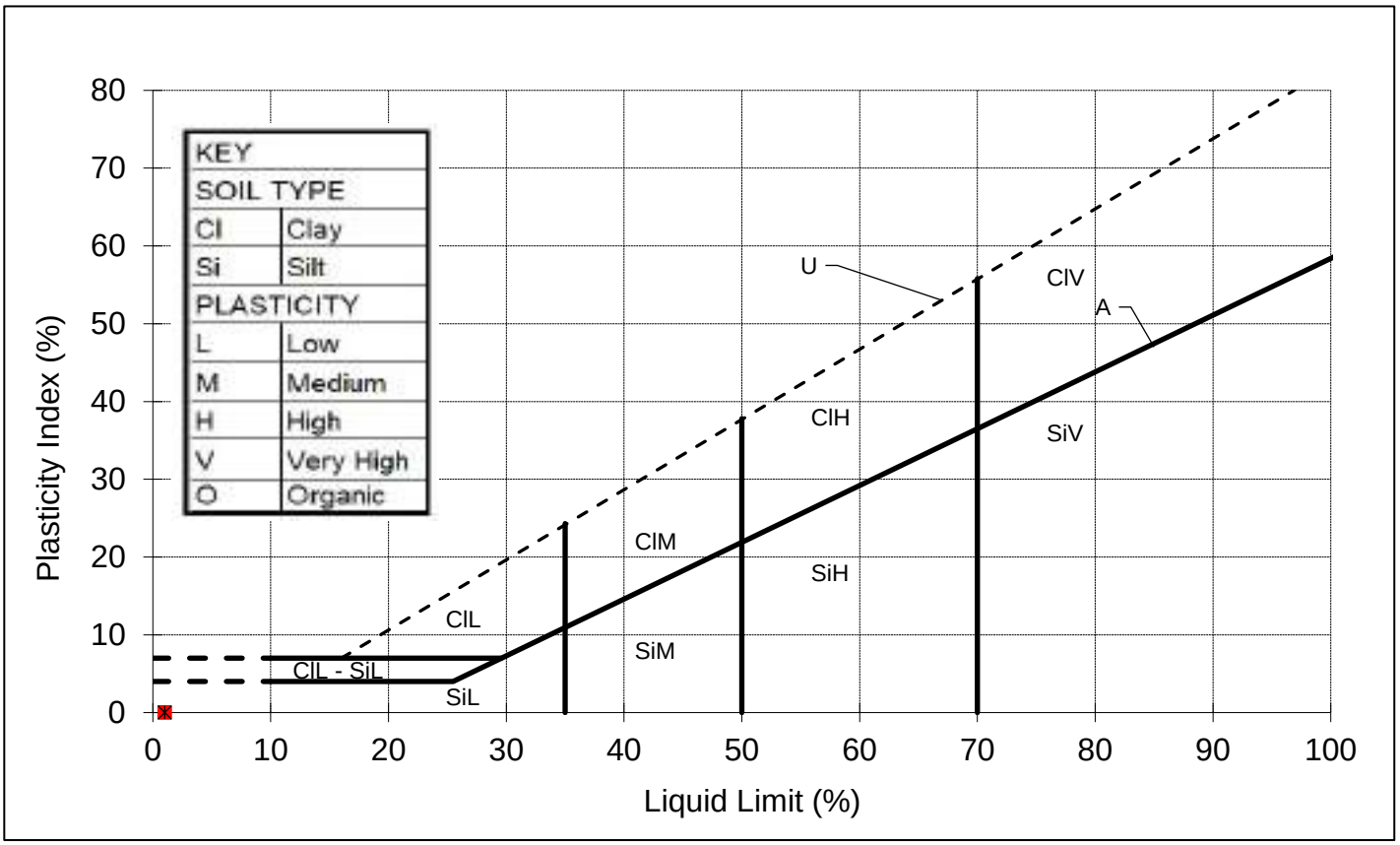
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-2	DATE SAMPLED	01-Jun-22
SAMPLE No.	113034	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23	N/A	Non Plastic	N/A	67



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

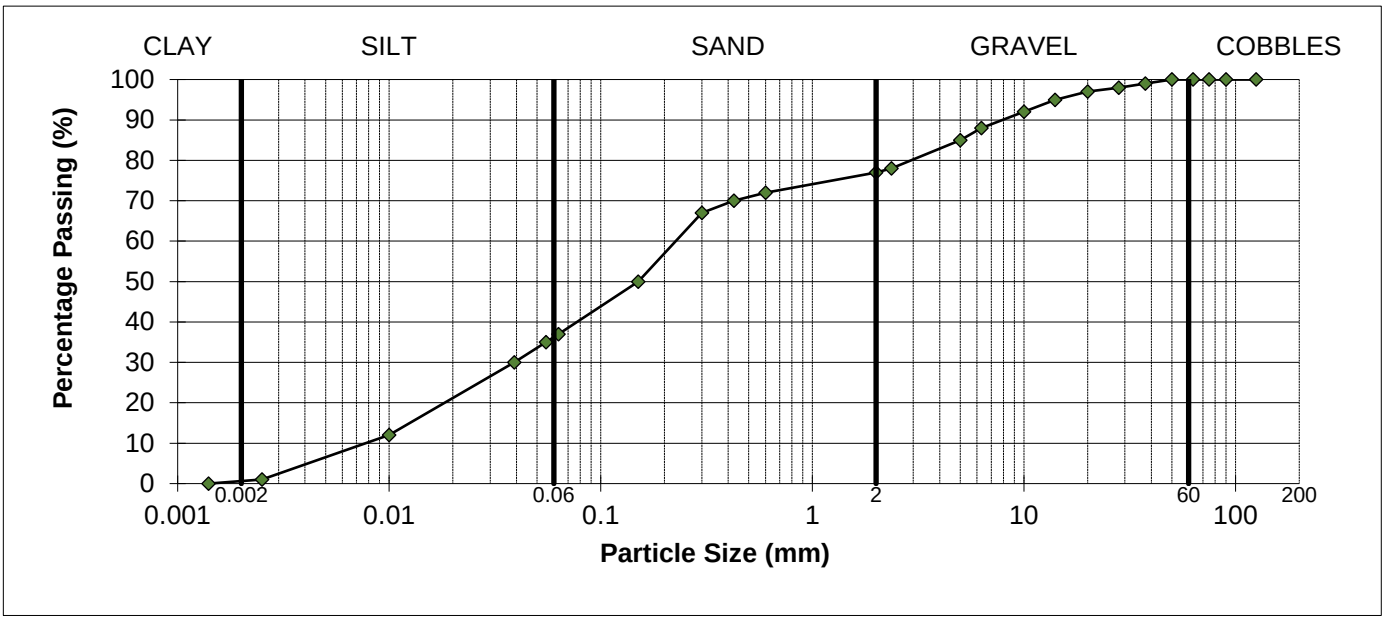
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113035	DATE RECEIVED	06-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	78	
90	100		2	77	
75	100		0.6	72	
63	100		0.425	70	
50	100		0.3	67	
37.5	99		0.15	50	
28	98		0.063	37	
20	97		0.055	35	
14	95		0.039	30	
10	92		0.01	12	
6.3	88		0.0025	1	
5	85		0.0014	0	



REMARKS
As received moisture content = 18%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

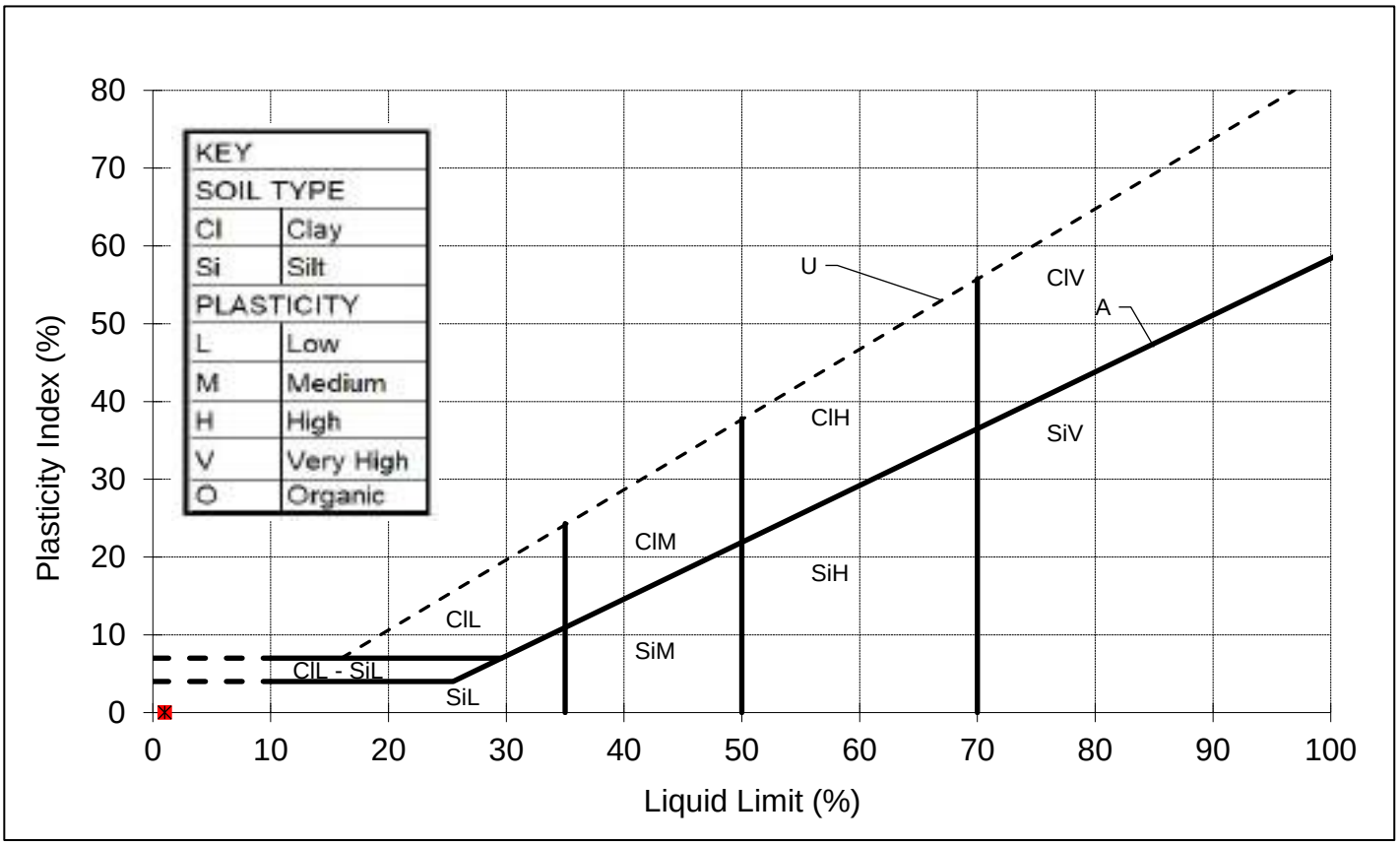
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-3	DATE SAMPLED	01-Jun-22
SAMPLE No.	113035	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	N/A	Non Plastic	N/A	70



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

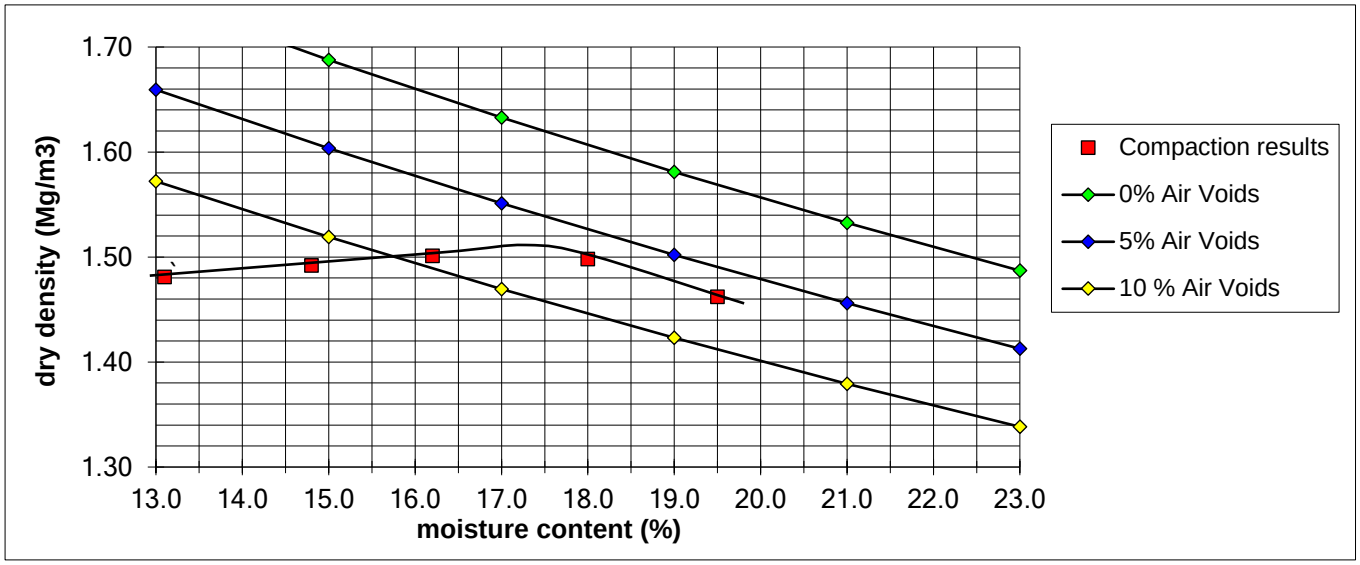
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113035	DATE RECEIVED	06-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		13.1	1.481
2		14.8	1.492
3		16.2	1.501
4		18.0	1.498
5		19.5	1.462
	Optimum	17.0	
	Maximum		1.51
	Particle Density	2.26 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 1%
Percentage of material retained on 20mm sieve = 3%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

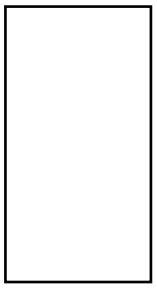
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113035	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	18	%
BULK DENSITY	1.75	Mg/m3
DRY DENSITY	1.48	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

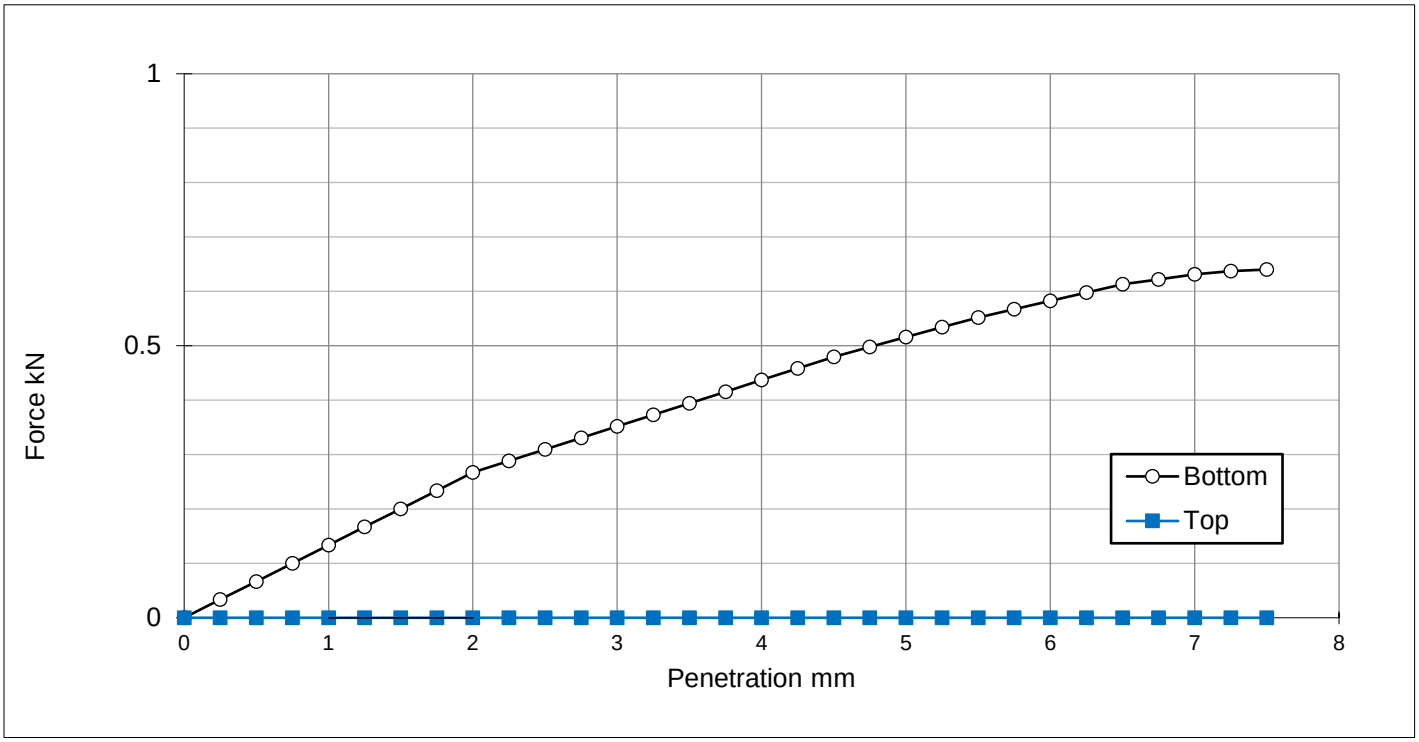
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-3	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113035	DATE RECEIVED	08-Jun-22
DATE TESTED	08-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		3 %			
BULK DENSITY	1.75 Mg/m3	MOISTURE CONTENT	18 %	DRY DENSITY	1.48 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	2.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	18	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

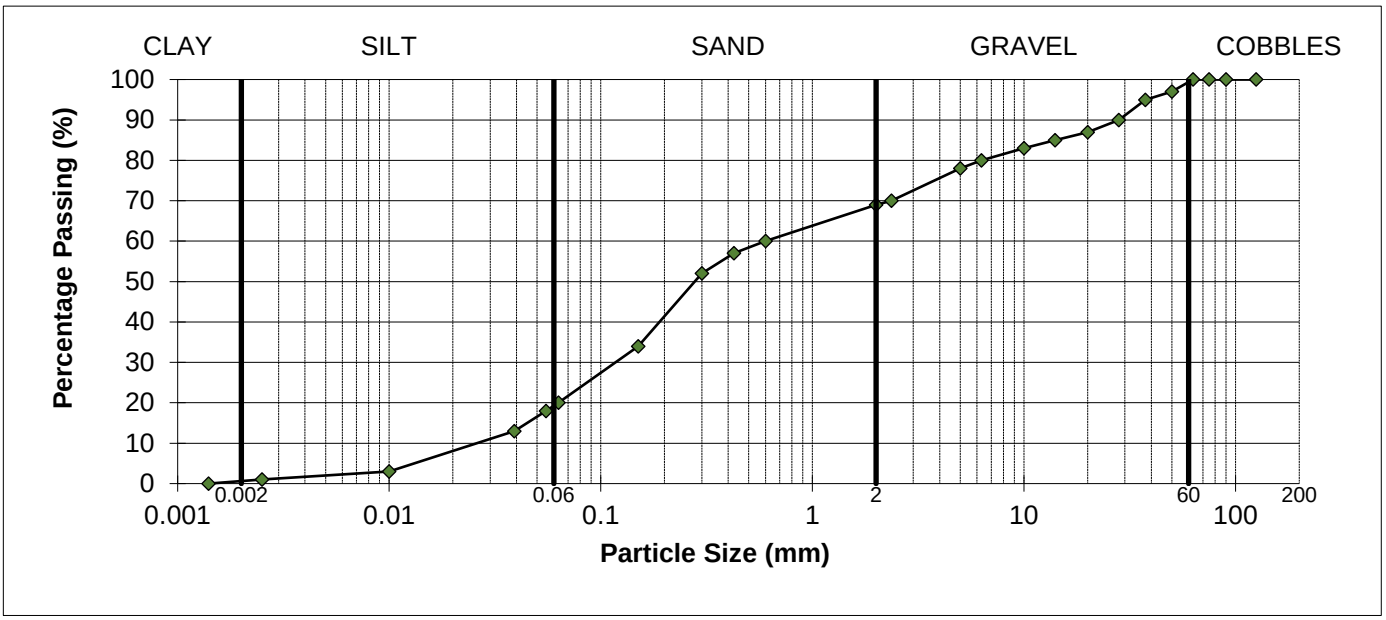
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-4	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113036	DATE RECEIVED	06-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	70	
90	100		2	69	
75	100		0.6	60	
63	100		0.425	57	
50	97		0.3	52	
37.5	95		0.15	34	
28	90		0.063	20	
20	87		0.055	18	
14	85		0.039	13	
10	83		0.01	3	
6.3	80		0.0025	1	
5	78		0.0014	0	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

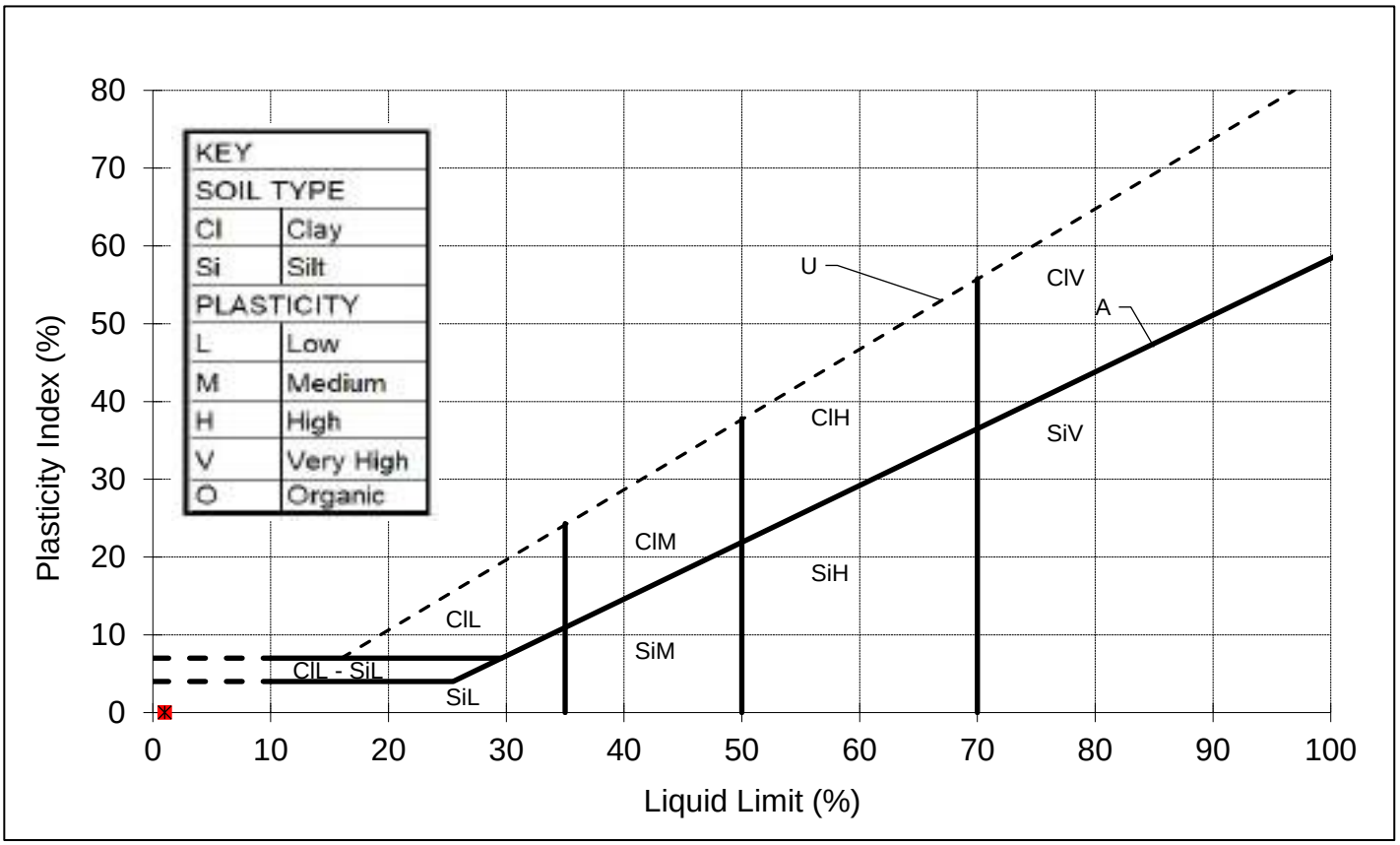
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-4	DATE SAMPLED	01-Jun-22
SAMPLE No.	113036	DATE RECEIVED	06-Jun-22
DATE TESTED	16-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	57



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 15-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

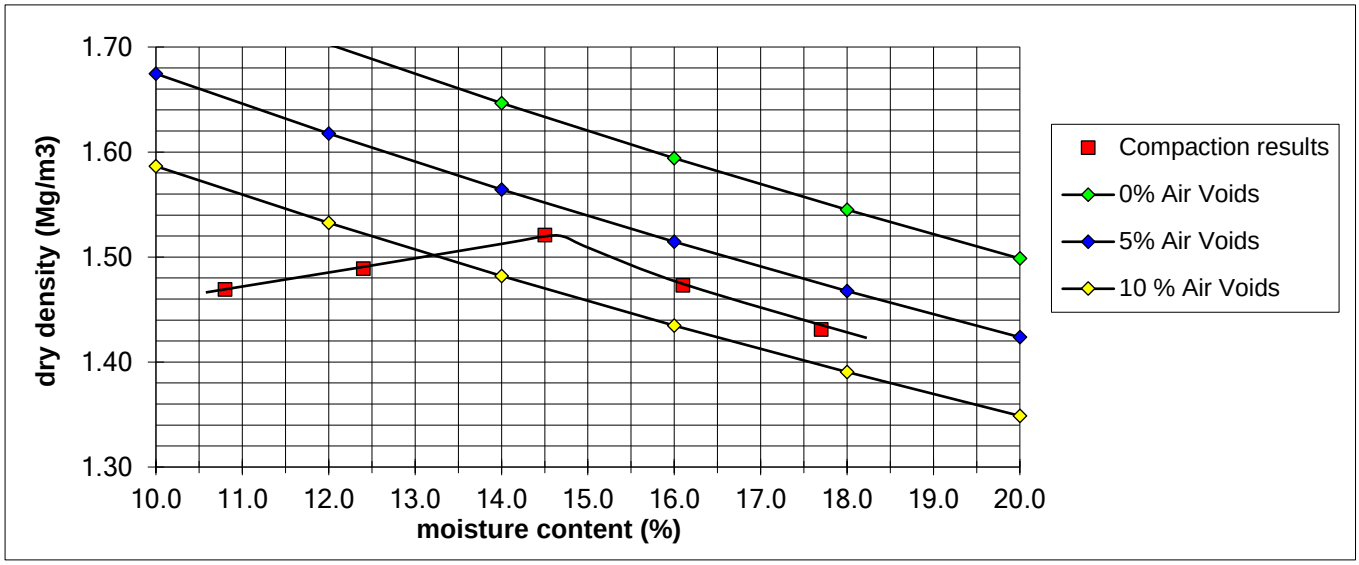
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-4	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113036	DATE RECEIVED	06-Jun-22
DATE TESTED	20-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		10.8	1.469
2		12.4	1.489
3		14.5	1.521
4		16.1	1.473
5		17.7	1.431
	Optimum	17.0	
	Maximum		1.51
	Particle Density	2.14 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 5%
Percentage of material retained on 20mm sieve = 13%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 15-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

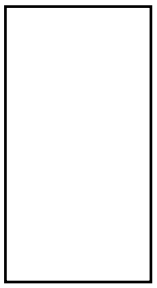
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-4	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113036	DATE RECEIVED	06-Jun-22
DATE TESTED	13-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	17	%
BULK DENSITY	1.69	Mg/m3
DRY DENSITY	1.44	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 15-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

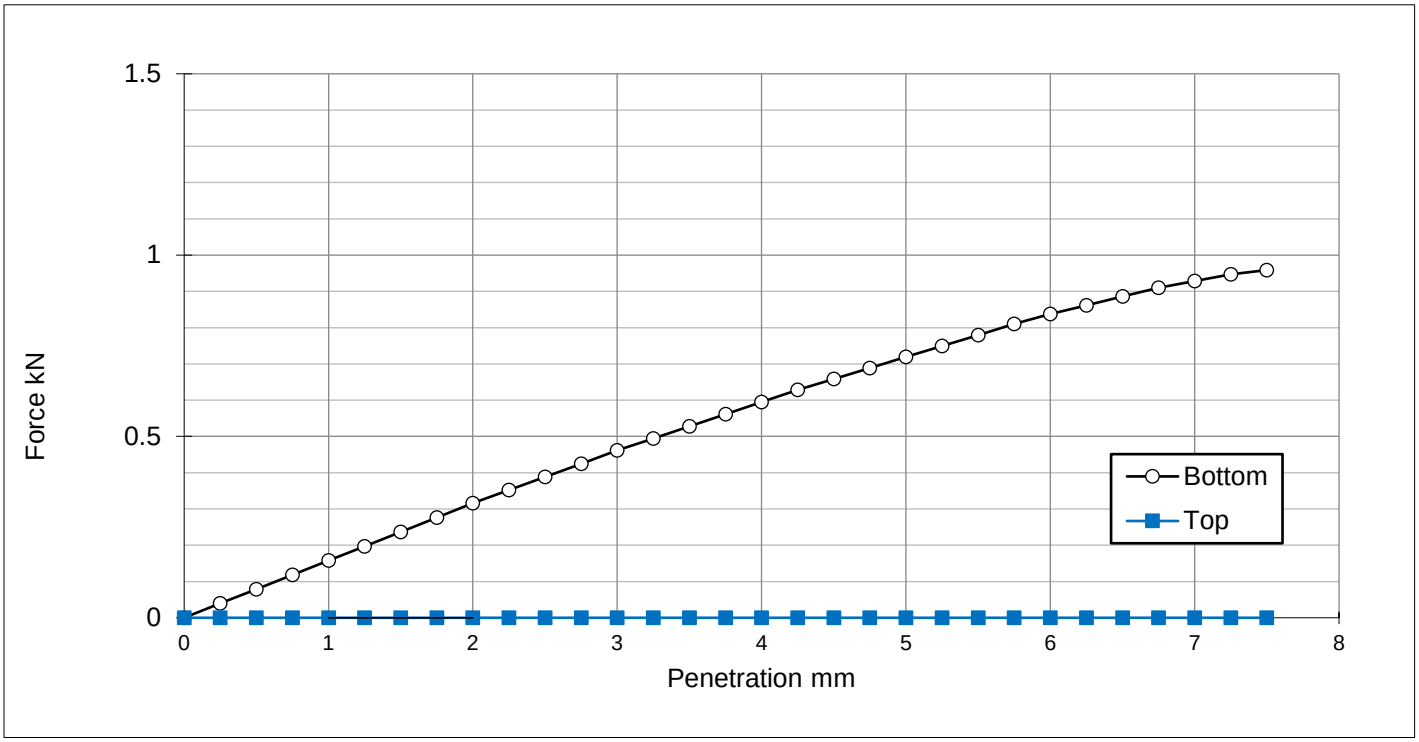
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/5

SAMPLE LABEL	TPD15-4	DATE SAMPLED	01-Jun-22
LAB SAMPLE No	113036	DATE RECEIVED	08-Jun-22
DATE TESTED	08-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		13 %			
BULK DENSITY	1.69 Mg/m3	MOISTURE CONTENT	17 %	DRY DENSITY	1.44 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.6	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	17	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract Stopes Road, Bolton

Job Number MRN 4454/6
Date of Issue 18 July 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/6				
TEST LOCATION	Test 01 - Lane 3		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	14-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4482	4501	4564	4516	0.00	0.00	0.0
4324	4468	4502	4431	-0.84	20.00	70.7
4347	4489	4535	4457	-0.59	0.00	0.0
4326	4464	4507	4432	-0.83	10.00	35.4
4296	4439	4485	4407	-1.09	15.00	53.1
4263	4413	4464	4380	-1.36	20.00	70.7
4224	4387	4442	4351	-1.65	24.00	84.9
4187	4358	4418	4321	-1.95	28.00	99.0
4142	4326	4386	4285	-2.31	31.00	109.6
4207	4386	4464	4352	-1.63	0.00	0.0
4182	4363	4437	4327	-1.88	9.00	31.8
4154	4339	4409	4301	-2.15	21.00	74.3
4119	4308	4380	4269	-2.47	31.00	109.6
4089	4284	4350	4241	-2.75	41.00	145.0
4039	4243	4310	4197	-3.18	50.00	176.8
3989	4212	4265	4155	-3.60	55.00	194.5
4081	4294	4376	4250	-2.65	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	94	kPa
Modulus of subgrade reaction (k) =	75	MPa/m
Equivalent 762 mm plate reaction =	60	MPa/m
Equivalent CBR =	11.8	%
Surface Stiffness Modulus (E) =	85	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	155	kPa
Modulus of subgrade reaction (k) =	124	MPa/m
Equivalent 762 mm plate reaction =	100	MPa/m
Equivalent CBR =	28.1	%
Surface Stiffness Modulus (E) =	149	MN/m^2

Surface Stiffness Modulus Ratio =	1.7

DATE 18-Jul-22

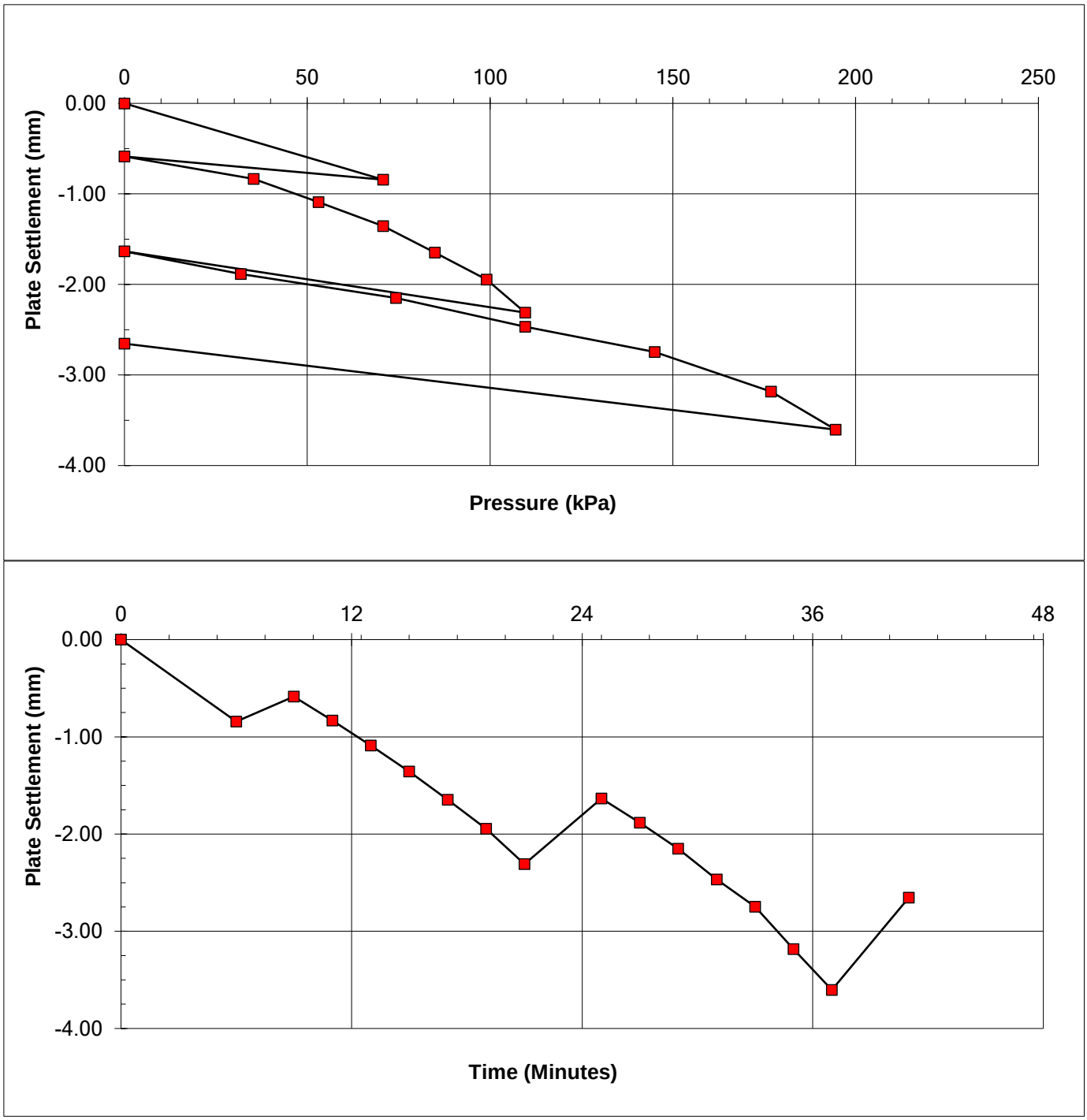
MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)



REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract Stopes Road, Bolton

Job Number MRN 4454/7
Date of Issue 18 July 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/7			
TEST LOCATION	Test 01 - Lane 2	LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	15-Jul-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4622	4605	4635	4621	0.00	0.00	0.0
4481	4467	4477	4475	-1.46	15.00	53.1
4490	4484	4500	4491	-1.29	0.00	0.0
4468	4457	4473	4466	-1.55	13.00	46.0
4427	4427	4444	4433	-1.88	21.00	74.3
4385	4395	4420	4400	-2.21	25.00	88.4
4350	4365	4384	4366	-2.54	30.00	106.1
4309	4331	4352	4331	-2.90	36.00	127.3
4271	4304	4324	4300	-3.21	40.00	141.5
4308	4348	4364	4340	-2.81	0.00	0.0
4267	4316	4337	4307	-3.14	17.00	60.1
4234	4291	4311	4279	-3.42	31.00	109.6
4207	4270	4287	4255	-3.66	43.00	152.1
4172	4240	4254	4222	-3.99	52.00	183.9
4141	4211	4228	4193	-4.27	59.00	208.7
4131	4201	4221	4184	-4.36	66.00	233.4
4202	4257	4300	4253	-3.68	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	106	kPa
Modulus of subgrade reaction (k) =	85	MPa/m
Equivalent 762 mm plate reaction =	68	MPa/m
Equivalent CBR =	14.6	%
Surface Stiffness Modulus (E) =	98	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	190	kPa
Modulus of subgrade reaction (k) =	152	MPa/m
Equivalent 762 mm plate reaction =	122	MPa/m
Equivalent CBR =	39.9	%
Surface Stiffness Modulus (E) =	186	MN/m^2

Surface Stiffness Modulus Ratio =	1.9

DATE 18-Jul-22

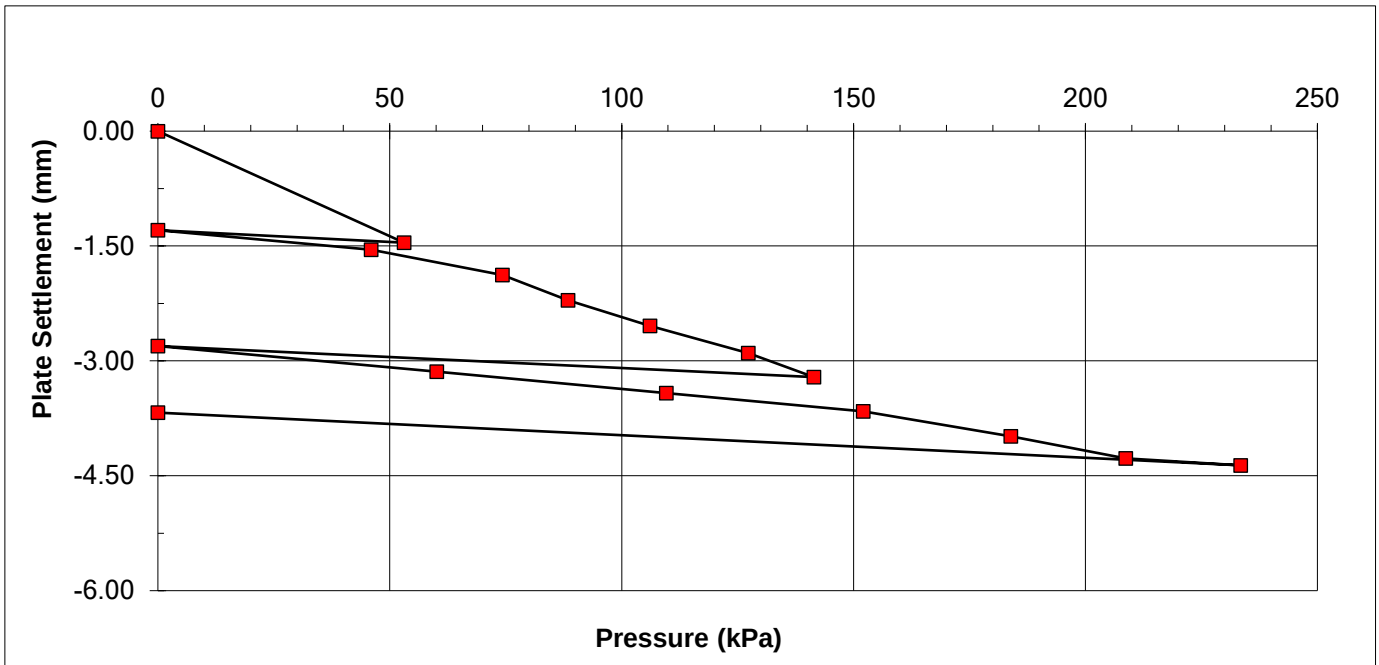
MURRAY RIX

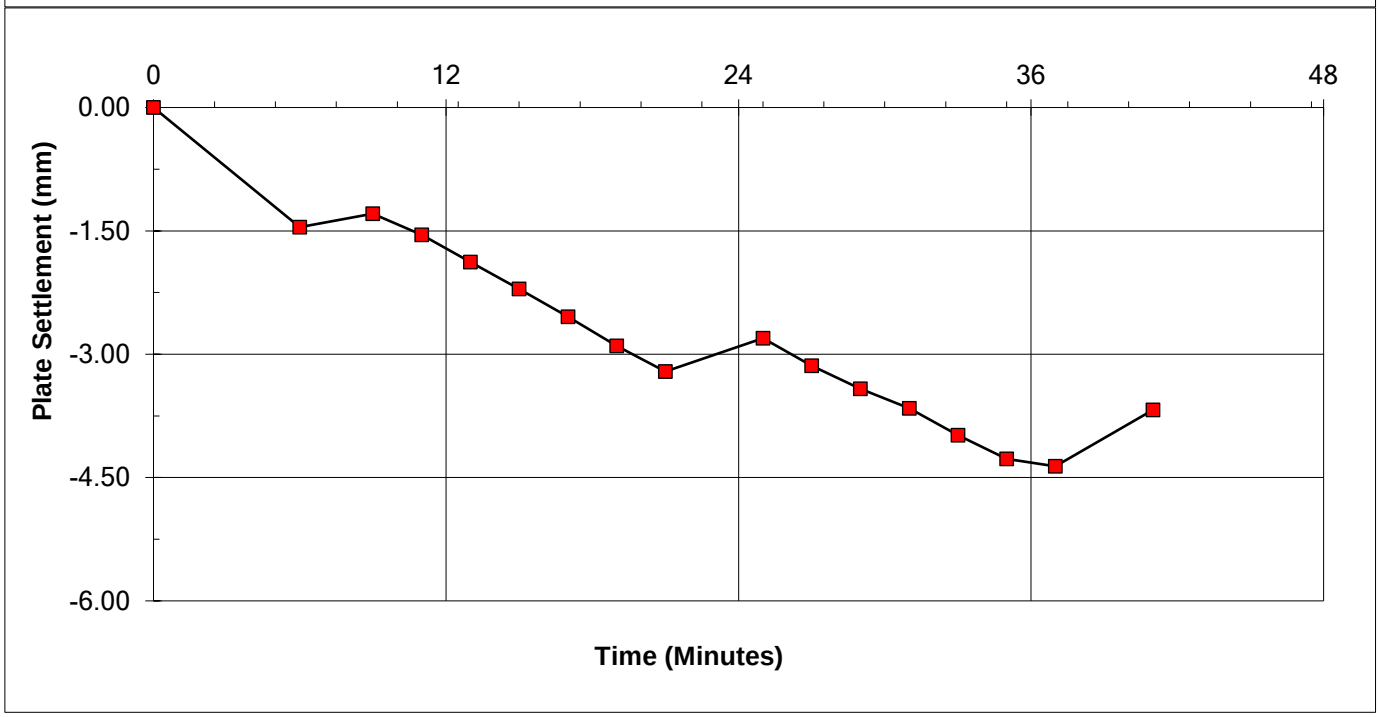
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Jul-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/7				
TEST LOCATION	Test 02 - Lane 1		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	15-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4567	4602	4634	4601	0.00	0.00	0.0
4404	4490	4449	4448	-1.53	24.00	84.9
4437	4511	4478	4475	-1.26	0.00	0.0
4412	4477	4449	4446	-1.55	17.00	60.1
4381	4451	4421	4418	-1.83	28.00	99.0
4340	4416	4383	4380	-2.21	37.00	130.9
4300	4385	4349	4345	-2.56	45.00	159.2
4249	4341	4309	4300	-3.01	55.00	194.5
4206	4306	4281	4264	-3.37	60.00	212.2
4309	4394	4367	4357	-2.44	0.00	0.0
4283	4371	4342	4332	-2.69	16.00	56.6
4252	4344	4313	4303	-2.98	28.00	99.0
4219	4307	4284	4270	-3.31	47.00	166.2
4185	4273	4249	4236	-3.65	62.00	219.3
4150	4238	4218	4202	-3.99	75.00	265.3
4096	4193	4169	4153	-4.48	90.00	318.3
4202	4296	4289	4262	-3.39	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	155	kPa
Modulus of subgrade reaction (k) =	124	MPa/m
Equivalent 762 mm plate reaction =	99	MPa/m
Equivalent CBR =	27.9	%
Surface Stiffness Modulus (E) =	148	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	225	kPa
Modulus of subgrade reaction (k) =	180	MPa/m
Equivalent 762 mm plate reaction =	145	MPa/m
Equivalent CBR =	53.5	%
Surface Stiffness Modulus (E) =	225	MN/m^2

Surface Stiffness Modulus Ratio =	1.5

DATE 18-Jul-22

MURRAY RIX

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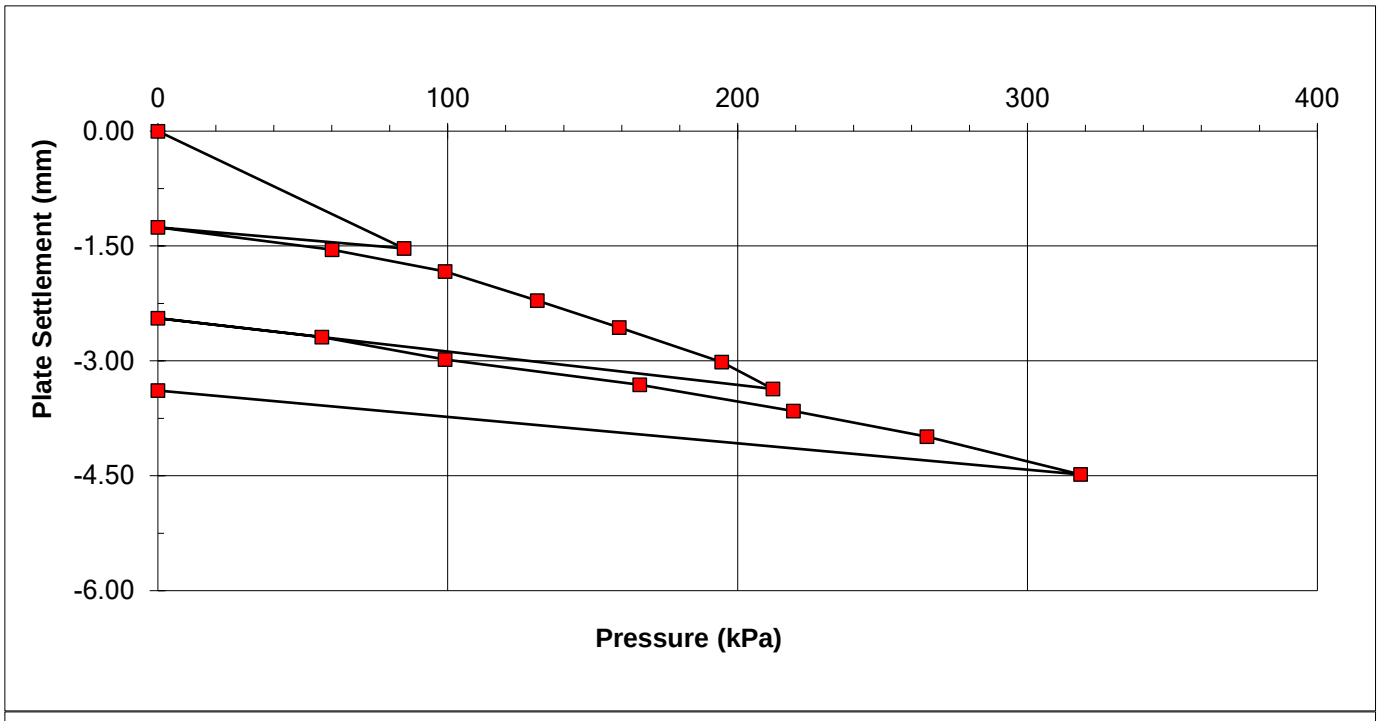
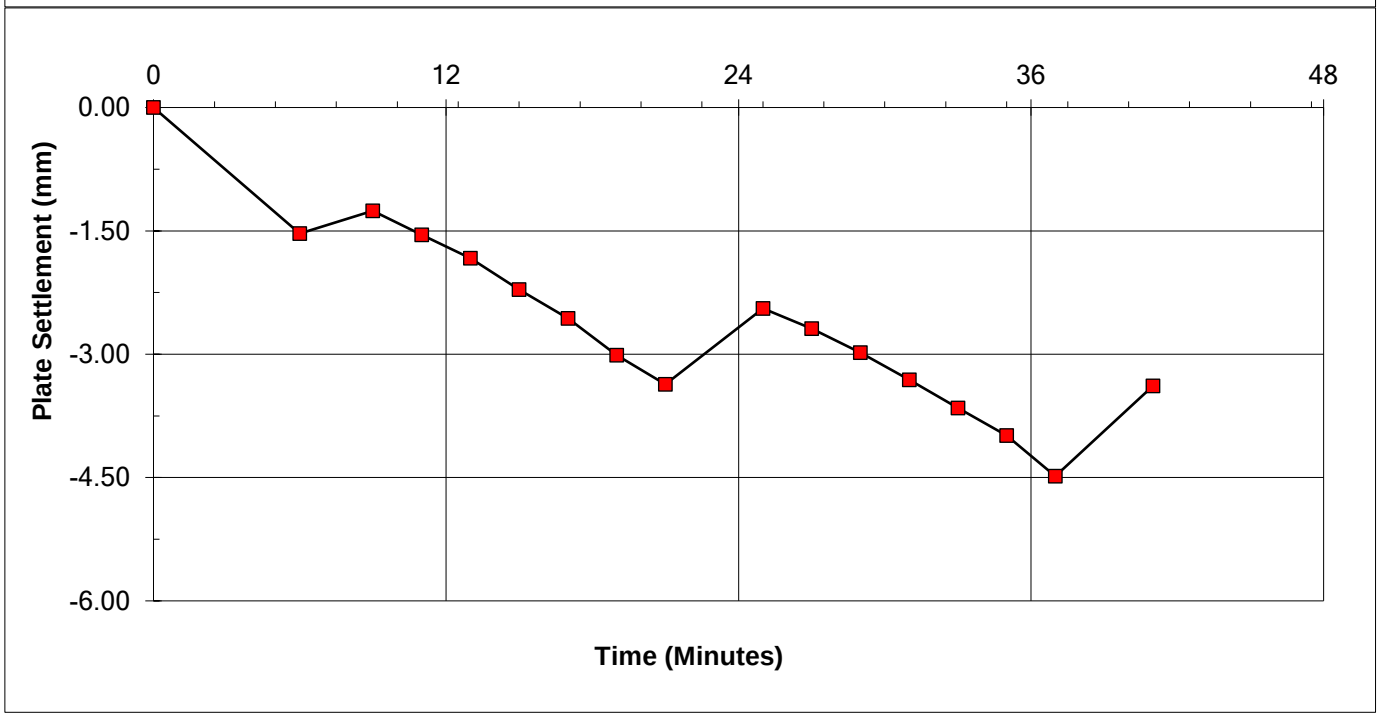
PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Jul-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/7				
TEST LOCATION	Test 03 - Lane 0		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	15-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4627	4609	4520	4585	0.00	0.00	0.0
4477	4463	4372	4437	-1.48	18.00	63.7
4485	4473	4421	4460	-1.26	0.00	0.0
4460	4444	4387	4430	-1.55	16.00	56.6
4421	4415	4348	4395	-1.91	27.00	95.5
4388	4377	4314	4360	-2.26	31.00	109.6
4351	4337	4283	4324	-2.62	41.00	145.0
4304	4302	4248	4285	-3.01	52.00	183.9
4265	4252	4208	4242	-3.44	60.00	212.2
4305	4297	4309	4304	-2.82	0.00	0.0
4277	4273	4272	4274	-3.11	12.00	42.4
4251	4241	4237	4243	-3.42	24.00	84.9
4223	4210	4208	4214	-3.72	54.00	191.0
4167	4157	4160	4161	-4.24	70.00	247.6
4123	4113	4109	4115	-4.70	84.00	297.1
4093	4084	4077	4085	-5.01	92.00	325.4
4174	4169	4175	4173	-4.13	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	134	kPa
Modulus of subgrade reaction (k) =	107	MPa/m
Equivalent 762 mm plate reaction =	86	MPa/m
Equivalent CBR =	21.9	%
Surface Stiffness Modulus (E) =	127	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	229	kPa
Modulus of subgrade reaction (k) =	183	MPa/m
Equivalent 762 mm plate reaction =	147	MPa/m
Equivalent CBR =	55.2	%
Surface Stiffness Modulus (E) =	229	MN/m^2

Surface Stiffness Modulus Ratio =	1.8

DATE 18-Jul-22

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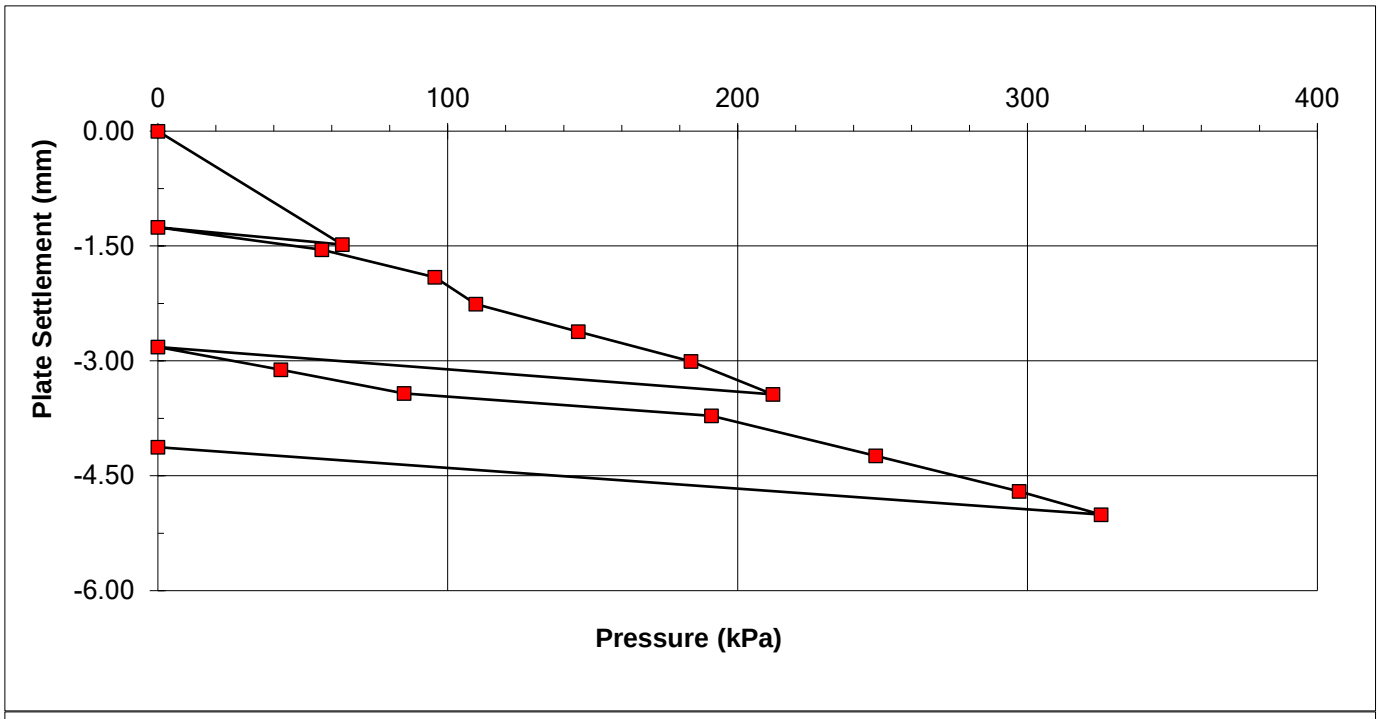
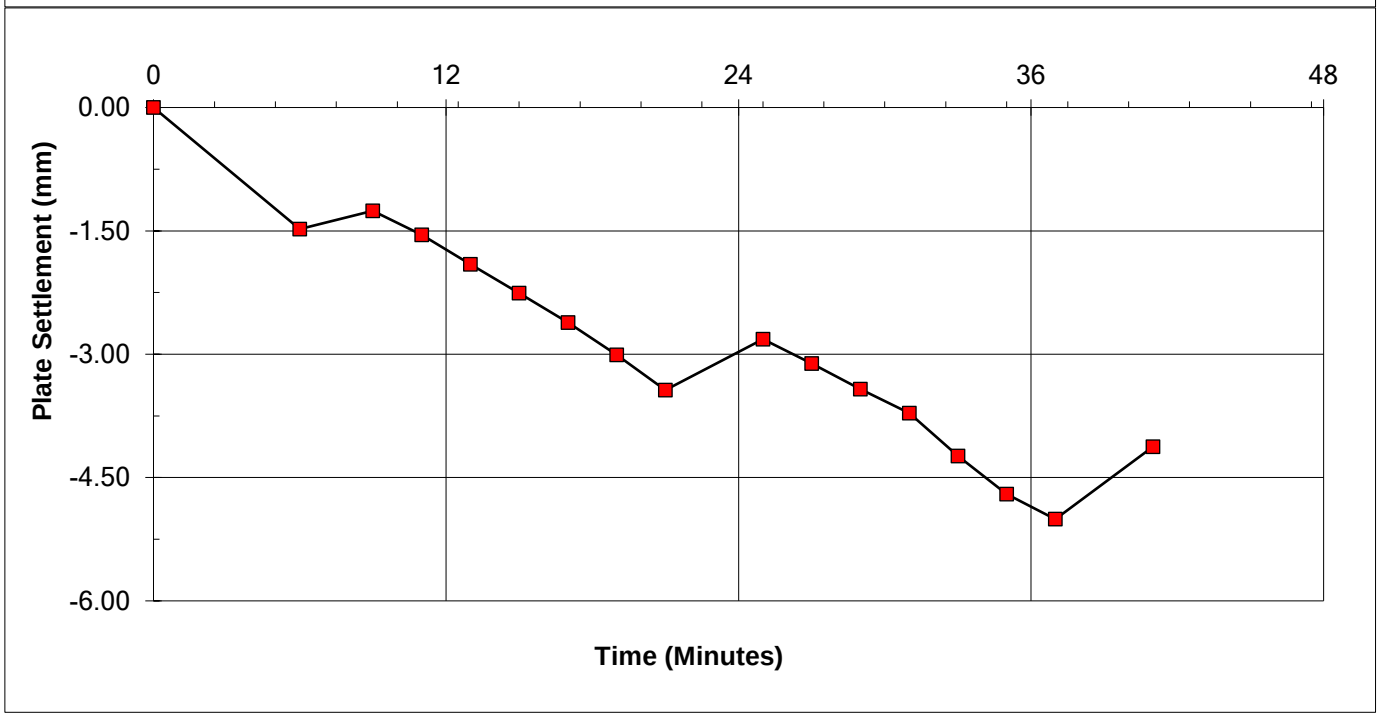
TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Jul-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/7				
TEST LOCATION	Test 04 - Lane 4	LOADING DEVICE	10 Tonne Enerpac Jack		
TEST DATE	15-Jul-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4610	4624	4535	4590	0.00	0.00	0.0
4448	4533	4392	4458	-1.32	5.00	17.7
4476	4472	4473	4474	-1.16	0.00	0.0
4451	4455	4440	4449	-1.41	18.00	63.7
4424	4428	4404	4419	-1.71	31.00	109.6
4397	4393	4367	4386	-2.04	43.00	152.1
4359	4363	4334	4352	-2.38	54.00	191.0
4334	4338	4300	4324	-2.66	63.00	222.8
4307	4312	4270	4296	-2.93	74.00	261.7
4366	4384	4388	4379	-2.10	0.00	0.0
4340	4347	4354	4347	-2.43	11.00	38.9
4314	4317	4314	4315	-2.75	25.00	88.4
4291	4293	4279	4288	-3.02	46.00	162.7
4264	4259	4245	4256	-3.34	72.00	254.6
4213	4217	4202	4211	-3.79	85.00	300.6
4157	4166	4152	4158	-4.31	96.00	339.5
4244	4236	4307	4262	-3.27	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	195	kPa
Modulus of subgrade reaction (k) =	156	MPa/m
Equivalent 762 mm plate reaction =	125	MPa/m
Equivalent CBR =	41.7	%
Surface Stiffness Modulus (E) =	192	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	256	kPa
Modulus of subgrade reaction (k) =	205	MPa/m
Equivalent 762 mm plate reaction =	165	MPa/m
Equivalent CBR =	67.1	%
Surface Stiffness Modulus (E) =	260	MN/m^2

