



Stage 1: Tier 2 Site Investigation GQRA

Project Reference: P23.207.GQRA.03
Former Honda Garage, Chippenham

Prepared For

Padlock Chippenham South Limited



Report Approval

Report Author(s)	Signature	Date
Ryan Gunn BSc Senior Geo-Environmental Engineer		03/10/2023
Report Approved	Signature	Date
Graham Carter BSc FGS MEnvSc Engineering Geologist, Director		03/10/2023
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Context

This report is written in the context of an agreed scope of work between Impact Geotechnical Ltd and the Client and should not be used in a different context. In light of additional information becoming available, improved practices and changes in legislation amendment or re-interpretation of the report in whole or part may be necessary after its original submission.

Professional Interpretation

The recommendations made and opinions expressed in the report are based on the conditions revealed by the site works together with an assessment of the data from the insitu and laboratory testing or in respect of the desktop reports. No responsibility can be accepted for conditions that have not been revealed by the research, site works and testing.

The Client is advised that the conditions observed on site by Impact Geotechnical Ltd at the time of any site survey may be subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance and they may subsequently have become evident. It is not possible to assess areas which are inaccessible or where access is not granted and IGL accept no liability for risks subsequently identified therein.

The Conceptual Site Model, Risk Assessment and sampling regime has been formulated in accordance with current UK guidance at time of production based upon the relevant information gained from Stage1, Stage 2 and Stage 3 Risk Assessments. While the model and assessment offer opinions and interpretations of these guidelines, the comments made are for guidance only and no liability can be accepted for their accuracy. It is possible that aspects of Geo-environmental reports may need to be altered following consultation with the statutory regulatory bodies to suit planning requirements.

Intrusive Field Operations

The data collected through direct operations in the production of this report has been so obtained, unless directly otherwise stated, in accordance with current UK guidance, law or accepted industry practice, including but not limited to: BS.5930: 1990 Code of Practice for Site Investigations (Amendment 3: 2015+A1:2020), & BS.10175: 2011 + A2: 2017 Investigations into Potentially Contaminated Sites. Exact exploratory locations will depend upon access conditions, site use and plant capability, IGL do not accept liability for issues arising from material identified between or outside of the area of exploratory locations.

Laboratory Testing

Unless stated otherwise within the text, all geotechnical and material laboratory tests have been performed in accordance with the relevant British Standard Documents. Laboratory testing for contaminated land assessment is completed under the UKAS / MCERTS accreditation schemes, unless identified as otherwise in the report.

Human Health Risk Assessment Criteria

The Environment Agency has undertaken revision of the Soil Guideline Values (SGVs) which are partially complete. Where standards are available using the "new" approach, these have been utilised for correlative purposes. Where standards have not yet been revised, guidance following the "old" approach has been utilised. Please note that upon release of the remaining guidelines, the standards contained within this report may be subject to change. In addition, the second edition of the LQM CIEH guidance has now been released and will be utilised in favour of previously published guideline values.

Third Parties

The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from previous Site investigations and chemical testing laboratories. IGL has assumed that such information is correct. IGL cannot and does not guarantee the authenticity or reliability of the information it has relied upon and can accept no responsibility for inaccuracies with the data supplied by other parties.

The accuracy of the historical map extracts supplied cannot be guaranteed and it should be noted that different conditions may have existed between mapping sheet editions. Therefore, there can be no certainty that all areas of contamination have been identified during the Stage 1: Tier 1 Preliminary Risk Assessment.

Definitions

Reference to the word "contamination" in this report does not relate to the statutory definition of contaminated land under 1990 Environmental Protection Act unless otherwise stated. The definition used in this report is: "Land that contains substances that, when present in sufficient quantities or concentrations, are likely to cause harm, directly or indirectly, to man, to the environment, or on occasion to other targets" (NATO CCMS, 1985).

1. INTRODUCTION

1.1 Brief

Impact Geotechnical Ltd (IGL) were instructed by Albert Cole Consultants on behalf of Padlock Chippenham South Limited (the Client) (Q23.279), to carry out a ground investigation and compile a report of the findings to inform on a Stage 1: Tier 2 Site Investigation and Generic Quantitative Risk Assessment (GQRA) at the former Honda Garage, Bath Road, Chippenham, SN14 0UX (hereafter referred to as the “site”). In summary, the site comprises a recently closed car dealership and associated garage, on the outskirts of Chippenham.

The brief was to undertake a ground investigation to identify any ground condition issues that may affect redevelopment of the site in terms of geo-environmental and geotechnical aspects, as well as to inform on the detailed design of temporary and permanent works associated with the planned construction. In summary, the investigation included advancing exploratory holes, along with associated sampling, in-situ and laboratory testing.

A previously issued Stage 1: Tier 1 Preliminary Risk Assessment (PRA), completed by Soiltechnics Ltd (Ref: STV5973-R01 Rev A; Dated: April 2023), has been undertaken on site. This report has been provided to IGL by the Client and is summarised in later report sections. IGL takes no responsibility to the accuracy of third party documents. The reader is referred to the relevant reports for further information regarding their contents.

1.2 Proposals

Proposals include the demolition of the existing car dealership/garage and construction of a new self-storage premises situated within a portal frame structure. Proposed drawings are included within Appendix A.

2. SITE LAYOUT

The description below relates to site conditions at the time of the investigation only.

2.1 Location and Topography

The site is centred on Easting 390032, Northing 172199, within the western extents of the town of Chippenham, Wiltshire. The land gradually slopes down towards the south, before a slope where it steeply declines towards Bath Road beyond the southern boundary. According to Ordnance Survey, the site is situated at approximately 60m AOD (Above Ordnance Datum).

2.2 Site Description

The site comprises a former car dealership and associated garage, a forecourt, and parking areas (separate ones for both customers and staff). The plot is roughly rectangular in shape, and access by vehicles can only be afforded via Hereford Close at the north-eastern corner of the site.

Both the car dealership and garage are situated within a steel-framed commercial unit, with the car dealership comprising a single-storey part at the southern elevation (facing Bath Road), and the bulk of the unit being a two-storey structure housing the garage. Access to the dealership is via a main door at the eastern elevation of the commercial unit building; access to the garage is via 6no. roller shutter doors at the northern elevation.

At the time of the investigation, the internal areas of both the car dealership and garage had been recently cleared and the building left mostly empty. However, evidence of garage use was present: staining around suspected vehicle lifters, some hydrocarbon sheening on the ground, inspection pit at one side of the building, the occasional abandoned fuel can (empty). The garage has a mezzanine floor, which was believed to have been used to store office equipment for the car dealership. The surface of both the internal areas to the car dealership and garage was hardstanding.

The northern and far western extents of the site include the former staff and garage parking, as well as fuel storage. This area is separated from the visitor car park by chain link fencing and gate. This car park was laid to tarmac hardstanding. The fuel storage area was contained within a single-storey steel shed; at the time of the investigation a waste oil company were emptying the contents of this shed.

The visitor car park was laid to tarmac hardstanding and comprised approximately one third of the total site area. It is suspected to have been used to display the car dealership vehicles as well. Notably is an approximately 3m² rectangle of newer tarmac that is suspected to be the location of a former support column for a garage shelter.

An oil/fuel tank (Above-ground Storage Tank – AST) was located at the north-eastern elevation of the commercial building, just within the staff parking/garage area. This was approximately 1m³ in volume, and supported/raised on concrete blocks; during the investigation it was mostly empty with some staining around the inlets/outlets. There was no other evidence of either underground or above-ground storage tanks during the investigation.

Mature trees are present immediately beyond the eastern and western boundaries of the site.

2.3 Surroundings

Residential dwellings are located immediately beyond the northern boundary of the site. Chain link fencing and an approximately 1m tall block-built retaining wall separates the site from these dwellings. The rest of the northern and north-eastern surrounds comprise a residential setting.

The southern surroundings include a commercial and retail setting. A supermarket is located west of the site.

3. PHYSICAL SETTING

The GeoIndex (BGS, 2023) indicates that the site is likely directly underlain by Bedrock Geology of the Cornbrash Formation. Whilst no Superficial Deposits have been recorded, it is expected that some Made Ground or re-worked natural soils are present, based on the historical development of the site. The table below identified the expected composition of the published stratum and the associated aquifer classification.

Bedrock / Solid Geology	
Unit Name	Cornbrash Formation
Geology Description	Medium to fine grained limestone; bluish grey when fresh, but weathering to yellowish brown
Aquifer Class	Secondary A Aquifer
Aquifer Description	Aquifers that comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers

Table 3.1: Geology and Hydrogeology

4. PREVIOUS REPORT(S)

IGL have been provided a report relating to the site, which has been summarised below. IGL takes no responsibility to the accuracy of third party documents. The reader is referred to the relevant reports for further information regarding their contents.

4.1 Soiltechnics Ltd – April 2023

A previously issued Stage 1: Tier 1 PRA, completed by Soiltechnics Ltd (Ref: STV5973-R01 Rev A; Dated: April 2023), has been undertaken on site. The purpose of this document was to review and summarise available desk study information in order to provide a contaminated land Preliminary Risk Assessment.

Following a site walkover, review of historical maps, and information on public record, the preliminary Conceptual Site Model (CSM) identified the following viable sources of contamination:

4.1.1. On-Site

- Car dealership and garage, including AST. Potential for petroleum hydrocarbons (TPH) and Volatile Organic Compounds (VOCs).
- Made Ground of unknown origin. Contaminants of Concern (CoC) are likely to include heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Asbestos Containing Soils (ACSS).

4.1.2. Off-Site

- Sainsbury's petrol filling station approximately 50m west. Potential for petroleum hydrocarbons (TPH) and Volatile Organic Compounds (VOCs).

In summary, the Preliminary Risk Assessment identified potential risks from contamination. As a result, a ground investigation was recommended in order to assess the identified potential pollutant linkages, with the objective to refine the associated risks.

It is recommended that the aforementioned report is reviewed for additional information.

5. FIELDWORKS

An investigation was required to identify the ground conditions on site to inform on the proposed development in terms of geo-environmental and geotechnical aspects.

5.1 Site Management and Preparation

The following intrusive works were undertaken over 14th August to 18th August 2023, supervised by an Engineer from IGL. The works were carried out in general accordance with statutory guidance including BS5930:2015+A1:2020 *Code of Practice for Site Investigations*, BS 10175:2011+A2:2017 *Investigation of Potentially Contaminated Sites: Code of Practice* and BRE Digest 365 *Soakaway Design*.

Prior to any excavations taking place, a Cable Avoidance Tool (CAT) was used to check for the position of any underlying electrical services; moreover, accessible manhole covers on site were carefully lifted to verify depth and direction of drainage. In addition, starter pits were excavated to <1.00 metres below ground level (mbgl), where possible, to clear test locations prior to the boreholes.

5.2 Rationale and Methodology

The purpose of the scope was to advance intrusive locations to assist with the geo-environmental and geotechnical design recommendations in relation to the proposed development. This was to be achieved with the completion of a combination of rotary boreholes, windowless sample boreholes and trial pits, to assess the nature of the underlying soils and groundwater conditions, along with specified in-situ testing. Samples were collected for subsequent geotechnical and geo-environmental laboratory analysis.

Hole locations were decided in order to meet the scope of works, mindful of existing site conditions and limitations. The table below summarises the exploratory hole location rationale. A plan indicating intrusive locations can be viewed in Appendix B.

Hole ID	Type	Location	Rationale
BH1-3	Rotary borehole	External areas. BH1 at western extent. BH2 just north of centre of site. BH3 eastern extents.	Located in external areas where there is sufficient space for drilling rig. Spread across the site in order to provide sufficient site coverage. To be used to inform on geotechnical parameters for proposed building. Allow for installation of monitoring standpipes.
WS1-4	Windowless Sample Borehole	Internal areas and/or external areas where access for rotary rig is unachievable. WS1 target inspection pit. WS2 target suspected (former) vehicle lifter. WS3/WS4 site spread.	In order to provide site coverage for geotechnical and geo-environmental parameters.
TP1	Machine excavated trial pit	Located within forecourt/car park within area of newer tarmac – suspected to be the location of a former support column for a garage shelter.	Determine presence of buried concrete footing.
TP2-3	Hand excavated trial pit	Adjacent to AST.	Assist with refining potential pollutant linkages and associated risks pertaining to tank.
TP4		Adjacent to fuel storage area.	To determine if any leaks/spills have occurred at the fuel storage. Feature not included with Preliminary

			Risk Assessment, but can be treated as a similar source as the AST.
SA1-2	Machine excavated trial pit	External areas.	To provide indication as the underlying drainage conditions to inform proposals.
DCP1-10	Dynamic Cone Penetrometer	External areas, targeting proposed areas of road/parking.	Provide CBR value to inform on pavement/road design.

Table 5.1: Exploratory Hole Location Rationale

5.2.1. Rotary Borehole

Three boreholes (BH1-3) were advanced through the base of their respective buried service inspection pits to depths ranging 10-15mbgl, using a multi-purpose Comacchio 205 rig. BH2 and BH3 were advanced entirely using ~116mm diameter rotary core (T6-116) with water flush. BH1 was initially advanced to a depth of 2.00mbgl using percussive dynamic sampling to produce continuous disturbed samples. Thereafter, this borehole utilised T6-116 with water flush. Penetration rates and volume of flush were continuously monitored as the boreholes were drilled. Standard Penetration Testing (SPT) was carried out at 1.00-1.50m spacings, until rock was met. The objective was to inform on deep foundation design. All three boreholes were installed with dual-purpose groundwater and ground gas/soil vapour monitoring wells, comprising 50mm diameter standpipes; the reader is referred to Appendix C for install pipe details.

5.2.2. Windowless Sample Boreholes

Four windowless sample boreholes (WS1, WS2, WS3 and WS4), where possible, were advanced through the base of their respective starter pits. However, due to presence of the underlying limestone, all four boreholes were terminated early on refusal at depths ranging 0.60m to 1.50mbgl. All four boreholes were backfilled with arisings, in reverse order, with the surface made level.

5.2.3. Trial Pits

Four trial pits (TP1-TP4) were excavated by means of hand digging equipment or machine excavator (EZ80 Excavator) to depths ranging 0.45m to 0.65mbgl. The purpose of these exploratory holes were to target specific areas of concern. The location of TP1 was undertaken with an area of newer tarmac to determine the presence of a buried foundation. TP2, TP3 and TP4 were undertaken in close proximity to fuel infrastructure or storage associated with the previous use of the site as a garage. The trial pits were backfilled with arisings once the holes were logged and representative samples taken.

5.2.4. Soakage Testing

Two soakage tests (SA1 and SA1) were undertaken with the aim to inform on drainage design. Testing was undertaken in general accordance with BRE Digest 365. Testing involved squaring of the excavation sides and subsequent rapid filling of the pit with potable water. The subsequent fall in water was monitored over a nominal period, with the aim to reach 75% and 25% effective depth/water column. Following testing (within the permitted timeframe), any remaining water was pumped out, and the pits backfilled with arisings in reverse order.

5.2.5. Dynamic Cone Penetrometer Testing

Ten Dynamic Cone Penetrometer tests (DCP 1-10) were completed to depths <1.00mbgl, by means of a TRL DCP, for subsequent conversion into an equivalent California Bearing Ratio (CBR).

5.2.6. Soil Sampling

All intrusive locations were logged, and visual/olfactory evidence of contamination noted in accordance with best practice. Soil sampling of the near surface materials was undertaken to assess generic contamination risks to human health. Samples were also removed at varying depths for geotechnical testing. Environmental samples were handled using a fresh pair of nitrile gloves. Selected samples were placed in sealable bags, sealed glass jars or plastic tubs (dependent on the exact laboratory requirement and analysis to be undertaken) and stored in a temperature-controlled environment before transit.

5.2.7. Obstructions and Refusals

All four windowless sample boreholes refused on the underlying limestone of the Cornbrash Formation at depths ranging 0.60m to 1.50mbgl. It should be noted that WS3 was not advanced beyond the hand pit (0.60m) in order to minimise damage to tooling, given the proximity of BH3 and the need for this rotary borehole to utilise rotary coring from 0.65mbgl.

TP2 was terminated at 0.45mbgl due to presence of yellow buried service warning tape at 0.45mbgl.

SA2 was terminated at 1.05mbgl due to presence of limestone bedrock and limitation of 8t machine excavator; a breaker was initially used to achieve greater depth although eventually deemed futile due to thickness and strength of rock.

6. GROUND CONDITIONS

6.1 Summary of Ground Conditions

The following soil conditions were encountered during the investigation works. They are generally considered to be consistent with the published geology. A summary of the encountered ground strata is included within the table below. Please refer to the engineering logs within Appendix C for more detailed descriptions.

Stratum	Depth to Top (mbgl)	Depth to Base (mbgl)
Topsoil	Ground level	0.10
Hardstanding (i.e. concrete or tarmac)	Ground level	0.08 – 0.20
Made Ground	Ground level to 0.20 (BH: 0.08 – 0.10. WLS/TP/SA: GL to 0.20)	0.30 – 1.40 (BH: 0.35 – 0.70. WLS/TP/SA: 0.30 – 1.45)
Cornbrash Formation (Weathered)	0.30 – 1.45 (BH: 0.35 – 0.70. WLS/TP/SA: 0.30 – 1.45)	>0.50 – >2.90 (BH: 2.00 – 2.80. WLS/TP/SA: >0.50 – >2.90)
Cornbrash Formation	2.10	2.40
Forest Marble Formation (Weathered)	2.00 – 2.80	4.50 – 6.30
Forest Marble Formation	4.50 – 6.30	>10.00 – 14.00
Mudstone/Limestone	13.50 – 14.00	>15.00

Table 6.1: Summary of Ground Conditions

6.2 Soil Conditions

Photographs of the recovered soils are included within Appendix D. Information regarding each stratum is included below.

6.2.1 Surface Covering

The surface of all the exploratory holes, with the exception of WS4, comprised of hardstanding as either tarmac or concrete. Hardstanding was proved to be no thicker than 200mm. In the case of WS4 (completed along the southern slope/embankment), this was surfaced with topsoil.

6.2.2 Made Ground

Made Ground was identified within all exploratory holes from ground level to a maximum depth of 1.45mbgl (in the case of WS4). However, the depth of the encountered Made Ground was usually recorded no deeper than 0.70mbgl.

The most common Made Ground soils encountered were a Type 1 sub-base, recorded immediately below the hardstanding layer. Thereafter, Made Ground if encountered was generally recorded as a pale brown clayey sandy Gravel of limestone, with occasional coarse gravel-sized pockets of dark brown clay; considered to be possibly re-worked natural soils.

WS4 is unique with respect to the remaining exploratory holes, as Made Ground was notably deeper. Initially the Made Ground within WS4 was encountered as a brown mottled yellowish brown sandy very gravelly Clay, with the gravel portion recorded as limestone with rare brick. From a depth of 0.50mbgl, this material was considered to be the re-worked material previously mentioned, i.e. Light/pale brown and yellowish brown silty sandy Gravel of

limestone. Thereafter, from 0.90m to 1.20mbgl, Made Ground was described as a dark brown speckled black silty sandy Gravel of limestone and clinker, with occasional gravel of slag. A material described as a greyish pink silty sandy Gravel of limestone and granite (recorded as Type 1 material) was recorded from 1.20m to 1.45mbgl; a geotextile membrane was recorded at the base of this Type 1 soil.

The thickness of Made Ground within WS4 may be attributable to some cut/fill during the formation of the embankment along the southern boundary, or possibly in conjunction with the construction of Bath Road. Notable is that the thickness of Made Ground within WS4 is roughly the same as the difference in height between the top of the embankment and Bath Road level.

It is recommended that the reader reviews the logs within Appendix C for more information pertaining to the encountered Made Ground soils.

6.2.3. Weathered Cornbrash Formation

The initial natural soils encountered, considered to be the underlying Bedrock Geology of the Cornbrash Formation were identified within most of the exploratory holes (except TP1 and TP2) from 0.30m to 2.90m. This material was initially recorded in a distinctly weathered state, described as either a Gravel of limestone or very gravelly Clay, with cobbles of limestone. In the case of SA1, the material was recorded as a Gravel and Cobbles of limestone, although given the nature of excavation the larger clast size is expected.

With depth, the character of this material transitioned suggesting only partial weathering. This partial weathered Cornbrash Formation was only encountered within the rotary boreholes, with limited recovery within the windowless sample boreholes. This rock was generally described as medium strong and strong yellow and light yellow Limestone, closely spaced with thin beds of brownish yellow sandy gravelly clay.

6.2.4. Cornbrash Formation

A recovered core sample from BH2 at 2.10m to 2.40mbgl, was considered to be un-weathered Cornbrash Formation due to the characteristic nature of the limestone. This rock was described as a medium strong pale grey and grey argillaceous Limestone, closely spaced with thin beds of grey silty clay.

6.2.5. Weathered Forest Marble Formation

Soil/rock samples exclusively from the rotary boreholes from depths ranging 2.00m to 6.30mbgl, were considered to be representative of the Forest Marble Formation within a range of weathered states. The material was initially recorded distinctly weathered from depths ranging 2.40m to 4.20mbgl, broadly described as a stiff grey and dark grey, sometimes very sandy, silty Clay. Below this the material displayed a more competent strength, and as such was described as only partially weathered, recorded as an extremely weak thinly laminated and very thinly bedded grey Mudstone, sometimes borderline very stiff Clay.

6.2.6. Forest Marble Formation

Un-weathered Forest Marble Formation was encountered from an initial depth of 4.50mbgl to 14.00mbgl, broadly described as an extremely weak and very weak fissured grey Mudstone, with the fissures typically sub-horizontal and sub-vertical, very closely and closely spaced, and undulating rough.

6.2.7. Limestone/Mudstone

Interbedded Limestone and Mudstone was recorded from 13.50m to the maximum intrusive depth of 15.00mbgl only within BH1 and BH3. This material was described as a very weak grey Mudstone interbedded with closely and

medium spaced thin beds of strong light grey Limestone. It is considered most likely that this is further Forest Marble Formation material.

6.3 Groundwater Conditions

Groundwater was encountered at depths ranging from 2.38m to 4.51mbgl (average circa 3.00mbgl) during subsequent groundwater monitoring.

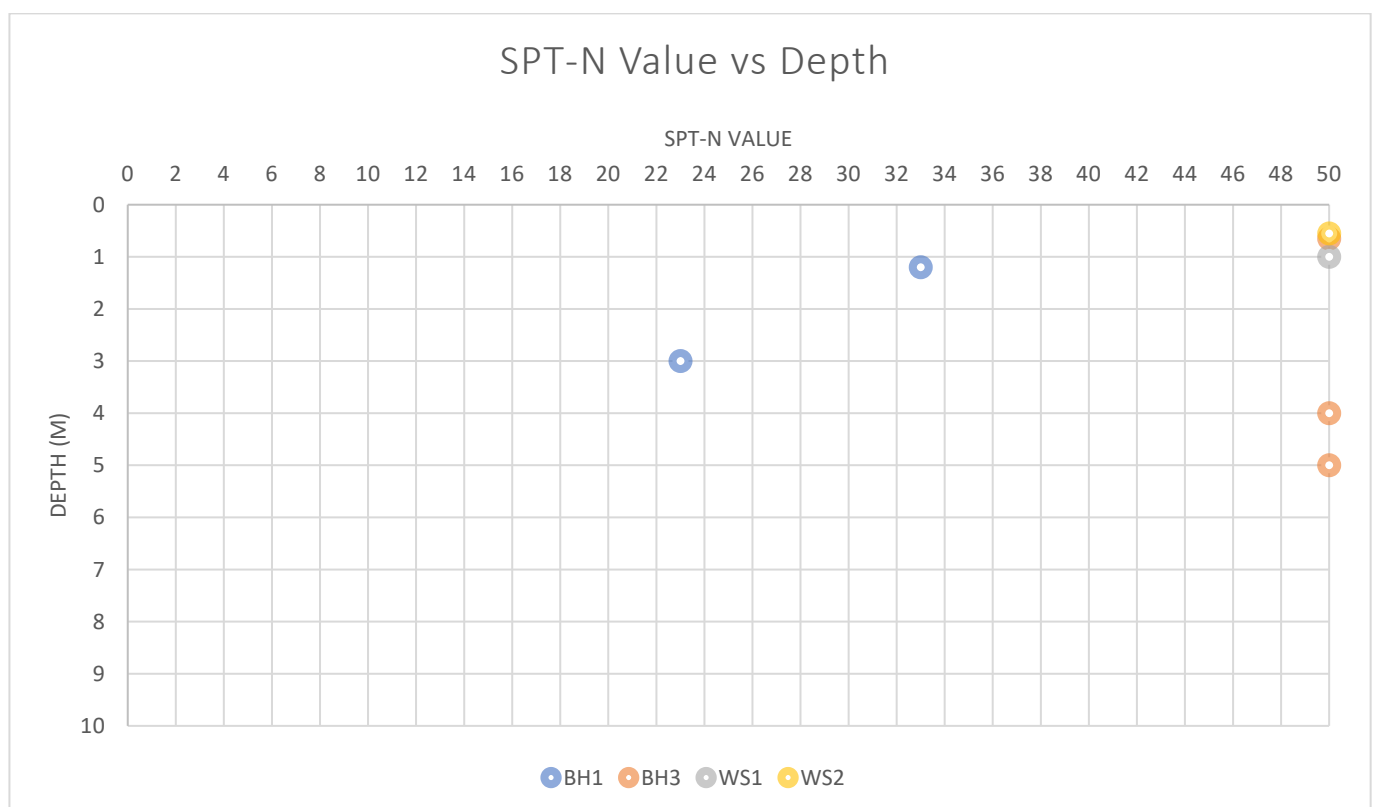
6.4 Visual and Olfactory Observations

There was no significant visual/olfactory evidence of contamination noted during the ground investigation, other than the anthropogenic materials (i.e. brick, concrete etc.) encountered within the Made Ground soils. Furthermore, there was no evidence of any hydrocarbon-specific contamination within the soils (i.e. hydrocarbon stains, sheens and odours).

6.5 In-Situ Testing

6.5.1. Standard Penetration Testing (SPT)

SPT is an in-situ dynamic penetration test to provide information on the geotechnical engineering properties of soil. This form of testing is completed using a 63.5kg drop hammer weight, over a 750mm drop, measuring the blow counts for six, 75mm increments. The first two values are recorded as seating blows, with the remaining four values, added together to provide an 'N-value'. 'N-value' of $N \geq 50$ is considered a refusal. SPT was only completed within soils or extremely weak rock, at the end of rotary runs, and/or at the base of the starter pits; SPT was not undertaken within competent rock. The results are presented within the graph below. It is recommended to review the engineering logs within Appendix C for further information.



Graph 6.1: Standard Penetration Testing

The initial SPT, at the bottom of the starter pits, at depths ranging 0.65m and 1.20mbgl, ranged from SPT-N=30 and N=50 (refusal). Thereafter, with the exception to BH1 at 3.00mbgl, the reported N-value was N=>50, associated with the presence of the competent bedrock. SPTs were ceased during drilling of the underlying Limestone and Mudstone of the Cornbrash Formation and Forest Marble Formation, respectively.

6.5.2. Soil Infiltration Testing

Soil infiltration testing was completed within SA1 and SA2 in general accordance with BRE Digest 365: *Soakaway Design*. Testing was undertaken within the underlying Cornbrash Formation. Testing comprised excavation of the trial pits to a target depth, squaring of the pit sides and subsequent rapid filling with potable water. The fall in water level was monitored over a nominal period to allow determination of the coefficient of permeability (k). The soil infiltration rate is calculated by the rate of outflow between 75% and 25% effective fill depth. The table below summarises the results, with the full test sheet included within Appendix F.

Test ref	Test Depth (mbgl)	Initial Water Column (m)	Time at 75% Fill Depth (mins)	Time at 25% fill Depth (mins)	K (m/s)
SA1 – Test 1	2.90	1.10	730	N/A*	Not valid
SA1 – Test 2	2.80	1.36	150	N/A	Not valid
SA2 – Test 1	1.00	0.60	300	N/A	Not valid
SA2 – Test 2	0.85	0.57	200	N/A	Not valid

Table 6.2: Soil Infiltration Testing Results

(*) Test ran for 1320 minutes (22 hours).

An entire test was not completed within the permitted timeframe of either SA1 or SA2. In order to be compliant with BRE 365 testing should be filled at least three times on the same or consecutive days. Results from in-situ testing indicate that drainage conditions of the underlying soils are poor (Karl Terzaghi, Ralph B. Peck and Gholamreza Mesri).

6.5.3. Dynamic Cone Penetrometer (DCP)

Ten DCP tests (DCP 1-10) were completed to depths <1.00mbgl, by means of a TRL DCP, for subsequent conversion into an equivalent CBR. The tests were undertaken in locations of proposed car park and road. The table below draws on the whole dataset and shows equivalent CBR range at selected depths below ground surface. DCP logs showing the full test results are included within Appendix G.

Depth (mbgl)	Approximate CBR Range (%)
0.30	10 – 180
0.50	10 – 50
0.60 – 0.70	5 – >600

Table 6.3: DCP testing and equivalent CBR

7. LABORATORY TESTING

Soil samples collected during the IGL investigation from various depths and locations were submitted to UKAS accredited laboratories. Laboratory test certificates are included as Appendix E.

7.1 Geotechnical Testing

7.1.1 Atterberg Limits and Natural Moisture Content

Nine soil samples from depths ranging 0.40m to 6.30mbgl, were submitted for determination of their Natural Moisture Content (NMC) and Plasticity Index (PI). The results are tabulated below.

Location and Depth	Material	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425µm sieve	Modified Plasticity Index (%)
BH1 0.50m	Made Ground	12	40	14	26	31	8
BH1 2.20m	Weathered Forest Marble Formation	23	42	19	23	100	23
BH1 2.50-3.00m	Weathered Forest Marble Formation	22	41	18	23	100	23
BH2 0.40m	Weathered Cornbrash Formation	15	40	15	25	54	14
BH2 2.50-3.00m	Weathered Forest Marble Formation	18	35	17	18	100	18
BH2 6.00-6.30m	Weathered Forest Marble Formation	20	41	21	20	96	19
BH3 0.40m	Made Ground	18	54	17	37	56	21
BH3 3.00-3.45m	Weathered Forest Marble Formation	22	37	17	20	82	16
SA1 2.80m	Weathered Cornbrash Formation	26	44	21	23	85	20

Table 7.1: Atterberg Limits

Following analysis, testing returned NMC values ranging 12% to 26%. Plasticity Index values ranged from 18% to 37%, with Liquid Limits ranging 35% to 54%. These values correspond cohesive soils with predominantly Intermediate Plasticity, and High Plasticity from BH3 at 0.40mbgl (Made Ground).

Considering the percentage retained on the 425µm sieve (0-69%), the modified plasticity index values are calculated at ranging 8% to 23%. In accordance with NHBC guidance, these cohesive soils can be described as having Low and Medium volume change potential.

7.1.2. Particle Size Distribution

Six samples of the underlying materials, at a depths of 0.40m to 2.80mbgl, were submitted for Particle Size Distribution (PSD) testing by wet sieve, in order to determine the percentage and range of grain sizes. The table below provides a summary of the testing.

Sample Reference	Component of Sample (%)					Laboratory Description
	Cobble	Gravel	Sand	Silt	Clay	
BH1 0.50m	0	62.3	14.3	23.4		Brown mottled reddish brown sandy silty clayey GRAVEL
BH1 1.00m	35.3	28.7	11.5	24.5		Brown slightly sandy gravelly silty CLAY with numerous cobbles
BH3 at 0.40m	0	37.0	15.0	48.0		Brown slightly sandy gravelly silty CLAY
SA1 2.80m	0	12.8	5.0	82.2		Brownish grey mottled light grey and light brown slightly sandy slightly gravelly silty CLAY
WS1 0.50m	19.4	55.1	13.3	12.2		Light grey gravel and cobble sized LIMESTONE fragments with occasional deposits of brown sandy silty clay
WS3 0.50m	0	85.9	6.8	7.4		Light grey gravel LIMESTONE fragments with occasional deposits of brown fine sandy silty clay

Table 7.2: Particle Size Distribution

7.1.3. Point Load Testing

Ten rock fragments and/or core samples were scheduled for point load testing. The results of the point loading testing can be converted in Unconfined Compressive Strength (UCS) values by using a conservative factor (k) of 15. The results are summarised below.

Location	Depth (mbgl)	Laboratory Description	Moisture Content (%)	Minimum Point Load Index (Is 50 / MPa)	Equivalent UCS (MPa)	Approx. Rock Strength
BH1	6.90 – 7.20	Dark grey Siltstone	17	0.04	0.6	Extremely weak
BH1	12.00 – 12.40	Dark grey Siltstone	15	0.03	0.45	N/A
BH2	1.50 – 1.70	Light brown Limestone	6.3	0.10	1.5	Very weak
BH2	4.50 – 5.00	Dark grey Mudstone	11	0.03	0.45	N/A
BH2	7.00 – 7.50	Dark grey Mudstone	16	0.06	0.9	Extremely weak
BH3	1.00	Light brown Limestone	3.9	0.53	7.95	Weak
BH3	6.00 – 6.50	Dark grey Limestone	2.0	0.72	10.8	Weak
BH3	10.20 – 10.60	Dark grey Siltstone	8.9	0.04	0.6	Extremely weak
BH3	13.00 – 13.40	Dark grey Siltstone	9.6	0.10	1.5	Very weak
SA2	1.00	Light grey Limestone	5.2	0.79	11.85	Weak

Table 7.3: Point Load Testing

7.1.4. Unconsolidated Undrained Triaxial Test

One UT undisturbed sample from the cohesive soils of BH3 at 3.00-3.45mbgl was scheduled for an undrained triaxial compression test. The table below summarises the results.

Location and Depth	Material	Moisture Content (%)	Bulk Density (Mg/m ³)	Cell Pressure (kPa)	Undrained Shear Strength (cu) (kPa)	Mode of Failure
BH3 at 3.00-3.45m	Weathered Forest Marble Formation	18	2.17	60 120 180	185 213 232	Compound

Table 7.4: Triaxial Testing

Testing indicates that the cohesive soils of the weathered Forest Marble Formation are of very high strength.

7.1.5. Water Soluble Sulphate and pH

Twenty soil samples were submitted for determination of pH and Water Soluble Sulphate concentration over the depth range of 0.20m to 10.50mbgl. Water soluble sulphate concentrations were found to range from 21mg/l to 370mg/l, with pH levels ranging from 6.9 to 12.2.

7.2 Geo-Environmental Testing

In light of the Stage 1: Tier 1 PRA, completed by Soiltechnics Ltd (Ref: STV5973-R01 Rev A; Dated: April 2023), it was recommended to undertake an intrusive investigation and soil laboratory testing, with comparisons against published Generic Assessment Criteria (GAC), in order to assess the pollutant linkages highlighted in the preliminary CSM.

7.2.1. Rationale

Soil samples collected during the IGL investigation were submitted to a UKAS accredited laboratory for analysis against a generic contamination suite. The generic contamination suite included heavy metals, phenols, speciated polyaromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPHs), BTEX and MTBE compounds and an asbestos screen. These suite was chosen to reflect commonly found contaminants as well as the Contaminants of Concern (CoCs) identified within the preliminary CSM.

With reference to the aforementioned PRA, it was recommended to test against a VOC suite. However, given the absence of any visual/olfactory evidence of hydrocarbon contamination it was deemed beneficial to test for a generic contamination suite, in place of VOCs, for due diligence purposes.

Fifteen soil samples were chosen at various locations and depths (ranging 0.20m to 1.30mbgl), from Made Ground and natural soils, to target the identified sources (as highlighted within preliminary CSM), as well as to provide coverage of the development area. Soil analysis rationale is tabulated below.

Sample ID	Material	Location	Rationale
BH1 at 0.30m	Made Ground	Western extent of site	Submitted for generic contamination suite. Taken from Made Ground and therefore targeting probable worst-case conditions. Located at western part of the site and therefore targeting neighbouring petrol station identified within PRA.
BH1 at 0.60m			

Sample ID	Material	Location	Rationale
BH2 at 0.40m	Weathered Cornbrash Formation	Northern part of site	General site coverage.
SA1 at 0.60m	Made Ground	Eastern part of site	
TP2 at 0.30m		Adjacent to AST	Targeting source identified within PRA (i.e. AST)
TP3 at 0.20m			
TP3 at 0.40m	Weathered Cornbrash Formation		
WS1 at 0.50m	Made Ground	Internal areas of existing garage located within proximity to inspection pit	Targeting feature pertaining to source relating to garage. Taken from Made Ground and therefore probably worst-case conditions.
WS1 at 0.80m	Weathered Cornbrash Formation		Targeting feature pertaining to source relating to garage. Sampled from deeper natural soils (than those above), to provide vertical delineation of potentially impacted soils.
WS2 at 0.30m	Made Ground	Internal areas of existing garage located within proximity of suspected (former) vehicle lifter	Targeting feature pertaining to source relating to garage. Taken from Made Ground and therefore probably worst-case conditions.
WS2 at 0.50m	Weathered Cornbrash Formation		Targeting feature pertaining to source relating to garage. Sampled from deeper natural soils (than those above), to provide vertical delineation of potentially impacted soils.
WS4 at 0.30m	Made Ground	Southern edge of existing building on top of embankment/slope	General site coverage. As well as to provide an indication as to the composition of the slope. Taken from Made Ground and therefore probably worst-case conditions.
WS4 at 1.30m			
TP4 at 0.20m		Far western part of site adjacent to fuel storage shed	Targeting feature pertaining to source relating to garage. Taken from Made Ground and therefore probably worst-case conditions.
BH3 at 0.40m		Eastern part of site	General site coverage.

Table 7.5: Geo-Environmental Soil Analysis Rationale

7.2.2. Generic Assessment Criteria

In order to assess the soil analysis with regard to potential human health risks, IGL has compared the results against Generic Assessment Criteria (GAC). GAC are conservative contaminant concentration values used for comparison purposes to assess the risks associated with contaminant concentrations on site and are derived using non-site-specific information. For the purposes of these works, these include the following:

- Suitable 4 Use Levels (S4ULs) Generic Assessment Criteria (GAC) developed by the Chartered Institute of Environmental Health (CIEH) in partnership with Land Quality Management Ltd. (LQM).
- Category 4 Screening Levels (C4SL) for lead, produced by CL:AIRE (2014).
- The UK Soil Guideline Values (SGVs) for selected metals, BTEX and phenols, produced by the EA and Department of Environment, Food and Rural Affairs (2009).

Comparisons have been made against the 'Commercial' land use setting, in light of the proposals. A conservative Soil Organic Matter (SOM) value of 1% is used for organic contaminants (i.e. TPH and PAHs) as a worst-case scenario, unless otherwise stated.

7.2.3. Soil Results

Laboratory certificates are included as Appendix E.

Asbestos

Asbestos was not detected within any of the tested samples, following the asbestos screen.

Heavy Metals

There were no exceedances of the relevant screening criteria for any of the tested heavy metal determinands from all tested soil samples.

PAHs

There were no exceedances of the screening criteria from any of the tested samples for all PAH determinands. Furthermore, a significant proportion of PAH determinands were recorded below their respective laboratory LOD from the tested soil samples.

TPHs

There were no exceedances of the screening criteria from any of the tested samples for all TPH determinands. Furthermore, with the exception of one sample (TP3 at 0.20mbgl), all TPH determinands were recorded below their respective laboratory LOD from the tested soil samples.

BTEX and MTBE

There were no exceedances of the screening criteria from any of the tested samples for all BTEX determinands and MTBE. Furthermore, with the exception of one sample (WS2 at 0.20mbgl), all BTEX/MTBE determinands were recorded below their respective laboratory LOD from the tested soil samples.

7.2.4. Summary

There were no exceedances of the 'Commercial' screening criteria for any of the tested contaminants from all tested soil samples. Moreover, concentrations of determinands from all tested soil samples were reported at levels below the more stringent 'Residential with homegrown produce' screening criteria. Asbestos was not detected within any of the samples following the asbestos screen.

The results of laboratory analysis are consistent with the findings of the investigation, and encountered soils, i.e. lack of evidence for hydrocarbon-specific contamination within the soils (i.e. hydrocarbon stains, sheens and odours), as well as limited extent of Made Ground soils.

8. GROUND GAS AND SOIL VAPOUR ASSESSMENT

The Stage 1: Tier 1 PRA, completed by Soiltechnics Ltd (Ref: STV5973-R01 Rev A; Dated: April 2023), deemed there to be a viable risk from soil vapour in light of the site use as a garage. Moreover, there was not deemed to be a significant risk from ground gas, based on available desk study information, and mindful of the absence of ground gas generating soils within the site and surrounds. Further detail is provided within Table 3-A of the aforementioned report (Ref: STV5973-R0).

In general accordance with BS8576:2013 *Guidance on investigations for ground gas – permanent gases and volatile organic compounds*, and utilising a multiple-lines-of-evidence approach, the ground gas/soil vapour potential and associated risks can be defined. Information detailed in the table below has either been taken from a review of previous reports and/or interpreted from the intrusive investigation conducted.

Factor	Evidence for Ground Gas/Soil Vapour Potential on Site	Evidence against Ground Gas/Soil Vapour Potential on Site
Landfills	-	There are no records of current and/or historical landfills in or within a 200m radius of the site.
Made Ground organic content	Made Ground on site. WS4 relatively deep Made Ground (circa >1.40mbgl).	With the exception of WS4, Made Ground thickness across site relatively shallow (i.e. <1.00m). No evidence of any ground gas generating material (peat, decomposing organic matter).
Natural Soil organic content	Natural soils/rock are limestone and therefore 'background' CO ₂ may be elevated	No evidence of any ground gas generating material (peat, decomposing organic matter) within natural soils.
Site Investigation	-	No notable hydrocarbon-specific visual and/or olfactory evidence of contamination; subsequent laboratory analysis confirmed this observation. No putrescible material encountered.
Volatiles	-	Soil laboratory results returned comparatively low concentrations of hydrocarbon-specific contaminants. No notable hydrocarbon-specific visual and/or olfactory evidence of contamination

Table 8.1: Factors Influencing Ground Gas/Soil Vapour Potential

8.1 Ground Gas and Soil Vapour Potential

Based on the above, the risks from both ground gas and soil vapour to site can be classified as **Low**. Nevertheless, a basic ground gas monitoring regime has been undertaken, principally to in conjunction with groundwater monitoring. It should be noted that the ground gas monitoring regime has not been based on the conceptual model.

The results from the monitoring round are summarised below. More information can be found within the monitoring sheets included in Appendix H. The flow rate was recorded ranging from no flow to 2.90l/hr. Methane was recorded consistently below <0.20%. A maximum carbon dioxide concentration of 3.80% was recorded. VOCs were recorded below 2ppm.

The value of carbon dioxide returned is elevated compared to atmospheric air, although this is considered attributable to the calcium carbonate, present in the underlying limestone of the Cornbrash Formation, dissolving to the underlying groundwater. Moreover, in the case of BH1 and BH3, the groundwater was present within the

slotted section of the monitoring pipe (at least 5m, based on monitoring data), and therefore monitoring from these boreholes may not be representative, as the underlying groundwater causes a confined space for gas movement.

On the basis of the values recorded (<1% methane, <5% carbon dioxide), and in light of NHBC guidance, the site would fall into a 'low/ green' risk category, and 'no special precaution/ measures' are required. However, it should be emphasised that this monitoring regime is not based on a conceptual site model and the findings are not representative. The outcomes of the CSM highlighting a Low risk from both ground gas and soil vapour remain and should be used to inform on the ground gas risk. Consequently, the requirement for on-going ground gas/soil vapour monitoring is not deemed necessary at this stage.

9. GEOTECHNICAL DISCUSSION

Proposals include the demolition of the existing car dealership/garage and construction of a new self-storage premises situated within a portal frame structure. Relatively high loadings in the order of 1200kN for load bearing columns are expected. Proposed drawings are included within Appendix A.

The selection and design of foundations is beyond the scope of current instruction and is the responsibility of the designers of the proposed building. The following discussion, deriving from observations made during the investigation and testing, are provided to support the design process.

9.1 Soil Engineering Properties

The following section discusses the key engineering properties of each encountered stratum as identified within the investigation and laboratory testing. In summary, the stratigraphy revealed during the investigation comprised Made Ground, over Cornbrash Formation – initially weathered and becoming less weathered to un-weathered with depth – underlain by the Forest Marble Formation.

9.1.1. *Made Ground*

Made Ground was identified within all exploratory holes from ground level to a maximum depth of 1.45mbgl (in the case of WS4). However, the depth of the encountered Made Ground was usually recorded no deeper than 0.70mbgl.

The most common Made Ground soils encountered were a Type 1 sub-base, recorded immediately below the hardstanding layer. Thereafter, Made Ground if encountered was generally recorded as a pale brown clayey sandy Gravel of limestone, with occasional coarse gravel-sized pockets of dark brown clay; considered to be possibly re-worked natural soils.

WS4 is unique with respect to the remaining exploratory holes, as Made Ground was notably deeper. Initially the Made Ground within WS4 was encountered as a brown mottled yellowish brown sandy very gravelly Clay, with the gravel portion recorded as limestone with rare brick. From a depth of 0.50mbgl, this material was considered to be the re-worked material previously mentioned, i.e. Light/pale brown and yellowish brown silty sandy Gravel of limestone. Thereafter, from 0.90m to 1.20mbgl, Made Ground was described as a dark brown speckled black silty sandy Gravel of limestone and clinker, with occasional gravel of slag. A material described as a greyish pink silty sandy Gravel of limestone and granite (recorded as Type 1 material) was recorded from 1.20m to 1.45mbgl; a geotextile membrane was recorded at the base of this Type 1 soil.

The thickness of Made Ground within WS4 may be attributable to some cut/fill during the formation of the embankment along the southern boundary, or possibly in conjunction with construction of Bath Road. Notably is that the thickness of Made Ground within WS4 is roughly the same as the difference in height between the top of the embankment and Bath Road level.

Made Ground encountered across the site would not be considered suitable as a bearing stratum. Soils of this origin are frequently present in a weak and variable condition such that unacceptable settlement would be anticipated even under light loading intensities.

9.1.2. *Cornbrash Formation*

The initial natural soils/rock encountered, considered to be the underlying Bedrock Geology of the Cornbrash Formation was identified within most of the exploratory holes (except TP1 and TP2) from 0.30m to 2.90m. This material was initially recorded in a distinctly weathered state, described as either a Gravel of limestone or very gravelly Clay, with cobbles of limestone. In the case of SA1, the material was recorded as a Gravel and Cobbles of limestone, although given the nature of excavation the larger clast size is expected.

With depth, the character of this material transitioned suggesting only partial weathering. This partial weathered Cornbrash Formation was only encountered within the rotary boreholes, with limited recovery within the windowless sample boreholes. This rock was generally described as medium strong and strong yellow and light yellow Limestone, closely spaced with thin beds of brownish yellow sandy gravelly clay.

A recovered core sample from BH2 at 2.10m to 2.40mbgl, was considered to be un-weathered Cornbrash Formation due to the characteristic nature of the limestone. This rock was described as a medium strong pale grey and grey argillaceous Limestone, closely spaced with thin beds of grey silty clay.

Particle Size Distribution analysis confirms the logging Engineer's description of Clay and Gravel soils, with cobbles of limestone. Laboratory testing of the cohesive part of these soils suggest they are Intermediate Plasticity, and would be considered to have generally Low volume change potential. In-situ testing of this material indicates generally dense and very dense soils, transitioning to rock, with SPT-N values ranging $N=33$ to $N=>50$. Point load testing of recovered core and rock samples from the Cornbrash Formation indicate a broad UCS value ranging 1.5MPa to 11.85MPa, indicative of very weak and weak rock; it should be noted, however, that a conversion factor has been used so these rock strength descriptions should be treated with caution.

9.1.3. *Forest Marble Formation*

Soil/rock samples exclusively from the rotary boreholes from depths ranging 2.00m to 14.00mbgl, were considered to be representative of the Forest Marble Formation within a range of weathered states. The material was initially recorded distinctly weathered from depths ranging 2.40m to 4.20mbgl, broadly described as a stiff grey and dark grey, sometimes very sandy, silty Clay. Below this, the material displayed a more competent strength, and as such was described as only partially weathered, recorded as an extremely weak thinly laminated and very thinly bedded grey Mudstone, sometimes borderline very stiff Clay.

Un-weathered Forest Marble Formation was encountered from an initial depth of 4.50mbgl to 14.00mbgl, broadly described as an extremely weak and very weak fissured grey Mudstone, with the fissures typically sub-horizontal and sub-vertical, very closely and closely spaced, and undulating rough.

Laboratory testing of the cohesive part of these soils suggest they are Intermediate Plasticity, and would be considered to have Low and Medium volume change potential. Undrained triaxial testing of the cohesive part of the weathered Forest Marble Formation indicates very high strength soils with a $c_u \sim 180\text{kPa}$. Point load testing of recovered core and rock samples from the Forest Marble Formation indicate typically a UCS in the range of 0.45MPa to 1.50MPa, indicative of extremely weak and very weak rock, which coincides with the strength descriptions made by the Logging Engineer; albeit, a conversion factor has been used so the calculated rock descriptions should be treated with a degree of caution.

9.1.4. Groundwater

Groundwater was encountered at depths ranging from 2.38m to 4.51mbgl during subsequent groundwater monitoring. It should be noted that groundwater levels are subject to seasonal changes in rainfall and localised tree root uptake. The investigation was undertaken during the summer, and therefore, it is quite feasible that groundwater levels will rise during wetter months.

9.2 Shallow Foundations

Proposals for the site include the construction of a new self-storage premises; it is anticipated that unfactored column loads will be up to 1200kN. Whilst the new loads are expected to be considerable, the shallow depth of the bedrock strata below the site would suggest that spread type foundations would be suitable for the proposed building.

It cannot be recommended to place major structural foundations within Made Ground Soils. Materials of this origin are frequently present in a weak and variable condition due to their emplaced nature and would be expected to give rise to unacceptable settlement even at light loading intensities.

The depth to the weathered rock across the proposed footprint is noted to vary slightly, with a greater thickness of overburden shown in BH1 as the upper Cornbrash material is weathered to a gravel, whereas this stratum is recorded as limestone elsewhere. Nevertheless the soil materials are considered to comprise dense gravel and stiff clay soils. Within stiff clay of the weathered Forest Marble Formation, a safe bearing pressure of 150kN/m² would be considered to be appropriate.

It would be possible to site foundations into the overlying Cornbrash, however the bearing pressure should be treated conservatively to account for the clay soils below. Assuming that a further areas of weathered limestone will be present as dense gravel, as in BH1, it would be considered that a safe bearing pressure of 250kN/m² may be used in this stratum. However, care must be taken not to adversely load the underlying clay soils, and an assessment of the loading influence with depth should be undertaken to ensure loading to the upper surface of the clay is kept ~150kN/m², allowing for 'spread' of the load through the soil column.

It is recommended that the zones of tree root influence are determined by the designing engineer on the basis of NHBC chapter 4.2 to determine final design thicknesses for this granular layer. It should be noted that a minimum foundation depth of 0.90mbgl would be considered suitable based on the presence of medium volume change clay soils, outside of the zones of tree root influence. Further advice should be sought from the NHBC relating to depths for foundations where limited new planting is proposed.

Care should be taken around the locations of existing foundations and buried services; all previous structures should be entirely removed prior to the construction of spread foundations of any sort, with any associated Made Ground replaced with fully compacted granular fill.

Given the variability in the upper limestone strata, it would be recommended that the formation level for any spread foundations is inspected by the designing engineer to ensure that the material is suitable based on applied design assumptions.

9.3 Deep Foundations

Given the high proposed loads, it is considered possible that the building may require piled foundations, should the required loadings not be practical in terms of necessary concrete pad / pier sizes. The un-weathered Forest Marble Formation material at depth would be expected to provide a competent bearing stratum for new end bearing piles.

It would be recommended that the investigation data is forwarded to a specialist piling contractor to determine the most suitable design loading and installation for piles, once the piling layout has been formulated.

Piled foundations should account for the potential for soil volume change, with the recommendations of the NHBC followed in relation to the inclusion of void former / compressible material around ground beams and piles where required.

9.4 Floor Slabs

The floor slab design will depend on the final foundation designs and is dependent on the underlying materials, including bearing capacity and the presence of any cohesive or Made Ground soils. Owing to the presence of Made Ground and (worst-case) Medium shrinkable clay, the most conservative approach would be to adopt a suspended ground floor for the new structure. However, given the commercial nature of the proposed building it is very unlikely that this will be practical and an engineered ground bearing slab may be considered.

Ground bearing slabs will require the formation of a fully compacted granular subbase, the formation of which should include the excavation of Made Ground and any soft / loose natural soils as necessary. Floor slabs should be suitably reinforced to cater for seasonal volume movements; the advice of the NHBC guidelines should be adhered to in the design of such a floor.

Any ground bearing slabs should be designed by a structural engineer taking into account the potential for seasonal ground movements and frost susceptibility of the cohesive soils and limestone encountered.

9.5 Excavations and Groundwater

It is possible that excavations to depths of 1.20m will require support and shoring. Excavations into which personnel are to enter will require individual risk assessment and appropriate shoring and support provided in order to satisfy statutory safety regulations.

Groundwater was encountered at depths ranging from 2.38m to 4.51mbgl during monitoring of the standpipes installed within the rotary boreholes (BH1, BH2 and BH3). It should be noted that groundwater levels are dependent upon seasonal variations and levels may change after periods of heavy rainfall or prolonged drought. The investigation was undertaken during the summer, and therefore, it is quite feasible that groundwater levels will rise during wetter months.

Where groundwater or surface water is encountered within any excavations during the construction phase it should be dealt with appropriately and removed using good engineering practices.

9.6 Retaining Structures

The design of any temporary retaining structures to support excavation faces should be made assuming the following moderately conservative parameters.

Material	Effective Angle of Friction (ϕ')	Effective Cohesion (kPa)	Bulk Density (kN/m ³)
Made Ground	23-24	0	16-17
Weathered Cornbrash - clay	26-27	0	19-20
Unweathered Cornbrash – gravel / limestone	33-35	0	19-20

Table 9.1: Retaining Wall Parameters

9.7 Drainage

Results from in-situ testing indicate that drainage conditions of the underlying soils are poor. As a consequence, traditional soakaways are unlikely to be suitable for the site. It is recommended that a positive drainage system is investigated. Appropriate capacity checks and permissions will be required. Alternatively, some other form of drainage design may be suitable, such as permeable paving.

9.8 Paved Areas

DCP testing on site returned equivalent CBR results, which should be used for preliminary pavement design. In-situ testing at formation level should confirm the proposed engineered CBR values at an appropriate time.

9.9 Aggressive Chemical Environment to Concrete

The results of laboratory testing (water soluble sulphate 21mg/l to 370mg/l, with pH 6.9 to 12.2) have indicated a design class of DS-1 and a subclass of AC-1 based on BRE SD1 Guidelines, and therefore buried concrete should be specified to comply with this classification.

10. GEO-ENVIRONMENTAL DISCUSSION AND CONCLUSIONS

The following conclusions and recommendations have been made based on the investigation undertaken to date in light of the outlined proposals. Any alterations to the proposals may warrant a reassessment. In summary, proposals comprise the development of a two-storey residential building, with shared garden and parking spaces.

10.1 Discussion of Findings

The preliminary Conceptual Site Model (Ref: STV5973-R01 Rev A; Dated: April 2023) identified the following potential sources of contamination:

10.1.1. Preliminary CSM Sources

On-Site

- Car dealership and garage, including AST. Potential for petroleum hydrocarbons (TPH) and Volatile Organic Compounds (VOCs).
- Made Ground of unknown origin. Contaminants of Concern (CoC) are likely to include heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Asbestos Containing Soils (ACSSs).

Off-Site

- Sainsbury's petrol filling station approximately 50m west. Potential for petroleum hydrocarbons (TPH) and Volatile Organic Compounds (VOCs).

In summary, the Preliminary Risk Assessment identified potential risks from contamination, generally **Moderate** risks. As a result, a ground investigation was recommended in order to assess the identified potential pollutant linkages, with the objective to refine the associated risks.

10.1.2. Significance of Soil Results

Soil samples were submitted to the laboratory for analysis against a contamination suite reflecting the contaminants of concern highlighted within the Preliminary CSM.

Analytical results from selected samples did not identify levels of tested organic or inorganic contaminants exceeding the relevant commercial GAC values. It is also noted that values were generally below the more stringent GAC values which would apply to 'residential' land use scenarios. Asbestos was not detected in any of the samples analysed.

The results are considered to be generally congruent with the logging descriptions of the soils encountered; whilst Made Ground soils were encountered these were typically formed by reworked natural soils or Type 1 sub-base, which would be expected to be relatively 'inert' in terms of potential contaminants. Moreover, there was no evidence of any hydrocarbon-specific contamination within the soils (i.e. hydrocarbon stains, sheens and odours).

10.1.3. Controlled Water

During monitoring, groundwater was encountered at depths ranging from 2.38m to 4.51mbgl. Following the investigation, and results of laboratory soil analysis, there is not deemed to be a significant risk to controlled waters underlying the site (specifically the underlying groundwater). As a result, the risks to controlled waters associated with the source-pathway-receptor pollutant linkages identified within the PRA have been reassessed as **Low**.

10.1.4. Ground Gas

The risks from both ground gas and soil vapour to site have been classified as **Low**, based on the findings of the investigation and utilising multiple-lines-of-evidence approach. Therefore, further assessment and mitigation is not deemed necessary.