Surface Stiffness Modulus Ratio =	1.4

DATE 18-Jul-22

MURRAY RIX

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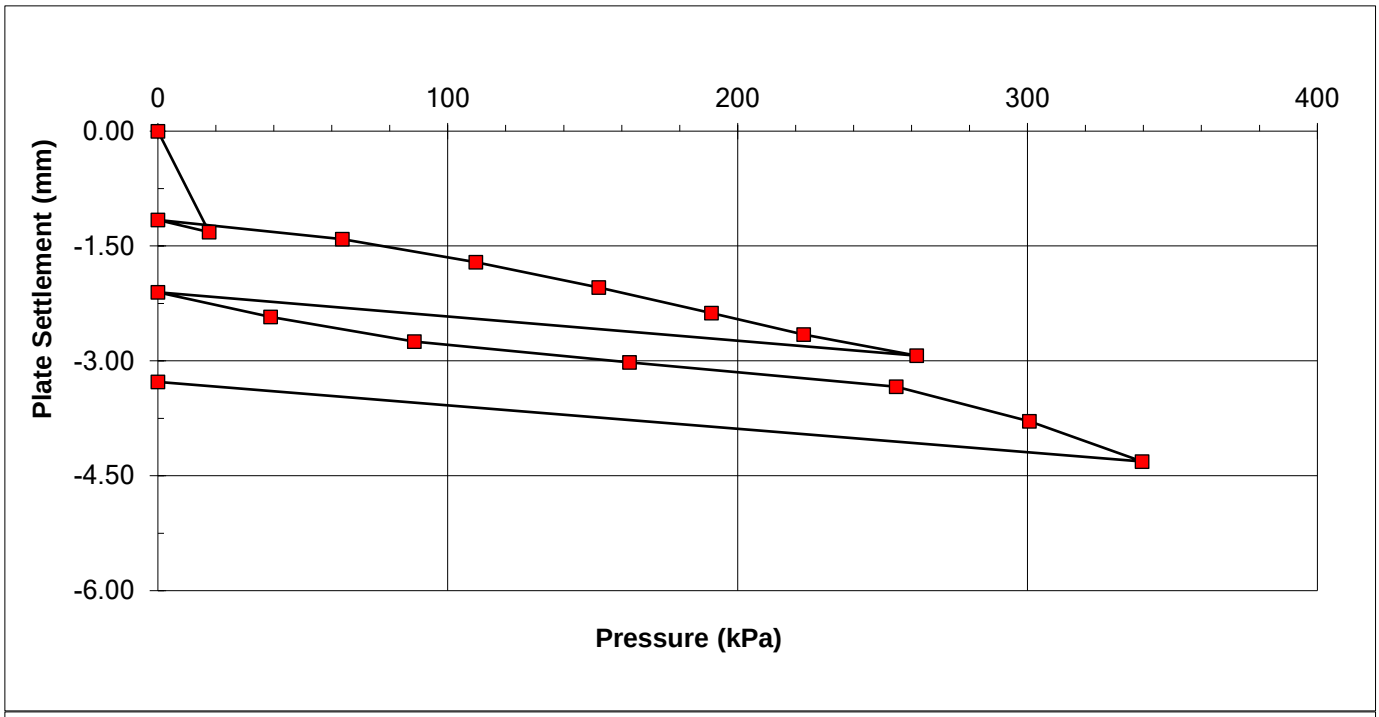
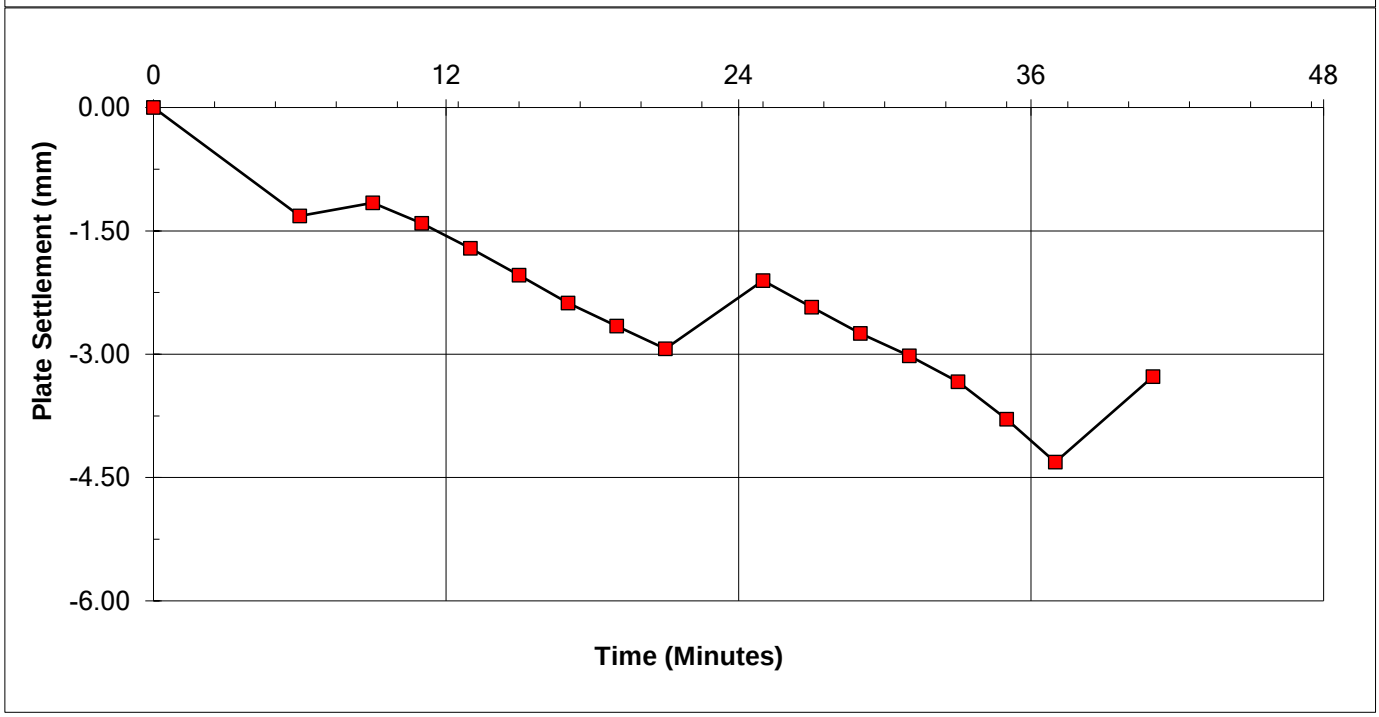
TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST
BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract Stopes Road, Bolton

Job Number MRN 4454/8
Date of Issue 20 July 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/8				
TEST LOCATION	Test 01 - Lane 2		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	19-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4377	4409	4578	4455	0.00	0.00	0.0
4209	4262	4445	4305	-1.49	14.00	49.5
4237	4297	4481	4338	-1.16	0.00	0.0
4202	4268	4460	4310	-1.45	8.00	28.3
4156	4233	4439	4276	-1.79	15.00	53.1
4119	4204	4415	4246	-2.09	18.00	63.7
4090	4172	4383	4215	-2.40	24.00	84.9
4040	4126	4339	4168	-2.86	30.00	106.1
4003	4095	4307	4135	-3.20	35.00	123.8
4085	4176	4379	4213	-2.41	0.00	0.0
4056	4151	4356	4188	-2.67	11.00	38.9
4019	4125	4329	4158	-2.97	25.00	88.4
3984	4092	4297	4124	-3.30	37.00	130.9
3952	4064	4273	4096	-3.58	45.00	159.2
3919	4034	4239	4064	-3.91	53.00	187.4
3886	4003	4210	4033	-4.22	62.00	219.3
4022	4113	4353	4163	-2.92	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	86	kPa
Modulus of subgrade reaction (k) =	69	MPa/m
Equivalent 762 mm plate reaction =	55	MPa/m
Equivalent CBR =	10.0	%
Surface Stiffness Modulus (E) =	77	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	166	kPa
Modulus of subgrade reaction (k) =	133	MPa/m
Equivalent 762 mm plate reaction =	107	MPa/m
Equivalent CBR =	31.7	%
Surface Stiffness Modulus (E) =	161	MN/m^2

Surface Stiffness Modulus Ratio =	2.1

DATE 20-Jul-22

MURRAY RIX

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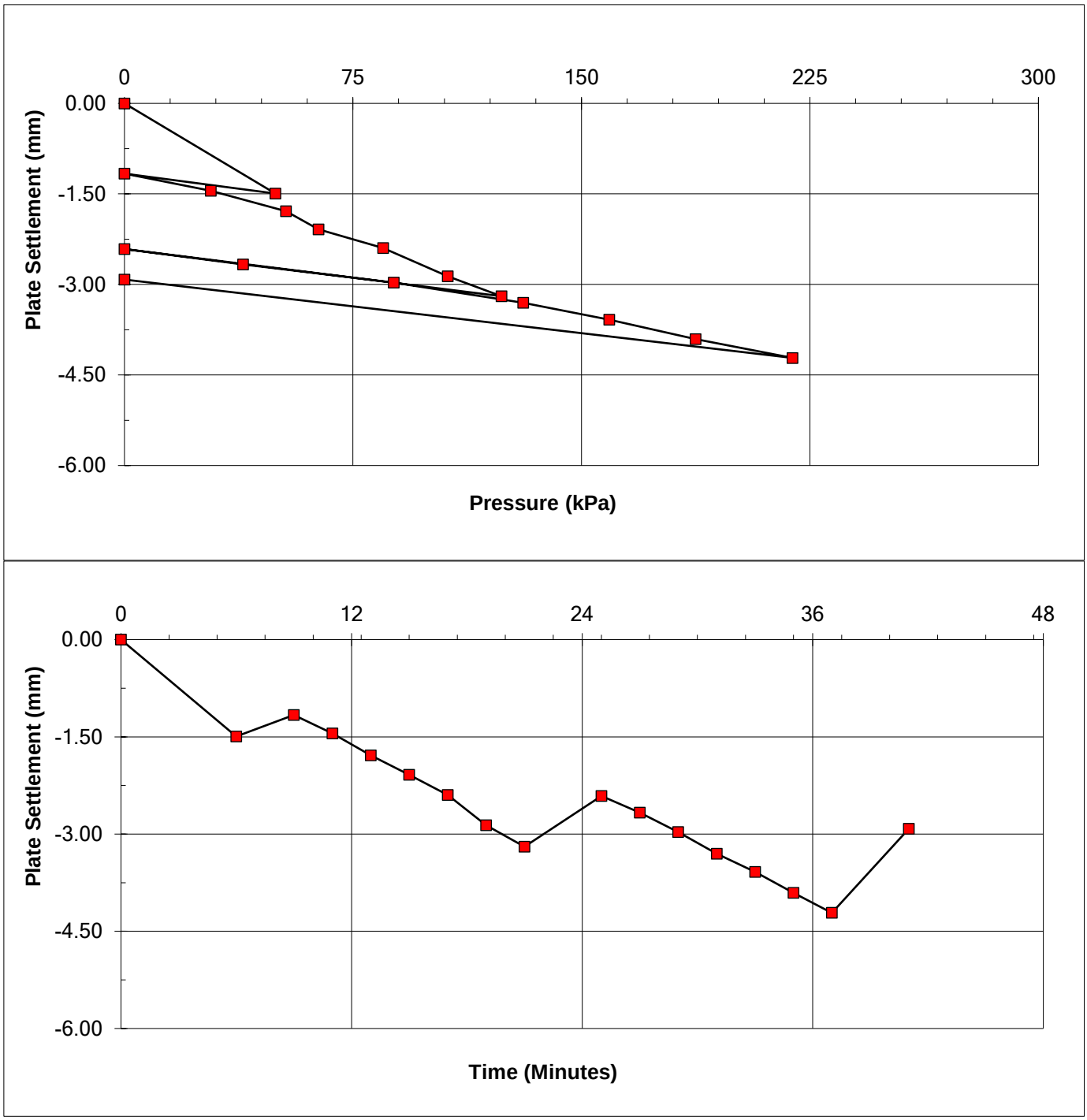
TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)



REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 20-Jul-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/8				
TEST LOCATION	Test 02 - Lane 1		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	19-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4535	4601	4630	4589	0.00	0.00	0.0
4475	4459	4480	4471	-1.17	26.00	92.0
4503	4478	4487	4489	-0.99	0.00	0.0
4473	4446	4462	4460	-1.28	15.00	53.1
4444	4420	4436	4433	-1.55	31.00	109.6
4397	4377	4397	4390	-1.98	43.00	152.1
4307	4297	4315	4306	-2.82	62.00	219.3
4253	4255	4271	4260	-3.29	71.00	251.1
4204	4206	4224	4211	-3.77	84.00	297.1
4288	4257	4263	4269	-3.19	0.00	0.0
4258	4233	4245	4245	-3.43	7.00	24.8
4227	4206	4205	4213	-3.76	18.00	63.7
4198	4181	4180	4186	-4.02	32.00	113.2
4176	4149	4152	4159	-4.30	51.00	180.4
4142	4120	4116	4126	-4.63	66.00	233.4
4111	3992	4086	4063	-5.26	89.00	314.8
4220	4083	4205	4169	-4.19	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	173	kPa
Modulus of subgrade reaction (k) =	138	MPa/m
Equivalent 762 mm plate reaction =	111	MPa/m
Equivalent CBR =	33.9	%
Surface Stiffness Modulus (E) =	168	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	204	kPa
Modulus of subgrade reaction (k) =	163	MPa/m
Equivalent 762 mm plate reaction =	131	MPa/m
Equivalent CBR =	45.2	%
Surface Stiffness Modulus (E) =	202	MN/m^2

Surface Stiffness Modulus Ratio =	1.2

DATE 20-Jul-22

MURRAY RIX

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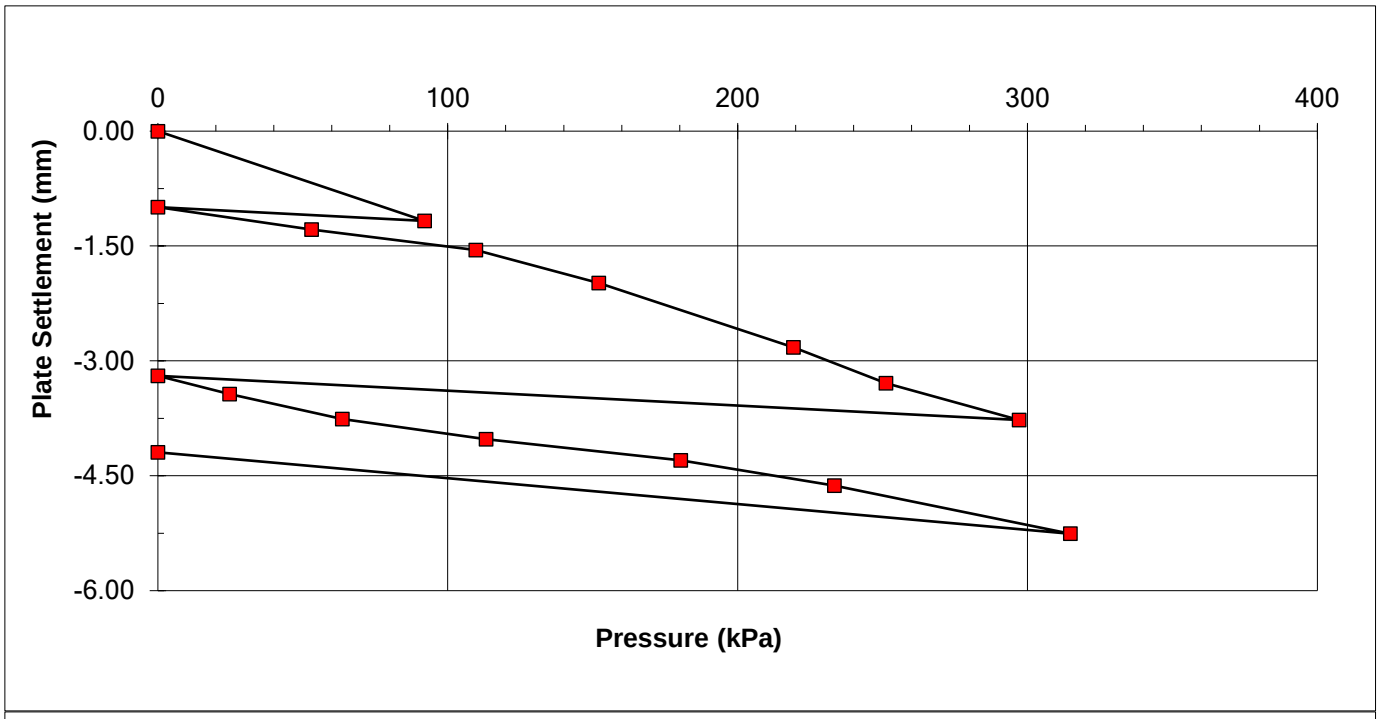

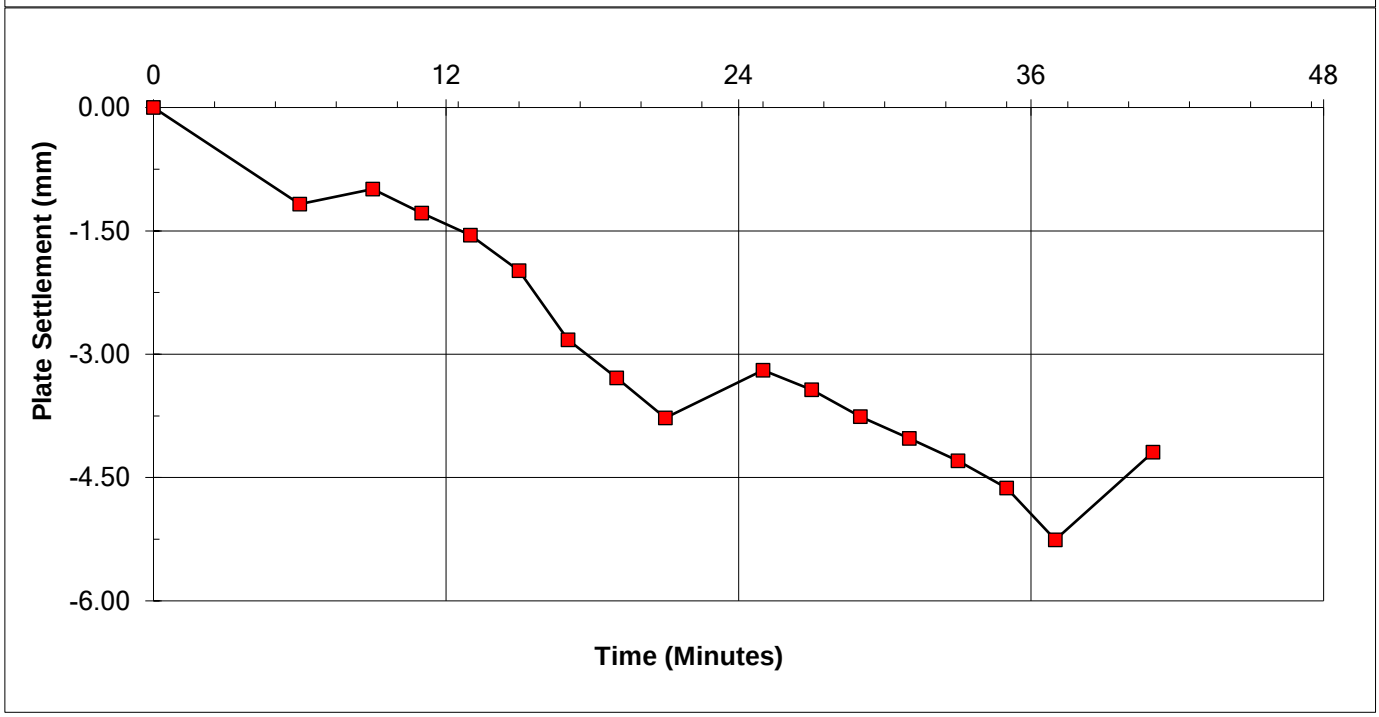

REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 20-Jul-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/8				
TEST LOCATION	Test 03 - Lane 3		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	19-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4636	4589	4490	4572	0.00	0.00	0.0
4480	4442	4353	4425	-1.47	30.00	106.1
4509	4487	4382	4459	-1.12	0.00	0.0
4479	4451	4350	4427	-1.45	24.00	84.9
4448	4423	4321	4397	-1.74	37.00	130.9
4410	4389	4284	4361	-2.11	50.00	176.8
4367	4337	4239	4314	-2.57	58.00	205.1
4333	4302	4197	4277	-2.94	70.00	247.6
4287	4260	4154	4234	-3.38	81.00	286.5
4364	4357	4231	4317	-2.54	0.00	0.0
4337	4329	4205	4290	-2.81	10.00	35.4
4307	4301	4172	4260	-3.12	26.00	92.0
4280	4270	4141	4230	-3.41	47.00	166.2
4256	4240	4114	4203	-3.68	65.00	229.9
4230	4208	4081	4173	-3.99	84.00	297.1
4202	4180	4046	4143	-4.29	96.00	339.5
4305	4265	4130	4233	-3.38	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	193	kPa
Modulus of subgrade reaction (k) =	154	MPa/m
Equivalent 762 mm plate reaction =	124	MPa/m
Equivalent CBR =	41.1	%
Surface Stiffness Modulus (E) =	190	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	254	kPa
Modulus of subgrade reaction (k) =	203	MPa/m
Equivalent 762 mm plate reaction =	164	MPa/m
Equivalent CBR =	66.2	%
Surface Stiffness Modulus (E) =	258	MN/m^2

Surface Stiffness Modulus Ratio =	1.4

DATE 20-Jul-22

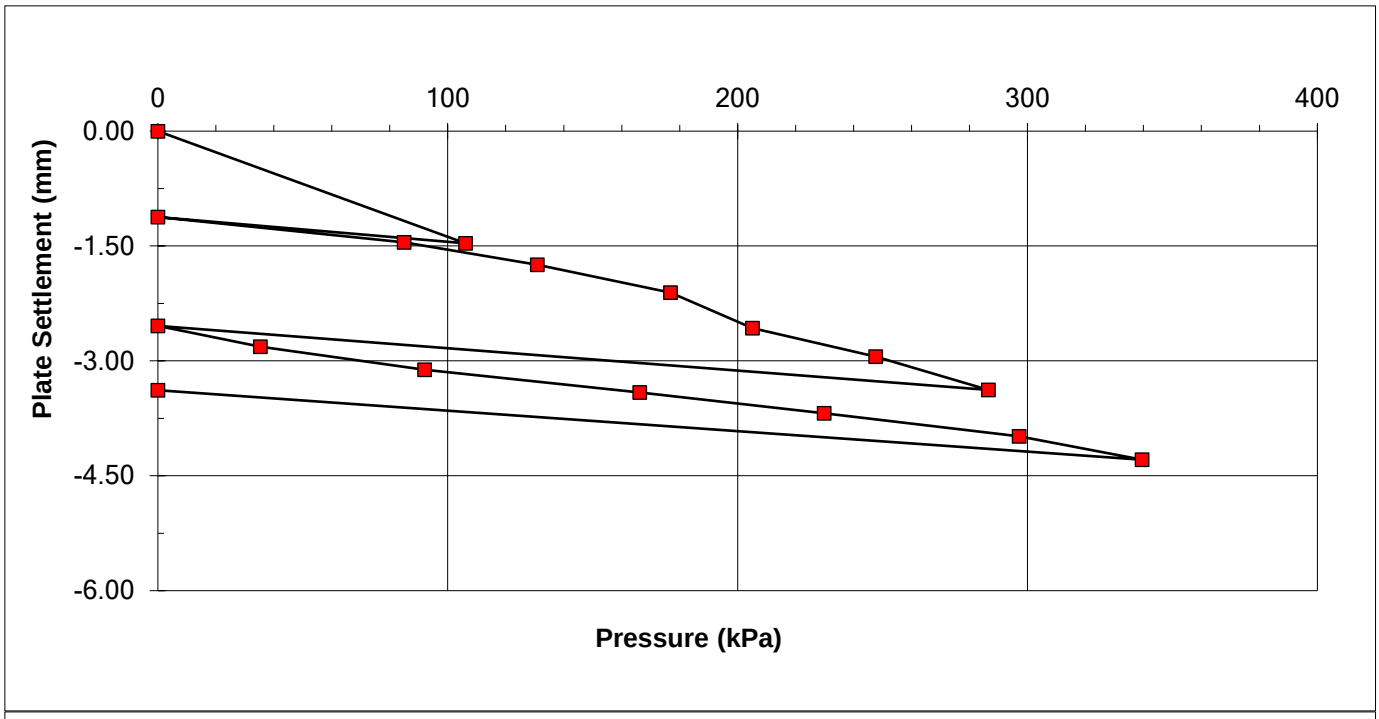
MURRAY RIX

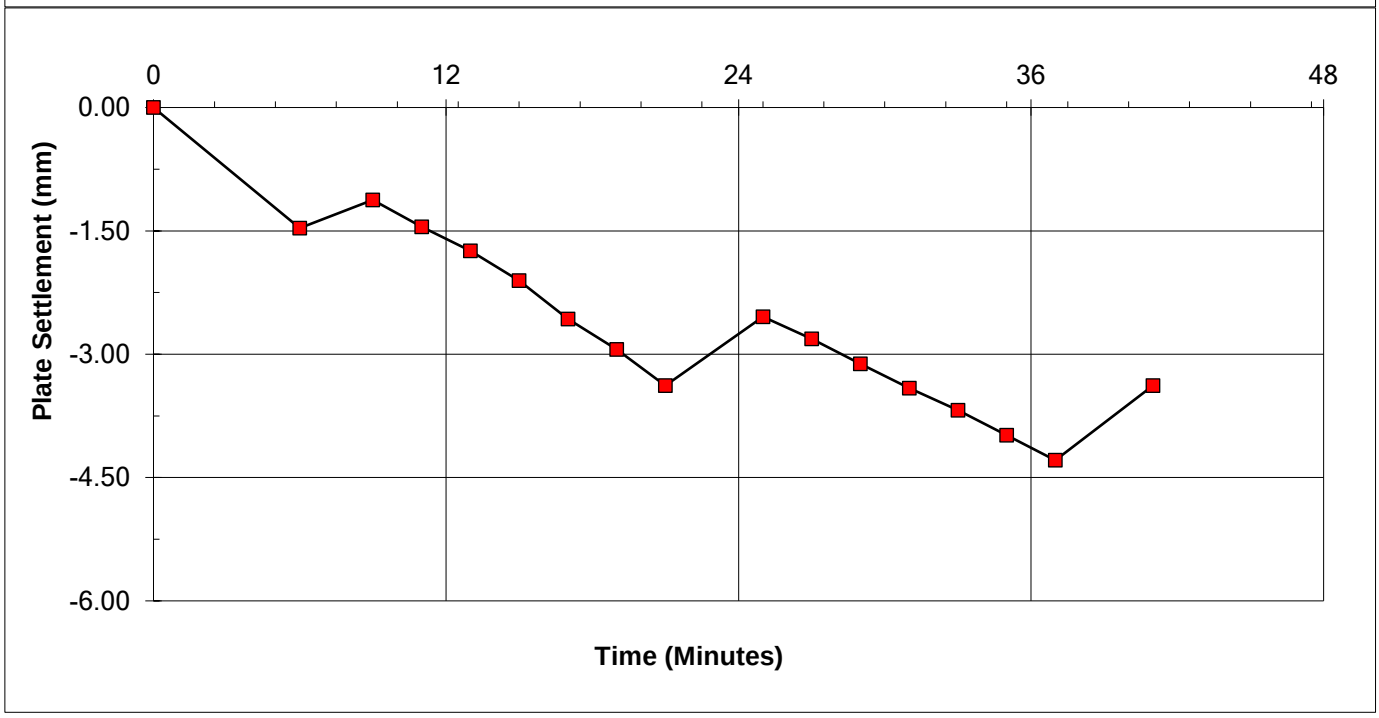
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 20-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

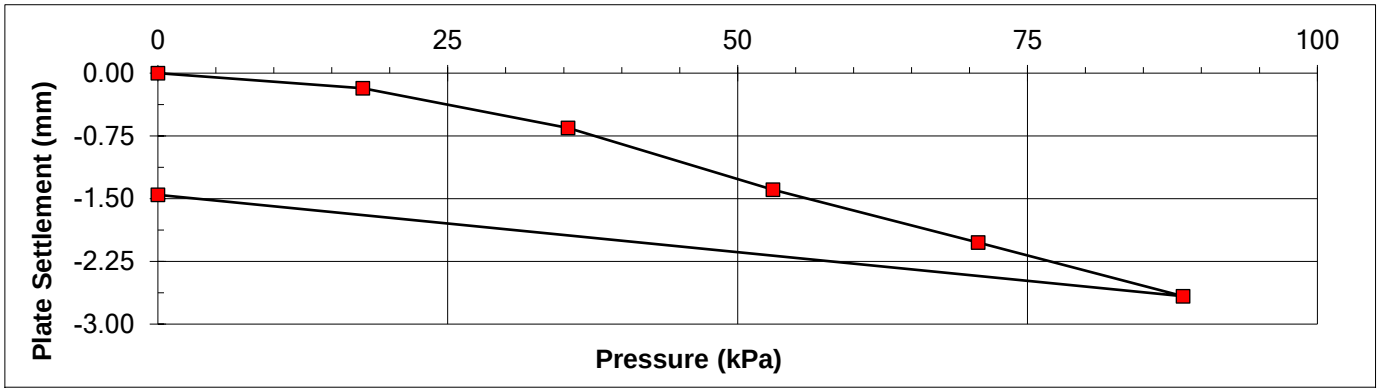
TEST CERTIFICATE

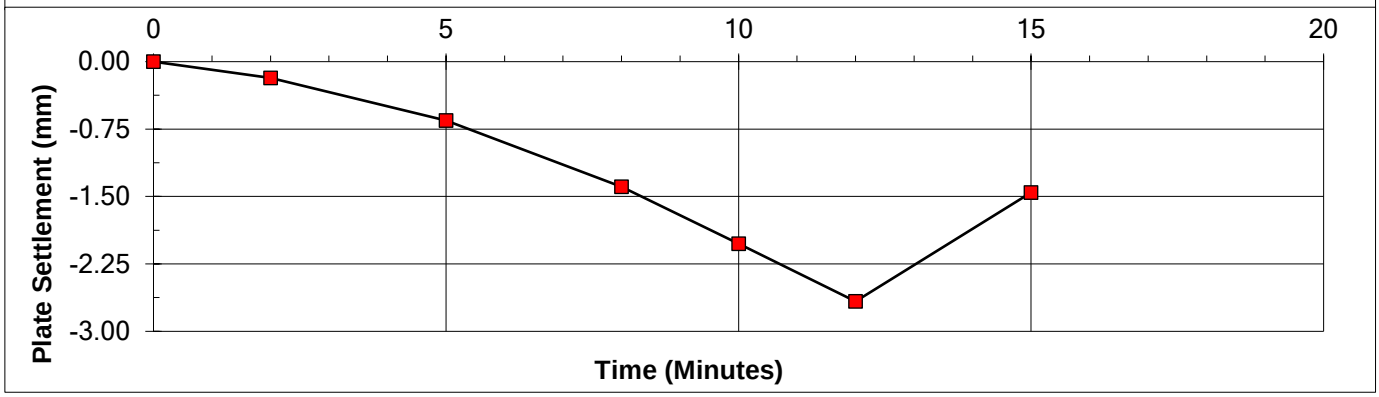
PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/8			
TEST LOCATION	RC6	LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	19-Jul-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash / Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4556	4549	4426	4510	0.00	0.00	0.0
4550	4530	4397	4492	-0.18	5.00	17.7
4513	4478	4344	4445	-0.65	10.00	35.4
4437	4415	4261	4371	-1.39	15.00	53.1
4371	4366	4186	4308	-2.03	20.00	70.7
4314	4301	4116	4244	-2.67	25.00	88.4
4409	4428	4257	4365	-1.46	0.00	0.0





Pressure at 1.25 mm deflexion =	50	kPa
Modulus of subgrade reaction (k) =	40	MPa/m
Equivalent 762 mm plate reaction =	32	MPa/m
Equivalent CBR =	3.9	%

REMARKS

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 20-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/9
Date of Issue 20 July 2022
Page 1 of 11

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

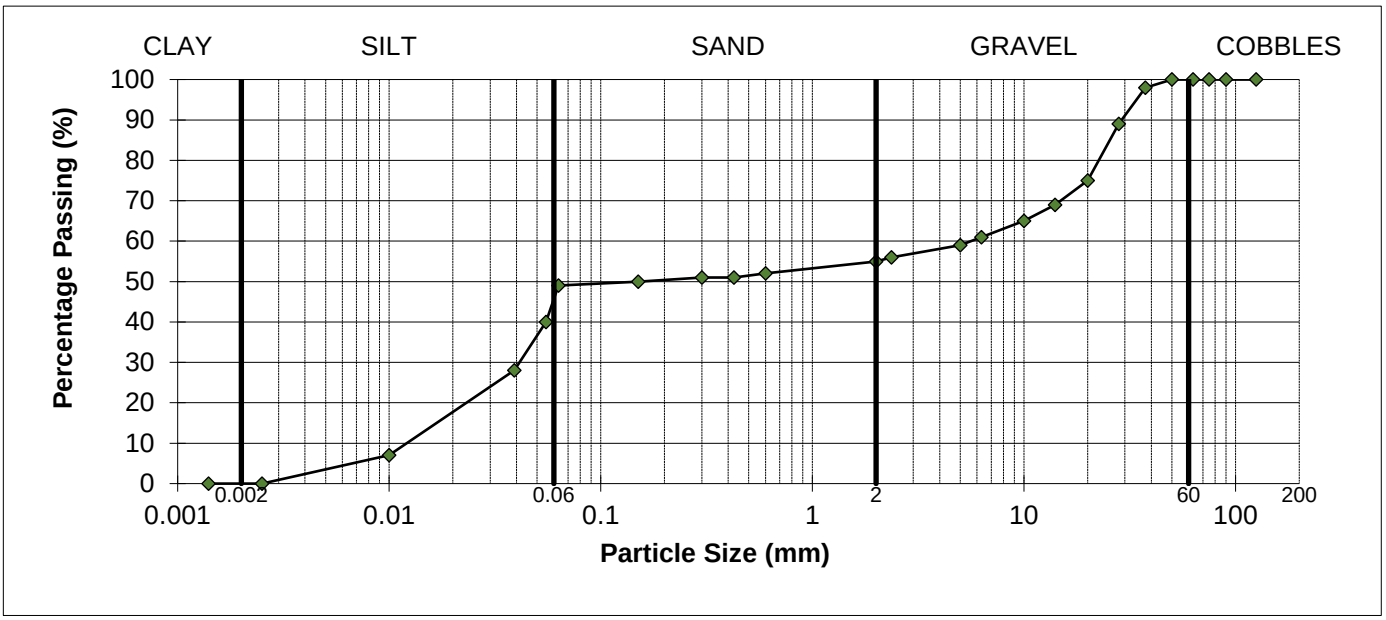
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-1	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114368	DATE RECEIVED	12-Jul-22
DATE TESTED	13-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	56	
90	100		2	55	
75	100		0.6	52	
63	100		0.425	51	
50	100		0.3	51	
37.5	98		0.15	50	
28	89		0.063	49	
20	75		0.055	40	
14	69		0.039	28	
10	65		0.01	7	
6.3	61		0.0025	0	
5	59		0.0014	0	



REMARKS
As received moisture content = 17%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 20-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

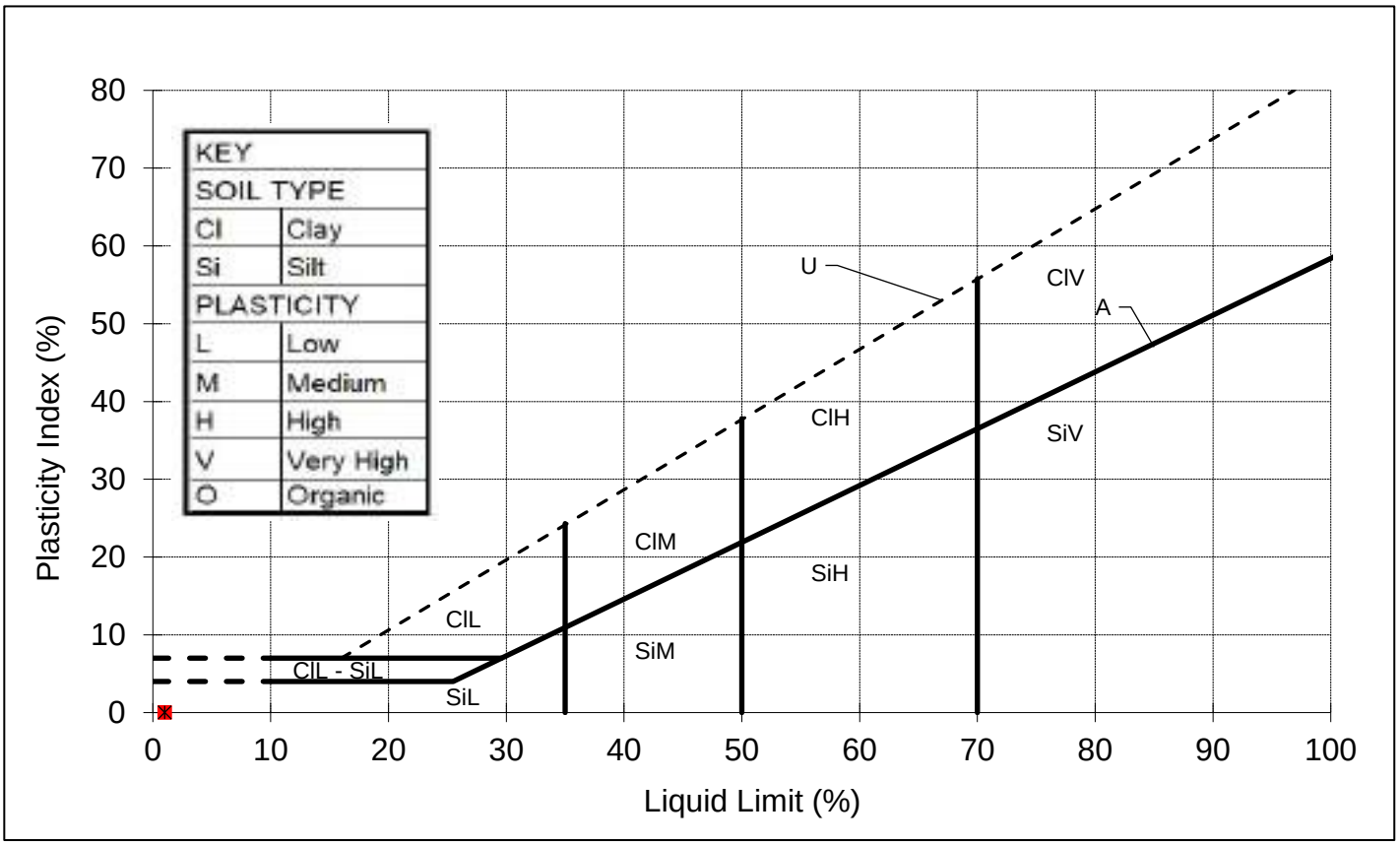
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-1	DATE SAMPLED	07-Jul-22
SAMPLE No.	114368	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	N/A	Non Plastic	N/A	51



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 20-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

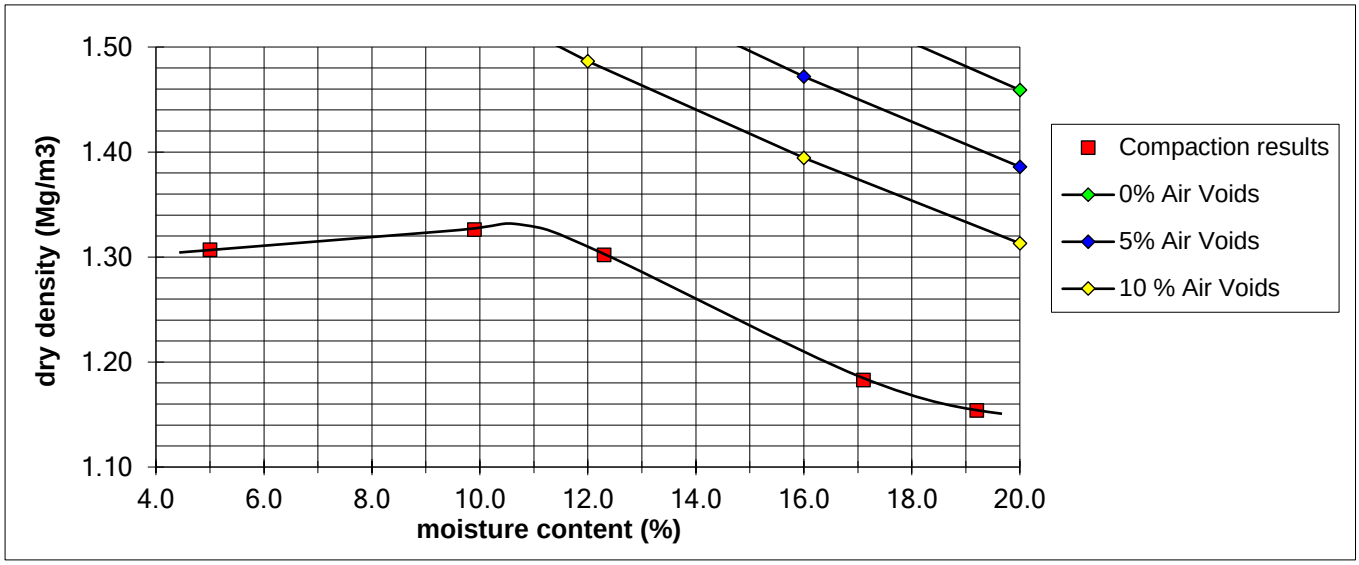
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-1	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114368	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		5.0	1.307
2		9.9	1.326
3		12.3	1.302
4		17.1	1.183
5		19.2	1.154
	Optimum	10.0	
	Maximum		1.33
	Particle Density	2.06 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 12%
Percentage of material retained on 20mm sieve = 25%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 20-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

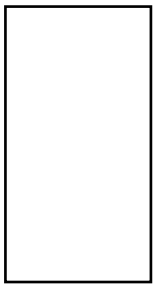
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-1	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114368	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	20	%
BULK DENSITY	1.34	Mg/m3
DRY DENSITY	1.12	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 20-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

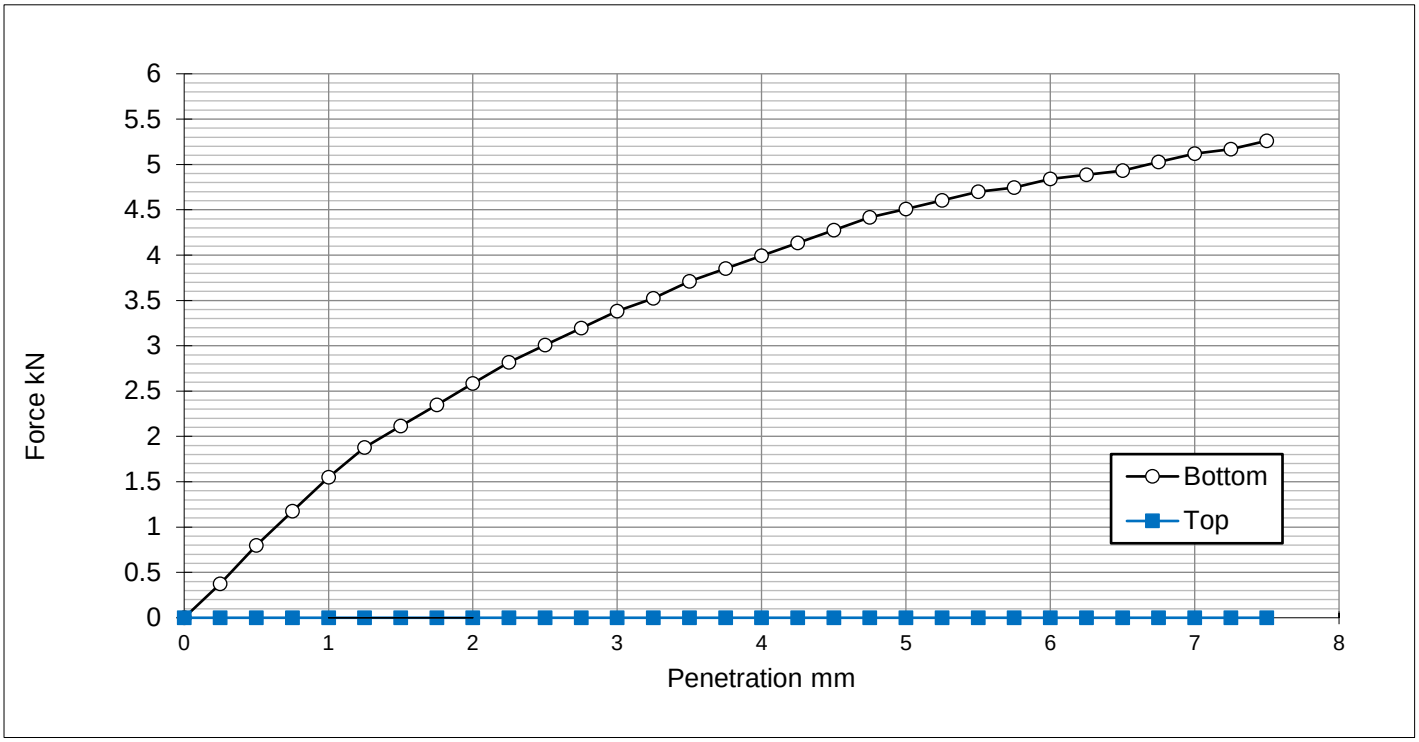
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-1	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114368	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		25 %			
BULK DENSITY	1.34 Mg/m3	MOISTURE CONTENT	20 %	DRY DENSITY	1.12 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	23	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	20	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 20-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

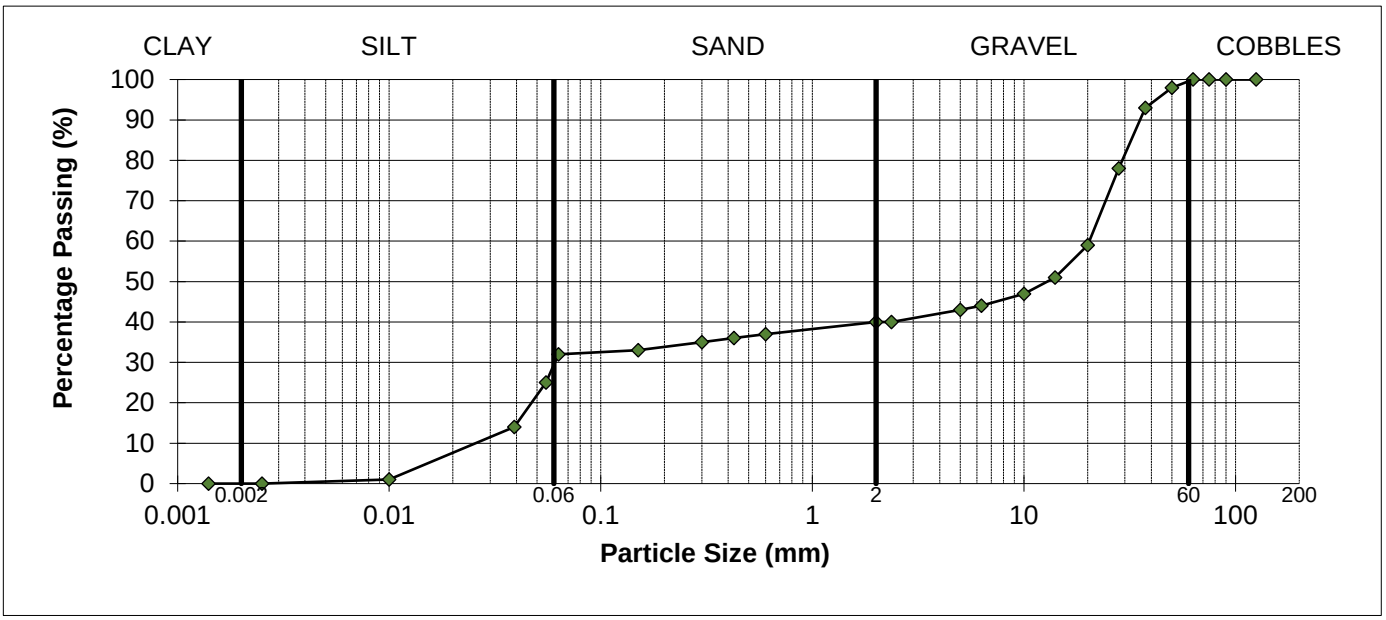
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-2	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114369	DATE RECEIVED	12-Jul-22
DATE TESTED	13-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	40	
90	100		2	40	
75	100		0.6	37	
63	100		0.425	36	
50	98		0.3	35	
37.5	93		0.15	33	
28	78		0.063	32	
20	59		0.055	25	
14	51		0.039	14	
10	47		0.01	1	
6.3	44		0.0025	0	
5	43		0.0014	0	



REMARKS
As received moisture content = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 20-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

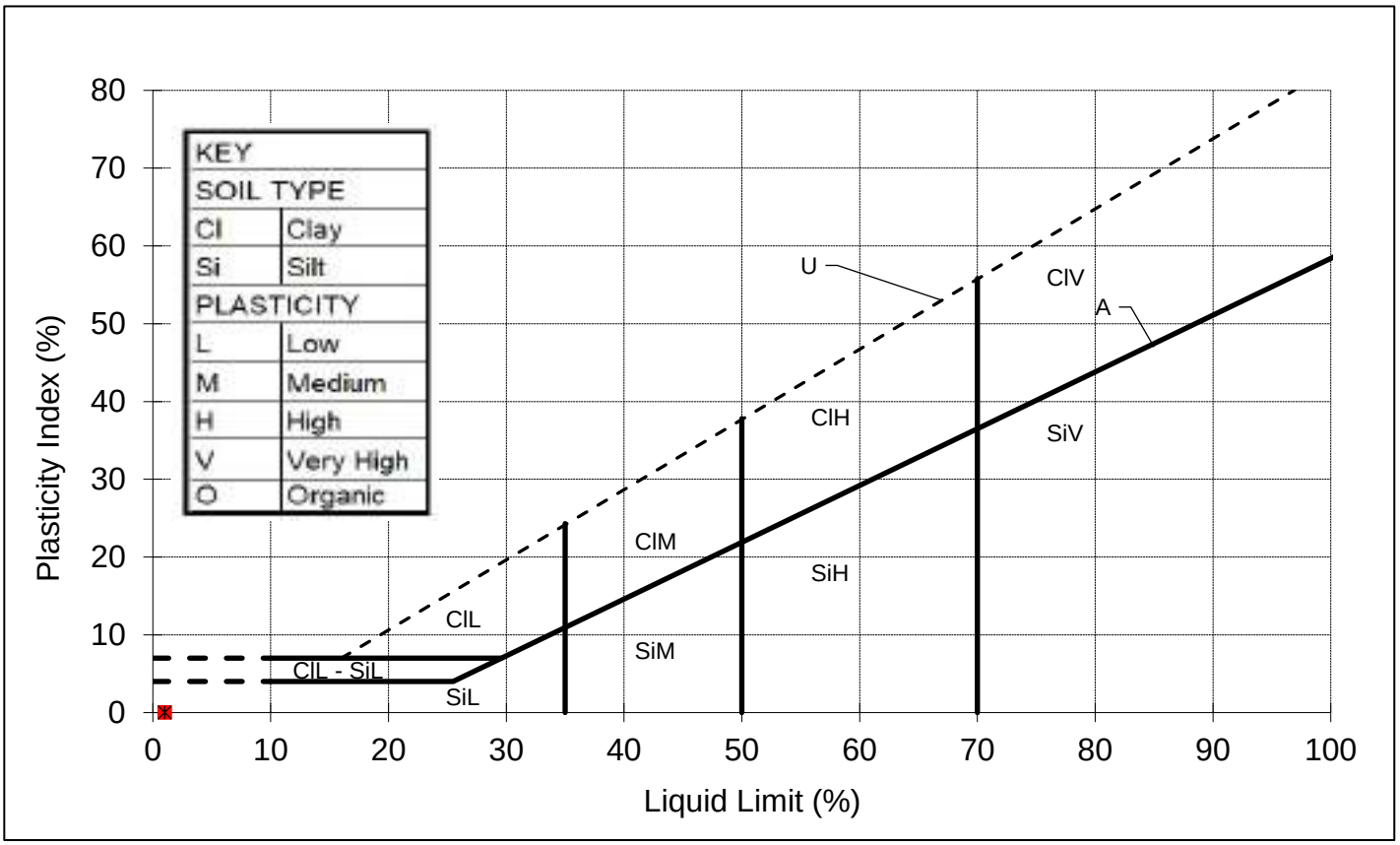
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-2	DATE SAMPLED	07-Jul-22
SAMPLE No.	114369	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12	N/A	Non Plastic	N/A	36



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 20-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

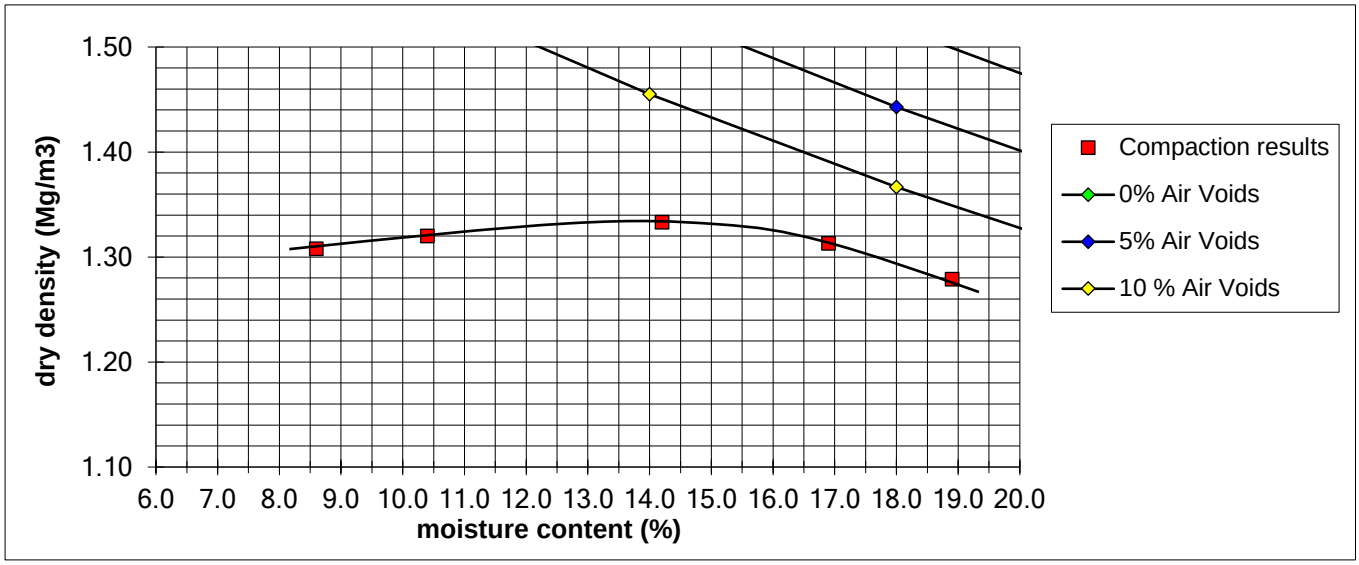
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-2	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114369	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		8.6	1.308
2		10.4	1.320
3		14.2	1.333
4		16.9	1.313
5		18.9	1.279
	Optimum	14.0	
	Maximum		1.33
	Particle Density	2.09 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 7%
Percentage of material retained on 20mm sieve = 41%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 20-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

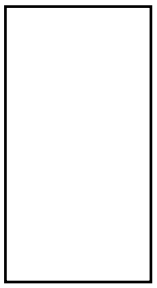
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-2	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114369	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	17	%
BULK DENSITY	1.53	Mg/m3
DRY DENSITY	1.31	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 20-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

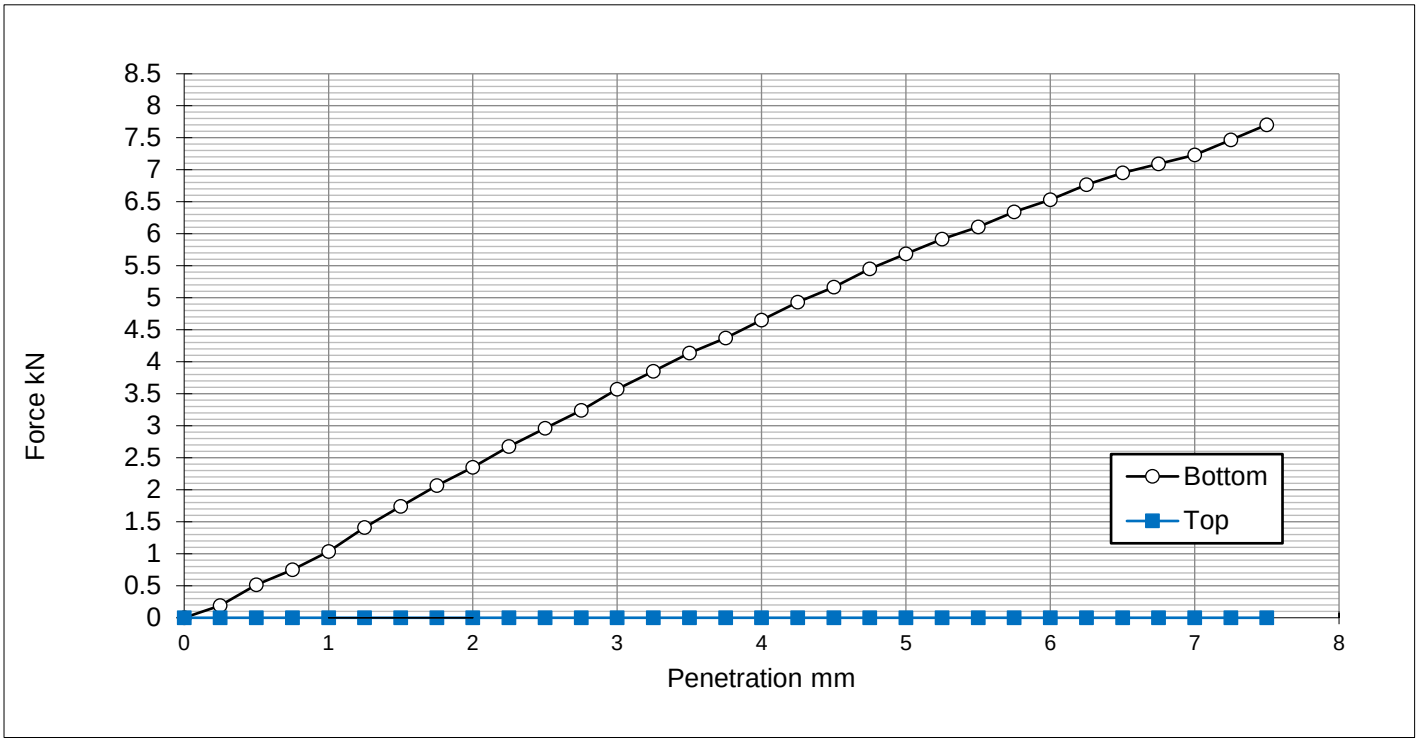
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/9

SAMPLE LABEL	SP-BLACK-2	DATE SAMPLED	07-Jul-22
LAB SAMPLE No	114369	DATE RECEIVED	12-Jul-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		41 %			
BULK DENSITY	1.54 Mg/m3	MOISTURE CONTENT	17 %	DRY DENSITY	1.31 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	28	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	17	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 20-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/10
Date of Issue 21 July 2022
Page 1 of 15

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

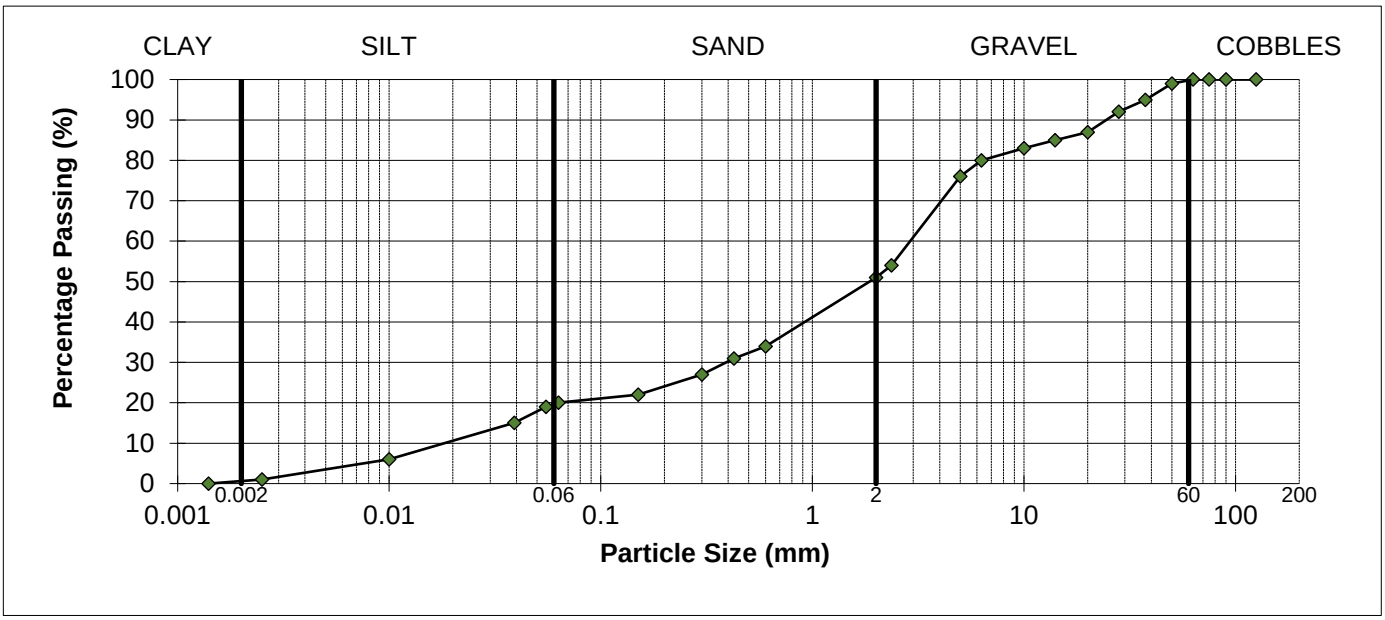
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP6F-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113681	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	54	
90	100		2	51	
75	100		0.6	34	
63	100		0.425	31	
50	99		0.3	27	
37.5	95		0.15	22	
28	92		0.063	20	
20	87		0.055	19	
14	85		0.039	15	
10	83		0.01	6	
6.3	80		0.0025	1	
5	76		0.0014	0	