10.2 Conceptual Site Model

The refined Conceptual Site Model has been formulated in general accordance with BS EN ISO 21365:2019 *Soil Quality – Conceptual Site Models for Potentially Contaminated Sites* and following information collated within the Site Investigation conducted and is intended to complete the GQRA, in accordance with LCRM 2020.

Following the GQRA undertaken on site to date, including soil laboratory testing, the risks from the identified potential sources of contamination to relevant receptors are considered to be reclassified as **Low**. This is defined as, 'the site should be considered suitable for the present or future use and environmental setting. Contaminants may be present but unlikely to have unacceptable impact on key targets'. As such, whilst pollutant linkages were addressed and identified with the Preliminary CSM, these do not need to be further refined.

10.3 Recommendations

The following recommendations are based on the plans proposed at the time of writing this report and may be subject to change. The design of the site investigation incorporated information from previous reports along with consideration of the development plans. Potential contamination sources were investigated as far as reasonably practicable and within the permitted timeframe.

Following the investigation to date, **Low** risks have been identified to the site from potential sources of contamination outlined. Consequently, no specific requirements are needed to address any specific contaminated land measures. Moreover, a Remediation Options Appraisal and Remediation Strategy are not specifically mandatory. Nevertheless, some basic recommendations have been made for the purposes of due diligence.

10.3.1. Watching Brief

A watching brief should be maintained on site, particularly during ground works. This must be undertaken as part of good working practices and in case there are any areas of unidentified contamination.

During any ground works, an appraisal of the exposed soils should be made by the on-site manager or developer's nominated person. If any material is noted to show visual and/or olfactory sign of contamination this material should be stockpiled separately and tested prior to its appropriate removal off site or re-use where necessary. A suitably qualified environmental specialist should be contacted to advise what further investigation is required.

The on-site manager/developer's nominated person should be able to display the relevant level of qualification and/or experience in managing construction works.

10.3.2. Services

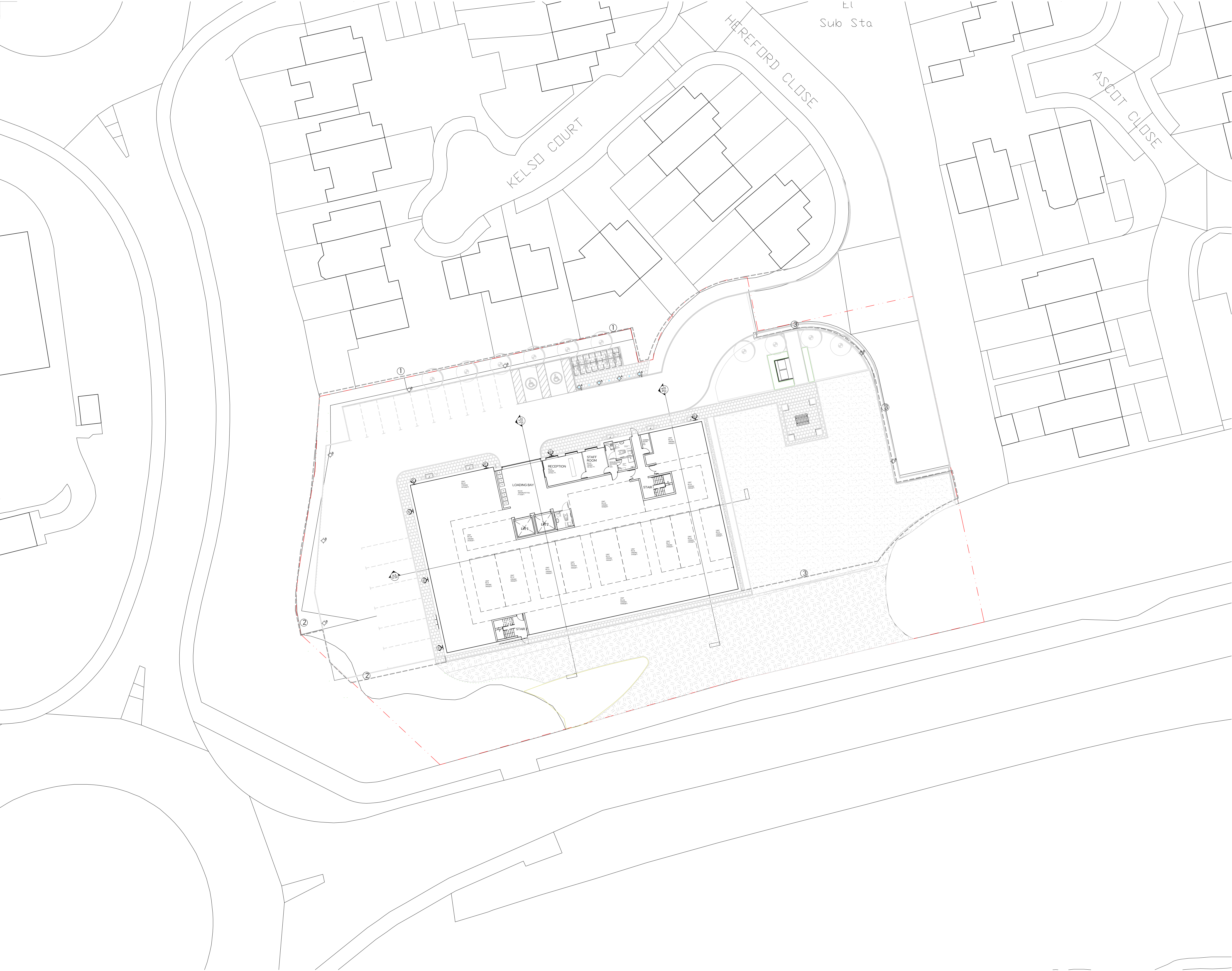
It is recommended the services are situated within lined trenches. The trenches should be lined with a geotextile membrane and backfilled with clean fill, such as pea shingle, which will demarcate the services from the surrounding soils, protecting both the services and the future maintenance workers.

10.3.3. Statutory Consultees

We would recommend that this report be forwarded to the relevant Statutory Consultees including the Local Council's Environmental Health and Planning Department to seek their comments and subsequent approval prior to works commencing on site.



APPENDIX A – SITE PLANS



GENERAL NOTES

Do not scale from this drawing, other than for Planning purposes. All dimensions to be checked on site. Any drawing errors, omissions or discrepancies should be brought to the attention of the architect. This document should not be relied on or used in circumstances other than those for which it was originally prepared for. STUDIO YUME accepts no responsibility for this document to any other party other than the person by whom it was commissioned.

CONSULTANTS

Refer to highways consultant's drawings for detail. Refer to landscape consultant's drawings for details. Landscape layout is indicative only.

AREAS

Refer to area schedule.

KEYPLAN

KEY/LEGEND

Rev	Notes	yy.mm.dd	By	Auth
A	For Planning Only	25.09.12	ST	ST

DRWG NOTES

- Ⓐ 1m Bollard 25W LED
 - Ⓑ PAX 24 LED lantern
 - Ⓒ Starview 18W 3K
-
- ① Existing fence
 - ② 2.1m metal palisade fence
 - ③ 1.8 m metal palisade fence

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71 Gayford Road London W12 9BY
www.studioyume.co.uk info@studioyume.co.uk
Date: dd/mm/yy Drawn by: xx Issued by: xx
Scale: 1:250 @ A1 / 1:500 @ A3 CAD File No:

FOR PLANNING PURPOSES ONLY

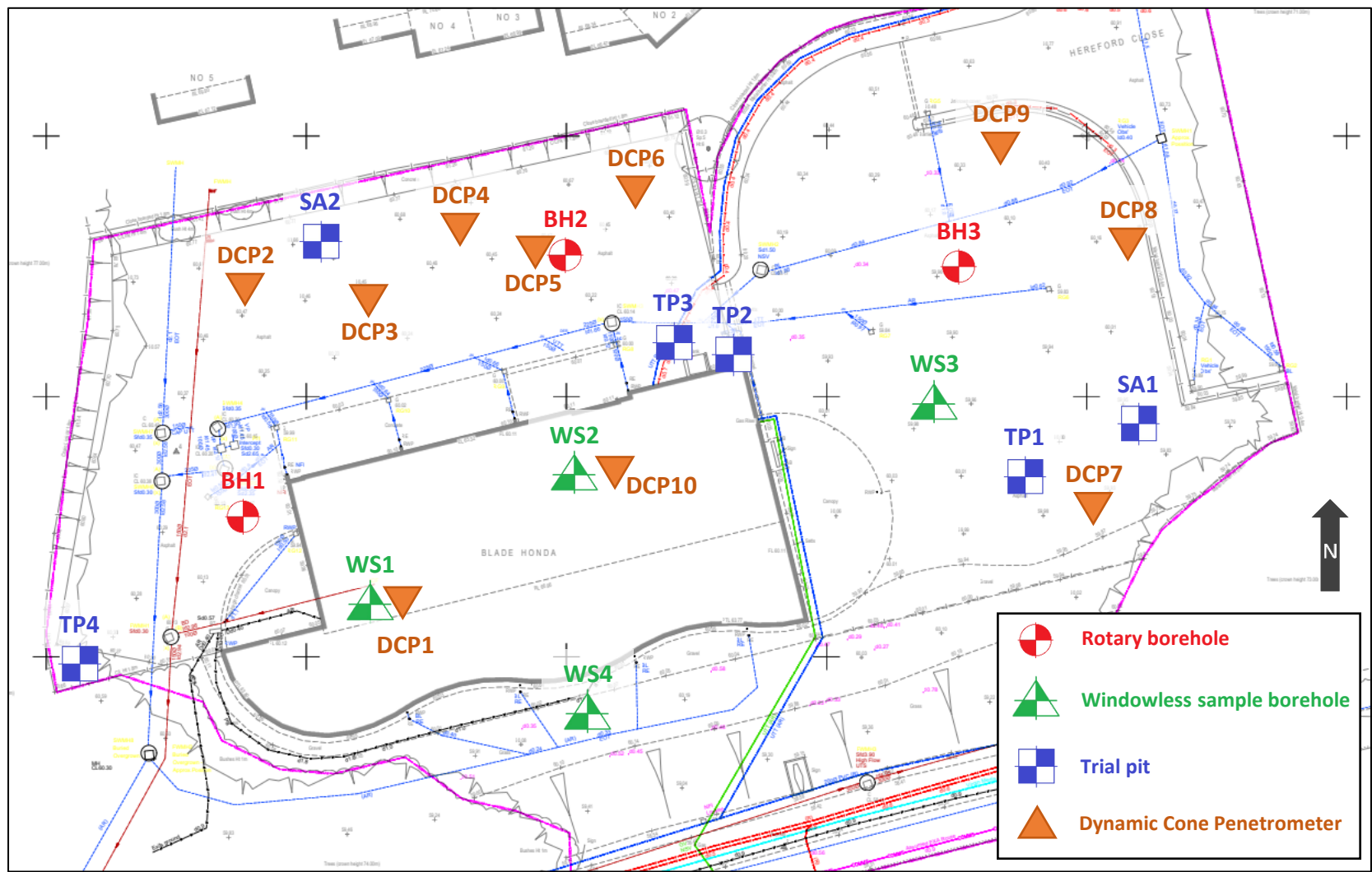
Project
Bath Road, Chippenham

Title
Proposed Site Plan
Client
Cinch Storage

Project No	Originator	Level	Type	Role / Package Code	Number	Revision
23004	STY	00	DR	A PO	101	A



APPENDIX B – HOLE LOCATION PLAN



Project:	Former Honda Garage, Chippenham			Title:	Hole Location Plan
Job Number:	P23.207	Client:	Padlock Chippenham South Ltd	Notes: 1. Do not scale from this drawing. 2. All dimensions must be checked on site prior to commencement of work. 3. Where applicable this drawing is to be read in conjunction with other consultants drawings. 4. This drawing is the copyright of Impact Geotechnical Ltd.	 IMPACT GEO TECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Drawing:	P23.207/HLP	Revision:	1		
Drawn:	RG	Date:	August 2023		
Checked by:	GC	Scale:	NTS		



APPENDIX C – STRATIGRAPHIC LOGS



Date: 14/08/2023 - 15/08/2023

Contractor: IGL / Marshall Drilling

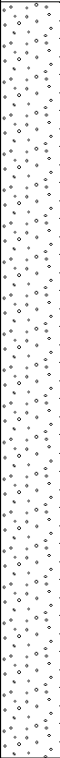
Drilling Equipment: Comacchio 205

Page Number
Sheet 1 of 2

Remarks	
CAT scanned at surface. Hand excavated buried service clearance pit to 1.20mbgl. Initially advanced to a depth of 2.00mbgl using percussive dynamic sampling. Thereafter, utilising ~116mm diameter rotary core (T6-116) with water flush. Installed with groundwater monitoring well.	

Rotary Core Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 14/08/2023 - 15/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: JS/SB		Drilling Equipment: Comacchio 205	
Borehole Number BH1	Hole Type RC	Level	Logged By RG	Scale 1:50	Page Number Sheet 2 of 2

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		9.500 - 10.00	D	100	100	90					Very weak fissured grey MUDSTONE. Fissures are sub-horizontal and sub-vertical closely spaced and undulating rough. Discontinuities infilled with grey clay. (FOREST MARBLE FORMATION).	11
		11.00 - 12.50	C	100	95	90						12
		12.00 - 12.40										
		13.00 - 13.10	D									13
		12.50 - 14.00	D	95	90	60		13.50				
		13.50 - 13.70									At 13.00mbgl: Very thinly bedded with lignite and pyrite	
		14.00 - 15.00	C	100	95	20		15.00			Very weak grey MUDSTONE interbedded with closely and medium spaced thin beds of strong light grey LIMESTONE. Closely spaced with thin beds of dark grey clay. From 13.50m to 13.70m: Recovered as grey and light grey clayey angular and sub-angular medium and coarse Gravel of limestone and mudstone.	14
		14.00 - 15.00									End of Borehole at 15.000m	15
												16
												17
												18
												19
												20

Remarks														
CAT scanned at surface. Hand excavated buried service clearance pit to 1.20mbgl. Initially advanced to a depth of 2.00mbgl using percussive dynamic sampling. Thereafter, utilising ~116mm diameter rotary core (T6-116) with water flush. Installed with groundwater monitoring well.														

Rotary Core Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 15/08/2023 - 16/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: JS/SB		Drilling Equipment: Comacchio 205	
Borehole Number BH2	Hole Type RC	Level	Logged By RG	Scale 1:50	Page Number Sheet 1 of 2

Well	Water	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.10			TARMAC: 20mm surface coarse over binder coarse.	
		0.40	D				0.35			MADE GROUND: Greyish pink silty sandy angular and sub-angular fine to coarse Gravel of limestone and granite. Sand is fine and medium. (TYPE 1 SUB-BASE).	
		0.40	ES				0.50				
		0.50 - 0.60	B								
		1.00	D								
		1.60 - 2.00	B	100	40	0				Firm to stiff brownish yellow slightly sandy and sandy very gravelly CLAY. Sand is fine and medium. Gravel is angular to sub-rounded fine to coarse limestone. Medium content of angular and sub-angular cobbles of weak light yellow limestone. (Distinctly weathered CORNBRAH FORMATION).	1
		2.20	D				2.10			Strong light yellow LIMESTONE. Closely spaced with thin beds of brownish yellow sandy gravelly clay. Sand is fine to coarse. Gravel is sub-angular fine and medium limestone. (Partially weathered CORNBRAH FORMATION).	2
		2.60 - 3.00	D	100	20	10	2.40			Medium strong pale grey and grey argillaceous LIMESTONE. Closely spaced with thin beds of grey silty clay. (CORNBRAH FORMATION).	3
		3.60 - 4.00	D	100	95	30	3.50			Stiff grey and dark grey very sandy silty CLAY. Sand is fine and medium. (Distinctly weathered FOREST MARBLE FORMATION).	4
		4.60 - 5.00	C	100	85	60				From 2.40m to 2.50mbgl: Mottled brownish orange.	
		5.00 - 5.20	C							Extremely weak thinly laminated and very thinly bedded grey MUDSTONE. Thin laminae and thin beds closely spaced with dark grey silty clay. (Partially weathered FOREST MARBLE FORMATION).	5
		5.00 - 6.50		95	90	57					
		6.00 - 6.30	D				6.00				
		6.40	C				6.30			Very stiff grey silty CLAY. Borderline extremely weak grey MUDSTONE. (Partially weathered FOREST MARBLE FORMATION).	6
		7.00 - 7.50	C							Extremely weak and very weak fissured grey MUDSTONE. Fissures are sub-horizontal and sub-vertical closely spaced and undulating. Discontinuities infilled with grey clay. (FOREST MARBLE FORMATION).	7
		6.50 - 8.00		100	100	85				From 6.30m to 6.45mbgl: Thinly bedded with strong light grey Limestone.	8
		8.20 - 8.40	C								
		8.00 - 9.50		100	100	100					
		9.00 - 9.20	C								
		9.50 - 10.00		90	85	80					
		10.00					10.00				

Hole Diameter		Casing Diameter		Chiselling			Inclination and Orientation				Drilling Flush				
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour

Remarks
 CAT scanned at surface. Hand excavated buried service clearance pit to 0.60mbgl. Drilled utilising ~116mm diameter rotary core (T6-116) with water flush. Installed with groundwater monitoring well.

Rotary Core Log

Project Name: Former Honda Garage, Chippenham			Client: Padlock Chippenham South Ltd			Date: 15/08/2023 - 16/08/2023		
Location: Bath Road, Chippenham, SN14 0UX			Contractor: IGL / Marshall Drilling					
Project No. : P23.207			Crew Name: JS/SB			Drilling Equipment: Comacchio 205		
Borehole Number BH2		Hole Type RC		Level		Logged By RG		Scale 1:50 Page Number Sheet 2 of 2

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
											Extremely weak and very weak fissured grey MUDSTONE. Fissures are sub- horizontal and sub-vertical closely spaced and undulating. Discontinuities infilled with grey clay. (FOREST MARBLE FORMATION). <i>From 9.90m to 10.00mbgl: Fossiliferous, shelly and very thinly bedded with lignite.</i> End of Borehole at 10.000m	11
												12
												13
												14
												15
												16
												17
												18
												19
												20

Hole Diameter Casing Diameter Chiselling Inclination and Orientation Drilling Flush Depth Base Diameter Depth Base Diameter Depth Top Depth Base Duration Tool Depth Top Depth Base Inclination Orientation Depth Top Depth Base Type Colour Min (%) Max (%)														

Remarks

CAT scanned at surface. Hand excavated buried service clearance pit to 0.60mbgl. Drilled utilising ~116mm diameter rotary core (T6-116) with water flush. Installed with groundwater monitoring well.



Page Number
Sheet 1 of 2



Rotary Core Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 17/08/2023 - 18/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: JS/SB		Drilling Equipment: Comacchio 205	
Borehole Number BH3	Hole Type RC	Level	Logged By RG	Scale 1:50	Page Number Sheet 2 of 2

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
		10.20 - 10.60 9.50 - 11.00	C	100	100	67					Extremely weak and very weak fissured grey MUDSTONE. Fissures are sub-horizontal and sub-vertical very closely and closely spaced and undulating. (FOREST MARBLE FORMATION).	11
		10.90	D								From 10.00m to 11.00mbgl: Interbedded with closely spaced very thin and thin beds of strong light grey Limestone.	
		11.50 11.00 - 12.50	D	100	93	60					From 11.40m to 12.20mbgl: Shelly with frequent bivalve shells	12
		12.30 - 12.50	C									
		13.00 - 13.40 12.50 - 14.00	C	100	93	67					Very weak fissured and sheared grey MUDSTONE. Fissures are sub-horizontal very closely spaced and undulating rough. Shears are sub-vertical and polished and grey. Partings closely spaced with light grey silty fine sand. (FOREST MARBLE FORMATION).	13
		14.00 - 14.50 14.00 - 15.00	C	100	90	45					Very weak grey MUDSTONE interbedded with closely and medium spaced thin beds of strong light grey LIMESTONE. Closely and medium spaced with very thin beds of dark grey gravelly clay. Gravel is sub-angular fine to coarse limestone.	14
											End of Borehole at 15.000m	15
												16
												17
												18
												19
												20

Remarks															
CAT scanned at surface. Hand excavated buried service clearance pit to 0.65mbgl. Drilled utilising ~116mm diameter rotary core (T6-116) with water flush. Installed with groundwater monitoring well.															



Date: 14/08/2023 - 18/08/2023

Contractor: IGL / Marshall Drilling

Drilling Equipment: Hand tools & Archway Dart

Page Number
Sheet 1 of 1[illegible]



Percussion Drilling Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 17/08/2023 - 18/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: RG/BW		Drilling Equipment: Hand tools & Archway Dart	
Borehole Number WS2	Hole Type WLS	Level	Logged By RG	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES	50 (5,10/50 for 200mm)	0.20			Floor tile over CONCRETE: 6mm diameter steel reinforcement at 120mm below ground level. Black plastic mesh at 150mm below ground level. 12mm diameter steel reinforcement at 180mm below ground level. Blue membrane at base.	
		0.50	D		0.40				
		0.50	ES						
		0.55	SPT		0.75				
								Brownish yellow clayey sandy angular and sub-angular fine to coarse GRAVEL of limestone. Sand is fine and medium. Medium content of angular and sub-angular weak and medium strong light yellow limestone. (Distinctly weathered CORNBRAH FORMATION).	1
								End of Borehole at 0.750m	2
									3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

CAT scanned at surface. Hand excavated buried service clearance pit to 0.55mbgl. Terminated on refusal. Groundwater not encountered. Backfilled with arisings.





Percussion Drilling Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 17/08/2023 - 18/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: RG/BW		Drilling Equipment: Hand tools & Archway Dart	
Borehole Number WS3	Hole Type WLS	Level	Logged By RG	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
			D ES		0.12			TARMAC: 20mm surface coarse over binder coarse.	1
					0.30			MADE GROUND: Greyish pink slightly silty sandy angular and sub-angular fine to coarse Gravel of limestone and granite. Sand is fine to coarse. (TYPE 1 SUB-BASE).	
		0.50 0.50						Light brownish yellow and light yellow clayey sandy angular and sub-angular fine to coarse GRAVEL of limestone. Sand is fine and medium. High content of angular and sub-angular cobbles of weak light yellowish grey limestone. (Distinctly weathered CORNBRAH FORMATION).	
					0.60			End of Borehole at 0.600m	
									2
									3
									4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
CAT scanned at surface. Hand excavated buried service clearance pit to 0.60mbgl. Terminated due to presence of limestone bedrock. No SPT undertaken. Groundwater not encountered. Backfilled with arisings.



Page Number
Sheet 1 of 1



Trial Pit Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd	Date: 15/08/2023 - 16/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling		
Project No. : P23.207		Crew Name: RG/BW		Equipment: EZ80 Excavator
Location Number SA1	Location Type TP	Level	Logged By RG	Scale 1:25
				Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.60	ES		0.10			TARMAC.	1
					0.35			MADE GROUND: Greyish pink silty sandy angular to sub-rounded fine to coarse Gravel of limestone and granite. Sand is fine and medium. (TYPE 1 SUB-BASE).	
					0.70			MADE GROUND: Dark pinkish brown silty sandy angular to sub-rounded fine to coarse Gravel of limestone. Sand is fine and medium. Occasional coarse gravel-sized pockets of dark brown clay.	
		1.50	B		2.50			Light brownish yellow clayey slightly sandy GRAVEL and COBBLES of limestone. Sand is fine and medium. Gravel is angular and sub-angular fine to coarse limestone. Cobbles are sub-angular weak and medium strong pale yellow limestone. (Distinctly weathered CORNBRAH FORMATION).	
								Stiff pale orangish yellow and pale grey mottled slightly sandy gravelly silty CLAY. Sand is fine and medium. Gravel is sub-angular fine to coarse limestone. Medium content of angular weak and medium strong pale yellow limestone. (Distinctly weathered CORNBRAH FORMATION).	
		2.80	B		2.90			End of Borehole at 2.900m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.40	0.50	Stable	None				

Remarks					
CAT scanned at surface. Groundwater not encountered. Backfilled with arisings.					



Date: 15/08/2023 - 16/08/2023

Contractor: IGL / Marshall Drilling

Equipment: EZ80 Excavator

Page Number
Sheet 1 of 1

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.50	0.45	Stable	None				



Trial Pit Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 15/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: RG/BW		Equipment: EZ80 Excavator	
Location Number TP1	Location Type TP	Level	Logged By RG	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.13			TARMAC.	
					0.40			MADE GROUND: Greyish pink silty sandy angular to sub-rounded fine to coarse Gravel of limestone and granite. Sand is fine and medium. (TYPE 1 SUB-BASE).	
					0.65			CONCRETE: Suspected concrete pad associated with former garage shelter. Four 24mm diameter steel hold-down bolts towards the centre of the newer tarmac area.	
								End of Borehole at 0.650m	
									1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length 2.40	Pit Width 0.50	Pit Stability Stable	Shoring Used None	Remarks	Date	Rate	Remarks

Remarks
CAT scanned at surface. Groundwater not encountered. Backfilled with arisings.





Trial Pit Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 16/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: RG/BW		Equipment: Hand tools	
Location Number TP2	Location Type TP	Level	Logged By RG	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.10 0.45			TARMAC. MADE GROUND: Greyish pink slightly silty sandy angular and sub-angular fine to coarse Gravel of limestone and granite. Sand is fine to coarse. Yellow buried service warning tape at base. (TYPE 1 SUB- BASE). End of Borehole at 0.450m	1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length 0.30	Pit Width 0.30	Pit Stability Stable	Shoring Used None	Remarks	Date	Rate	Remarks

Remarks

CAT scanned at surface. Terminated at 0.45mbgl due to presence of yellow buried service warning tape at 0.45m. Groundwater not encountered. Backfilled with arisings.





Trial Pit Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 16/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: RG/BW		Equipment: Hand tools	
Location Number TP3	Location Type TP	Level	Logged By RG	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10			TARMAC.	
		0.20	ES		0.30			MADE GROUND: Greyish pink slightly silty sandy angular and sub-angular fine to coarse Gravel of limestone and granite. Sand is fine to coarse. (TYPE 1 SUB-BASE).	
		0.40	ES					Light brownish yellow and light yellow clayey sandy angular and sub-angular fine to coarse GRAVEL of limestone. Sand is fine and medium. Medium content of sub-angular cobbles of weak light yellowish grey limestone.	
					0.50			End of Borehole at 0.500m	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length 0.30	Pit Width 0.30	Pit Stability Stable	Shoring Used None	Remarks	Date	Rate	Remarks

Remarks CAT scanned at surface. Groundwater not encountered. Backfilled with arisings.	
---	--



Trial Pit Log

Project Name: Former Honda Garage, Chippenham		Client: Padlock Chippenham South Ltd		Date: 18/08/2023	
Location: Bath Road, Chippenham, SN14 0UX		Contractor: IGL / Marshall Drilling			
Project No. : P23.207		Crew Name: RG/BW		Equipment: Hand tools	
Location Number TP4	Location Type TP	Level	Logged By RG	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.10			MADE GROUND: Grey sub-angular fine and medium Gravel of limestone. MADE GROUND: Pale brown clayey slightly sandy angular to sub-rounded fine to coarse Gravel of limestone. Sand is fine and medium. Occasional coarse gravel-sized pockets of brown mottled pale brown silty Clay. Pale brownish yellow and light yellow clayey sandy angular and sub-angular fine to coarse GRAVEL of limestone. Sand is fine and medium. Medium content of sub-angular cobbles of pale yellowish grey weak limestone. (Distinctly weathered CORNBASH FORMATION). <u>From 0.30m to 0.40mbgl: Abundant roots.</u> End of Borehole at 0.550m	1
					0.30				
					0.55				
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
0.30	0.30	Stable	None				

Remarks CAT scanned at surface. Groundwater not encountered. Backfilled with arisings.	
---	--



APPENDIX D – PHOTOGRAPHS

1.



2.



3.



4.



Project:	Former Honda Garage, Chippenham		Title:	Site Photographs
Job Number:	P23.207	1. Existing site 2. Existing site 3. Existing site 4. Fuel storage shed		 IMPACT GEO TECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Padlock Chippenham South Ltd			
Produced by:	RG			
Checked by:	GC			

5.



6.



7.



8.



Project:	Former Honda Garage, Chippenham	Title:	Site Photographs
Job Number:	P23.207	5. BH1 6. BH1 1.00m to 6.50mbgl 7. BH1 11.00m to 15.00mbgl 8. BH1 monitoring well installation	
Client:	Padlock Chippenham South Ltd		
Produced by:	RG		
Checked by:	GC		



Impact Geotechnical Limited
www.impactgeo.co.uk

9.



10.



11.



12.



Project:	Former Honda Garage, Chippenham		Title:	Site Photographs
Job Number:	P23.207	9. BH2 10. BH2 1.00m to 2.00mbgl 11. BH2 2.00m to 4.00mbgl 12. BH2 monitoring well installation		 IMPACT GEO TECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Padlock Chippenham South Ltd			
Produced by:	RG			
Checked by:	GC			

13.



14.



15.