REMARKS
As received moisture content = 6.5%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

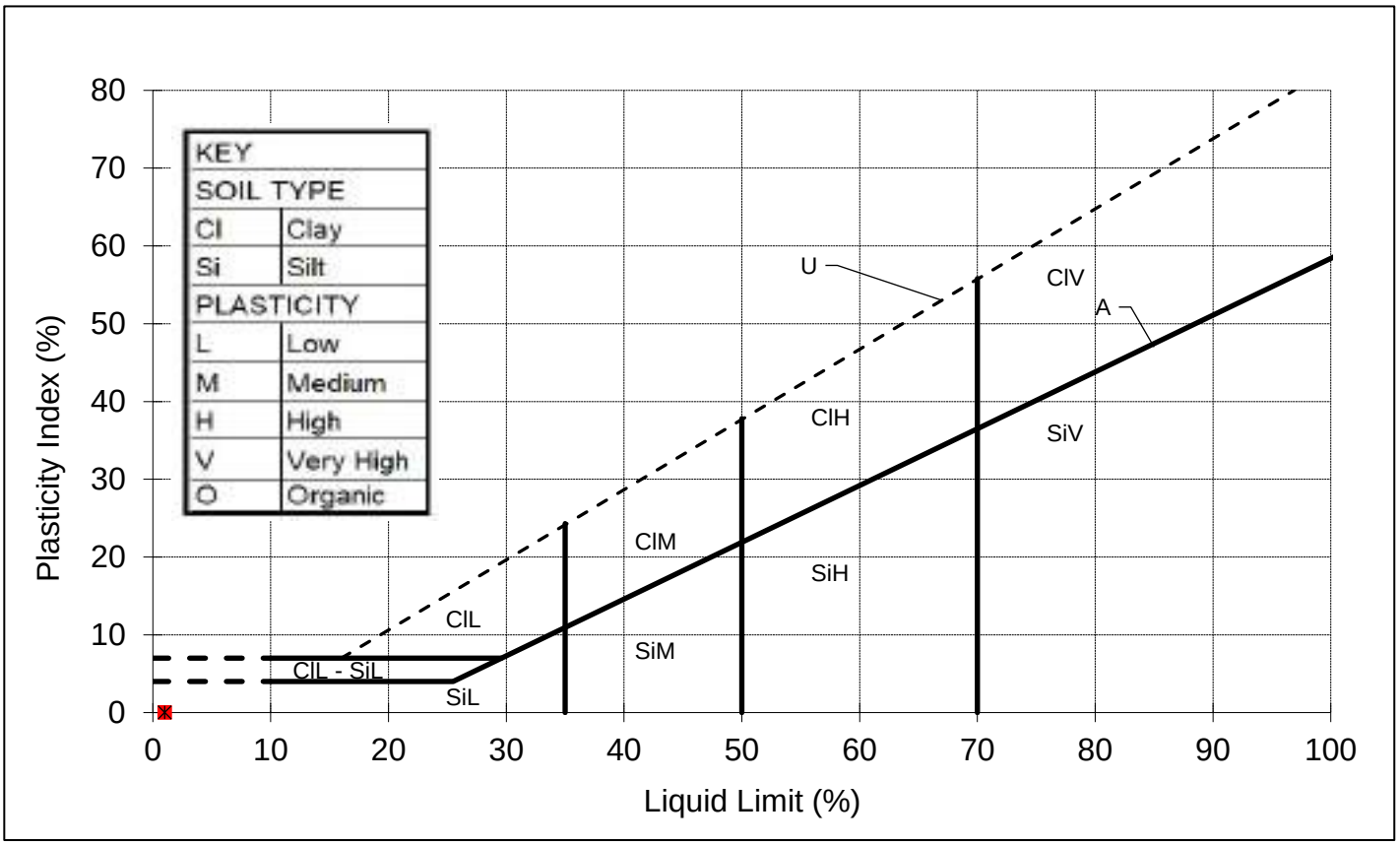
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP6F-G1	DATE SAMPLED	20-Jun-22
SAMPLE No.	113681	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
6.5	N/A	Non Plastic	N/A	31



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

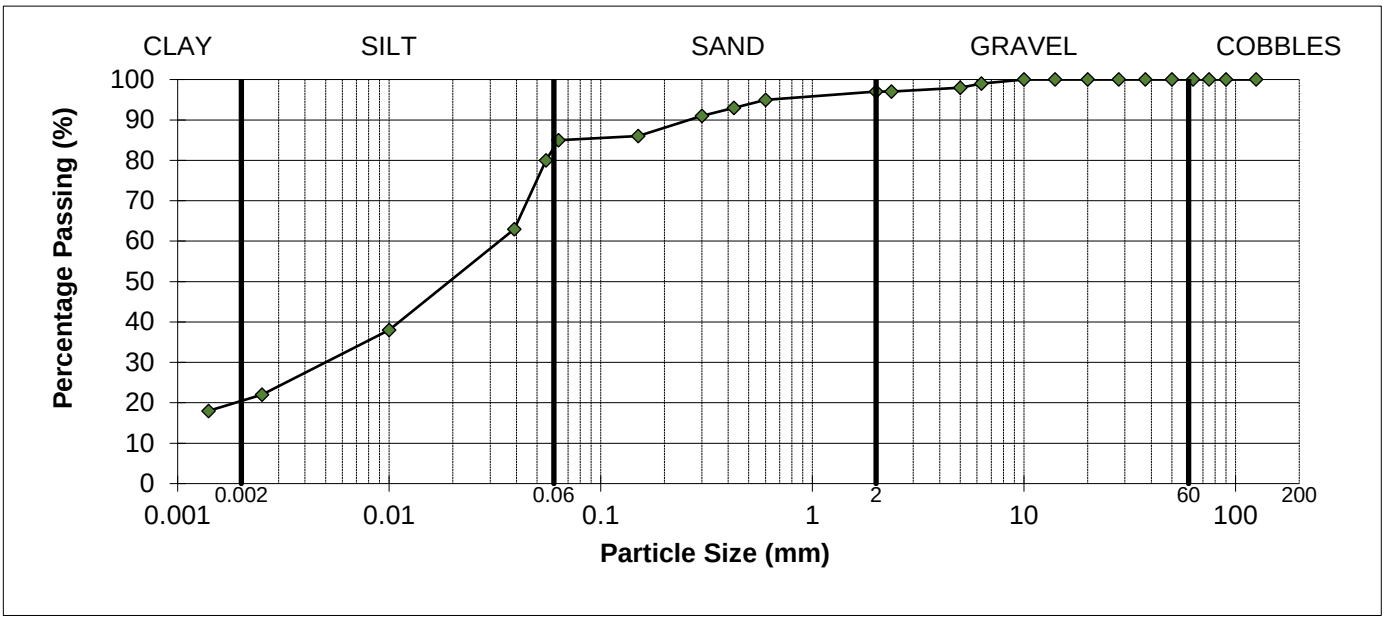
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP6G-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113680	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	Cohesive Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	97	
90	100		2	97	
75	100		0.6	95	
63	100		0.425	93	
50	100		0.3	91	
37.5	100		0.15	86	
28	100		0.063	85	
20	100		0.055	80	
14	100		0.039	63	
10	100		0.01	38	
6.3	99		0.0025	22	
5	98		0.0014	18	



REMARKS
As received moisture content = 13%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

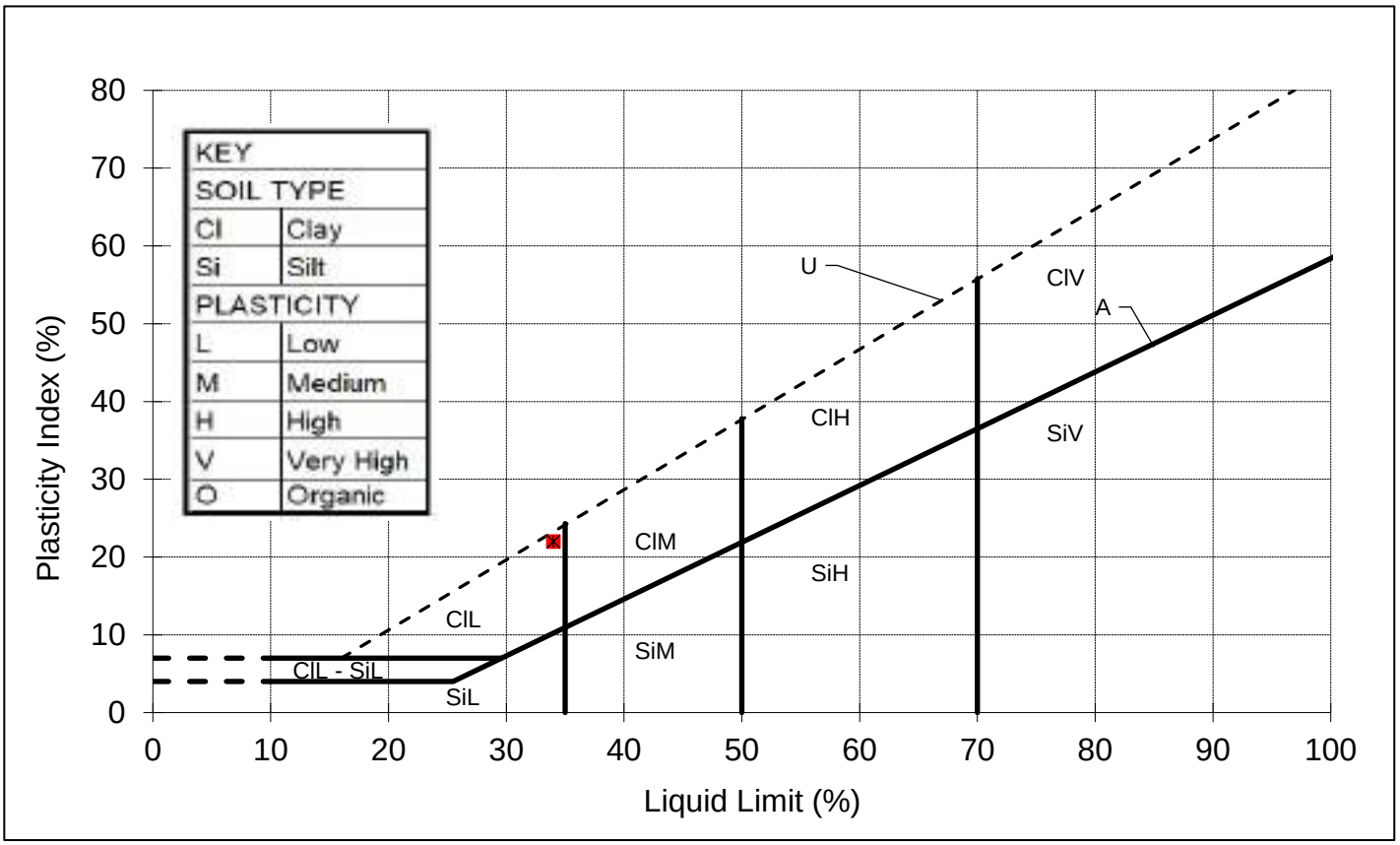
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP6G-G1	DATE SAMPLED	20-Jun-22
SAMPLE No.	113680	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	Cohesive Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
13	34	12	22	93



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 21-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

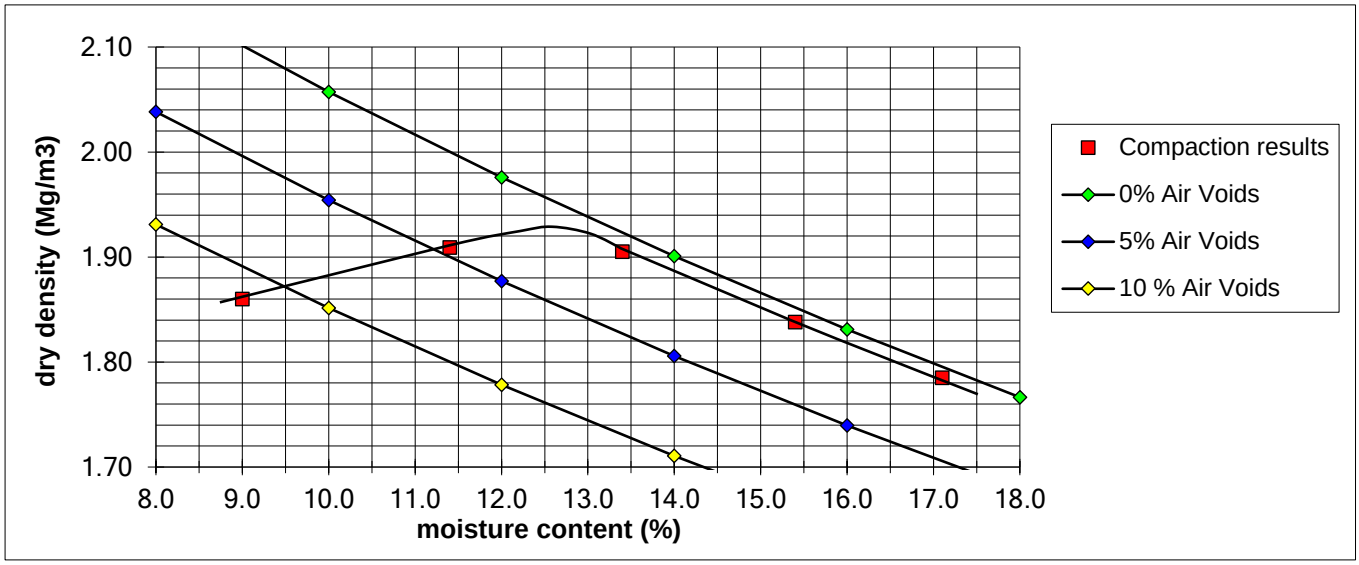
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP6G-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113680	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	Cohesive Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		9.0	1.860
2		11.4	1.909
3		13.4	1.905
4		15.4	1.838
5		17.1	1.785
	Optimum	13.0	
	Maximum		1.93
	Particle Density	2.59 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

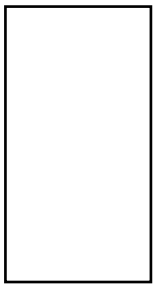
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP6G-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113680	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	Cohesive Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	13	%
BULK DENSITY	2.13	Mg/m3
DRY DENSITY	1.89	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
200	20	1.52	187.9	94

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer,

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

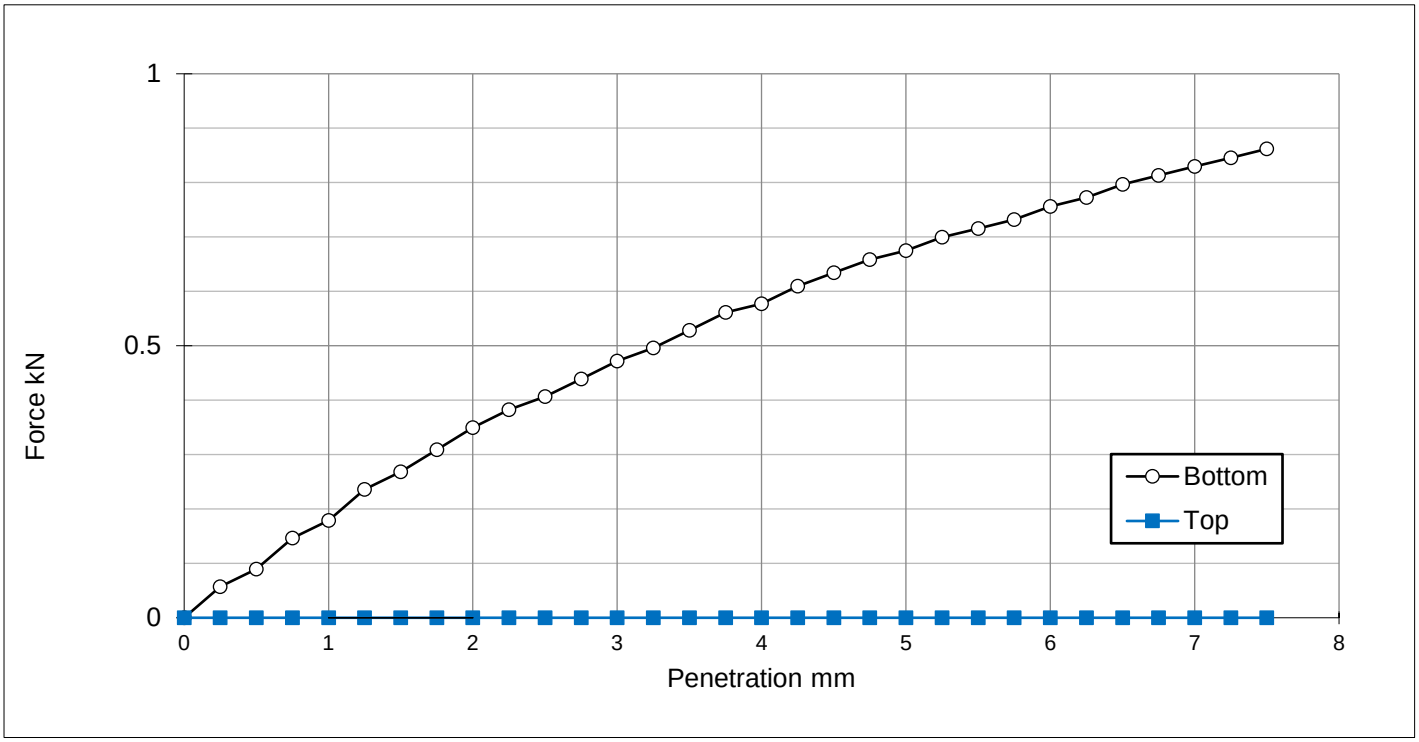
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TPG6-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113680	DATE RECEIVED	22-Jun-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		0 %			
BULK DENSITY	2.13 Mg/m3	MOISTURE CONTENT	13 %	DRY DENSITY	1.88 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.4	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	13	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

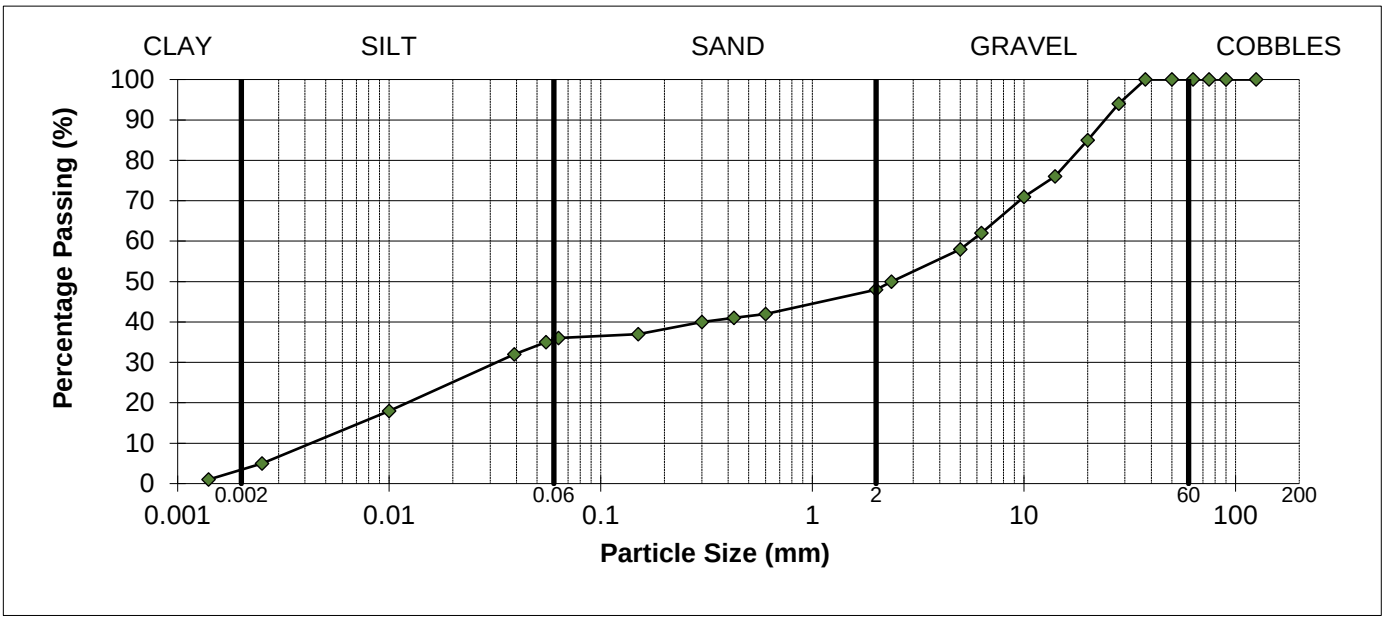
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP7F-G2	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113676	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	50	
90	100		2	48	
75	100		0.6	42	
63	100		0.425	41	
50	100		0.3	40	
37.5	100		0.15	37	
28	94		0.063	36	
20	85		0.055	35	
14	76		0.039	32	
10	71		0.01	18	
6.3	62		0.0025	5	
5	58		0.0014	1	



REMARKS
As received moisture content = 19%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

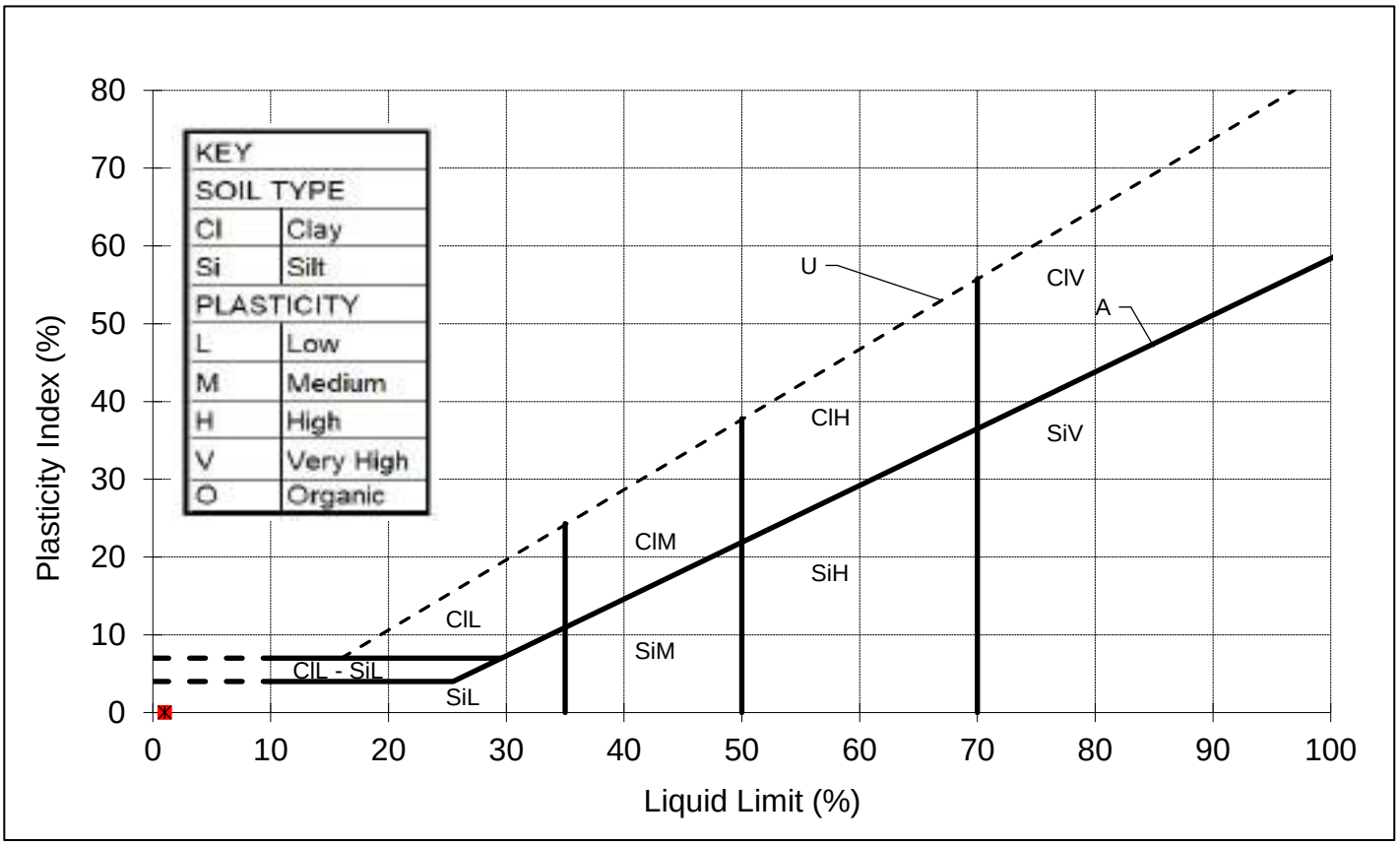
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP7F-G2	DATE SAMPLED	20-Jun-22
SAMPLE No.	113676	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	Ash Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19	N/A	Non Plastic	N/A	41



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

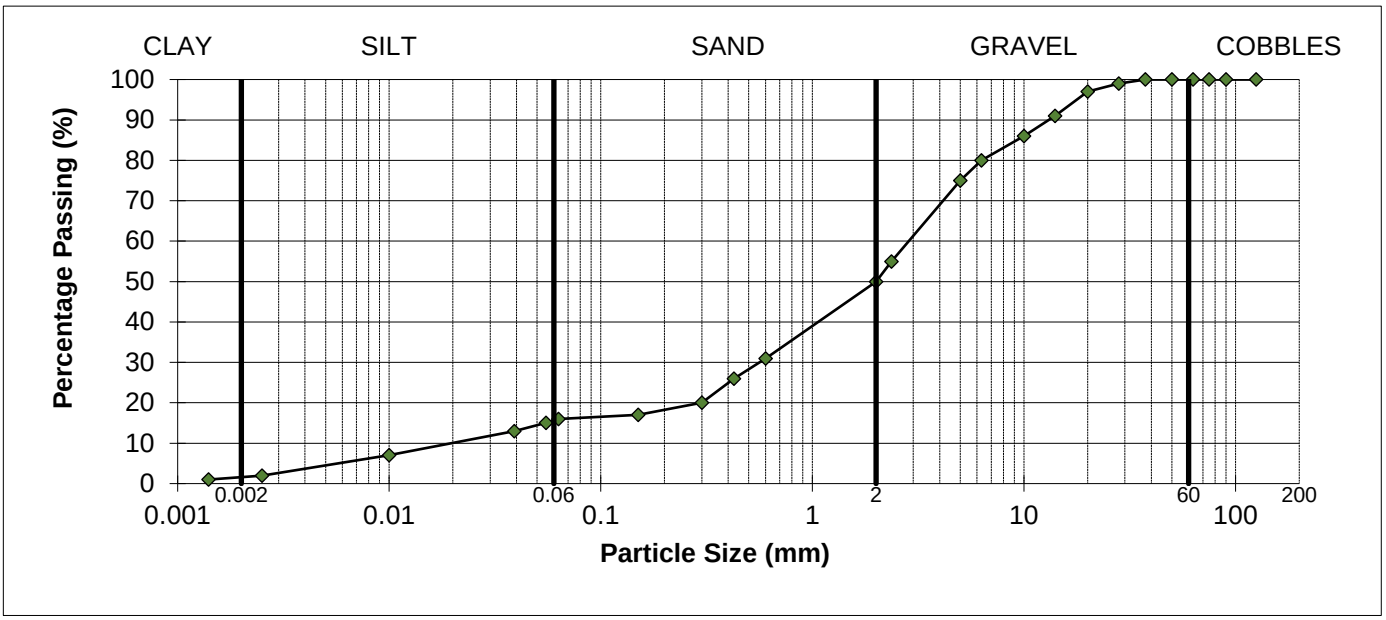
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP7G-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113682	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	55	
90	100		2	50	
75	100		0.6	31	
63	100		0.425	26	
50	100		0.3	20	
37.5	100		0.15	17	
28	99		0.063	16	
20	97		0.055	15	
14	91		0.039	13	
10	86		0.01	7	
6.3	80		0.0025	2	
5	75		0.0014	1	



REMARKS
As received moisture content = 4.2%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

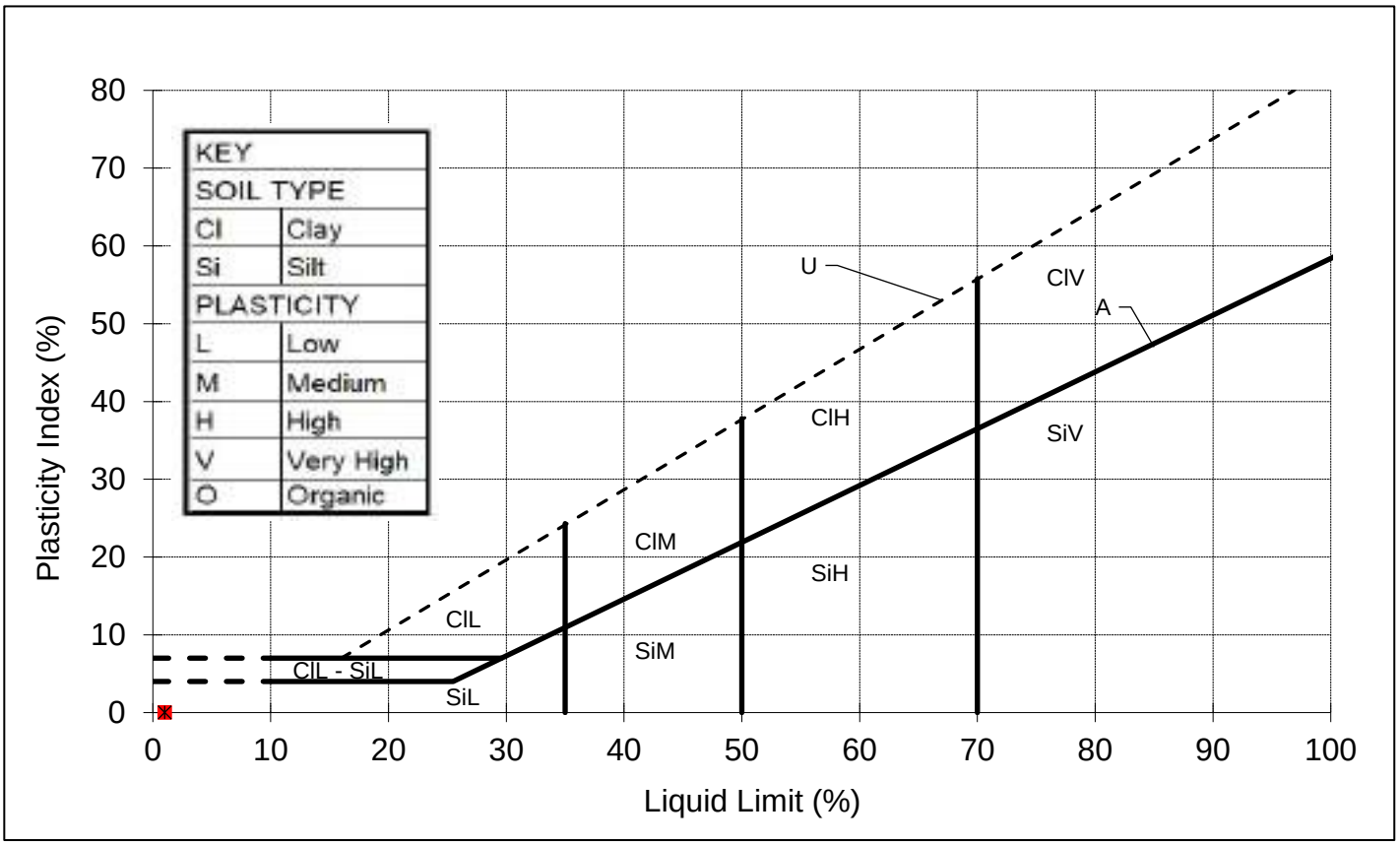
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP7G-G1	DATE SAMPLED	20-Jun-22
SAMPLE No.	113682	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
4.2	N/A	Non Plastic	N/A	26



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 21-Jul-22

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

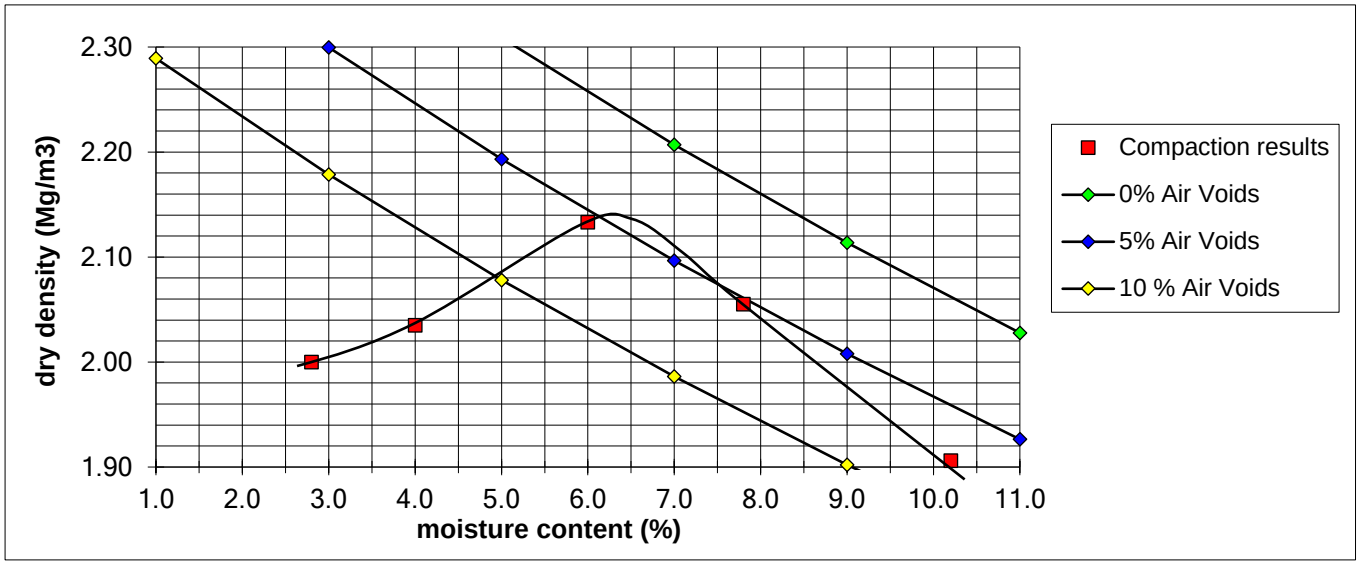
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP7G-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113682	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		2.8	2.000
2		4.0	2.035
3		6.0	2.133
4		7.8	2.055
5		10.2	1.906
	Optimum	6.2	
	Maximum		2.14
	Particle Density	2.61 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 3%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

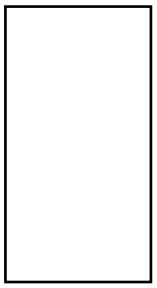
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TP7G-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113682	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	4	%
BULK DENSITY	2.10	Mg/m3
DRY DENSITY	2.02	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After compaction sample did not hold together during sample p

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

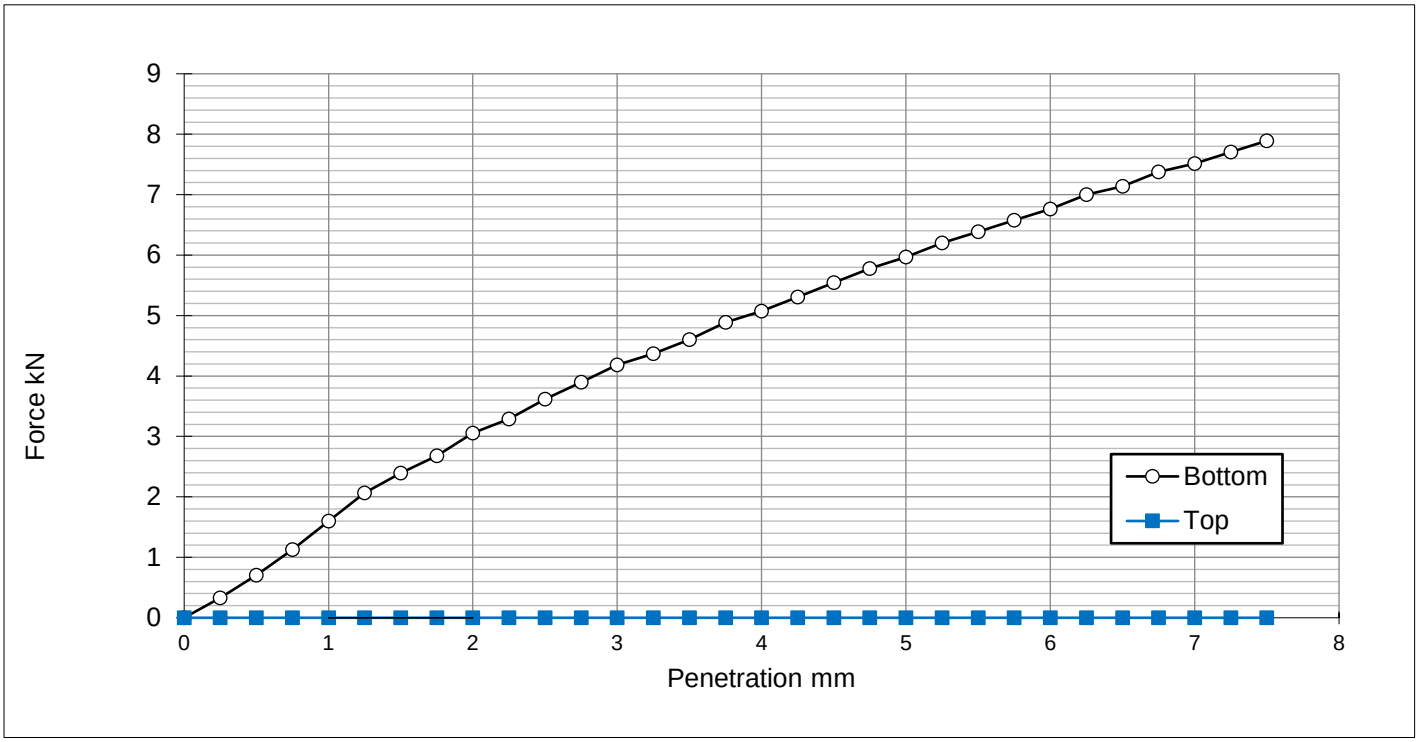
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/10

SAMPLE LABEL	TPG6-G1	DATE SAMPLED	20-Jun-22
LAB SAMPLE No	113680	DATE RECEIVED	22-Jun-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		3 %			
BULK DENSITY	2.10 Mg/m3	MOISTURE CONTENT	4.2 %	DRY DENSITY	2.02 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	30	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	4.2	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 21-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/11
Date of Issue 21 July 2022
Page 1 of 8

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

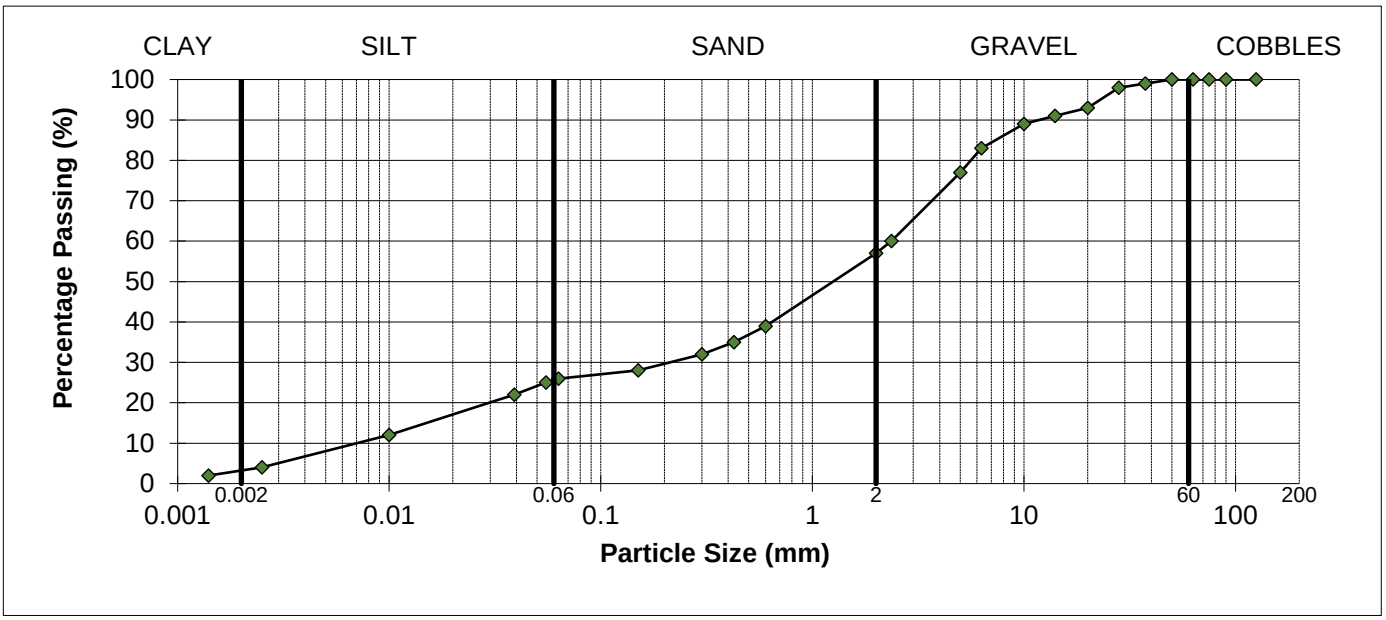
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC8-1	DATE SAMPLED	23-Jun-22
LAB SAMPLE No	113852	DATE RECEIVED	29-Jun-22
DATE TESTED	05-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	60	
90	100		2	57	
75	100		0.6	39	
63	100		0.425	35	
50	100		0.3	32	
37.5	99		0.15	28	
28	98		0.063	26	
20	93		0.055	25	
14	91		0.039	22	
10	89		0.01	12	
6.3	83		0.0025	4	
5	77		0.0014	2	



REMARKS
As received moisture content = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

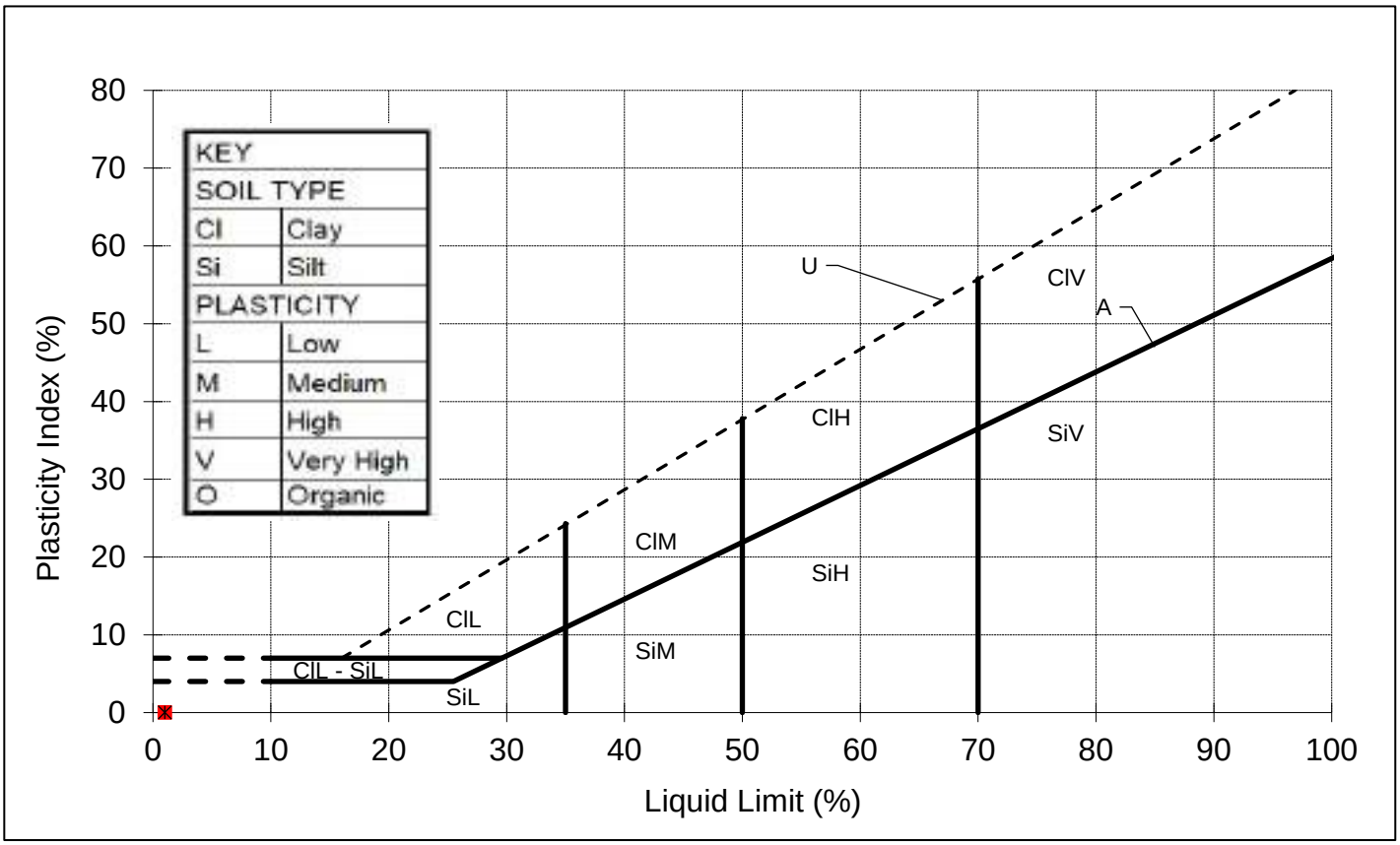
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC8-1	DATE SAMPLED	23-Jun-22
SAMPLE No.	113852	DATE RECEIVED	29-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
10	N/A	N/A	N/A	35



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 21-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

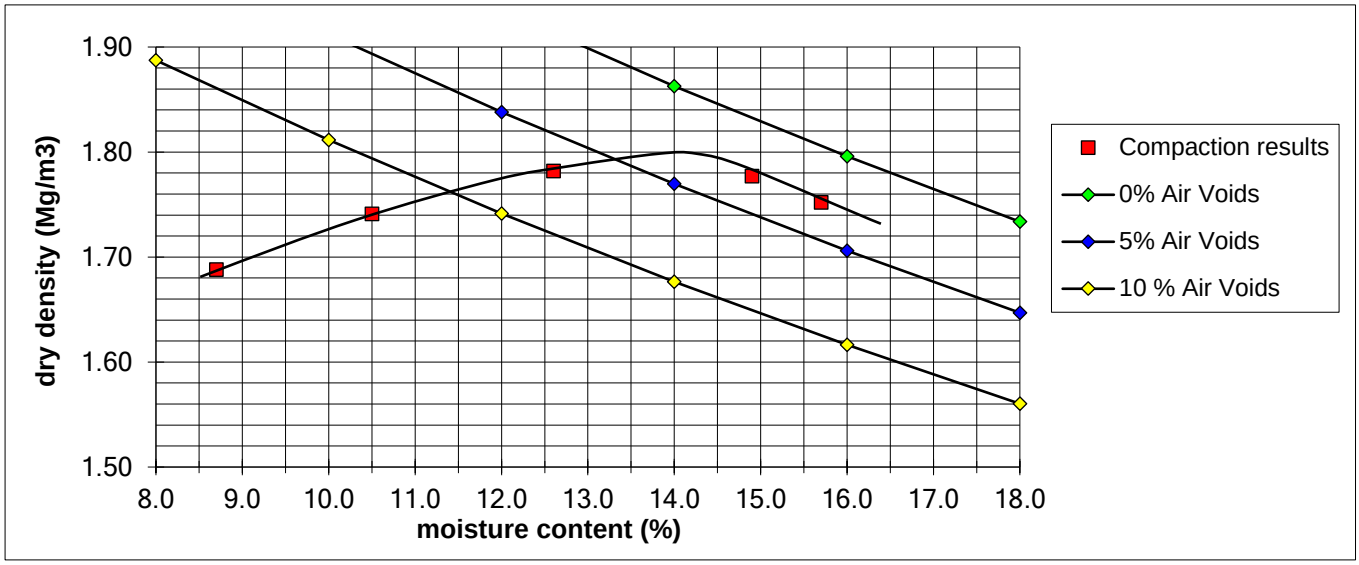
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC8-1	DATE SAMPLED	23-Jun-22
LAB SAMPLE No	113852	DATE RECEIVED	29-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		8.7	1.688
2		10.5	1.741
3		12.6	1.782
4		14.9	1.777
5		15.7	1.752
	Optimum	14.0	
	Maximum		1.80
	Particle Density	2.52 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 1%
Percentage of material retained on 20mm sieve = 7%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

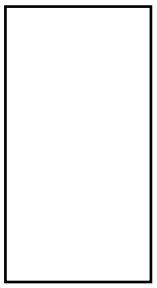
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC8-1	DATE SAMPLED	23-Jun-22
LAB SAMPLE No	113852	DATE RECEIVED	29-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	N/A	mm
SPECIMEN DIAMETER	N/A	mm
MOISTURE CONTENT OF SAMPLE	10	%
BULK DENSITY	1.87	Mg/m3
DRY DENSITY	1.70	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
N/A	N/A	N/A	N/A	N/A

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer, After re-compaction sample did not hold together during preparation for testing.

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

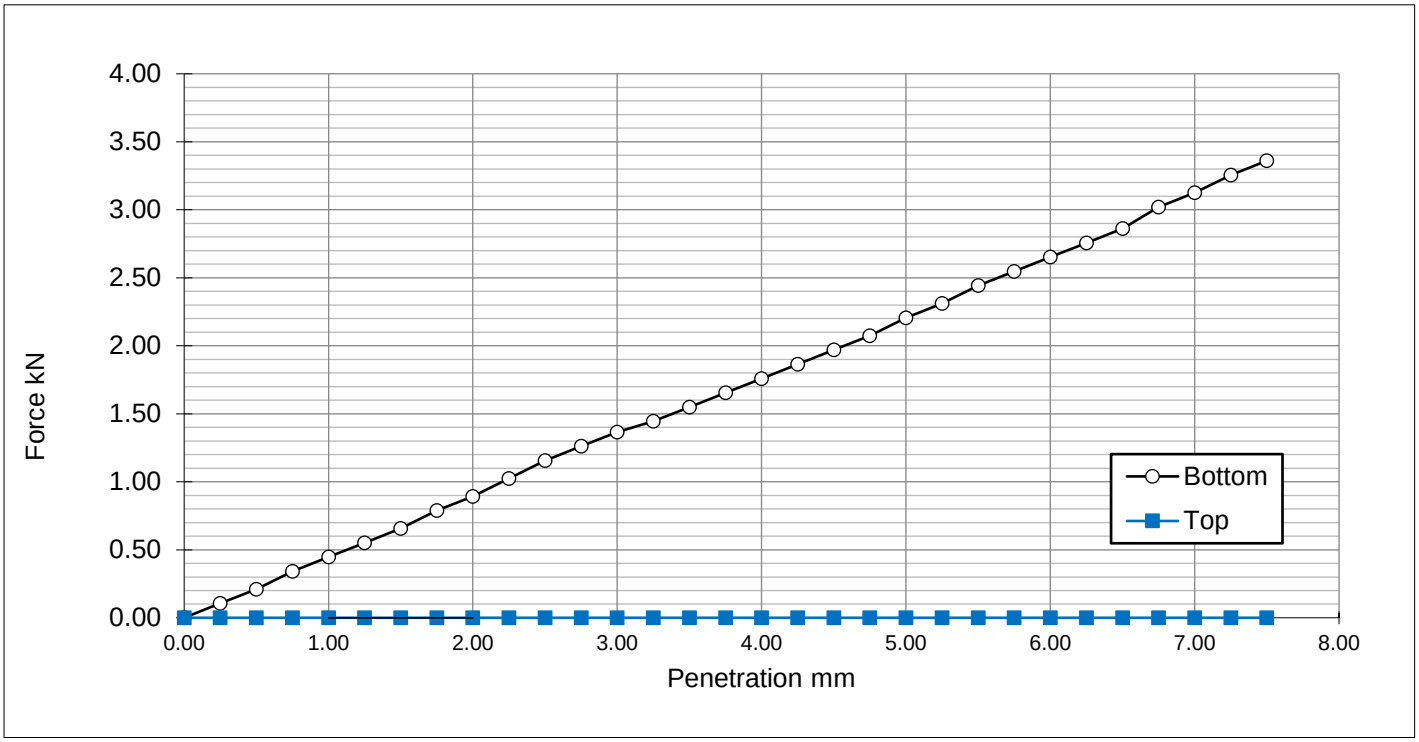
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC8-1	DATE SAMPLED	23-Jun-22
LAB SAMPLE No	113852	DATE RECEIVED	29-Jun-22
DATE TESTED	15-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		7 %			
BULK DENSITY	1.87 Mg/m3	MOISTURE CONTENT	10.0 %	DRY DENSITY	1.70 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	11	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	10	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 21-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

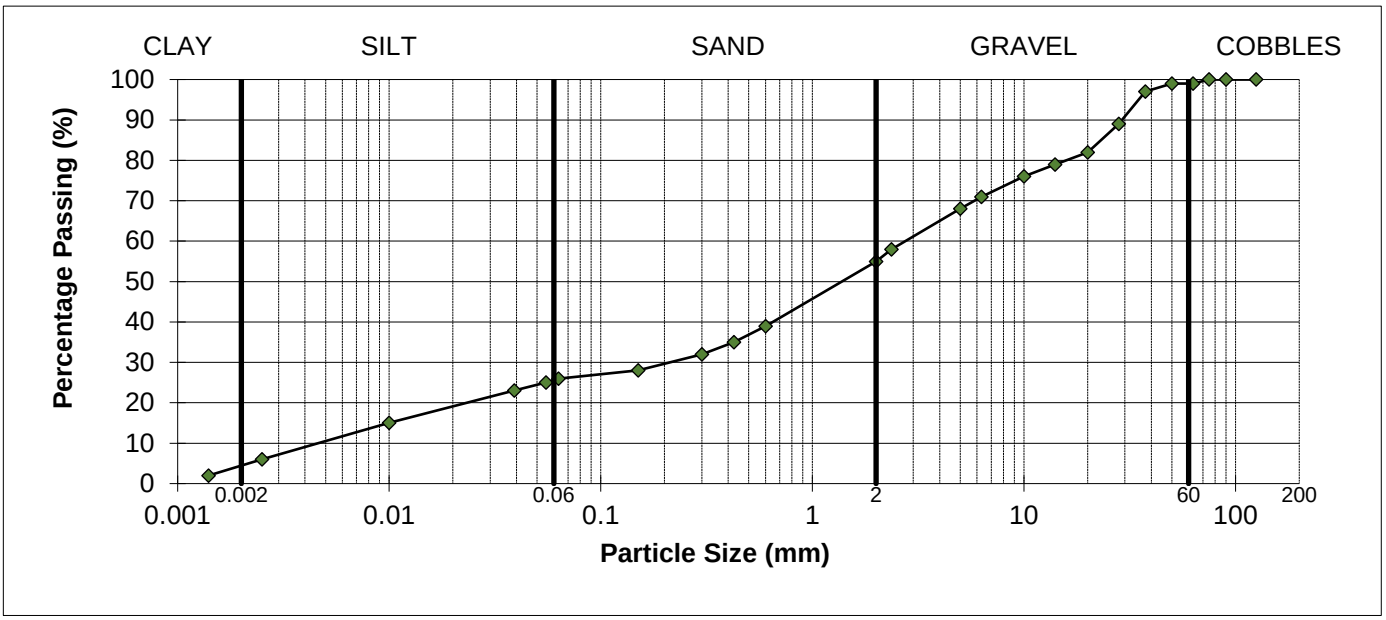
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC11-1	DATE SAMPLED	23-Jun-22
LAB SAMPLE No	113856	DATE RECEIVED	29-Jun-22
DATE TESTED	05-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	58	
90	100		2	55	
75	100		0.6	39	
63	99		0.425	35	
50	99		0.3	32	
37.5	97		0.15	28	
28	89		0.063	26	
20	82		0.055	25	
14	79		0.039	23	
10	76		0.01	15	
6.3	71		0.0025	6	
5	68		0.0014	2	



REMARKS
As received moisture content = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 21-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

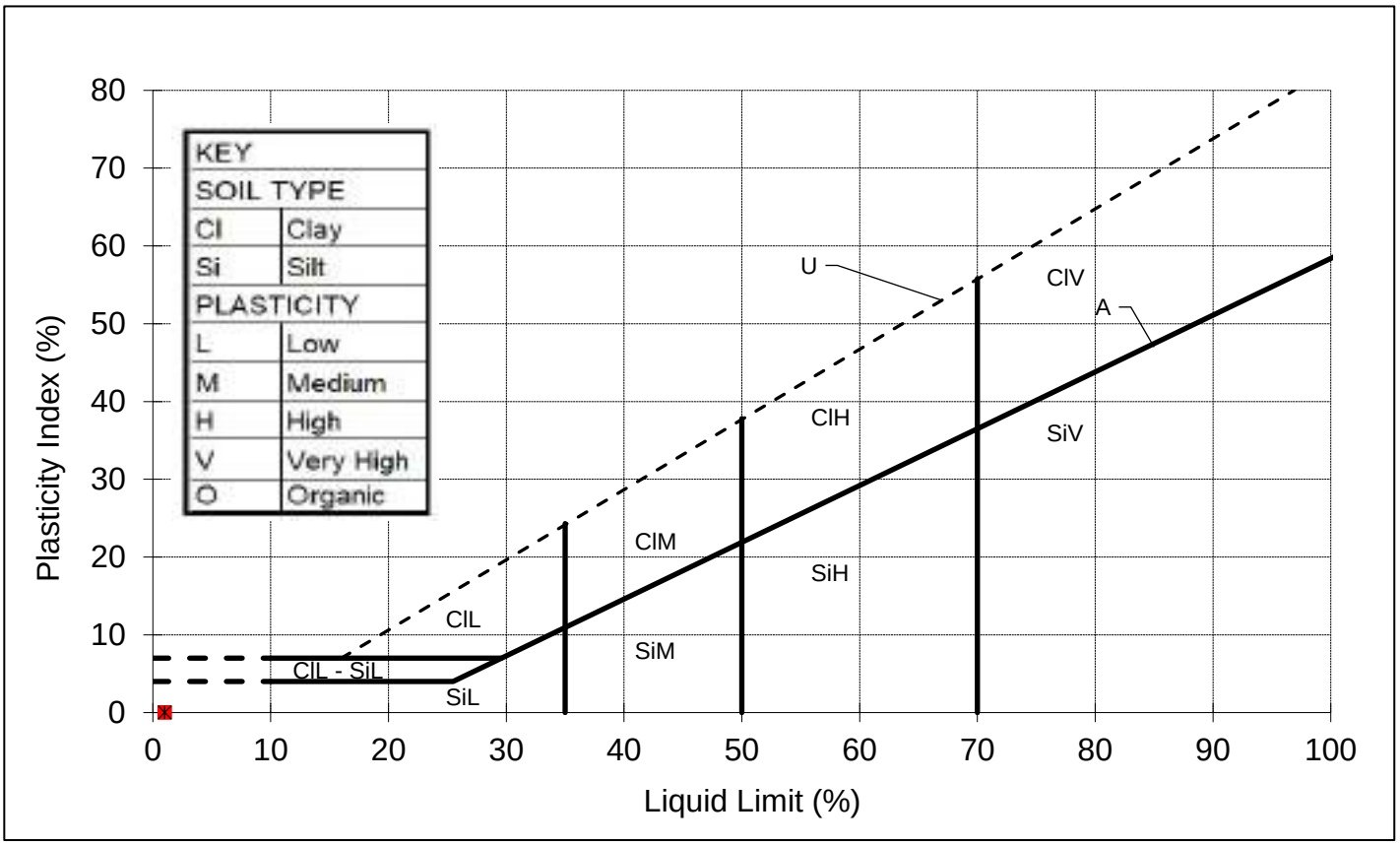
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/11

SAMPLE LABEL	TPC11-1	DATE SAMPLED	23-Jun-22
SAMPLE No.	113856	DATE RECEIVED	29-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
10	N/A	N/A	N/A	35



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 21-Jul-22

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/12
Date of Issue 22 July 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

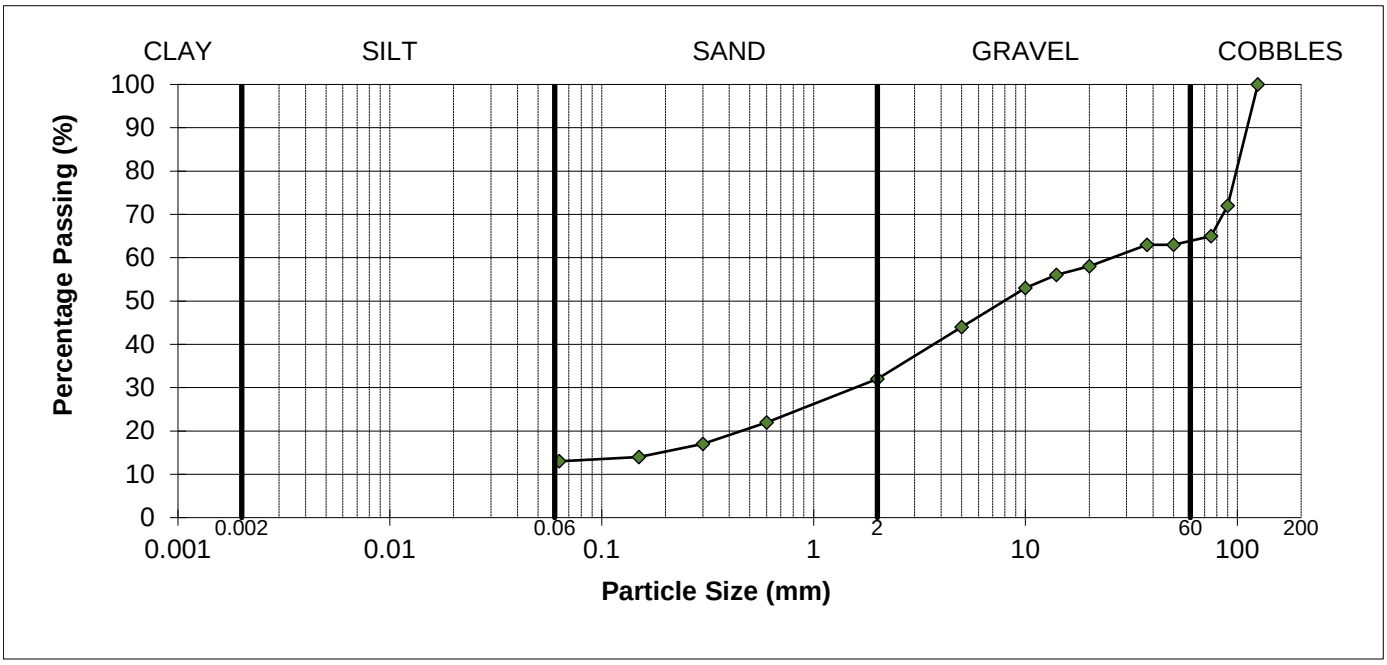
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPC6-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113675	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	53	
90	72		5	44	
75	65		2	32	
50	63		0.6	22	
37.5	63		0.3	17	
20	58		0.15	14	
14	56		0.063	13	



REMARKS
As received moisture content = 9.7%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

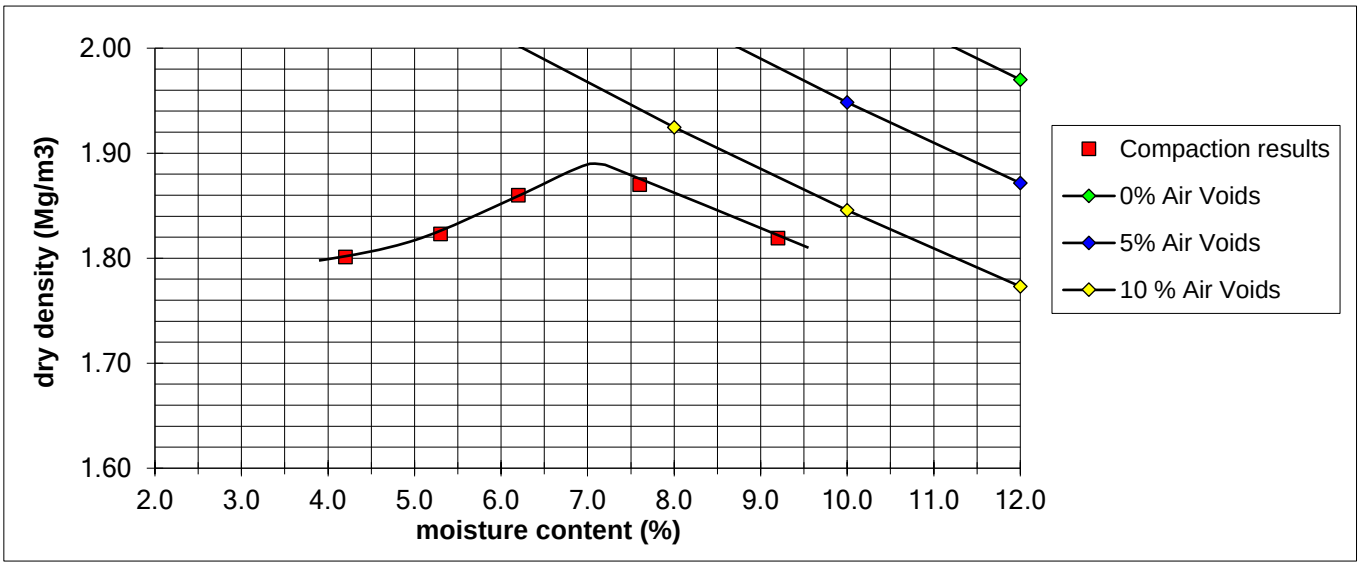
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP VIBRATING HAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPC6-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113675	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		4.2	1.801
2		5.3	1.823
3		6.2	1.860
4		7.6	1.870
5		9.2	1.819
	Optimum	7.1	
	Maximum		1.89
	Particle Density	2.58 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 37%
Percentage of material retained on 20mm sieve = 42%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

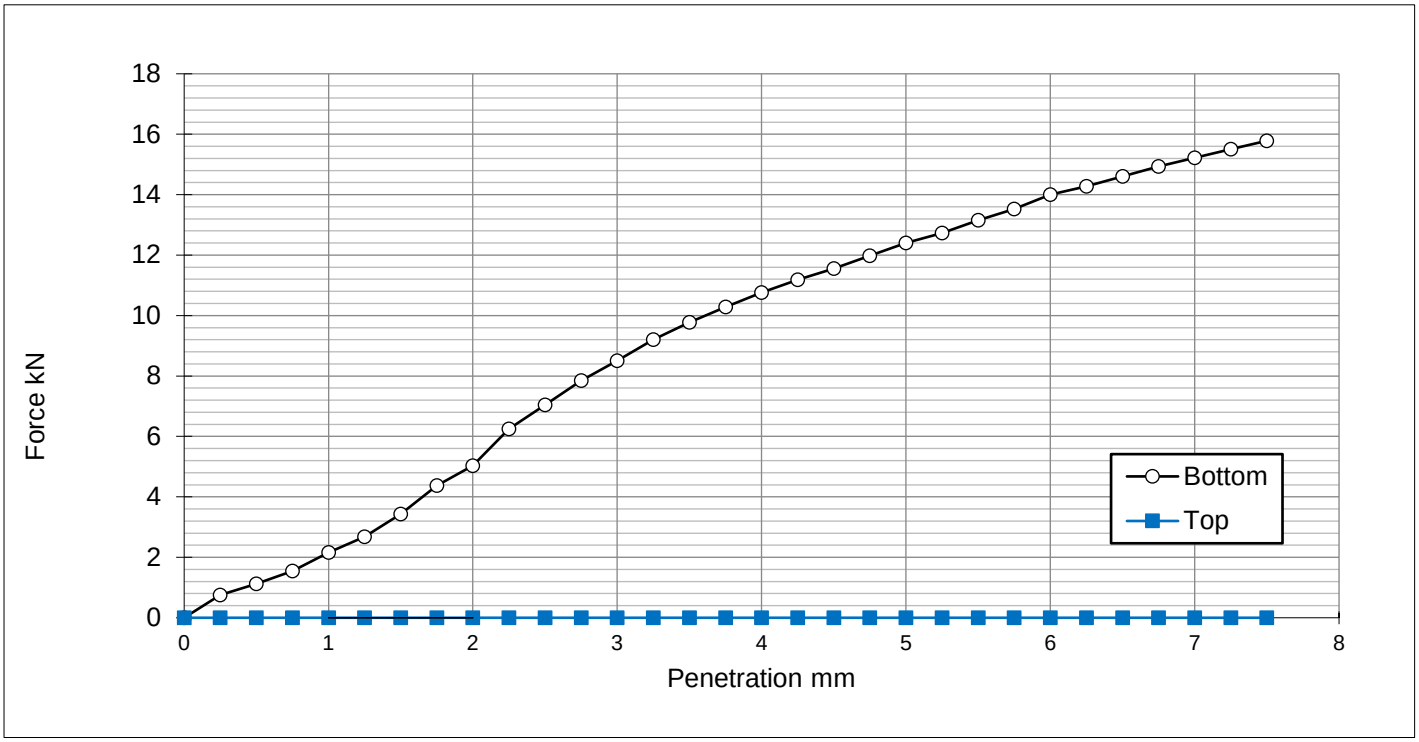
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPC6-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113675	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Density, Vibrating Hammer			
GREATER THAN 20 mm REMOVED		42 %			
BULK DENSITY	2.02 Mg/m3	MOISTURE CONTENT	7.1 %	DRY DENSITY	1.89 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	62	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	7.1	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 22-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

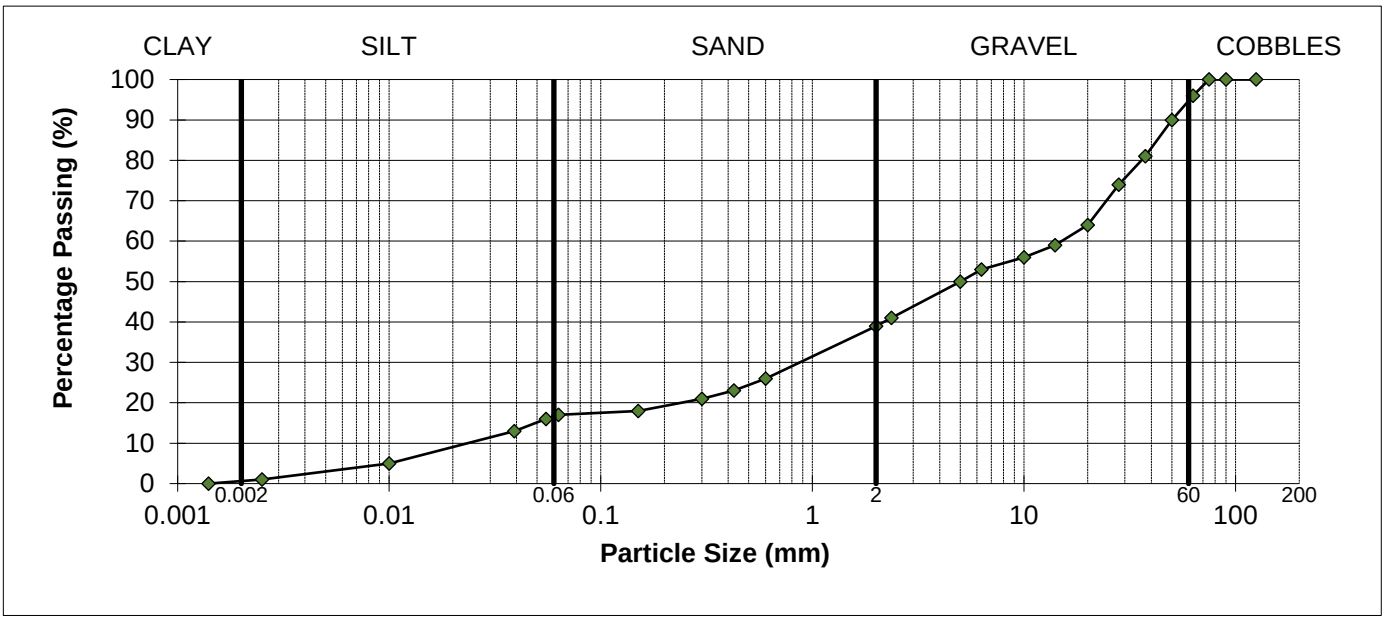
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE6-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113677	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	41	
90	100		2	39	
75	100		0.6	26	
63	96		0.425	23	
50	90		0.3	21	
37.5	81		0.15	18	
28	74		0.063	17	
20	64		0.055	16	
14	59		0.039	13	
10	56		0.01	5	
6.3	53		0.0025	1	
5	50		0.0014	0	



REMARKS
As received moisture content = 12%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

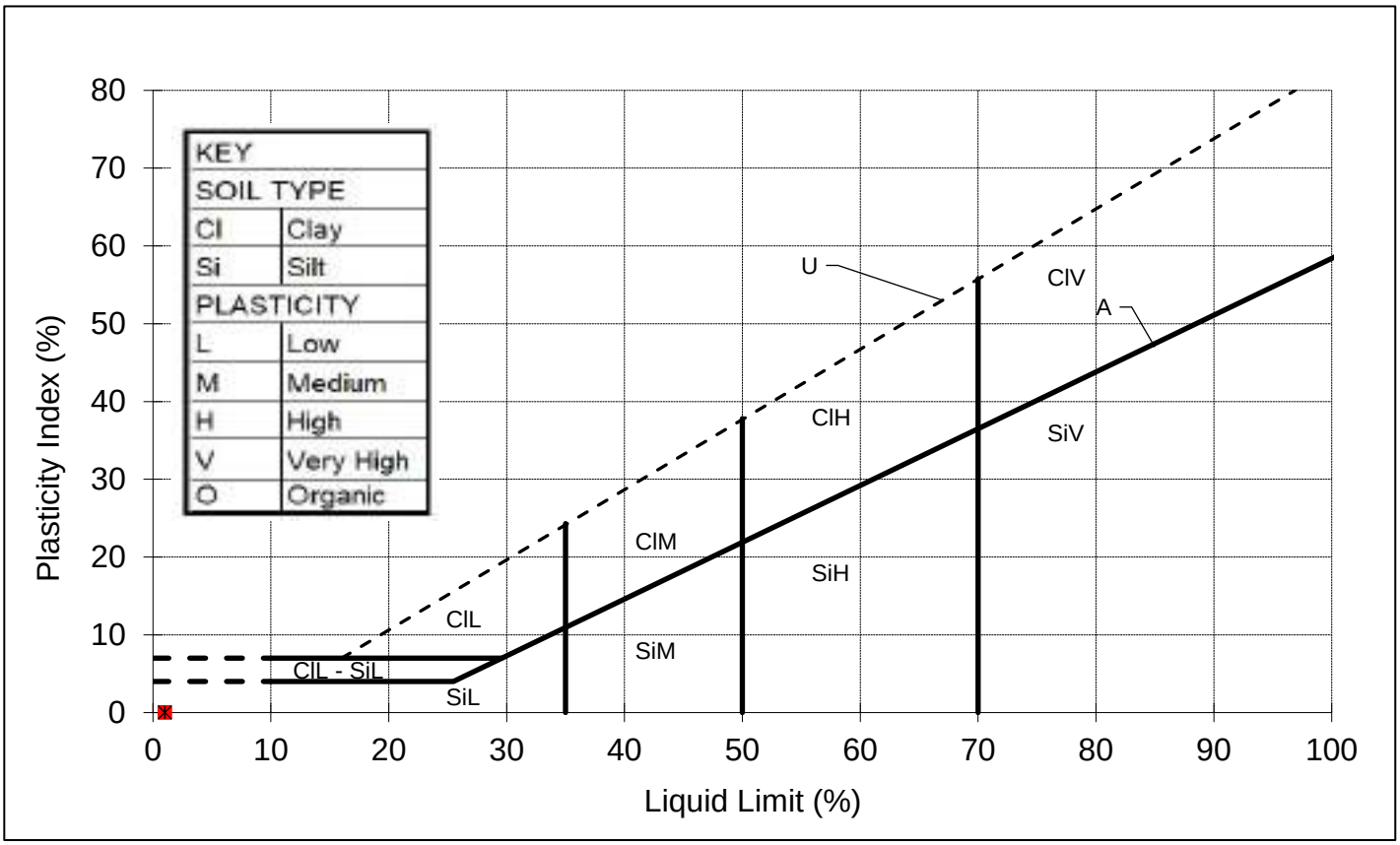
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE6-1	DATE SAMPLED	17-Jun-22
SAMPLE No.	113677	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
12	N/A	N/A	N/A	23



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 22-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

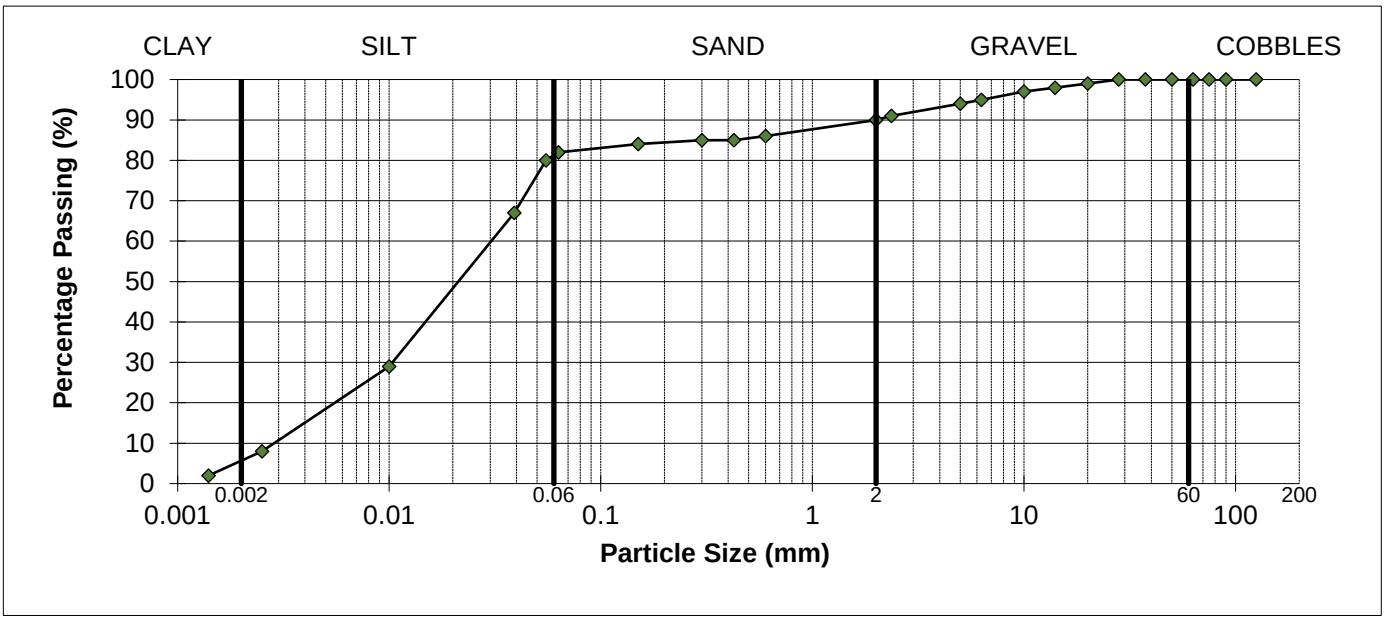
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE7-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113678	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	91	
90	100		2	90	
75	100		0.6	86	
63	100		0.425	85	
50	100		0.3	85	
37.5	100		0.15	84	
28	100		0.063	82	
20	99		0.055	80	
14	98		0.039	67	
10	97		0.01	29	
6.3	95		0.0025	8	
5	94		0.0014	2	



REMARKS
As received moisture content = 36%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870 FAX 0161 475 0871

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

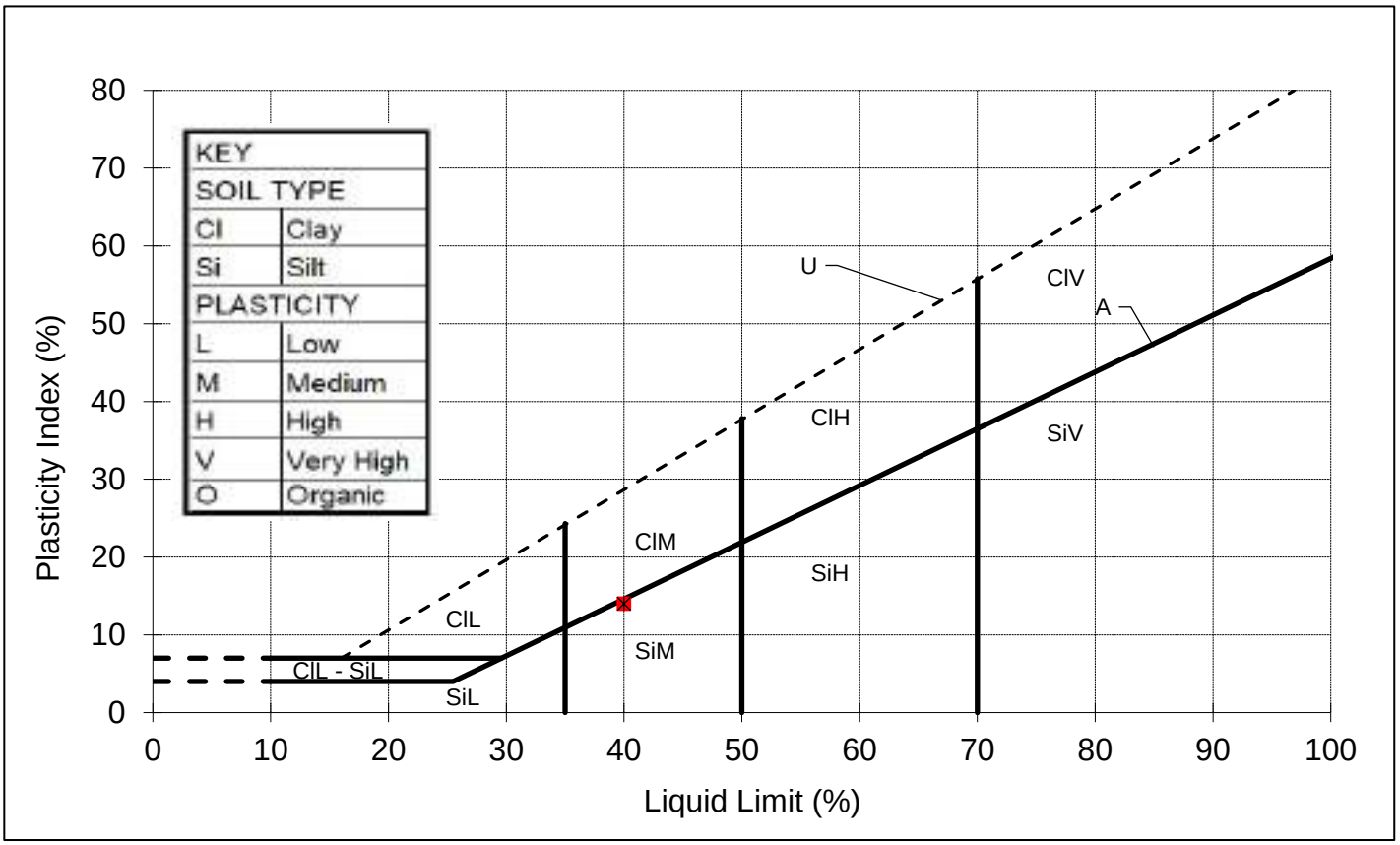
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE7-1	DATE SAMPLED	17-Jun-22
SAMPLE No.	113678	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
36	40	26	14	85



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 22-Jul-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

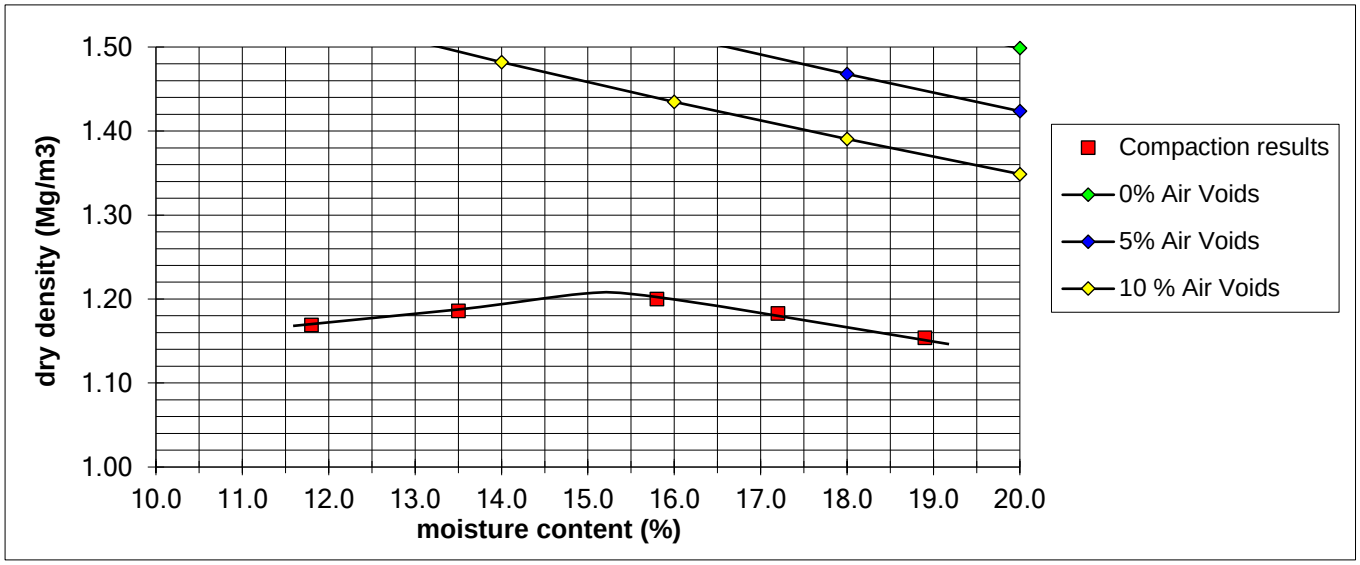
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE7-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113678	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		11.8	1.169
2		13.5	1.186
3		15.8	1.200
4		17.2	1.183
5		18.9	1.154
	Optimum	15.0	
	Maximum		1.20
	Particle Density	2.14 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 1%

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

BS 1377 : PART 7: Clause 8 Single Stage & Specification For Highway Works Clause 633

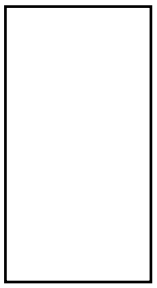
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE7-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113678	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

SPECIMEN LENGTH	200	mm
SPECIMEN DIAMETER	100	mm
MOISTURE CONTENT OF SAMPLE	36	%
BULK DENSITY	1.36	Mg/m3
DRY DENSITY	1.00	Mg/m3
DEPTH OF TOP OF SPECIMEN	N/A	m
RATE OF STRAIN	1	%/min
RUBBER MEMBRANE THICKNESS	0.4	mm

SPECIMEN AT FAILURE



Measured Cell Pressure (kPa)	Strain at Failure (%)	Membrane Correction (kPa)	Corrected Max Deviator Stress (kPa)	Shear Stress Cu (kPa)
200	20	1.47	88.5	44

REMARKS

Sample re-compacted at as received moisture content using 2.5kg rammer,

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TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

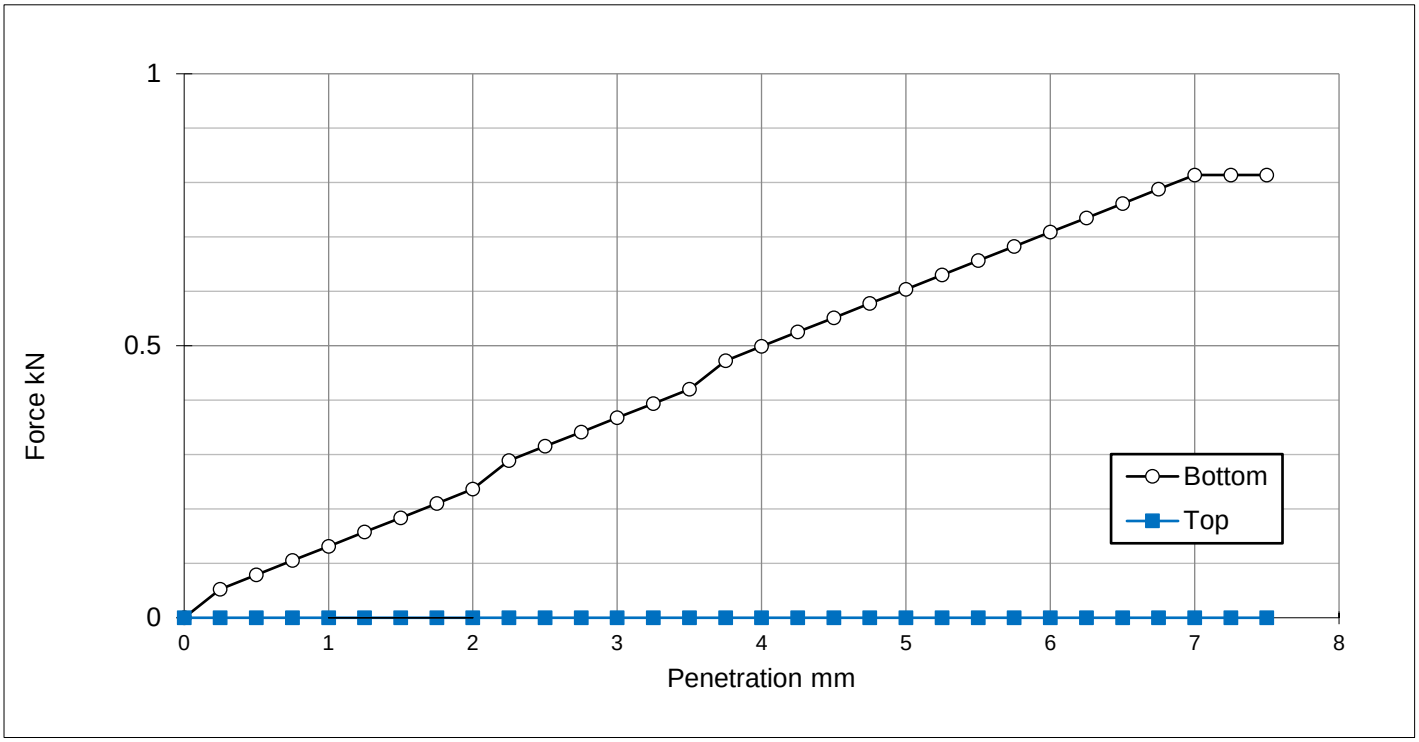
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPE7-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113678	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Effort, 2.5 kg Rammer			
GREATER THAN 20 mm REMOVED		1 %			
BULK DENSITY	1.36 Mg/m3	MOISTURE CONTENT	36 %	DRY DENSITY	1.00 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	3.0	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	36	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 22-Jul-22

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DUKINFIELD, CHESHIRE SK16 4QX
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PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.5: 1990

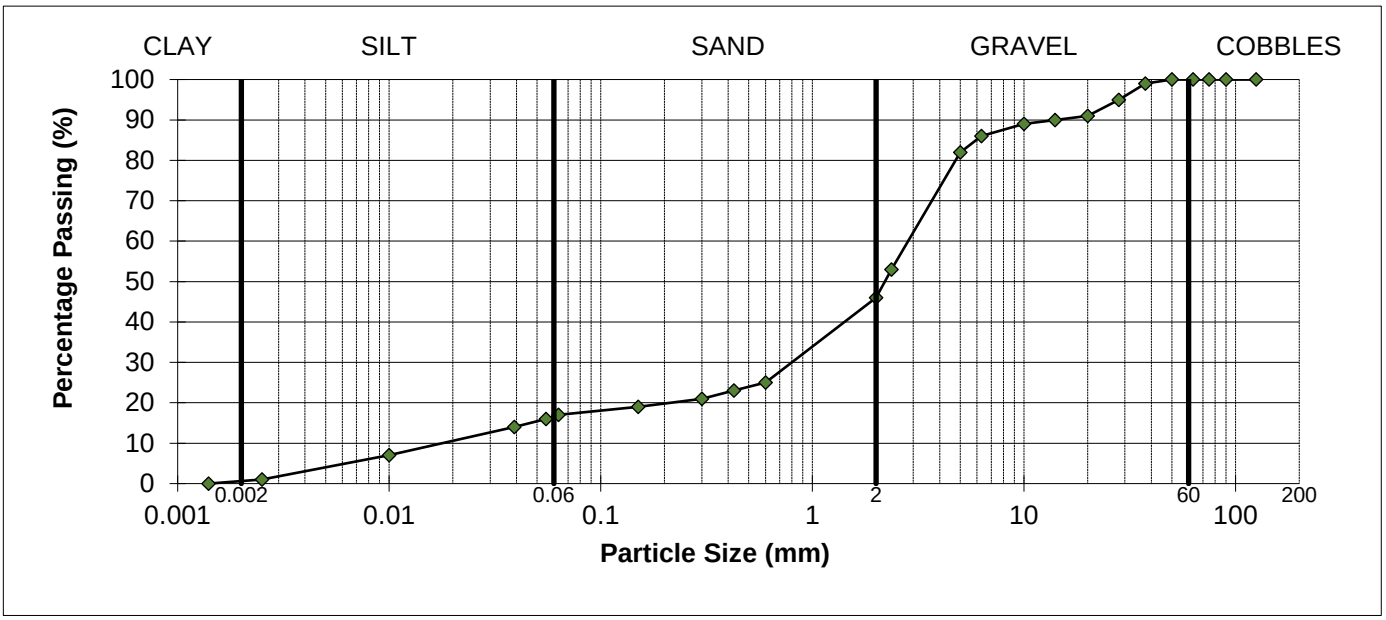
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPF7-1	DATE SAMPLED	17-Jun-22
LAB SAMPLE No	113679	DATE RECEIVED	22-Jun-22
DATE TESTED	29-Jun-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2.36	53	
90	100		2	46	
75	100		0.6	25	
63	100		0.425	23	
50	100		0.3	21	
37.5	99		0.15	19	
28	95		0.063	17	
20	91		0.055	16	
14	90		0.039	14	
10	89		0.01	7	
6.3	86		0.0025	1	
5	82		0.0014	0	



REMARKS
As received moisture content = 10%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 22-Jul-22

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

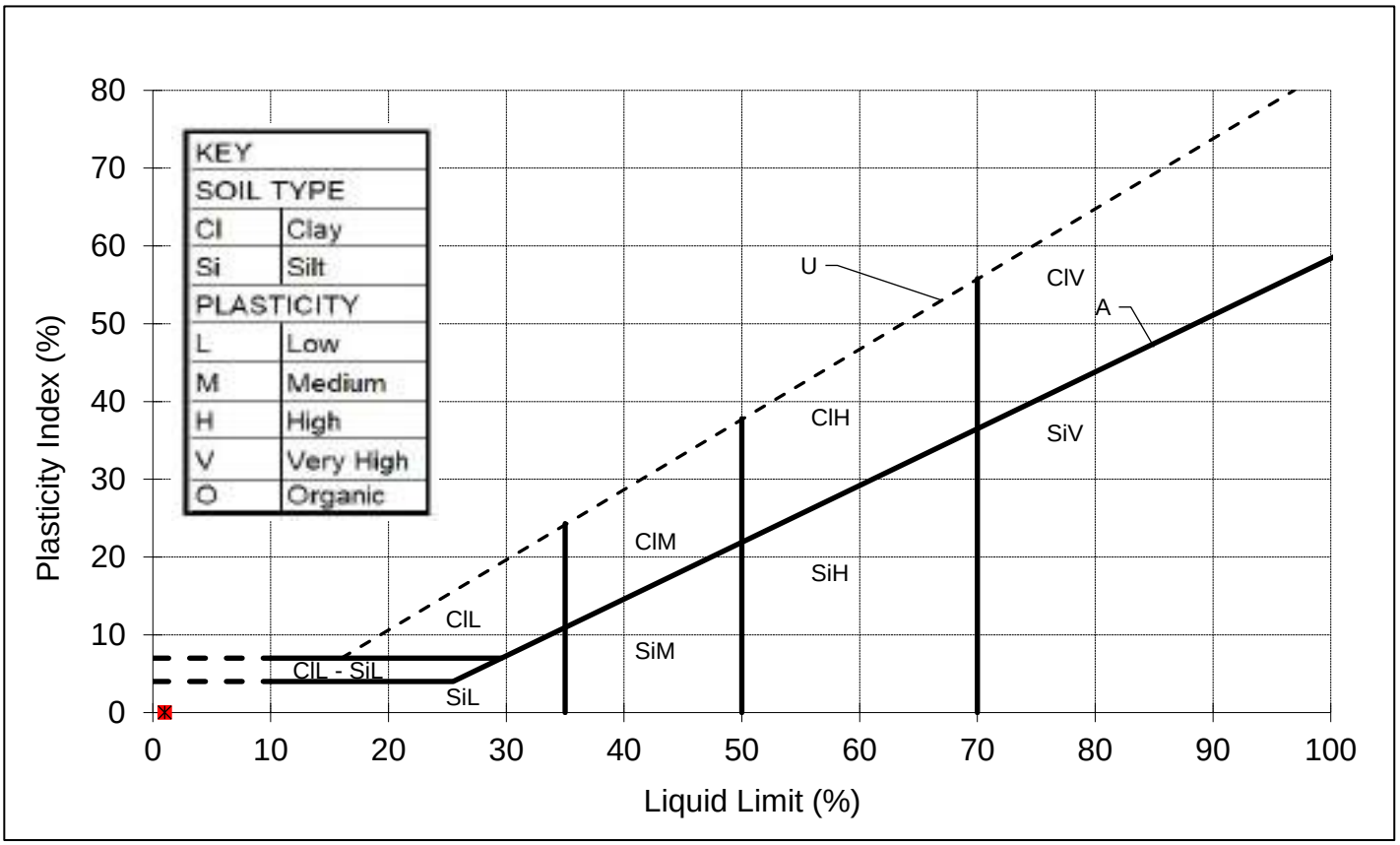
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/12

SAMPLE LABEL	TPF7-1	DATE SAMPLED	17-Jun-22
SAMPLE No.	113679	DATE RECEIVED	22-Jun-22
DATE TESTED	06-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Investigation Sample

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
10	N/A	N/A	N/A	23



REMARKS
Sample tested after wet sieving.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 22-Jul-22

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract Stopes Road, Bolton

Job Number MRN 4454/13
Date of Issue 25 July 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/13				
TEST LOCATION	Test 01 - Area 2A-1		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	22-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4501	4497	4634	4544	0.00	0.00	0.0
4337	4355	4506	4399	-1.45	40.00	141.5
4381	4405	4525	4437	-1.07	0.00	0.0
4351	4371	4497	4406	-1.38	22.00	77.8
4322	4342	4469	4378	-1.66	36.00	127.3
4293	4313	4440	4349	-1.95	48.00	169.8
4265	4287	4413	4322	-2.22	65.00	229.9
4235	4256	4387	4293	-2.51	80.00	282.9
4203	4230	4361	4265	-2.79	98.00	346.6
4302	4314	4446	4354	-1.90	0.00	0.0
4272	4289	4422	4328	-2.16	10.00	35.4
4238	4259	4403	4300	-2.44	30.00	106.1
4198	4223	4371	4264	-2.80	50.00	176.8
4169	4196	4346	4237	-3.07	70.00	247.6
4147	4168	4320	4212	-3.32	84.00	297.1
4105	4140	4288	4178	-3.66	98.00	346.6
4200	4210	4348	4253	-2.91	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	248	kPa
Modulus of subgrade reaction (k) =	198	MPa/m
Equivalent 762 mm plate reaction =	159	MPa/m
Equivalent CBR =	63.2	%
Surface Stiffness Modulus (E) =	250	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	263	kPa
Modulus of subgrade reaction (k) =	211	MPa/m
Equivalent 762 mm plate reaction =	169	MPa/m
Equivalent CBR =	70.3	%
Surface Stiffness Modulus (E) =	268	MN/m^2

Surface Stiffness Modulus Ratio =	1.1

DATE 25-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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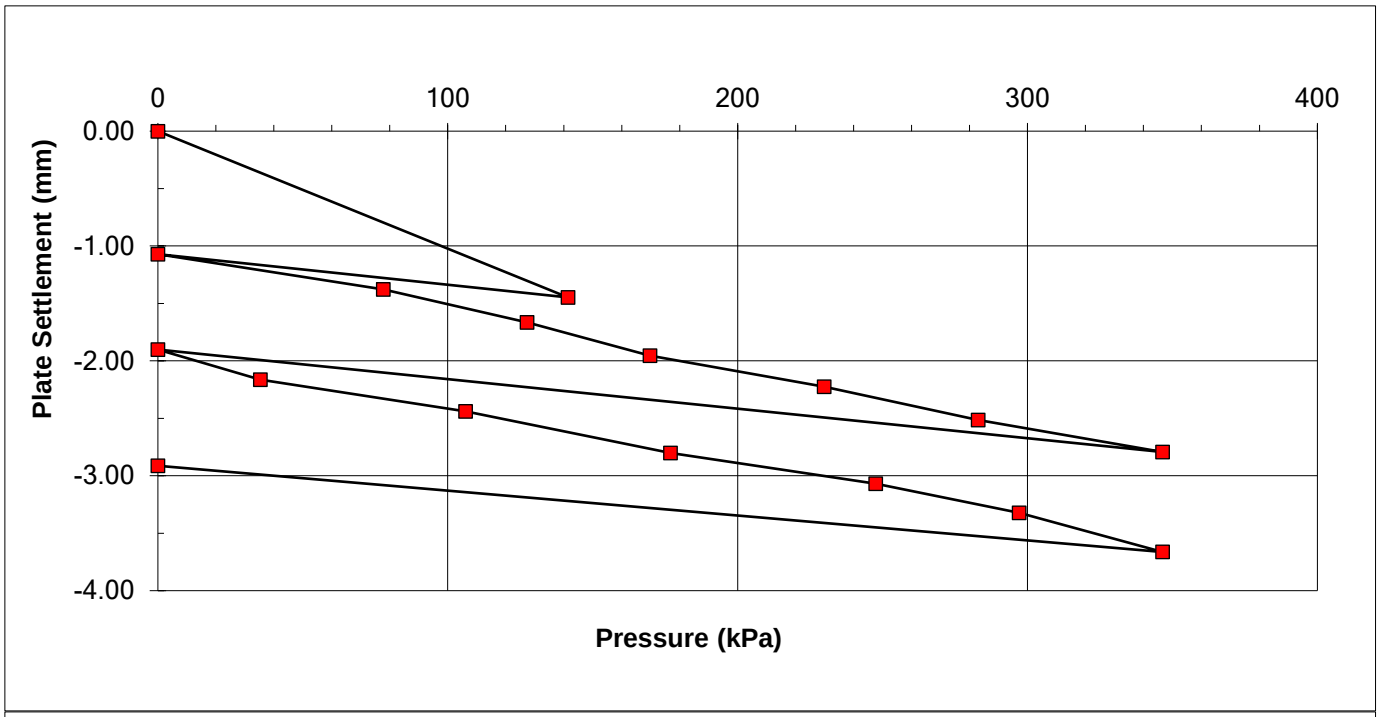
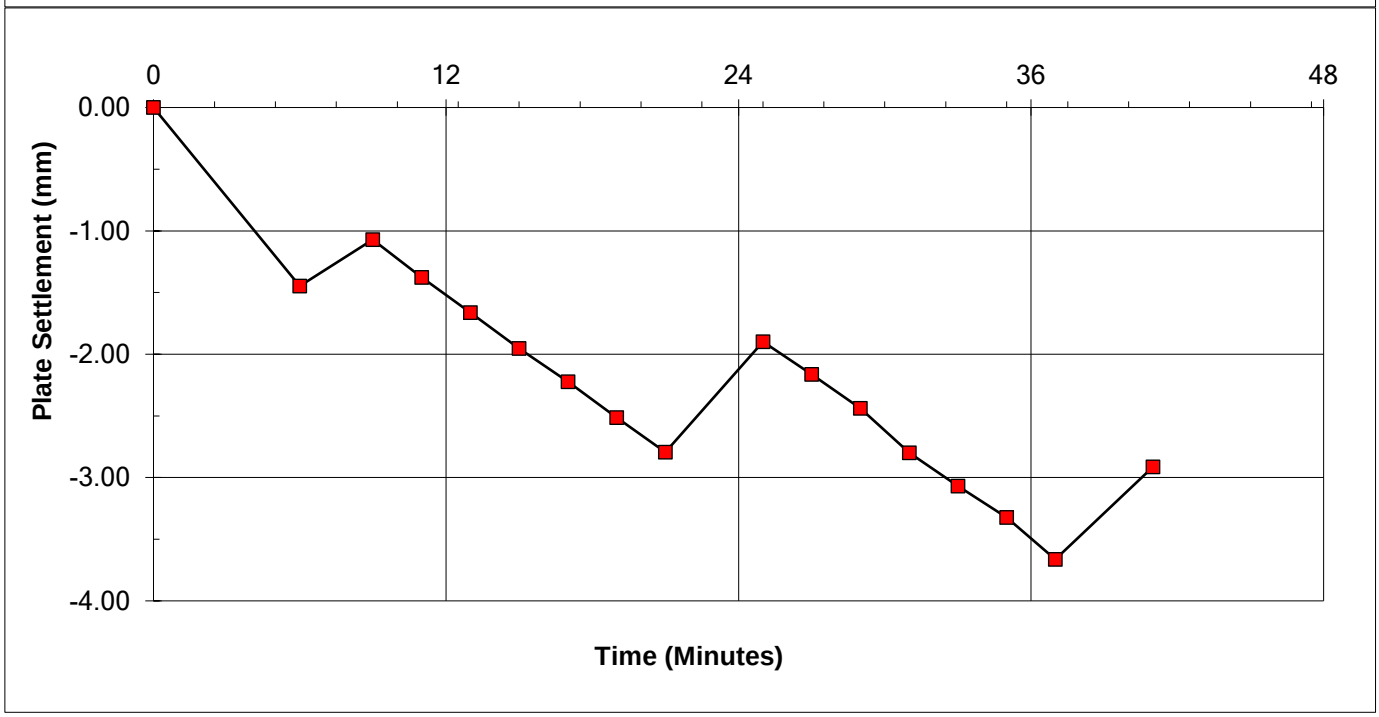
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Jul-22

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/13				
TEST LOCATION	Test 02 - Area 2B-1		LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	22-Jul-22		PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface		REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST		Black Ash/Sand	MOISTURE CONTENT		Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4776	4690	4618	4695	0.00	0.00	0.0
4626	4557	4455	4546	-1.49	15.00	53.1
4687	4526	4493	4569	-1.26	0.00	0.0
4657	4497	4357	4504	-1.91	12.00	42.4
4630	4471	4319	4473	-2.21	18.00	63.7
4600	4443	4285	4443	-2.52	27.00	95.5
4557	4407	4241	4402	-2.93	36.00	127.3
4536	4368	4200	4368	-3.27	43.00	152.1
4488	4339	4172	4333	-3.62	53.00	187.4
4581	4417	4305	4434	-2.60	0.00	0.0
4531	4389	4274	4398	-2.97	9.00	31.8
4512	4347	4235	4365	-3.30	15.00	53.1
4484	4317	4200	4334	-3.61	24.00	84.9
4380	4283	4159	4274	-4.21	37.00	130.9
4312	4249	4119	4227	-4.68	49.00	173.3
4277	4208	4084	4190	-5.05	58.00	205.1
4508	4324	4259	4364	-3.31	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	94	kPa
Modulus of subgrade reaction (k) =	76	MPa/m
Equivalent 762 mm plate reaction =	61	MPa/m
Equivalent CBR =	11.9	%
Surface Stiffness Modulus (E) =	86	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	104	kPa
Modulus of subgrade reaction (k) =	83	MPa/m
Equivalent 762 mm plate reaction =	67	MPa/m
Equivalent CBR =	14.0	%
Surface Stiffness Modulus (E) =	95	MN/m^2

Surface Stiffness Modulus Ratio =	1.1

DATE 25-Jul-22

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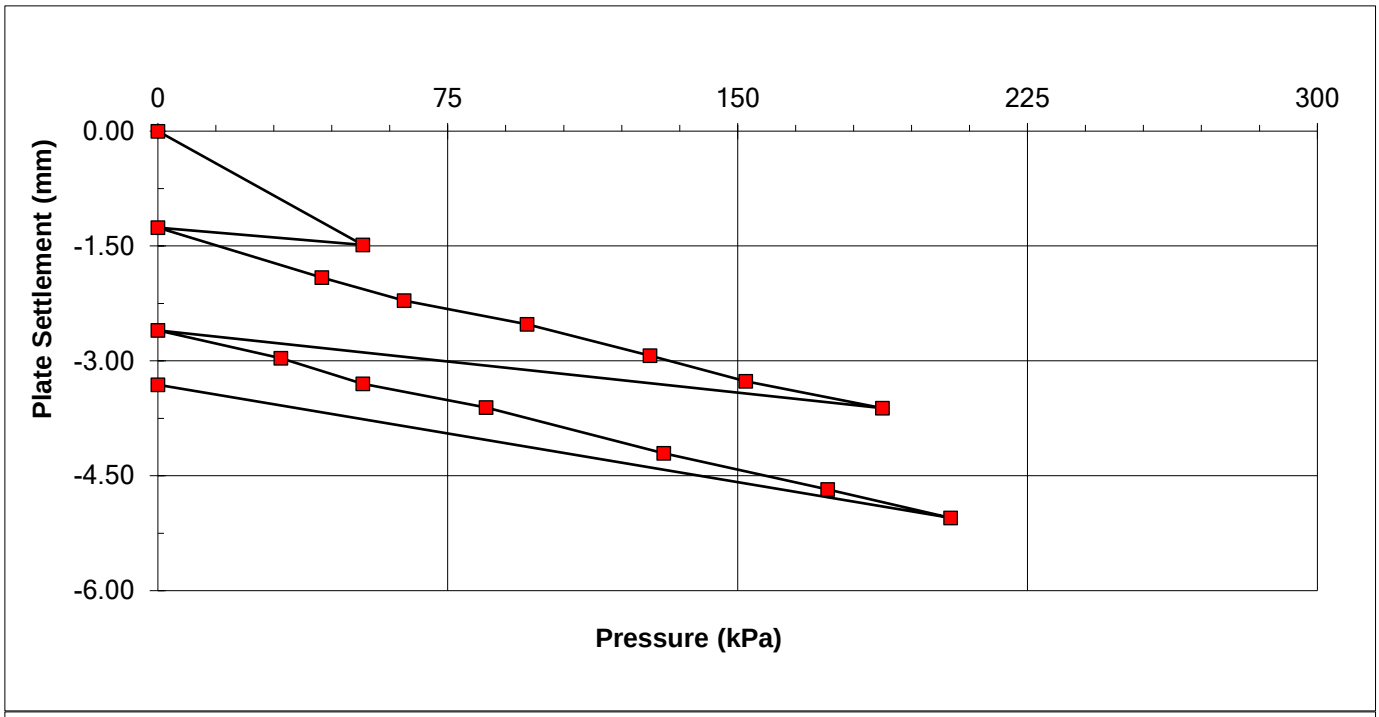
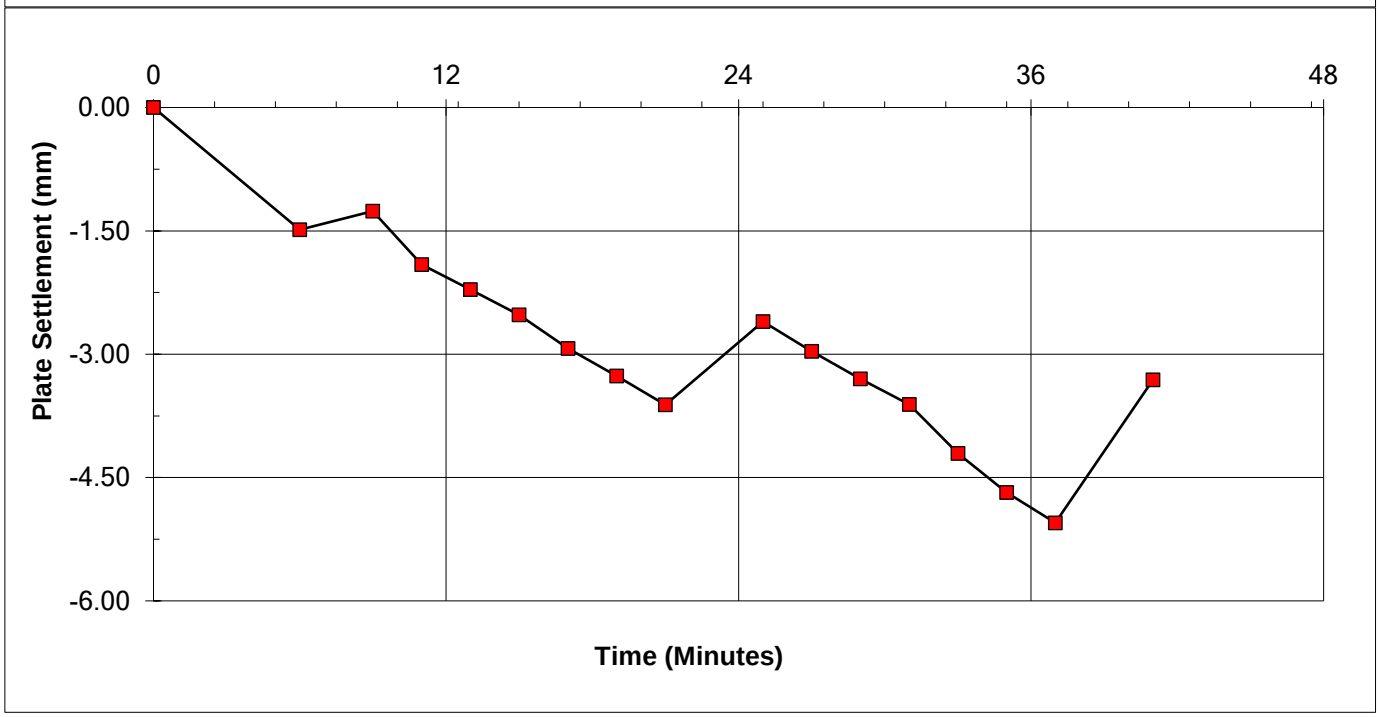
TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Jul-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc		
SITE	Stopes Road, Bolton		
JOB NUMBER	MRN 4454/13		
TEST LOCATION	Test 03 - Area 2B-2	LOADING DEVICE	10 Tonne Enerpac Jack
TEST DATE	22-Jul-22	PLATE SIZE (mm)	600 diameter
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4490	4525	4634	4550	0.00	0.00	0.0
4339	4377	4499	4405	-1.45	14.00	49.5
4380	4426	4503	4436	-1.13	0.00	0.0
4324	4362	4479	4388	-1.61	15.00	53.1
4294	4332	4448	4358	-1.92	20.00	70.7
4245	4289	4407	4314	-2.36	25.00	88.4
4199	4250	4370	4273	-2.77	30.00	106.1
4162	4204	4320	4229	-3.21	38.00	134.4
4117	4164	4271	4184	-3.66	46.00	162.7
4178	4236	4359	4258	-2.92	0.00	0.0
4076	4213	4332	4207	-3.43	5.00	17.7
4092	4172	4292	4185	-3.64	10.00	35.4
4076	4136	4259	4157	-3.93	21.00	74.3
4046	4107	4220	4124	-4.25	34.00	120.3
3981	4065	4191	4079	-4.71	43.00	152.1
3941	4026	4158	4042	-5.08	58.00	205.1
4038	4099	4175	4104	-4.46	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	89	kPa
Modulus of subgrade reaction (k) =	72	MPa/m
Equivalent 762 mm plate reaction =	58	MPa/m
Equivalent CBR =	10.8	%
Surface Stiffness Modulus (E) =	81	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	109	kPa
Modulus of subgrade reaction (k) =	87	MPa/m
Equivalent 762 mm plate reaction =	70	MPa/m
Equivalent CBR =	15.1	%
Surface Stiffness Modulus (E) =	100	MN/m^2

Surface Stiffness Modulus Ratio =	1.2

DATE 25-Jul-22

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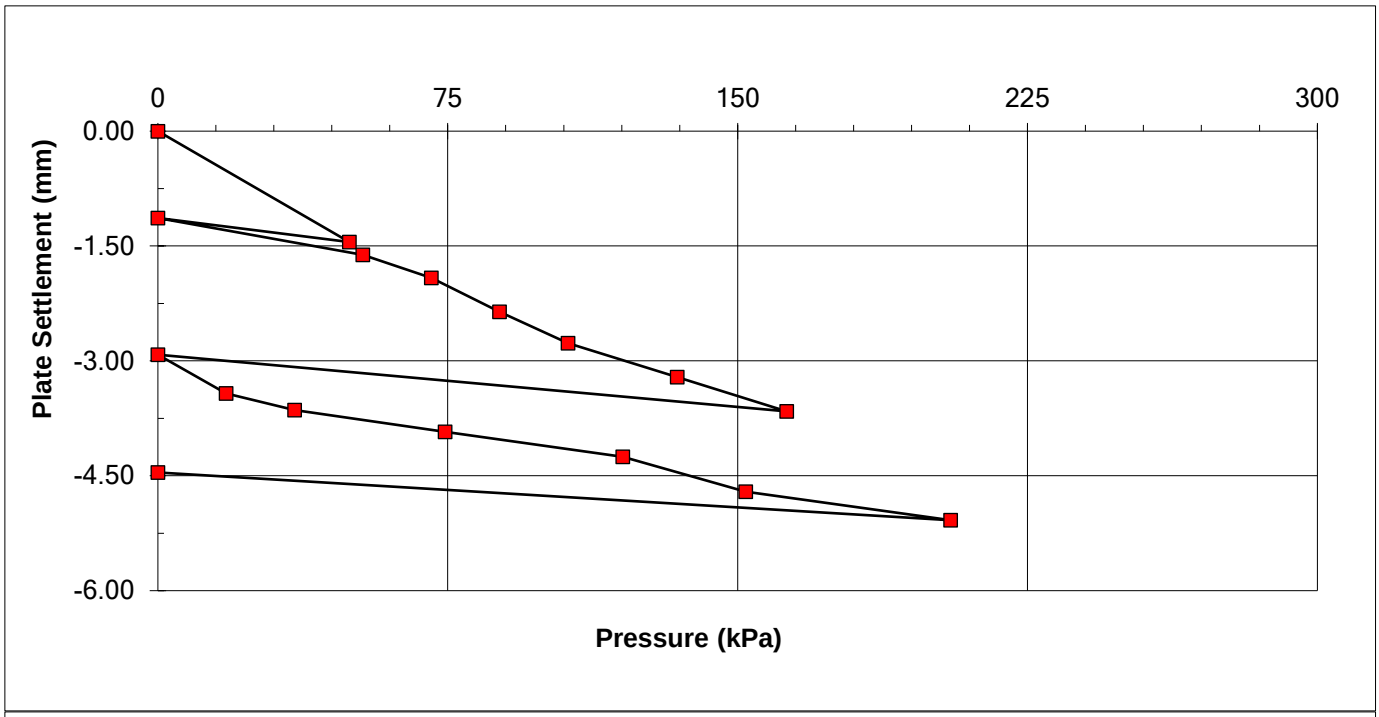
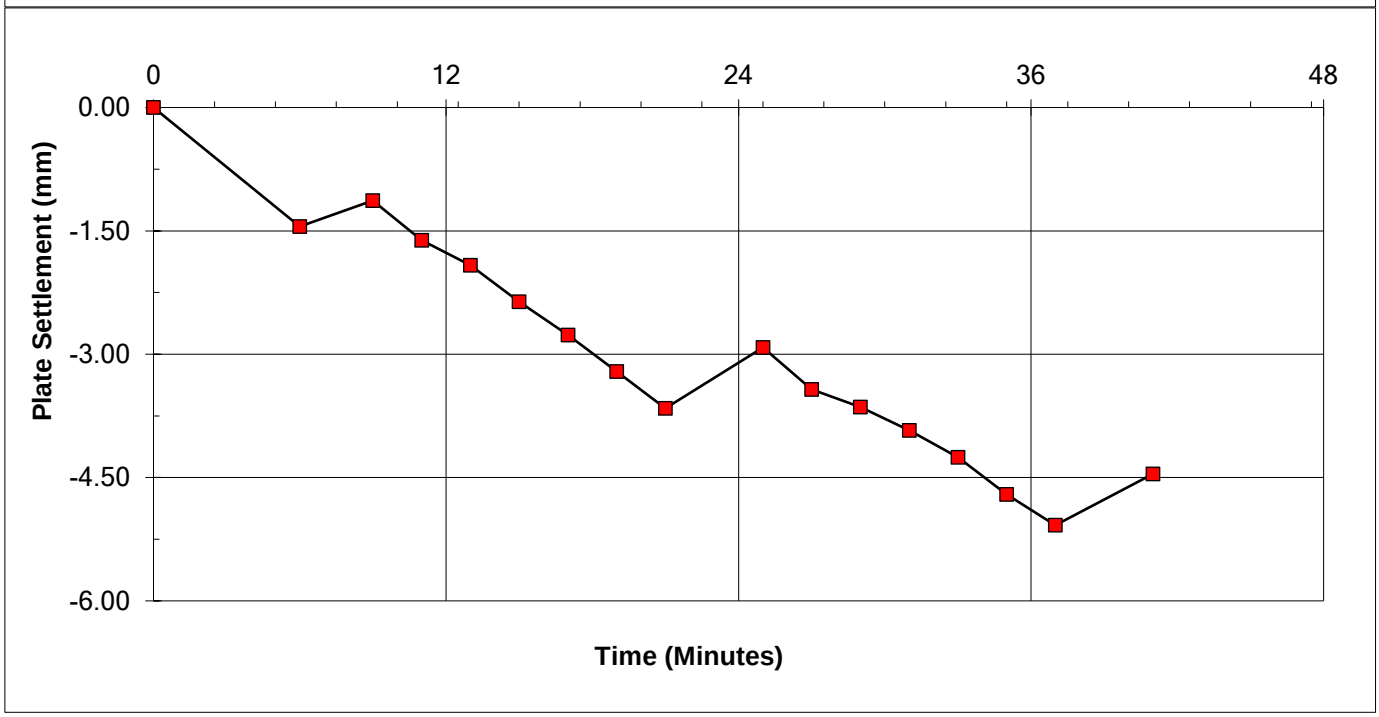
PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/14
Date of Issue 26 July 2022
Page 1 of 4

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

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ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

CALIBRATION OF NUCLEAR DENSITY GAUGE

BY DIRECT COMPARISON WITH SAND REPLACEMENT DENSITY TESTS

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton
JOB NUMBER	MRN 4454/14
MATERIAL	Black Ash/Sand
ADVISED SOURCE	Site Won

Date of Test	20 July 2022

Gauge Number	24958
Gauge Type	Troxler 3440

Sand Replacements			Nuclear Density Gauge (NDG)			Difference	
Test No.	Wet Density	Moisture	Test No.	Wet Density	Moisture	Wet Density	Moisture
1	1.543	12.4	1	1.595	9.1	0.052	3.3
2	1.598	13.8	2	1.636	10.8	0.038	3.1
3	1.751	10.2	3	1.735	9.2	0.016	1.1
4	1.751	11.1	4	1.776	10.2	0.025	0.9
5	1.822	8.8	5	1.766	10.1	0.056	1.3

Adjustment Required to Nuclear Density Gauge Reading	
Wet Density	Subtract 0.008 Mg/m^3 from the NDG Result
Moisture Content	Add 1.4% from the NDG Result