16.



Project:	Former Honda Garage, Chippenham		Title:	Site Photographs
Job Number:	P23.207	13. BH3 14. BH3 0.60m to 1.00mbgl 15. BH3 3.00m to 4.00mbgl 16. BH3 monitoring well installation		 IMPACT GEO TECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Padlock Chippenham South Ltd			
Produced by:	RG			
Checked by:	GC			

17.



18.



19.



20.



Project:	Former Honda Garage, Chippenham		Title:	Site Photographs
Job Number:	P23.207	17. SA1 18. SA2 19. TP1 20. TP2+TP3 in relation to AST		 IMPACT GEO TECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Padlock Chippenham South Ltd			
Produced by:	RG			
Checked by:	GC			

21.



22.



23.



24.



Project:	Former Honda Garage, Chippenham		Title:	Site Photographs
Job Number:	P23.207	21. TP4 in relation to fuel storage shed 22. Inspection pits 23. Garage 24. Staining on ground		 IMPACT GEOTECHNICAL Impact Geotechnical Limited www.impactgeo.co.uk
Client:	Padlock Chippenham South Ltd			
Produced by:	RG			
Checked by:	GC			

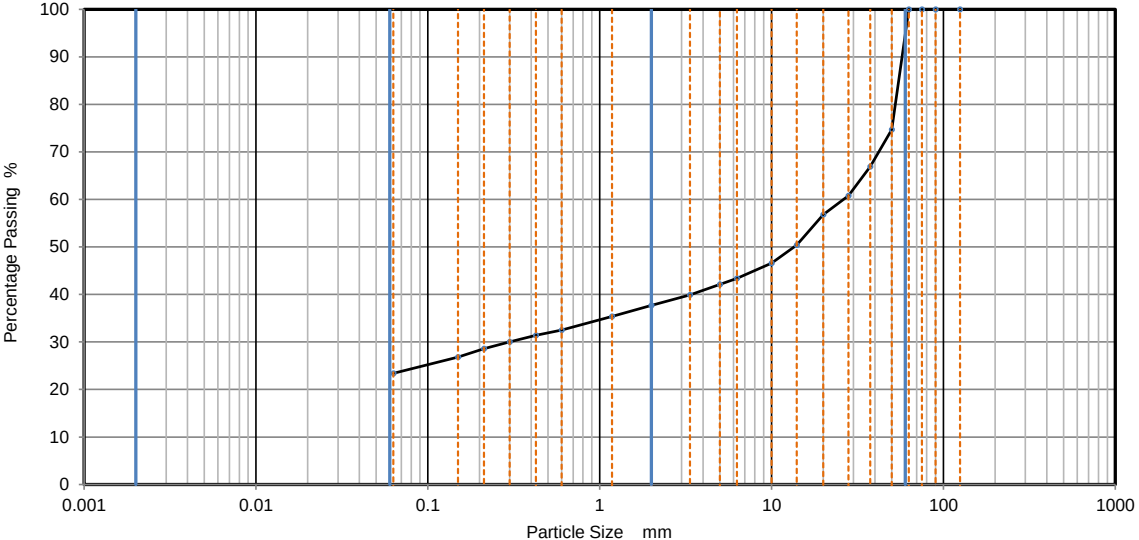


APPENDIX E – LABORATORY CERTIFICATES

					Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results Tested in accordance with BS1377 : Part 3 : 2018, Clause 7.6 & Clause 12				
Job No. 33982		Project Name Former Honda Garage, Chippenham (Chippenham)						Programme	
								Samples received	22/08/2023
								Schedule received	30/08/2023
Project No. P23.207		Client Impact Geotechnical						Project started	31/08/2023
								Testing Started	04/09/2023
Hole No.	Sample				Soil description	Dry Mass passing 2mm %	SO4 Content mg/l	pH	Remarks
	Ref	Top m	Base m	Type					
BH1	5	1.20	1.65	D	Brown mottled light grey slightly gravelly slightly sandy silty CLAY with rare pockets of dark grey organic matter (gravel is fmc limestone fragments)	80	220	6.9	
BH1	15	10.50	-	D	Dark grey silty CLAY	100	370	7.0	
BH3	5	2.00	2.50	D	Brown slightly sandy clayey GRAVEL (gravel is fmc limestone fragments)	19	190	7.1	
BH3	13	6.80	-	D	Dark grey silty CLAY	100	310	7.1	
SA1	2	1.50	-	B	Light brown slightly sandy clayey GRAVEL with cobbles (gravel is fmc limestone fragments)	12	200	7.0	
 Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com These results only apply to the items tested NOTE: The report shall not be reproduced except in full without authority of the laboratory Checked and Approved Initials J.P Date: 15/09/2023									
2519		Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)						MSF-5-R29	

	PARTICLE SIZE DISTRIBUTION			Job Ref	33982
				Borehole/Pit No.	BH1
Site Name	Former Honda Garage, Chippenham (Chippenham)			Sample No.	2
Project No.	P23.207	Client	Impact Geotechnical	Depth Top	0.50 m
Soil Description	Brown mottled reddish brown sandy silty clayey GRAVEL (gravel is fmc limestone fragments)			Depth Base	- m
				Sample Type	B
				Samples received	22/08/2023
				Schedules received	30/08/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	31/08/2023
These results only apply to the items tested				Date tested	04/09/2023

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	75		
37.5	67		
28	61		
20	57		
14	50		
10	47		
6.3	43		
5	42		
3.35	40		
2	38		
1.18	35		
0.6	33		
0.425	31		
0.3	30		
0.212	29		
0.15	27		
0.063	23		

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		62.34
Sand		14.26
Fines <0.063mm		23.40

Grading Analysis		
D100	mm	
D60	mm	26.2
D30	mm	0.297
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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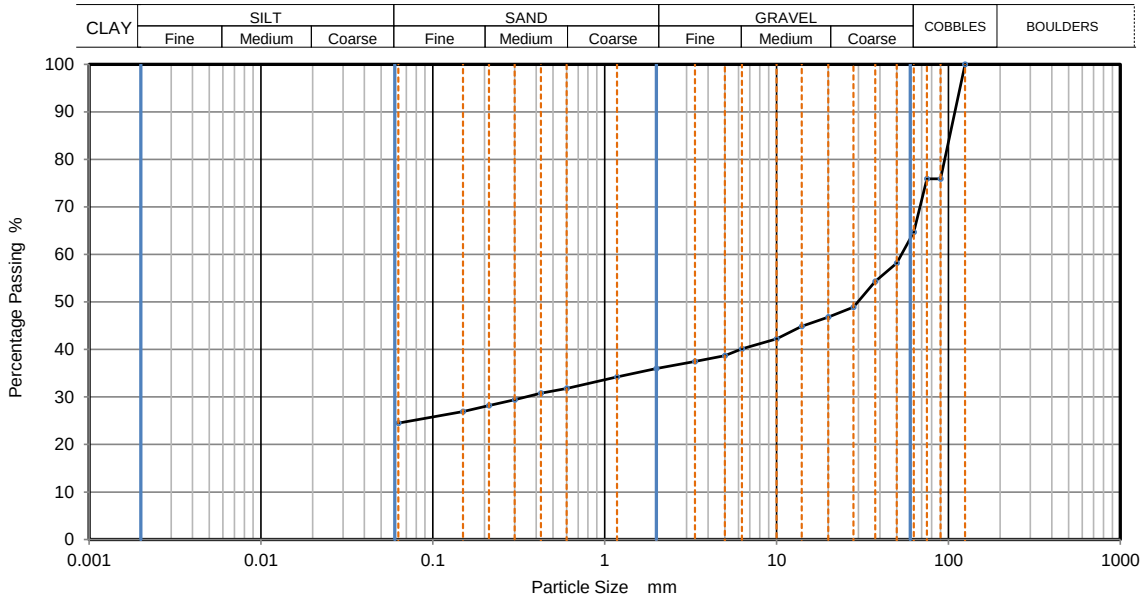
	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 15/09/2023
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3
	2519		



PARTICLE SIZE DISTRIBUTION

	PARTICLE SIZE DISTRIBUTION			Job Ref	33982	
				Borehole/Pit No.	BH1	
Site Name	Former Honda Garage, Chippenham (Chippenham)			Sample No.	4	
Project No.	P23.207	Client	Impact Geotechnical	Depth Top	1.00	m
Soil Description	Brown slightly sandy gravelly silty CLAY with numerous cobbles (gravel is fmc limestone fragments)			Depth Base	-	m
				Sample Type	B	
				Samples received	22/08/2023	
				Schedules received	30/08/2023	
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	31/08/2023	
These results only apply to the items tested				Date tested	04/09/2023	

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	76		
75	76		
63	65		
50	58		
37.5	54		
28	49		
20	47		
14	45		
10	42		
6.3	40		
5	39		
3.35	38		
2	36		
1.18	34		
0.6	32		
0.425	31		
0.3	29		
0.212	28		
0.15	27		
0.063	25		

Sample Proportions	% dry mass
Very coarse	35.30
Gravel	28.70
Sand	11.54
Fines <0.063mm	24.47

Grading Analysis	
D100	mm 125
D60	mm 53.3
D30	mm 0.35
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: J.P

Date: 15/09/2023

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

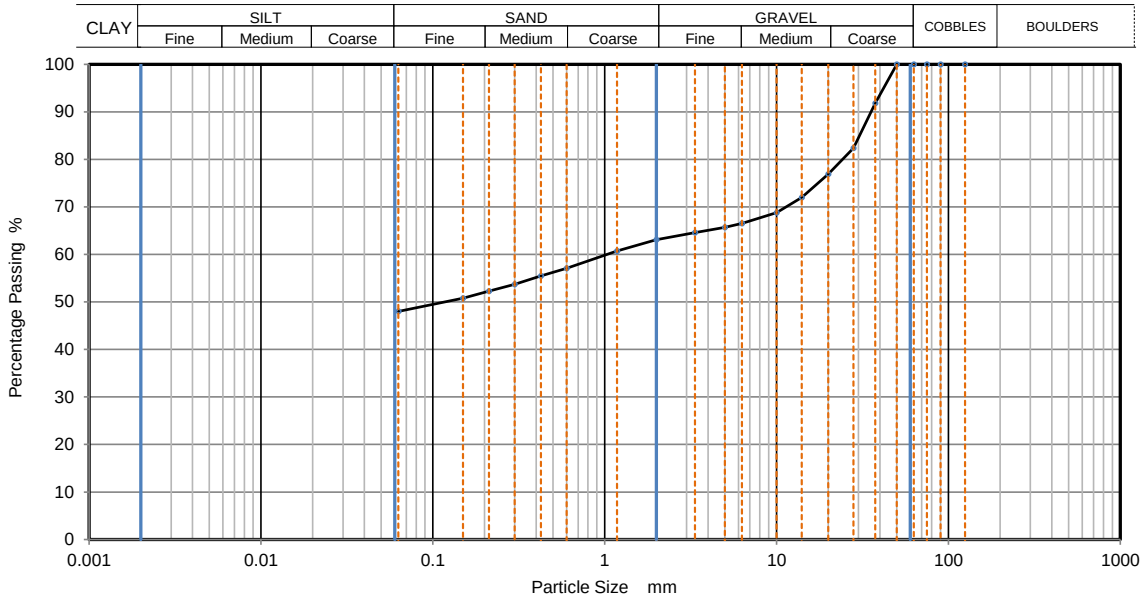
MSF-5-R3



PARTICLE SIZE DISTRIBUTION

	PARTICLE SIZE DISTRIBUTION			Job Ref	33982	
				Borehole/Pit No.	BH3	
Site Name	Former Honda Garage, Chippenham (Chippenham)			Sample No.	2	
Project No.	P23.207	Client	Impact Geotechnical	Depth Top	0.40	m
Soil Description	Brown slightly sandy gravelly silty CLAY (gravel is fmc limestone fragments)			Depth Base	-	m
				Sample Type	B	
				Samples received	22/08/2023	
				Schedules received	30/08/2023	
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	31/08/2023	
These results only apply to the items tested				Date tested	04/09/2023	

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	92		
28	82		
20	77		
14	72		
10	69		
6.3	67		
5	66		
3.35	65		
2	63		
1.18	61		
0.6	57		
0.425	56		
0.3	54		
0.212	52		
0.15	51		
0.063	48		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	36.94
Sand	15.09
Fines <0.063mm	47.96

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: J.P

Date: 15/09/2023

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3

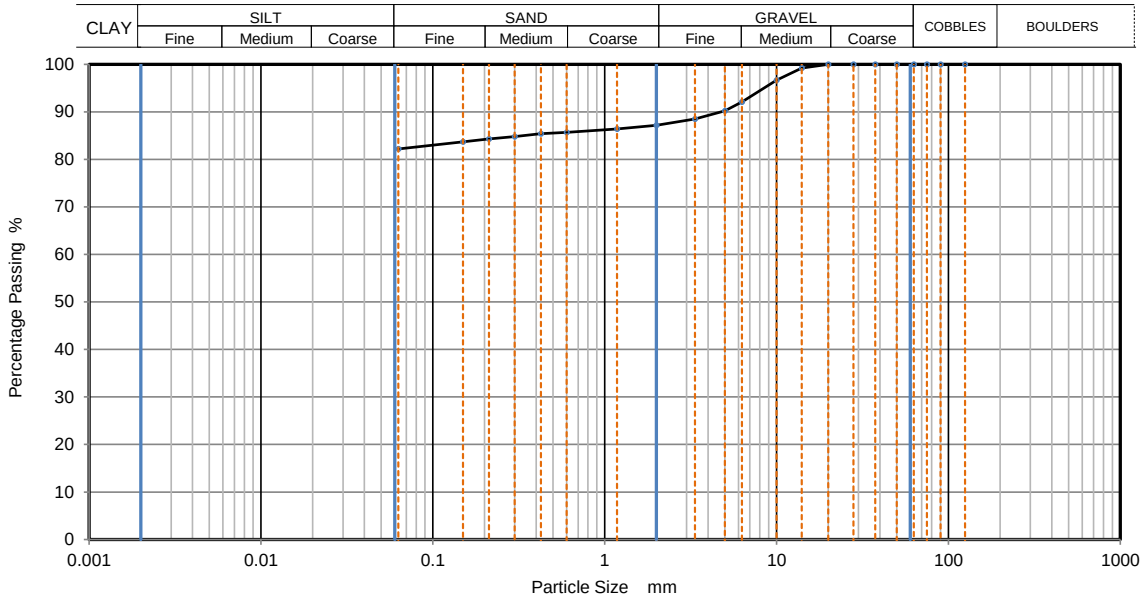


PARTICLE SIZE DISTRIBUTION

Job Ref			33982	
			SA1	
Borehole/Pit No.			SA1	
Sample No.			3	
Depth Top			2.80 m	
Depth Base			- m	
Sample Type			B	
Samples received			22/08/2023	
Schedules received			30/08/2023	
Project started			31/08/2023	
Date tested			04/09/2023	

Site Name	Former Honda Garage, Chippenham (Chippenham)		
Project No.	P23.207	Client	Impact Geotechnical
Soil Description	Brownish grey mottled light grey and light brown slightly sandy slightly gravelly silty CLAY (gravel is fm siltstone fragments)		
Test Method	BS1377:Part 2: 1990, clause 9.0		

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	97		
6.3	92		
5	90		
3.35	89		
2	87		
1.18	86		
0.6	86		
0.425	85		
0.3	85		
0.212	84		
0.15	84		
0.063	82		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	12.82
Sand	4.95
Fines <0.063mm	82.23

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

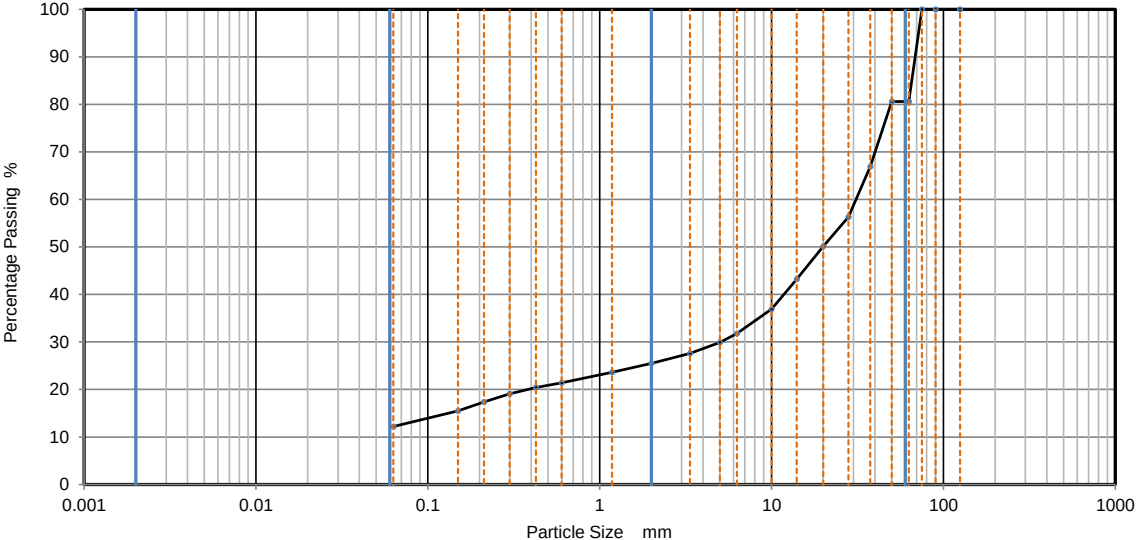
Remarks
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	Email: james@k4soils.com		Date:	15/09/2023
	Tel: 01923 711288			
2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)			MSF-5-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	33982
				Borehole/Pit No.	WS1
Site Name	Former Honda Garage, Chippenham (Chippenham)			Sample No.	1
Project No.	P23.207	Client	Impact Geotechnical	Depth Top	0.50 m
Soil Description	Light grey fmc and cobble sized LIMESTONE fragments with occasional deposits of brown sandy silty clay			Depth Base	- m
				Sample Type	D
				Samples received	22/08/2023
				Schedules received	30/08/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	31/08/2023
These results only apply to the items tested				Date tested	04/09/2023

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	81		
50	81		
37.5	67		
28	56		
20	50		
14	43		
10	37		
6.3	32		
5	30		
3.35	28		
2	26		
1.18	24		
0.6	21		
0.425	20		
0.3	19		
0.212	17		
0.15	16		
0.063	12		

Sample Proportions		% dry mass
Very coarse		19.40
Gravel		55.09
Sand		13.28
Fines <0.063mm		12.19

Grading Analysis		
D100	mm	
D60	mm	31
D30	mm	5.04
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

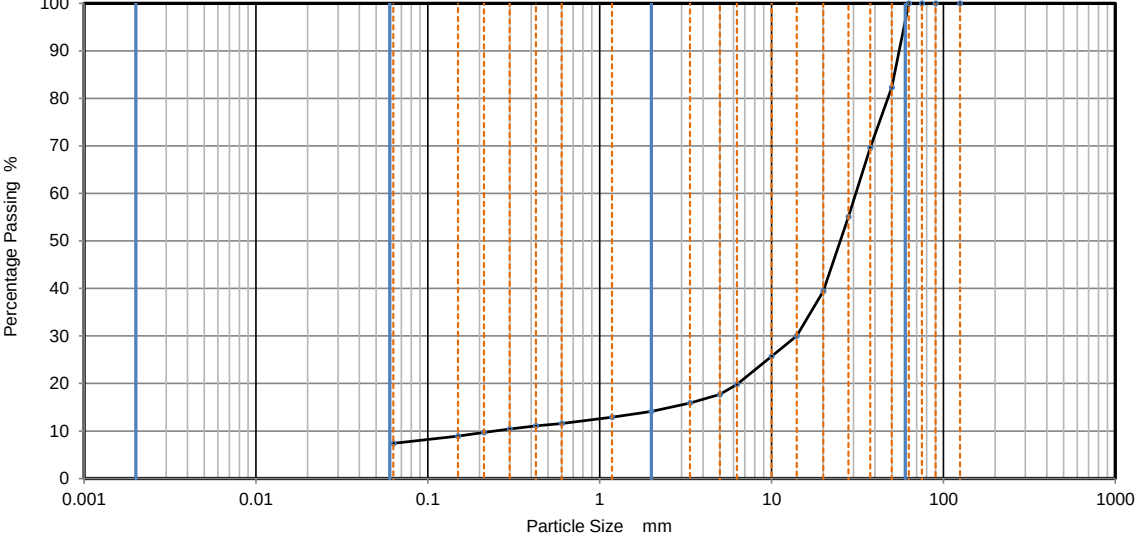
Remarks
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	2519		

	PARTICLE SIZE DISTRIBUTION			Job Ref	33982
				Borehole/Pit No.	WS3
Site Name	Former Honda Garage, Chippenham (Chippenham)			Sample No.	2
Project No.	P23.207	Client	Impact Geotechnical	Depth Top	0.50 m
Soil Description	Light grey fmc LIMESTONE fragments with occasional deposits of brown fine sandy silty clay			Depth Base	- m
				Sample Type	D
				Samples received	22/08/2023
				Schedules received	30/08/2023
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	31/08/2023
These results only apply to the items tested				Date tested	04/09/2023

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	82		
37.5	70		
28	55		
20	39		
14	30		
10	26		
6.3	20		
5	18		
3.35	16		
2	14		
1.18	13		
0.6	12		
0.425	11		
0.3	10		
0.212	10		
0.15	9		
0.063	7		

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		85.88
Sand		6.75
Fines <0.063mm		7.37

Grading Analysis		
D100	mm	
D60	mm	30.9
D30	mm	14
D10	mm	0.247
Uniformity Coefficient		130
Curvature Coefficient		26

Remarks
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	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3
	2519		



Summary of Point Load Test Results

Job No. 33982		Project Name Former Honda Garage, Chippenham (Chippenham)											Programme			
													Samples received		22/08/2023	
Project No. P23.207		Client Impact Geotechnical											Schedule received		30/08/2023	
													Project started		31/08/2023	
													Date started		31/08/2023	
Hole No.	Sample				Description	Test Type	Sample Width W (mm)	Platen Separation D (mm)	Mositure Content %	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De2 (Mpa)	Correction Factor F	Is (50)	Remarks	
	Ref	Top m	Base m	Type												
BH1	12	6.90	7.20	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	17	0.29	101.55	0.03	1.38	0.04		
BH1	12	6.90	7.20	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	17	0.30	101.55	0.03	1.38	0.04		
BH1	12	6.90	7.20	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	17	0.50	101.55	0.05	1.38	0.07		
BH1	12	6.90	7.20	C	Dark grey SILTSTONE core	Axial	90.00	59.00	17	0.60	82.22	0.09	1.25	0.11		
BH1	12	6.90	7.20	C	Dark grey SILTSTONE core	Axial	90.00	33.00	17	0.25	61.49	0.07	1.10	0.07		
BH1	16	12.00	12.40	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	15	0.45	101.55	0.04	1.38	0.06		
BH1	16	12.00	12.40	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	15	0.22	101.55	0.02	1.38	0.03		
BH1	16	12.00	12.40	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	15	0.42	101.55	0.04	1.38	0.06		
BH1	16	12.00	12.40	C	Dark grey SILTSTONE core	Axial	90.00	53.00	15	0.69	77.93	0.11	1.22	0.14		
BH1	16	12.00	12.40	C	Dark grey SILTSTONE core	Axial	90.00	45.00	15	0.30	71.81	0.06	1.18	0.07		
BH2	6	1.50	1.70	B	Light brown LIMESTONE fragments coated in brown slightly sandy silty clay	Axial	90.00	42.00	6.3	0.40	69.37	0.08	1.16	0.10		
Tested in accordance with ISRM 325-89 RTH Suggested Method for Determining Point Load Strength						Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com									Checked and Approved	
															Initials	
															Date: 15/09/2023	
Approved Signatories: K.Phaure (Tech.Mar) J.Phaure (Lab.Mar)															MSF-5-R33	



Summary of Point Load Test Results

Job No. 33982		Project Name Former Honda Garage, Chippenham (Chippenham)											Programme				
													Samples received		22/08/2023		
													Schedule received		30/08/2023		
Project No. P23.207		Client Impact Geotechnical											Project started		31/08/2023		
													Date started		31/08/2023		
Hole No.	Sample				Description	Test Type	Sample Width W (mm)	Platen Separation D (mm)	Mositure Content %	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De2 (Mpa)	Correction Factor F	Is (50)	Remarks		
	Ref	Top m	Base m	Type													
BH2	6	1.50	1.70	B	Light brown LIMESTONE fragments coated in brown slightly sandy silty clay	Axial	86.00	41.00	6.3	0.50	67.00	0.11	1.14	0.13			
BH2	6	1.50	1.70	B	Light brown LIMESTONE fragments coated in brown slightly sandy silty clay	Irregular lump	69.00	39.00	6.3	2.80	58.53	0.82	1.07	0.88			
BH2	6	1.50	1.70	B	Light brown LIMESTONE fragments coated in brown slightly sandy silty clay	Irregular lump	63.00	34.00	6.3	3.65	52.22	1.34	1.02	1.36			
BH2	6	1.50	1.70	B	Light brown LIMESTONE fragments coated in brown slightly sandy silty clay	Irregular lump	61.00	37.00	6.3	3.50	53.61	1.22	1.03	1.26			
BH2	10	4.50	5.00	C	Dark grey MUDSTONE core	Diametral	90.00	90.00	11	0.35	101.55	0.03	1.38	0.05			
BH2	10	4.50	5.00	C	Dark grey MUDSTONE core	Diametral	90.00	90.00	11	0.23	101.55	0.02	1.38	0.03			
BH2	10	4.50	5.00	C	Dark grey MUDSTONE core	Diametral	90.00	90.00	11	0.28	101.55	0.03	1.38	0.04			
BH2	10	4.50	5.00	C	Dark grey MUDSTONE core	Axial	90.00	42.00	11	0.30	69.37	0.06	1.16	0.07			
BH2	10	4.50	5.00	C	Dark grey MUDSTONE core	Axial	90.00	22.00	11	0.27	50.21	0.11	1.00	0.11			
BH2	14	7.00	7.50	C	Dark grey MUDSTONE core	Diametral	90.00	90.00	16	0.55	101.55	0.05	1.38	0.07			
BH2	14	7.00	7.50	C	Dark grey MUDSTONE core	Diametral	90.00	90.00	16	0.45	101.55	0.04	1.38	0.06			
Tested in accordance with ISRM 325-89 RTH Suggested Method for Determining Point Load Strength					Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com										Checked and Approved		
															Initials		J.P
															Date:		15/09/2023
Approved Signatories: K.Phaure (Tech.Mar) J.Phaure (Lab.Mar)																	
MSF-5-R33																	



Summary of Point Load Test Results

Job No. 33982		Project Name Former Honda Garage, Chippenham (Chippenham)											Programme				
													Samples received		22/08/2023		
Project No. P23.207		Client Impact Geotechnical											Schedule received		30/08/2023		
													Project started		31/08/2023		
													Date started		31/08/2023		
Hole No.	Sample				Description	Test Type	Sample Width W (mm)	Platen Separation D (mm)	Moisture Content %	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De2 (Mpa)	Correction Factor F	Is (50)	Remarks		
	Ref	Top m	Base m	Type													
BH2	14	7.00	7.50	C	Dark grey MUDSTONE core	Axial	90.00	45.00	16	0.35	71.81	0.07	1.18	0.08			
BH2	14	7.00	7.50	C	Dark grey MUDSTONE core	Axial	90.00	46.00	16	0.50	72.60	0.09	1.18	0.11			
BH2	14	7.00	7.50	C	Dark grey MUDSTONE core	Axial	90.00	36.00	16	0.41	64.23	0.10	1.12	0.11			
BH3	4	1.00	-	C	Light brown LIMESTONE core	Diametral	90.00	90.00	3.9	4.00	101.55	0.39	1.38	0.53			
BH3	4	1.00	-	C	Light brown LIMESTONE core	Diametral	90.00	90.00	3.9	9.50	101.55	0.92	1.38	1.27			
BH3	4	1.00	-	C	Light brown LIMESTONE core	Axial	90.00	43.00	3.9	8.20	70.20	1.66	1.16	1.94			
BH3	4	1.00	-	C	Light brown LIMESTONE core	Axial	90.00	29.00	3.9	3.70	57.65	1.11	1.07	1.19			
BH3	4	1.00	-	C	Light brown LIMESTONE core	Axial	90.00	21.00	3.9	2.52	49.06	1.05	0.99	1.04			
BH3	12	6.00	6.50	C	Dark grey fractured LIMESTONE core	Diametral	90.00	90.00	2.0	5.42	101.55	0.53	1.38	0.72			
BH3	12	6.00	6.50	C	Dark grey fractured LIMESTONE core	Diametral	90.00	90.00	2.0	0.75	101.55	0.07	1.38	0.10	Failed on fracture		
BH3	12	6.00	6.50	C	Dark grey fractured LIMESTONE core	Diametral	90.00	90.00	2.0	7.60	101.55	0.74	1.38	1.01			
Tested in accordance with ISRM 325-89 RTH Suggested Method for Determining Point Load Strength						Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com									Checked and Approved		
															Initials		J.P
															Date:		15/09/2023
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)															MSF-5-R33		