(Wet Density results expressed as Mg/m^3, Moisture Content results expressed as % of Dry Mass)

COMMENT / ANOMALIES

NDG results reported are the average of 4 readings, Correction calculated as an average

SIGNED

(Deputy Radiation Protection Supervisor)

NAME O.P. Davies BA (Hons)
(Laboratory Manager / DPRS)

DATE 26-Jul-22

M U R R A Y R I X

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TEL 0161 475 0870

TEST CERTIFICATE

CALIBRATION OF NUCLEAR DENSITY GAUGE

BY DIRECT COMPARISON WITH SAND REPLACEMENT DENSITY TESTS

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton
JOB NUMBER	MRN 4454/14
MATERIAL	Black Ash/Sand
ADVISED SOURCE	Site Won

Date of Test	21 July 2022

Gauge Number	24958
Gauge Type	Troxler 3440

Sand Replacements			Nuclear Density Gauge (NDG)			Difference	
Test No.	Wet Density	Moisture	Test No.	Wet Density	Moisture	Wet Density	Moisture
1	1.669	9.9	1	1.652	9.9	0.017	0.0
2	1.689	10.3	2	1.738	9.7	0.049	0.6
3	1.846	8.0	3	1.776	10.3	0.070	2.3
4	1.814	8.8	4	1.733	11.7	0.081	2.9
5	1.878	10.9	5	1.796	10.5	0.082	0.4

Adjustment Required to Nuclear Density Gauge Reading	
Wet Density	Add 0.040 Mg/m^3 from the NDG Result
Moisture Content	Subtract 0.8% from the NDG Result

(Wet Density results expressed as Mg/m^3, Moisture Content results expressed as % of Dry Mass)

COMMENT / ANOMALIES

NDG results reported are the average of 4 readings, Correction calculated as an average

SIGNED

(Deputy Radiation Protection Supervisor)

NAME O.P. Davies BA (Hons)
(Laboratory Manager / DPRS)

DATE 26-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIBRATION OF NUCLEAR DENSITY GAUGE

BY DIRECT COMPARISON WITH SAND REPLACEMENT DENSITY TESTS

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton
JOB NUMBER	MRN 4454/14
MATERIAL	Yellow Gravel
ADVISED SOURCE	Site Won

Date of Test	21 July 2022

Gauge Number	24958
Gauge Type	Troxler 3440

Sand Replacements			Nuclear Density Gauge (NDG)			Difference	
Test No.	Wet Density	Moisture	Test No.	Wet Density	Moisture	Wet Density	Moisture
1	2.063	4.8	1	1.882	6.0	0.181	1.2
2	2.022	4.2	2	1.909	4.5	0.113	0.2
3	2.036	4.3	3	1.922	4.3	0.115	0.0
4	2.149	4.0	4	1.842	4.3	0.307	0.3
5	2.172	4.9	5	1.842	4.7	0.331	0.2

Adjustment Required to Nuclear Density Gauge Reading	
Wet Density	Add 0.209 Mg/m^3 from the NDG Result
Moisture Content	Subtract 0.3% from the NDG Result

(Wet Density results expressed as Mg/m^3, Moisture Content results expressed as % of Dry Mass)

COMMENT / ANOMALIES

NDG results reported are the average of 4 readings, Correction calculated as an average

SIGNED

(Deputy Radiation Protection Supervisor)

NAME O.P. Davies BA (Hons)
(Laboratory Manager / DPRS)

DATE 26-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/15
Date of Issue 26 July 2022
Page 1 of 2

Approved Signatories

S J Hutchings, O P Davies

Notes

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M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/15

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	22/07/2022
DATE OF TEST	22/07/2022	SAMPLED BY	Murray Rix
DATE TESTED	23/07/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
114759	SRD (Trial Pad)	Black Ash/Sand	1.68	1.47	14	N/A	N/A
Maximum Dry Density (Mg/m^3)				N/A		(Not Advised)	
Particle Density (Mg/m^3)				N/A		(Not Advised)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 26-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract Stopes Road, Bolton

Job Number MRN 4454/16
Date of Issue 26 July 2022

Approved Signatories

S J Hutchings, O P Davies

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Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/16				
TEST LOCATION	Test 01 - PT4	LOADING DEVICE	10 Tonne Enerpac Jack		
TEST DATE	25-Jul-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4664	4702	4729	4698	0.00	0.00	0.0
4502	4586	4519	4536	-1.63	7.00	24.8
4538	4637	4557	4577	-1.21	0.00	0.0
4510	4622	4528	4553	-1.45	6.00	21.2
4472	4589	4488	4516	-1.82	8.00	28.3
4427	4546	4437	4470	-2.28	10.00	35.4
4391	4507	4378	4425	-2.73	14.00	49.5
4356	4487	4357	4400	-2.98	15.00	53.1
4325	4439	4327	4364	-3.35	19.00	67.2
4420	4537	4443	4467	-2.32	0.00	0.0
4392	4514	4421	4442	-2.56	3.00	10.6
4356	4477	4387	4407	-2.92	5.00	17.7
4308	4428	4349	4362	-3.37	9.00	31.8
4292	4415	4328	4345	-3.53	11.00	38.9
4256	4378	4297	4310	-3.88	16.00	56.6
4217	4336	4257	4270	-4.28	18.00	63.7
4294	4415	4375	4361	-3.37	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	41	kPa
Modulus of subgrade reaction (k) =	33	MPa/m
Equivalent 762 mm plate reaction =	26	MPa/m
Equivalent CBR =	2.8	%
Surface Stiffness Modulus (E) =	34	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	41	kPa
Modulus of subgrade reaction (k) =	32	MPa/m
Equivalent 762 mm plate reaction =	26	MPa/m
Equivalent CBR =	2.8	%
Surface Stiffness Modulus (E) =	34	MN/m^2

Surface Stiffness Modulus Ratio =	1.0

DATE 26-Jul-22

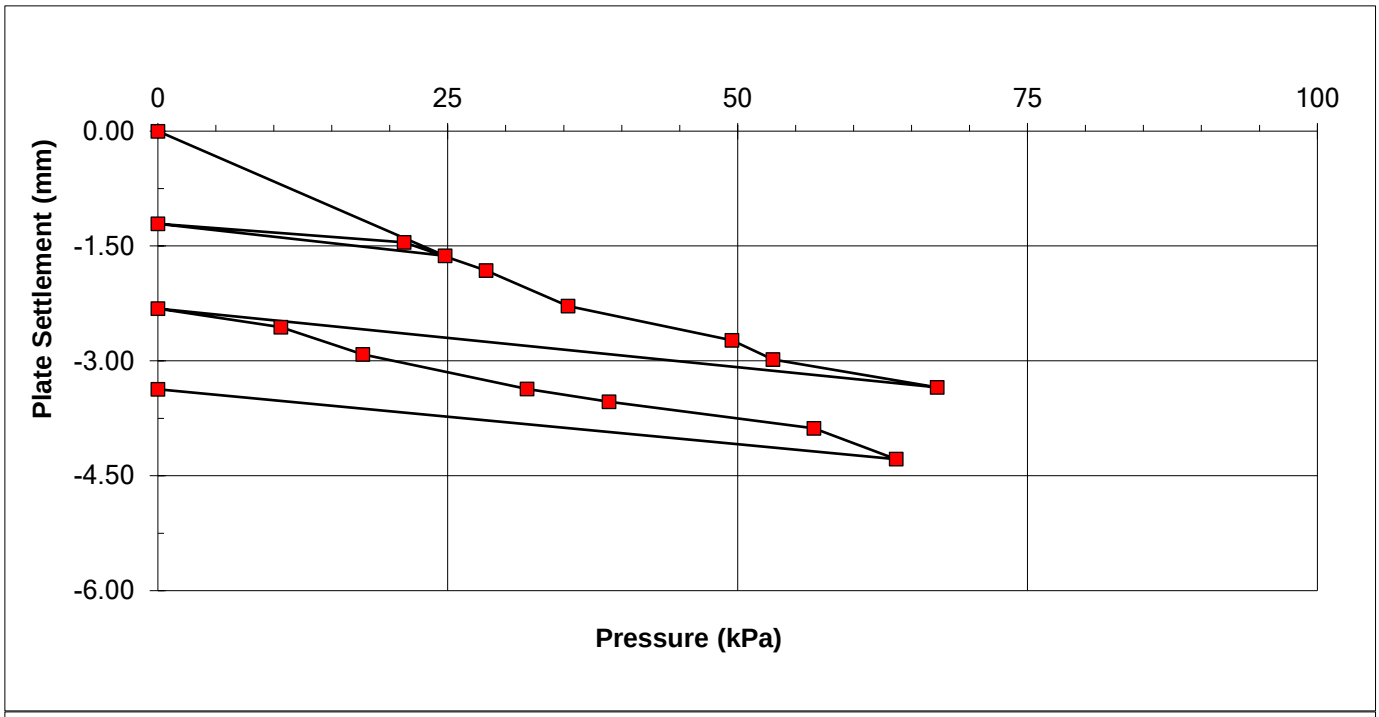
MURRAY RIX

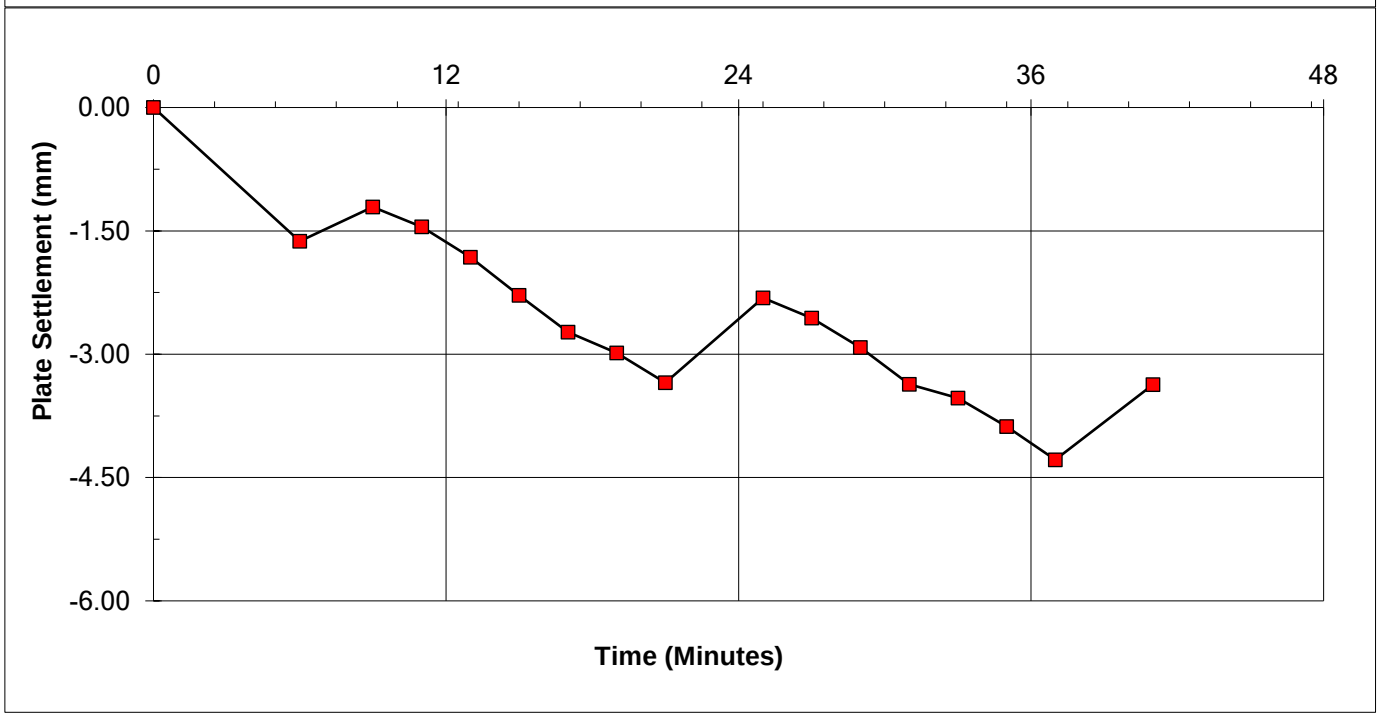
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 26-Jul-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/16				
TEST LOCATION	Test 02 - PT3	LOADING DEVICE	10 Tonne Enerpac Jack		
TEST DATE	25-Jul-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4641	4583	4680	4635	0.00	0.00	0.0
4491	4437	4520	4483	-1.52	10.00	35.4
4509	4467	4553	4510	-1.25	0.00	0.0
4480	4440	4517	4479	-1.56	10.00	35.4
4441	4398	4472	4437	-1.98	13.00	46.0
4407	4366	4434	4402	-2.32	17.00	60.1
4364	4326	4397	4362	-2.72	21.00	74.3
4322	4293	4357	4324	-3.11	26.00	92.0
4278	4246	4315	4280	-3.55	30.00	106.1
4391	4354	4437	4394	-2.41	0.00	0.0
4363	4330	4408	4367	-2.68	10.00	35.4
4336	4297	4376	4336	-2.98	14.00	49.5
4306	4270	4344	4307	-3.28	19.00	67.2
4279	4243	4311	4278	-3.57	25.00	88.4
4255	4215	4276	4249	-3.86	31.00	109.6
4216	4173	4231	4207	-4.28	36.00	127.3
4351	4308	4362	4340	-2.94	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	66	kPa
Modulus of subgrade reaction (k) =	53	MPa/m
Equivalent 762 mm plate reaction =	43	MPa/m
Equivalent CBR =	6.5	%
Surface Stiffness Modulus (E) =	58	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	95	kPa
Modulus of subgrade reaction (k) =	76	MPa/m
Equivalent 762 mm plate reaction =	61	MPa/m
Equivalent CBR =	12.0	%
Surface Stiffness Modulus (E) =	86	MN/m^2

Surface Stiffness Modulus Ratio =	1.5

DATE 26-Jul-22

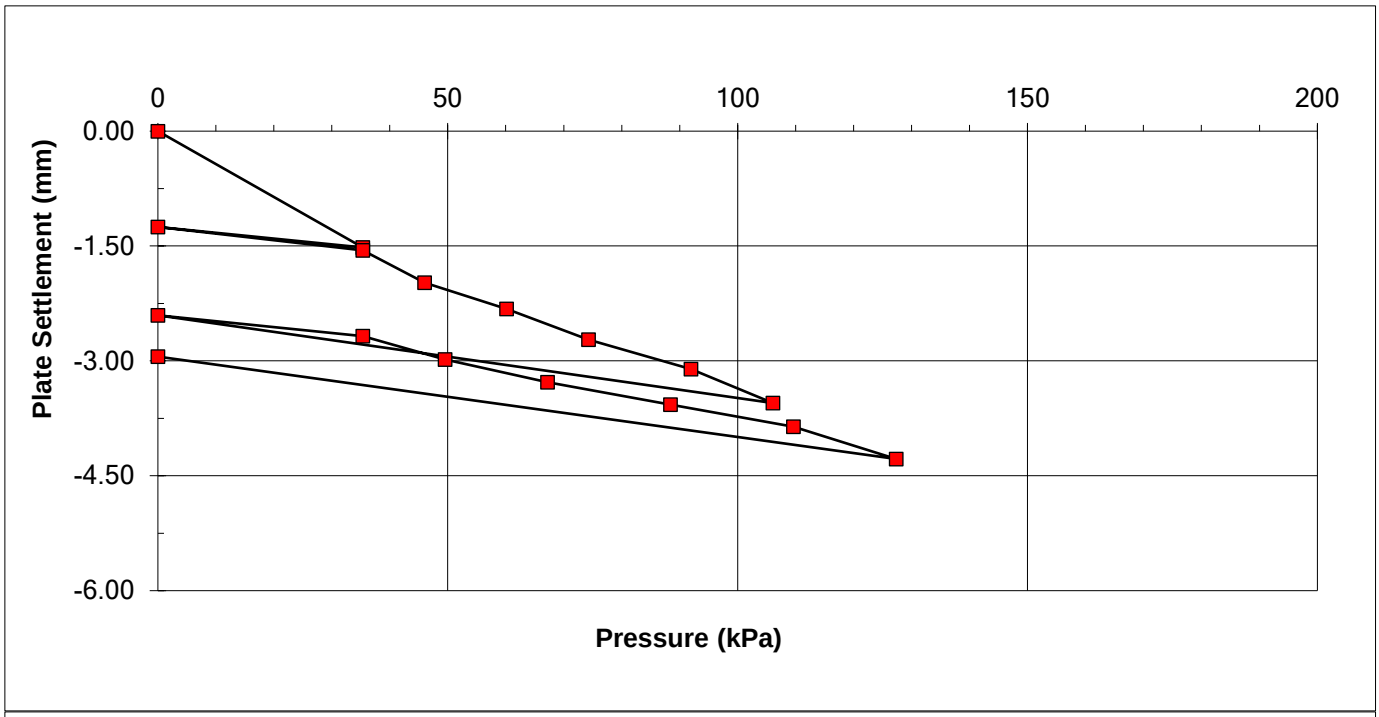
MURRAY RIX

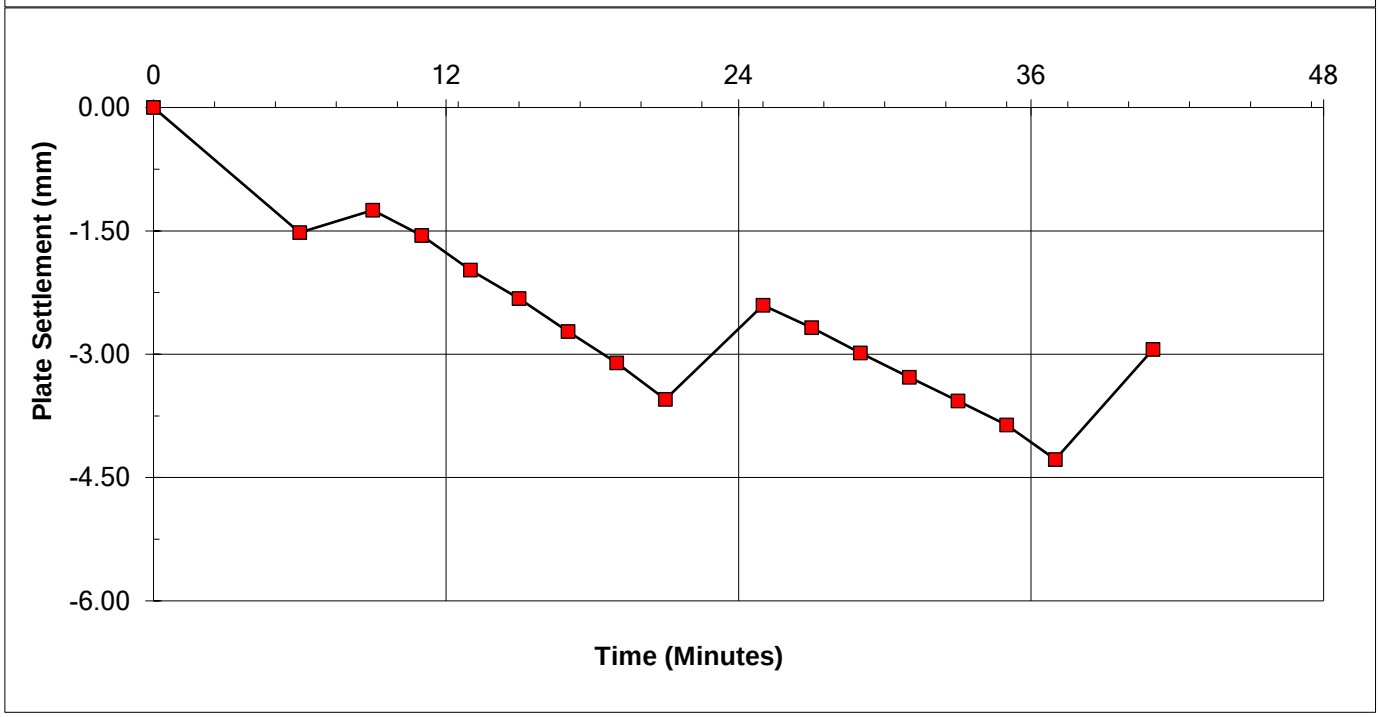
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 26-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/17
Date of Issue 29 July 2022
Page 1 of 2

Approved Signatories

S J Hutchings, O P Davies

Notes

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ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIBRATION OF NUCLEAR DENSITY GAUGE

BY DIRECT COMPARISON WITH SAND REPLACEMENT DENSITY TESTS

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton
JOB NUMBER	MRN 4454/17
MATERIAL	Yellow Gravel
ADVISED SOURCE	Site Won

Date of Test	27 July 2022

Gauge Number	24958
Gauge Type	Troxler 3440

Sand Replacements			Nuclear Density Gauge (NDG)			Difference	
Test No.	Wet Density	Moisture	Test No.	Wet Density	Moisture	Wet Density	Moisture
1	1.958	5.0	1	1.945	5.0	0.013	0.0
2	2.261	5.8	2	1.981	6.8	0.281	1.0
3	2.267	5.7	3	1.969	7.0	0.298	1.3
4	2.355	6.0	4	2.099	7.3	0.256	1.3
5	2.273	6.5	5	1.994	8.0	0.279	1.5

Adjustment Required to Nuclear Density Gauge Reading	
Wet Density	Add 0.225 Mg/m^3 from the NDG Result
Moisture Content	Subtract 1.0% from the NDG Result

(Wet Density results expressed as Mg/m^3, Moisture Content results expressed as % of Dry Mass)

COMMENT / ANOMALIES

NDG results reported are the average of 4 readings, Correction calculated as an average

SIGNED

(Deputy Radiation Protection Supervisor)

NAME O.P. Davies BA (Hons)
(Laboratory Manager / DPRS)

DATE 29-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/18
Date of Issue 29 July 2022
Page 1 of 3

Approved Signatories

S J Hutchings, O P Davies

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ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	28-Jul-22	**JOB NUMBER**	MRN 4454/18
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	E11	225	1.64	1.42	15	N/A	N/A
2	E10	225	1.66	1.42	17	N/A	N/A
3	D11	225	1.75	1.56	12	N/A	N/A
4	D10	225	1.58	1.39	14	N/A	N/A
5	E9	225	1.75	1.55	13	N/A	N/A
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Not Advised)	
				Particle Density (Mg/m3)	N/A	(Not Advised)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 29-Jul-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/18

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	28/07/2022
DATE OF TEST	28/07/2022	SAMPLED BY	Murray Rix
DATE TESTED	29/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
114845	SRD E11	Black Ash/Sand	1.64	1.45	13	N/A	N/A
Maximum Dry Density (Mg/m^3)				N/A		(Not Advised)	
Particle Density (Mg/m^3)				N/A		(Not Advised)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 29-Jul-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/19
Date of Issue 01 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	29-Jul-22	**JOB NUMBER**	MRN 4454/19
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C10	225	1.65	1.52	8.9	N/A	N/A
2	C9	225	1.56	1.44	8.2	N/A	N/A
3	C8	225	1.81	1.56	16	N/A	N/A
4	E12	225	1.81	1.58	15	N/A	N/A
5	C7	225	1.95	1.71	14	N/A	N/A
6	D7	225	1.86	1.59	17	N/A	N/A
7	D12	225	1.85	1.61	15	N/A	N/A
8	D8	225	1.94	1.66	16	N/A	N/A
9	E9	225	1.56	1.37	14	N/A	N/A
10	F10	225	1.55	1.35	14	N/A	N/A
11	F11	225	1.56	1.38	13	N/A	N/A
12	F12	225	1.56	1.39	13	N/A	N/A
13	G12	225	1.64	1.48	11	N/A	N/A
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Advised by client)	
				Particle Density (Mg/m3)	N/A	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 01-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/19

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	27/07/2022
DATE OF TEST	27/07/2022	SAMPLED BY	Murray Rix
DATE TESTED	28/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115020	SRD 1 F10	Black Ash/Sand	1.57	1.40	13	N/A	N/A
		Maximum Dry Density (Mg/m^3)			N/A	(Not Advised)	
		Particle Density (Mg/m^3)			N/A	(Not Advised)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 01-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

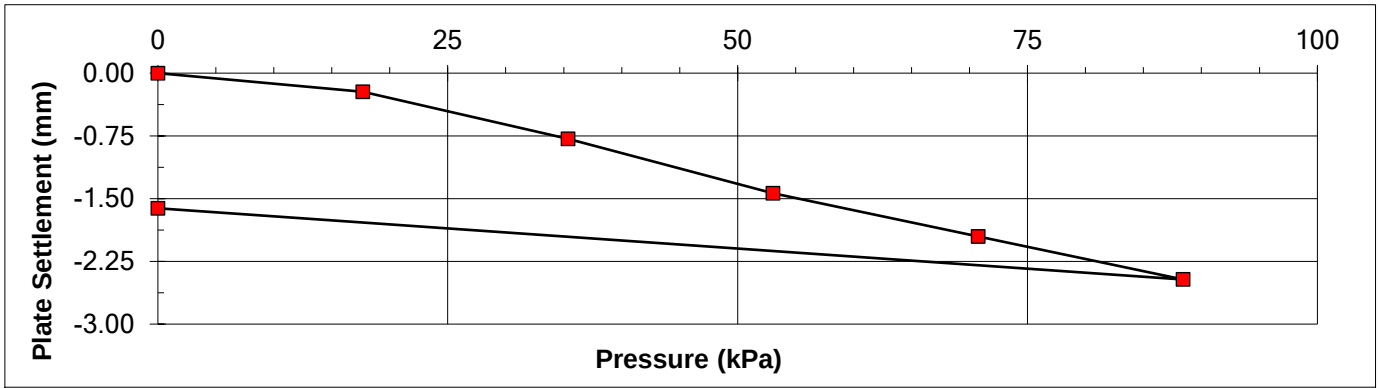
TEST CERTIFICATE

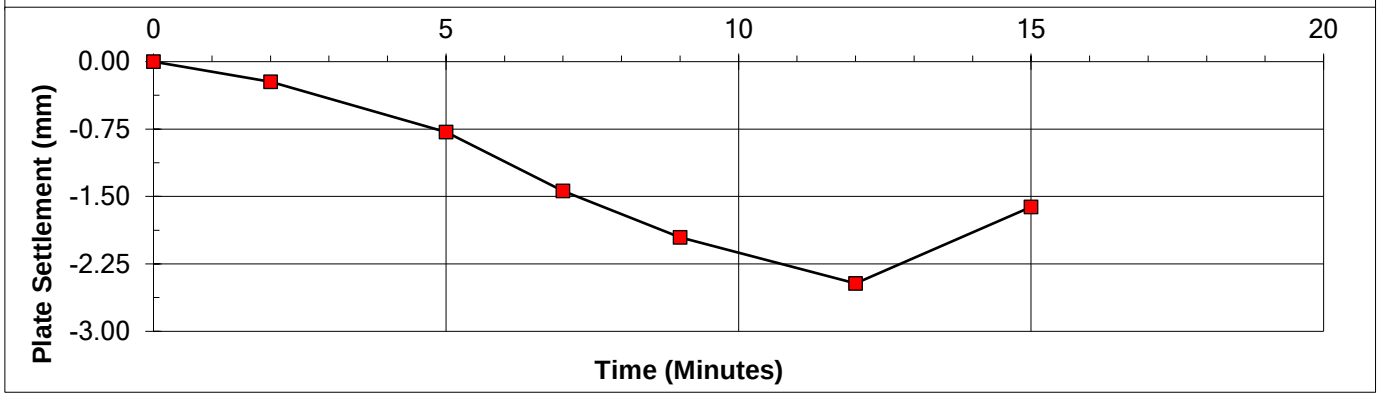
PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

CLIENT	VHE Construction Plc		
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1N		
JOB NUMBER	MRN 4454/19		
TEST LOCATION	Test 01 - CBR 2	LOADING DEVICE	10 Tonne Enerpac Jack
TEST DATE	29-Jul-22	PLATE SIZE (mm)	600 diameter
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4529	4511	4595	4545	0.00	0.00	0.0
4508	4489	4571	4523	-0.22	5.00	17.7
4446	4443	4511	4467	-0.78	10.00	35.4
4380	4378	4446	4401	-1.44	15.00	53.1
4321	4343	4385	4350	-1.95	20.00	70.7
4270	4294	4331	4298	-2.47	25.00	88.4
4367	4345	4438	4383	-1.62	0.00	0.0





Pressure at 1.25 mm deflexion =	48	kPa
Modulus of subgrade reaction (k) =	38	MPa/m
Equivalent 762 mm plate reaction =	31	MPa/m
Equivalent CBR =	3.7	%

REMARKS

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 01-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

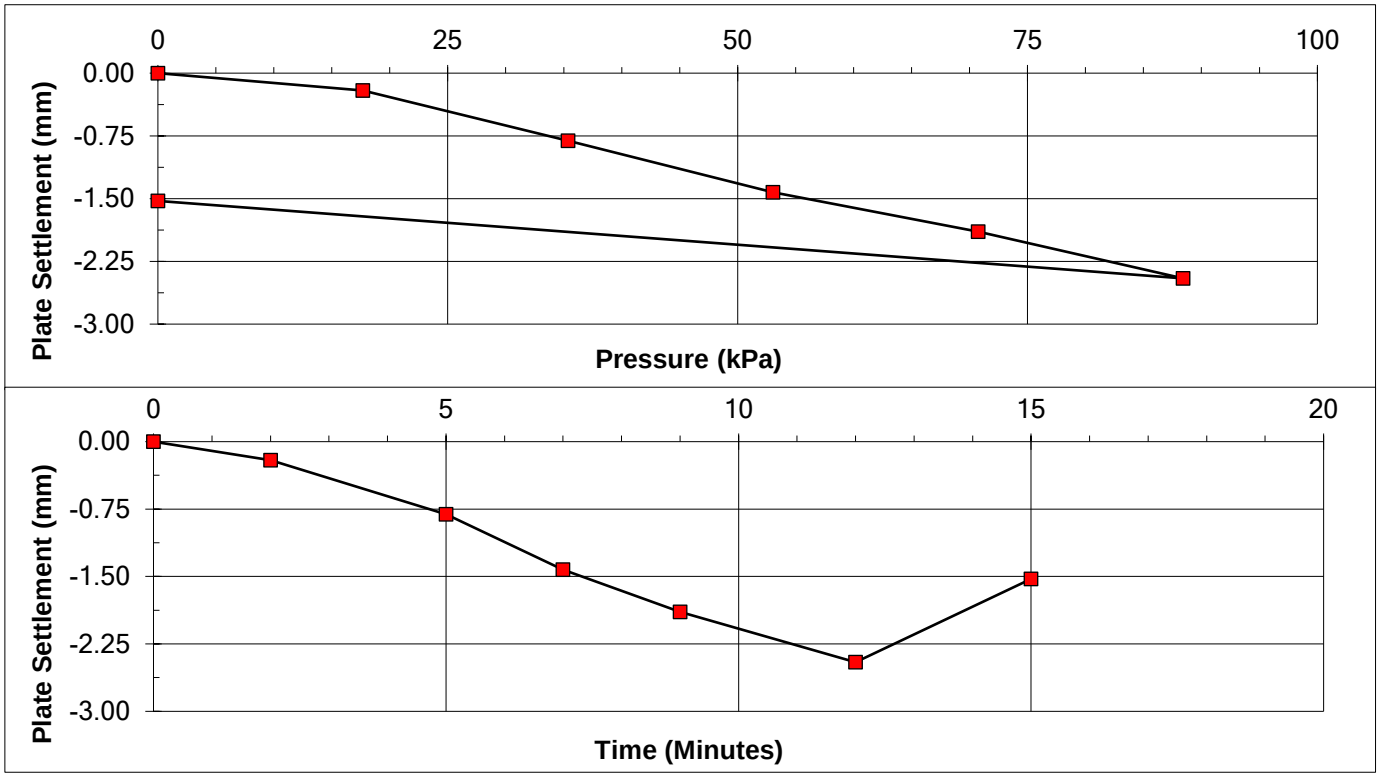
TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

CLIENT	VHE Construction Plc		
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1N		
JOB NUMBER	MRN 4454/19		
TEST LOCATION	Test 02 - CBR 4	LOADING DEVICE	10 Tonne Enerpac Jack
TEST DATE	29-Jul-22	PLATE SIZE (mm)	600 diameter
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4671	4657	4692	4673	0.00	0.00	0.0
4653	4632	4673	4653	-0.21	5.00	17.7
4581	4580	4617	4593	-0.81	10.00	35.4
4515	4526	4552	4531	-1.42	15.00	53.1
4465	4483	4504	4484	-1.89	20.00	70.7
4402	4431	4451	4428	-2.45	25.00	88.4
4469	4516	4577	4521	-1.53	0.00	0.0



Pressure at 1.25 mm deflexion =	48	kPa
Modulus of subgrade reaction (k) =	38	MPa/m
Equivalent 762 mm plate reaction =	31	MPa/m
Equivalent CBR =	3.7	%

REMARKS

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 01-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

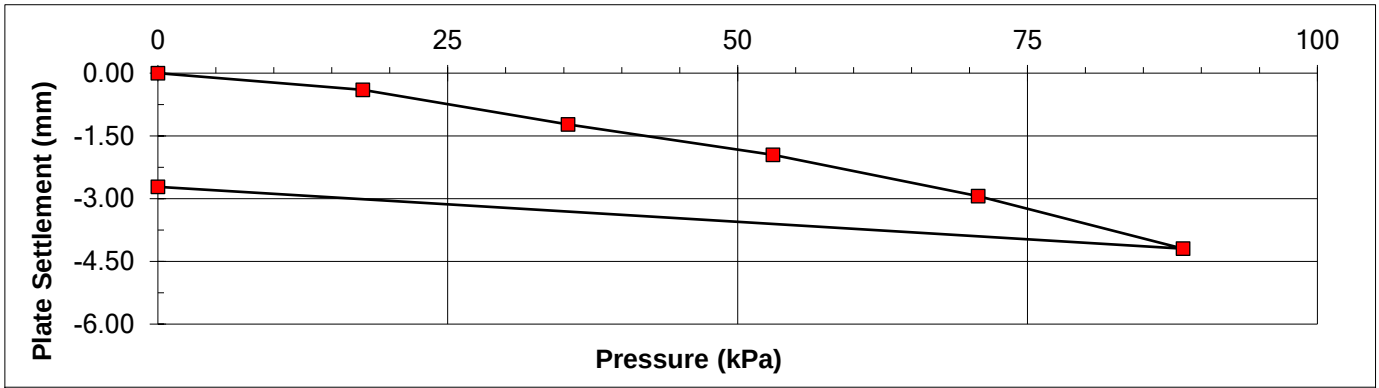
TEST CERTIFICATE

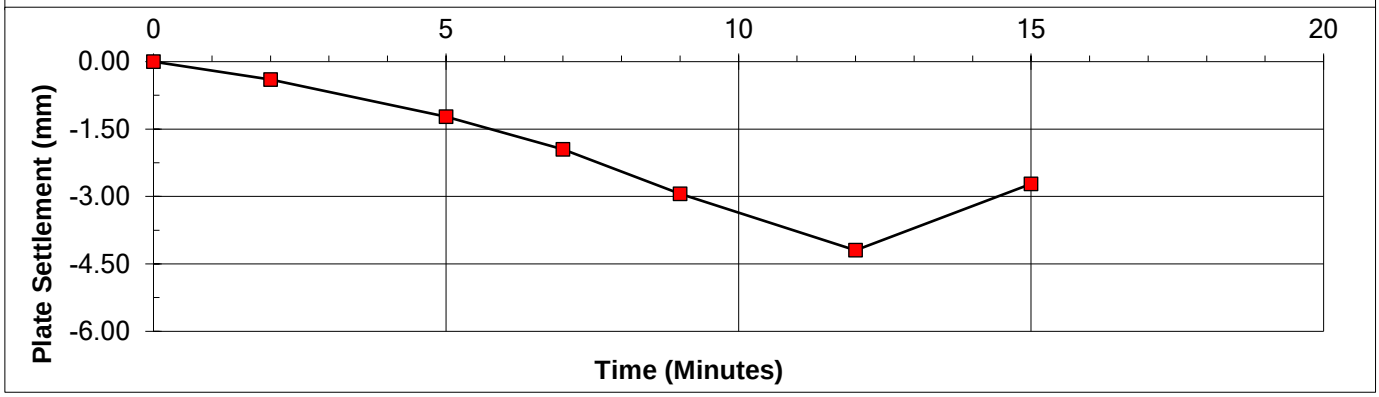
PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

CLIENT	VHE Construction Plc		
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1N		
JOB NUMBER	MRN 4454/19		
TEST LOCATION	Test 03 - CBR 3	LOADING DEVICE	10 Tonne Enerpac Jack
TEST DATE	29-Jul-22	PLATE SIZE (mm)	600 diameter
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4385	4477	4490	4451	0.00	0.00	0.0
4360	4438	4435	4411	-0.40	5.00	17.7
4268	4369	4347	4328	-1.23	10.00	35.4
4149	4306	4311	4255	-1.95	15.00	53.1
4052	4212	4205	4156	-2.94	20.00	70.7
3930	4093	4070	4031	-4.20	25.00	88.4
4108	4217	4211	4179	-2.72	0.00	0.0





Pressure at 1.25 mm deflexion =	36	kPa
Modulus of subgrade reaction (k) =	29	MPa/m
Equivalent 762 mm plate reaction =	23	MPa/m
Equivalent CBR =	2.2	%

REMARKS

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 01-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/20
Date of Issue 02 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	01-Aug-22	**JOB NUMBER**	MRN 4454/20
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	E11 Layer 2	225	1.54	1.39	11	N/A	N/A
2	D11 Layer 2	225	1.53	1.39	10	N/A	N/A
3	C11 Layer 2	225	1.52	1.35	13	N/A	N/A
4	C10 Layer 2	225	1.56	1.40	12	N/A	N/A
5	D10 Layer 2	225	1.57	1.42	11	N/A	N/A
6	C9 Layer 2	225	1.55	1.37	13	N/A	N/A
7	D9 Layer 2	225	1.76	1.52	16	N/A	N/A
8	D8 Layer 2	225	1.71	1.53	12	N/A	N/A
9	C8 Layer 2	225	1.80	1.64	10	N/A	N/A
10	C7 Layer 2	225	1.85	1.68	10	N/A	N/A
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Advised by client)	
				Particle Density (Mg/m3)	N/A	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 02-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/21
Date of Issue 03 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
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Also at: London: 020 8523 1999

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M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	02-Aug-22	**JOB NUMBER**	MRN 4454/21
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	E12 Layer 2	225	1.61	1.45	11	N/A	N/A
2	D12 Layer 2	225	1.60	1.45	9.7	N/A	N/A
3	F12 Layer 2	225	1.55	1.41	9.8	N/A	N/A
4	F11 Layer 2	225	1.58	1.32	19	N/A	N/A
5	E10 Layer 2	225	1.63	1.43	15	N/A	N/A
6	E9 Layer 2	225	1.66	1.47	12	N/A	N/A
7	F10 Layer 2	225	1.64	1.48	11	N/A	N/A
8	D7 Layer 2	225	1.68	1.45	16	N/A	N/A
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Advised by client)	
				Particle Density (Mg/m3)	N/A	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 03-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/22
Date of Issue 04 August 2022
Page 1 of 2

Approved Signatories

S J Hutchings, O P Davies

Notes

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M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/22

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	02/08/2022
DATE OF TEST	02/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	03/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115079	SRD D8 L2	Black Ash/Sand	1.75	1.52	15	N/A	N/A
115080	SRD D11 L2	Black Ash/Sand	1.56	1.38	13	N/A	N/A
		Maximum Dry Density (Mg/m^3)		N/A		(Not Advised)	
		Particle Density (Mg/m^3)		N/A		(Not Advised)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 04-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/23
Date of Issue 09 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	04-Aug-22	**JOB NUMBER**	MRN 4454/23
MATERIAL	Black Ash/Gravel		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	L2 G12	225	1.76	1.53	15	N/A	N/A
2	L3 C7	225	1.95	1.67	16	N/A	N/A
3	L3 C8	225	1.95	1.67	16	N/A	N/A
4	L3 C9	225	1.93	1.65	17	N/A	N/A
5	L3 C10	225	1.93	1.68	15	N/A	N/A
6	L3 D7	225	1.97	1.73	14	N/A	N/A
7	L3 D8	225	1.94	1.68	16	N/A	N/A
8	L3 D9	225	1.88	1.63	16	N/A	N/A
9	L3 D10	225	1.96	1.71	15	N/A	N/A
10	L3 D11	225	1.93	1.65	17	N/A	N/A
11	L3 E9	225	1.84	1.56	18	N/A	N/A
12	L3 E10	225	1.97	1.69	16	N/A	N/A
13	L3 E11	225	1.85	1.60	15	N/A	N/A
14	L3 F10	225	1.94	1.65	17	N/A	N/A
15	L3 F11	225	1.93	1.63	18	N/A	N/A
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Not Advised)	
				Particle Density (Mg/m3)	N/A	(Not Advised)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 09-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/23

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	04/08/2022
DATE OF TEST	04/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	05/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115152	L1 F11	Ash	1.90	1.68	13	N/A	N/A
115153	L2 G12	Ash	1.77	1.57	13	N/A	N/A
115154	L1 D8	Ash	1.91	1.67	14	N/A	N/A
		Maximum Dry Density (Mg/m^3)		N/A		(Not Advised)	
		Particle Density (Mg/m^3)		N/A		(Not Advised)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 09-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
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S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/24
Date of Issue 09 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	05-Aug-22	**JOB NUMBER**	MRN 4454/24
MATERIAL	Ash		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	L3 D6	200	1.88	1.60	17	N/A	N/A
2	L3 D7	200	2.00	1.80	11	N/A	N/A
3	L3 D8	200	1.85	1.61	14	N/A	N/A
4	L3 D9	200	1.91	1.73	10	N/A	N/A
5	L3 D10	200	1.75	1.58	11	N/A	N/A
6	L3 D11	200	1.85	1.64	13	N/A	N/A
7	L3 D12	200	1.83	1.55	19	N/A	N/A
8	L3 E12	200	2.03	1.78	14	N/A	N/A
9	L3 E11	200	1.95	1.76	11	N/A	N/A
10	L3 E10	200	1.97	1.75	12	N/A	N/A
11	L3 E9	200	2.03	1.75	16	N/A	N/A
12	L3 E8	200	1.88	1.65	14	N/A	N/A
13	L3 F10	200	2.05	1.88	9.0	N/A	N/A
14	L3 F11	200	1.85	1.61	15	N/A	N/A
15	L1 B12	200	1.54	1.21	27	N/A	N/A
16	L1 B11	200	1.66	1.38	20	N/A	N/A
17	L1 C11	200	1.72	1.52	13	N/A	N/A
18	L1 C12	200	1.74	1.47	19	N/A	N/A
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Not Advised)	
				Particle Density (Mg/m3)	N/A	(Not Advised)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 09-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/25
Date of Issue 09 August 2022
Page 1 of 2

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

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M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	08-Aug-22	**JOB NUMBER**	MRN 4454/25
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3451	**SERIAL NUMBER**	28
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C10 Layer 4	225	1.71	1.56	10	N/A	N/A
2	D9 Layer 4	225	1.57	1.35	16	N/A	N/A
3	D8 Layer 4	225	1.69	1.53	10	N/A	N/A
4	D7 Layer 4	225	1.49	1.35	11	N/A	N/A
5	D10 Layer 4	225	1.53	1.37	11	N/A	N/A
6	C7 Layer 4	225	1.43	1.26	13	N/A	N/A
7	C8 Layer 4	225	1.43	1.25	15	N/A	N/A
8	C9 Layer 4	225	1.43	1.25	15	N/A	N/A
9	D11 Layer 4	225	1.69	1.53	11	N/A	N/A
10	C11 Layer 4	225	1.70	1.52	12	N/A	N/A
11	F12 Layer 4	225	1.68	1.54	10	N/A	N/A
12	G12 Layer 4	225	1.70	1.52	12	N/A	N/A
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Not Advised)	
				Particle Density (Mg/m3)	N/A	(Not Advised)	
				Results correct for NDG calibration/correlation to site materials	No		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 09-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/26
Date of Issue 10 August 2022

Approved Signatories

S J Hutchings, O P Davies

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Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/26

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	08/08/2022
DATE OF TEST	08/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	09/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115178	SRD 1	Black Ash/Sand	1.84	1.61	15	N/A	N/A
Maximum Dry Density (Mg/m^3)				N/A		(Not Advised)	
Particle Density (Mg/m^3)				N/A		(Not Advised)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 10-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
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Contract 808 -
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Job Number MRN 4454/27
Date of Issue 10 August 2022

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MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	09-Aug-22	**JOB NUMBER**	MRN 4454/27
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3451	**SERIAL NUMBER**	28
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C12 L2	225	1.85	1.66	11	N/A	N/A
2	B12 L2	225	1.88	1.71	10	N/A	N/A
3	B11 L2	225	1.86	1.70	10	N/A	N/A
4	D12 L4	225	1.93	1.73	12	N/A	N/A
5	E12 L4	225	1.94	1.75	11	N/A	N/A
6	E11 L4	225	1.81	1.65	10	N/A	N/A
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Not Advised)	
				Particle Density (Mg/m3)	N/A	(Not Advised)	
				Results correct for NDG calibration/correlation to site materials	No		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 10-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/27				
TEST LOCATION	Test 01 - E12 L4	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	09-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4619	4601	4660	4627	0.00	0.00	0.0
4468	4463	4524	4485	-1.42	6.00	21.2
4505	4474	4549	4509	-1.17	0.00	0.0
4471	4446	4515	4477	-1.49	6.00	21.2
4429	4412	4460	4434	-1.93	10.00	35.4
4393	4389	4427	4403	-2.24	16.00	56.6
4357	4354	4390	4367	-2.60	20.00	70.7
4328	4320	4363	4337	-2.90	23.00	81.3
4292	4293	4320	4302	-3.25	29.00	102.6
4415	4402	4418	4412	-2.15	0.00	0.0
4389	4379	4393	4387	-2.40	11.00	38.9
4361	4354	4366	4360	-2.66	17.00	60.1
4334	4331	4338	4334	-2.92	21.00	74.3
4306	4305	4309	4307	-3.20	24.00	84.9
4279	4269	4275	4274	-3.52	36.00	127.3
4243	4235	4240	4239	-3.87	41.00	145.0
4303	4360	4299	4321	-3.06	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	64	kPa
Modulus of subgrade reaction (k) =	51	MPa/m
Equivalent 762 mm plate reaction =	41	MPa/m
Equivalent CBR =	6.1	%
Surface Stiffness Modulus (E) =	56	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	111	kPa
Modulus of subgrade reaction (k) =	89	MPa/m
Equivalent 762 mm plate reaction =	72	MPa/m
Equivalent CBR =	15.8	%
Surface Stiffness Modulus (E) =	103	MN/m^2

Surface Stiffness Modulus Ratio =	1.8

DATE 10-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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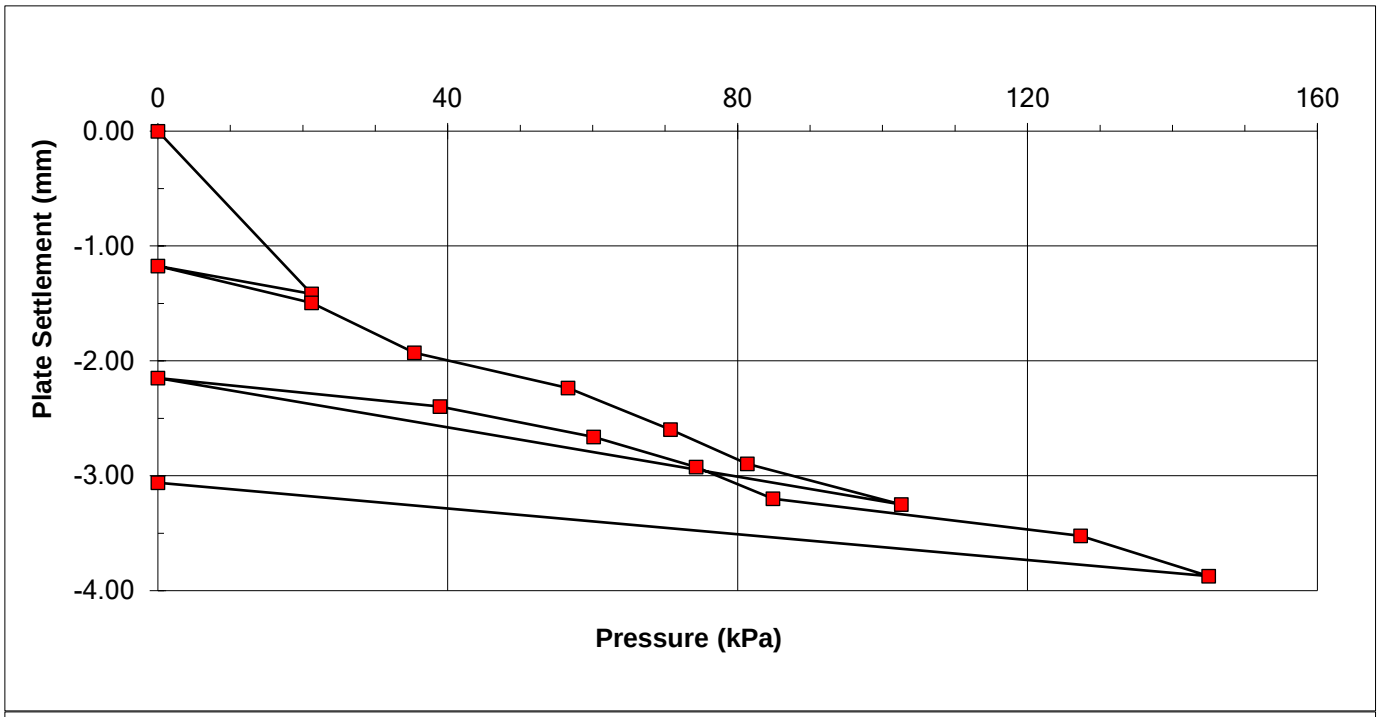
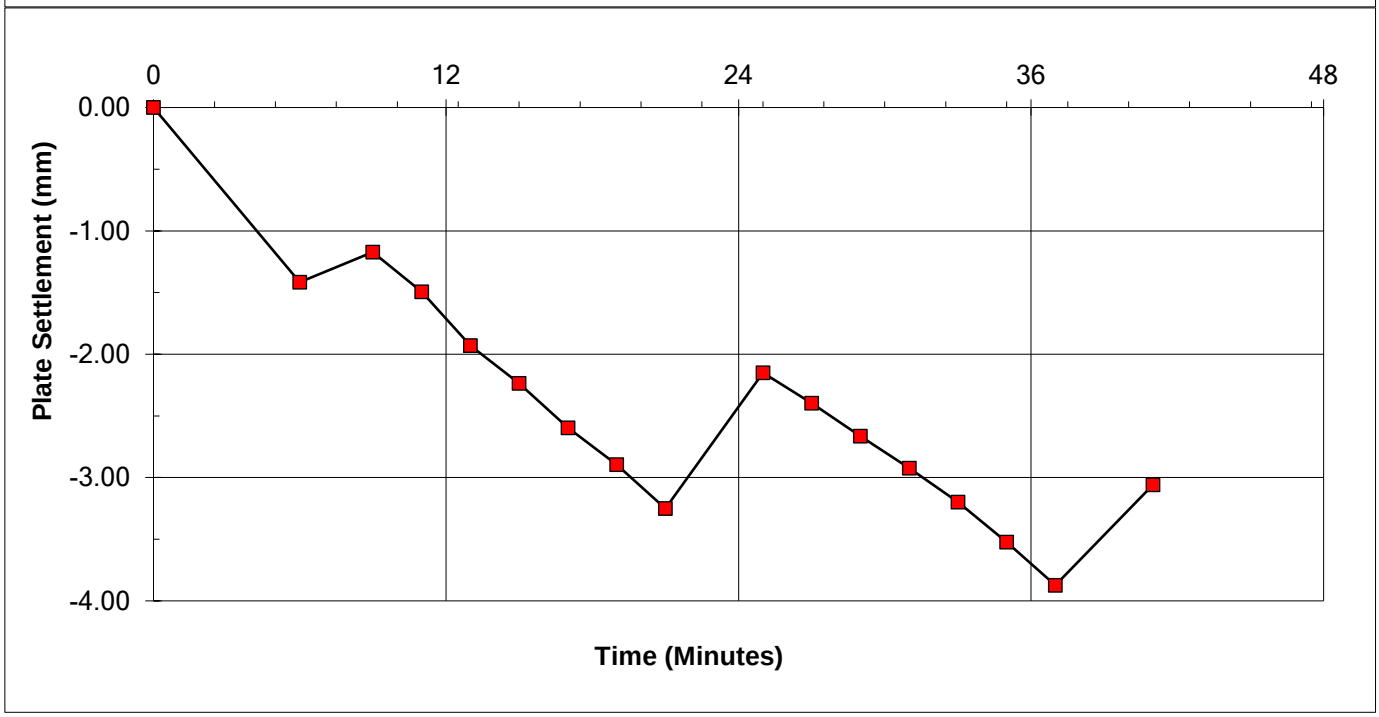
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST
BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 10-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/27			
TEST LOCATION	Test 02 - D10 L4	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	09-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4667	4611	4600	4626	0.00	0.00	0.0
4516	4472	4459	4482	-1.44	21.00	74.3
4547	4523	4513	4528	-0.98	0.00	0.0
4521	4500	4476	4499	-1.27	17.00	60.1
4495	4471	4451	4472	-1.54	23.00	81.3
4465	4444	4418	4442	-1.84	34.00	120.3
4431	4411	4387	4410	-2.16	41.00	145.0
4403	4400	4373	4392	-2.34	45.00	159.2
4392	4371	4343	4369	-2.57	52.00	183.9
4477	4460	4446	4461	-1.65	0.00	0.0
4447	4437	4417	4434	-1.92	15.00	53.1
4417	4409	4387	4404	-2.22	28.00	99.0
4387	4381	4361	4376	-2.50	45.00	159.2
4360	4358	4334	4351	-2.75	60.00	212.2
4314	4317	4296	4309	-3.17	72.00	254.6
4285	4286	4265	4279	-3.47	88.00	311.2
4426	4403	4378	4402	-2.24	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	151	kPa
Modulus of subgrade reaction (k) =	120	MPa/m
Equivalent 762 mm plate reaction =	97	MPa/m
Equivalent CBR =	26.7	%
Surface Stiffness Modulus (E) =	144	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	227	kPa
Modulus of subgrade reaction (k) =	182	MPa/m
Equivalent 762 mm plate reaction =	146	MPa/m
Equivalent CBR =	54.5	%
Surface Stiffness Modulus (E) =	227	MN/m^2

Surface Stiffness Modulus Ratio =	1.6

DATE 10-Aug-22

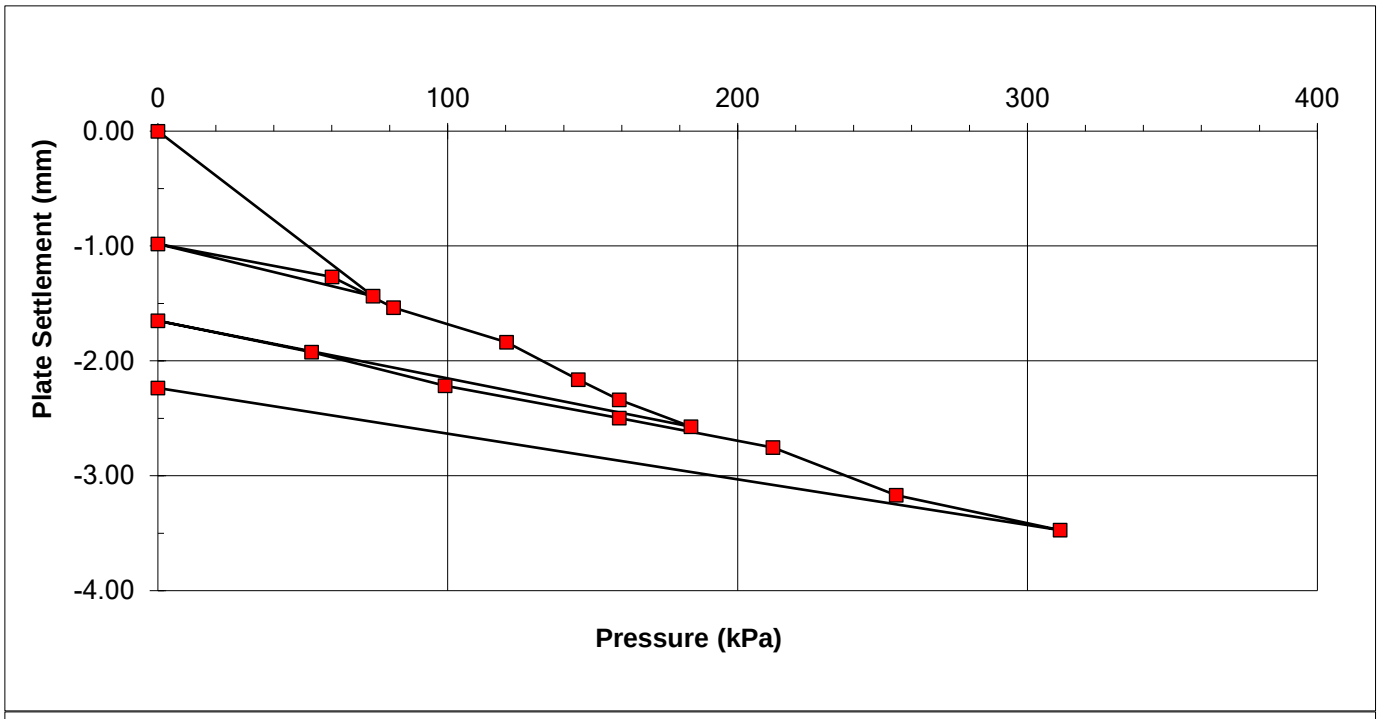
MURRAY RIX

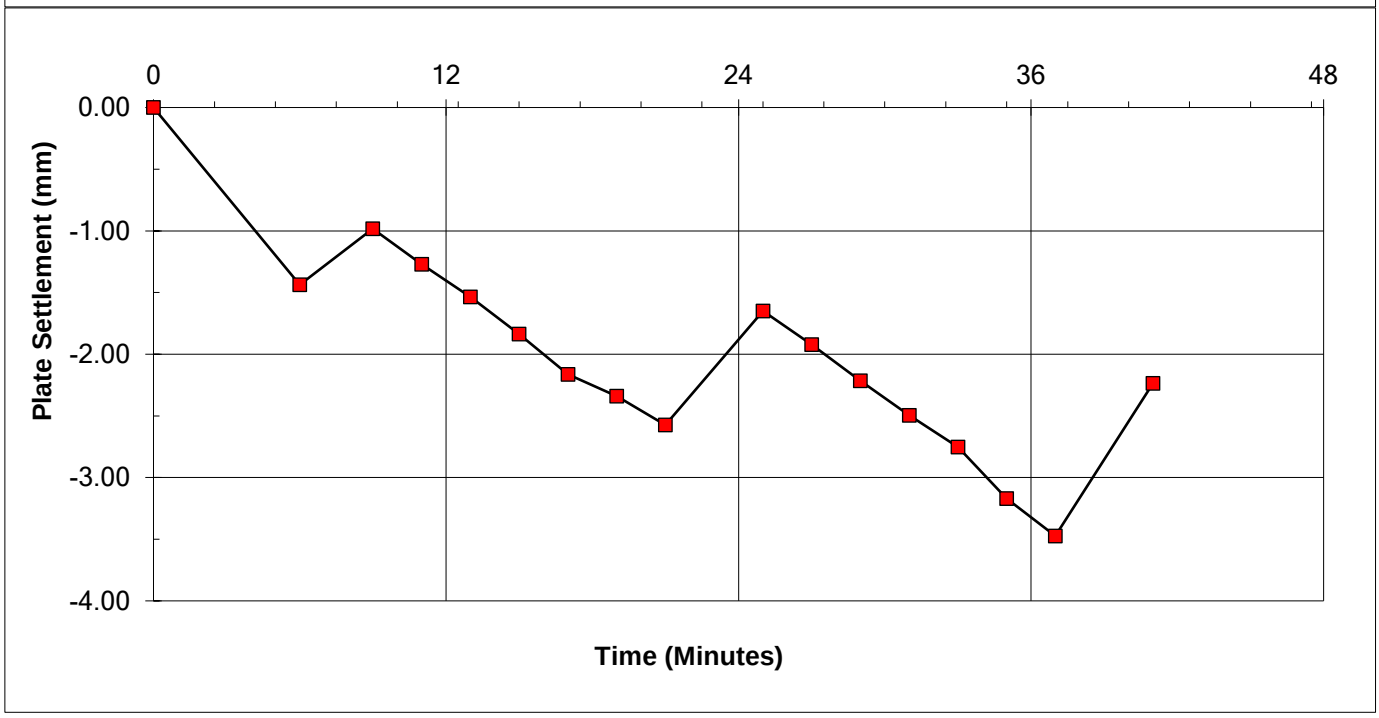
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 10-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/27				
TEST LOCATION	Test 03 - D8 L4	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	09-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4611	4635	4672	4639	0.00	0.00	0.0
4455	4494	4523	4491	-1.49	38.00	134.4
4511	4529	4574	4538	-1.01	0.00	0.0
4482	4503	4550	4512	-1.28	12.00	42.4
4453	4471	4520	4481	-1.58	28.00	99.0
4427	4447	4492	4455	-1.84	42.00	148.5
4395	4415	4456	4422	-2.17	60.00	212.2
4352	4376	4412	4380	-2.59	73.00	258.2
4313	4341	4376	4343	-2.96	86.00	304.2
4438	4467	4465	4457	-1.83	0.00	0.0
4415	4441	4430	4429	-2.11	22.00	77.8
4391	4416	4400	4402	-2.37	43.00	152.1
4364	4389	4368	4374	-2.66	64.00	226.4
4335	4366	4342	4348	-2.92	87.00	307.7
4305	4329	4308	4314	-3.25	104.00	367.8
4272	4295	4265	4277	-3.62	114.00	403.2
4426	4423	4414	4421	-2.18	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	222	kPa
Modulus of subgrade reaction (k) =	178	MPa/m
Equivalent 762 mm plate reaction =	143	MPa/m
Equivalent CBR =	52.4	%
Surface Stiffness Modulus (E) =	222	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	336	kPa
Modulus of subgrade reaction (k) =	269	MPa/m
Equivalent 762 mm plate reaction =	216	MPa/m
Equivalent CBR =	107.5	%
Surface Stiffness Modulus (E) =	351	MN/m^2