Summary of Point Load Test Results

Job No. 33982		Project Name Former Honda Garage, Chippenham (Chippenham)											Programme				
													Samples received		22/08/2023		
Project No. P23.207		Client Impact Geotechnical											Schedule received		30/08/2023		
													Project started		31/08/2023		
													Date started		31/08/2023		
Hole No.	Sample				Description	Test Type	Sample Width W (mm)	Platen Separation D (mm)	Mositure Content %	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De2 (Mpa)	Correction Factor F	Is (50)	Remarks		
	Ref	Top m	Base m	Type													
BH3	12	6.00	6.50	C	Dark grey fractured LIMESTONE core	Axial	90.00	39.00	2.0	24.00	66.85	5.37	1.14	6.12			
BH3	12	6.00	6.50	C	Dark grey fractured LIMESTONE core	Axial	90.00	59.00	2.0	19.90	82.22	2.94	1.25	3.68			
BH3	17	10.20	10.60	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	8.9	0.71	101.55	0.07	1.38	0.09			
BH3	17	10.20	10.60	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	8.9	0.70	101.55	0.07	1.38	0.09			
BH3	17	10.20	10.60	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	8.9	0.30	101.55	0.03	1.38	0.04			
BH3	17	10.20	10.60	C	Dark grey SILTSTONE core	Axial	90.00	40.00	8.9	1.65	67.70	0.36	1.15	0.41			
BH3	17	10.20	10.60	C	Dark grey SILTSTONE core	Axial	90.00	52.00	8.9	0.60	77.19	0.10	1.22	0.12			
BH3	21	13.00	13.40	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	9.6	0.90	101.55	0.09	1.38	0.12			
BH3	21	13.00	13.40	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	9.6	1.20	101.55	0.12	1.38	0.16			
BH3	21	13.00	13.40	C	Dark grey SILTSTONE core	Diametral	90.00	90.00	9.6	1.00	101.55	0.10	1.38	0.13			
BH3	21	13.00	13.40	C	Dark grey SILTSTONE core	Axial	90.00	59.00	9.6	0.52	82.22	0.08	1.25	0.10			
Tested in accordance with ISRM 325-89 RTH Suggested Method for Determining Point Load Strength					Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com										Checked and Approved		
															Initials		J.P
															Date:		15/09/2023
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)															MSF-5-R33		



Summary of Point Load Test Results

Job No. 33982		Project Name Former Honda Garage, Chippenham (Chippenham)										Programme Samples received 22/08/2023 Schedule received 30/08/2023 Project started 31/08/2023 Date started 31/08/2023				
Project No. P23.207		Client Impact Geotechnical														
Hole No.	Sample				Description	Test Type	Sample Width W (mm)	Platen Separation D (mm)	Moisture Content %	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De ² (Mpa)	Correction Factor F	Is (50)	Remarks	
	Ref	Top m	Base m	Type												
BH3	21	13.00	13.40	C	Dark grey SILTSTONE core	Axial	90.00	56.00	9.6	0.92	80.11	0.14	1.24	0.18		
SA2	3	1.00	-	B	Light grey coarse to boulder sized LIMESTONE fragments	Irregular lump	89.00	35.00	5.2	13.20	62.98	3.33	1.11	3.69		
SA2	3	1.00	-	B	Light grey coarse to boulder sized LIMESTONE fragments	Irregular lump	74.00	44.00	5.2	6.00	64.39	1.45	1.12	1.62		
SA2	3	1.00	-	B	Light grey coarse to boulder sized LIMESTONE fragments	Irregular lump	80.00	30.00	5.2	3.00	55.28	0.98	1.05	1.03		
SA2	3	1.00	-	B	Light grey coarse to boulder sized LIMESTONE fragments	Irregular lump	43.00	42.00	5.2	8.50	47.95	3.70	0.98	3.63		
SA2	3	1.00	-	B	Light grey coarse to boulder sized LIMESTONE fragments	Irregular lump	73.00	30.00	5.2	2.15	52.81	0.77	1.02	0.79		
Tested in accordance with ISRM 325-89 RTH Suggested Method for Determining Point Load Strength					Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com										Checked and Approved Initials J.P Date: 15/09/2023	
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)															MSF-5-R33	

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure

Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
33982	Former Honda Garage, Chippenham (Chippenham)	Samples received	22/08/2023
		Schedule received	30/08/2023
Project No.	Client	Project started	31/08/2023
P23.207	Impact Geotechnical	Testing Started	31/08/2023

[illegible]

Legend	UU - single stage test (single and multiple specimens)	σ_3	Cell pressure	Mode of failure ;	B - Brittle
	UUM - Multistage test on a single specimen	$\sigma_1 - \sigma_3$	Maximum corrected deviator stress		P - Plastic
	suffix R - remoulded or recompacted	cu	Undrained shear strength, $\frac{1}{2} (\sigma_1 - \sigma_3)$		C - Compound



Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com

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Checked and Approved

Initials: J.P
Date: 15/09/2023

MSF-5-R7b



Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - Multistage test

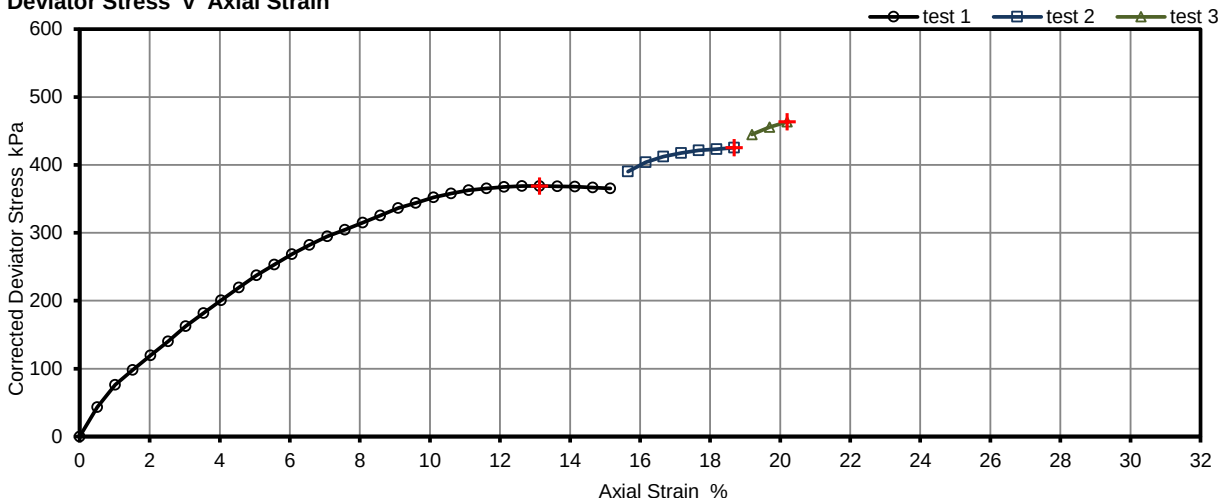
Job Ref	33982		
	Borehole/Pit No.		
BH3		Sample No.	
7		Depth Top	
3.00 m		Depth Base	
3.45 m		Sample Type	
UT		Samples received	
22/08/2023		Schedules received	
30/08/2023		Date of test	
31/08/2023		Test Method	
BS1377:Part 7:1990, clause 9, multistage test on a single specimen		Soil Description	
Very high strength grey slightly gravelly silty CLAY with frequent pockets of fine sand (gravel is fm siltstone fragments)		Project No.	
P23.207		Client	
Impact Geotechnical		Site Name	
Former Honda Garage, Chippenham (Chippenham)		Remarks	

Remarks

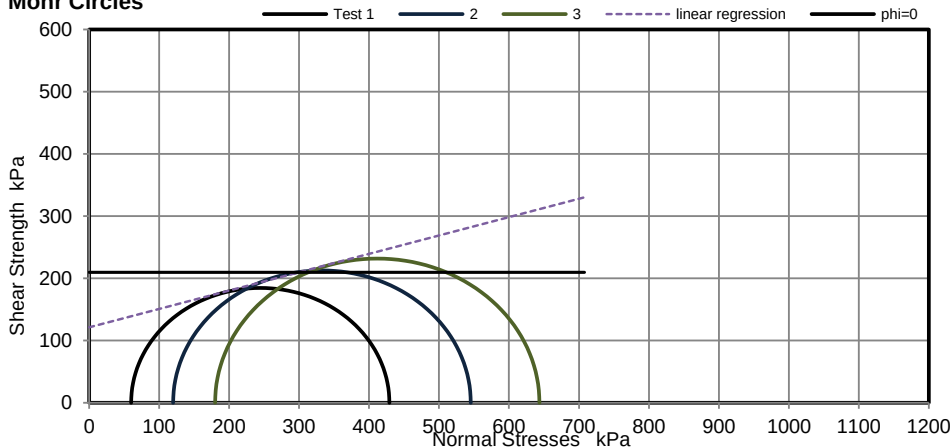
Position within sample

Length	mm	198.0		
Diameter	mm	103.0		
Bulk Density	Mg/m3	2.17		
Moisture Content	%	18		
Dry Density	Mg/m3	1.84		
Rate of Strain	%/min	2.00		
Stage Number		1	2	3
Cell Pressure	kPa	60	120	180
Axial Strain	%	13	19	20
Deviator Stress, ($\sigma_1 - \sigma_3$) f	kPa	369	425	464
Shear strength, cu	kPa	185	213	232
Mode of failure		Compound		

Deviator Stress v Axial Strain



Mohr Circles



$\phi_u = 0$

Average c_u 210 kPa

Linear Regression

ϕ_u 16.4 °

c_u 121 kPa

Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.



Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

Checked and
Approved

Initials: J.P

Date: 15/09/2023

					Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results						
Job No.		Project Name				Programme					
33982		Former Honda Garage, Chippenham (Chippenham)				Samples received		22/08/2023			
Project No.		Client				Schedule received		30/08/2023			
P23.207		Impact Geotechnical				Project started		31/08/2023			
						Testing Started		11/09/2023			
Hole No.	Sample				Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks
	Ref	Top m	Base m	Type							
BH1	2	0.50	-	B	Brown mottled reddish brown sandy silty clayey GRAVEL (gravel is fmc limestone fragments)	12	31	40	14	26	Sample washed to obtain test fraction
BH1	8	2.20	-	D	Greyish brown slightly sandy silty CLAY	23	100	42	19	23	
BH1	9	2.50	3.00	D	Grey slightly sandy silty CLAY	22	100	41	18	23	
BH2	2	0.40	-	D	Light brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and sub-angular fragments)	15	54	40	15	25	Sample washed to obtain test fraction
BH2	8	2.50	3.00	D	Grey slightly sandy silty CLAY	18	100	35	17	18	
BH2	12	6.00	6.30	D	Grey slightly gravelly slightly sandy silty CLAY (gravel is fine and sub-angular)	20	96	41	21	20	
BH3	2	0.40	-	B	Brown slightly sandy gravelly silty CLAY (gravel is fmc limestone fragments)	18	56	54	17	37	
BH3	7	3.00	3.45	UT	Very high strength grey slightly gravelly silty CLAY with frequent pockets of fine sand (gravel is fm siltstone fragments)	22	82	37	17	20	
SA1	3	2.80	-	B	Brownish grey mottled light grey and light brown slightly sandy slightly gravelly silty CLAY (gravel is fm siltstone fragments)	26	85	44	21	23	

	Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3, 4.4 and 5.0 <i>These results only apply to the items tested</i>	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com	Checked and Approved Initials J.P Date: 15/09/2023
	NOTE: The report shall not be reproduced except in full without authority of the laboratory		
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		
	2519		MSF-5-R1



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33982

Borehole/Pit No. BH1

Site Name Former Honda Garage, Chippenham (Chippenham)

Sample No. 2

Project No. P23.207 Client Impact Geotechnical

Depth Top 0.50 m

Depth Base - m

Sample Type B

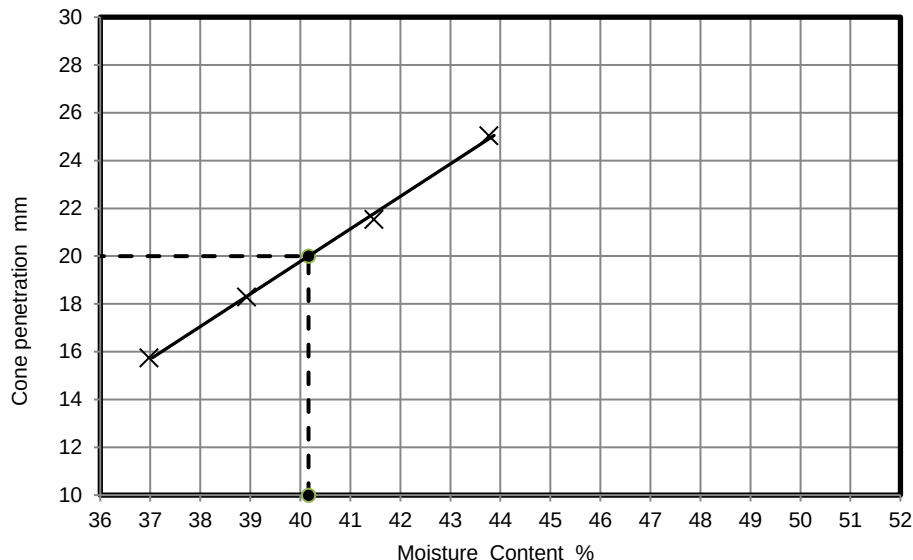
Soil Description Brown mottled reddish brown sandy silty clayey GRAVEL (gravel is fmc limestone fragments)

Samples received 22/08/2023

Schedules received 30/08/2023

Project Started 31/08/2023

Date Tested 12/09/2023



NATURAL MOISTURE CONTENT

12 %

% PASSING 425µm SIEVE

31 %

LIQUID LIMIT

40 %

PLASTIC LIMIT

14 %

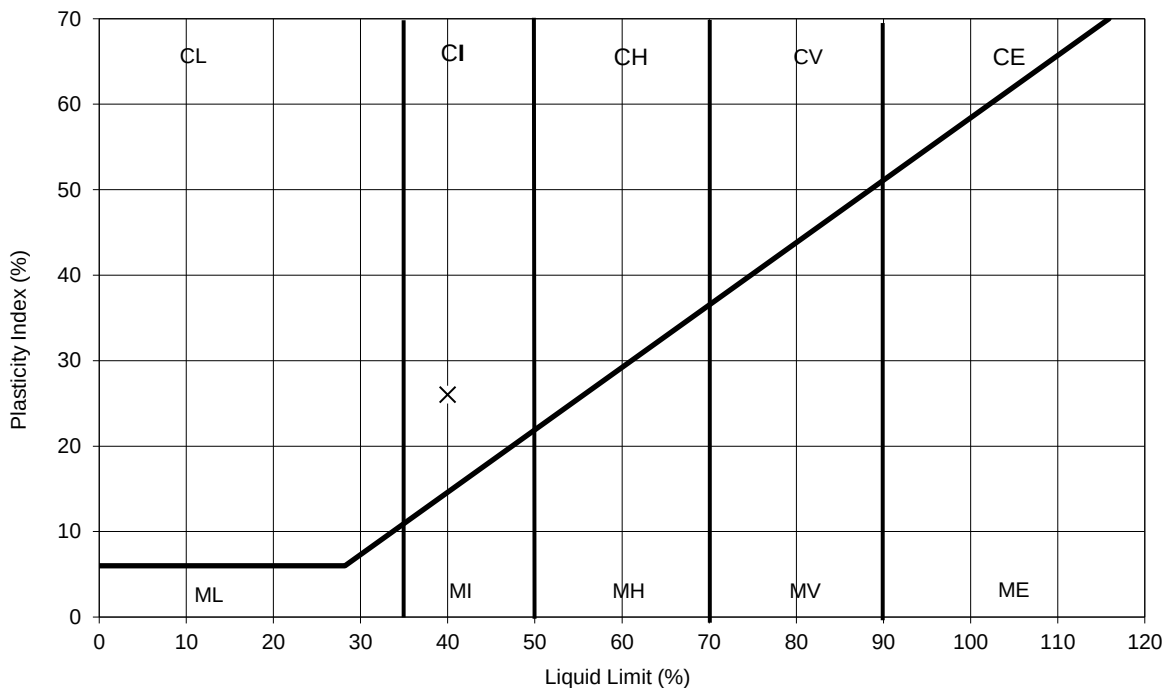
PLASTICITY INDEX

26 %

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 15/09/2023

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33982

Borehole/Pit No. BH1

Site Name Former Honda Garage, Chippenham (Chippenham)

Sample No. 8

Project No. P23.207 Client Impact Geotechnical

Depth Top 2.20 m

Depth Base - m

Sample Type D

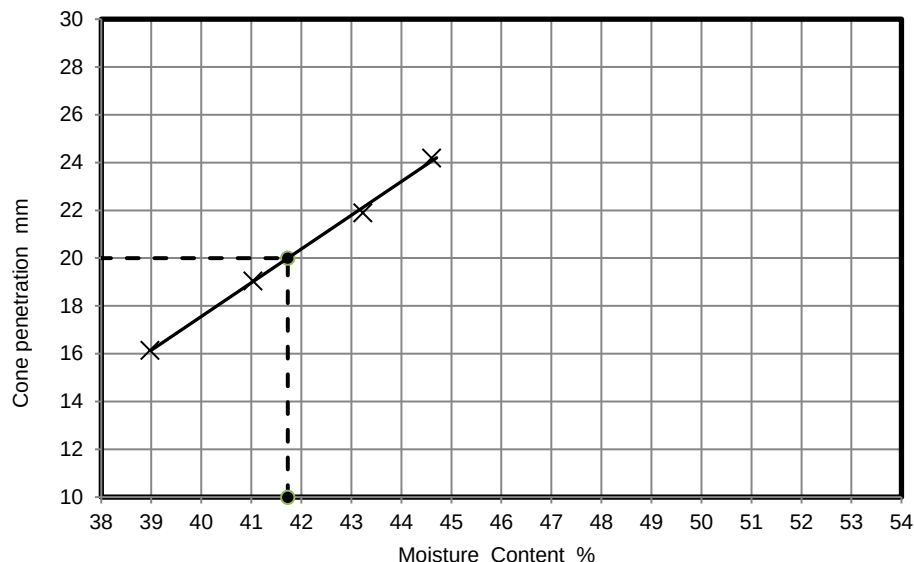
Soil Description Greyish brown slightly sandy silty CLAY

Samples received 22/08/2023

Schedules received 30/08/2023

Project Started 31/08/2023

Date Tested 11/09/2023



NATURAL MOISTURE CONTENT

23 %

% PASSING 425µm SIEVE

100 %

LIQUID LIMIT

42 %

PLASTIC LIMIT

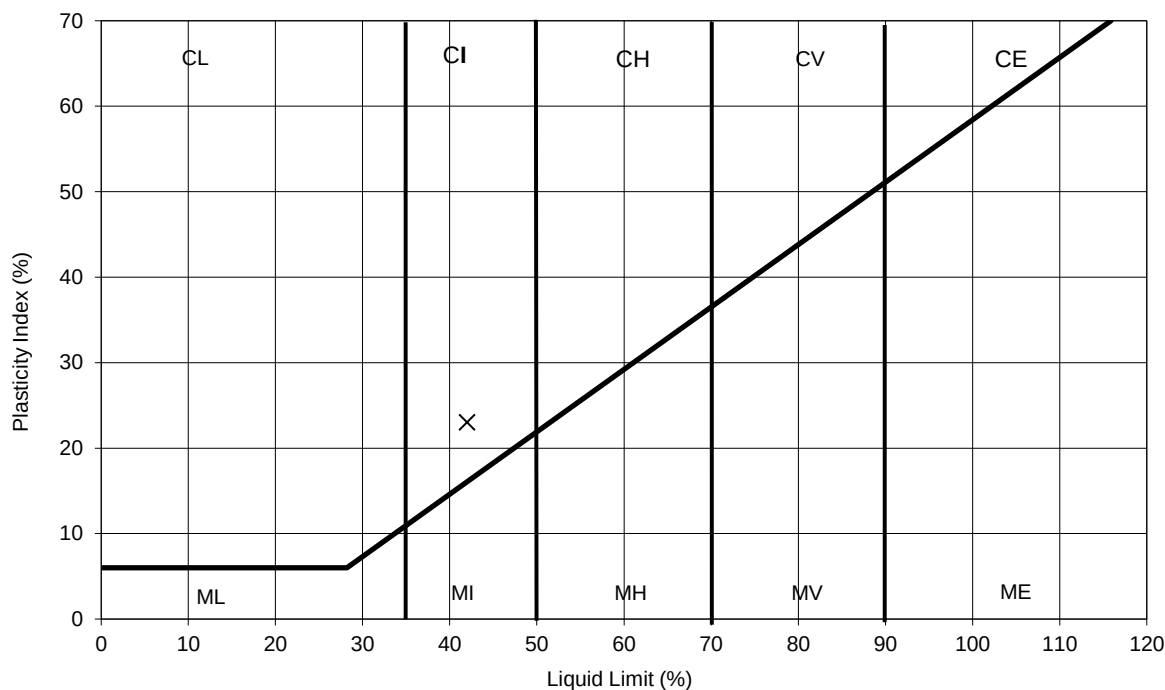
19 %

PLASTICITY INDEX

23 %

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Checked and Approved

Initials: J.P

Date: 15/09/2023

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33982

Borehole/Pit No. BH1

Site Name Former Honda Garage, Chippenham (Chippenham)

Sample No. 9

Project No. P23.207 Client Impact Geotechnical

Depth Top 2.50 m

Depth Base 3.00 m

Sample Type D

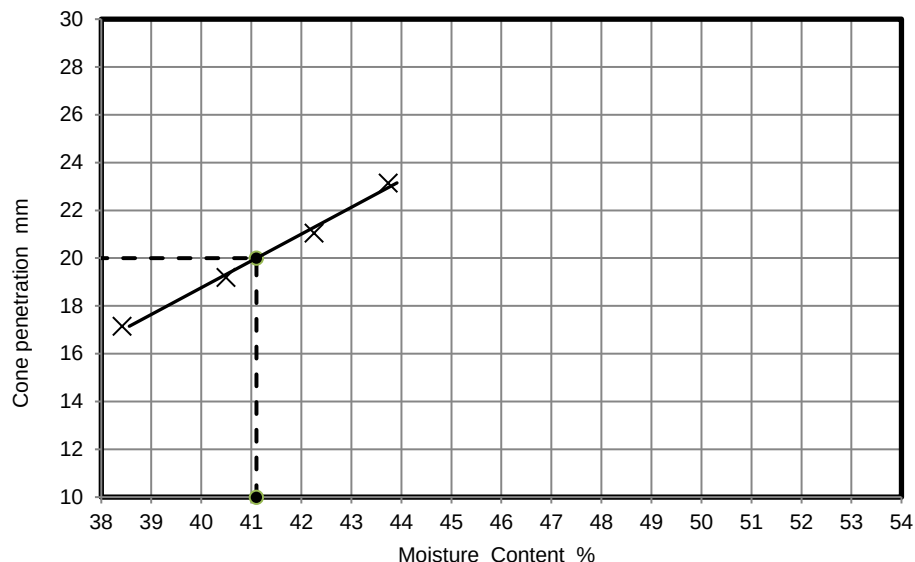
Soil Description Grey slightly sandy silty CLAY

Samples received 22/08/2023

Schedules received 30/08/2023

Project Started 31/08/2023

Date Tested 11/09/2023



NATURAL MOISTURE CONTENT

22 %

% PASSING 425µm SIEVE

100 %

LIQUID LIMIT

41 %

PLASTIC LIMIT

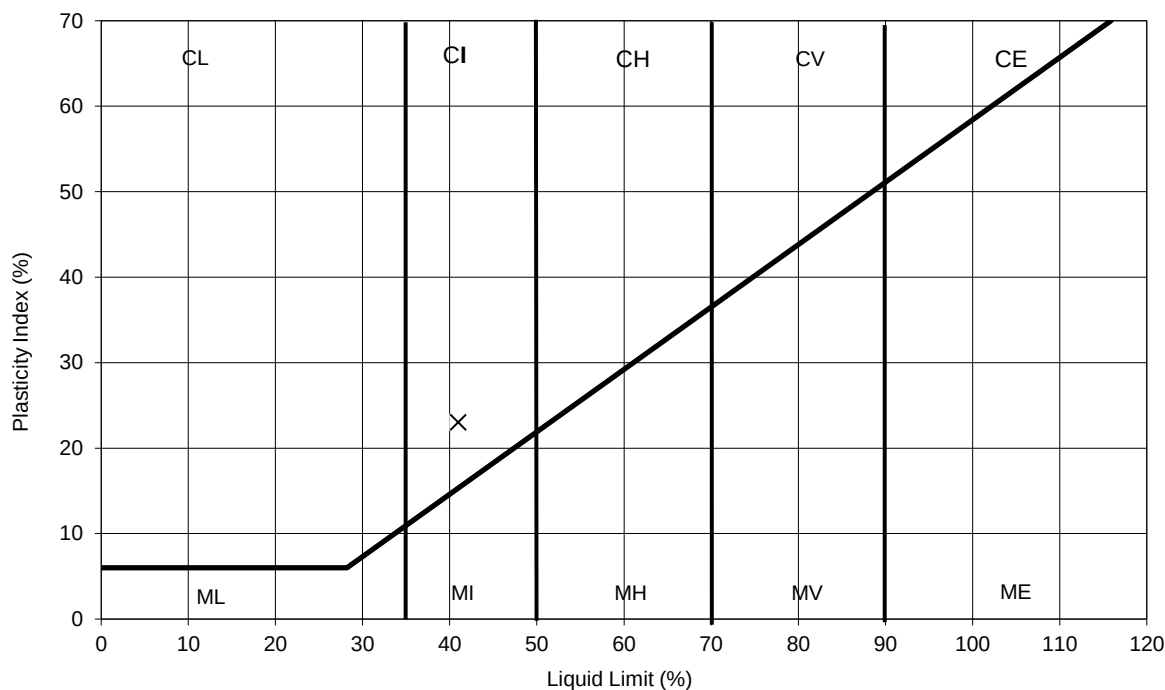
18 %

PLASTICITY INDEX

23 %

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 15/09/2023

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

33982

Borehole/Pit No.

BH2

Site Name

Former Honda Garage, Chippenham (Chippenham)

Sample No.

2

Project No.

P23.207

Client

Impact Geotechnical

Depth Top

0.40

m

Depth Base

-

m

Sample Type

D

Soil Description

Light brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and sub-angular fragments)

Samples received

22/08/2023

Schedules received

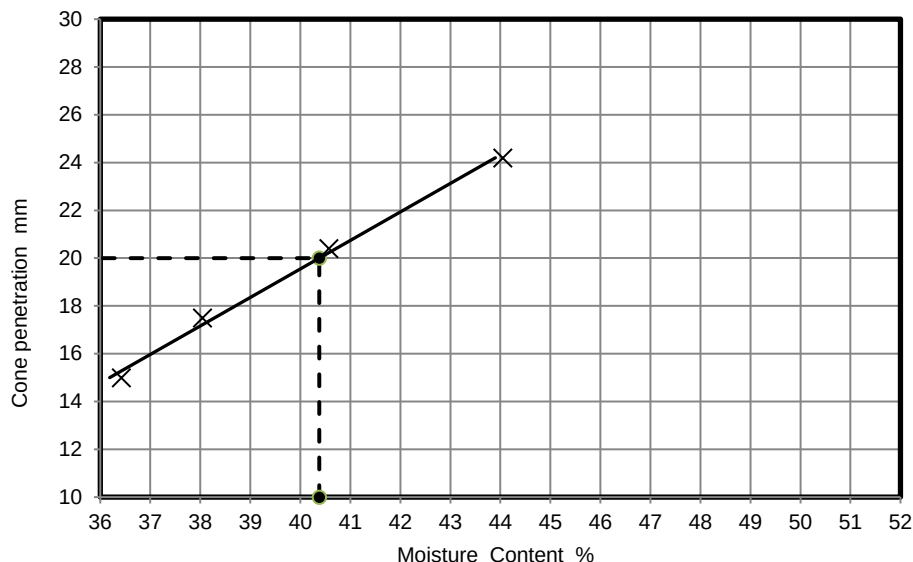
30/08/2023

Project Started

31/08/2023

Date Tested

12/09/2023



NATURAL MOISTURE CONTENT

15

%

% PASSING 425µm SIEVE

54

%

LIQUID LIMIT

40

%

PLASTIC LIMIT

15

%

PLASTICITY INDEX

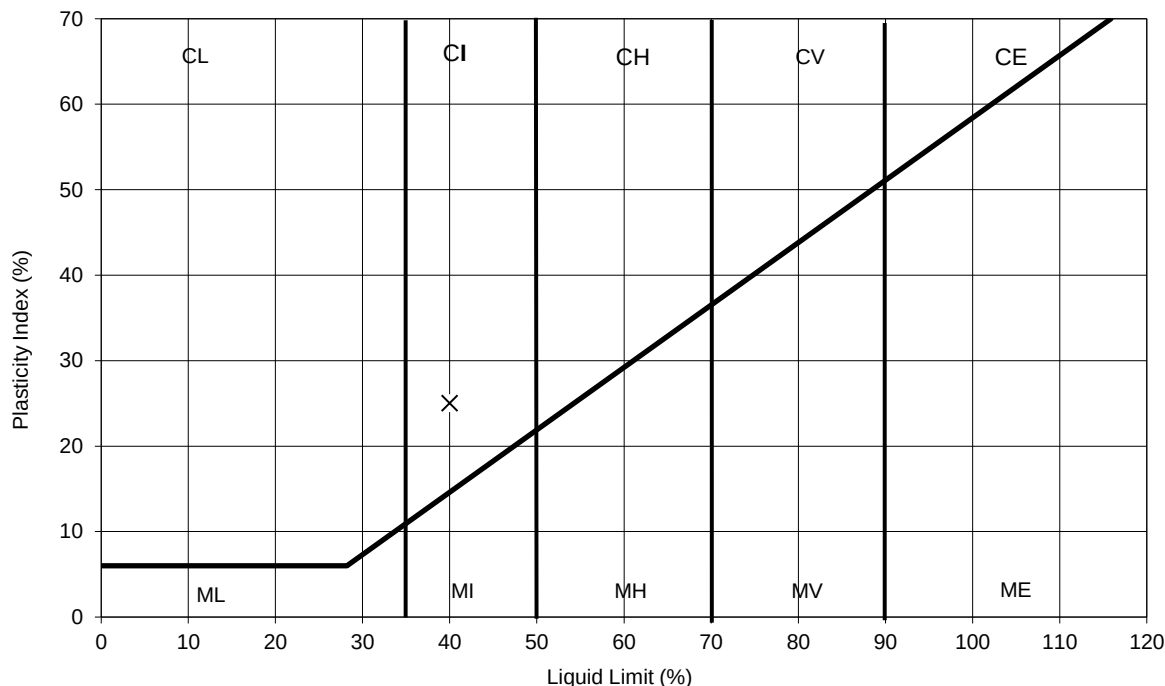
25

%

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 15/09/2023

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

33982

Borehole/Pit No.

BH2

Site Name

Former Honda Garage, Chippenham (Chippenham)

Sample No.

8

Project No.

P23.207

Client

Impact Geotechnical

Depth Top

2.50

m

Depth Base

3.00

m

Sample Type

D

Soil Description

Grey slightly sandy silty CLAY

Samples received

22/08/2023

Schedules received

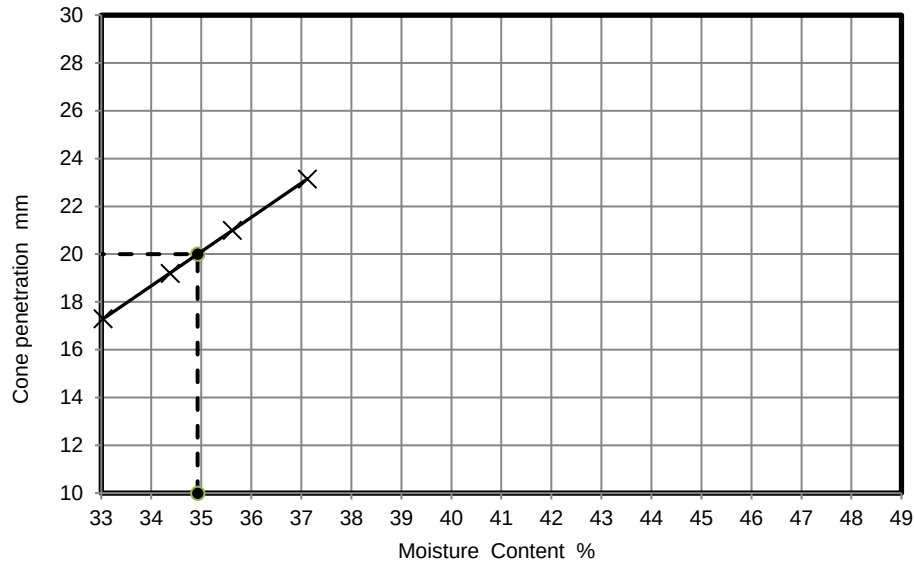
30/08/2023

Project Started

31/08/2023

Date Tested

11/09/2023



NATURAL MOISTURE CONTENT

18

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

35

%

PLASTIC LIMIT

17

%

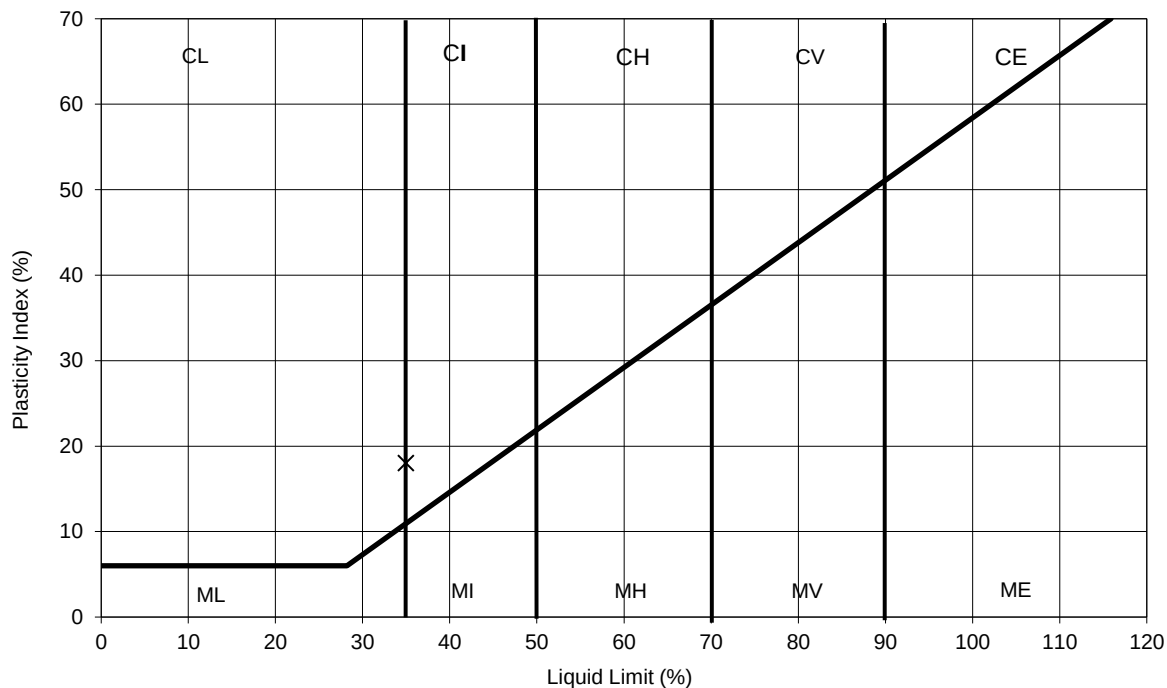
PLASTICITY INDEX

18

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 15/09/2023

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

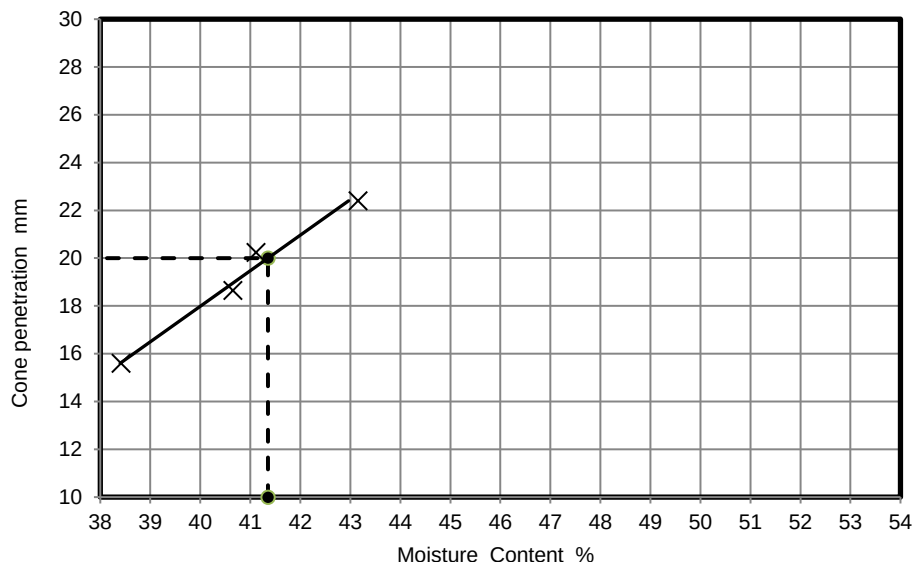
MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.	33982
Borehole/Pit No.	BH2
Sample No.	12
Depth Top	6.00 m
Depth Base	6.30 m
Sample Type	D
Samples received	22/08/2023
Schedules received	30/08/2023
Project Started	31/08/2023
Date Tested	11/09/2023

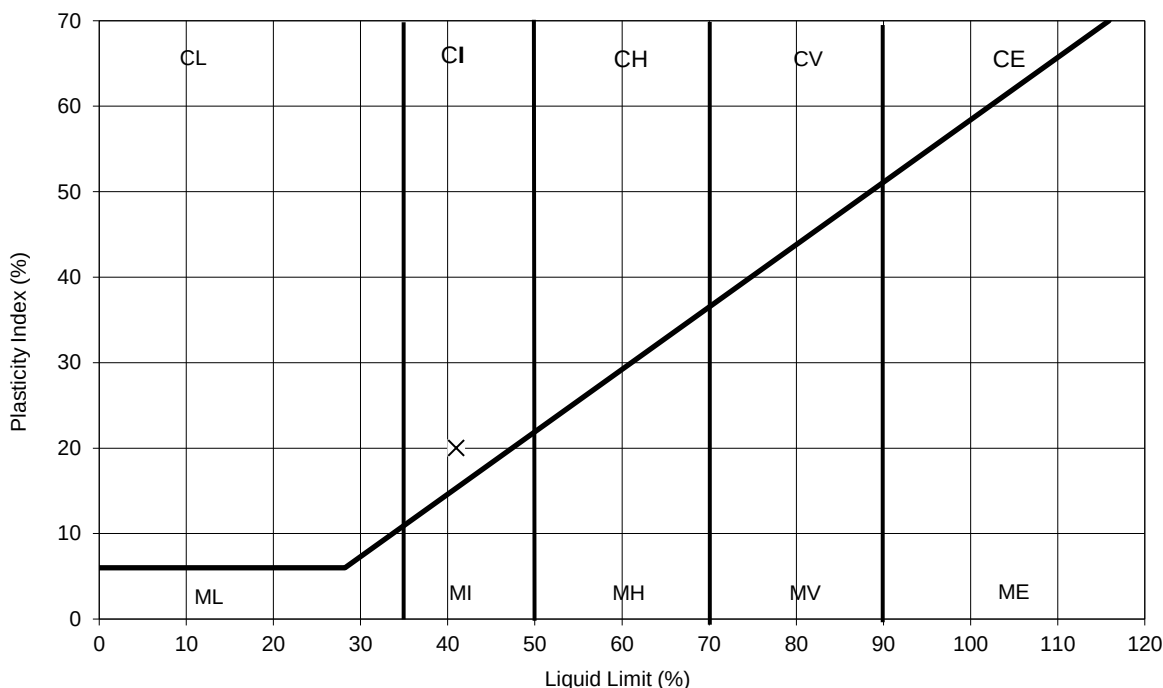
Site Name	Former Honda Garage, Chippenham (Chippenham)		
Project No.	P23.207	Client	Impact Geotechnical
Soil Description	Grey slightly gravelly slightly sandy silty CLAY (gravel is fine and sub-angular)		



NATURAL MOISTURE CONTENT	20	%
% PASSING 425µm SIEVE	96	%
LIQUID LIMIT	41	%
PLASTIC LIMIT	21	%
PLASTICITY INDEX	20	%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 15/09/2023

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33982

Borehole/Pit No. BH3

Site Name Former Honda Garage, Chippenham (Chippenham)

Sample No. 2

Project No. P23.207 Client Impact Geotechnical

Depth Top 0.40 m

Depth Base - m

Soil Description Brown slightly sandy gravelly silty CLAY (gravel is fmc limestone fragments)

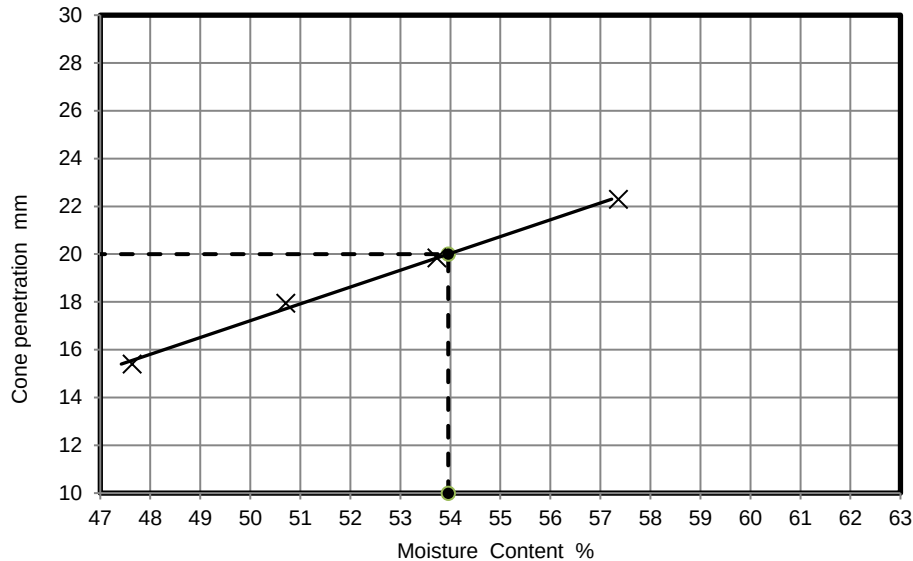
Sample Type B

Samples received 22/08/2023

Schedules received 30/08/2023

Project Started 31/08/2023

Date Tested 12/09/2023



NATURAL MOISTURE CONTENT

18

%

% PASSING 425µm SIEVE

56

%

LIQUID LIMIT

54

%

PLASTIC LIMIT

17

%

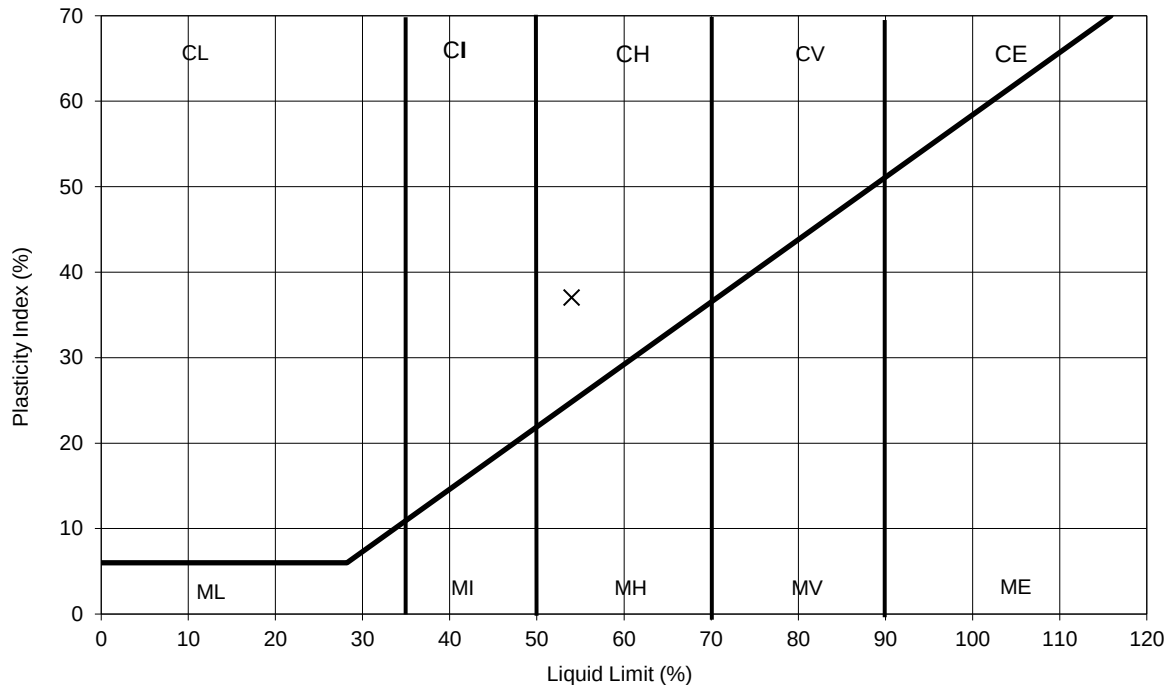
PLASTICITY INDEX

37

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 15/09/2023

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 33982

Borehole/Pit No. BH3

Site Name Former Honda Garage, Chippenham (Chippenham)

Sample No. 7

Project No. P23.207 Client Impact Geotechnical

Depth Top 3.00 m

Depth Base 3.45 m

Sample Type UT

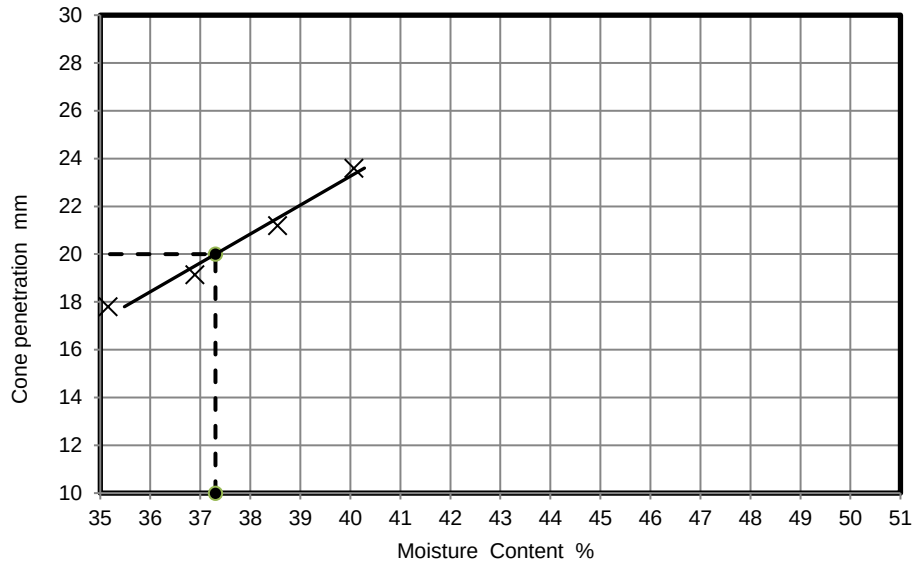
Soil Description Very high strength grey slightly gravelly silty CLAY with frequent pockets of fine sand (gravel is fm siltstone fragments)

Samples received 22/08/2023

Schedules received 30/08/2023

Project Started 31/08/2023

Date Tested 11/09/2023



NATURAL MOISTURE CONTENT

22 %

% PASSING 425µm SIEVE

82 %

LIQUID LIMIT

37 %

PLASTIC LIMIT

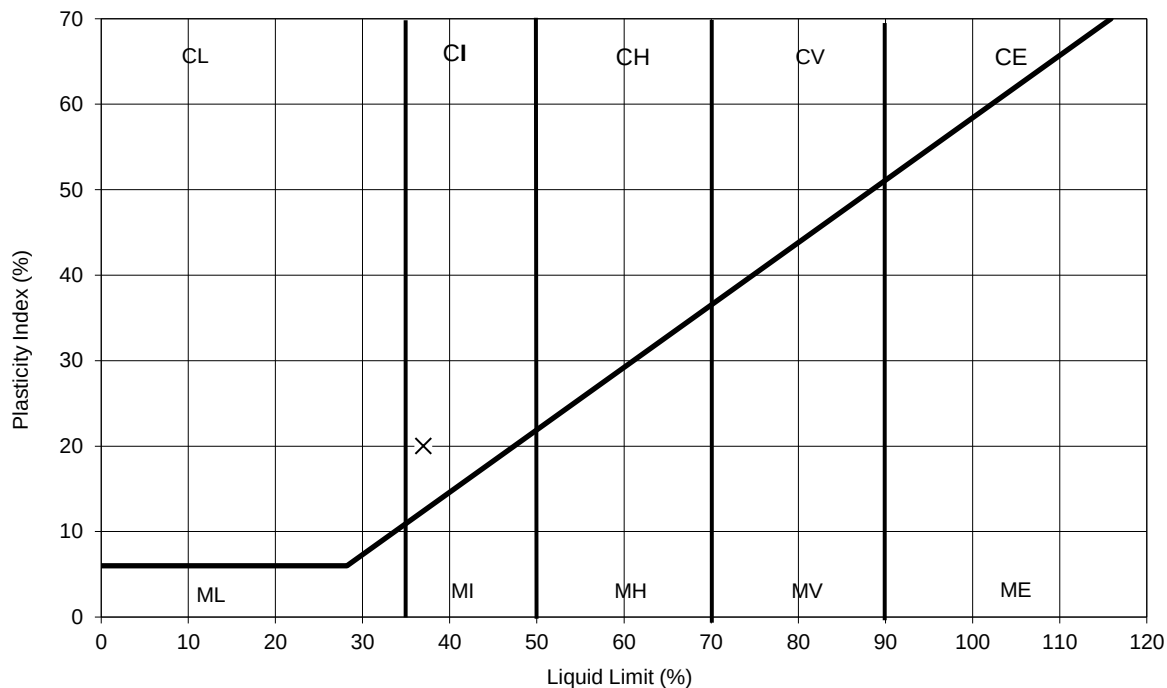
17 %

PLASTICITY INDEX

20 %

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 15/09/2023

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

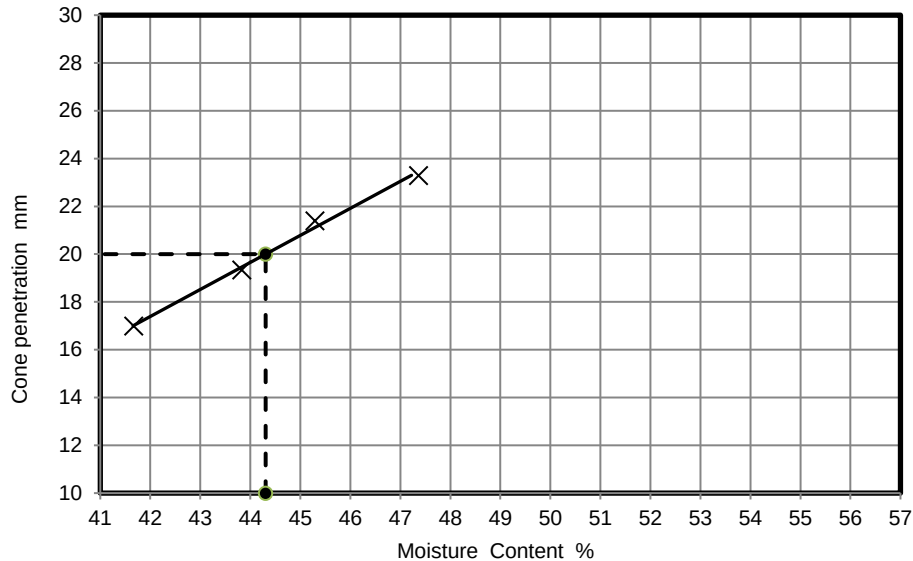
MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.	33982
Borehole/Pit No.	SA1
Sample No.	3
Depth Top	2.80 m
Depth Base	- m
Sample Type	B
Samples received	22/08/2023
Schedules received	30/08/2023
Project Started	31/08/2023
Date Tested	11/09/2023

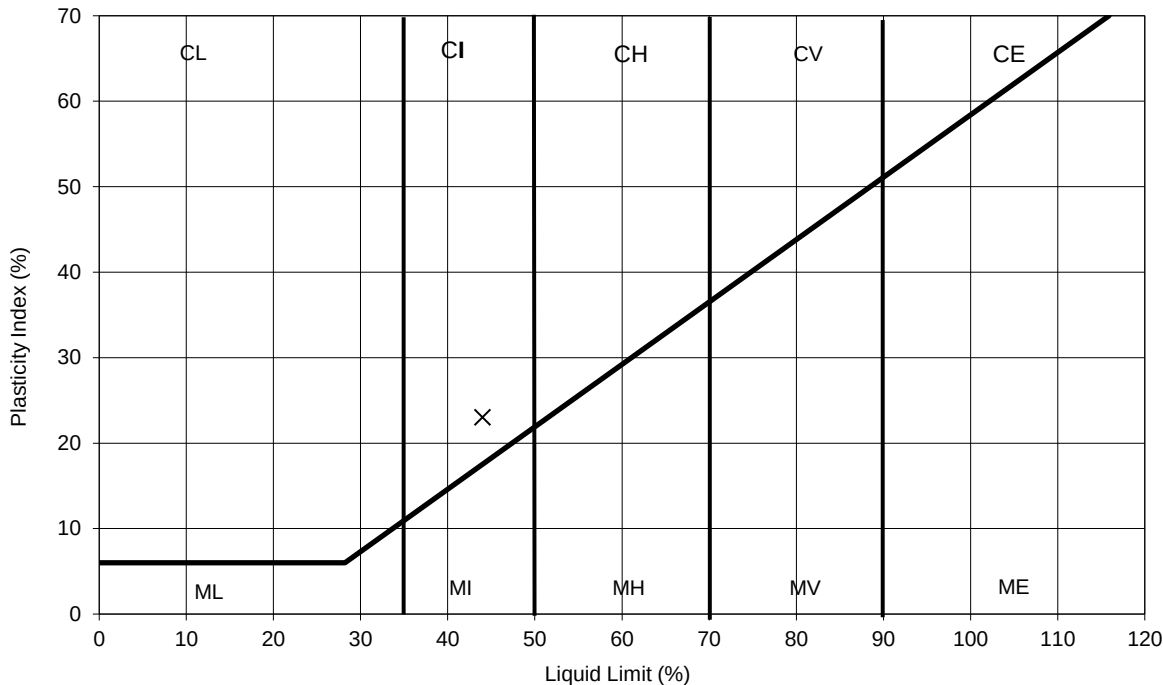
Site Name	Former Honda Garage, Chippenham (Chippenham)		
Project No.	P23.207	Client	Impact Geotechnical
Soil Description	Brownish grey mottled light grey and light brown slightly sandy slightly gravelly silty CLAY (gravel is fm siltstone fragments)		



NATURAL MOISTURE CONTENT	26	%
% PASSING 425µm SIEVE	85	%
LIQUID LIMIT	44	%
PLASTIC LIMIT	21	%
PLASTICITY INDEX	23	%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
 BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
 BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying
 Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
 Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P
 Date: 15/09/2023

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



Ryan Gunn
Impact Geotechnical Ltd
26 Anmore Road
Denmead
Hants
PO7 6NP

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-10706

Site Reference: Former Honda Garage, Chippenham (Chippenham)

Project / Job Ref: P23.207

Order No: None Supplied

Sample Receipt Date: 21/08/2023

Sample Scheduled Date: 21/08/2023

Report Issue Number: 1

Reporting Date: 25/08/2023

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



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Soil Analysis Certificate						
DETS Report No: 23-10706	Date Sampled	14/08/23	14/08/23	16/08/23	15/08/23	16/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	BH1	BH1	BH2	SA1	TP2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.30	0.60	0.40	0.60	0.30
Reporting Date: 25/08/2023	DETS Sample No	670913	670914	670915	670916	670917

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.5	8.3	8.2	8.6	8.8
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	140	102	190	49	32
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.14	0.10	0.19	0.05	0.03
Organic Matter (SOM)	%	< 0.1	MCERTS	4.3	4.4	3.9	11.8	9.1
Arsenic (As)	mg/kg	< 2	MCERTS	15	12	9	25	18
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.6	< 0.2	< 0.2	0.6	0.7
Chromium (Cr)	mg/kg	< 2	MCERTS	5	8	6	9	6
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	15	12	10	56	16
Lead (Pb)	mg/kg	< 3	MCERTS	45	11	7	98	41
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	7	9	7	9	7
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	88	21	10	86	78
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

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



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Maidstone
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Soil Analysis Certificate						
DETS Report No: 23-10706	Date Sampled	16/08/23	14/08/23	14/08/23	14/08/23	17/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	TP3	TP3	WS1	WS1	WS2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.20	0.40	0.50	0.80	0.30
Reporting Date: 25/08/2023	DETS Sample No	670918	670919	670920	670921	670922