Surface Stiffness Modulus Ratio =	1.6

DATE 10-Aug-22

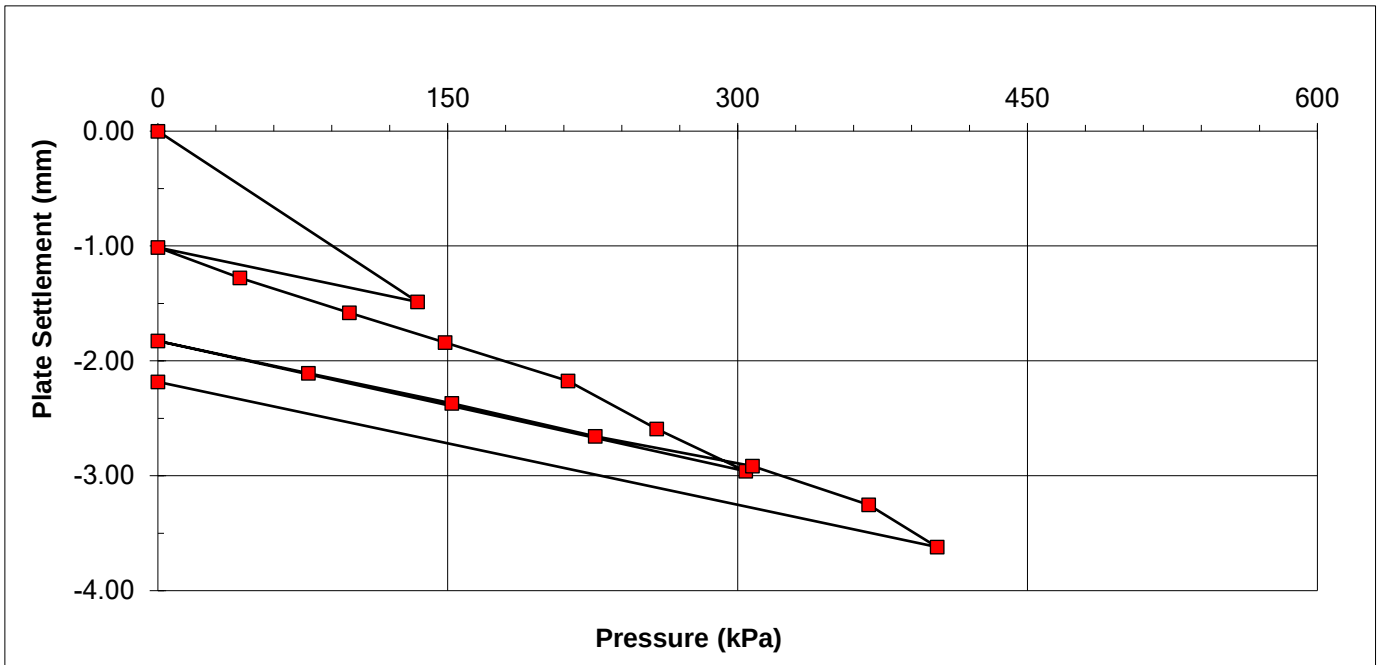
MURRAY RIX

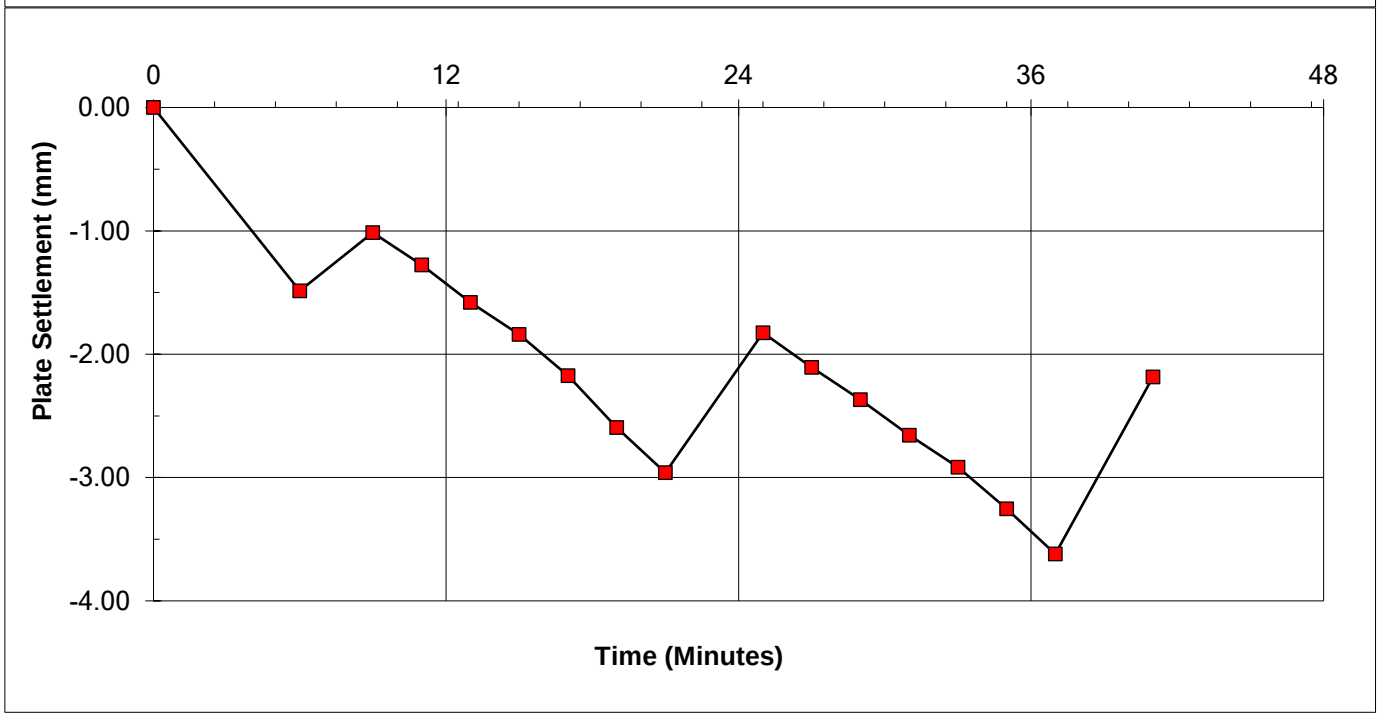
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 10-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/28
Date of Issue 11 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	10-Aug-22	**JOB NUMBER**	MRN 4454/28
MATERIAL	Ash		
NDG MODEL	Troxler 3451	**SERIAL NUMBER**	28
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	Layer 4 E10	225	1.40	1.21	15	N/A	N/A
2	Layer 4 E9	225	1.73	1.53	13	N/A	N/A
3	Layer 4 F10	225	1.52	1.34	13	N/A	N/A
4	Layer 4 F11	225	1.49	1.32	12	N/A	N/A
5	Layer 1 D13	225	1.65	1.48	11	N/A	N/A
6	Layer 1 D14	225	1.72	1.46	18	N/A	N/A
7	Layer 1 C14	225	1.73	1.51	15	N/A	N/A
8	Layer 1 C13	225	1.64	1.44	14	N/A	N/A
9	Layer 3 C13	225	1.74	1.43	22	N/A	N/A
10	Layer 3 B12	225	1.76	1.57	12	N/A	N/A
11	Layer 3 B11	225	1.59	1.49	6.9	N/A	N/A
12	Layer 3 C11	225	1.60	1.38	16	N/A	N/A
13							
14							
15							
16							
17							
18							
19							
20							
					Maximum Dry Density (Mg/m3)	N/A	(Not Advised)
					Particle Density (Mg/m3)	N/A	(Not Advised)
					Results correct for NDG calibration/correlation to site materials	No	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

SIGNED

DATE 11-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/28				
TEST LOCATION	Test 01 - Layer 4 F10	LOADING DEVICE	10 Tonne Enerpac Jack		
TEST DATE	10-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Ash	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4915	4806	4948	4890	0.00	0.00	0.0
4790	4667	4797	4751	-1.38	15.00	53.1
4806	4713	4827	4782	-1.08	0.00	0.0
4780	4662	4792	4745	-1.45	14.00	49.5
4748	4631	4764	4714	-1.75	20.00	70.7
4717	4596	4734	4682	-2.07	25.00	88.4
4675	4569	4697	4647	-2.43	31.00	109.6
4644	4537	4668	4616	-2.73	39.00	137.9
4617	4506	4639	4587	-3.02	44.00	155.6
4698	4554	4726	4659	-2.30	0.00	0.0
4670	4535	4700	4635	-2.55	12.00	42.4
4639	4504	4668	4604	-2.86	20.00	70.7
4612	4462	4638	4571	-3.19	26.00	92.0
4573	4419	4604	4532	-3.58	40.00	141.5
4537	4374	4568	4493	-3.97	50.00	176.8
4503	4335	4529	4456	-4.34	58.00	205.1
4637	4475	4675	4596	-2.94	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	104	kPa
Modulus of subgrade reaction (k) =	83	MPa/m
Equivalent 762 mm plate reaction =	67	MPa/m
Equivalent CBR =	14.0	%
Surface Stiffness Modulus (E) =	95	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	138	kPa
Modulus of subgrade reaction (k) =	111	MPa/m
Equivalent 762 mm plate reaction =	89	MPa/m
Equivalent CBR =	23.1	%
Surface Stiffness Modulus (E) =	131	MN/m^2

Surface Stiffness Modulus Ratio =	1.4

DATE 11-Aug-22

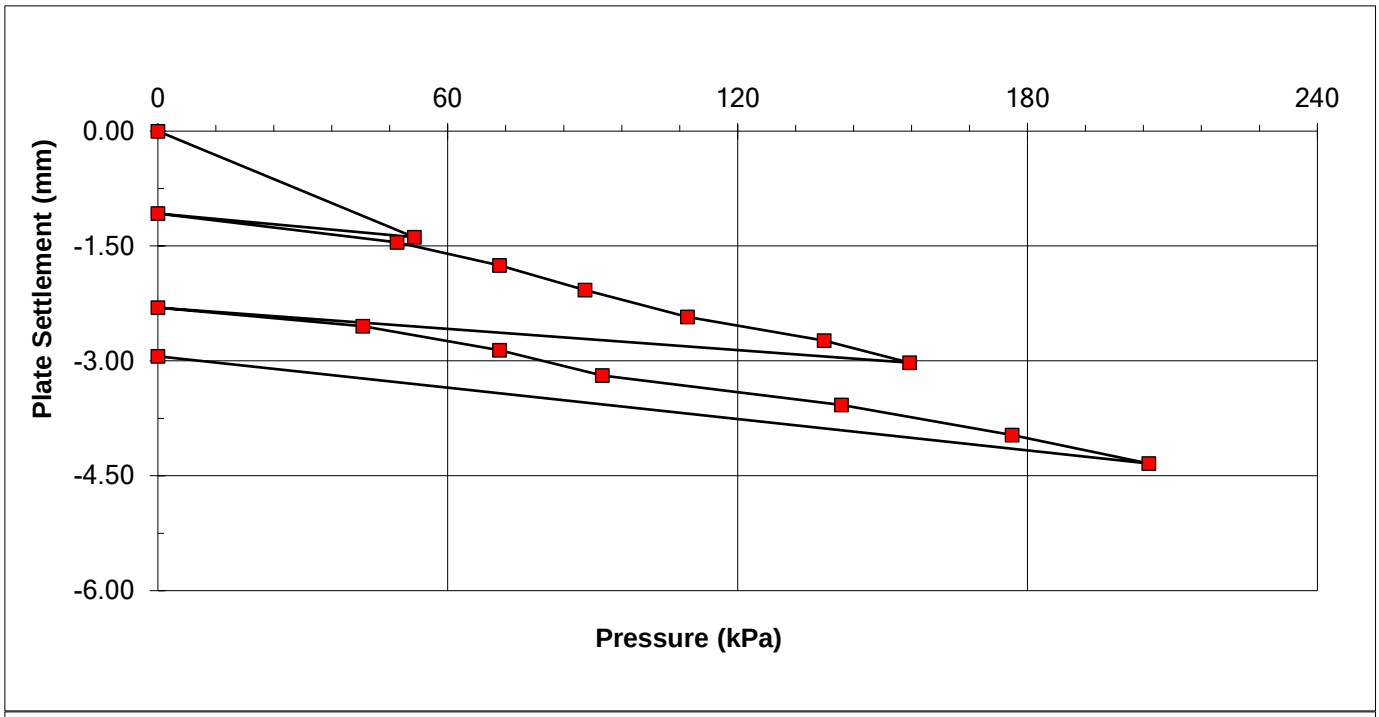
MURRAY RIX

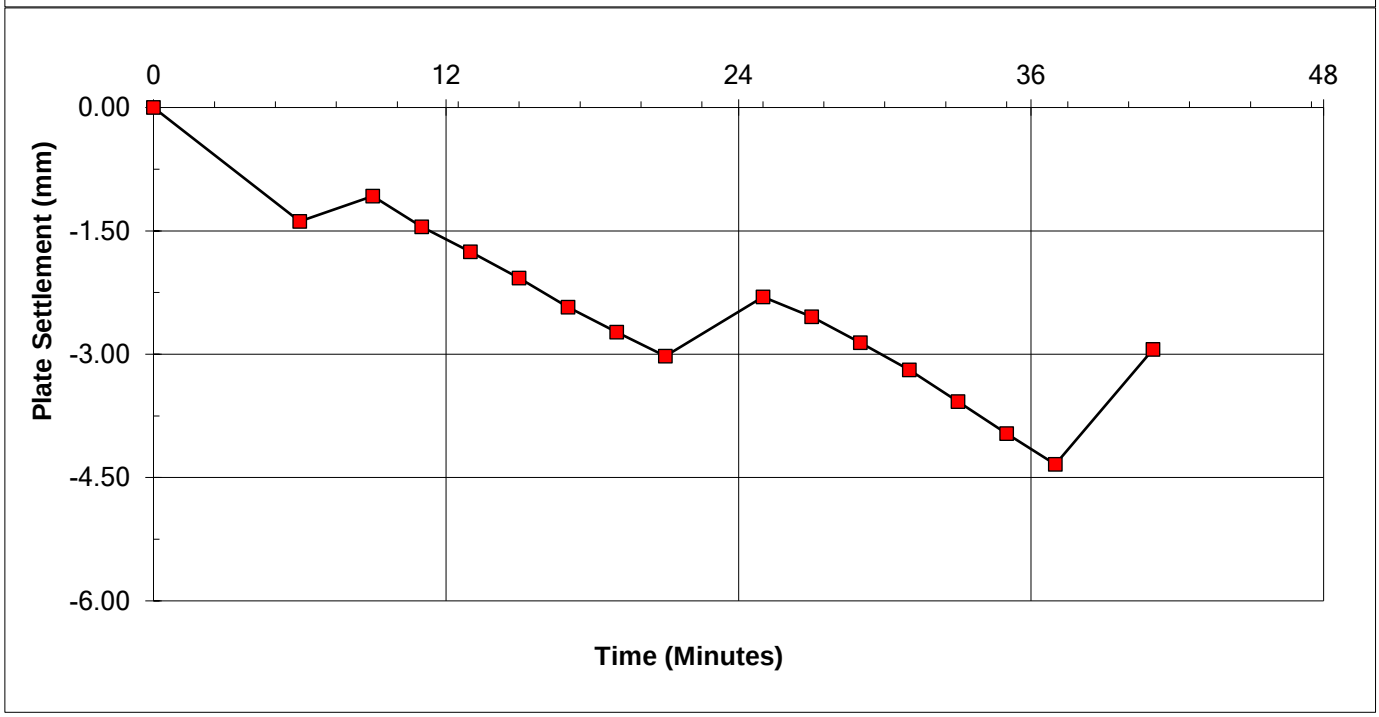
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 11-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/29
Date of Issue 12 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	11-Aug-22	**JOB NUMBER**	MRN 4454/29
MATERIAL	Ash / Fill		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	L5 D11	225	1.53	1.29	18	N/A	N/A
2	L5 C11	225	1.50	1.27	18	N/A	N/A
3	L5 C10	225	1.49	1.25	20	N/A	N/A
4	L5 D10	225	1.50	1.26	19	N/A	N/A
5	L5 D9	225	1.48	1.23	20	N/A	N/A
6	L5 C9	225	1.51	1.27	19	N/A	N/A
7	L5 D8	225	1.47	1.23	20	N/A	N/A
8	L5 D7	225	1.53	1.29	18	N/A	N/A
9	L5 C7	225	1.49	1.25	19	N/A	N/A
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Advised by client)	
				Particle Density (Mg/m3)	N/A	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 12-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
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Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/30
Date of Issue 15 August 2022

Approved Signatories

S J Hutchings, O P Davies

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TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/30

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	10/08/2022
DATE OF TEST	10/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	11/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115254	L4 F11	Ash	1.71	1.47	16	97.0	5.6
115255	L3 C12	Ash	1.70	1.48	15	97.2	6.8
115256	L1 D14	Ash	1.80	1.54	17	101.0	0.1
		Maximum Dry Density (Mg/m^3)		1.52		(Advised by client)	
		Particle Density (Mg/m^3)		2.08		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
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Contract 808 -
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Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/31
Date of Issue 15 August 2022
Page 1 of 2

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UKAS TESTING 1580

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/31

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	11/08/2022
DATE OF TEST	11/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	12/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115397	L5 D11	Ash	1.61	1.36	18	95.1	3.9
		Maximum Dry Density (Mg/m^3)		1.43		(Advised by client)	
		Particle Density (Mg/m^3)		1.90		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
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Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/32
Date of Issue 15 August 2022
Page 1 of 3

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TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/32

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	12/08/2022
DATE OF TEST	12/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	15/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115405	L2 D14	Ash	1.69	1.47	15	102.8	0.6
		Maximum Dry Density (Mg/m^3)		1.43		(Advised by client)	
		Particle Density (Mg/m^3)		1.90		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Aug-22

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BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/32

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	12/08/2022
DATE OF TEST	12/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	15/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115406	L4 B11	Ash	1.70	1.50	13	98.9	8.1
115407	L5 E11	Ash	1.67	1.45	15	95.4	8.5
115408	L5 G12	Ash	1.66	1.46	14	96.1	9.4
		Maximum Dry Density (Mg/m^3)		1.52		(Advised by client)	
		Particle Density (Mg/m^3)		2.08		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 15-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
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Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/33
Date of Issue 16 August 2022
Page 1 of 5

Approved Signatories

S J Hutchings, O P Davies

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/33			
TEST LOCATION	Test 01 - E13	LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	15-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Clay	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4630	4595	4675	4633	0.00	0.00	0.0
4474	4461	4537	4491	-1.43	8.00	28.3
4497	4494	4573	4521	-1.12	0.00	0.0
4467	4466	4545	4493	-1.41	5.00	17.7
4437	4441	4519	4466	-1.68	8.00	28.3
4389	4408	4481	4426	-2.07	11.00	38.9
4360	4376	4450	4395	-2.38	13.00	46.0
4322	4352	4423	4366	-2.68	15.00	53.1
4267	4304	4375	4315	-3.18	20.00	70.7
4295	4366	4538	4400	-2.34	0.00	0.0
4267	4343	4513	4374	-2.59	6.00	21.2
4234	4313	4475	4341	-2.93	10.00	35.4
4201	4289	4431	4307	-3.26	16.00	56.6
4160	4257	4395	4271	-3.63	18.00	63.7
4124	4221	4361	4235	-3.98	22.00	77.8
4091	4197	4335	4208	-4.26	24.00	84.9
4194	4275	4484	4318	-3.16	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	46	kPa
Modulus of subgrade reaction (k) =	37	MPa/m
Equivalent 762 mm plate reaction =	29	MPa/m
Equivalent CBR =	3.4	%
Surface Stiffness Modulus (E) =	38	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	63	kPa
Modulus of subgrade reaction (k) =	50	MPa/m
Equivalent 762 mm plate reaction =	40	MPa/m
Equivalent CBR =	5.9	%
Surface Stiffness Modulus (E) =	55	MN/m^2

Surface Stiffness Modulus Ratio =	1.4

DATE 16-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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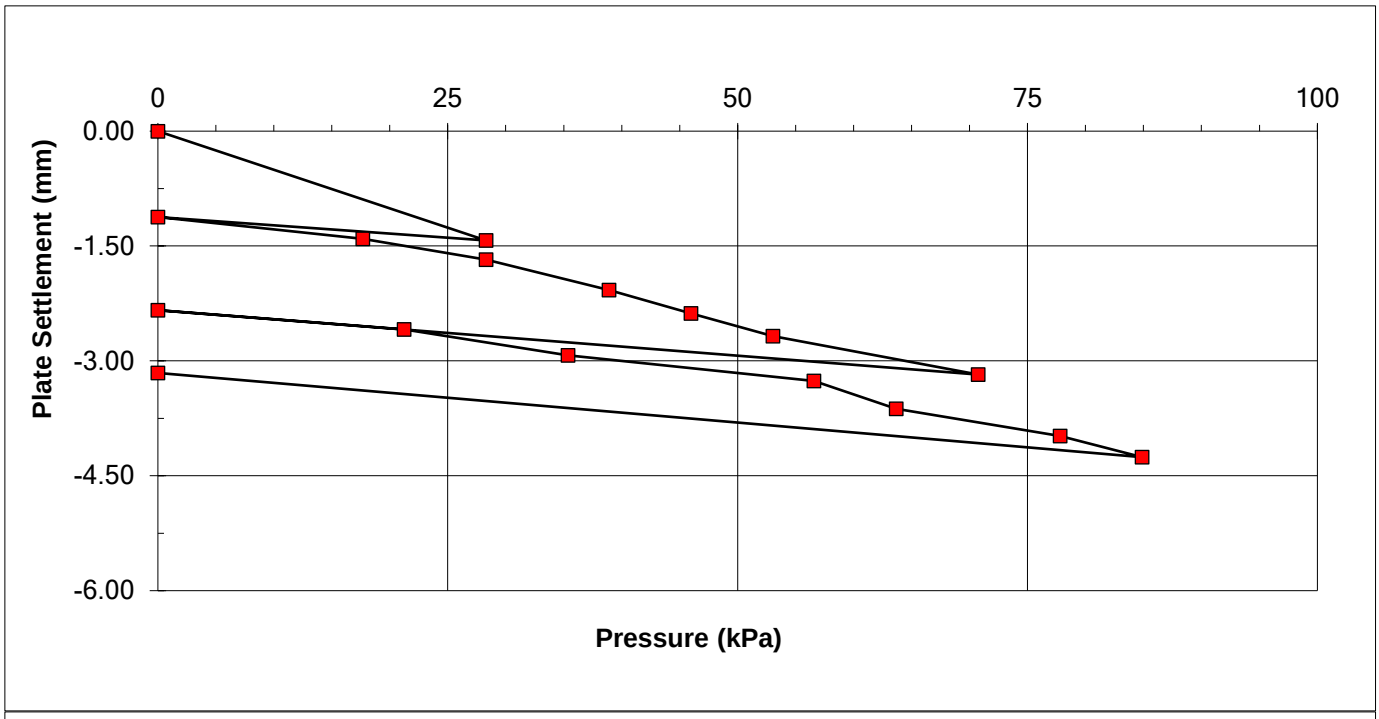
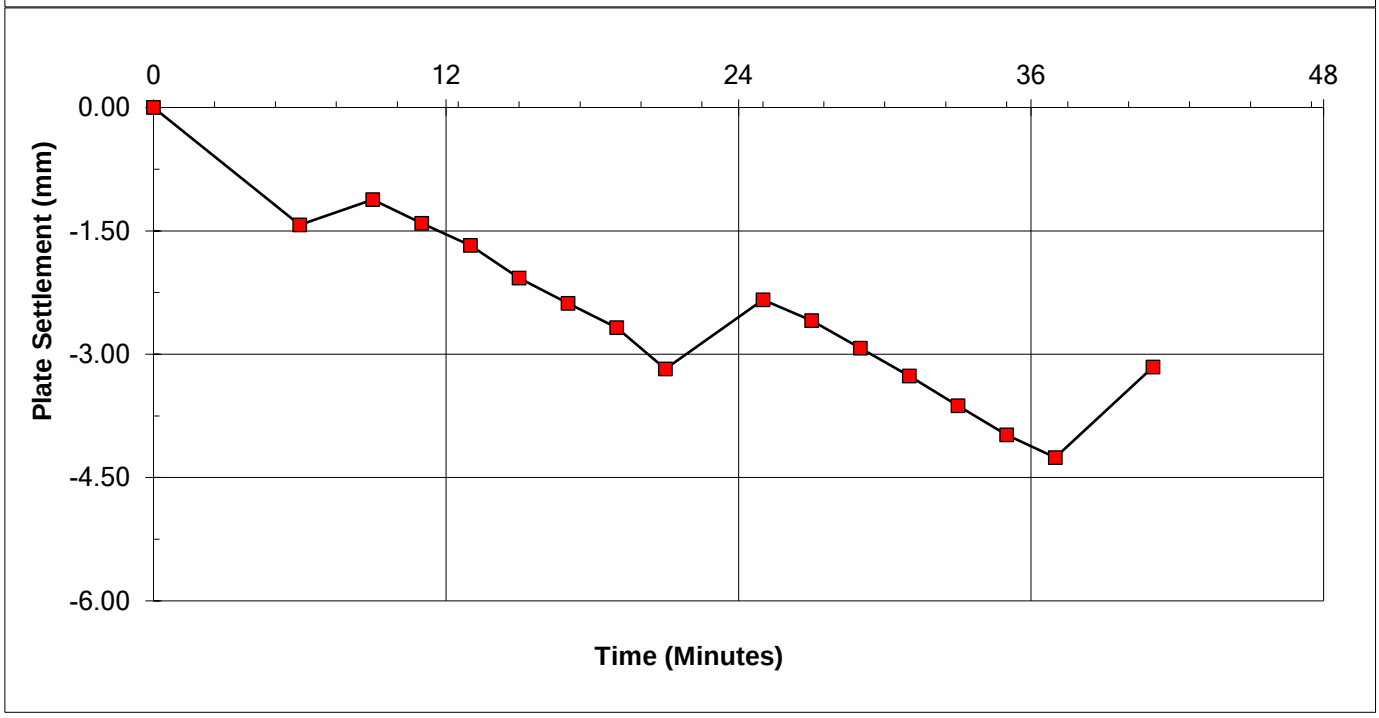
TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 16-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/33			
TEST LOCATION	Test 02 - B15 L0	LOADING DEVICE	10 Tonne Enerpac Jack	
TEST DATE	15-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4646	4610	4651	4636	0.00	0.00	0.0
4494	4466	4485	4482	-1.54	10.00	35.4
4504	4497	4525	4509	-1.27	0.00	0.0
4473	4470	4486	4476	-1.59	5.00	17.7
4447	4445	4452	4448	-1.88	12.00	42.4
4417	4423	4416	4419	-2.17	15.00	53.1
4380	4392	4373	4382	-2.54	17.00	60.1
4349	4361	4342	4351	-2.85	21.00	74.3
4296	4328	4295	4306	-3.29	25.00	88.4
4385	4407	4393	4395	-2.41	0.00	0.0
4357	4383	4355	4365	-2.71	5.00	17.7
4327	4355	4322	4335	-3.01	10.00	35.4
4295	4332	4288	4305	-3.31	17.00	60.1
4263	4305	4257	4275	-3.61	22.00	77.8
4231	4274	4229	4245	-3.91	27.00	95.5
4198	4250	4201	4216	-4.19	31.00	109.6
4304	4378	4321	4334	-3.01	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	60	kPa
Modulus of subgrade reaction (k) =	48	MPa/m
Equivalent 762 mm plate reaction =	38	MPa/m
Equivalent CBR =	5.4	%
Surface Stiffness Modulus (E) =	52	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	81	kPa
Modulus of subgrade reaction (k) =	65	MPa/m
Equivalent 762 mm plate reaction =	52	MPa/m
Equivalent CBR =	9.1	%
Surface Stiffness Modulus (E) =	72	MN/m^2

Surface Stiffness Modulus Ratio =	1.4

DATE 16-Aug-22

MURRAY RIX

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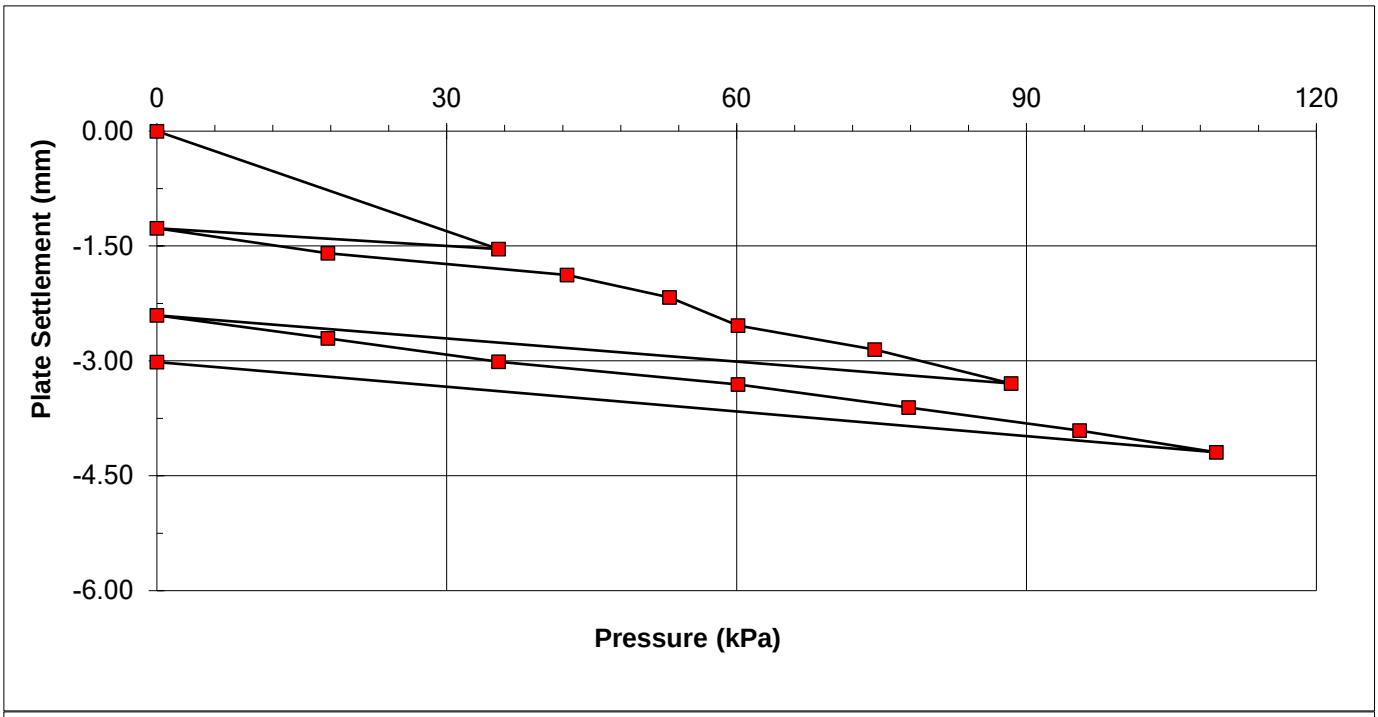
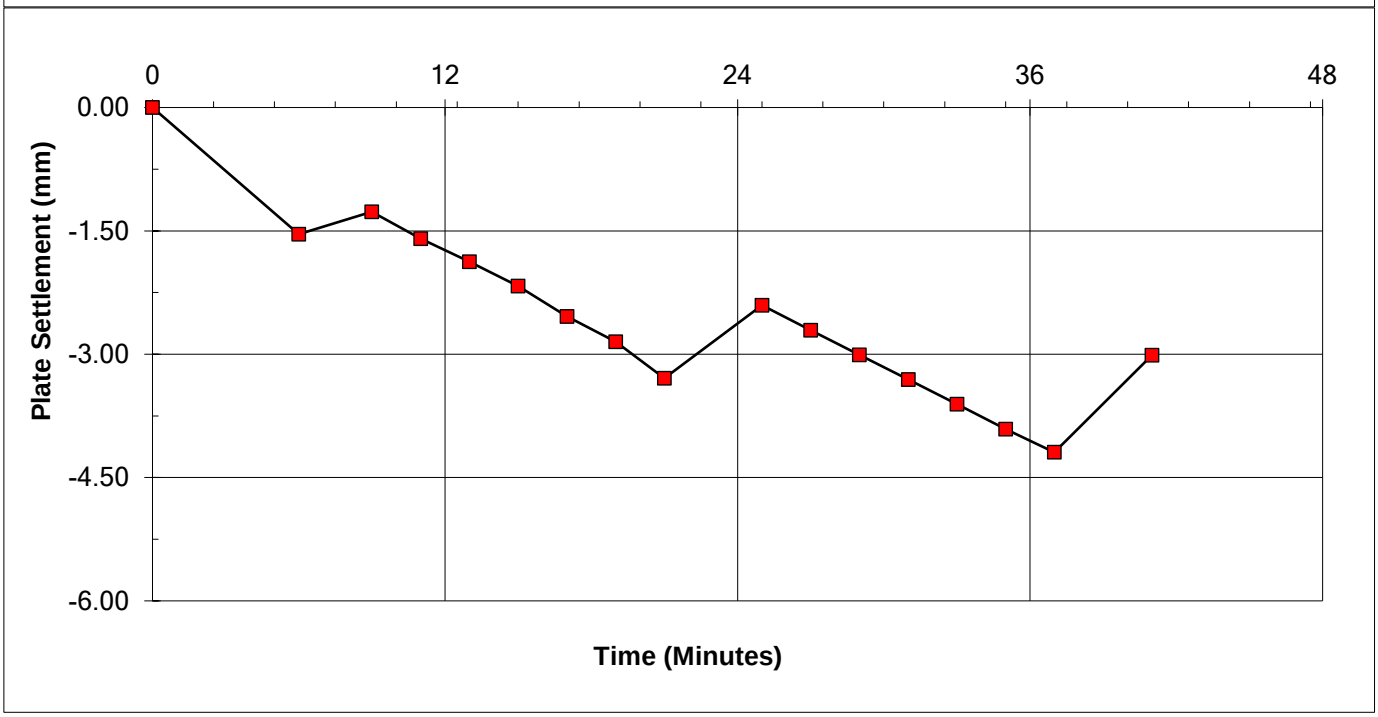
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST
BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 16-Aug-22

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
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S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/34
Date of Issue 17 August 2022
Page 1 of 6

Approved Signatories

S J Hutchings, O P Davies

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TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	16-Aug-22	**JOB NUMBER**	MRN 4454/34
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D7 L6	225	1.70	1.51	13	99.1	7.9
2	C10 L6	225	1.71	1.51	13	99.5	7.5
3	D10 L6	225	1.73	1.51	14.6	99.6	5.2
4	D11 L6	225	1.73	1.52	14	100.1	5.7
5	C11 L6	225	1.68	1.48	13.1	97.5	9.4
6	B12 L4	225	1.72	1.50	15	98.5	5.7
7	C12 L4	225	1.69	1.46	16	96.2	6.9
8	D12 L5	225	1.71	1.49	15	98.1	6.2
9	E12 L5	225	1.73	1.52	14	100.0	5.8
10	F11 L5	225	1.70	1.49	14	98.0	7.8
11	F10 L5	225	1.71	1.52	13	99.7	7.5
12	F12 L5	225	1.68	1.50	12	98.8	9.9
13	E10 L5	225	1.69	1.47	15	96.5	7.3
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.52	(Advised by client)	
				Particle Density (Mg/m3)	2.08	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	16-Aug-22	**JOB NUMBER**	MRN 4454/34
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C7 L6	225	1.59	1.44	10	100.8	9.0
2	C6 L6	225	1.58	1.42	11	99.6	9.5
3	D6 L6	225	1.60	1.42	13	99.1	7.2
4	D8 L6	225	1.59	1.44	11	100.5	9.2
5	C8 L6	225	1.55	1.37	13	95.8	9.5
6	C9 LO6	225	1.63	1.43	14	99.9	4.8
7	D9 L6	225	1.64	1.44	14	100.7	4.0
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.43	(Advised by client)	
				Particle Density (Mg/m3)	1.90	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	16-Aug-22	**JOB NUMBER**	MRN 4454/34
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
21	D13 L2	225	1.61	1.39	16	96.9	4.5
22	D14 L2	225	1.66	1.42	17	99.1	1.5
23	C13 L2	225	1.60	1.44	11	100.5	8.1
24	B14 L2	225	1.57	1.37	15	95.9	7.5
25	E14 L2	225	1.60	1.39	15	97.5	6.3
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
				Maximum Dry Density (Mg/m3)	1.43	(Advised by client)	
				Particle Density (Mg/m3)	1.90	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	16-Aug-22	**JOB NUMBER**	MRN 4454/34
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
21	E9 L5	225	1.73	1.53	13	100.6	6.8
22	E13 L1	225	1.73	1.47	18	97.0	3.2
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
					Maximum Dry Density (Mg/m3)	1.52	(Advised by client)
					Particle Density (Mg/m3)	2.08	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/34

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	16/08/2022
DATE OF TEST	16/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	17/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115567	D10 L6	Black Ash/Sand	1.75	1.52	15	100.1	4.1
		Maximum Dry Density (Mg/m^3)		1.52		(Advised by client)	
		Particle Density (Mg/m^3)		2.08		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road,
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/35
Date of Issue 17 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

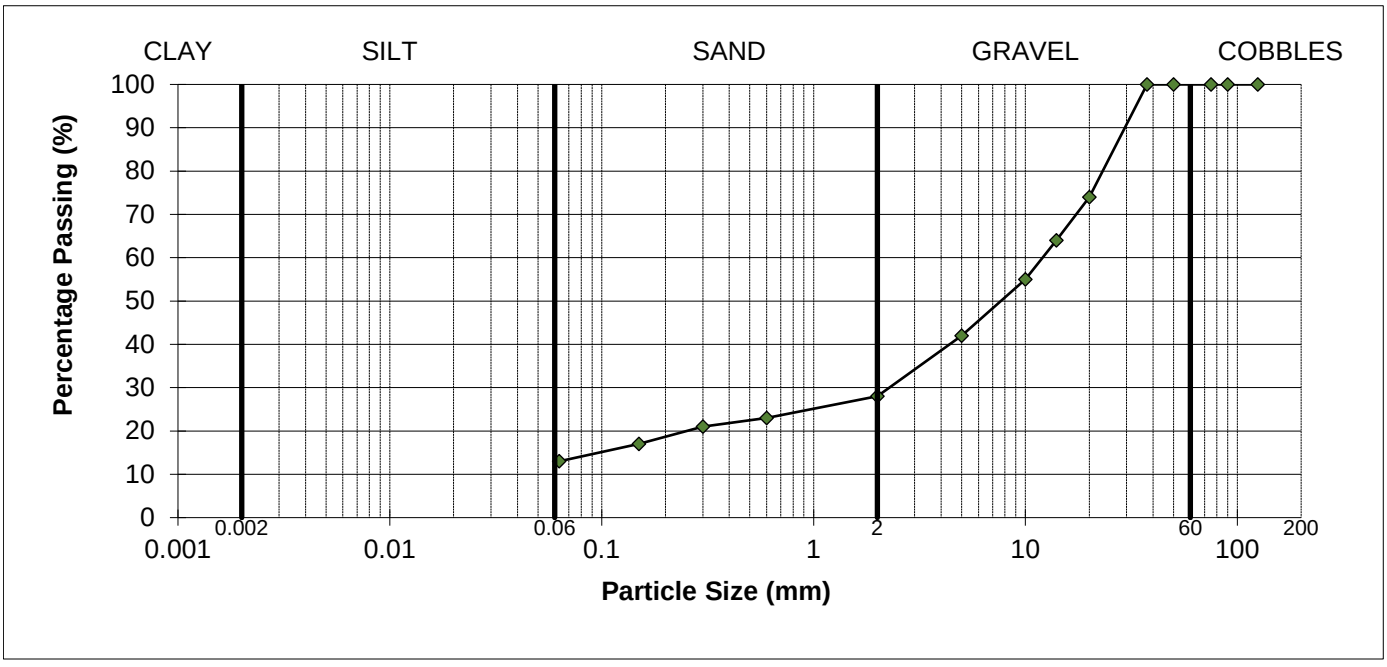
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/35

SAMPLE LABEL	TPD14-Yellow Gravel-1	DATE SAMPLED	21-Jul-22
LAB SAMPLE No	114700	DATE RECEIVED	21-Jul-22
DATE TESTED	25-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	55	
90	100		5	42	
75	100		2	28	
50	100		0.6	23	
37.5	100		0.3	21	
20	74		0.15	17	
14	64		0.063	13	



REMARKS
As received moisture content = 2.9%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 17-Aug-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

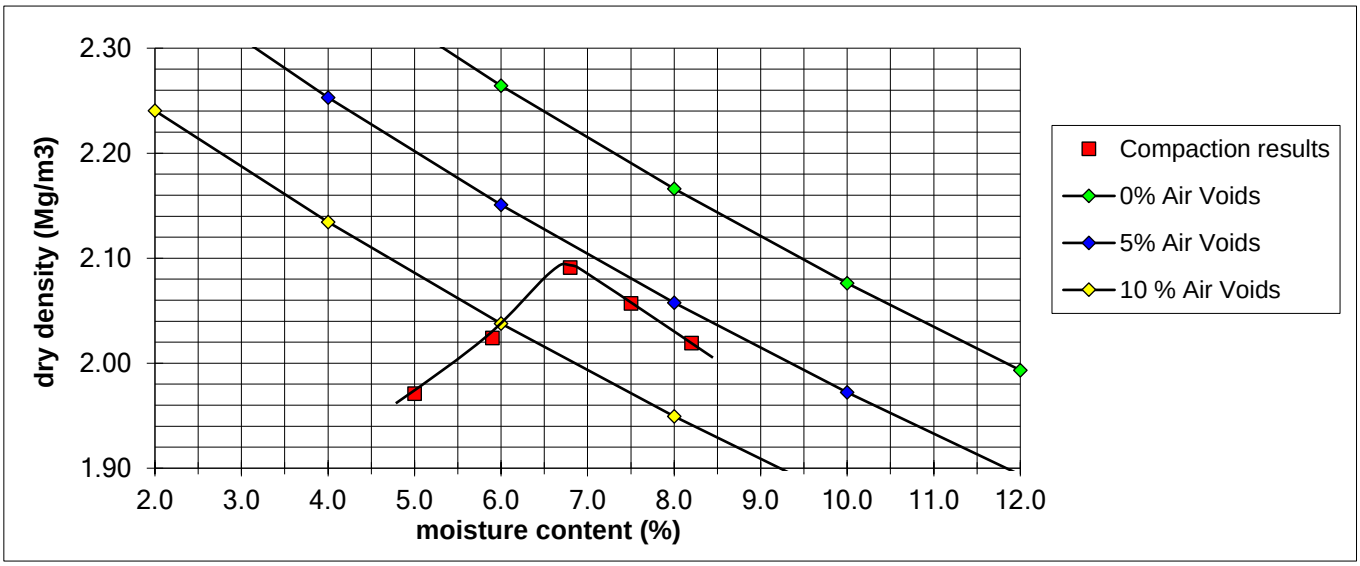
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP VIBRATING HAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/35

SAMPLE LABEL	TPD14-Yellow Gravel-1	DATE SAMPLED	21-Jul-22
LAB SAMPLE No	114700	DATE RECEIVED	21-Jul-22
DATE TESTED	01-Aug-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number	Moisture Content (%)	Dry Density (Mg/m3)
1	5.0	1.971
2	5.9	2.024
3	6.8	2.091
4	7.5	2.057
5	8.2	2.019
Optimum	6.7	
Maximum		2.09
Particle Density	2.62 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 0%
Percentage of material retained on 20mm sieve = 26%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 17-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

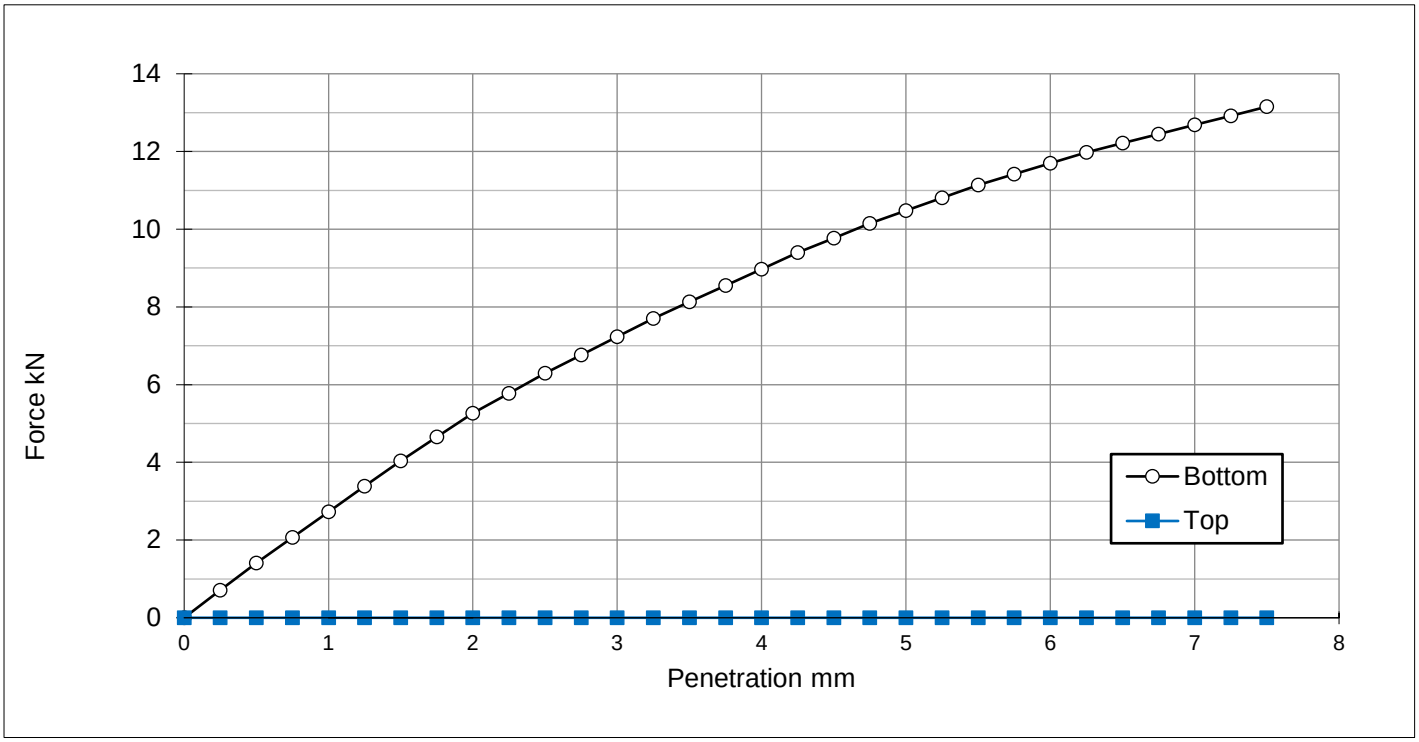
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/35

SAMPLE LABEL	TPD14-Yellow Gravel-1	DATE SAMPLED	21-Jul-22
LAB SAMPLE No	114700	DATE RECEIVED	21-Jul-22
DATE TESTED	10-Aug-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Density, Vibrating Hammer			
GREATER THAN 20 mm REMOVED		26 %			
BULK DENSITY	2.23 Mg/m3	MOISTURE CONTENT	6.9 %	DRY DENSITY	2.09 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	52	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	6.7	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

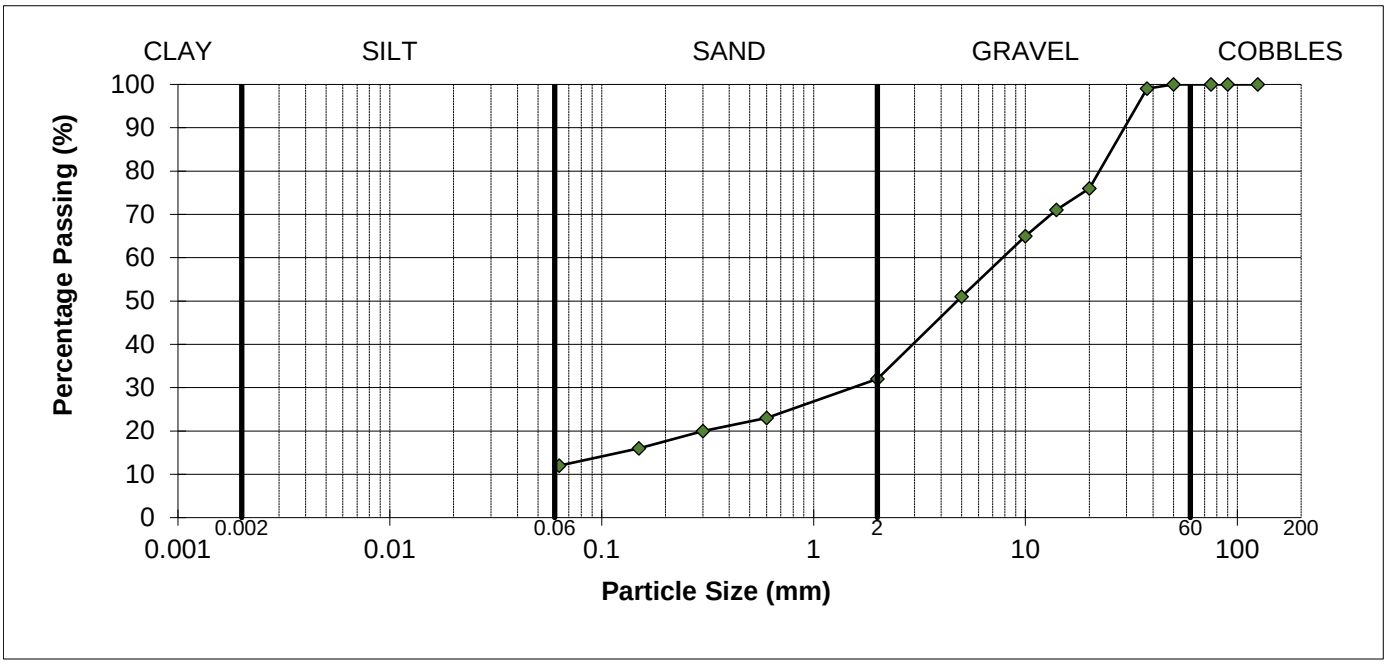
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/35

SAMPLE LABEL	TPD15-Yellow Gravel-2	DATE SAMPLED	21-Jul-22
LAB SAMPLE No	114701	DATE RECEIVED	21-Jul-22
DATE TESTED	25-Jul-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	65	
90	100		5	51	
75	100		2	32	
50	100		0.6	23	
37.5	99		0.3	20	
20	76		0.15	16	
14	71		0.063	12	



REMARKS
As received moisture content = 3.0%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 17-Aug-22

form omcram

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

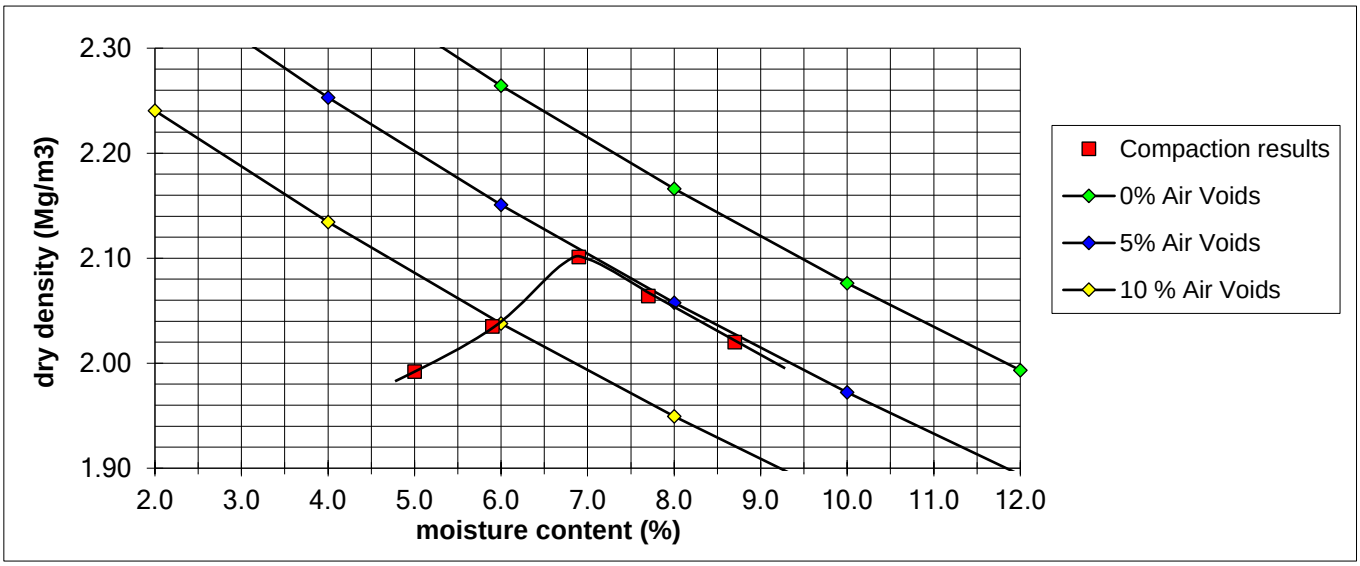
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP VIBRATING HAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/35

SAMPLE LABEL	TPD15-Yellow Gravel-2	DATE SAMPLED	21-Jul-22
LAB SAMPLE No	114701	DATE RECEIVED	21-Jul-22
DATE TESTED	01-Aug-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won
PRE TREATMENT	Air Dried/Separate Batches

Point Number	Moisture Content (%)	Dry Density (Mg/m3)
1	5.0	1.992
2	5.9	2.035
3	6.9	2.101
4	7.7	2.064
5	8.7	2.020
Optimum	6.9	
Maximum		2.10
Particle Density	2.62 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 1%
Percentage of material retained on 20mm sieve = 24%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 17-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

CALIFORNIA BEARING RATIO
BS 1377: PART 4: Clause 7: 1990
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2 (oven dry)

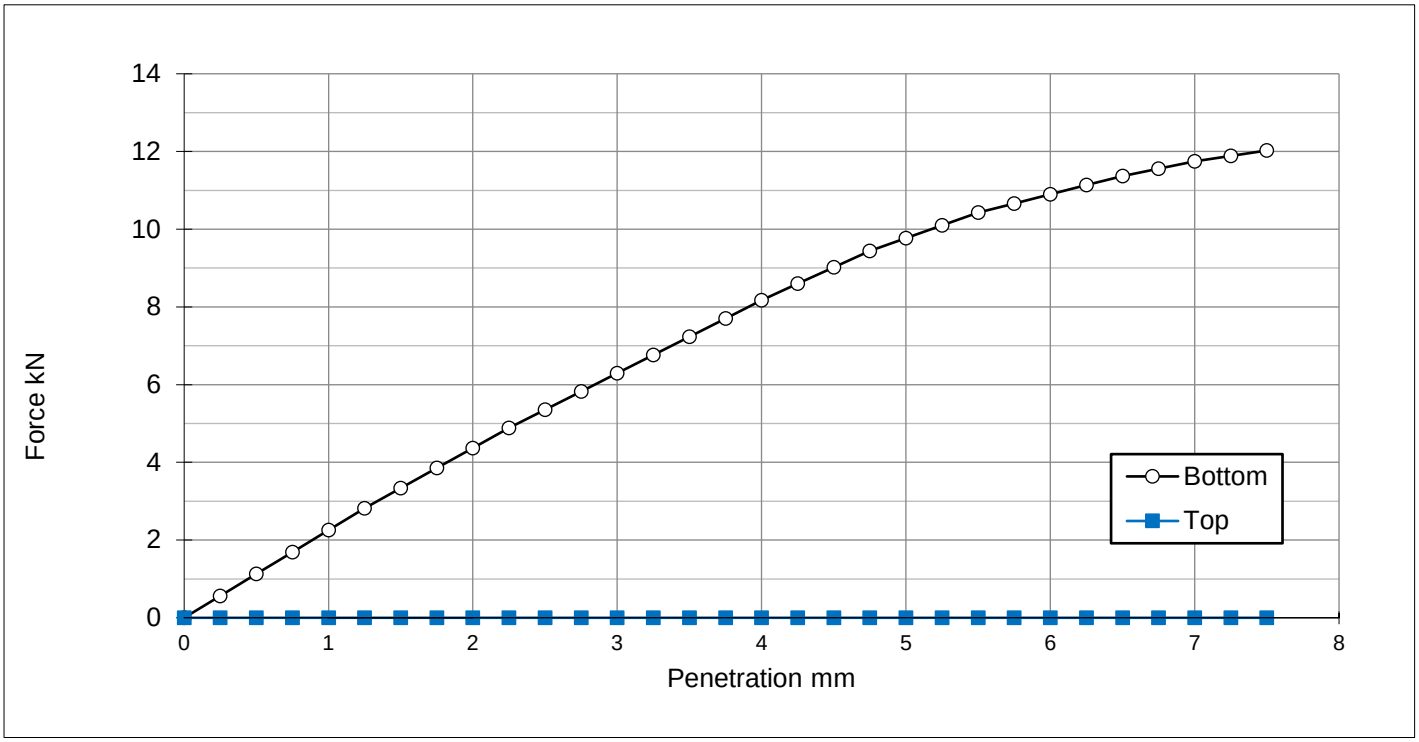
CLIENT	VHE Construction Plc
SITE	Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/35

SAMPLE LABEL	TPD15-Yellow Gravel-2	DATE SAMPLED	21-Jul-22
LAB SAMPLE No	114701	DATE RECEIVED	21-Jul-22
DATE TESTED	10-Aug-22	SAMPLED BY	Client

MATERIAL	General Fill
ADVISED SOURCE	Site Won

INITIAL CONDITIONS

SAMPLE PREPARATION		Dynamic Compaction, Specified Density, Vibrating Hammer			
GREATER THAN 20 mm REMOVED		24 %			
BULK DENSITY	2.24 Mg/m3	MOISTURE CONTENT	6.9 %	DRY DENSITY	2.10 Mg/m3
TEST CONDITION	Unsoaked	MEASURED SWELL	N/A mm	SURCHARGE	2 kg



CBR VALUE

Top	N/A	%
Bottom	49	%

ORIGIN CORRECTION

Top	N/A	mm
Bottom	N/A	mm

FINAL MOISTURE CONTENT

Top	N/A	%
Bottom	6.9	%

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 17-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/36
Date of Issue 18 August 2022
Page 1 of 6

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	17-Aug-22	**JOB NUMBER**	MRN 4454/36
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D7 L7	225	1.73	1.53	13	97.6	9.9
2	D6 L7	225	1.76	1.57	12	99.8	8.8
3	C6 L7	225	1.77	1.54	15	98.0	6.3
4	C7 L7	225	1.78	1.51	18	96.0	3.6
5	E9 L6	225	1.81	1.52	19	96.8	1.4
6	E10 L6	225	1.84	1.62	14	103.1	3.8
7	E12 L6	225	1.76	1.57	12	100.3	9.5
8	F12 L6	225	1.77	1.57	13	100.1	7.7
9	F11 L6	225	1.76	1.58	11	100.4	9.7
10	F10 L6	225	1.72	1.49	15	94.9	8.9
11	D12 L6	225	1.74	1.51	15	96.1	7.7
12	G12 L6	225	1.75	1.55	13	98.6	8.8
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.57	(Advised by client)	
				Particle Density (Mg/m3)	2.18	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 18-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/34				
TEST LOCATION	Test 01 - D7 L7	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	17-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4871	4730	4865	4822	0.00	0.00	0.0
4714	4592	4687	4664	-1.58	6.00	21.2
4748	4608	4711	4689	-1.33	0.00	0.0
4713	4585	4666	4655	-1.67	4.00	14.1
4681	4552	4633	4622	-2.00	6.00	21.2
4648	4524	4599	4590	-2.32	8.00	28.3
4608	4490	4565	4554	-2.68	10.00	35.4
4558	4443	4519	4507	-3.15	13.00	46.0
4505	4404	4485	4465	-3.57	15.00	53.1
4572	4457	4529	4519	-3.03	0.00	0.0
4547	4432	4505	4495	-3.27	2.00	7.1
4521	4405	4483	4470	-3.52	6.00	21.2
4503	4377	4459	4446	-3.76	10.00	35.4
4484	4342	4429	4418	-4.04	14.00	49.5
4454	4305	4379	4379	-4.43	18.00	63.7
4393	4276	4355	4341	-4.81	21.00	74.3
4443	4329	4427	4400	-4.22	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	33	kPa
Modulus of subgrade reaction (k) =	27	MPa/m
Equivalent 762 mm plate reaction =	22	MPa/m
Equivalent CBR =	2.0	%
Surface Stiffness Modulus (E) =	27	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	58	kPa
Modulus of subgrade reaction (k) =	47	MPa/m
Equivalent 762 mm plate reaction =	37	MPa/m
Equivalent CBR =	5.1	%
Surface Stiffness Modulus (E) =	50	MN/m^2

Surface Stiffness Modulus Ratio =	1.8

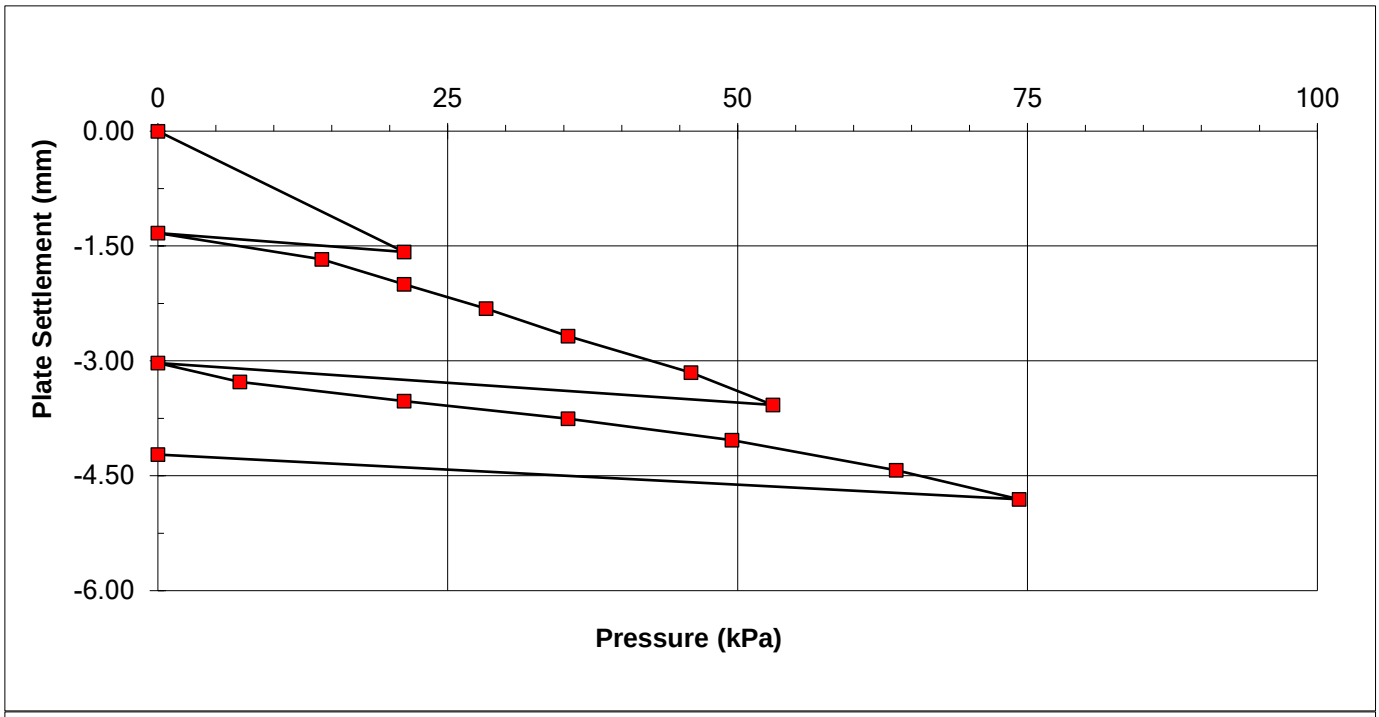
DATE 18-Aug-22

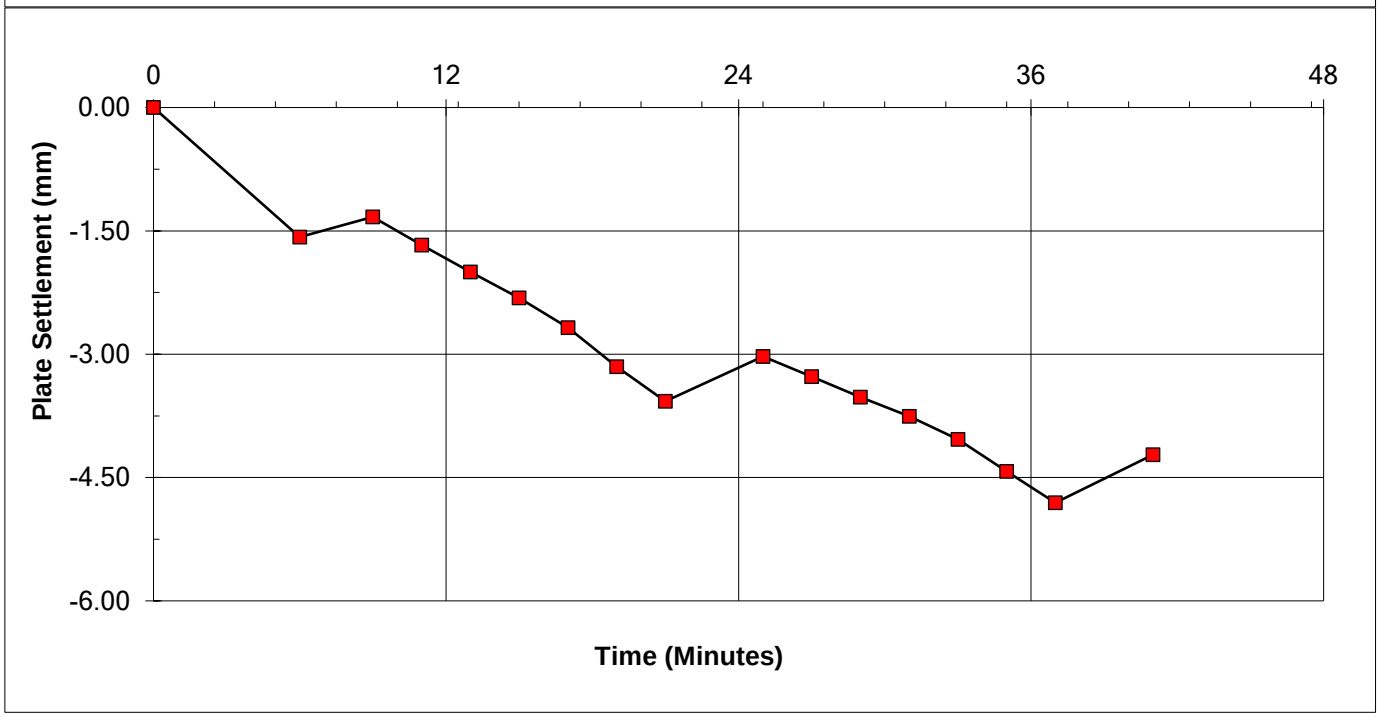
MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST
BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/34				
TEST LOCATION	Test 02 - D16 L0	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	17-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4641	4610	4690	4647	0.00	0.00	0.0
4492	4470	4525	4496	-1.51	17.00	60.1
4521	4486	4548	4518	-1.29	0.00	0.0
4493	4463	4518	4491	-1.56	11.00	38.9
4460	4438	4481	4460	-1.87	18.00	63.7
4421	4407	4437	4422	-2.25	21.00	74.3
4351	4333	4356	4347	-3.00	29.00	102.6
4339	4292	4322	4318	-3.29	31.00	109.6
4292	4251	4259	4267	-3.80	37.00	130.9
4359	4337	4370	4355	-2.92	0.00	0.0
4332	4314	4340	4329	-3.18	12.00	42.4
4302	4288	4307	4299	-3.48	21.00	74.3
4271	4260	4274	4268	-3.79	29.00	102.6
4232	4235	4242	4236	-4.11	35.00	123.8
4202	4209	4210	4207	-4.40	40.00	141.5
4155	4174	4157	4162	-4.85	46.00	162.7
4256	4252	4250	4253	-3.94	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	85	kPa
Modulus of subgrade reaction (k) =	68	MPa/m
Equivalent 762 mm plate reaction =	55	MPa/m
Equivalent CBR =	9.9	%
Surface Stiffness Modulus (E) =	76	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	127	kPa
Modulus of subgrade reaction (k) =	102	MPa/m
Equivalent 762 mm plate reaction =	82	MPa/m
Equivalent CBR =	20.0	%
Surface Stiffness Modulus (E) =	120	MN/m^2

Surface Stiffness Modulus Ratio =	1.6

DATE 18-Aug-22

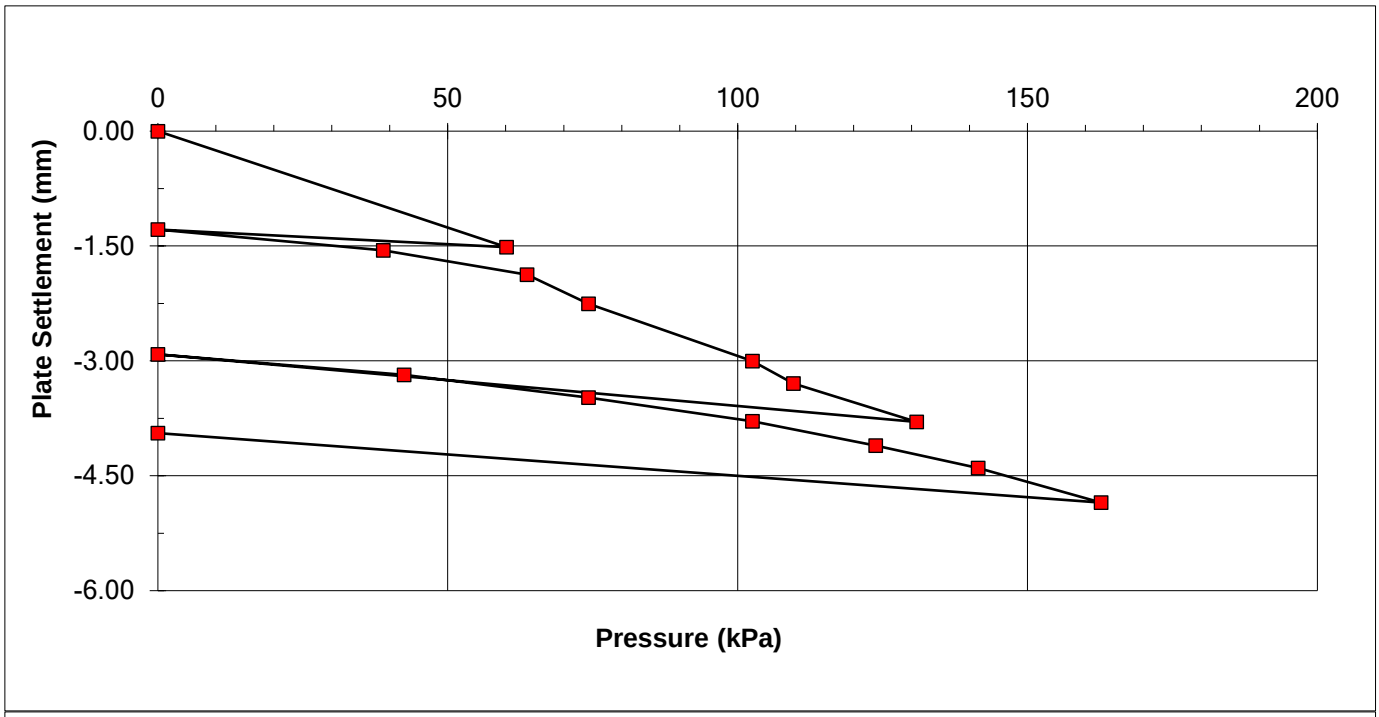
MURRAY RIX

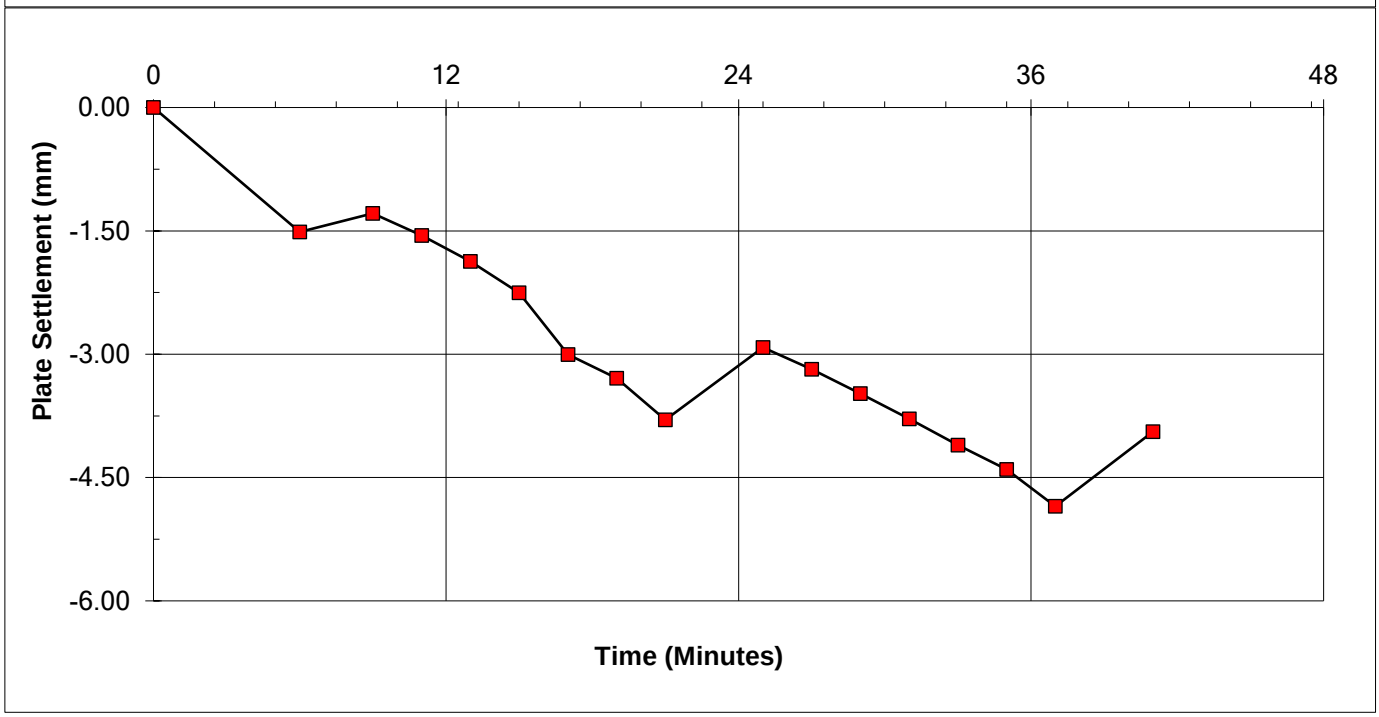
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 18-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/37
Date of Issue 19 August 2022
Page 1 of 6

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	18-Aug-22	**JOB NUMBER**	MRN 4454/37
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	E13 L2	225	1.78	1.49	19	95.2	2.4
2	E11 L6	225	1.71	1.49	15	94.6	9.6
3	C8 L7	225	1.77	1.58	12	100.5	8.4
4	D8 L7	225	1.76	1.58	11	100.9	9.7
5	B11 L5	225	1.76	1.55	13	99.0	8.2
6	B12 L5	225	1.75	1.56	12	99.5	9.8
7	C12 L5	225	1.83	1.62	13	103.0	4.7
8	F12 L3	225	1.78	1.60	11	101.9	8.6
9	G12 L3	225	1.76	1.52	16	96.8	6.3
10	G12 L2	225	1.73	1.52	14	96.7	8.9
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.57	(Advised by client)	
				Particle Density (Mg/m3)	2.18	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 19-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/37			
TEST LOCATION	Test 01 - B17 L0	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	18-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4680	4641	4677	4666	0.00	0.00	0.0
4528	4501	4523	4517	-1.49	18.00	63.7
4557	4536	4578	4557	-1.09	0.00	0.0
4530	4505	4545	4527	-1.39	10.00	35.4
4498	4480	4504	4494	-1.72	20.00	70.7
4461	4449	4466	4459	-2.07	25.00	88.4
4423	4407	4431	4420	-2.46	30.00	106.1
4381	4365	4394	4380	-2.86	34.00	120.3
4348	4330	4359	4346	-3.20	40.00	141.5
4411	4388	4436	4412	-2.54	0.00	0.0
4387	4363	4413	4388	-2.78	9.00	31.8
4359	4335	4388	4361	-3.05	16.00	56.6
4331	4312	4366	4336	-3.30	28.00	99.0
4306	4287	4334	4309	-3.57	33.00	116.7
4268	4258	4307	4278	-3.88	41.00	145.0
4237	4230	4285	4251	-4.15	47.00	166.2
4321	4322	4388	4344	-3.22	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	101	kPa
Modulus of subgrade reaction (k) =	81	MPa/m
Equivalent 762 mm plate reaction =	65	MPa/m
Equivalent CBR =	13.3	%
Surface Stiffness Modulus (E) =	92	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	137	kPa
Modulus of subgrade reaction (k) =	110	MPa/m
Equivalent 762 mm plate reaction =	88	MPa/m
Equivalent CBR =	22.6	%
Surface Stiffness Modulus (E) =	130	MN/m^2

Surface Stiffness Modulus Ratio =	1.4

DATE 19-Aug-22

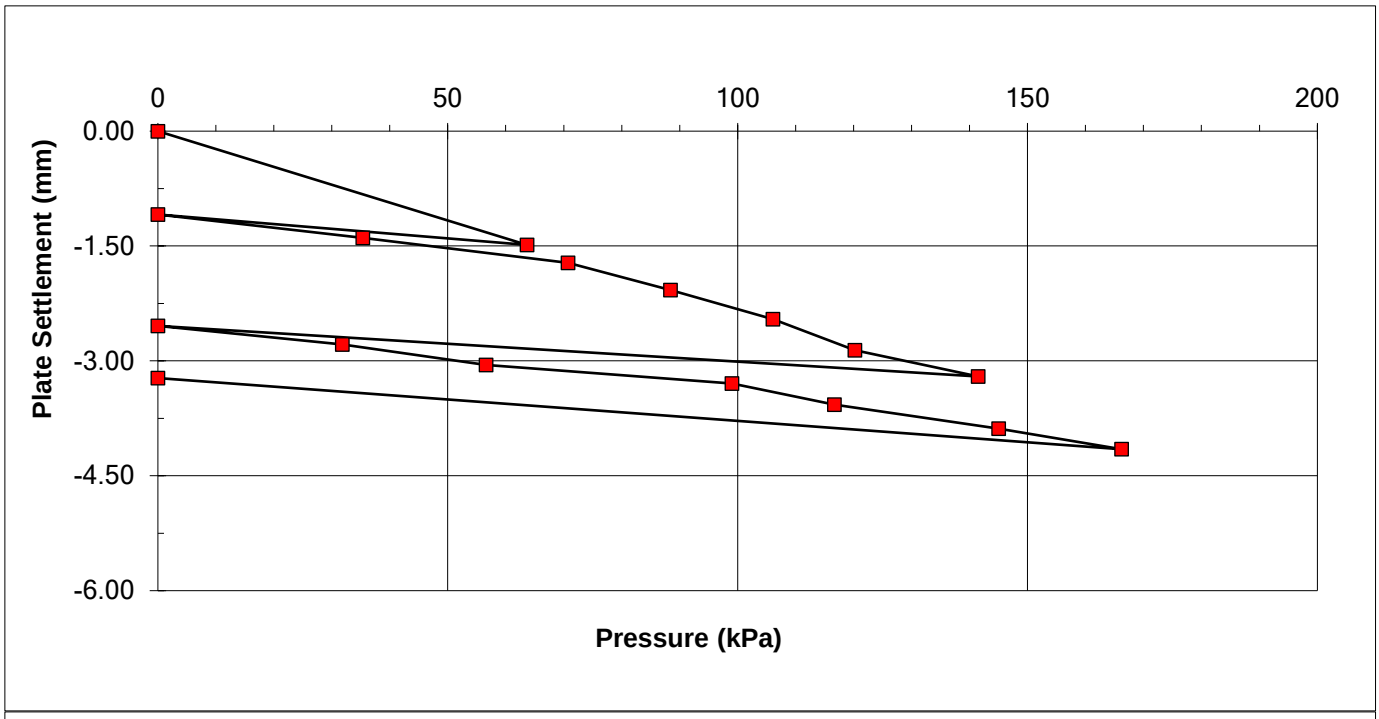
MURRAY RIX

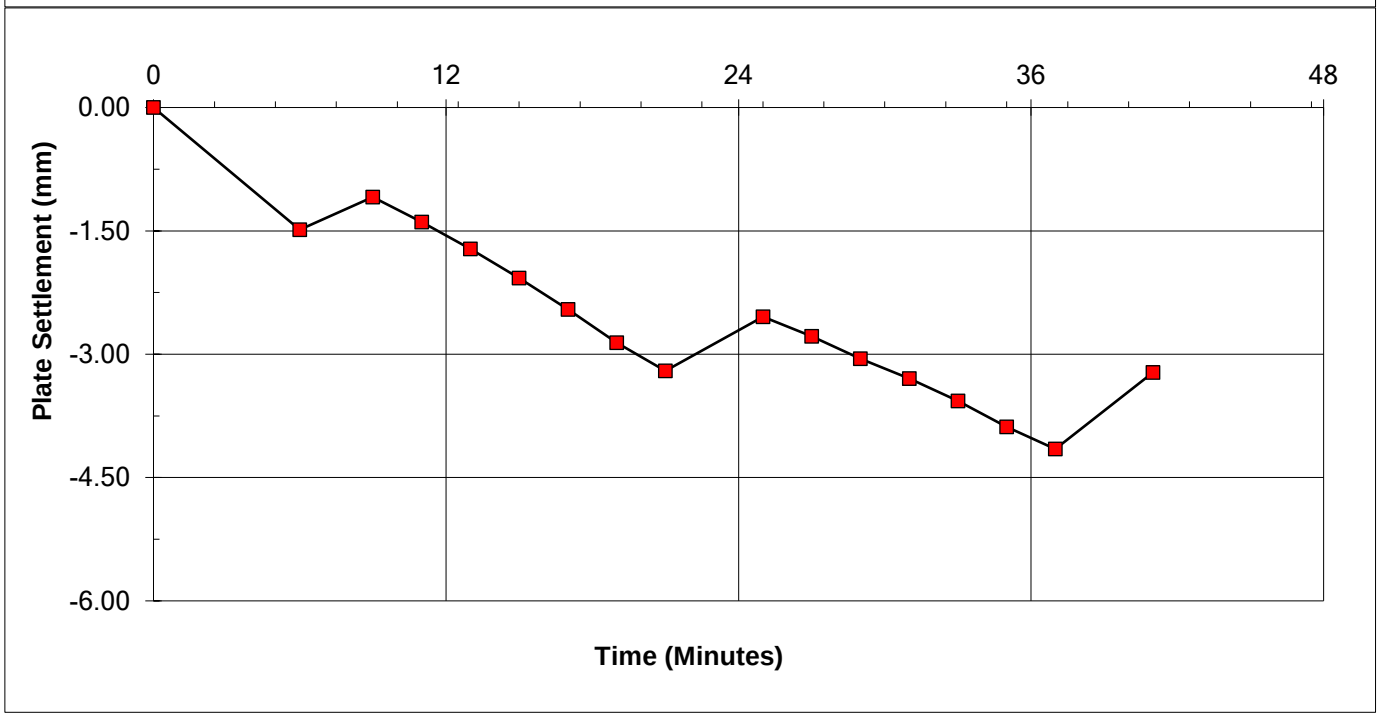
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 19-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/37			
TEST LOCATION	Test 02 - G20 L0	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	18-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Yellow Gravel	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4727	4695	4730	4717	0.00	0.00	0.0
4576	4553	4677	4602	-1.15	8.00	28.3
4605	4588	4713	4635	-0.82	0.00	0.0
4579	4559	4688	4609	-1.09	5.00	17.7
4549	4533	4661	4581	-1.36	8.00	28.3
4516	4507	4641	4555	-1.63	10.00	35.4
4480	4476	4613	4523	-1.94	11.00	38.9
4449	4452	4586	4496	-2.22	12.00	42.4
4417	4421	4559	4466	-2.52	14.00	49.5
4466	4457	4613	4512	-2.05	0.00	0.0
4437	4433	4578	4483	-2.35	8.00	28.3
4406	4409	4548	4454	-2.63	12.00	42.4
4377	4387	4516	4427	-2.91	15.00	53.1
4347	4358	4486	4397	-3.20	18.00	63.7
4302	4318	4443	4354	-3.63	20.00	70.7
4270	4294	4414	4326	-3.91	22.00	77.8
4372	4366	4524	4421	-2.97	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	41	kPa
Modulus of subgrade reaction (k) =	32	MPa/m
Equivalent 762 mm plate reaction =	26	MPa/m
Equivalent CBR =	2.7	%
Surface Stiffness Modulus (E) =	34	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	65	kPa
Modulus of subgrade reaction (k) =	52	MPa/m
Equivalent 762 mm plate reaction =	42	MPa/m
Equivalent CBR =	6.3	%
Surface Stiffness Modulus (E) =	57	MN/m^2

Surface Stiffness Modulus Ratio =	1.7

DATE 19-Aug-22

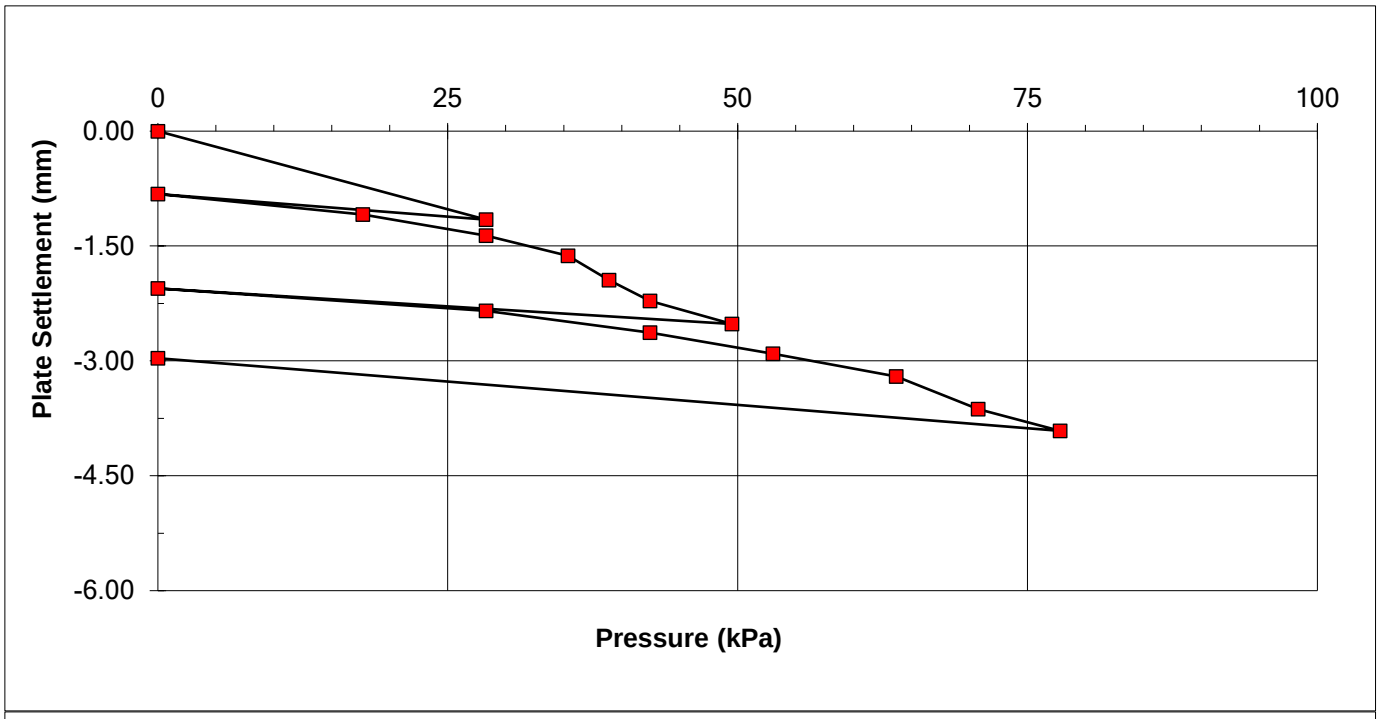
MURRAY RIX

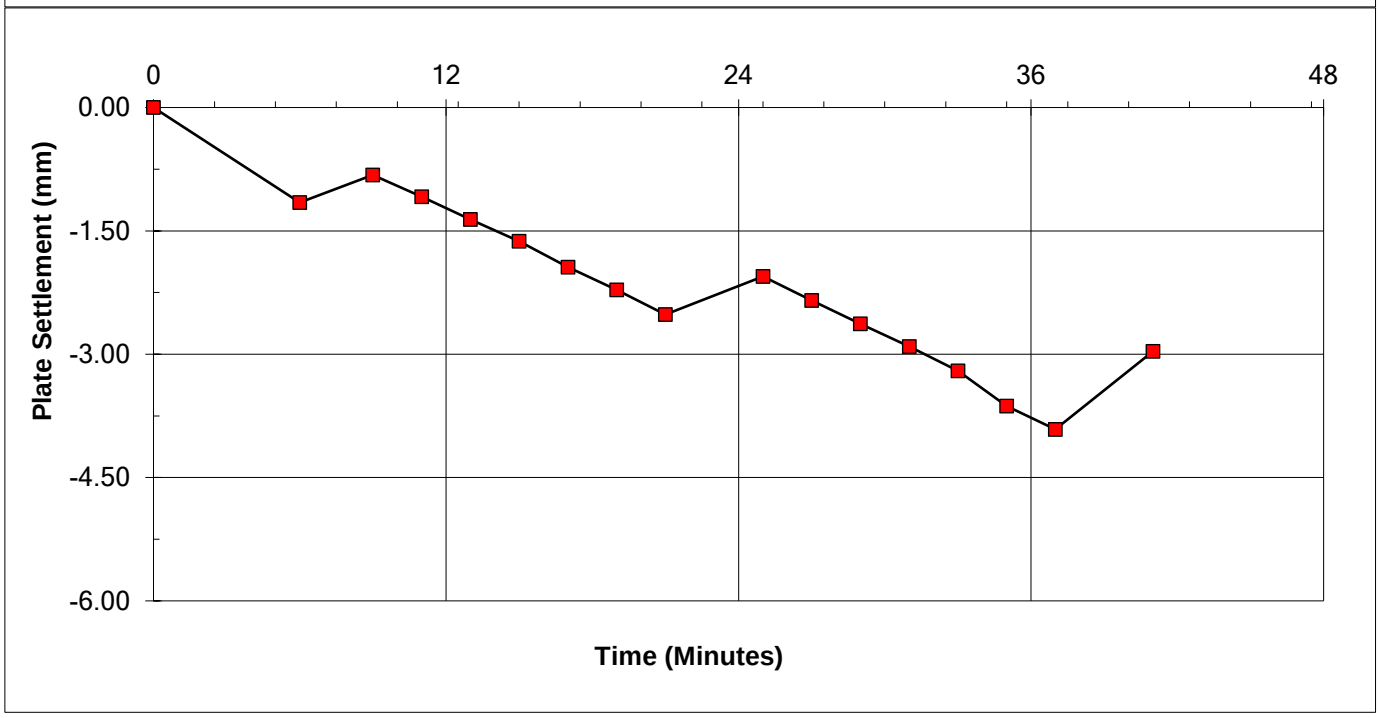
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 19-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/38
Date of Issue 19 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

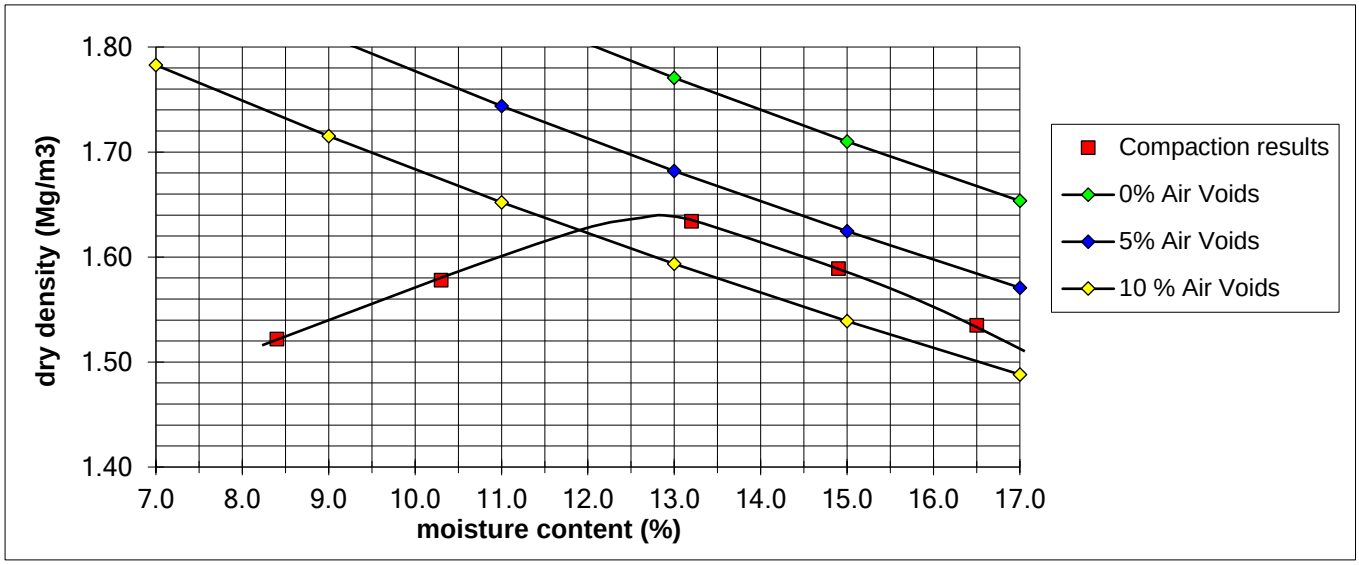
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/38

SAMPLE LABEL	L1 D8	DATE SAMPLED	04-Aug-22
LAB SAMPLE No	115108	DATE RECEIVED	04-Aug-22
DATE TESTED	05-Aug-22	SAMPLED BY	Client

MATERIAL	Black Ash
ADVISED SOURCE	Site won
PRE TREATMENT	Air Dried/Separate Batches

Point Number	Moisture Content (%)	Dry Density (Mg/m3)
1	8.4	1.522
2	10.3	1.578
3	13.2	1.634
4	14.9	1.589
5	16.5	1.535
Optimum	13.0	
Maximum		1.64
Particle Density	2.3 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 22%
Percentage of material retained on 20mm sieve = 35%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 19-Aug-22

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

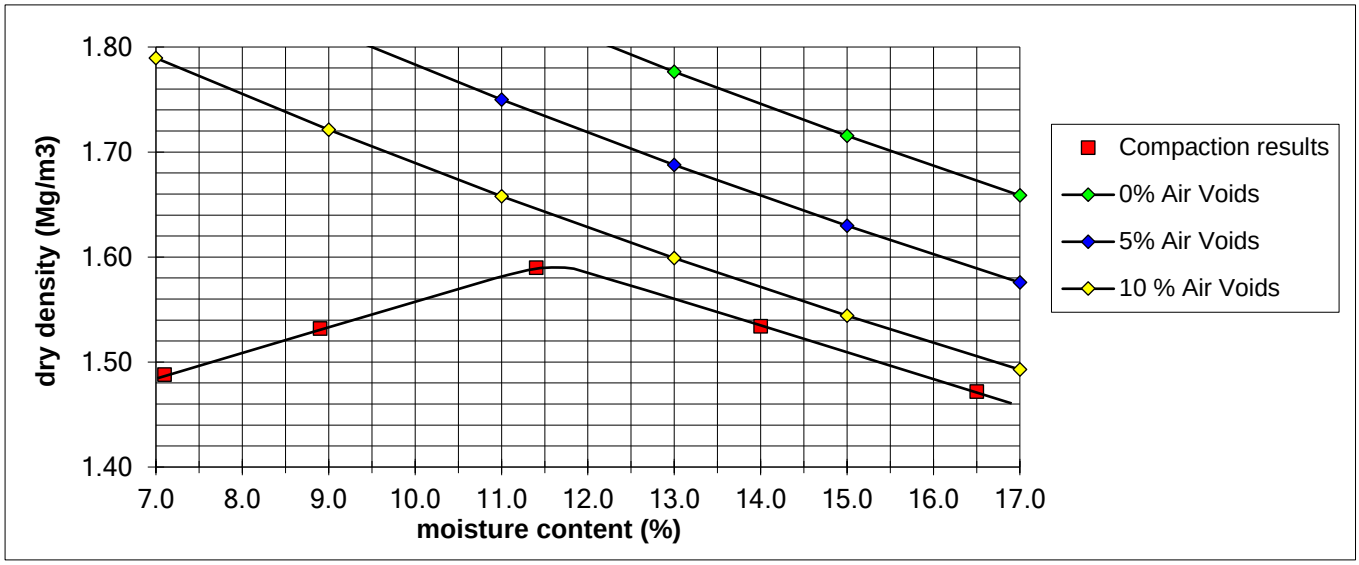
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/38

SAMPLE LABEL	L2 G12	DATE SAMPLED	04-Aug-22
LAB SAMPLE No	115109	DATE RECEIVED	04-Aug-22
DATE TESTED	05-Aug-22	SAMPLED BY	Client

MATERIAL	Black Ash
ADVISED SOURCE	Site won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		7.1	1.488
2		8.9	1.532
3		11.4	1.590
4		14.0	1.534
5		16.5	1.472
	Optimum	12.0	
	Maximum		1.59
	Particle Density	2.31 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 15%
Percentage of material retained on 20mm sieve = 32%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 19-Aug-22

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

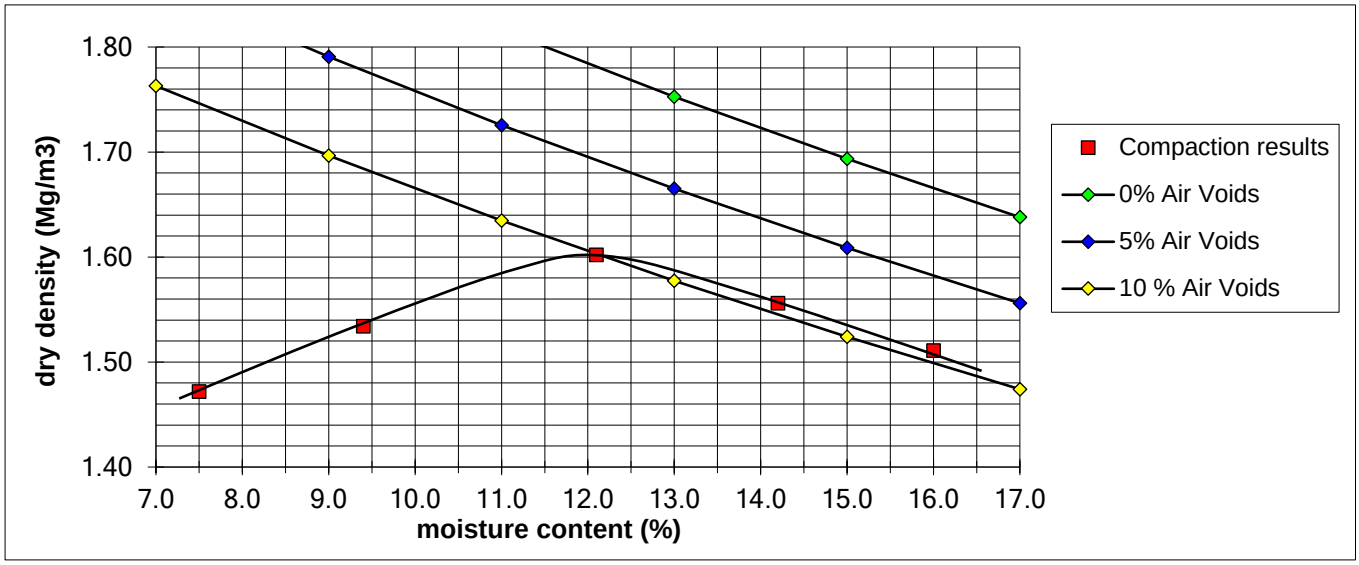
DRY DENSITY/MOISTURE CONTENT RELATIONSHIP 2.5kg RAMMER
BS 1377: PART 4: 1990
PARTICLE DENSITY METHOD BS 1377: PART 2: 1990 Clause 8.2

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/38

SAMPLE LABEL	L1 F11	DATE SAMPLED	04-Aug-22
LAB SAMPLE No	115110	DATE RECEIVED	04-Aug-22
DATE TESTED	05-Aug-22	SAMPLED BY	Client

MATERIAL	Black Ash
ADVISED SOURCE	Site won
PRE TREATMENT	Air Dried/Separate Batches

Point Number		Moisture Content (%)	Dry Density (Mg/m3)
1		7.5	1.472
2		9.4	1.534
3		12.1	1.602
4		14.2	1.556
5		16.0	1.511
	Optimum	12.0	
	Maximum		1.60
	Particle Density	2.27 (Measured)	



REMARKS/ABNORMALITIES
Percentage of material retained on 37.5mm sieve = 19%
Percentage of material retained on 20mm sieve = 38%

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 19-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/39
Date of Issue 22 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	19-Aug-22	**JOB NUMBER**	MRN 4454/39
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C12 L6	225	1.86	1.65	13	100.3	6.8
2	D7 L8	225	1.81	1.60	13	97.6	8.8
3	C7 L8	225	1.93	1.70	14	103.5	2.4
4	C13 L3	225	1.81	1.58	14	96.6	7.9
5	C14 L3	225	1.78	1.56	14	95.1	9.5
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17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.64	(Advised by client)	
				Particle Density (Mg/m3)	2.28	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 22-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	19-Aug-22	**JOB NUMBER**	MRN 4454/39
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	B11 L6	225	1.72	1.50	14	98.9	6.0
2	B12 L6	225	1.71	1.48	15	97.3	6.1
3	D6 L8	225	1.75	1.49	17	98.3	2.4
4	D8 L7	225	1.76	1.49	18	98.1	1.1
5	D13 L3	225	1.75	1.48	18	97.2	1.7
6	D14 L3	225	1.74	1.47	18	96.7	2.2
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.52	(Advised by client)	
				Particle Density (Mg/m3)	2.08	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 22-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/39

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	19/08/2022
DATE OF TEST	19/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	20/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115799	SRD C12 L6	Black Ash/Sand	1.89	1.67	13	101.8	5.0
115800	SRD D9 L7	Black Ash/Sand	1.83	1.62	13	98.7	7.9
		Maximum Dry Density (Mg/m^3)		1.64		(Advised by client)	
		Particle Density (Mg/m^3)		2.28		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 22-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/40
Date of Issue 23 August 2022
Page 1 of 2

Approved Signatories

S J Hutchings, O P Davies

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	22-Aug-22	**JOB NUMBER**	MRN 4454/40
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C8 L8	225	1.78	1.58	13	N/A	N/A
2	D8 L8	225	1.78	1.58	13	N/A	N/A
3	E9 L7	225	1.67	1.44	16	N/A	N/A
4	E9 L8	225	1.67	1.44	16	N/A	N/A
5	D9 L8	225	1.80	1.65	9.1	N/A	N/A
6	C9 L7	225	1.78	1.63	8.9	N/A	N/A
7	C9 L8	225	1.62	1.51	7.5	N/A	N/A
8							
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11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	N/A	(Not Advised)	
				Particle Density (Mg/m3)	N/A	(Not Advised)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 23-Aug-22

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/41
Date of Issue 24 August 2022
Page 1 of 10

Approved Signatories

S J Hutchings, O P Davies

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/41			
TEST LOCATION	Test 01 - D19 L0	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	23-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4672	4650	4544	4622	0.00	0.00	0.0
4518	4509	4382	4470	-1.52	8.00	28.3
4556	4553	4431	4513	-1.09	0.00	0.0
4530	4524	4402	4485	-1.37	5.00	17.7
4503	4497	4376	4459	-1.63	8.00	28.3
4465	4460	4341	4422	-2.00	12.00	42.4
4448	4450	4293	4397	-2.25	15.00	53.1
4395	4420	4279	4365	-2.57	20.00	70.7
4342	4361	4217	4307	-3.15	25.00	88.4
4420	4418	4281	4373	-2.49	0.00	0.0
4391	4386	4227	4335	-2.87	6.00	21.2
4371	4364	4210	4315	-3.07	10.00	35.4
4337	4332	4176	4282	-3.40	16.00	56.6
4297	4297	4133	4242	-3.80	18.00	63.7
4264	4266	4098	4209	-4.13	22.00	77.8
4232	4240	4070	4181	-4.41	24.00	84.9
4342	4361	4238	4314	-3.08	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	58	kPa
Modulus of subgrade reaction (k) =	46	MPa/m
Equivalent 762 mm plate reaction =	37	MPa/m
Equivalent CBR =	5.1	%
Surface Stiffness Modulus (E) =	50	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	63	kPa
Modulus of subgrade reaction (k) =	50	MPa/m
Equivalent 762 mm plate reaction =	40	MPa/m
Equivalent CBR =	5.8	%
Surface Stiffness Modulus (E) =	54	MN/m^2

Surface Stiffness Modulus Ratio =	1.1

DATE 24-Aug-22

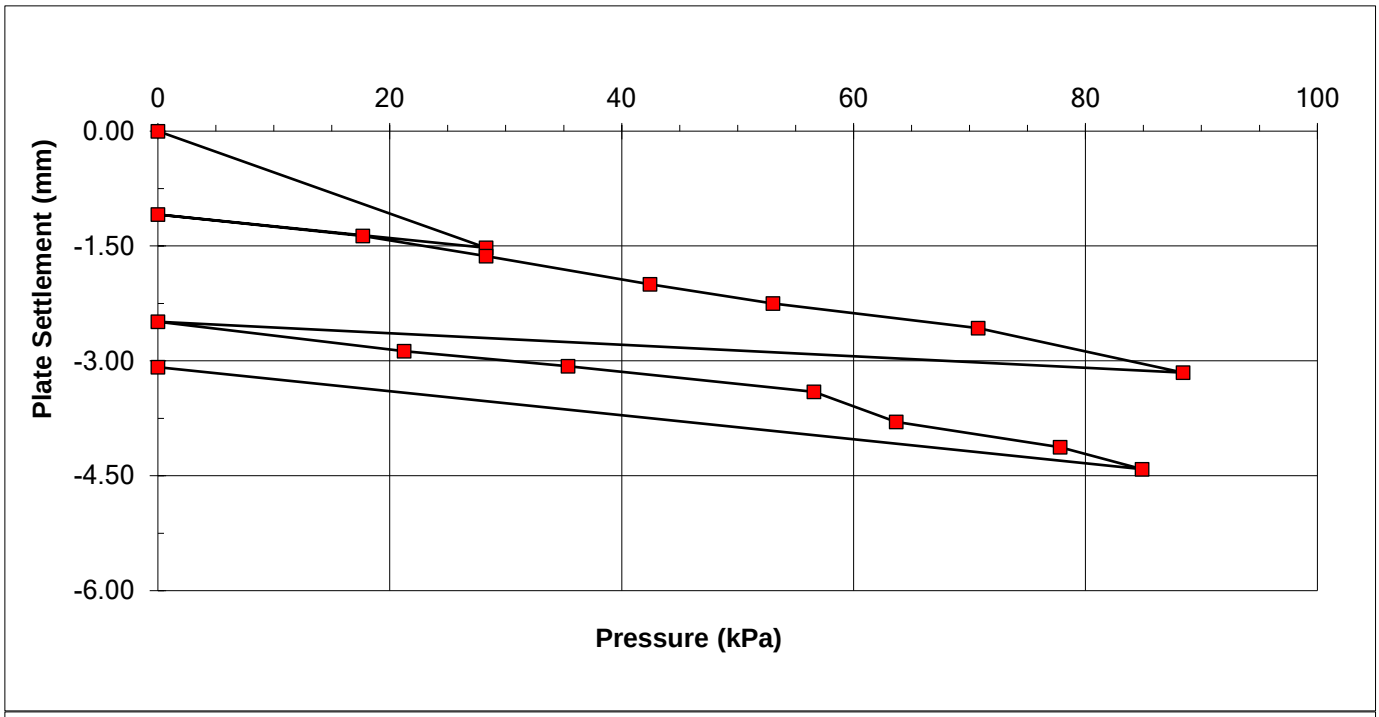
MURRAY RIX

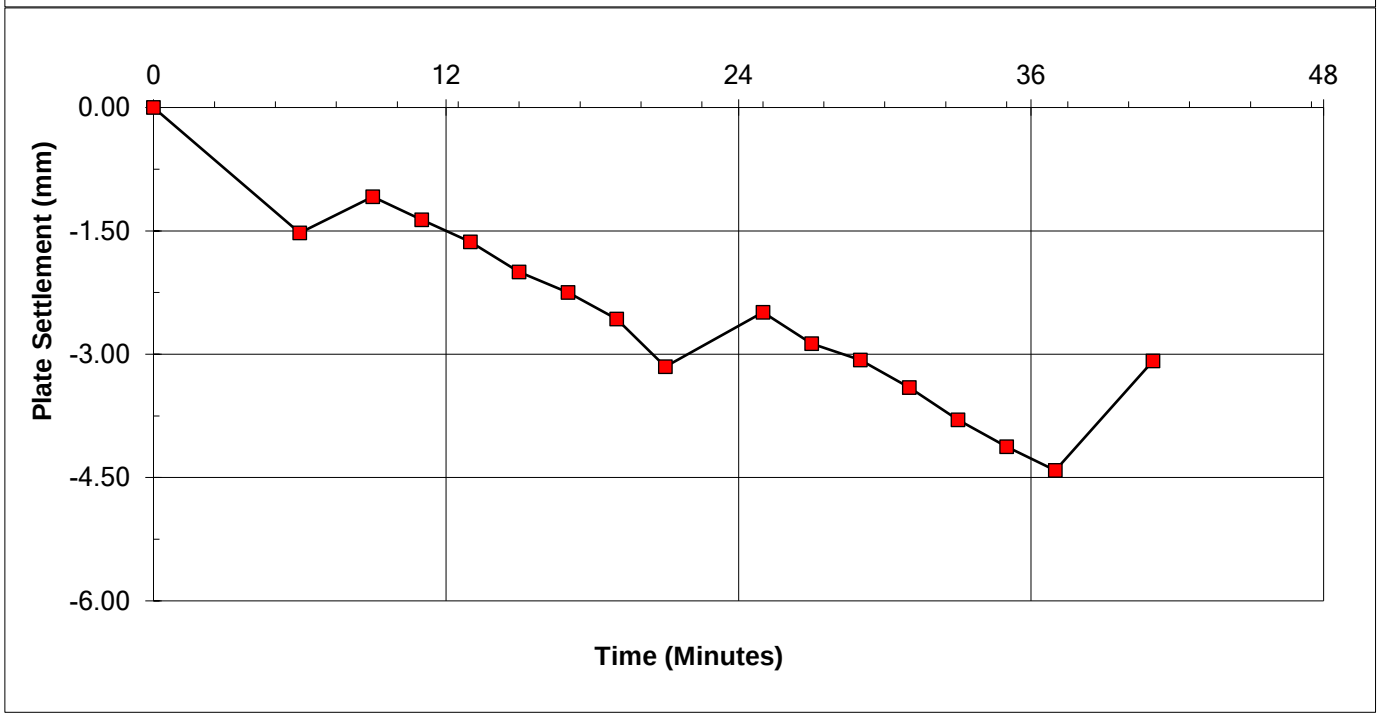
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 24-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41
MATERIAL	Subbase, Type 1		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	G21 L1	200	2.17	2.00	8.4	95.3	6.8
2	G21 L2	200	2.19	2.01	8.9	95.9	5.3
3							
4							
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17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	2.10	(Advised by client)	
				Particle Density (Mg/m3)	2.62	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D10 L7	225	1.83	1.58	16	96.3	5.3
2	D10 L8	225	1.89	1.64	15	99.7	3.3
3	C10 L7	225	1.88	1.64	15	100.0	4.3
4	E10 L7	225	1.80	1.59	14	96.7	8.6
5	E10 L8	225	1.83	1.61	14	97.9	6.9
6	F10 L7	225	1.80	1.58	14	96.0	8.2
7	F10 L8	225	1.80	1.57	15	95.6	7.9
8	F11 L7	225	1.83	1.59	15	97.1	6.4
9	F11 L8	225	1.83	1.61	14	98.0	7.1
10							
11							
12							
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14							
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16							
17							
18							
19							
20							
					Maximum Dry Density (Mg/m3)	1.64	(Advised by client)
					Particle Density (Mg/m3)	2.28	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D11 L8	225	1.75	1.53	15	100.4	3.8
2	E11 L7	225	1.68	1.47	15	96.4	7.6
3	E11 L8	225	1.67	1.47	14	96.5	9.0
4	F12 L7	225	1.71	1.40	22	92.1	1.6
5	F12 L8	225	1.74	1.41	23	92.9	-0.5
6	E12 L7	225	1.77	1.46	21	96.2	-1.3
7	E12 L8	225	1.76	1.46	21	95.8	-0.8
8							
9							
10							
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17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.52	(Advised by client)	
				Particle Density (Mg/m3)	2.08	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

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DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D12 L7	225	1.73	1.52	14	96.7	9.2
2	D12 L8	225	1.75	1.53	14	97.4	7.8
3	G12 L7	225	1.77	1.55	14	98.5	6.7
4	D11 L7	225	1.73	1.52	14	96.8	9.0
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18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.57	(Advised by client)	
				Particle Density (Mg/m3)	2.18	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

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BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D13 L4	225	1.80	1.53	18	97.6	2.6
2	D14 L4	225	1.77	1.58	13	100.4	7.9
3							
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18							
19							
20							
					Maximum Dry Density (Mg/m3)	1.57	(Advised by client)
					Particle Density (Mg/m3)	2.18	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/41

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	23/08/2022
DATE OF TEST	23/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	24/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115885	SRD D11 L8	Black Ash/Sand	1.82	1.57	16	103.3	-0.6
		Maximum Dry Density (Mg/m^3)		1.52		(Advised by client)	
		Particle Density (Mg/m^3)		2.08		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/41

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	23/08/2022
DATE OF TEST	23/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	24/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115884	SRD D11 L7	Black Ash/Sand	1.78	1.54	16	98.1	1.3
115886	SRD G12 L7	Black Ash/Sand	1.80	1.62	11	103.2	4.3
		Maximum Dry Density (Mg/m^3)		1.57		(Advised by client)	
		Particle Density (Mg/m^3)		2.18		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/41A
Date of Issue 24 August 2022
Page 1 of 10

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/41A			
TEST LOCATION	Test 01 - D19 L0	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	23-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4672	4650	4544	4622	0.00	0.00	0.0
4518	4509	4382	4470	-1.52	8.00	28.3
4556	4553	4431	4513	-1.09	0.00	0.0
4530	4524	4402	4485	-1.37	5.00	17.7
4503	4497	4376	4459	-1.63	8.00	28.3
4465	4460	4341	4422	-2.00	12.00	42.4
4448	4450	4293	4397	-2.25	15.00	53.1
4395	4420	4279	4365	-2.57	20.00	70.7
4342	4361	4217	4307	-3.15	25.00	88.4
4420	4418	4281	4373	-2.49	0.00	0.0
4391	4386	4227	4335	-2.87	6.00	21.2
4371	4364	4210	4315	-3.07	10.00	35.4
4337	4332	4176	4282	-3.40	16.00	56.6
4297	4297	4133	4242	-3.80	18.00	63.7
4264	4266	4098	4209	-4.13	22.00	77.8
4232	4240	4070	4181	-4.41	24.00	84.9
4342	4361	4238	4314	-3.08	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	58	kPa
Modulus of subgrade reaction (k) =	46	MPa/m
Equivalent 762 mm plate reaction =	37	MPa/m
Equivalent CBR =	5.1	%
Surface Stiffness Modulus (E) =	50	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	63	kPa
Modulus of subgrade reaction (k) =	50	MPa/m
Equivalent 762 mm plate reaction =	40	MPa/m
Equivalent CBR =	5.8	%
Surface Stiffness Modulus (E) =	54	MN/m^2

Surface Stiffness Modulus Ratio =	1.1

DATE 24-Aug-22

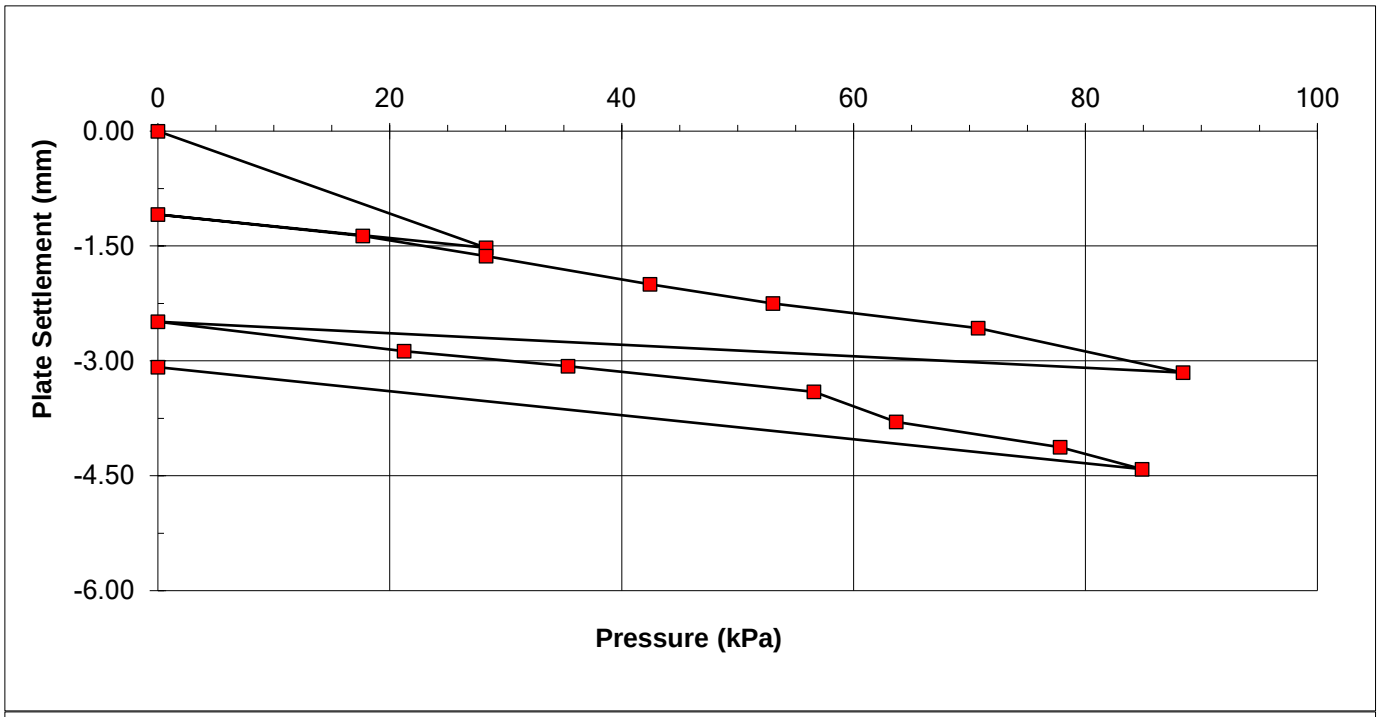
MURRAY RIX

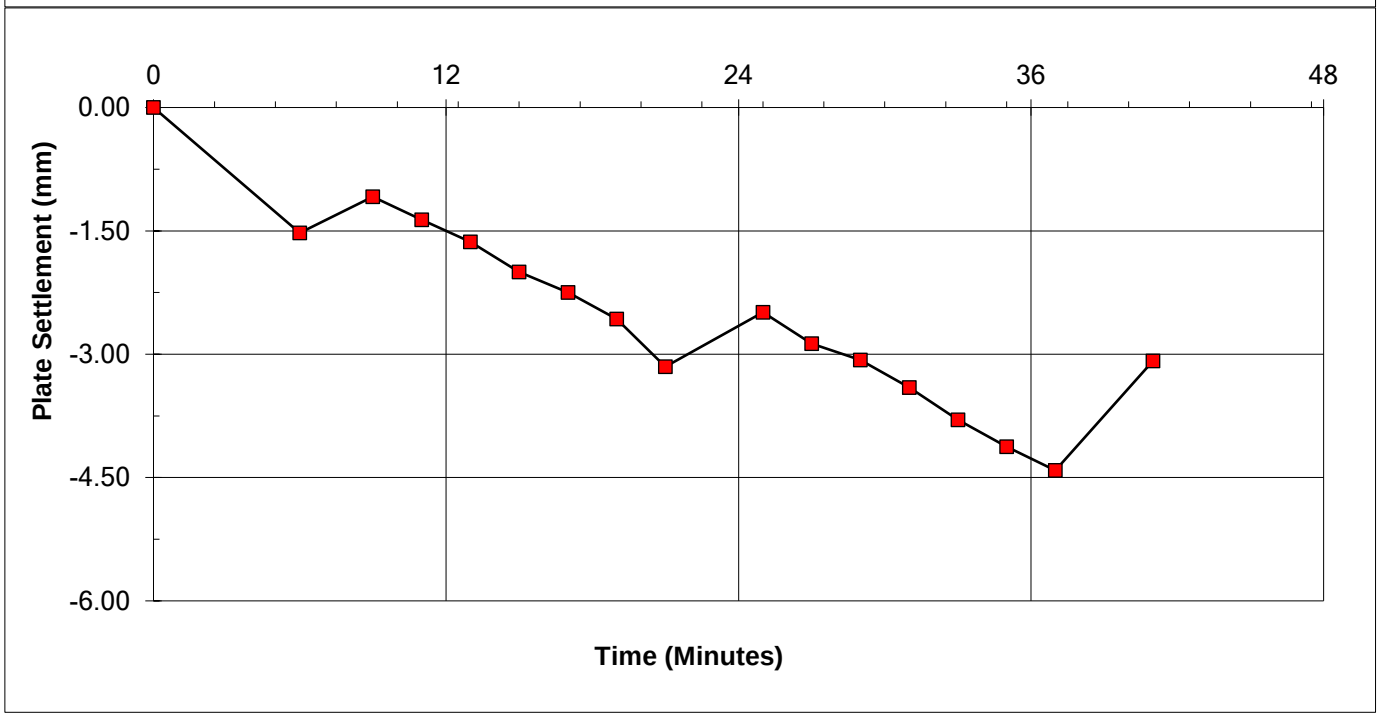
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS

Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 24-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41A
MATERIAL	Subbase, Type 1		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	G20 L1	200	2.17	2.00	8.4	95.3	6.8
2	G20 L2	200	2.19	2.01	8.9	95.9	5.3
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	2.10	(Advised by client)	
				Particle Density (Mg/m3)	2.62	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41A
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D10 L7	225	1.83	1.58	16	96.3	5.3
2	D10 L8	225	1.89	1.64	15	99.7	3.3
3	C10 L7	225	1.88	1.64	15	100.0	4.3
4	E10 L7	225	1.80	1.59	14	96.7	8.6
5	E10 L8	225	1.83	1.61	14	97.9	6.9
6	F10 L7	225	1.80	1.58	14	96.0	8.2
7	F10 L8	225	1.80	1.57	15	95.6	7.9
8	F11 L7	225	1.83	1.59	15	97.1	6.4
9	F11 L8	225	1.83	1.61	14	98.0	7.1
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
					Maximum Dry Density (Mg/m3)	1.64	(Advised by client)
					Particle Density (Mg/m3)	2.28	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41A
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D11 L8	225	1.75	1.53	15	100.4	3.8
2	E11 L7	225	1.68	1.47	15	96.4	7.6
3	E11 L8	225	1.67	1.47	14	96.5	9.0
4	F12 L7	225	1.71	1.40	22	92.1	1.6
5	F12 L8	225	1.74	1.41	23	92.9	-0.5
6	E12 L7	225	1.77	1.46	21	96.2	-1.3
7	E12 L8	225	1.76	1.46	21	95.8	-0.8
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.52	(Advised by client)	
				Particle Density (Mg/m3)	2.08	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41A
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D12 L7	225	1.73	1.52	14	96.7	9.2
2	D12 L8	225	1.75	1.53	14	97.4	7.8
3	G12 L7	225	1.77	1.55	14	98.5	6.7
4	D11 L7	225	1.73	1.52	14	96.8	9.0
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
					Maximum Dry Density (Mg/m3)	1.57	(Advised by client)
					Particle Density (Mg/m3)	2.18	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	23-Aug-22	**JOB NUMBER**	MRN 4454/41A
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D13 L4	225	1.80	1.53	18	97.6	2.6
2	D14 L4	225	1.77	1.58	13	100.4	7.9
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
					Maximum Dry Density (Mg/m3)	1.57	(Advised by client)
					Particle Density (Mg/m3)	2.18	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/41A

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	23/08/2022
DATE OF TEST	23/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	24/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115885	SRD D11 L8	Black Ash/Sand	1.82	1.57	16	103.3	-0.6
		Maximum Dry Density (Mg/m^3)		1.52		(Advised by client)	
		Particle Density (Mg/m^3)		2.08		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/41A

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	23/08/2022
DATE OF TEST	23/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	24/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115884	SRD D11 L7	Black Ash/Sand	1.78	1.54	16	98.1	1.3
115886	SRD G12 L7	Black Ash/Sand	1.80	1.62	11	103.2	4.3
		Maximum Dry Density (Mg/m^3)		1.57		(Advised by client)	
		Particle Density (Mg/m^3)		2.18		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 24-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/42
Date of Issue 25 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/42			
TEST LOCATION	Test 01 - G20 L4	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	24-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Crush	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4780	4989	4623	4797	0.00	0.00	0.0
4669	4837	4491	4666	-1.32	13.00	46.0
4679	4845	4509	4678	-1.20	0.00	0.0
4659	4816	4478	4651	-1.46	10.00	35.4
4635	4778	4439	4617	-1.80	16.00	56.6
4600	4746	4402	4583	-2.15	21.00	74.3
4569	4717	4369	4552	-2.46	28.00	99.0
4538	4681	4330	4516	-2.81	32.00	113.2
4512	4640	4259	4470	-3.27	36.00	127.3
4569	4682	4253	4501	-2.96	0.00	0.0
4538	4619	4233	4463	-3.34	10.00	35.4
4512	4594	4200	4435	-3.62	23.00	81.3
4485	4569	4170	4408	-3.89	32.00	113.2
4458	4543	4136	4379	-4.18	40.00	141.5
4430	4504	4092	4342	-4.55	50.00	176.8
4400	4475	4060	4312	-4.86	58.00	205.1
4437	4516	4108	4354	-4.44	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	98	kPa
Modulus of subgrade reaction (k) =	79	MPa/m
Equivalent 762 mm plate reaction =	63	MPa/m
Equivalent CBR =	12.7	%
Surface Stiffness Modulus (E) =	90	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	144	kPa
Modulus of subgrade reaction (k) =	115	MPa/m
Equivalent 762 mm plate reaction =	93	MPa/m
Equivalent CBR =	24.7	%
Surface Stiffness Modulus (E) =	137	MN/m^2

Surface Stiffness Modulus Ratio =	1.5

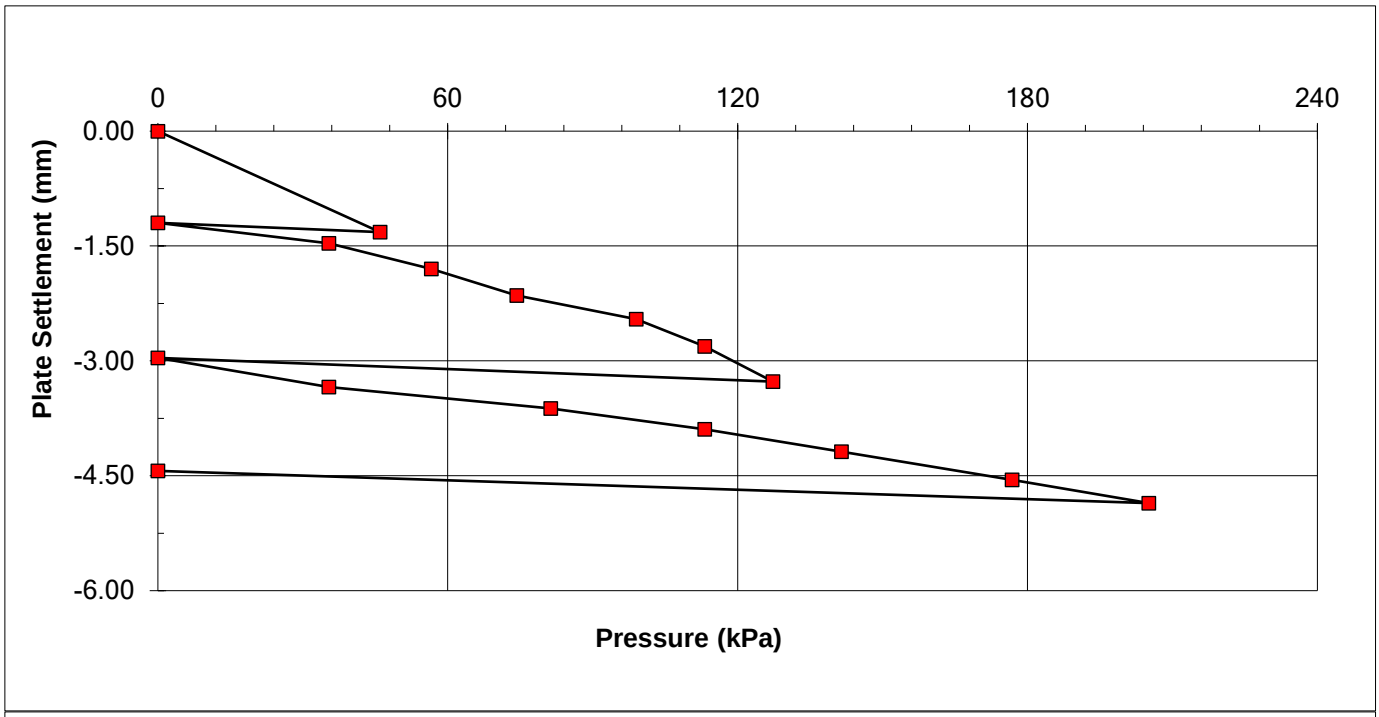
DATE 25-Aug-22

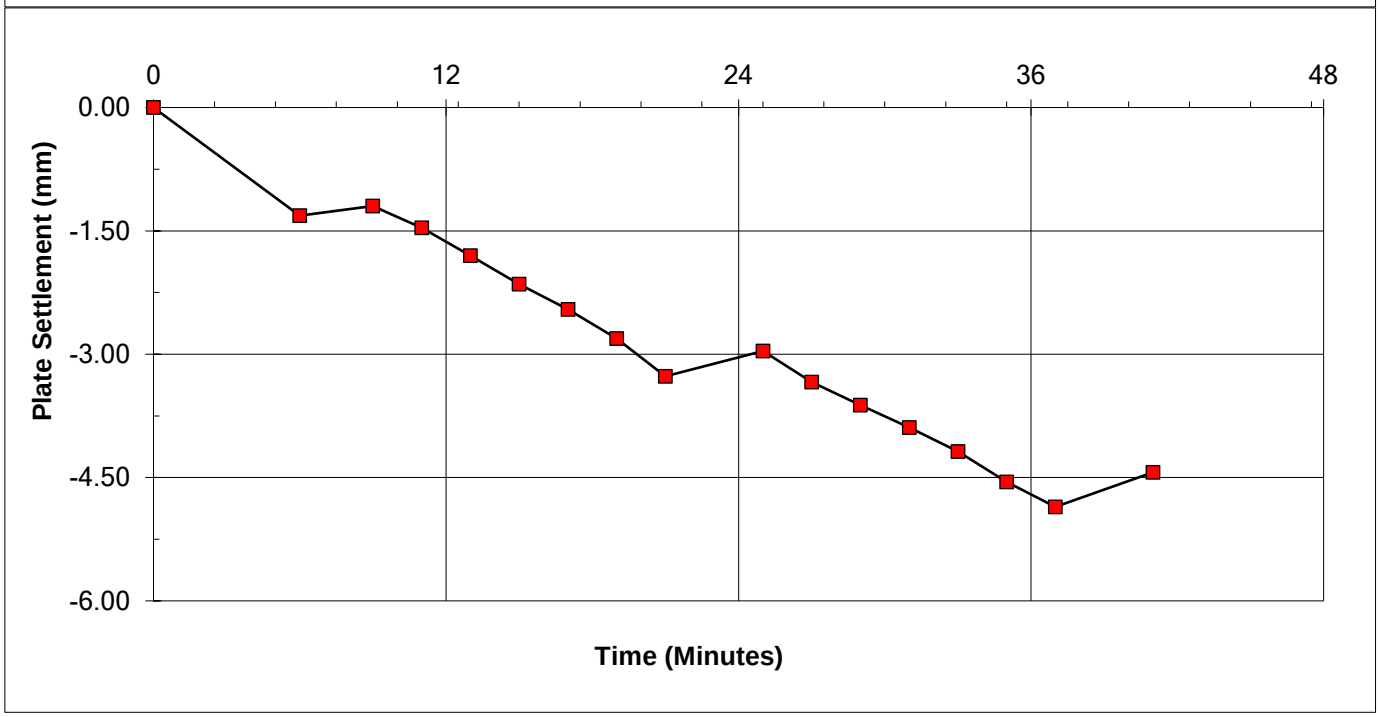
MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST
BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/42				
TEST LOCATION	Test 02 - B13 L0	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	24-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Ash	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4563	4875	4831	4756	0.00	0.00	0.0
4419	4723	4720	4621	-1.36	12.00	42.4
4432	4749	4739	4640	-1.16	0.00	0.0
4401	4719	4710	4610	-1.46	12.00	42.4
4369	4680	4674	4574	-1.82	18.00	63.7
4330	4649	4647	4542	-2.14	24.00	84.9
4297	4614	4618	4510	-2.47	30.00	106.1
4257	4572	4579	4469	-2.87	36.00	127.3
4220	4538	4545	4434	-3.22	41.00	145.0
4257	4609	4581	4482	-2.74	0.00	0.0
4229	4572	4559	4453	-3.03	12.00	42.4
4200	4543	4529	4424	-3.32	21.00	74.3
4167	4515	4501	4394	-3.62	30.00	106.1
4137	4475	4470	4361	-3.96	36.00	127.3
4106	4450	4440	4332	-4.24	42.00	148.5
4071	4421	4412	4301	-4.55	50.00	176.8
4161	4552	4531	4415	-3.42	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	103	kPa
Modulus of subgrade reaction (k) =	82	MPa/m
Equivalent 762 mm plate reaction =	66	MPa/m
Equivalent CBR =	13.7	%
Surface Stiffness Modulus (E) =	94	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	130	kPa
Modulus of subgrade reaction (k) =	104	MPa/m
Equivalent 762 mm plate reaction =	84	MPa/m
Equivalent CBR =	20.6	%
Surface Stiffness Modulus (E) =	122	MN/m^2

Surface Stiffness Modulus Ratio =	1.3

DATE 25-Aug-22

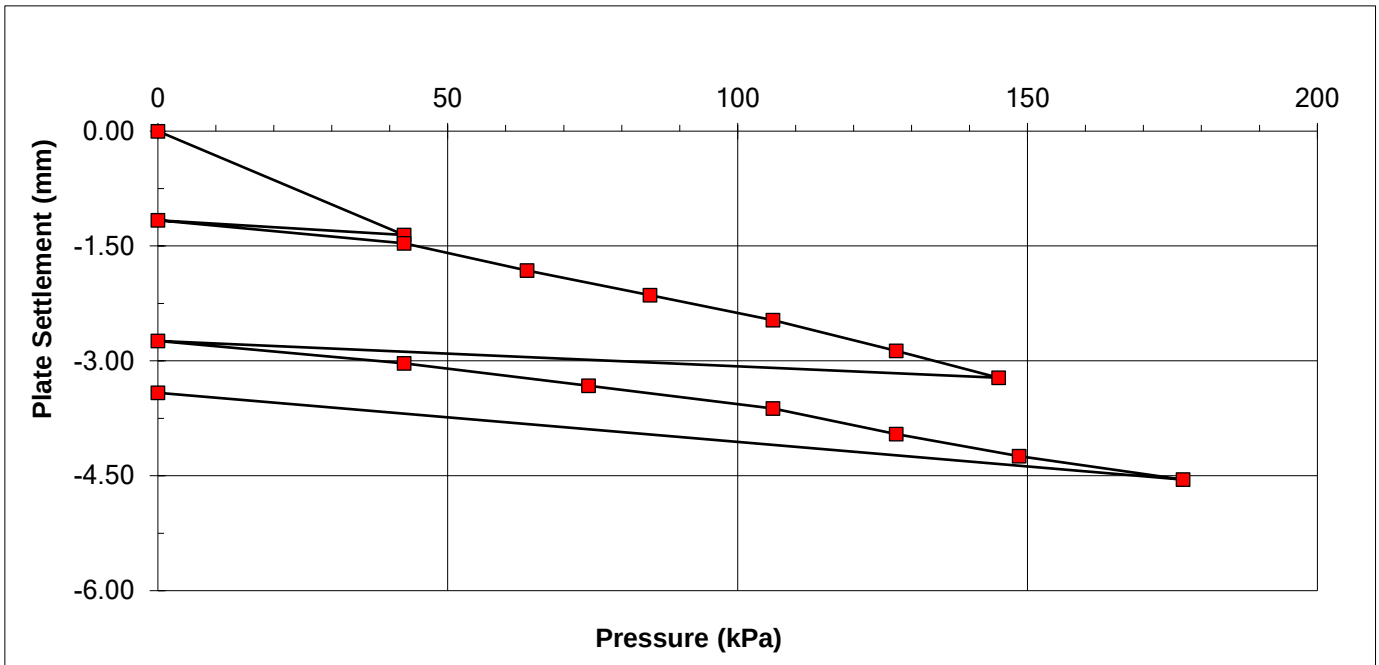
MURRAY RIX

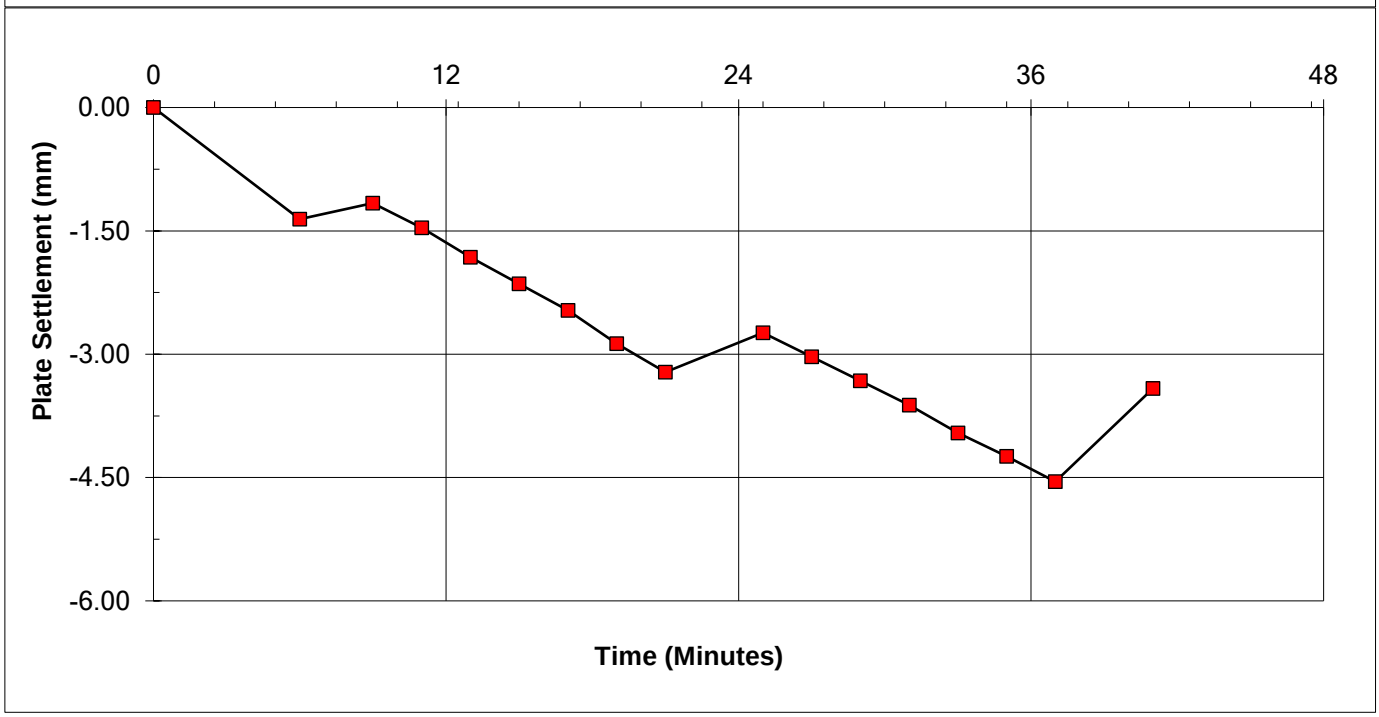
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,

DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/42			
TEST LOCATION	Test 03 - D17 L0	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	24-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Black Ash/Clay	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4565	4915	4822	4767	0.00	0.00	0.0
4495	4875	4690	4687	-0.81	5.00	17.7
4501	4884	4697	4694	-0.73	0.00	0.0
4470	4868	4665	4668	-1.00	5.00	17.7
4442	4842	4639	4641	-1.26	8.00	28.3
4415	4812	4598	4608	-1.59	10.00	35.4
4385	4779	4559	4574	-1.93	12.00	42.4
4352	4748	4519	4540	-2.28	14.00	49.5
4318	4713	4472	4501	-2.66	17.00	60.1
4356	4741	4509	4535	-2.32	0.00	0.0
4337	4723	4474	4511	-2.56	5.00	17.7
4313	4694	4446	4484	-2.83	10.00	35.4
4286	4669	4418	4458	-3.10	15.00	53.1
4256	4640	4378	4425	-3.43	20.00	70.7
4226	4607	4338	4390	-3.77	25.00	88.4
4198	4575	4304	4359	-4.08	30.00	106.1
4269	4667	4369	4435	-3.32	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	44	kPa
Modulus of subgrade reaction (k) =	35	MPa/m
Equivalent 762 mm plate reaction =	28	MPa/m
Equivalent CBR =	3.1	%
Surface Stiffness Modulus (E) =	36	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	78	kPa
Modulus of subgrade reaction (k) =	62	MPa/m
Equivalent 762 mm plate reaction =	50	MPa/m
Equivalent CBR =	8.6	%
Surface Stiffness Modulus (E) =	70	MN/m^2

Surface Stiffness Modulus Ratio =	1.9

DATE 25-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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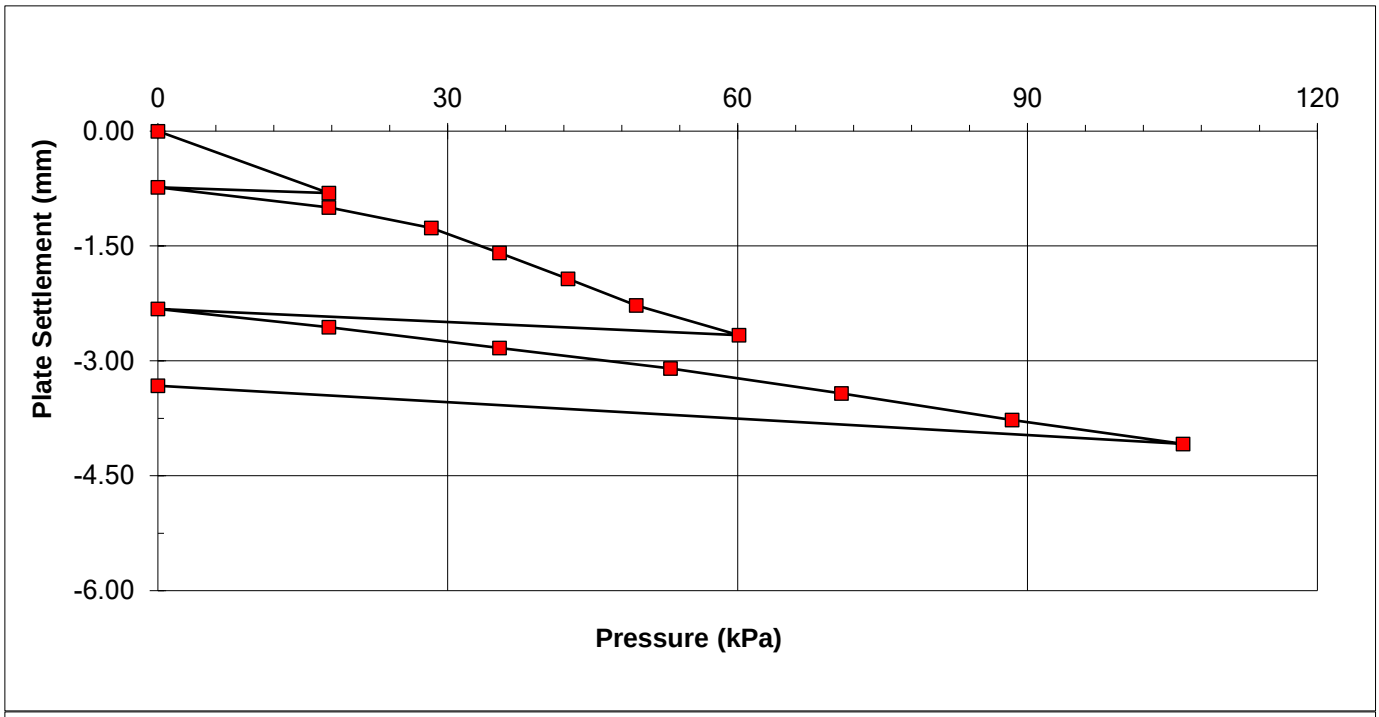
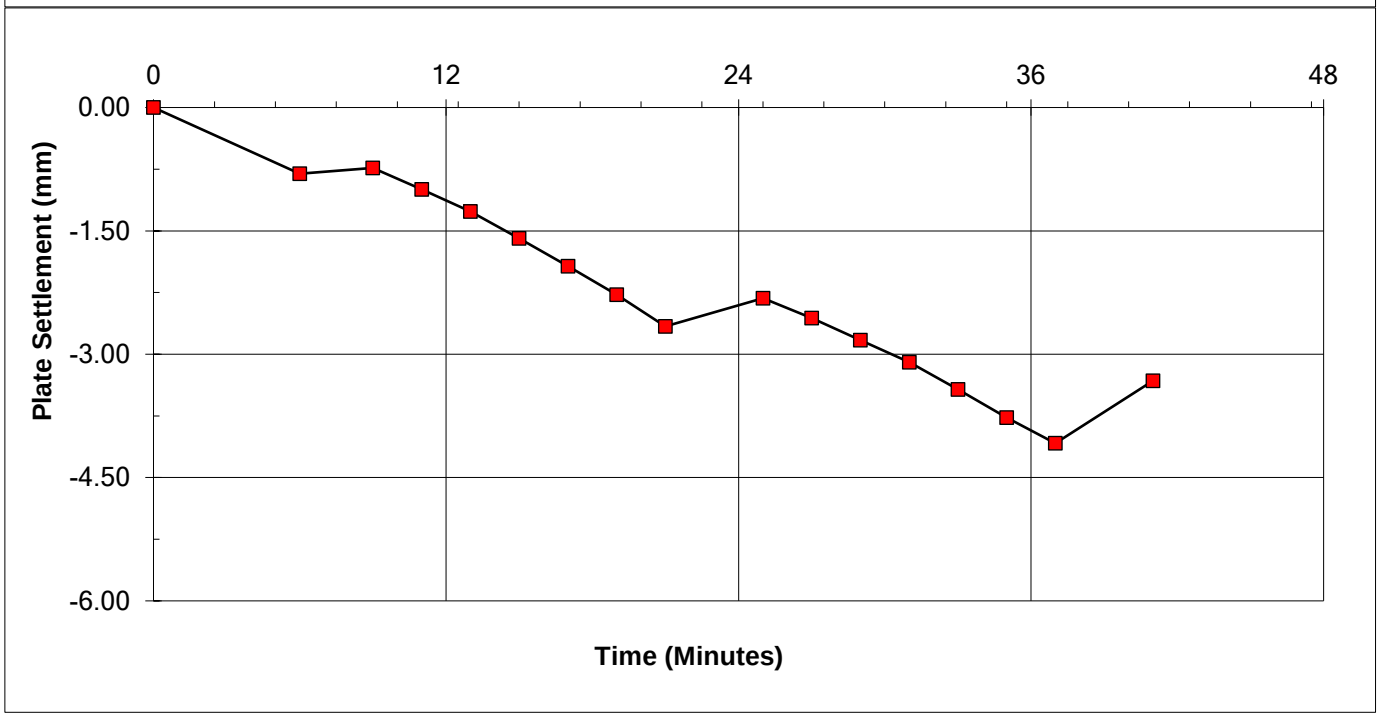
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Aug-22

MURRAY RIX

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TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST
BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)
Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/42				
TEST LOCATION	Test 04 - C11 L4	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	24-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Ash	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4561	4768	4720	4683	0.00	0.00	0.0
4427	4645	4568	4547	-1.36	8.00	28.3
4439	4674	4576	4563	-1.20	0.00	0.0
4409	4650	4545	4535	-1.48	8.00	28.3
4368	4617	4518	4501	-1.82	13.00	46.0
4334	4578	4480	4464	-2.19	19.00	67.2
4304	4548	4446	4433	-2.50	22.00	77.8
4266	4507	4407	4393	-2.90	31.00	109.6
4236	4477	4380	4364	-3.19	37.00	130.9
4289	4537	4395	4407	-2.76	0.00	0.0
4260	4510	4367	4379	-3.04	5.00	17.7
4228	4481	4330	4346	-3.37	10.00	35.4
4197	4451	4305	4318	-3.65	16.00	56.6
4168	4420	4281	4290	-3.93	22.00	77.8
4137	4390	4247	4258	-4.25	30.00	106.1
4108	4361	4219	4229	-4.54	38.00	134.4
4184	4479	4280	4314	-3.69	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	76	kPa
Modulus of subgrade reaction (k) =	61	MPa/m
Equivalent 762 mm plate reaction =	49	MPa/m
Equivalent CBR =	8.2	%
Surface Stiffness Modulus (E) =	67	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	85	kPa
Modulus of subgrade reaction (k) =	68	MPa/m
Equivalent 762 mm plate reaction =	54	MPa/m
Equivalent CBR =	9.8	%
Surface Stiffness Modulus (E) =	76	MN/m^2

Surface Stiffness Modulus Ratio =	1.1

DATE 25-Aug-22

MURRAY RIX

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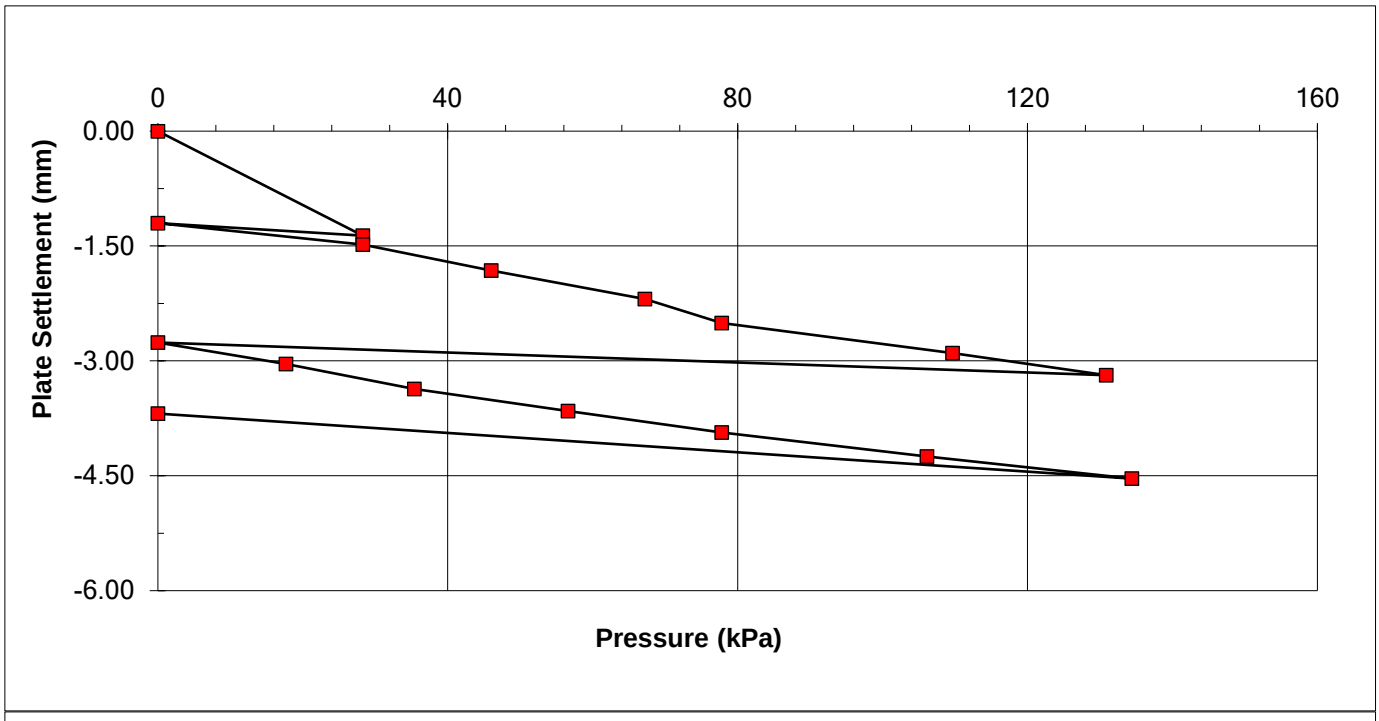
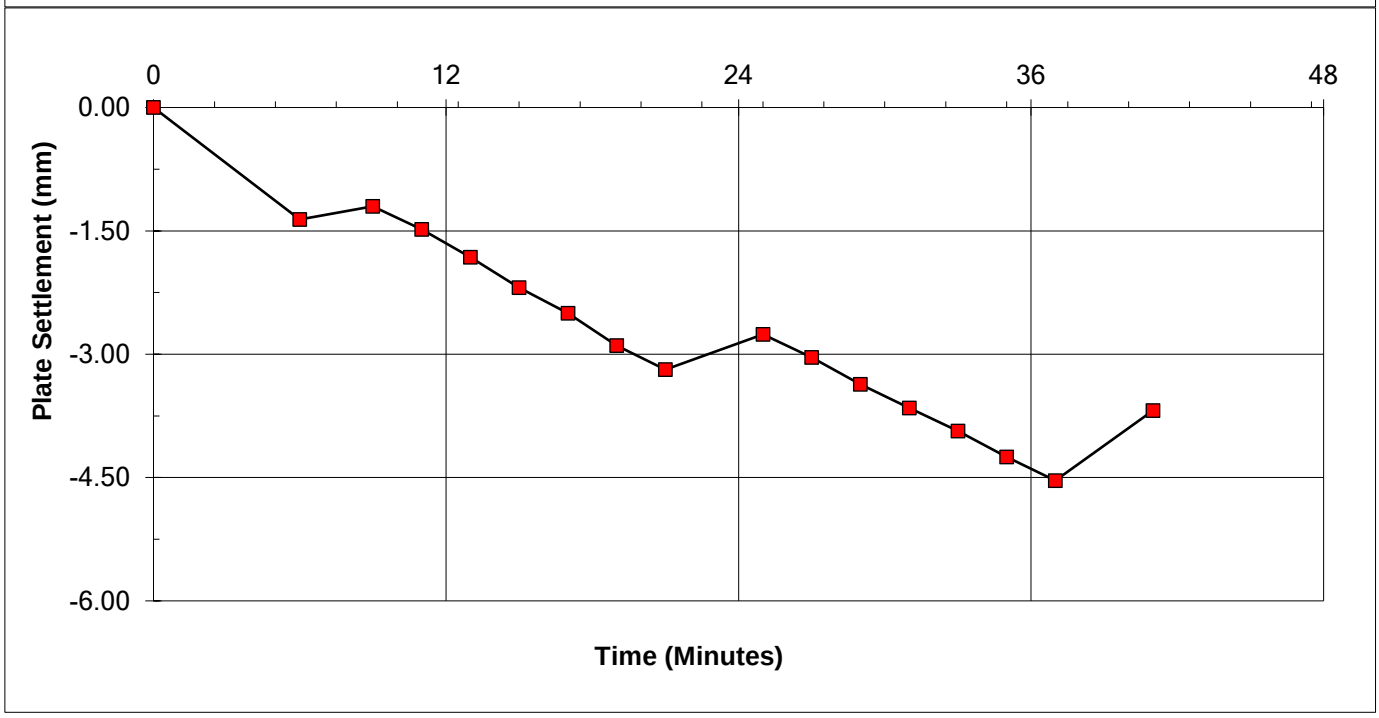
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 25-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	24-Aug-22	**JOB NUMBER**	MRN 4454/42
MATERIAL	Crush		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	G20 L3	200	2.18	2.02	7.8	96.3	7.0
2	G20 L4	200	2.20	2.05	7.2	97.7	6.9
3							
4							
5							
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8							
9							
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14							
15							
16							
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18							
19							
20							
				Maximum Dry Density (Mg/m3)	2.10	(Advised by client)	
				Particle Density (Mg/m3)	2.62	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 25-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	24-Aug-22	**JOB NUMBER**	MRN 4454/42
MATERIAL	Ash		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C11 L7	225	2.03	1.84	10	97.6	8.0
2	C12 L7	225	2.09	1.85	13	98.0	2.7
3	B12 L7	225	2.01	1.80	11	95.4	7.5
4	B11 L7	225	2.10	1.90	11	100.4	4.3
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.89	(Advised by client)	
				Particle Density (Mg/m3)	2.51	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 25-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/43
Date of Issue 26 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc			
SITE	Stopes Road, Bolton			
JOB NUMBER	MRN 4454/43			
TEST LOCATION	Test 01 - G20 L5	LOADING DEVICE	20 Tonne Enerpac Jack	
TEST DATE	25-Aug-22	PLATE SIZE (mm)	600 diameter	
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant	
MATERIAL UNDER TEST	Crush	MOISTURE CONTENT	Not Required	

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4779	4961	4796	4845	0.00	0.00	0.0
4664	4808	4686	4719	-1.26	8.00	28.3
4681	4824	4693	4733	-1.13	0.00	0.0
4642	4777	4668	4696	-1.50	8.00	28.3
4612	4747	4636	4665	-1.80	14.00	49.5
4577	4717	4605	4633	-2.12	17.00	60.1
4542	4678	4564	4595	-2.51	22.00	77.8
4510	4646	4537	4564	-2.81	26.00	92.0
4491	4618	4510	4540	-3.06	31.00	109.6
4549	4678	4619	4615	-2.30	0.00	0.0
4527	4636	4563	4575	-2.70	12.00	42.4
4496	4609	4546	4550	-2.95	26.00	92.0
4472	4579	4527	4526	-3.19	32.00	113.2
4459	4545	4501	4502	-3.44	40.00	141.5
4428	4515	4465	4469	-3.76	47.00	166.2
4391	4487	4435	4438	-4.08	54.00	191.0
4431	4524	4501	4485	-3.60	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	72	kPa
Modulus of subgrade reaction (k) =	57	MPa/m
Equivalent 762 mm plate reaction =	46	MPa/m
Equivalent CBR =	7.4	%
Surface Stiffness Modulus (E) =	63	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	150	kPa
Modulus of subgrade reaction (k) =	120	MPa/m
Equivalent 762 mm plate reaction =	97	MPa/m
Equivalent CBR =	26.6	%
Surface Stiffness Modulus (E) =	144	MN/m^2

Surface Stiffness Modulus Ratio =	2.3

DATE 26-Aug-22

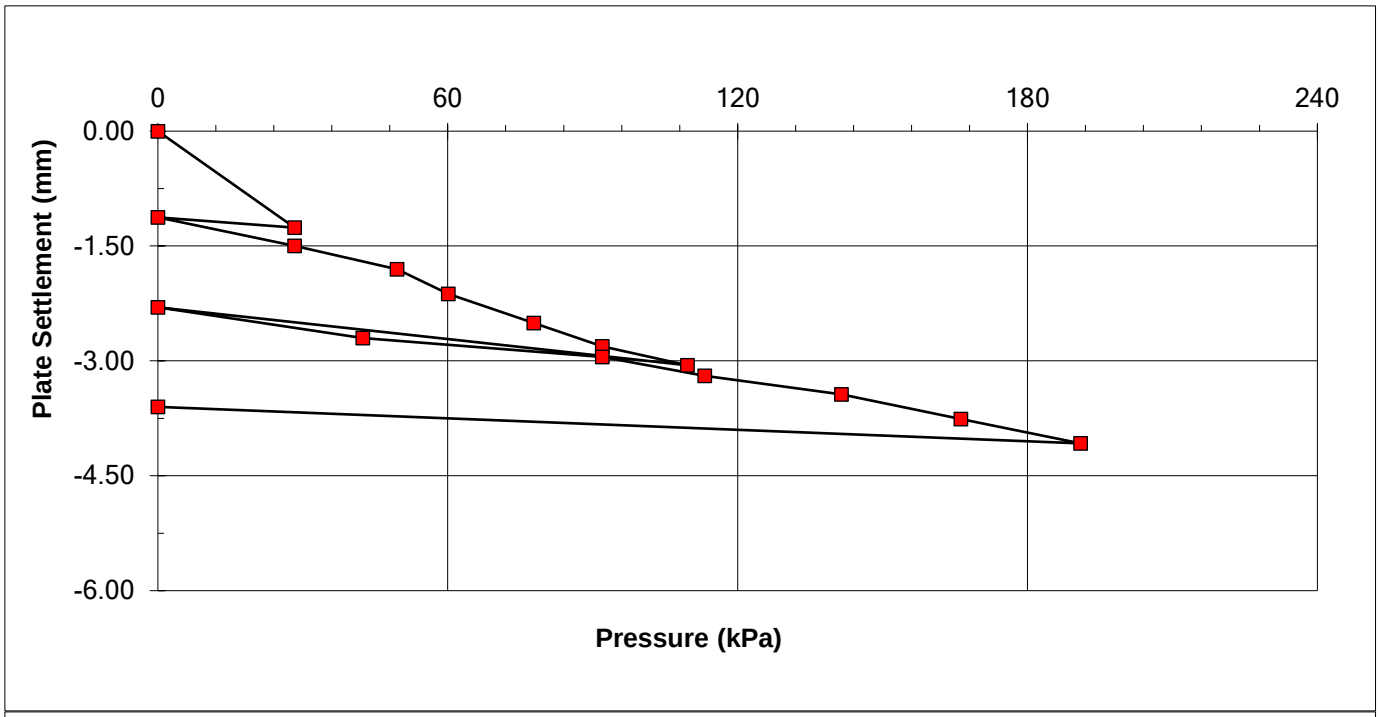
MURRAY RIX

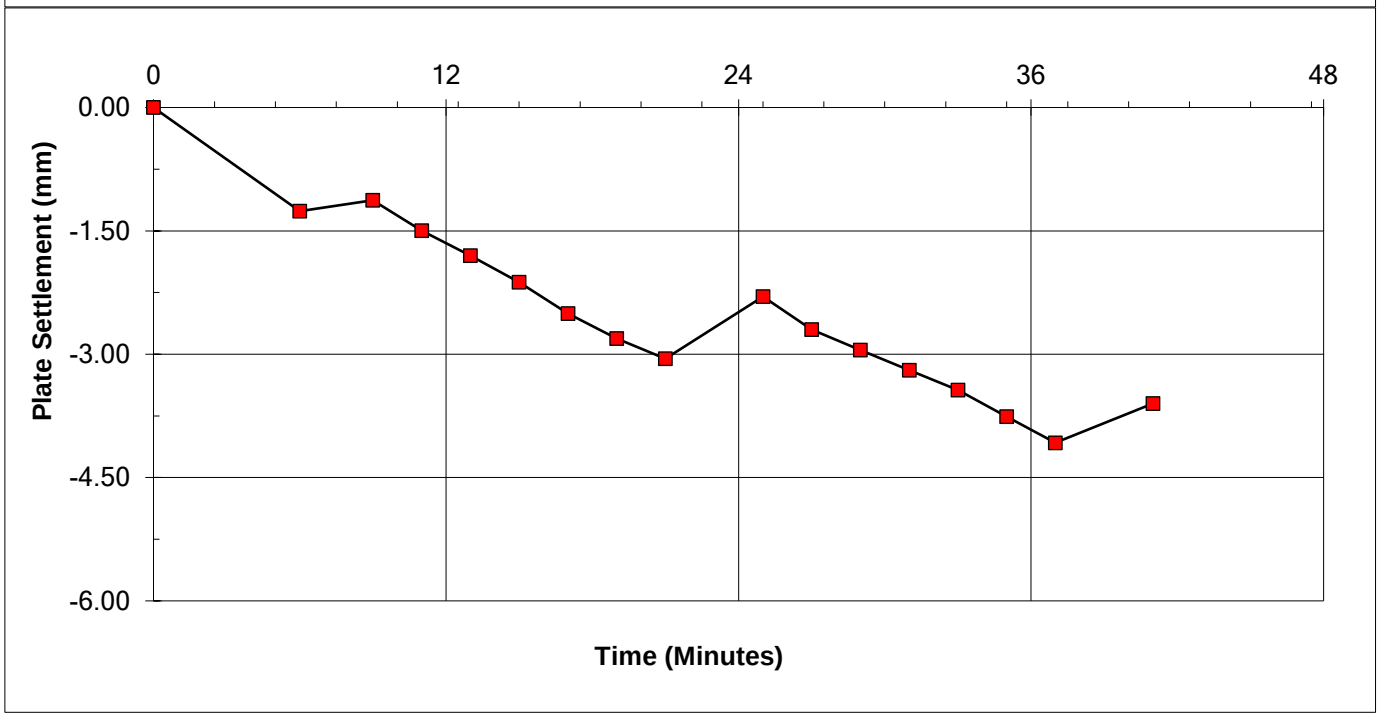
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 26-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	25-Aug-22	**JOB NUMBER**	MRN 4454/43
MATERIAL	Ash		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	E14 L5	225	2.03	1.80	13	100.5	0.0
2	E13 L5	225	1.93	1.71	13	95.3	5.0
3	D14 L5	225	1.97	1.79	10	100.0	5.7
4	D13 L5	225	1.94	1.79	8.4	100.0	8.8
5	B12 L7	225	1.98	1.72	15	96.1	1.2
6	C9 L10	225	1.94	1.73	12	96.7	5.3
7	D8 L9	225	1.98	1.78	11	99.4	4.4
8	D9 L9	225	1.91	1.75	9.2	97.8	9.5
9	D9 L10	225	1.92	1.76	9.2	98.2	9.0
10	D10 L9	225	2.01	1.84	10	102.5	4.5
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
				Maximum Dry Density (Mg/m3)	1.79	(Advised by client)	
				Particle Density (Mg/m3)	2.35	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 26-Aug-22

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	25-Aug-22	**JOB NUMBER**	MRN 4454/43
MATERIAL	Ash		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
21	D10 L10	225	2.06	1.89	9.0	105.7	2.6
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
				Maximum Dry Density (Mg/m3)	1.79	(Advised by client)	
				Particle Density (Mg/m3)	2.35	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 26-Aug-22

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	25-Aug-22	**JOB NUMBER**	MRN 4454/43
MATERIAL	Ash		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	B11 L7	225	1.88	1.61	17	97.2	1.7
2	C12 L7	225	1.86	1.63	14	98.2	4.5
3	C11 L7	225	1.89	1.64	15	98.9	2.2
4	B12 L8	225	1.90	1.66	15	99.7	2.0
5	B11 L8	225	1.82	1.58	15	95.4	6.0
6	C12 L8	225	1.87	1.64	14	98.9	4.2
7	C11 L8	225	1.86	1.60	16	96.6	3.0
8	C10 L9	225	1.85	1.65	12	99.5	6.5
9	C10 L10	225	1.85	1.67	11	100.7	7.4
10	C9 L9	225	1.86	1.61	15	97.1	3.8
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
					Maximum Dry Density (Mg/m3)	1.66	(Advised by client)
					Particle Density (Mg/m3)	2.25	(Advised by client)
					Results correct for NDG calibration/correlation to site materials	Yes	

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 26-Aug-22

MURRAY RIX

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TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/43

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	25/08/2022
DATE OF TEST	25/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	26/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
116031	E13 L5	Ash	1.93	1.78	8.4	99.4	9.3
		Maximum Dry Density (Mg/m^3)		1.79		(Advised by client)	
		Particle Density (Mg/m^3)		2.35		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 26-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/43

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	25/08/2022
DATE OF TEST	25/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	26/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
116032	B11 L8	Ash	1.99	1.76	13	106.0	-1.1
		Maximum Dry Density (Mg/m^3)		1.66		(Advised by client)	
		Particle Density (Mg/m^3)		2.25		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 26-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/44
Date of Issue 31 August 2022
Page 1 of 4

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	30-Aug-22	**JOB NUMBER**	MRN 4454/44
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D12 L8	225	1.79	1.64	9.3	102.4	9.7
2	D11 L7	225	1.86	1.64	13	102.4	3.0
3	E11 L7	225	1.79	1.62	10	101.4	8.8
4	F12 L7	225	1.78	1.62	9.9	101.2	9.8
5	F10 L7	225	1.83	1.68	9.0	105.1	7.8
6	F11 L7	225	1.83	1.67	9.4	104.3	7.8
7	E12 L7	225	1.90	1.65	15	102.9	-0.4
8	A14 L1	225	1.77	1.59	11	99.6	9.1
9	A13 L1	225	1.77	1.58	12	98.8	8.3
10	A16 L1	225	1.91	1.67	14	104.4	-0.5
11	A17 L1	225	1.88	1.65	14	103.0	1.0
12							
13							
14							
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19							
20							
				Maximum Dry Density (Mg/m3)	1.60	(Advised by client)	
				Particle Density (Mg/m3)	2.18	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	30-Aug-22	**JOB NUMBER**	MRN 4454/44
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C13 L5	225	1.74	1.59	9.4	104.5	8.8
2	C15 L1	225	1.80	1.55	16	101.8	0.3
3	B15 L1	225	1.74	1.59	10	104.5	8.1
4	A15 L1	225	1.75	1.57	11	103.6	6.4
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20							
				Maximum Dry Density (Mg/m3)	1.52	(Advised by client)	
				Particle Density (Mg/m3)	2.08	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/44

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	30/08/2022
DATE OF TEST	30/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	31/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
116124	SRD F12 L8	Black Ash/Sand	1.84	1.64	12	102.5	5.1
116125	SRD E12 L8	Black Ash/Sand	1.87	1.64	14	102.4	1.9
116126	SRD D12 L8	Black Ash/Sand	1.83	1.68	9.2	105.0	7.5
		Maximum Dry Density (Mg/m^3)		1.60		(Advised by client)	
		Particle Density (Mg/m^3)		2.18		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/44A
Date of Issue 31 August 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	30-Aug-22	**JOB NUMBER**	MRN 4454/44A
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	A14 L1	225	1.77	1.59	11	99.6	9.1
2	A13 L1	225	1.77	1.58	12	98.8	8.3
3	A16 L1	225	1.91	1.67	14	104.4	-0.5
4	A17 L1	225	1.88	1.65	14	103.0	1.0
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20							
				Maximum Dry Density (Mg/m3)	1.60	(Advised by client)	
				Particle Density (Mg/m3)	2.18	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	30-Aug-22	**JOB NUMBER**	MRN 4454/44A
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C13 L5	225	1.74	1.59	9.4	104.5	8.8
2	C15 L1	225	1.80	1.55	16	101.8	0.3
3	B15 L1	225	1.74	1.59	10	104.5	8.1
4	A15 L1	225	1.75	1.57	11	103.6	6.4
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20							
				Maximum Dry Density (Mg/m3)	1.52	(Advised by client)	
				Particle Density (Mg/m3)	2.08	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
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TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/44A

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	30/08/2022
DATE OF TEST	30/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	31/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
116126	SRD D12 L8	Black Ash/Sand	1.83	1.68	9.2	105.0	7.5
		Maximum Dry Density (Mg/m^3)		1.60		(Advised by client)	
		Particle Density (Mg/m^3)		2.18		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD
BS 1377 : Part 9 : Clause 2.2
MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/44A

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	30/08/2022
DATE OF TEST	30/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	31/08/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
116124	SRD F12 L8	Black Ash/Sand	1.84	1.64	12	108.0	1.4
116125	SRD E12 L8	Black Ash/Sand	1.87	1.64	14	107.6	-1.6
		Maximum Dry Density (Mg/m^3)		1.52		(Advised by client)	
		Particle Density (Mg/m^3)		2.08		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 31-Aug-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/45
Date of Issue 01 September 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

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MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	31-Aug-22	**JOB NUMBER**	MRN 4454/45
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	D16 L1	225	1.99	1.79	11	105	2.6
2	C17 L1	225	1.82	1.63	12	95.1	9.8
3	B16 L1	225	1.89	1.73	9.1	101.1	9.1
4	C18 L1	225	1.85	1.66	11	97.1	9.1
5	B17 L1	225	1.85	1.64	12	96.2	8.4
6	D18 L1	225	1.92	1.75	9.8	102.2	6.9
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20							
				Maximum Dry Density (Mg/m3)	1.71	(Advised by client)	
				Particle Density (Mg/m3)	2.30	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 01-Sep-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF IN-SITU BULK DENSITY AND IN-SITU MOISTURE DENSITY
BY THE NUCLEAR METHOD
BS 1377-9: Clause 2.5: 1990

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP

DATE	31-Aug-22	**JOB NUMBER**	MRN 4454/45
MATERIAL	Black Ash/Sand		
NDG MODEL	Troxler 3440	**SERIAL NUMBER**	24958
MODE OF OPERATION	Direct Transmission	**MEASUREMENT APPLICATION**	Compliance tests for compacted material

Test No.	Test Chainage / Location	Test Depth (mm)	Wet Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Percentage Compaction (%)	Air Voids (%)
1	C16 L1	225	1.79	1.61	11	102.4	8.5
2	D17 L1	225	1.80	1.60	12	102.1	6.6
3	D19 L1	225	1.76	1.55	14	98.6	7.8
4	C19 L1	225	1.75	1.56	12.3	99.3	9.4
5	C13 L4	225	1.75	1.55	13.1	98.6	8.7
6	C14 L4	225	1.82	1.59	14.3	101.3	4.4
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20							
				Maximum Dry Density (Mg/m3)	1.57	(Advised by client)	
				Particle Density (Mg/m3)	2.18	(Advised by client)	
				Results correct for NDG calibration/correlation to site materials	Yes		

REMARKS/ABNORMALITIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 01-Sep-22

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)

Estimated Surface Stiffness Modulus CD225 Ver. 1, April 2020

CLIENT	VHE Construction Plc				
SITE	Stopes Road, Bolton				
JOB NUMBER	MRN 4454/44				
TEST LOCATION	Test 01 - C14 L4	LOADING DEVICE	20 Tonne Enerpac Jack		
TEST DATE	31-Aug-22	PLATE SIZE (mm)	600 diameter		
TEST DEPTH	Surface	REACTION LOAD USED	Site Plant		
MATERIAL UNDER TEST	Black Ash/Sand	MOISTURE CONTENT	Not Required		

Dial Gauge 1 (mmx100)	Dial Gauge 2 (mmx100)	Dial Gauge 3 (mmx100)	Mean Gauge (mmx100)	Mean Deflection (mm)	Load (kN)	Pressure (kPa)
4579	4613	4620	4604	0.00	0.00	0.0
4423	4486	4480	4463	-1.41	21.00	74.3
4441	4504	4525	4490	-1.14	0.00	0.0
4415	4481	4496	4464	-1.40	19.00	67.2
4388	4453	4471	4437	-1.67	23.00	81.3
4359	4429	4447	4412	-1.92	30.00	106.1
4327	4403	4421	4384	-2.20	33.00	116.7
4291	4374	4392	4352	-2.52	40.00	141.5
4251	4345	4364	4320	-2.84	47.00	166.2
4304	4384	4425	4371	-2.33	0.00	0.0
4277	4361	4397	4345	-2.59	22.00	77.8
4248	4336	4371	4318	-2.86	41.00	145.0
4207	4304	4335	4282	-3.22	56.00	198.1
4158	4269	4297	4241	-3.63	65.00	229.9
4110	4225	4253	4196	-4.08	73.00	258.2
4068	4191	4213	4157	-4.47	83.00	293.6
4169	4272	4273	4238	-3.66	0.00	0.0

1st Load Cycle

Pressure at 1.25 mm deflexion =	131	kPa
Modulus of subgrade reaction (k) =	105	MPa/m
Equivalent 762 mm plate reaction =	85	MPa/m
Equivalent CBR =	21.1	%
Surface Stiffness Modulus (E) =	124	MN/m^2

2nd Load Cycle

Pressure at 1.25 mm deflexion =	226	kPa
Modulus of subgrade reaction (k) =	181	MPa/m
Equivalent 762 mm plate reaction =	146	MPa/m
Equivalent CBR =	54.1	%
Surface Stiffness Modulus (E) =	226	MN/m^2

Surface Stiffness Modulus Ratio =	1.8

DATE 01-Sep-22

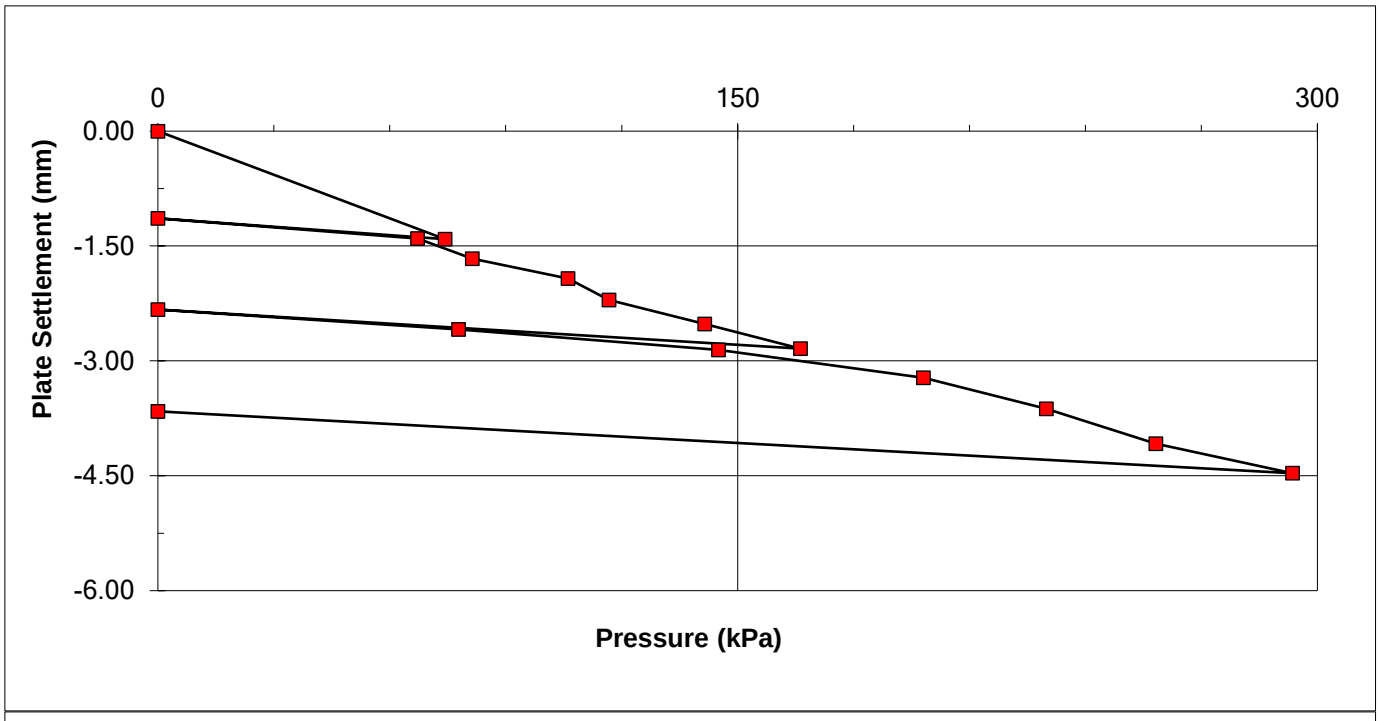
MURRAY RIX

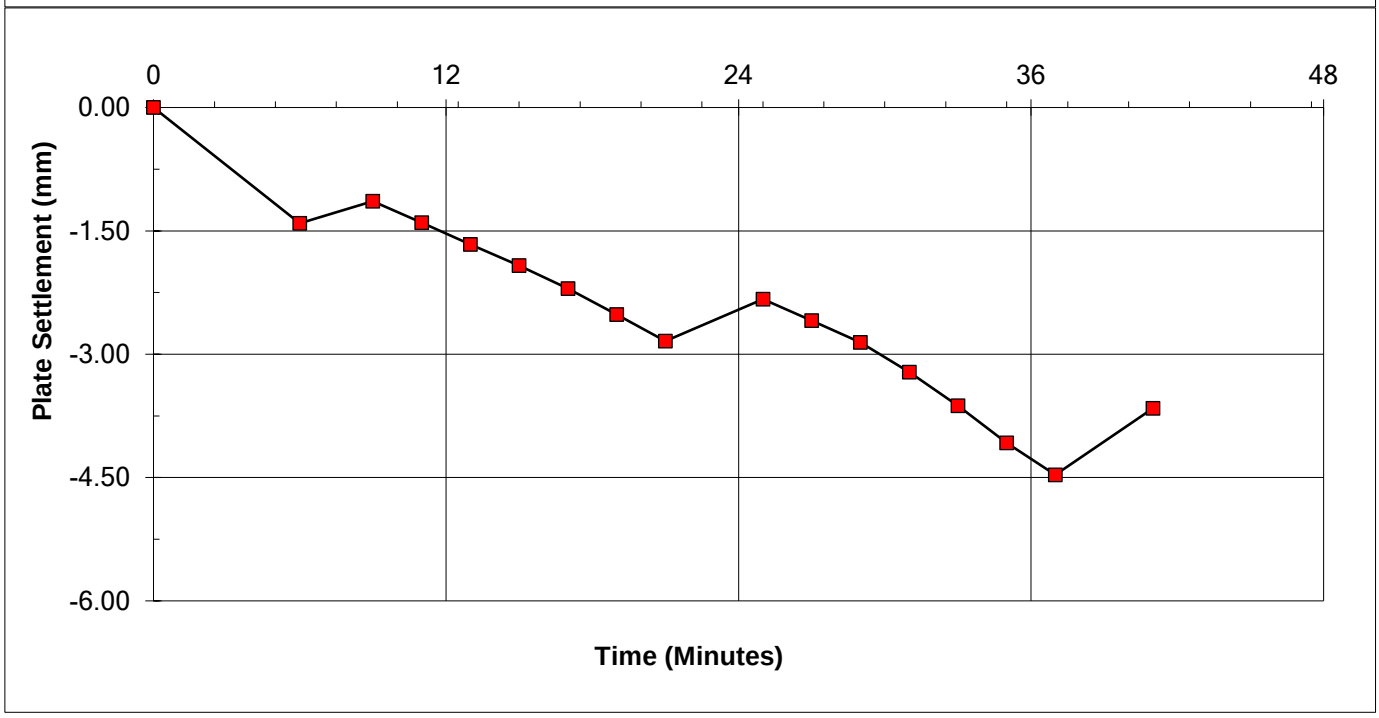
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PLATE INCREMENTAL LOAD TEST

BS 1377 : PART 9 : CL 4.1 and IAN 73/06 Rev 1 (2009)





REMARKS
Recommended CBR range for Surface Stiffness Modulus calculation is 2-12%.

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 01-Sep-22

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,

DUKINFIELD, CHESHIRE SK16 4QX

TEL 0161 475 0870

TEST CERTIFICATE

INSITU DENSITY, SAND REPLACEMENT METHOD

BS 1377 : Part 9 : Clause 2.2

MOISTURE CONTENT METHOD BS 1377 : Part 2 CLAUSE 3.2 : 1990 (OVEN DRY)

CLIENT	VHE Construction Plc
SITE	808 - Former Tarmac Manufacturing Plant, Stopes Road, Bolton, Greater Manchester BL3 1NP
JOB NUMBER	MRN 4454/45

TEST METHOD	Large Pouring Cylinder	DATE RECEIVED	31/08/2022
DATE OF TEST	31/08/2022	SAMPLED BY	Murray Rix
DATE TESTED	01/09/2022	MATERIAL SOURCE	Site Won

Laboratory Sample Number	Test Location	Material	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Moisture Content (%)	Compaction (%)	Air Voids (%)
115164	SRD C16 L1	Black Ash/Sand	1.80	1.55	16	98.7	4.1
115165	SRD C19 L1	Black Ash/Sand	1.77	1.59	11	101.3	9.6
		Maximum Dry Density (Mg/m^3)		1.57		(Advised by client)	
		Particle Density (Mg/m^3)		2.18		(Advised by client)	

COMMENT / ANOMALIES

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 01-Sep-22

MURRAY RIX
CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client VHE Construction Plc

Address Whaley Road
Barugh
Barnsley
South Yorkshire
S75 1HT

Contract 808 -
Former Tarmac Manufacturing Plant, Stopes Road
Bolton, Greater Manchester BL3 1NP

Job Number MRN 4454/46
Date of Issue 02 September 2022

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.