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.5	8.7	8.6	8.3	12.2
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	50	30	192	97	39
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	0.03	0.19	0.10	0.04
Organic Matter (SOM)	%	< 0.1	MCERTS	4.6	5	5.3	4.4	7.1
Arsenic (As)	mg/kg	< 2	MCERTS	16	7	15	13	11
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.6	< 0.2	< 0.2	< 0.2	0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	4	4	9	9	8
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	13	11	14	13	15
Lead (Pb)	mg/kg	< 3	MCERTS	38	10	13	11	35
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	6	6	9	11	7
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	80	20	35	23	50
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 23-10706	Date Sampled	17/08/23	16/08/23			
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	WS2	WS4			
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.30			
Reporting Date: 25/08/2023	DETS Sample No	670923	670924			

Determinand	Unit	RL	Accreditation	(n)		
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	
pH	pH Units	N/a	MCERTS	11.9	8.2	
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	176	50	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.18	0.05	
Organic Matter (SOM)	%	< 0.1	MCERTS	5.2	4.5	
Arsenic (As)	mg/kg	< 2	MCERTS	8	15	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	6	14	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	12	15	
Lead (Pb)	mg/kg	< 3	MCERTS	11	16	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	7	15	
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	
Zinc (Zn)	mg/kg	< 3	MCERTS	24	43	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-10706	Date Sampled	14/08/23	14/08/23	16/08/23	15/08/23	16/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippendenham (Chippendenham)	TP / BH No	BH1	BH1	BH2	SA1	TP2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.30	0.60	0.40	0.60	0.30
Reporting Date: 25/08/2023	DETS Sample No	670913	670914	670915	670916	670917

Determinand	Unit	RL	Accreditation	(n)				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.16	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.20	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.18	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.10	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.16	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.14	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

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



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-10706	Date Sampled	16/08/23	14/08/23	14/08/23	14/08/23	17/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippendenham (Chippendenham)	TP / BH No	TP3	TP3	WS1	WS1	WS2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.20	0.40	0.50	0.80	0.30
Reporting Date: 25/08/2023	DETS Sample No	670918	670919	670920	670921	670922

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.84	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.40	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.29	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.31	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.15	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	4	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-10706	Date Sampled	17/08/23	16/08/23			
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Former Honda Garage, Chippendenham (Chippendenham)	TP / BH No	WS2	WS4			
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.30			
Reporting Date: 25/08/2023	DETS Sample No	670923	670924			

Determinand	Unit	RL	Accreditation	(n)		
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	



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Maidstone
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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 23-10706	Date Sampled	14/08/23	14/08/23	16/08/23	15/08/23	16/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	BH1	BH1	BH2	SA1	TP2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.30	0.60	0.40	0.60	0.30
Reporting Date: 25/08/2023	DETS Sample No	670913	670914	670915	670916	670917

Determinand	Unit	RL	Accreditation	(n)					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42	< 42

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



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Rose Lane
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Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 23-10706	Date Sampled	16/08/23	14/08/23	14/08/23	14/08/23	17/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	TP3	TP3	WS1	WS1	WS2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.20	0.40	0.50	0.80	0.30
Reporting Date: 25/08/2023	DETS Sample No	670918	670919	670920	670921	670922

Determinand	Unit	RL	Accreditation	(n)		(n)		(n)
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	56	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	56	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	10	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	127	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	127	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	183	< 42	< 42	< 42	< 42



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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-10706	Date Sampled	17/08/23	16/08/23			
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	WS2	WS4			
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.30			
Reporting Date: 25/08/2023	DETS Sample No	670923	670924			

Determinand	Unit	RL	Accreditation	(n)		
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-10706	Date Sampled	14/08/23	14/08/23	16/08/23	15/08/23	16/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	BH1	BH1	BH2	SA1	TP2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.30	0.60	0.40	0.60	0.30
Reporting Date: 25/08/2023	DETS Sample No	670913	670914	670915	670916	670917

Determinand	Unit	RL	Accreditation	(n)				
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-10706	Date Sampled	16/08/23	14/08/23	14/08/23	14/08/23	17/08/23
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Former Honda Garage, Chippendenham (Chippendenham)	TP / BH No	TP3	TP3	WS1	WS1	WS2
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.20	0.40	0.50	0.80	0.30
Reporting Date: 25/08/2023	DETS Sample No	670918	670919	670920	670921	670922

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	6
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	5
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-10706	Date Sampled	17/08/23	16/08/23			
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	WS2	WS4			
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.30			
Reporting Date: 25/08/2023	DETS Sample No	670923	670924			

Determinand	Unit	RL	Accreditation	(n)		
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-10706		Date Sampled	14/08/23			Landfill Waste Acceptance Criteria Limits		
Impact Geotechnical Ltd		Time Sampled	None Supplied					
Site Reference: Former Honda Garage, Chippenham (Chippenham)		TP / BH No	BH1					
Project / Job Ref: P23.207		Additional Refs	None Supplied					
Order No: None Supplied		Depth (m)	0.60					
Reporting Date: 25/08/2023		DETS Sample No	670914					
Determinand	Unit	MDL						
TOC ^{MU}	%	< 0.1	2.5					
Loss on Ignition ^{MU}	%	< 0.01	3					
BTEX ^{MU}	mg/kg	< 0.05	< 0.05					
Sum of PCBs	mg/kg	< 0.1	< 0.1					
Mineral Oil ^{MU}	mg/kg	< 10	< 10					
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7					
pH ^{MU}	pH Units	N/a	8.3					
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	3.2					
Eluate Analysis				10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)
Arsenic ^U			< 0.01				< 0.1	0.5 2 25
Barium ^U			< 0.02				< 0.2	20 100 300
Cadmium ^U			< 0.0005				< 0.005	0.04 1 5
Chromium ^U			< 0.005				< 0.05	0.5 10 70
Copper ^U			< 0.01				< 0.1	2 50 100
Mercury ^U			< 0.0005				< 0.005	0.01 0.2 2
Molybdenum ^U			< 0.001				< 0.01	0.5 10 30
Nickel ^U			< 0.007				< 0.07	0.4 10 40
Lead ^U			< 0.005				< 0.05	0.5 10 50
Antimony ^U			< 0.005				< 0.05	0.06 0.7 5
Selenium ^U			< 0.005				< 0.05	0.1 0.5 7
Zinc ^U			< 0.005				< 0.05	4 50 200
Chloride ^U			6.9				69	800 15000 25000
Fluoride ^U			< 0.5				< 5	10 150 500
Sulphate ^U			10.1				101	1000 20000 50000
TDS			90				900	4000 60000 100000
Phenol Index ^U			< 0.01				< 0.1	1 - -
DOC ^U			18				180	500 800 1000
Leach Test Information								
Sample Mass (kg)				0.10				
Dry Matter (%)				90.1				
Moisture (%)				11				
Stage 1								
Volume Eluate L10 (litres)				0.89				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-10706		Date Sampled	16/08/23			Landfill Waste Acceptance Criteria Limits		
Impact Geotechnical Ltd		Time Sampled	None Supplied					
Site Reference: Former Honda Garage, Chippenham (Chippenham)		TP / BH No	TP3					
Project / Job Ref: P23.207		Additional Refs	None Supplied					
Order No: None Supplied		Depth (m)	0.20					
Reporting Date: 25/08/2023		DETS Sample No	670918					
Determinand	Unit	MDL				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC ^{MU}	%	< 0.1	2.7			3%	5%	6%
Loss on Ignition ^{MU}	%	< 0.01	1.60			--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	< 0.05			6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1			1	--	--
Mineral Oil ^{MU}	mg/kg	< 10	141			500	--	--
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7			100	--	--
pH ^{MU}	pH Units	N/a	8.5			--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.6			--	To be evaluated	To be evaluated
Eluate Analysis			10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01			< 0.1	0.5	2	25
Barium ^U		0.17			1.7	20	100	300
Cadmium ^U		< 0.0005			< 0.005	0.04	1	5
Chromium ^U		< 0.005			< 0.05	0.5	10	70
Copper ^U		< 0.01			< 0.1	2	50	100
Mercury ^U		< 0.0005			< 0.005	0.01	0.2	2
Molybdenum ^U		0.001			0.01	0.5	10	30
Nickel ^U		< 0.007			< 0.07	0.4	10	40
Lead ^U		< 0.005			< 0.05	0.5	10	50
Antimony ^U		< 0.005			< 0.05	0.06	0.7	5
Selenium ^U		< 0.005			< 0.05	0.1	0.5	7
Zinc ^U		< 0.005			< 0.05	4	50	200
Chloride ^U		1.7			17	800	15000	25000
Fluoride ^U		< 0.5			< 5	10	150	500
Sulphate ^U		6.5			65	1000	20000	50000
TDS		69			690	4000	60000	100000
Phenol Index ^U		< 0.01			< 0.1	1	-	-
DOC ^U		15.8			158	500	800	1000
Leach Test Information								
Sample Mass (kg)			0.09					
Dry Matter (%)			94.9					
Moisture (%)			5.4					
Stage 1								
Volume Eluate L10 (litres)			0.89					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
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Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-10706	
Impact Geotechnical Ltd	
Site Reference: Former Honda Garage, Chippenham (Chippenham)	
Project / Job Ref: P23.207	
Order No: None Supplied	
Reporting Date: 25/08/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
670913	BH1	None Supplied	0.30	6.8	Light brown sandy clay with stones
670914	BH1	None Supplied	0.60	10	Light brown sandy clay with stones
670915	BH2	None Supplied	0.40	9	Light brown sandy clay with stones
670916	SA1	None Supplied	0.60	3.4	Brown sandy gravel with stones and concrete
670917	TP2	None Supplied	0.30	4.5	Brown gravelly sand with stones
670918	TP3	None Supplied	0.20	5	Brown sandy gravel with stones and concrete
670919	TP3	None Supplied	0.40	8.1	Brown sandy gravel with stones
670920	WS1	None Supplied	0.50	9.3	Light brown sandy clay with stones
670921	WS1	None Supplied	0.80	13.7	Light brown sandy clay with stones
670922	WS2	None Supplied	0.30	4.2	Brown sandy gravel with stones and concrete
670923	WS2	None Supplied	0.50	7.3	Brown sandy gravel with stones and concrete
670924	WS4	None Supplied	0.30	12.9	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-10706

Impact Geotechnical Ltd

Site Reference: Former Honda Garage, Chippenham (Chippenham)

Project / Job Ref: P23.207

Order No: None Supplied

Reporting Date: 25/08/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Water Analysis Certificate - Methodology & Miscellaneous Information	
DETS Report No: 23-10706	
Impact Geotechnical Ltd	
Site Reference: Former Honda Garage, Chippenham (Chippenham)	
Project / Job Ref: P23.207	
Order No: None Supplied	
Reporting Date: 25/08/2023	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%



Ryan Gunn
Impact Geotechnical Ltd
26 Anmore Road
Denmead
Hants
PO7 6NP

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-10764

Site Reference: Former Honda Garage, Chippenham (Chippenham)

Project / Job Ref: P23.207

Order No: P23.207

Sample Receipt Date: 22/08/2023

Sample Scheduled Date: 22/08/2023

Report Issue Number: 1

Reporting Date: 29/08/2023

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 23-10764	Date Sampled	17/08/23	18/08/23	17/08/23		
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	WS4	TP4	BH3		
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: P23.207	Depth (m)	1.30	0.20	0.40		
Reporting Date: 29/08/2023	DETS Sample No	671156	671157	671158		

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	7.8	8.0	7.9		
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1		
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	21	70	66		
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	0.07	0.07		
Organic Matter (SOM)	%	< 0.1	MCERTS	4.9	6.3	2.8		
Arsenic (As)	mg/kg	< 2	MCERTS	21	15	15		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.5	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	6	10	11		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	32	18	11		
Lead (Pb)	mg/kg	< 3	MCERTS	106	16	11		
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	8	10	15		
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Zinc (Zn)	mg/kg	< 3	MCERTS	90	43	15		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-10764	Date Sampled	17/08/23	18/08/23	17/08/23		
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Former Honda Garage, Chippendenham (Chippendenham)	TP / BH No	WS4	TP4	BH3		
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: P23.207	Depth (m)	1.30	0.20	0.40		
Reporting Date: 29/08/2023	DETS Sample No	671156	671157	671158		

Determinand	Unit	RL	Accreditation	(n)			
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	0.24	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	0.33	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	MCERTS	0.27	< 0.1	< 0.1	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.23	< 0.1	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.15	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.12	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	1.7	< 1.6	< 1.6	

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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 23-10764	Date Sampled	17/08/23	18/08/23	17/08/23		
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	WS4	TP4	BH3		
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: P23.207	Depth (m)	1.30	0.20	0.40		
Reporting Date: 29/08/2023	DETS Sample No	671156	671157	671158		

Determinand	Unit	RL	Accreditation	(n)			
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-10764	Date Sampled	17/08/23	18/08/23	17/08/23		
Impact Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Former Honda Garage, Chippenham (Chippenham)	TP / BH No	WS4	TP4	BH3		
Project / Job Ref: P23.207	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: P23.207	Depth (m)	1.30	0.20	0.40		
Reporting Date: 29/08/2023	DETS Sample No	671156	671157	671158		

Determinand	Unit	RL	Accreditation	(n)			
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	

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



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2																																							
DETS Report No: 23-10764		Date Sampled	17/08/23		<table border="1"> <thead> <tr> <th colspan="3">Landfill Waste Acceptance Criteria Limits</th> </tr> <tr> <th>Inert Waste Landfill</th> <th>Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill</th> <th>Hazardous Waste Landfill</th> </tr> </thead> <tbody> <tr> <td>3%</td> <td>5%</td> <td>6%</td> </tr> <tr> <td>--</td> <td>--</td> <td>10%</td> </tr> <tr> <td>6</td> <td>--</td> <td>--</td> </tr> <tr> <td>1</td> <td>--</td> <td>--</td> </tr> <tr> <td>500</td> <td>--</td> <td>--</td> </tr> <tr> <td>100</td> <td>--</td> <td>--</td> </tr> <tr> <td>--</td> <td>>6</td> <td>--</td> </tr> <tr> <td>--</td> <td>To be evaluated</td> <td>To be evaluated</td> </tr> </tbody> </table>					Landfill Waste Acceptance Criteria Limits			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	3%	5%	6%	--	--	10%	6	--	--	1	--	--	500	--	--	100	--	--	--	>6	--	--	To be evaluated	To be evaluated
Landfill Waste Acceptance Criteria Limits																																							
Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill																																					
3%	5%	6%																																					
--	--	10%																																					
6	--	--																																					
1	--	--																																					
500	--	--																																					
100	--	--																																					
--	>6	--																																					
--	To be evaluated	To be evaluated																																					
Impact Geotechnical Ltd		Time Sampled	None Supplied																																				
Site Reference: Former Honda Garage, Chippenham (Chippenham)		TP / BH No	WS4																																				
Project / Job Ref: P23.207		Additional Refs	None Supplied																																				
Order No: P23.207		Depth (m)	1.30																																				
Reporting Date: 29/08/2023		DETS Sample No	671156																																				
Determinand	Unit	MDL																																					
TOC ^{MU}	%	< 0.1	2.9																																				
Loss on Ignition ^{MU}	%	< 0.01	2.08																																				
BTEX ^{MU}	mg/kg	< 0.05	< 0.05																																				
Sum of PCBs	mg/kg	< 0.1	< 0.1																																				
Mineral Oil ^{MU}	mg/kg	< 10	< 10																																				
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7																																				
pH ^{MU}	pH Units	N/a	7.8																																				
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.7																																				
Eluate Analysis			10:1 mg/l			Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)																																
Arsenic ^U		< 0.01				0.5	2	25																															
Barium ^U		0.11				1.1	20	100	300																														
Cadmium ^U		< 0.0005				< 0.005	0.04	1	5																														
Chromium ^U		< 0.005				< 0.05	0.5	10	70																														
Copper ^U		< 0.01				< 0.1	2	50	100																														
Mercury ^U		< 0.0005				< 0.005	0.01	0.2	2																														
Molybdenum ^U		0.003				0.03	0.5	10	30																														
Nickel ^U		< 0.007				< 0.07	0.4	10	40																														
Lead ^U		< 0.005				< 0.05	0.5	10	50																														
Antimony ^U		< 0.005				< 0.05	0.06	0.7	5																														
Selenium ^U		< 0.005				< 0.05	0.1	0.5	7																														
Zinc ^U		0.005				0.05	4	50	200																														
Chloride ^U		1.6				16	800	15000	25000																														
Fluoride ^U		< 0.5				< 5	10	150	500																														
Sulphate ^U		5.9				59	1000	20000	50000																														
TDS		74				740	4000	60000	100000																														
Phenol Index ^U		< 0.01				< 0.1	1	-	-																														
DOC ^U		16.2				162	500	800	1000																														
Leach Test Information																																							
Sample Mass (kg)		0.09																																					
Dry Matter (%)		95.1																																					
Moisture (%)		5.2																																					
Stage 1																																							
Volume Eluate L10 (litres)		0.89																																					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-10764	
Impact Geotechnical Ltd	
Site Reference: Former Honda Garage, Chippenham (Chippenham)	
Project / Job Ref: P23.207	
Order No: P23.207	
Reporting Date: 29/08/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
671156	WS4	None Supplied	1.30	4.8	Brown sandy gravel with stones and concrete
671157	TP4	None Supplied	0.20	10.7	Light brown sandy clay with stones
671158	BH3	None Supplied	0.40	16.6	Light brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{U/S}

Unsuitable Sample ^{U/S}



DETS Ltd
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Rose Lane
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Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-10764

Impact Geotechnical Ltd

Site Reference: Former Honda Garage, Chippenham (Chippenham)

Project / Job Ref: P23.207

Order No: P23.207

Reporting Date: 29/08/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Water Analysis Certificate - Methodology & Miscellaneous Information	
DETS Report No: 23-10764	
Impact Geotechnical Ltd	
Site Reference: Former Honda Garage, Chippenham (Chippenham)	
Project / Job Ref: P23.207	
Order No: P23.207	
Reporting Date: 29/08/2023	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%



APPENDIX F – SOIL INFILTRATION TESTING SHEET

BRE 365 Soil Infiltration Testing

Project Ref	P23.207	Hole Ref	SA1
Site Name	Chippenham	Test Number	1

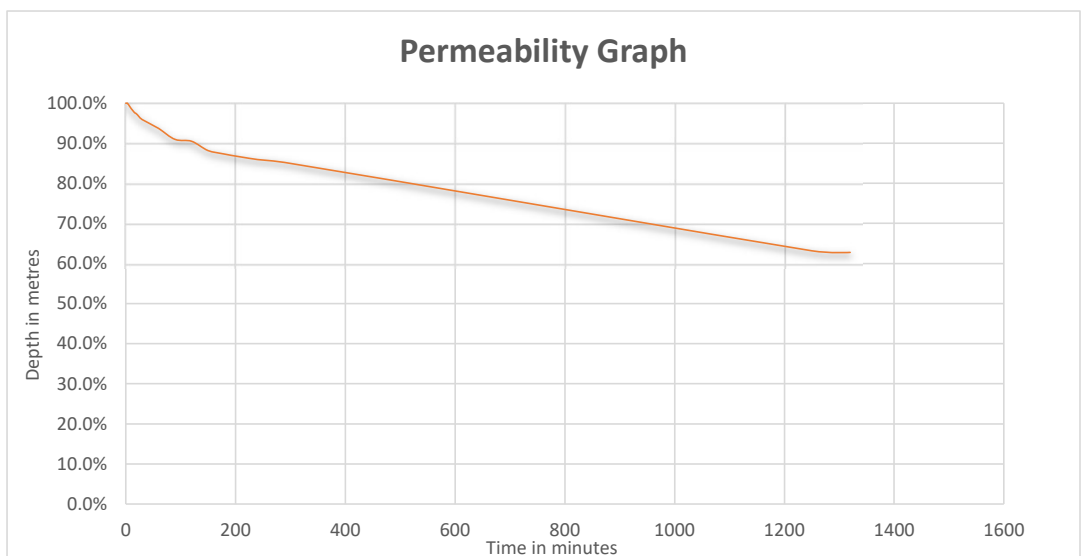
Project Ref	P23.207	Hole Ref	SA1
Site Name	Chippenham	Test Number	1

[illegible]

Pit Size		Time in mins	
Length	2.40	730	75%
Width	0.50		25%
Depth	2.90		

invalid 25% and/or 75% times	
Infiltration Rate	from 75%-25% not valid

Infiltration Rate	from 75%-25%	not valid
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BRE 365 Soil Infiltration Testing

Project Ref	P23.207	Hole Ref	SA1
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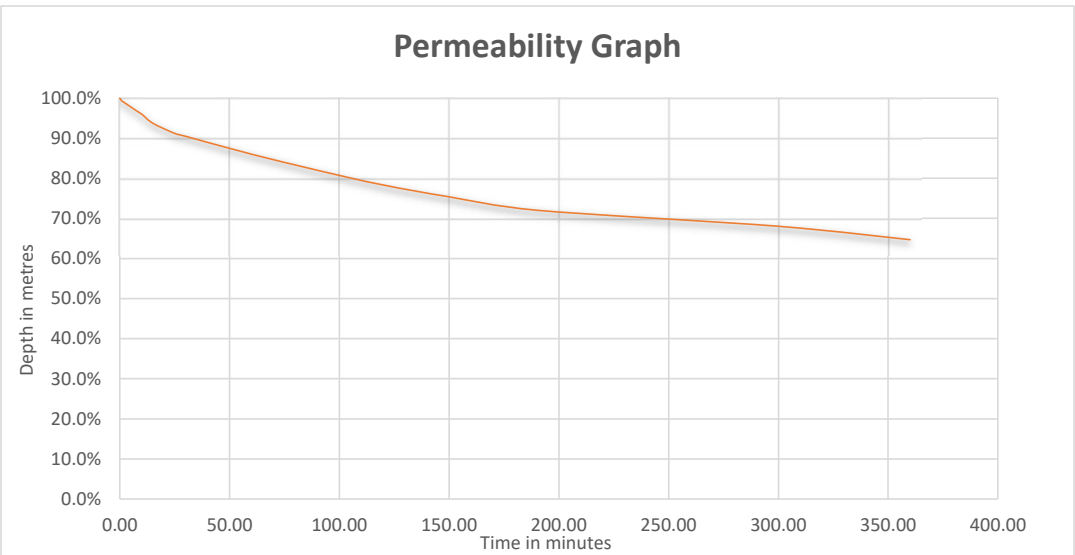
Site Name	Chippenham	Test Number	2
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[illegible]

Pit Size		Time in mins	
Length	2.40	150	75%
Width	0.50		25%
Depth	2.80		

invalid 25% and/or 75% times

Infiltration Rate from 75%-25% **not valid**



BRE 365 Soil Infiltration Testing

Project Ref	P23.207	Hole Ref	SA2
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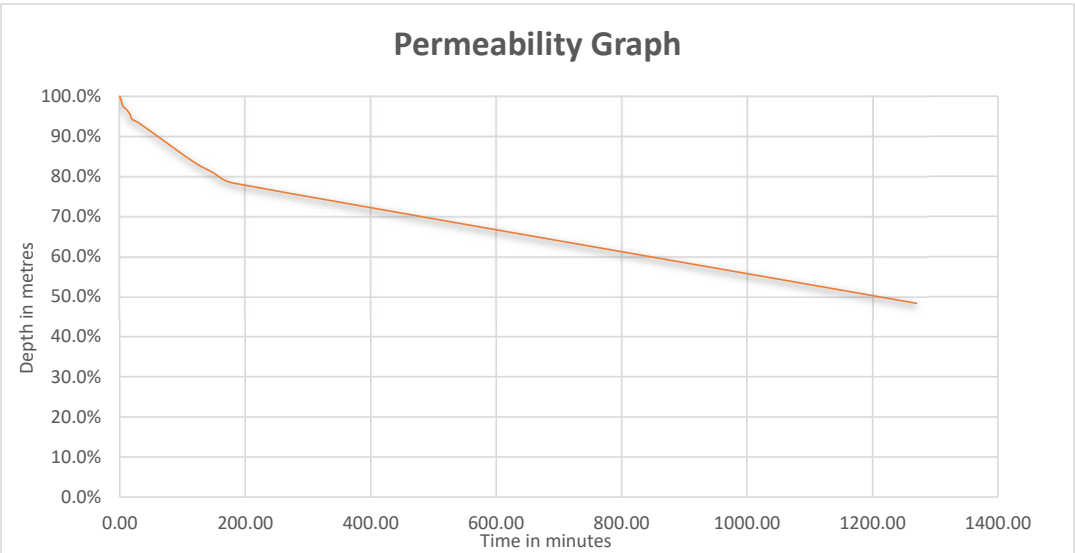
Site Name	Chippenham	Test Number	1
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[illegible]

Pit Size		Time in mins	
Length	2.50	300	75%
Width	0.45		25%
Depth	1.00		

invalid 25% and/or 75% times

Infiltration Rate from 75%-25% not valid



BRE 365 Soil Infiltration Testing

Project Ref	P23.207	Hole Ref	SA2
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Site Name	Chippenham	Test Number	2
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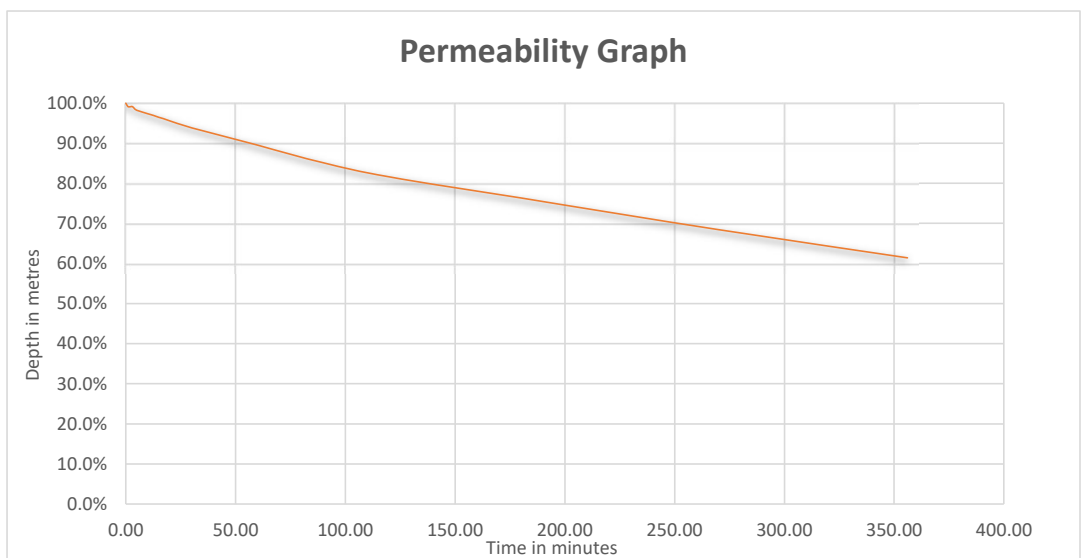
[illegible]

Pit Size		Time in mins	
Length	2.50	200	75%
Width	0.45		25%
Depth	0.85		

invalid 25% and/or 75% times

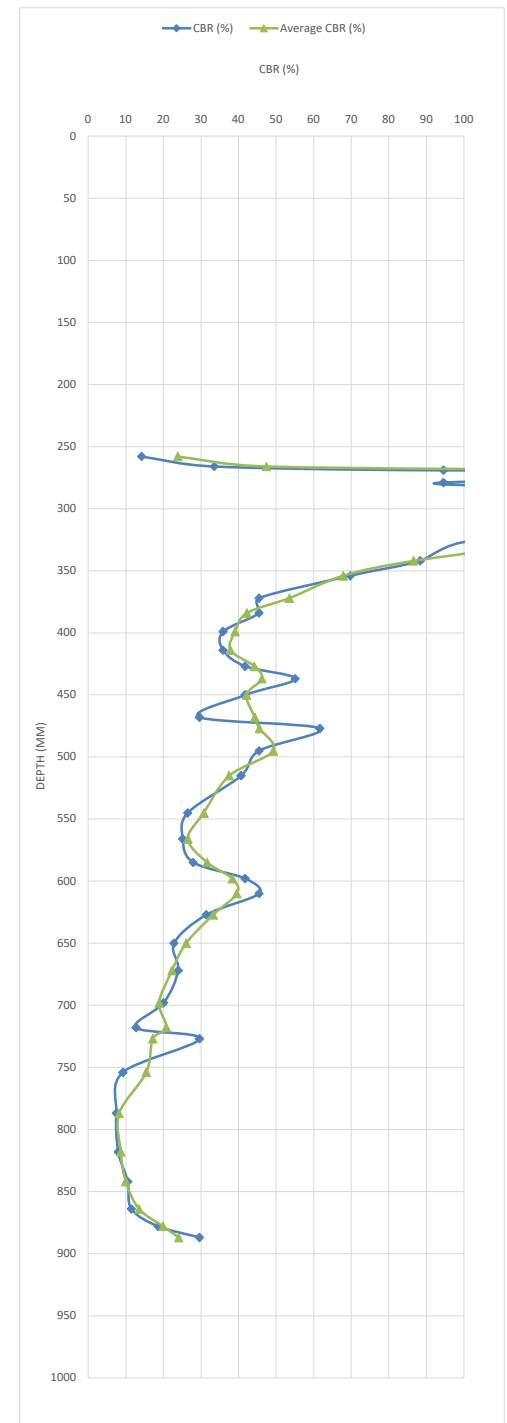
<u>Infiltration Rate</u>	from 75%-25%	not valid
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not valid





APPENDIX G – DCP TEST SHEETS



Dynamic Cone Penetrometer Testing

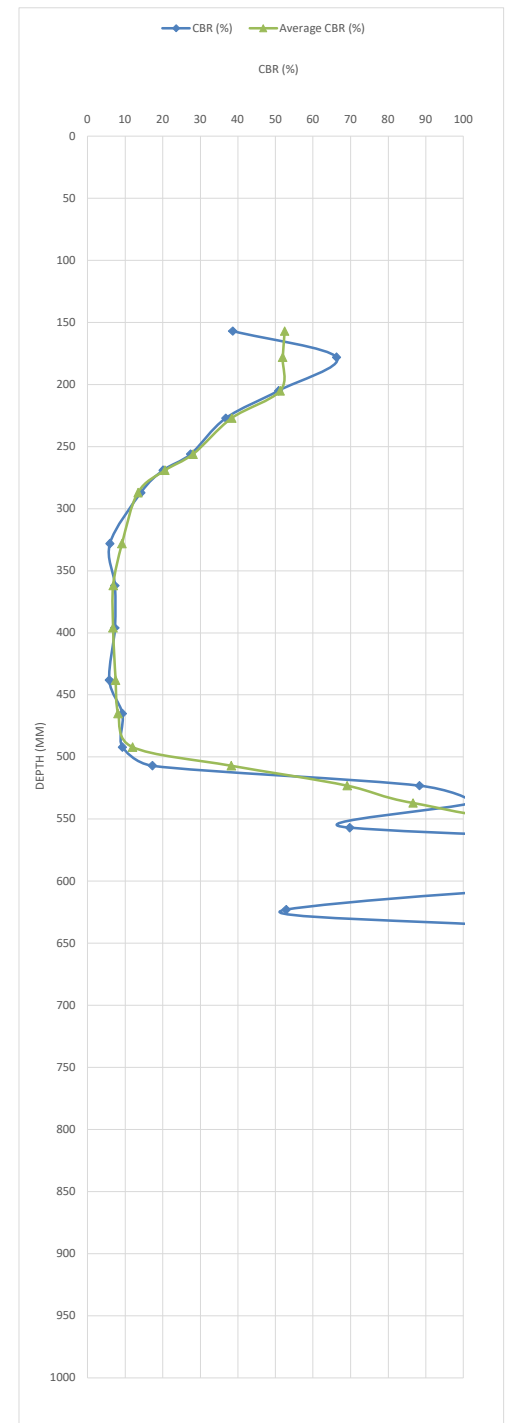
Determination of Penetration Value of Unbound Soil using Dynamic Cone Penetrometer (DCP)

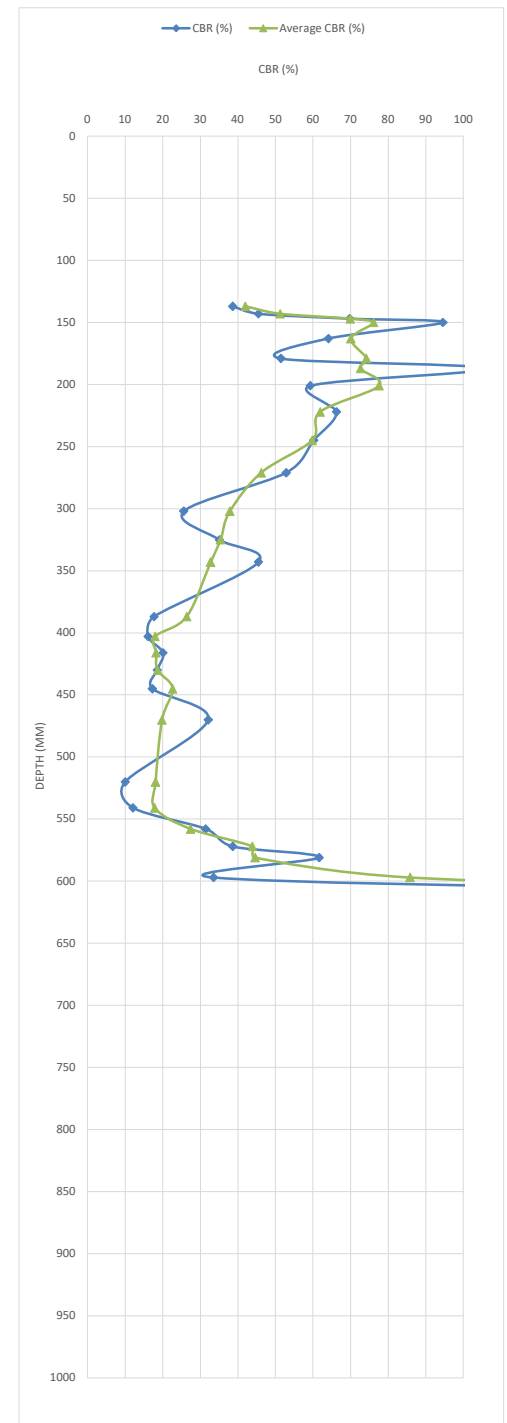
Sample Reference

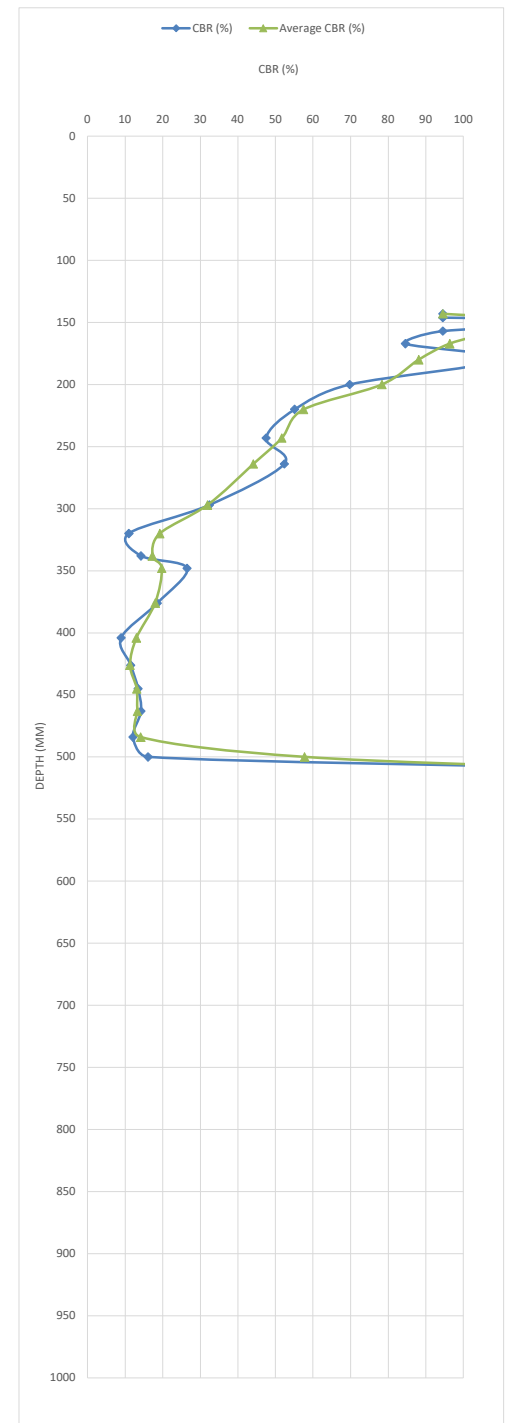
Test Ref.	DCP2
Location	Former Honda Garage, Chippenham
Project ID	P23.207
Date	14/08/2023
Material	Type 1 over Made Ground, overlying weathered Cornbrash Formation
Level	0.15mbgl below tarmac in car park

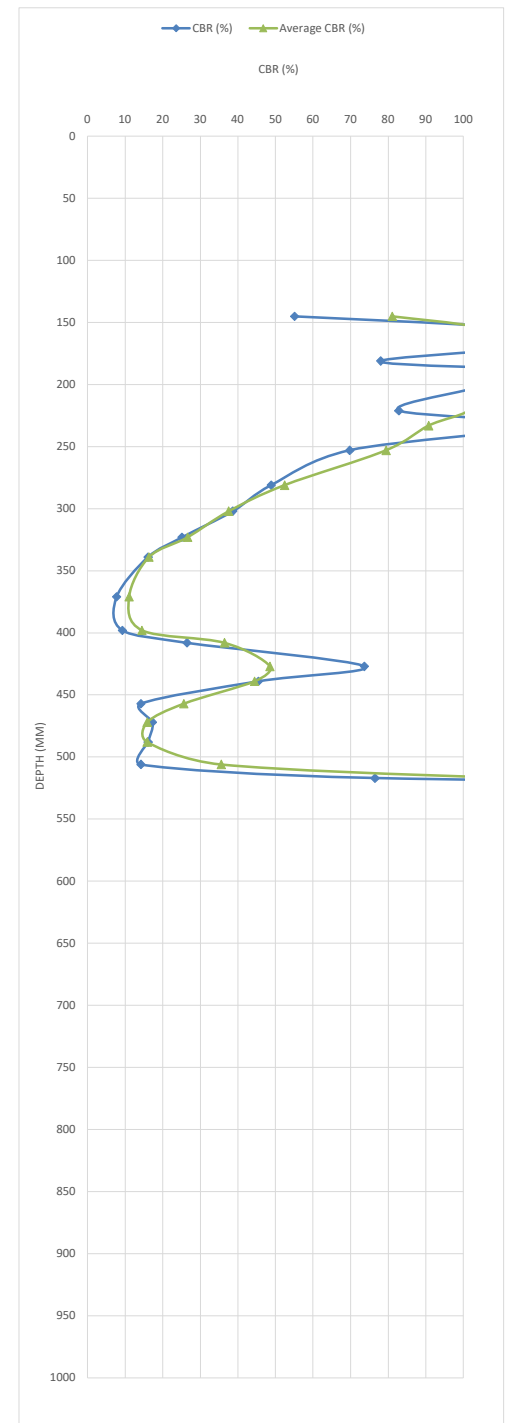
Number of Blows	Total Blows	Rod 1 Reading (mm)	Rod 2 Reading (mm)	Total Depth	mm/Blow	CBR (%)	Average CBR (%)
START POSITION:		150					
	Zero	208		150			
1	1	215		157	7	1.5867314	38.6
5	6	236		178	4.2	1.8212255	66.3
5	11	263		205	5.4	1.7058598	50.8
3	14	285		227	7.333333	1.5653764	36.8
3	17	314		256	9.666667	1.4385625	27.5
1	18	327		269	13	1.3025619	20.1
1	19	345		287	18	1.153177	14.2
1	20	386		328	41	0.7752875	6.0
1	21	420		362	34	0.8612268	7.3
1	22	454		396	34	0.8612268	7.3
1	23	496		438	42	0.7642255	5.8
1	24	523		465	27	0.9670485	9.3
1	25	550		492	27	0.9670485	9.3
1	26	565		507	15	1.2368715	17.3
5	31	581		523	3.2	1.9460565	88.3
5	36	595		537	2.8	2.007354	101.7
5	41	615		557	4	1.8436226	69.8
10	51	628		570	1.3	2.3595619	228.9
10	61	633		575	0.5	2.7981887	628.3
10	71	639		581	0.6	2.7144941	518.2
10	81	655		597	1.6	2.2642452	183.8
5	86	681		623	5.2	1.7231845	52.9
5	91	694		636	2.6	2.0413732	110.0
5	96	704		646	2	2.1618113	145.1
5	101	712		654	1.6	2.2642452	183.8
10	111	720		662	0.8	2.5824339	382.3
10	121	726		668	0.6	2.7144941	518.2
10	131	732		674	0.6	2.7144941	518.2
10	141	738		680	0.6	2.7144941	518.2
10	151	752		694	1.4	2.3255427	211.6
10	161	771		713	1.9	2.1853574	153.2
10	171	780		722	0.9	2.5283657	337.6
10	181	783		725	0.3	3.0326828	1078.2
10	191	786		728	0.3	3.0326828	1078.2
10	201	789		731	0.3	3.0326828	1078.2
10	211	791		733	0.2	3.2188113	1655.1
10	221	795		737	0.4	2.9006226	795.5
10	231	798		740	0.3	3.0326828	1078.2
10	241	799		741	0.1	3.537	3443.5
Remarks							

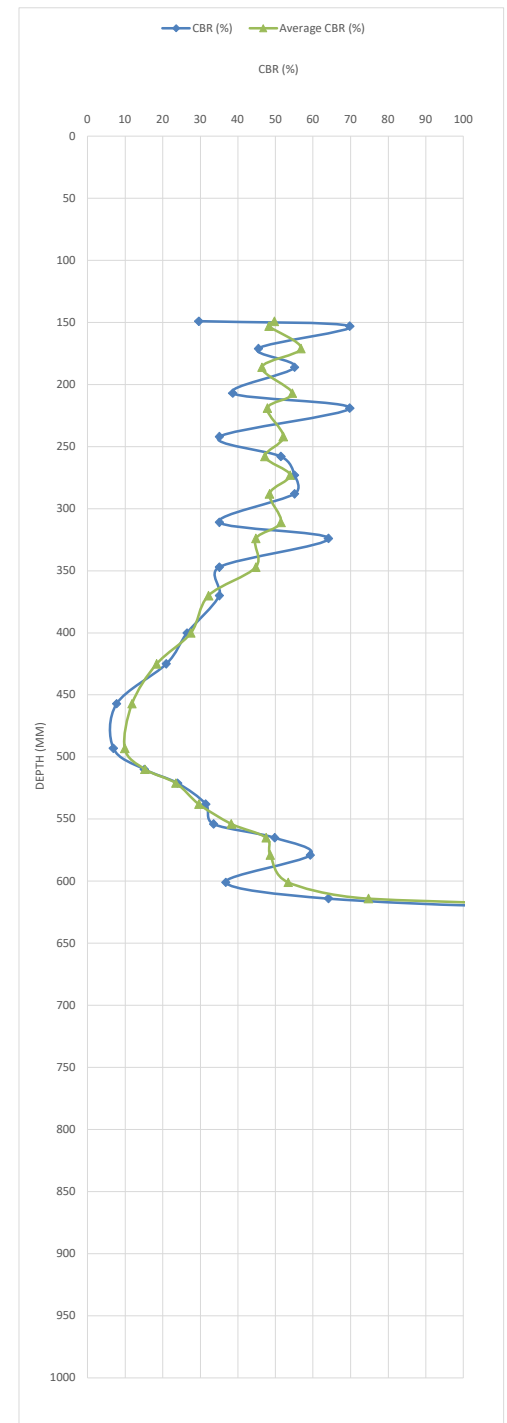
TEST DCP2

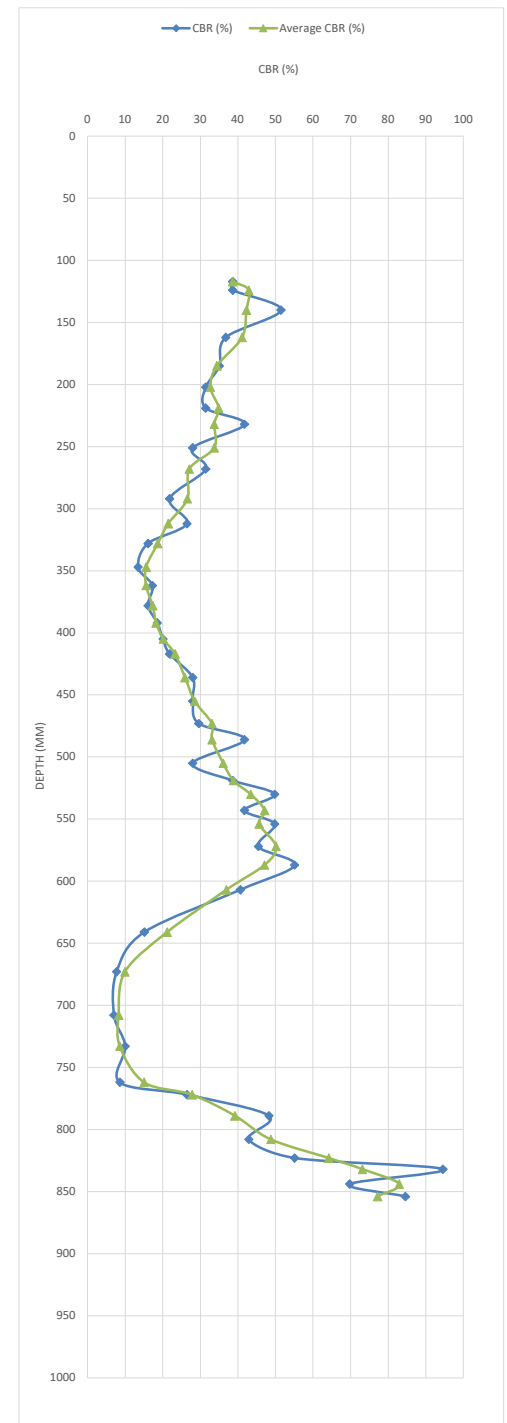


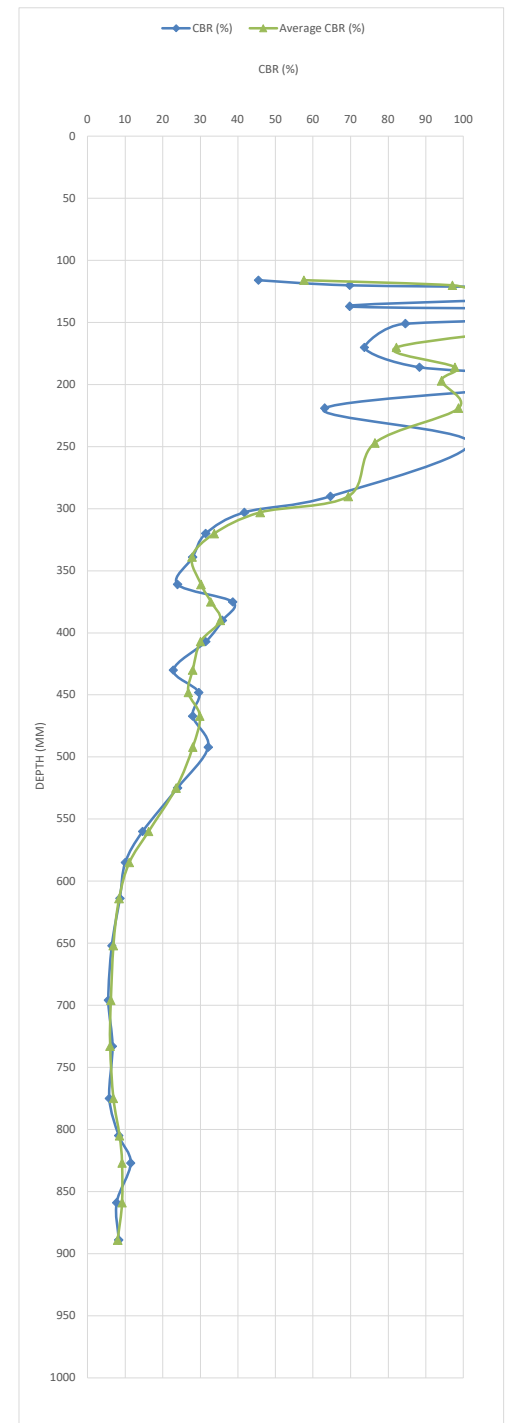


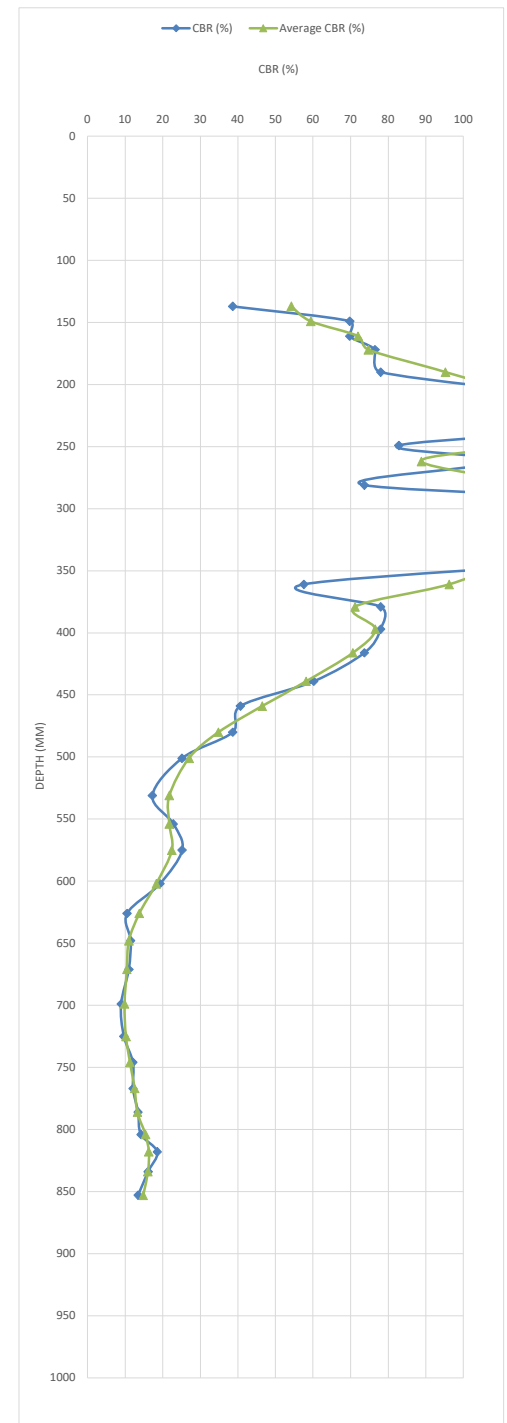


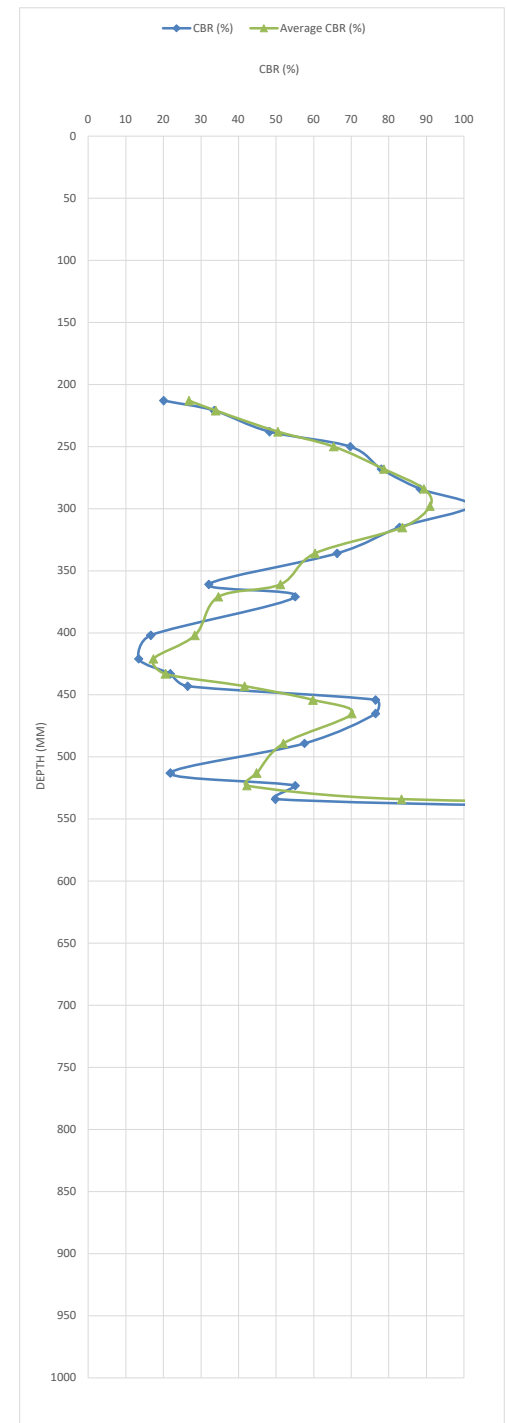














APPENDIX H – MONITORING SHEETS

Borehole Monitoring Record

Project Name:	Former Honda Garage, Chippenham	Project Reference:	P23.207
Date:	29/08/23	Personnel:	RM
Weather:	Overcast	Ground Conditions:	Dry
Temp (°C):	19	Humidity (%):	83%
Atmospheric Pressure:	1006mb	Monitoring Round:	MON 1

Groundwater Records										
Well No.	BH1	BH2	BH3							
Borehole Diameter (mm):	50	50	50							
Time Monitored	11:40	11:50	12:00							
Groundwater level (mbgl)	2.92	2.55	2.55							
Depth of installation (mbgl)	14.00	2.95	10.20							
Volume Purged (l)	15	15	15							
Water Appearance	Grey silty	Grey silty	Grey silty							
Gas Monitoring Records										
Atmospheric Pressure (mb)	1006	1006	1006							
Downhole Pressure (mb)	-0.24	-0.24	-0.23							
Flow Rate (l/hr)	-2.2	0.1	0.12							
Methane (%)	Max.	0.1	0.0	0.0						
	Steady	0.1	0.0	0.0						
Carbon Dioxide (%)	Max.	0.1	0.1	2.4						
	Steady	0.1	0.1	2.4						
Oxygen (%)	Min.	11.0	20.4	7.1						
	Steady	20.9	20.8	7.1						
VOCs (ppm)	N/A	N/A	N/A							
H ₂ S (ppm)	0.0	0.0	1							
Carbon Monoxide (ppm)	1.0	1.0	2.0							
Notes:	No hydrocarbon odour and sheen noted on groundwater									



Project Name:	Former Honda Garage, Chippenham	Project Reference:	P23.207
Date:	05/09/23	Personnel:	RM
Weather:	Sunny	Ground Conditions:	Dry
Temp (°C):	30	Humidity (%):	56%
Atmospheric Pressure:	1008mb	Monitoring Round:	MON 2

Groundwater Records

Well No.	BH1	BH2	BH3							
Borehole Diameter (mm):	50	50	50							
Time Monitored	13:40	13:50	14:00							
Groundwater level (mbgl)	4.45	2.66	2.38							
Depth of installation (mbgl)	14.00	2.95	10.20							
Volume Purged (l)	-	-	-							
Water Appearance	-	-	-							

Gas Monitoring Records

Atmospheric Pressure (mb)		1008	1008	1008						
Downhole Pressure (mb)		-0.09	-0.05	-0.00						
Flow Rate (l/hr)		0.0	0.1	0.0						
Methane (%)	Max.	0.1	0.0	0.0						
	Steady	0.1	0.0	0.0						
Carbon Dioxide (%)	Max.	3.6	0.8	0.9						
	Steady	3.6	0.8	0.9						
Oxygen (%)	Min.	0.4	17.0	16.7						
	Steady	0.5	17.2	17.8						
VOCs (ppm)		N/A	N/A	N/A						
H2S (ppm)		9	1	1						
Carbon Monoxide (ppm)		14	3	5						

Notes:



Project Name:	Former Honda Garage, Chippenham	Project Reference:	P23.207
Date:	14/09/2023	Personnel:	BW
Weather:	Clear/Dry	Ground Conditions:	Dry
Temp (°C):	17	Humidity (%):	72%
Atmospheric Pressure:	1014-1015mb	Monitoring Round:	MON 3

Groundwater Records

Well No.	BH1	BH2	BH3							
Borehole Diameter (mm):	50	50	50							
Time Monitored	08.50	9.15	9.30							
Groundwater level (mbgl)	4.51	2.68	2.45							
Depth of installation (mbgl)	14.00	2.95	10.20							
Volume Purged (l)	-	-	-							
Water Appearance	-	-	-							

Gas Monitoring Records

Atmospheric Pressure (mb)		1014	1015	1014							
Downhole Pressure (mb)		0.14	-0.02	0.14							
Flow Rate (l/hr)		0.4	3	2.9							
Methane (%)	Max.	0.2	0.1	0.0							
	Steady	0.1	0.0	0.0							
Carbon Dioxide (%)	Max.	3.8	2.2	1.2							
	Steady	3.7	1.4	1.2							
Oxygen (%)	Min.	0.7	13.9	11.9							
	Steady	2.4	16.1	12.5							
VOCs (ppm)		1.7	0.9	1.4							
H2S (ppm)		4	0	0							
Carbon Monoxide (ppm)		7	1	3							

Notes: