GRM Development Solutions Ltd
Laurus House
First Avenue
Centrum 100
Burton upon Trent
Staffordshire
DE14 2WH

Tel: 01283 551 249
Fax: 01283 211 968
Web: www.grm-uk.com

Our Ref: P8723\RCL.01

Date: 30th January 2020

Partner Constuction Limited
18 Mallard Way
Derby
DE24 8GX

Waterloo Housing Group Ltd
1700 Solihull Parkway
Birmingham Business Park
Solihull
B37 7YD

**Attention of Mr D. Wigley**

Dear Dean,

**Re: Remediation Completion Letter – Crease Drove, Crowland**

GRM Development Solutions Limited (GRM) has been appointed by Partner Construction Ltd and Waterloo Housing Group (Clients) to oversee the implementation of the remediation of identified soil contamination (petroleum hydrocarbons (TPHs)), along with the removal of any associated underground services and suspected tanks that may be present in the south western corner at the above site.

GRM Standard Limitations of Reporting are provided in Appendix A of this report.

The Client proposes to redevelop the site with residential properties. The proposed end use includes garden areas, soft landscaping and a balancing pond. The outline development proposal is presented in Appendix B.

The site is located south of the centre of Crowland with access to the site from Crease Drove bordering the western boundary. A Site Location and Boundary Plan is presented in Appendix C.

This report should be read in conjunction with the following information:

- GRM, "*Phase I Site Appraisal, Crease Drove, Crowland*", Ref: GRM/P8723/DS.1, dated: December 2018.
- GRM, "*Gas Addendum Letter, Crease Drove, Crowland*", Ref: GRM/P8723/PEL/GAL, dated: March 2019.
- GRM, *"Phase II Site Appraisal, Crease Drove, Crowland*", Ref: GRM/P8723/F.1, dated: July 2019. Revision of the original Phase II report dated January 2019.

- GRM, *"Remedial Strategy, Crease Drove, Crowland"*, Ref: GRM/P8723/RS.1, dated: September 2019.
- GRM, *"Controlled Waters Detailed Quantitative Risk Assessment (DQRA), Crease Drove, Crowland"*, Ref: GRM/P8723/DQRA, dated: September 2019.
- GRM, *'Additional Gas Addendum Letter for Crease Drove, Crowland'*, Ref: GRM/P8723/Addnl.GAL dated 10th January 2020.

This Remediation Completion Letter is intended to provide sufficient information for the relevant planning conditions to be discharged and provide information that will assist decision making by identifying and recommending solutions to ground engineering issues.

**Approved Remedial Strategy**

The ground conditions, chemical status and remedial strategy for the site are discussed in full in the GRM Remedial Strategy (P8723), dated September 2019 which should be read in conjunction with this report.

In summary the approved remediation scheme comprised a bulk excavation of the identified hydrocarbon-impacted materials, including removal of any suspected underground services or tanks that may be present within the hotspot area. The remedial extent was centred on two window sample boreholes (WS06 and WS109) in which elevated levels of hydrocarbon contamination were recorded above the relevant Remedial Target Values (RTV), as set out within the GRM DQRA dated September 2019.

The hydrocarbon-impacted material was to be excavated and removed from site, and testing for TPH contamination of the remaining sides and walls of the excavation at 5m intervals, the results of which were to be compared against the outlined RTV.

The Remediation Plan is presented within Appendix D.

**Remediation Works**

The Client appointed Mick George Ltd as the Remedial Services Contractor and GRM attended site over the course of six days, from 25th November to 2nd December 2019, to oversee the removal of the identified impacted soils and undertake validation sampling of the resultant void.

The outlined remediation extent was marked out by GRM and confirmed with Client and the remedial services contractor (Mick George Ltd) both of whom were present during the remediation works.

The previous structures on-site had been demolished prior to attending site, with the hardstanding covering within the west and south west of the site having been removed and only sub-base material remaining.

An area of topsoil remained, in which three ground level service hatches were in place. The covers of the hatches were removed, which revealed two brick lined interceptor tanks, measured to depths of 1.4m and 1.1m below existing ground level (begl) and filled with water.

The other service hatch comprised of a shallow (0.4m begl) brick drainage channel infilled with waste material with no visual signs of hydrocarbon contamination present.

A photographic record of the remedial and validation works is shown in Appendix E.

During the excavation of the identified area, the materials encountered included:

- Subbase – a covering of buff slightly silty, sandy cobbly gravel with gravels and cobbles of limestone aggregate. This material was present across the western most portion of the site, where hardstanding and previous structures were once present and was recorded to depths of 0.2m begl.
- Topsoil – present within the south western most corner of the site, and in which the interceptor tanks and drainage channels were embedded. Topsoil was present to depths of 0.1m begl.
- Made ground – present within the south western most corner of the site, and recorded below the topsoil and sub-base. The made ground was recorded to depths of 0.4m begl, and locally deeper when the interceptor tanks were removed to depths of 1.5m begl.
- Peat - grey to stained black organic sandy silty peat which progressed to grey sandy clay, encountered from depths of 0.4m begl to 1.5m begl.
- Abbey Sand and Gravel – this strata was encountered as light brown, slightly clayey, sandy gravel, with gravels of quartzite, and was encountered from depths of 1.5m begl.
- Oxford Clay Formation – encountered at approximately 2.2m begl and was recorded as slightly sandy, slightly gravelly clay, with gravels of chalk. This strata was recorded to depths of 2.7m, black staining was noted within the formation and was chased out to these depths.

All excavated arisings were placed directly within dumper trucks and exported immediately off-site and disposed within a landfill site operated by Mick George Ltd, the associated waste transfer tickets are presented in Appendix F.

**Excavation**

The full excavation covered an area of approximately 30m by 15m. The excavation began at the eastern most extent and proceeded to depths of 1.7m begl, no olfactory or visual evidence of contamination was noted in the eastern area.

The excavation progressed westwards towards the noted service hatches and interceptors. Prior to the removal of the interceptors, the remaining water was pumped out, which revealed a black sludge at the base. The excavation was then carefully extended to the brick lining, after which a bunded sump was made to capture any sludge that may escape during removal. The brick linings were cautiously broken apart and removed with intervals of pumping to ensure any sludge was not allowed to spread into the excavation. The brick work and concrete were encountered to depths of 1.6m begl. Once the brick work and concrete was removed, the material beneath was noted to have a hydrocarbon odour, suggesting the tanks were the source of the contamination. The excavation was continued towards the western boundary with Crease Drove, where a 2m standoff was specified so as to not undermine the road construction.

Oily sheens and odours were recorded in the north western corner of the excavation, and the excavation proceeded northward until no further sign of contamination was observed.

The arisings taken from the excavation were screened using a Photo-Ionisation Detector (PID) along with visual and olfactory inspection, by a GRM Engineer. No elevated (>10ppm) PID readings were recorded in both the arisings and resultant excavation.

**Asbestos**

During excavation of material around the interceptor tanks, a six inch drainage pipe was uncovered within the vicinity of the smaller shallow drainage service hatch, and running north west. The pipe material was suspected to comprise asbestos containing materials (ACM's), and was deemed a potential risk to site workers. As such, appropriate protocols and PPE/RPE were adopted by Mick George and GRM during the remaining excavation work, with any further suspected ACM's hand-picked and removed during the validation process.

The pipe was encased within concrete, however black staining was noted on the material. Due to this further sampling was undertaken along the trench (VS18, VS30 and VS31), and the samples were submitted for testing for both asbestos and TPH.

All suspected ACMs were segregated from other materials and covered by polythene sheeting.

**Excavation Backfill**
The resultant excavation was backfilled with clean natural clay material supplied by the Client. The documentation provided showed that the material was chemically and geo-technically suitable for use (Appendix G).

**Validation Chemical Analysis**
*Hydrocarbons*
A total of 33 soil validation samples were taken from the base and sides of the excavation and beneath the service run of the asbestos pipe, all of which were sent for validation chemical testing. The Validation Plan showing the extent of the excavation and validation sample locations is presented in Appendix H.

The results of the testing were compared against the remedial targets presented below, derived from the GRM DQRA:

| Contaminant of Potential Concern | Remedial Target Concentration (mg/kg) | Max. Concentration (mg/kg) |
|---|---|---|
| TPH Aromatic >C12-C16 | 531 | 150 |
| TPH Aromatic >C16-C21 | 284 | 170 |

The results revealed concentrations of hydrocarbons were below the remedial targets outlined above.

*Asbestos*
A sample of the drainage pipe was taken by Mike George and the test result confirmed the pipe to contain chrysotile.

Three samples of the soil beneath the drainage run (VS18, VS30 and VS31) were submitted for asbestos screen testing. The results did not reveal asbestos to be present within the surrounding soils, therefore, no further works were warranted.

A copy of the results is included in Appendix I.

**Post Remediation Groundwater Sampling**
Prior to the remedial excavation works, window sample boreholes WS06 and WS109 were located within the delineated hotspot area and in order to fully remediate the impacted materials, the wells were removed.

In order to demonstrate that there is no residual risk posed to controlled waters following the remedial work, two additional monitoring wells were reinstated to the north and down-gradient of the excavation (WS106A and WS109A) on the 11th December 2019.

The response zones of the new wells were targeted at the same formation (Peat) as the previous wells (WS06 and WS109), the exploratory hole location plan and additional logs are presented in Appendix J and K, respectively.

Groundwater samples were taken on 13th January 2020 and sent for chemical analysis.

The results of the testing were compared against the remedial targets presented below, derived from the GRM DQRA:

| Contaminant of Concern | Remedial Target Concentration mg/L | Max conc. in groundwater post-remediation mg/L |
|---|---|---|
| TPH Aromatic >C12-C16 | 1.95 | <0.01 |
| TPH Aromatic >C16-C21 | 0.25 | <0.01 |

The concentrations of the contaminants of concern post-remediation within the groundwater were found to be below the laboratory limit of detection and remedial targets.

However, concentrations of aliphatic bands C5-C6, C8-C10 and aromatic band C8-C10 were found to be above the limits of detection as shown in the table below;

| Contaminant of Concern | EAL* µg/L | Post-remediation groundwater concentration µg/L |
|---|---|---|
| TPH Aliphatic >C5-C6 | 15000 | 1.77 |
| TPH Aliphatic >C8-C10 | 300 | 4.03 |
| TPH Aromatic >C8-C10 | 30^ | 0.57 |

* Environmental Assessment Level (EAL) based on WHO, 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality as reported in CL:AIRE, 2017.
^ Freshwater EQS from DEFRA & EA, 2018 and Freshwater EQS xylene

When compared against the EAL values within the GRM DQRA, none of the TPH fractions were found to be in exceedance.

**Discussion**
In consideration of the above, the risk posed to controlled waters has been successfully mitigated and no residual risk has been determined from the post-remediation chemical testing.

The residual risk posed to site workers from the previously unidentified asbestos contamination is negligible following the removal and disposal of the pipe.

Therefore it is considered that the remediation of the contamination has been successfully completed and no further remedial works are required.

We trust that the information provided is sufficient for your current requirements. If you require any additional information or clarification of the contents of this letter then do not hesitate to contact us.

Yours sincerely,
for GRM Development Solutions Ltd

**Andrew Lamont**
BSc (Hons) FGS
Engineering Geologist

**Charlotte Mortimer**
BSc (Hons) MIEnvSc
Senior Environmental Scientist

**Siobhan Jackson**
BSc (Hons) MIEnvSc
Principal Geo-environmental Scientist

Appendices

Appendix A: General Appraisal Comments and Standard Limitations
Appendix B: Proposed Development Layout Plan
Appendix C: Site Location and Boundary Plan
Appendix D: Remediation Plan
Appendix E: Photographic Record of Remedial Works
Appendix F: Waste Transfer Notes
Appendix G: Chemical and Geotechnical Results – Imported Backfill
Appendix H: Validation Plan
Appendix I: Soil and Water Validation Results
Appendix J: Post-remediation Exploratory Hole Plan
Appendix K: Post-remediation Exploratory Hole Logs

# APPENDIX A

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com

## GENERAL APPRAISAL COMMENTS

### i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- BGS online viewer: http://www.bgs.ac.uk/data/mapViewers/home.html
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: http://www.environment-agency.gov.uk/
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2015), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- PHE-CRCE-032 (PHE, 2017), Radon in Homes in England: 2016 Data Report
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

### ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Copper
- Nickel
- Zinc
- Phenols
- cyanide (total)
- pH
- Water soluble sulphate
- PAH (polycyclic aromatic hydrocarbons)

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

**iii CONCEPTUAL MODEL METHODOLOGY**

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

**iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY**

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

**v GROUND GAS RISK ASSESSMENT METHODOLOGY**

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007) and BS8576 'Guidance on Investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) (2013).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2015)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates ($Q_{hg}$), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

**vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY**

Guidance contained in the Environment Agency's CLEA Reports has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of

one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables.
For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Category 4 Screening Levels (C4SLs) published by DEFRA, values calculated by GRM using the CLEA v1.071 risk assessment, and values and Suitable for Use Levels (S4UL) developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.071 risk assessment software using the age classes and pathways described above.

**vii RISK TO SITE WORKERS – GENERAL COMMENTS**

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

**viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY**

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

**ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY**

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

**x WASTE DISPOSAL, SITE WASTE MANAGEMENT PLANS AND MATERIAL MANAGEMENT PLANS**

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. GRM can assist in the production of Material Management Plans under the CL:AIRE Definition of Waste: Code of Practice. The DoWCoP enables:

- The direct transfer and re-use of clean naturally occurring soil materials between sites, and
- The re-use of both contaminated and uncontaminated materials on their site of origin and between sites within defined Cluster projects.

GRM can also undertake the role of Qualified Person and submit the DoW CoP project Declaration.

Likewise making the site as volume neutral as possible will reduce the costs of development. Whilst not a statutory requirement, Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

**xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS**

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

**xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT**

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off-site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

**xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS**

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

**xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES**

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

**xv GEOTECHNICAL ASSESSMENT – SOAKAWAYS**

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE DG 365 (2016). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.

- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.
- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

**xvi GEOTECHNICAL ASSESSMENT – FOUNDATIONS**

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

## NOTES ON LIMITATIONS

**General**

GRM Development Solutions Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement had been executed, or with whom an assignment had been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GRM Development Solutions Limited; a charge may be levied against such approval.

GRM Development Solutions Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) the consequences of this document being used by any third party with whom an agreement has not been executed.

**Phase I Environmental Audits/ Desk Studies**

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

**Phase II Environmental Audits (Contamination Investigations)**

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

**Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)**

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

# APPENDIX B

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com




## ACCOMMODATION SCHEDULE

| DWELLING TYPE | | GIFA | HEIGHT (STOREYS) | AMOUNT | % |
|---|---|---|---|---|---|
| 1B | 1B2P HOUSE | 54.20m² | 2 | 06 | 12 |
| F133 | 2B4P HOUSE | 72.54m² | 2 | 24 | 48 |
| F113 | 3B5P HOUSE | 84.30m² | 2 | 02 | 40 |
| F131 | 3B5P HOUSE | 83.66m² | 2 | 18 | |
| | | | TOTAL | 50 | 100 |

**AREA = 1.54 Ha**

- 1800mm brick wall
- 1800mm close boarded fence
- Proposed Knee Rail
- Paving Hatch
- Proposed trees
- Trees retained
- Trees removed
- Root Protection Area
- Bin storage
- Rent to Buy
- Shared Ownership
- Rented

Notes

– Copyright in this drawing remains the property of BM3 Architecture Limited.

– Do not scale this drawing. Work to figured dimensions only.

– Contractors and consultants are to advise BM3 Architecture Limited of any discrepancies.

| Revision | Date | By | Chkd |
|---|---|---|---|
| **A** MIX UPDATED | **17.10.18** | **JJ** | |
| **B** MOVED PLOTS 9M AWAY NORTHERN AND SOUTHERN BOUNDARY EDGE | **26.10.18** | **JB** | |
| **C** HOUSING MIX UPDATED BASED ON COMMENTS. DRAWING UPDATED TO PLANNING. INDICATED TREES AROUND BOUNDARY EDGE REMOVED. | **30.01.19** | **JB** | **JJ** |
| **D** LAYOUT AMENDED BASED ON REPOSITIONING OF BALANCING POND, INCLUSION OF PUMPING STATION AND COMMENTS FROM WATERLOO. | **22.02.19** | **JB** | |
| **E** UPDATED BASED ON CHANGE IN HOUSING MIX TO SUIT REQUIRED TENURES AND COMMENTS FROM PARTNER CONSTRUCTION. | **07.03.19** | **JB** | **JJ** |

PLANNING

N

Client: Partner

Project: CREASE DRIVE, CROWLANDS, PETERBOROUGH

CiSfb Element:

Drawing: SITE LAYOUT

| Drawn by | Checked | |
|---|---|---|
| JJ | | |
| Scale | Dated | |
| 1:500@A2 | OCT 2018 | |
| Job No. | Drawing No. | Revision |
| 70688 | D01 | E |

Birmingham Office
28 Pickford Street, Digbeth, Birmingham, B5 5QH
T. 0121 633 0000 F. 0121 633 0300 E. design@bm3.co.uk

BM3

# APPENDIX C

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

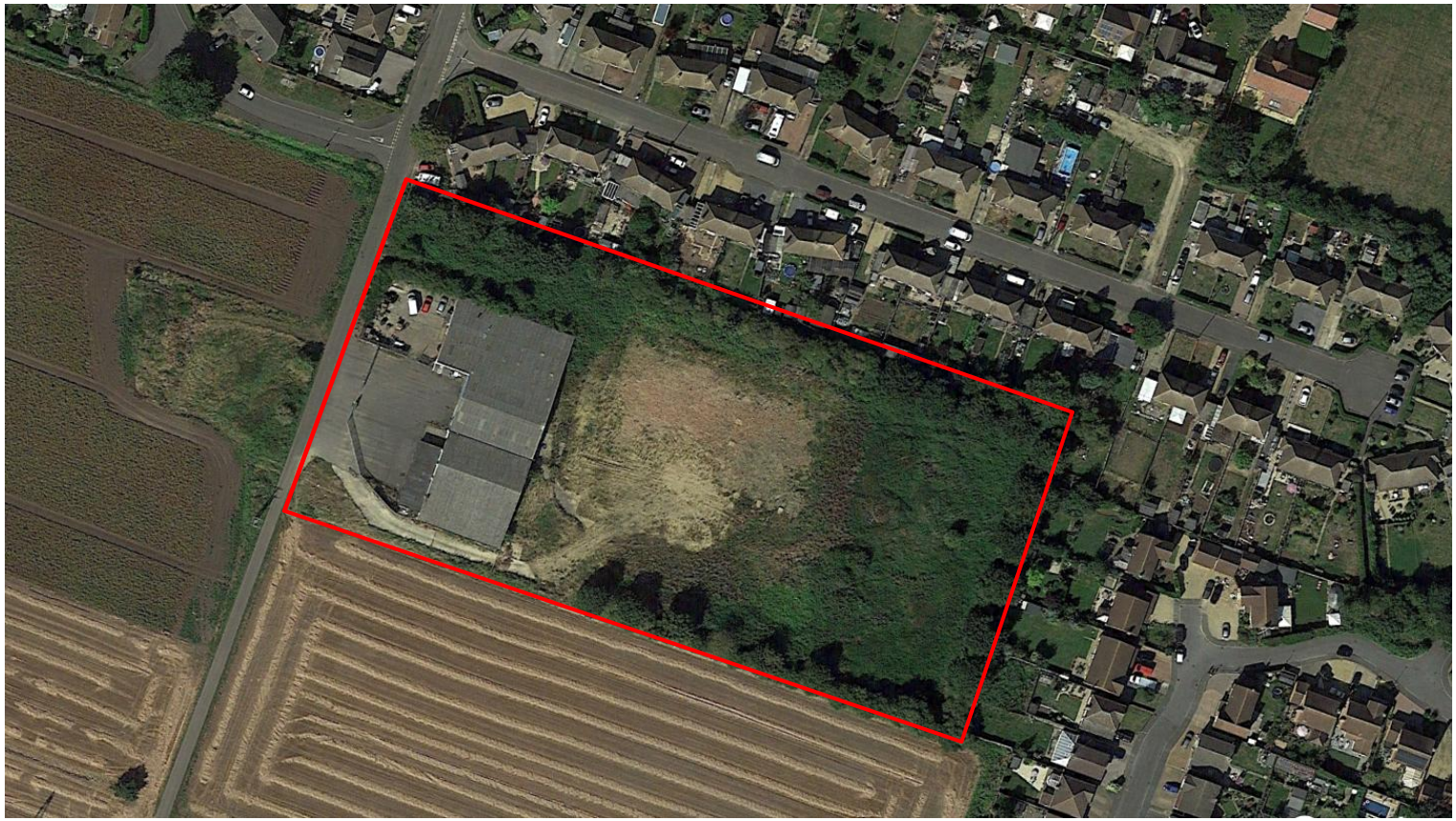
**Tel:** 01283 551249

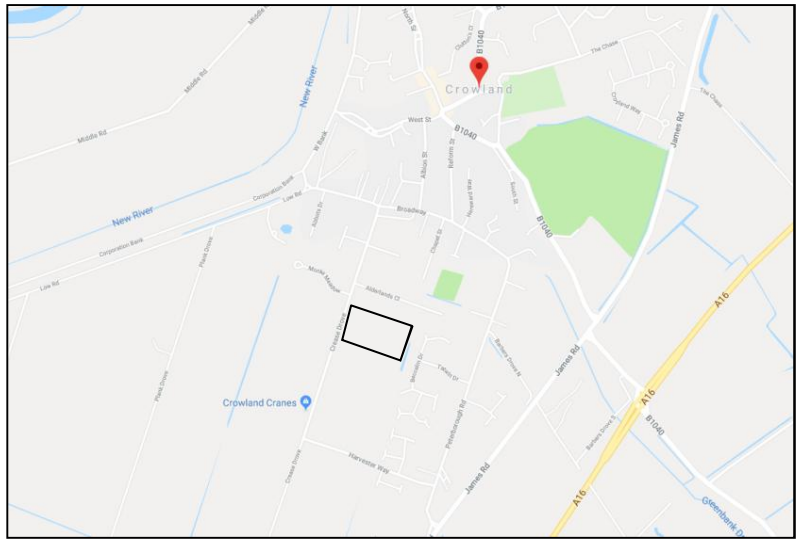
**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com









DO NOT SCALE

NOTES:

Approximate Site Boundary

**GRM Development Solutions Ltd**
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:

**Partner Construction Ltd**

PROJECT:

**Crease Drove, Crowland**

TITLE:

**Site Location and Boundary Plan**

| SCALE@SIZE : | ISSUE: |
|---|---|
| NTS | FINAL |
| DESIGN/DRAWN by : | DATE: |
| DAA | June 2019 |
| PROJECT No: | DRAWING No: |
| P8723 | 02 |

**© GRM Development Solutions Ltd**
© Crown Copyright. AL 100014100

# APPENDIX D

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com




N

Site Boundary

Approximate Extent of Contamination

Service Hatches

NOTES:

Remedial extent based on recorded contamination in soils.

| | |
|---|---|
| CLIENT: | Partner Construction Ltd & Waterloo Housing Group Ltd |
| PROJECT: | Crease Drove, Crowland |
| TITLE: | Illustrative Remediation Plan |
| PROJECT No: | P8723 |
| DATE: | 07/2019 |
| DESIGN/DRAWN: | CM |
| DRAWING NUMBER: | 03 |
| ISSUE: | FINAL REV A |

© GRM Development Solutions Ltd © Crown Copyright. AL 100014100

GRM Development Solutions Ltd
Tel: 01283 551 249
mail@grm-uk.com www.grm-uk.com

# APPENDIX E

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com



**Photograph 1 -** Remedial area prior to beginning excavation with hardstanding stripped and sub-base exposed.



**Photograph 2 –** Start of excavation to the east, adjacent the southern boundary of remedial area.



**Photograph 3 –** Backfilling of eastern extents and progression of excavation westwards.



**Photograph 4 –** Excavation progressing westwards towards interceptor tanks.

DO NOT SCALE

NOTES:


**GRM Development Solutions Ltd**
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com


CLIENT:

**Partner Construction Ltd**

PROJECT:

**Crease Drove, Crowland**

TITLE:

**Photographic Record of Remedial Works**

| SCALE@SIZE : | ISSUE: |
|---|---|
| NTS | FINAL |
| DESIGN/DRAWN by : | DATE: |
| AL | Jan 2020 |
| PROJECT No: | DRAWING No: |
| P9206 | 4 |


**© GRM Development Solutions Ltd**
© Crown Copyright. AL 100014100



**Photograph 5 –** Exposure of largest interceptor tank.



**Photograph 7 –** Breaking up and removal of interceptor tanks.



**Photograph 6 –** Chasing out contamination northwards following tank removals.



**Photograph 8 –** Chasing out contamination noted below base of interceptors.

DO NOT SCALE

NOTES:


**GRM Development Solutions Ltd**
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com


CLIENT:

**Partner Construction Ltd**

PROJECT:

**Crease Drove, Crowland**

TITLE:

**Photographic Record of Remedial Works**

| SCALE@SIZE : | ISSUE: |
|---|---|
| NTS | FINAL |
| DESIGN/DRAWN by : | DATE: |
| AL | Jan 2020 |
| PROJECT No: | DRAWING No: |
| P9206 | 5 |


**© GRM Development Solutions Ltd**
© Crown Copyright. AL 100014100



**Photograph 9 –** Backfilling of clean materials towards western most extents.



**Photograph 10 –** Approximate 2m standoff from Crease Drove (Road) to the west.



**Photograph 11 –** Exposure and removal of asbestos pipe.



**Photograph 12 –** Handpicking of surface materials during asbestos pipe excavation.

DO NOT SCALE

NOTES:


**GRM Development Solutions Ltd**
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com


CLIENT:

**Partner Construction Ltd**

PROJECT:

**Crease Drove, Crowland**

TITLE:

**Photographic Record of Remedial Works**

| SCALE@SIZE : | ISSUE: |
|---|---|
| NTS | FINAL |
| DESIGN/DRAWN by : | DATE: |
| AL | Jan 2020 |
| PROJECT No: | DRAWING No: |
| P9206 | 6 |


**© GRM Development Solutions Ltd**
© Crown Copyright. AL 100014100



**Photograph 13 –** Removing last remnants of contaminated materials (north western most corner).



**Photograph 14 –** Final backfilling along northern wall.



**Photograph 15 –** Western remedial extents after completion.

DO NOT SCALE

NOTES:


**GRM Development Solutions Ltd**
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com


CLIENT:

**Partner Construction Ltd**

PROJECT:

**Crease Drove, Crowland**

TITLE:

**Photographic Record of Remedial Works**

| SCALE@SIZE : | ISSUE: |
|---|---|
| NTS | FINAL |
| DESIGN/DRAWN by : | DATE: |
| AL | Jan 2020 |
| PROJECT No: | DRAWING No: |
| P9206 | 7 |


**© GRM Development Solutions Ltd**
© Crown Copyright. AL 100014100

# APPENDIX F

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com

MICK GEORGE

# WASTE TRANSFER & PRODUCT DELIVERY NOTE

| CARRIER LICENSE | ISSUED BY | TICKET NO. | DATE |
|---|---|---|---|
| CBDU87105 | Environment Agency | 0000332288 | 29/11/19 |

## COLLECTION

**NAME:** Mick George Environmental Ltd

**COLLECTION/PRODUCT SOURCE ADDRESS:**

MGE0369 - Partner Construction
50 Crease Drove (almost opposite Crowland Cranes)
Crowland
Peterborough
PE6 0BN

## DELIVER

**NAME:** Mick George Ltd

**DELIVERY/DISPOSAL ADDRESS:**

Mepal Bio Remediation
Witcham Meadlands
Block Fen
Mepal
Cambridgeshire
CB6 2AY

**LICENCE No.** EPR/EP3492SP

## WASTE/PRODUCT DESCRIPTION

TPH Contaminated Soils

| DRIVER NAME | VEHICLE | WAF NO. | SIC |
|---|---|---|---|
| Karolis Bartkus | FL19PHO | | 41.10 |

## WEIGHT INFORMATION

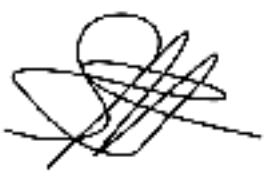
**GROSS WEIGHT:** 32.780 **TARE WEIGHT:** 12900 **NET WEIGHT/LOAD:** 19880

**COLLECT SIGNATURE:**



John Lumsden

**DELIVERY OR DISPOSAL SIGNATURE:**



Simba M

**DRIVER SIGNATURE:**



Karolis Bartkus

By signing this duty of care waste transfer note the producer/holder of the waste confirms that they have fulfilled their duty to apply the waste hirearchy as required by regulation 12 of the waste (England & Wales regulations 2011).

Terms & conditions of sale subject to Mick George Limited standard terms and conditions (available on request)

VAT GB 550 6329 53 Mick George Ltd Registered No. 2417831 (England)

# APPENDIX G

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

# Amended Report

| | | | |
|---|---|---|---|
| **Report No.:** | 19-15425-2 | | |
| **Initial Date of Issue:** | 09-May-2019 | **Date of Re-Issue:** | 06-Jun-2019 |
| **Client** | Mick George (Haulage) Limited | | |
| **Client Address:** | 6 Lancaster Way<br>Ermine Business Park<br>Huntington<br>Cambridgeshire<br>PE29 6XU | | |
| **Contact(s):** | Group | | |
| **Project** | Mepal Clay | | |
| **Quotation No.:** | Q19-16617 | **Date Received:** | 08-May-2019 |
| **Order No.:** | PO000969 / MGE0251 | **Date Instructed:** | 08-May-2019 |
| **No. of Samples:** | 2 | | |
| **Turnaround (Wkdays):** | 21 | **Results Due:** | 06-Jun-2019 |
| **Date Approved:** | 06-Jun-2019 | | |

**Approved By:**



**Details:** Martin Dyer, Laboratory Manager

Chemtest
The right chemistry to deliver results

# Results - Soil

**Project: Mepal Clay**

| **Client: Mick George (Haulage) Limited** | | | **Chemtest Job No.:** | | 19-15425 | 19-15425 |
|---|---|---|---|---|---|---|
| Quotation No.: Q19-16617 | | | **Chemtest Sample ID.:** | | 821907 | 821908 |
| | | | Client Sample ID.: | | S3 | S4 |
| | | | Sample Type: | | SOIL | SOIL |
| | | | Date Sampled: | | 07-May-2019 | 07-May-2019 |
| | | | Asbestos Lab: | | COVENTRY | COVENTRY |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| ACM Type | U | 2192 | | N/A | - | - |
| Asbestos Identification | U | 2192 | % | 0.001 | No Asbestos Detected | No Asbestos Detected |
| ACM Detection Stage | U | 2192 | | N/A | - | - |
| Asbestos by Gravimetry | U | 2192 | % | 0.001 | - | - |
| Total Asbestos | N | 2192 | % | 0.001 | - | - |
| Moisture | N | 2030 | % | 0.020 | 17 | 19 |
| Arsenic | U | 2450 | mg/kg | 1.0 | 17 | 20 |
| Boron | N | 2450 | mg/kg | 0.40 | 21 | 25 |
| Beryllium | U | 2450 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Cadmium | U | 2450 | mg/kg | 0.10 | 0.11 | < 0.10 |
| Chromium | U | 2450 | mg/kg | 1.0 | 22 | 24 |
| Copper | U | 2450 | mg/kg | 0.50 | 15 | 13 |
| Mercury | U | 2450 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Nickel | U | 2450 | mg/kg | 0.50 | 36 | 36 |
| Lead | U | 2450 | mg/kg | 0.50 | 20 | 19 |
| Selenium | U | 2450 | mg/kg | 0.20 | < 0.20 | < 0.20 |
| Zinc | U | 2450 | mg/kg | 0.50 | 44 | 39 |
| Chromium (Hexavalent) | N | 2490 | mg/kg | 0.50 | < 0.50 | < 0.50 |
| Aliphatic TPH >C5-C6 | N | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aliphatic TPH >C6-C8 | N | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aliphatic TPH >C8-C10 | U | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aliphatic TPH >C10-C12 | U | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aliphatic TPH >C12-C16 | U | 2680 | mg/kg | 1.0 | 3.4 | 1.2 |
| Aliphatic TPH >C16-C21 | U | 2680 | mg/kg | 1.0 | < 1.0 | 1.9 |
| Aliphatic TPH >C21-C35 | U | 2680 | mg/kg | 1.0 | 25 | 25 |
| Aliphatic TPH >C35-C44 | N | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Total Aliphatic Hydrocarbons | N | 2680 | mg/kg | 5.0 | 29 | 28 |
| Aromatic TPH >C5-C7 | N | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aromatic TPH >C7-C8 | N | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aromatic TPH >C8-C10 | U | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aromatic TPH >C10-C12 | U | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aromatic TPH >C12-C16 | U | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Aromatic TPH >C16-C21 | U | 2680 | mg/kg | 1.0 | 1.2 | 5.3 |
| Aromatic TPH >C21-C35 | U | 2680 | mg/kg | 1.0 | 30 | 47 |
| Aromatic TPH >C35-C44 | N | 2680 | mg/kg | 1.0 | < 1.0 | < 1.0 |
| Total Aromatic Hydrocarbons | N | 2680 | mg/kg | 5.0 | 32 | 53 |
| Total Petroleum Hydrocarbons | N | 2680 | mg/kg | 10.0 | 61 | 81 |
| Naphthalene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |

Chemtest
The right chemistry to deliver results

# Results - Soil

**Project: Mepal Clay**

| **Client: Mick George (Haulage) Limited** | | | **Chemtest Job No.:** | | 19-15425 | 19-15425 |
|---|---|---|---|---|---|---|
| Quotation No.: Q19-16617 | | | **Chemtest Sample ID.:** | | 821907 | 821908 |
| | | | Client Sample ID.: | | S3 | S4 |
| | | | Sample Type: | | SOIL | SOIL |
| | | | Date Sampled: | | 07-May-2019 | 07-May-2019 |
| | | | Asbestos Lab: | | COVENTRY | COVENTRY |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | |
| Acenaphthylene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Acenaphthene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Fluorene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Phenanthrene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Anthracene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Fluoranthene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Pyrene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Benzo[a]anthracene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Chrysene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Benzo[b]fluoranthene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Benzo[k]fluoranthene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Benzo[a]pyrene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Indeno(1,2,3-c,d)Pyrene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Dibenz(a,h)Anthracene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Benzo[g,h,i]perylene | U | 2700 | mg/kg | 0.10 | < 0.10 | < 0.10 |
| Total Of 16 PAH's | U | 2700 | mg/kg | 2.0 | < 2.0 | < 2.0 |
| Benzene | U | 2760 | µg/kg | 1.0 | < 1.0 | < 1.0 |
| Toluene | U | 2760 | µg/kg | 1.0 | 1.3 | 1.6 |
| Ethylbenzene | U | 2760 | µg/kg | 1.0 | < 1.0 | < 1.0 |
| m & p-Xylene | U | 2760 | µg/kg | 1.0 | < 1.0 | < 1.0 |
| o-Xylene | U | 2760 | µg/kg | 1.0 | < 1.0 | < 1.0 |
| PCB 28 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| PCB 52 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| PCB 90+101 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| PCB 118 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| PCB 153 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| PCB 138 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| PCB 180 | U | 2815 | mg/kg | 0.010 | < 0.010 | < 0.010 |
| Total PCBs (7 Congeners) | N | 2815 | mg/kg | 0.10 | < 0.10 | < 0.10 |

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2120 | Water Soluble Boron, Sulphate, Magnesium & Chromium | Boron; Sulphate; Magnesium; Chromium | Aqueous extraction / ICP-OES |
| 2192 | Asbestos | Asbestos | Polarised light microscopy / Gravimetry |
| 2450 | Acid Soluble Metals in Soils | Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc | Acid digestion followed by determination of metals in extract by ICP-MS. |
| 2490 | Hexavalent Chromium in Soils | Chromium [VI] | Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide. |
| 2680 | TPH A/A Split | Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44 | Dichloromethane extraction / GCxGC FID detection |
| 2700 | Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID | Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene | Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds) |
| 2760 | Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS | Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule | Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds. |
| 2815 | Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS | ICES7 PCB congeners | Acetone/Hexane extraction / GC-MS |

## Report Information

### Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### Sample Deviation Codes

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

### Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1** |

**Client:**

WYG Environmental

Geneva Building
Lakeview Drive
Sherwood Business Park
Annesley
Nottinghamshire
NG15 0ED


***Soil Property Testing Ltd***

**15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG**

**Tel: 01480 455579**
**Email:** enquiries@soilpropertytesting.com
**Website:** www.soilpropertytesting.com


**Samples Submitted By:**

WYG Environmental

**Samples Labelled:**

Mepal Landfill Site - Phase 9

**Approved Signatories:**

- ☑ **J.C. Garner B.Eng (Hons) FGS** — Technical Director
- ☐ **S.P. Townend FGS** — Quality Manager
- ☐ **W. Johnstone** — Materials Lab Manager
- ☐ **D. Sabnis** — Operations Manager

**Date Received:** 08/05/2018

**Samples Tested Between:** 08/05/2018 **and** 25/05/2018

**Remarks:**

For the attention of Mr A Forse
Your Reference No: A103049

**Notes:**

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2. (a) UKAS - United Kingdom Accreditation Service
   (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

0998

| | | | |
|---|---|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** | | |
| **Serial No.** | **S33037-1** | **Target Date** | 21/05/2018 |
| **Scheduled By** | WYG Environmental | | |

## SCHEDULE OF LABORATORY TESTS

**Schedule Remarks**

| Bore Hole No. | Type | Sample Ref. | Top Depth | Water Content BSEN | Density Determination BSEN | Liquid/Plastic Limits | PSD by Hydrometer | PSD by Dry Sieve | Particle Density by Small Pyk | Triaxial Permeability | | | | | | | | | | | | | Sample Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | C | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | | |
| - | C | 2 | | 1 | 1 | | | | | | | | | | | | | | | | | | |
| - | B | 1 | | 1 | | 1 | 1 | | 1 | | | | | | | | | | | | | | |
| - | B | 2 | | 1 | | 1 | 1 | | 1 | | | | | | | | | | | | | | |
| - | C | P1 | | | | | | | | 1 | | | | | | | | | | | | | |
| - | B | T1 | | | | | | 1 | | | | | | | | | | | | | | | |
| - | B | T2 | | | | | | 1 | | | | | | | | | | | | | | | |
| **Totals** | | | | **4** | **2** | **2** | **2** | **2** | **2** | **1** | | | | | | | | | | | | | **End of Schedule** |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

UKAS TESTING

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1** |

## DETERMINATION OF DENSITY AND WATER CONTENT

| Borehole /Pit No. | Depth (m) | Sample | | Water Content (%) | Bulk Density (Mg/m3) | Dry Density (Mg/m3) | Description | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Type | Reference | | | | | |
| - | | C | 1 | 25.0 | 1.86 | 1.49 | Stiff dark grey calcareous CLAY with rare shell fragments. | |
| - | | C | 2 | 29.4 | 1.98 | 1.53 | Firm dark grey calcareous CLAY with rare shell fragments. | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Method of Preparation:

Method of Test: BS EN ISO 17892-1: 2014 & BS EN ISO 17892-2: 2014

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J - Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

Remarks to Include: Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110°C.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1** |

## SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole /Pit No. | Depth (m) | Type | Ref. | Water Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasti-city Index (%) | Liquid-ity Index (%) | SAMPLE PREPARATION | | | | Description | CLASS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Method | Ret'd 0.425mm (%) | Corr'd W/C <0.425mm | Curing Time (hrs) | | |
| - | | B | 1 | **28.7** | 68 | 25 | 43 | 0.09 | From Natural | 0 (A) | | 24 | Stiff dark grey calcareous CLAY with occasional grey mottling, rare shell fragments, and possible traces of selenite. | CH |
| - | | B | 2 | **28.8** | 68 | 24 | 44 | 0.11 | From Natural | 0 (A) | | 24 | Firm dark grey calcareous CLAY with occasional grey mottling, rare shell and fossil fragments, and possible traces of selenite. | CH |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

Remarks to Include: Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

# TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

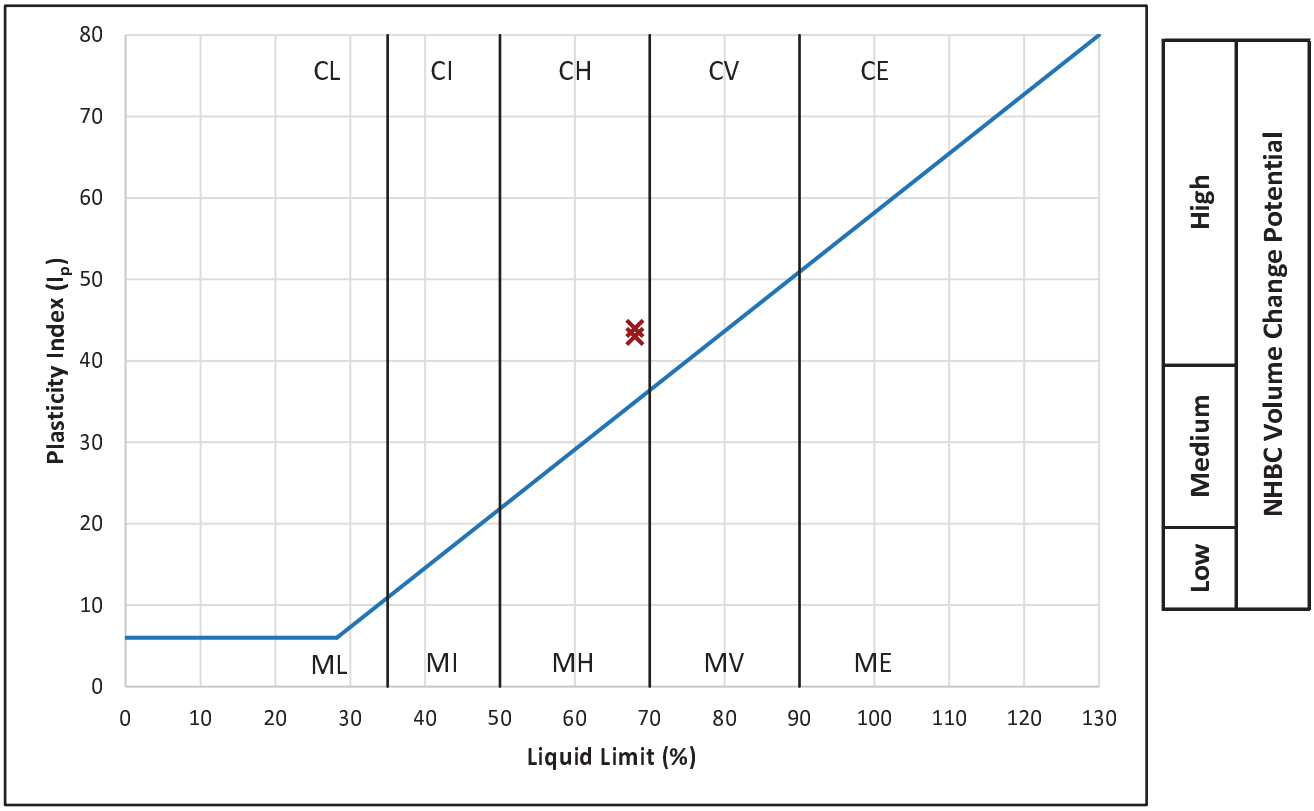
DATE ISSUED: 25/05/2018

0998

| | |
|---|---|
| Contract | Mepal Landfill Site - Phase 9 |
| Serial No. | S33037-1 |

## PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

| Plasticity | | | | |
|---|---|---|---|---|
| Low | Medium | High | Very High | Extremely High |




Plasticity Chart BS5930: 2015: Figure 8

| | |
|---|---|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2 |
| Method of Test: | BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4 |
| Type of Sample Key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter |
| Comments: | Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

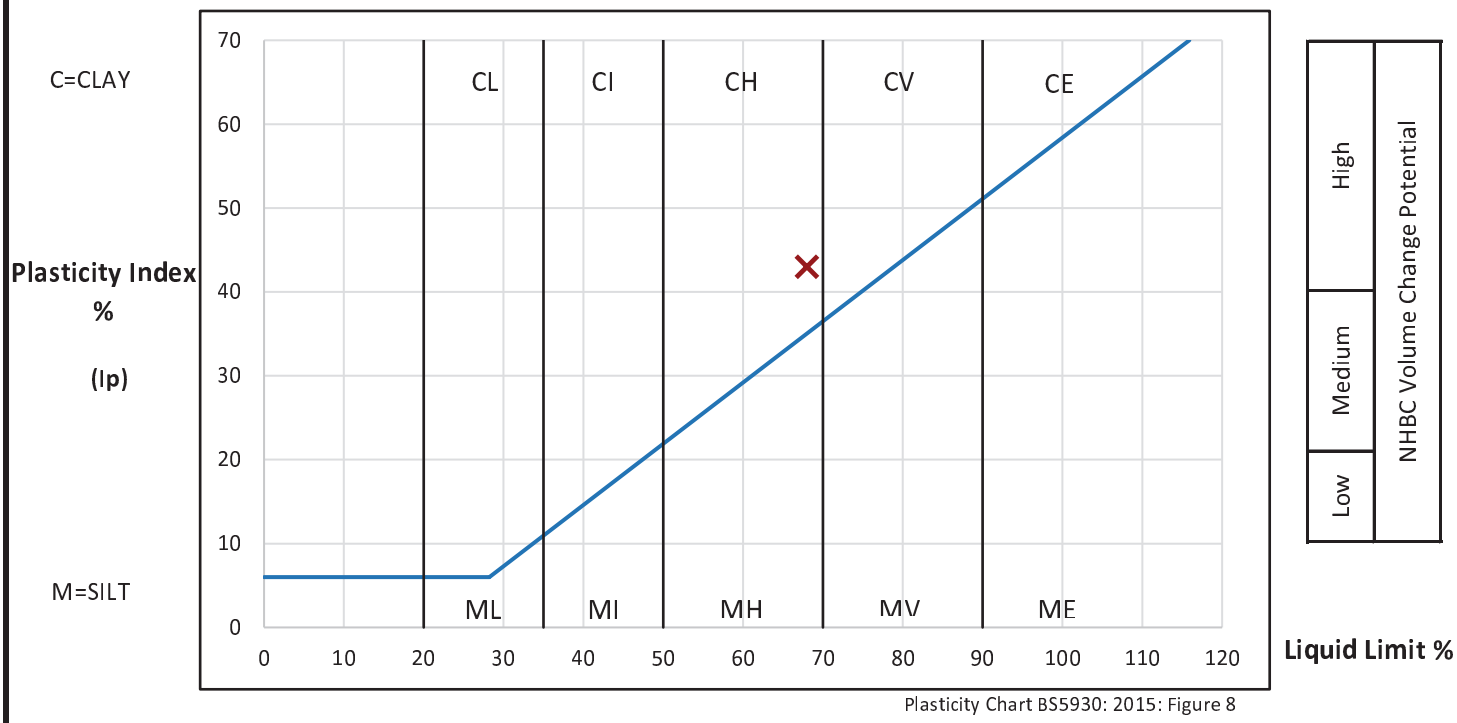
0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1** |

## DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole / Pit No. | Depth m | Sample Type | Sample Reference | Water Content (W) % | Description | Remarks |
|---|---|---|---|---|---|---|
| - | | B | 1 | 28.7 | Stiff dark grey calcareous CLAY with occasional grey mottling, rare shell fragments, and possible traces of selenite. | Specimen dried at 80°C due to the possible presence of selenite. |

| PREPARATION | | | | Liquid Limit | 68 % |
|---|---|---|---|---|---|
| Method of preparation | | From natural | | Plastic Limit | 25 % |
| Sample retained 0.425mm sieve | (Assumed) | 0 % | | Plasticity Index | 43 % |
| Corrected water content for material passing 0.425mm | | | | Liquidity Index | 0.09 |
| Sample retained 2mm sieve | (Assumed) | 0 % | | NHBC Modified (I'p) | n/a |
| Curing time | 24 hrs | Clay Content | 66 % | Derived Activity | 0.65 |




Plasticity Chart BS5930: 2015: Figure 8

| | |
|---|---|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2 |
| Method of Test: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4 |
| Type of Sample Key: | U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter |
| Comments: | |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

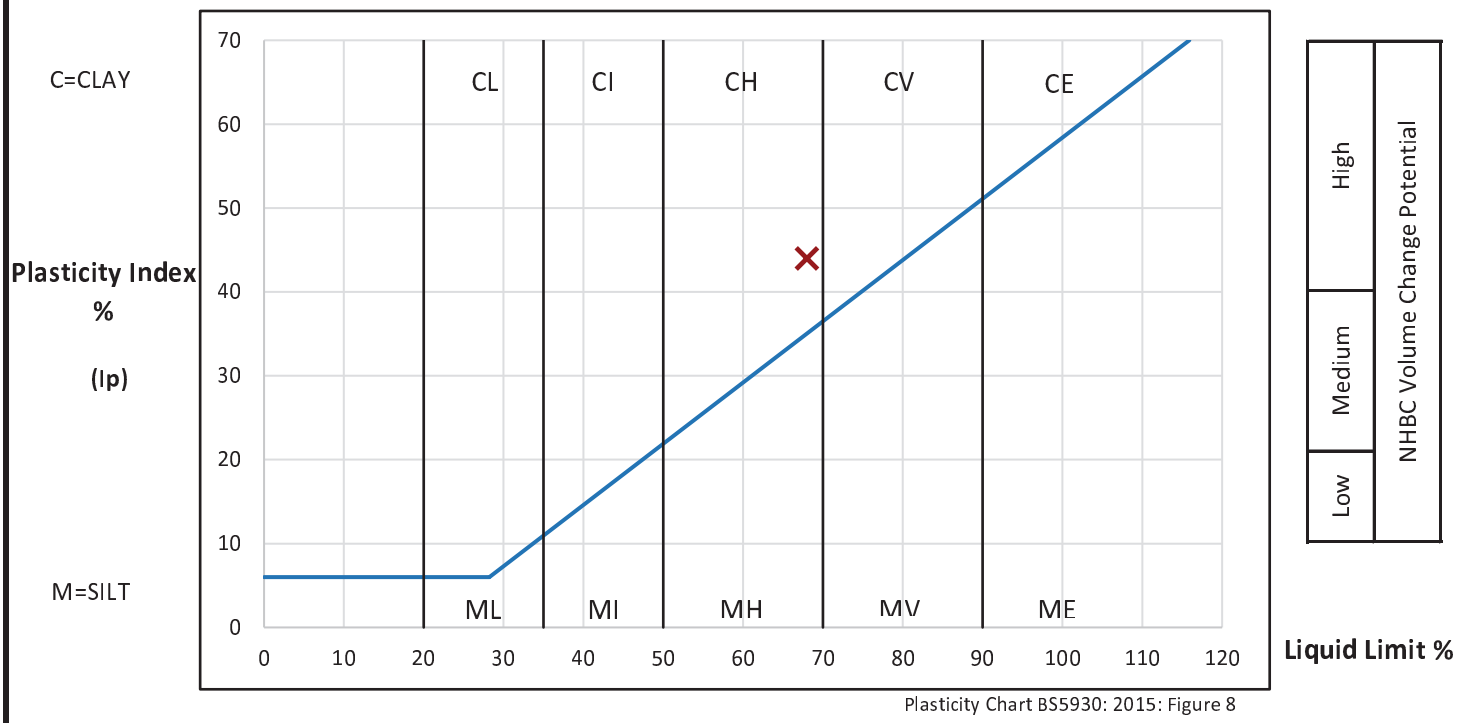
0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1** |

## DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole / Pit No. | Depth m | Sample Type | Sample Reference | Water Content (W) % | Description | Remarks |
|---|---|---|---|---|---|---|
| - | | B | 2 | 28.8 | Firm dark grey calcareous CLAY with occasional grey mottling, rare shell and fossil fragments, and possible traces of selenite. | Specimen dried at 80°C due to the possible presence of selenite. |

| PREPARATION | | | | Liquid Limit | 68 % |
|---|---|---|---|---|---|
| Method of preparation | | From natural | | Plastic Limit | 24 % |
| Sample retained 0.425mm sieve | (Assumed) | 0 % | | Plasticity Index | 44 % |
| Corrected water content for material passing 0.425mm | | | | Liquidity Index | 0.11 |
| Sample retained 2mm sieve | (Assumed) | 0 % | | NHBC Modified (I'p) | n/a |
| Curing time | 24 hrs | Clay Content | 67 % | Derived Activity | 0.66 |




Plasticity Chart BS5930: 2015: Figure 8

| | |
|---|---|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2 |
| Method of Test: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4 |
| Type of Sample Key: | U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter |
| Comments: | |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

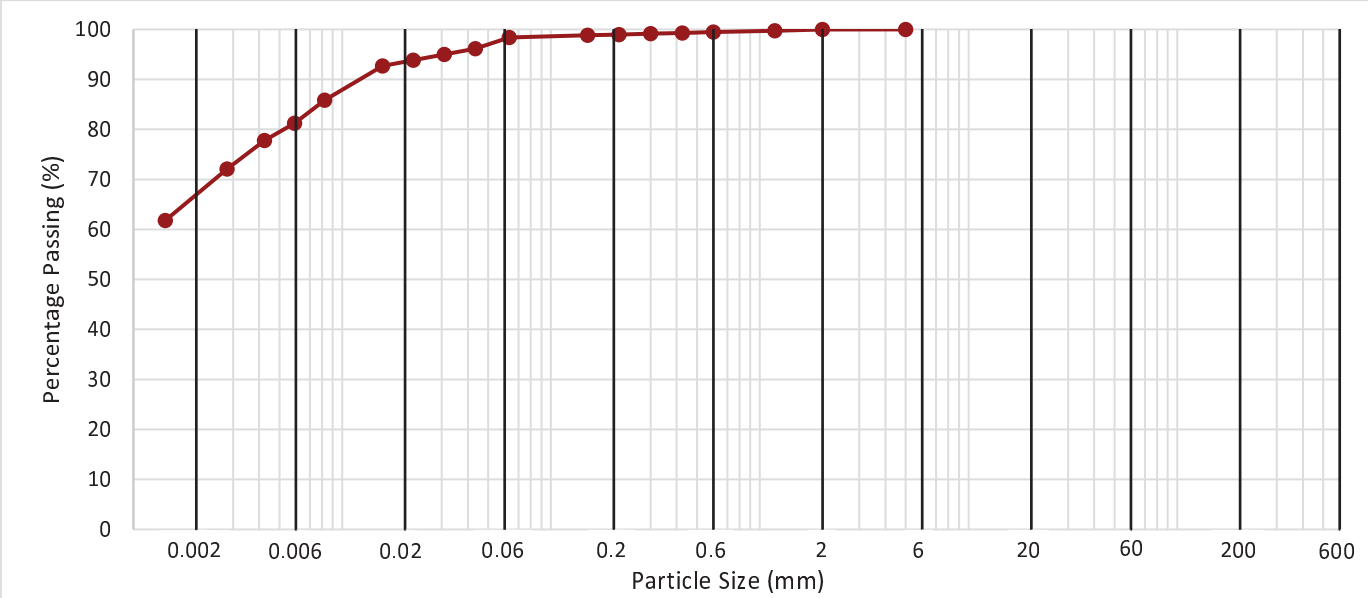
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-1 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 1 | Stiff dark grey calcareous CLAY with occasional grey mottling, rare shell fragments, and possible traces of selenite. | Specimen dried at 80°C due to the presence of selenite. |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| 0.0434 | 96 | 32 |
| 0.0309 | 95 | |
| 0.0219 | 94 | |
| 0.0156 | 93 | Clay by Dry Mass (%) |
| 0.0082 | 86 | |
| 0.0059 | 81 | |
| 0.0042 | 78 | 66 |
| 0.0028 | 72 | |
| 0.0014 | 62 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 2 |
| 1.18 | 100 | |
| 0.600 | 99 | |
| 0.425 | 99 | |
| 0.300 | 99 | |
| 0.212 | 99 | |
| 0.150 | 99 | |
| 0.063 | 98 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 98 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | 100 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

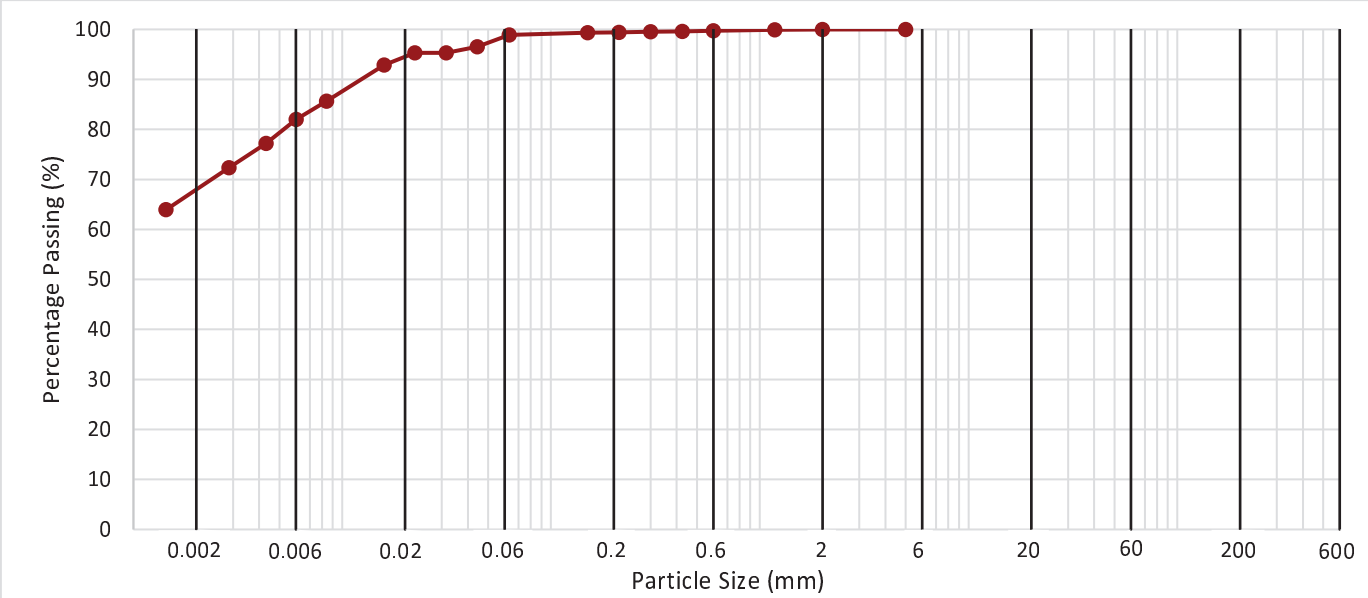
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-1 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 2 | Firm dark grey calcareous CLAY with occasional grey mottling, rare shell and fossil fragments, and possible traces of selenite. | Specimen dried at 80°C due to the presence of selenite. |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| 0.0443 | 97 | 32 |
| 0.0315 | 95 | |
| 0.0223 | 95 | |
| 0.0159 | 93 | Clay by Dry Mass (%) |
| 0.0084 | 86 | |
| 0.0060 | 82 | |
| 0.0043 | 77 | 67 |
| 0.0029 | 72 | |
| 0.0014 | 64 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 1 |
| 1.18 | 100 | |
| 0.600 | 100 | |
| 0.425 | 100 | |
| 0.300 | 100 | |
| 0.212 | 99 | |
| 0.150 | 99 | |
| 0.063 | 99 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 99 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | 100 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

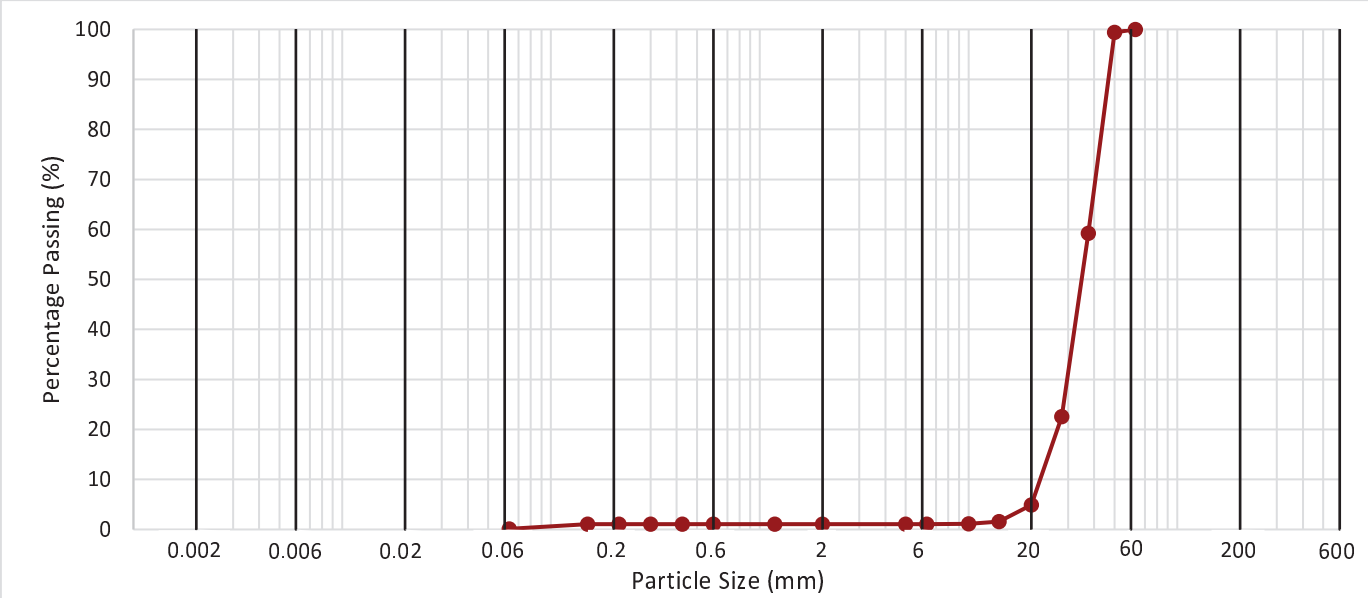
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-1 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | T1 | SHREDDED TYRES | Dry mass of sample required 15kg. Mass of sample submitted 6.8kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3. |

| Method of Test: | Dry Sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| | | |
| | | |
| | | |
| | | Clay by Dry Mass (%) |
| | | |
| | | |
| | | |
| | | |
| | | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 1 | 1 |
| 1.18 | 1 | |
| 0.600 | 1 | |
| 0.425 | 1 | |
| 0.300 | 1 | |
| 0.212 | 1 | |
| 0.150 | 1 | |
| 0.063 | 0 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 0 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 99 |
| 125 | | |
| 90 | | |
| 63 | 100 | |
| 50 | 99 | |
| 37.5 | 59 | |
| 28 | 23 | |
| 20 | 5 | |
| 14 | 2 | |
| 10 | 1 | |
| 6.3 | 1 | |
| 5 | 1 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.39.2
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

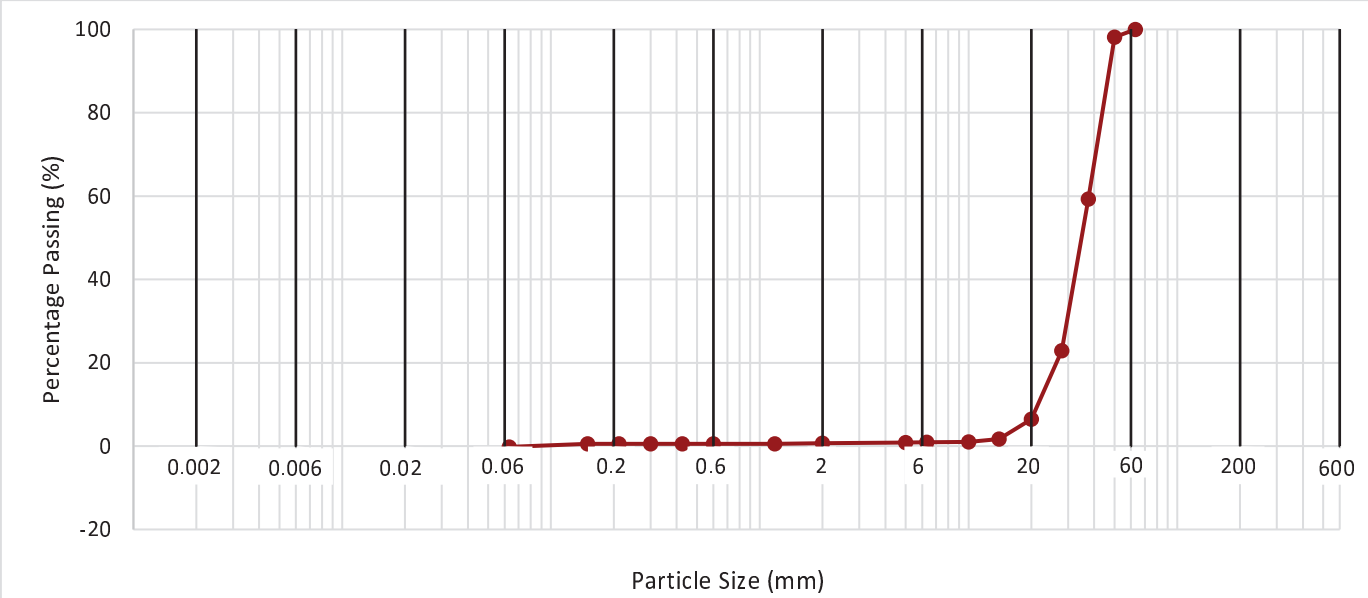
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-1 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | T2 | SHREDDED TYRES | Dry mass of sample required 15kg. Mass of sample submitted 7.5kg. Sample Unrepresentative BS1377:Part 2:1990 Table 3. |

| | | | |
|---|---|---|---|
| Method of Test: | Dry Sieve | Method of Pretreatment: | Not required |




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| | | |
| | | |
| | | |
| | | Clay by Dry Mass (%) |
| | | |
| | | |
| | | |
| | | |
| | | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 1 | 1 |
| 1.18 | 1 | |
| 0.600 | 1 | |
| 0.425 | 1 | |
| 0.300 | 1 | |
| 0.212 | 1 | |
| 0.150 | 1 | |
| 0.063 | 0 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 0 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 99 |
| 125 | | |
| 90 | | |
| 63 | 100 | |
| 50 | 98 | |
| 37.5 | 59 | |
| 28 | 23 | |
| 20 | 6 | |
| 14 | 2 | |
| 10 | 1 | |
| 6.3 | 1 | |
| 5 | 1 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.39.2
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 25/05/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1** |

## SUMMARY OF PARTICLE DENSITY TESTS

| Borehole /Pit No. | Depth (m) | Type | Ref. | Particle Density ($Mg/m^3$) | Description | Remarks |
|---|---|---|---|---|---|---|
| - | | B | 1 | **2.67** | Stiff dark grey calcareous CLAY with occasional grey mottling, rare shell fragments, and possible traces of selenite. | Specimen dried at 80°C due to the possible presence of selenite |
| - | | B | 2 | **2.66** | Firm dark grey calcareous CLAY with occasional grey mottling, rare shell and fossil fragments, and possible traces of selenite. | Specimen dried at 80°C due to the possible presence of selenite |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | |
|---|---|
| Method Of Preparation: | BS1377: Part 1: 2016: 8.3 & 8.4.4 |
| Method of Test: | BS1377: Part 2: 1990: 8.3 |
| Type of Sample Key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter |
| Comments: | |
| Remarks to Include: | Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1S** |

**Client:**

WYG Environmental

Geneva Building
Lakeview Drive
Sherwood Business Park
Annesley
Nottinghamshire
NG15 0ED


***Soil Property Testing Ltd***

**15, 16, 18 Halcyon Court, St Margaret's Way,**
**Stukeley Meadows, Huntingdon,**
**Cambridgeshire, PE29 6DG**

**Tel: 01480 455579**
**Email:** enquiries@soilpropertytesting.com
**Website:** www.soilpropertytesting.com


**Samples Submitted By:**

WYG Environmental

**Samples Labelled:**

Mepal Landfill Site - Phase 9

**Approved Signatories:**

- ☑ **J.C. Garner B.Eng (Hons) FGS** — Technical Director
- ☐ **S.P. Townend FGS** — Quality Manager
- ☐ **W. Johnstone** — Materials Lab Manager
- ☐ **D. Sabnis** — Operations Manager

**Date Received:** 08/05/2018

**Samples Tested Between:** 08/05/2018 **and** 06/06/2018

**Remarks:**

For the attention of Mr M Holzer
Your Reference No: A103049

This is a supplement to Test Report S33037-1 dated 25/05/18 and includes the results of 1nr Triaxial Permeability tests

**Notes:**

1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2 (a) UKAS - United Kingdom Accreditation Service
(b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

0998

| | | | |
|---|---|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** | | |
| **Serial No.** | **S33037-1S** | **Target Date** | 21/05/2018 |
| **Scheduled By** | WYG Environmental | | |

## SCHEDULE OF LABORATORY TESTS

**Schedule Remarks**

| Bore Hole No. | Type | Sample Ref. | Top Depth | Triaxial Permeability | | | | | | | | | | | | | | | | | Sample Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | C | P1 | | 1 | | | | | | | | | | | | | | | | | |
| **Totals** | | | | **1** | | | | | | | | | | | | | | | | | End of Schedule |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

UKAS TESTING

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-1S** |

## DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL
## Measured Under Constant Head Conditions
## Test Method - BS1377: Part 6: 1990

| BH / TP | Depth (m) | Type | Ref. | Description | Remarks |
|---|---|---|---|---|---|
| - | | C | P1 | Firm dark grey calcareous CLAY with rare fine to medium chert gravel. | |

| Sample Details | |
|---|---|
| Type of Sample | Undisturbed |

| Flow Conditions | |
|---|---|
| Direction | Vertical Downwards |

| Test Specimen Details | | Initial | Final |
|---|---|---|---|
| Mass of Sample | g | 1186.2 | 1203.9 |
| Diameter | mm | 100.64 | 101.32 |
| Area | $mm^2$ | 7955.9 | 8063.7 |
| Length | mm | 75.89 | 75.78 |
| Bulk Density | $Mg/m^3$ | 1.96 | 1.97 |
| Water Content | % | 30.0 | 29.9 |
| Dry Density | $Mg/m^3$ | 1.51 | 1.52 |

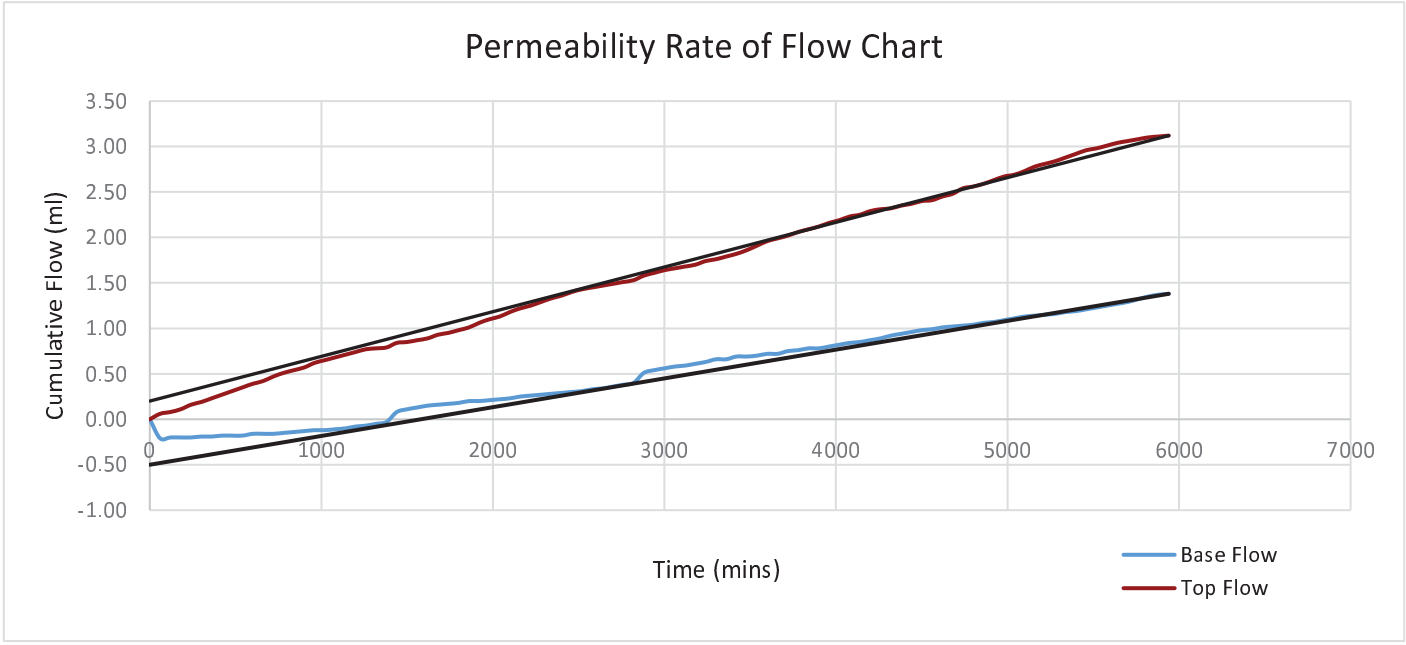
| Test Duration | |
|---|---|
| Cell Pressure Test | 1 |
| Saturation | 5 |
| Consolidation | 7 |
| Flow | 4 |

| Saturation Stage | | |
|---|---|---|
| B Value (Initial/Final) | 0.91 | 0.97 |

| Consolidation Stage | | |
|---|---|---|
| Consolidation Pressure | kPa | 100 |

| Permeability Stage | | |
|---|---|---|
| Test Temperature | °C | 20 |
| Mean Effective Stress | kPa | 85 |
| Cell Pressure | kPa | 426 |
| Top Drain Pressure | kPa | 356 |
| Base Drain Pressure | kPa | 326 |
| Differential Pressure | kPa | 30 |
| Rate of Flow (q) | mL/min | 0.0005 |

| Test Result | | |
|---|---|---|
| **Permeability (kv)** | **m/s** | **$2.6 \times 10^{-11}$** |




| | |
|---|---|
| Method of Preparation: | BS1377: PART 1: 2016: 9.3 |
| Method of Test: | BS1377: PART 6: 1990: 6 - SATURATION |
| | BS1377: PART 6: 1990: 6 - CONSOLIDATION - With deviation to allow flow from both ends of specimen |
| | BS1377: PART 6: 1990: 6 - FLOW |
| Type of sample key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W= Water, SPT = Split Spoon Sample, C = Core Cutter |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2** |

**Client:**

WYG Environmental

Geneva Building
Lakeview Drive
Sherwood Business Park
Annesley
Nottinghamshire
NG15 0ED


***Soil Property Testing Ltd***

**15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG**

**Tel: 01480 455579**
**Email:** enquiries@soilpropertytesting.com
**Website:** www.soilpropertytesting.com


**Samples Submitted By:**

WYG Environmental

**Samples Labelled:**

Mepal Landfill Site - Phase 9

**Approved Signatories:**

- ☑ **J.C. Garner B.Eng (Hons) FGS** Technical Director
- ☐ **S.P. Townend FGS** Quality Manager
- ☐ **W. Johnstone** Materials Lab Manager
- ☐ **D. Sabnis** Operations Manager

**Date Received:** 11/05/2018

**Samples Tested Between:** 11/05/2018 **and** 23/05/2018

**Remarks:**

For the attention of Mr M Holzer
Your Reference No: A103049

The results of 2nr Triaxial Permeability tests to follow as a supplement to this Test Report on completion of testing .

**Notes:**

1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2 (a) UKAS - United Kingdom Accreditation Service
(b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

0998

| | | | |
|---|---|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** | | |
| **Serial No.** | **S33037-2** | **Target Date** | 24/05/2018 |
| **Scheduled By** | WYG Environmental | | |

## SCHEDULE OF LABORATORY TESTS

**Schedule Remarks**

| Bore Hole No. | Type | Sample Ref. | Top Depth | Water Content BSEN | Density Determination BSEN | Liquid/Plastic Limits | PSD by Hydro + Pre-sieve | Particle Density by Small Pyk | Triaxial Permeability | | | | | | | | | | | | | Sample Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | C | 3 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | C | 4 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | B | 3 | | 1 | | 1 | 1 | 1 | | | | | | | | | | | | | | |
| - | B | 4 | | 1 | | 1 | 1 | 1 | | | | | | | | | | | | | | |
| - | C | P2 | | | | | | | 1 | | | | | | | | | | | | | |
| - | C | P3 | | | | | | | 1 | | | | | | | | | | | | | |
| **Totals** | | | | **4** | **2** | **2** | **2** | **2** | **2** | | | | | | | | | | | | | **End of Schedule** |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

UKAS TESTING

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2** |

## DETERMINATION OF DENSITY AND WATER CONTENT

| Borehole /Pit No. | Depth (m) | Sample | | Water Content (%) | Bulk Density (Mg/m3) | Dry Density (Mg/m3) | Description | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Type | Reference | | | | | |
| - | | C | 3 | 32.3 | 1.93 | 1.46 | Firm dark grey CLAY with light grey mottling, and rare shell fragments. | |
| - | | C | 4 | 31.1 | 1.95 | 1.49 | Firm dark grey CLAY with light grey mottling, and rare shell fragments. | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Method of Preparation:

Method of Test: BS EN ISO 17892-1: 2014 & BS EN ISO 17892-2: 2014

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J - Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

Remarks to Include: Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110°C.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2** |

## SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole /Pit No. | Depth (m) | Type | Ref. | Water Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasti-city Index (%) | Liquid-ity Index (%) | SAMPLE PREPARATION | | | | Description | CLASS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Method | Ret'd 0.425mm (%) | Corr'd W/C <0.425mm | Curing Time (hrs) | | |
| - | | B | 3 | 29.1 | 72 | 25 | 47 | 0.09 | From Natural | 0 (A) | | 24 | Stiff dark grey CLAY with rare shell fragments. | CV |
| - | | B | 4 | 30.7 | 68 | 25 | 43 | 0.13 | From Natural | 0 (A) | | 24 | Firm dark grey CLAY with rare shell fragments. | CH |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

Remarks to Include: Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

# TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

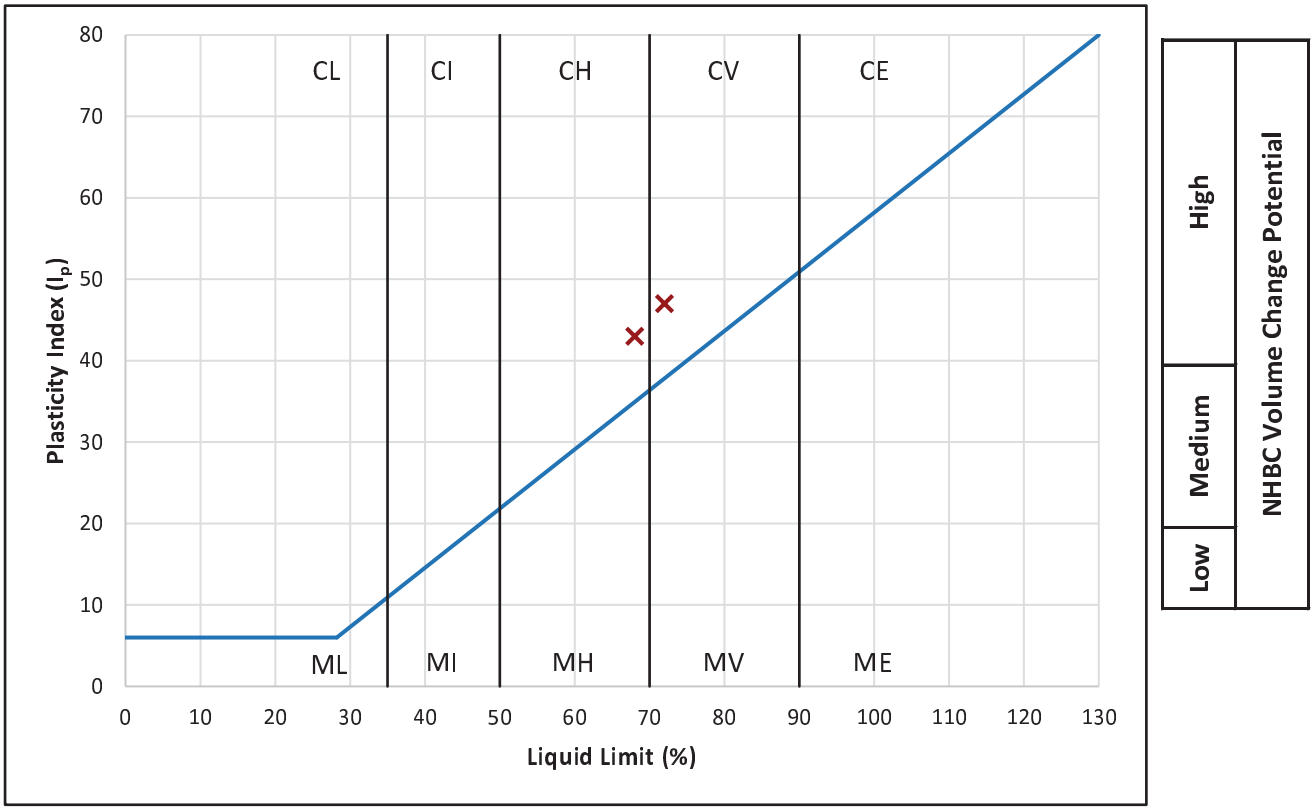
DATE ISSUED: 23/05/2018

0998

| | |
|---|---|
| Contract | Mepal Landfill Site - Phase 9 |
| Serial No. | S33037-2 |

## PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

| Plasticity | | | | |
|---|---|---|---|---|
| Low | Medium | High | Very High | Extremely High |




Plasticity Chart BS5930: 2015: Figure 8

| | |
|---|---|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2 |
| Method of Test: | BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4 |
| Type of Sample Key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter |
| Comments: | Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

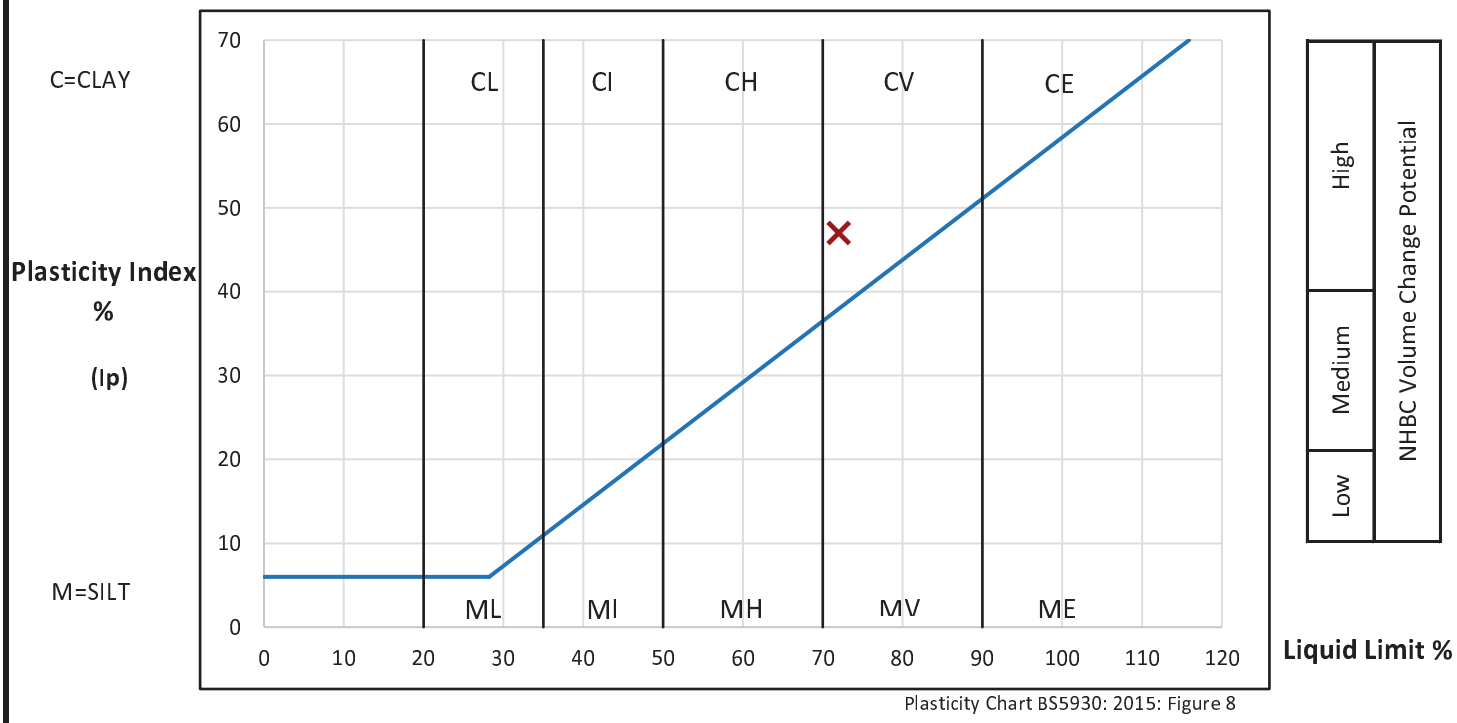
0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2** |

## DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole / Pit No. | Depth m | Sample Type | Sample Reference | Water Content (W) % | Description | Remarks |
|---|---|---|---|---|---|---|
| - | | B | 3 | 29.1 | Stiff dark grey CLAY with rare shell fragments. | |

| PREPARATION | | | | Liquid Limit | 72 % |
|---|---|---|---|---|---|
| Method of preparation | | | From natural | Plastic Limit | 25 % |
| Sample retained 0.425mm sieve | (Assumed) | | 0 % | Plasticity Index | 47 % |
| Corrected water content for material passing 0.425mm | | | | Liquidity Index | 0.09 |
| Sample retained 2mm sieve | (Assumed) | | 0 % | NHBC Modified (I'p) | n/a |
| Curing time | 24 hrs | Clay Content | 69 % | Derived Activity | 0.68 |




Plasticity Chart BS5930: 2015: Figure 8

| | |
|---|---|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2 |
| Method of Test: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4 |
| Type of Sample Key: | U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter |
| Comments: | |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

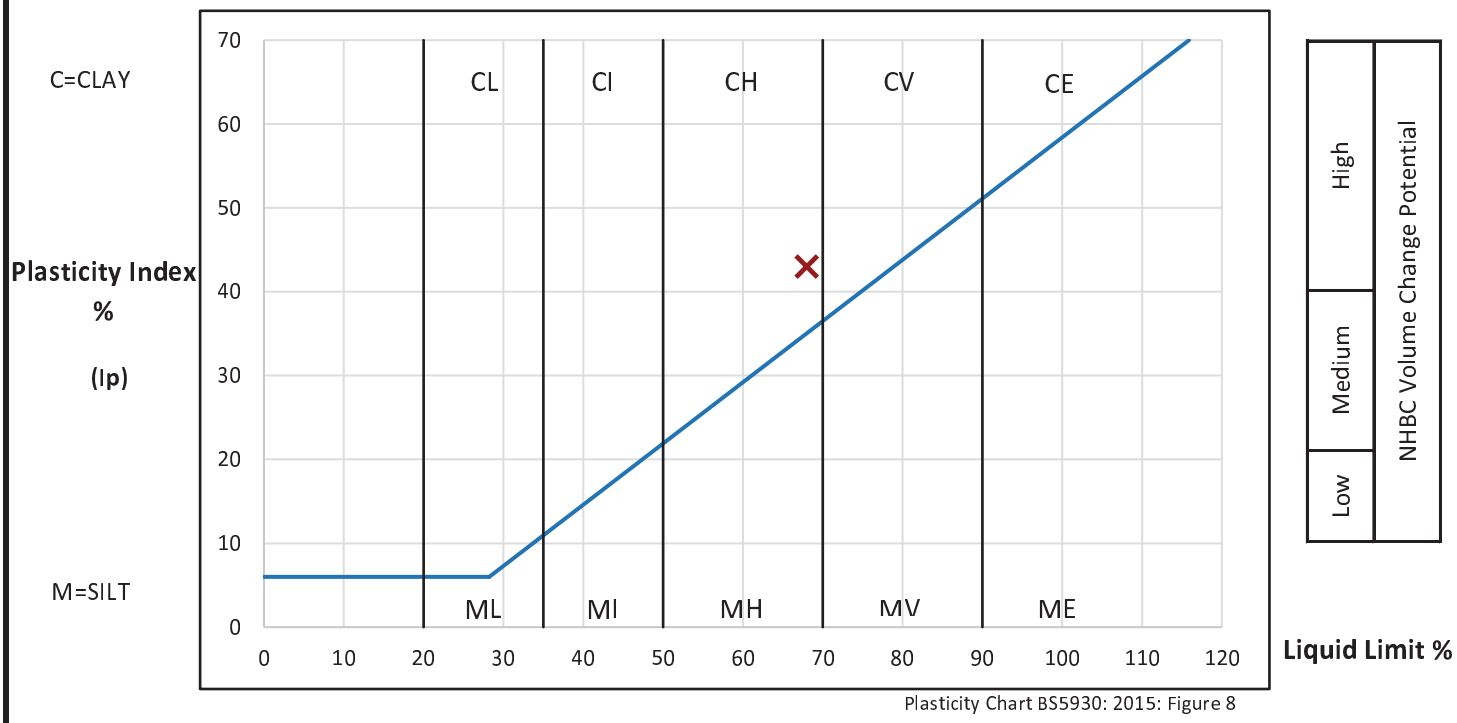
0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2** |

## DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole / Pit No. | Depth m | Sample Type | Sample Reference | Water Content (W) % | Description | Remarks |
|---|---|---|---|---|---|---|
| - | | B | 4 | 30.7 | Firm dark grey CLAY with rare shell fragments. | |

| PREPARATION | | | | Liquid Limit | 68 % |
|---|---|---|---|---|---|
| Method of preparation | | | From natural | Plastic Limit | 25 % |
| Sample retained 0.425mm sieve | (Assumed) | | 0 % | Plasticity Index | 43 % |
| Corrected water content for material passing 0.425mm | | | | Liquidity Index | 0.13 |
| Sample retained 2mm sieve | (Assumed) | | 0 % | NHBC Modified (I'p) | n/a |
| Curing time | 24 hrs | Clay Content | 66 % | Derived Activity | 0.65 |




Plasticity Chart BS5930: 2015: Figure 8

| | |
|---|---|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2 |
| Method of Test: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4 |
| Type of Sample Key: | U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter |
| Comments: | |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

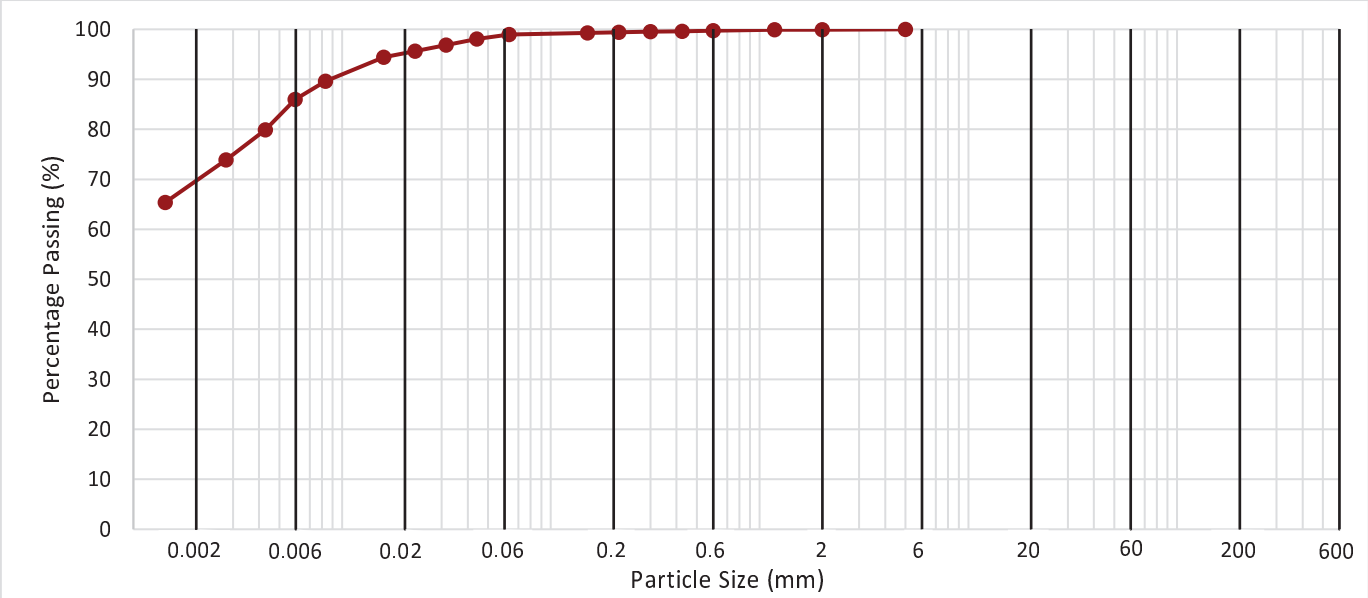
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-2 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 3 | Stiff dark grey CLAY with rare shell fragments. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| 0.0442 | 98 | 30 |
| 0.0314 | 97 | |
| 0.0223 | 96 | |
| 0.0158 | 94 | Clay by Dry Mass (%) |
| 0.0083 | 90 | |
| 0.0060 | 86 | |
| 0.0043 | 80 | 69 |
| 0.0028 | 74 | |
| 0.0014 | 65 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 1 |
| 1.18 | 100 | |
| 0.600 | 100 | |
| 0.425 | 100 | |
| 0.300 | 100 | |
| 0.212 | 99 | |
| 0.150 | 99 | |
| 0.063 | 99 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 99 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | 100 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

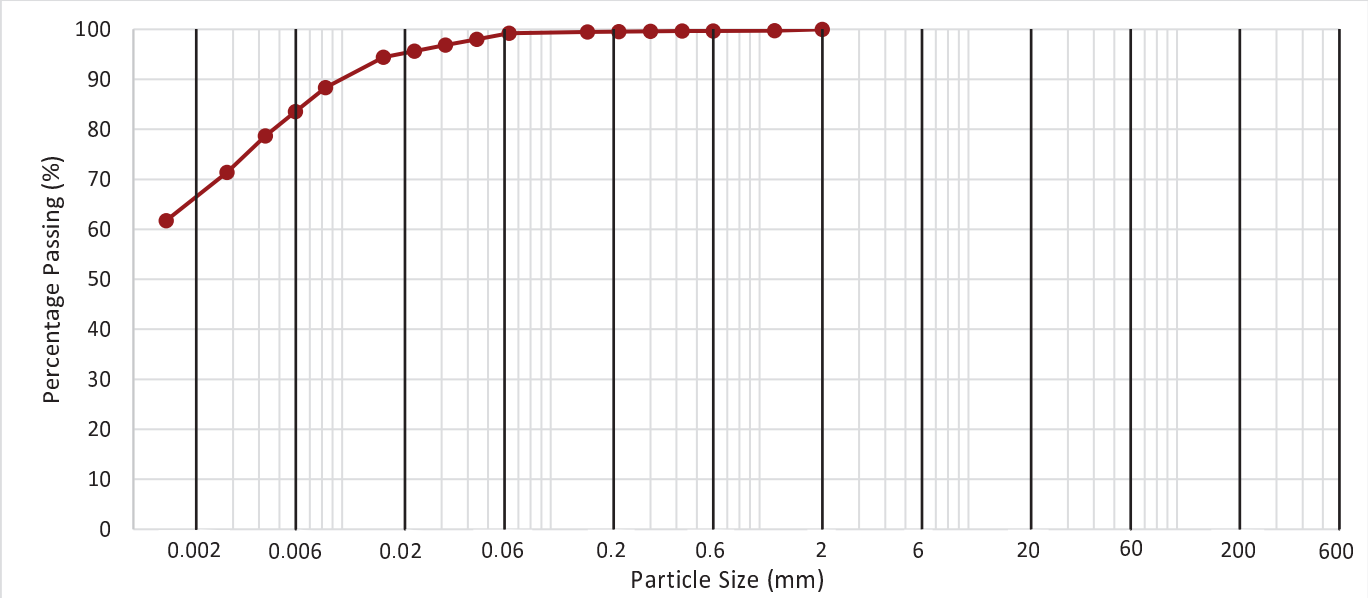
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-2 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 4 | Firm dark grey CLAY with rare shell fragments. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| 0.0441 | 98 | 33 |
| 0.0313 | 97 | |
| 0.0222 | 96 | |
| 0.0158 | 94 | Clay by Dry Mass (%) |
| 0.0083 | 88 | |
| 0.0060 | 84 | |
| 0.0043 | 79 | 66 |
| 0.0028 | 71 | |
| 0.0014 | 62 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 1 |
| 1.18 | 100 | |
| 0.600 | 100 | |
| 0.425 | 100 | |
| 0.300 | 100 | |
| 0.212 | 100 | |
| 0.150 | 99 | |
| 0.063 | 99 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 99 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 23/05/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2** |

## SUMMARY OF PARTICLE DENSITY TESTS

| Borehole /Pit No. | Depth (m) | Type | Ref. | Particle Density ($Mg/m^3$) | Description | Remarks |
|---|---|---|---|---|---|---|
| - | | B | 3 | **2.67** | Stiff dark grey CLAY with rare shell fragments. | |
| - | | B | 4 | **2.68** | Firm dark grey CLAY with rare shell fragments. | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | |
|---|---|
| Method Of Preparation: | BS1377: Part 1: 2016: 8.3 & 8.4.4 |
| Method of Test: | BS1377: Part 2: 1990: 8.3 |
| Type of Sample Key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter |
| Comments: | |
| Remarks to Include: | Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-2S** |

**Client:**

WYG Environmental

Geneva Building
Lakeview Drive
Sherwood Business Park
Annesley
Nottinghamshire
NG15 0ED


***Soil Property Testing Ltd***

**15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG**

**Tel: 01480 455579**
**Email:** enquiries@soilpropertytesting.com
**Website:** www.soilpropertytesting.com


**Samples Submitted By:**

WYG Environmental

**Samples Labelled:**

Mepal Landfill Site - Phase 9

**Approved Signatories:**

- ☑ **J.C. Garner B.Eng (Hons) FGS** Technical Director
- ☐ **S.P. Townend FGS** Quality Manager
- ☐ **W. Johnstone** Materials Lab Manager
- ☐ **D. Sabnis** Operations Manager

**Date Received:** 11/05/2018

**Samples Tested Between:** 11/05/2018 **and** 06/06/2018

**Remarks:**

For the attention of Mr M Holzer
Your Reference No: A103049

This is a supplement to Test Report S33037-2 dated 23/05/18 and includes the results of 2nr Triaxial Permeability tests

**Notes:**

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2. (a) UKAS - United Kingdom Accreditation Service
   (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

0998

| | | | |
|---|---|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** | | |
| **Serial No.** | **S33037-2S** | **Target Date** | 08/06/2018 |
| **Scheduled By** | WYG Environmental | | |

## SCHEDULE OF LABORATORY TESTS

**Schedule Remarks**

| Bore Hole No. | Type | Sample Ref. | Top Depth | Triaxial Permeability | | | | | | | | | | | | | | | | | Sample Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | C | P2 | | 1 | | | | | | | | | | | | | | | | | |
| - | C | P3 | | 1 | | | | | | | | | | | | | | | | | |
| Totals | | | | **2** | | | | | | | | | | | | | | | | | End of Schedule |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

UKAS TESTING 0998

| | |
|---|---|
| Contract | Mepal Landfill Site - Phase 9 |
| Serial No. | S33037-2S |

## DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL
## Measured Under Constant Head Conditions
## Test Method - BS1377: Part 6: 1990

| BH / TP | Depth (m) | Type | Ref. | Description | Remarks |
|---|---|---|---|---|---|
| - | | C | P2 | Stiff dark grey calcareous CLAY with rare fine to medium chert gravel. | |

| Sample Details | |
|---|---|
| Type of Sample | Undisturbed |

| Flow Conditions | |
|---|---|
| Direction | Vertical Downwards |

| Test Specimen Details | | Initial | Final |
|---|---|---|---|
| Mass of Sample | g | 1177.3 | 1179.6 |
| Diameter | mm | 100.73 | 100.78 |
| Area | $mm^2$ | 7970.4 | 7977.5 |
| Length | mm | 76.04 | 75.84 |
| Bulk Density | $Mg/m^3$ | 1.94 | 1.95 |
| Water Content | % | 30.4 | 32.2 |
| Dry Density | $Mg/m^3$ | 1.49 | 1.47 |

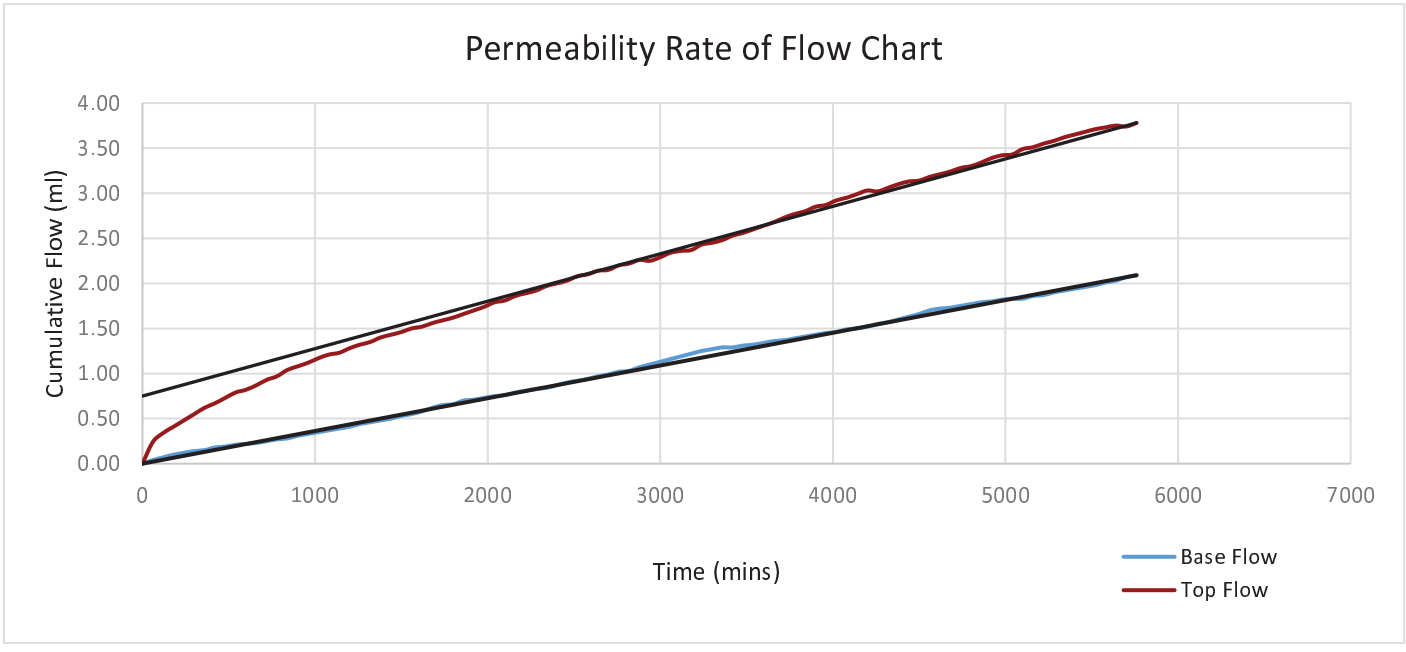
| Test Duration | |
|---|---|
| Cell Pressure Test | 1 |
| Saturation | 5 |
| Consolidation | 3 |
| Flow | 4 |

| Saturation Stage | | |
|---|---|---|
| B Value (Initial/Final) | 0.93 | 1.00 |

| Consolidation Stage | | |
|---|---|---|
| Consolidation Pressure | kPa | 100 |

| Permeability Stage | | |
|---|---|---|
| Test Temperature | °C | 20 |
| Mean Effective Stress | kPa | 85 |
| Cell Pressure | kPa | 421 |
| Top Drain Pressure | kPa | 351 |
| Base Drain Pressure | kPa | 321 |
| Differential Pressure | kPa | 30 |
| Rate of Flow (q) | mL/min | 0.0005 |

| Test Result | | |
|---|---|---|
| **Permeability (kv)** | **m/s** | **$2.6 \times 10^{-11}$** |




| | |
|---|---|
| Method of Preparation: | BS1377: PART 1: 2016: 9.3 |
| Method of Test: | BS1377: PART 6: 1990: 6 - SATURATION |
| | BS1377: PART 6: 1990: 6 - CONSOLIDATION - With deviation to allow flow from both ends of specimen |
| | BS1377: PART 6: 1990: 6 - FLOW |
| Type of sample key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W= Water, SPT = Split Spoon Sample, C = Core Cutter |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

UKAS TESTING 0998

| | |
|---|---|
| Contract | Mepal Landfill Site - Phase 9 |
| Serial No. | S33037-2S |

## DETERMINATION OF PERMEABILITY IN A TRIAXIAL CELL
## Measured Under Constant Head Conditions
## Test Method - BS1377: Part 6: 1990

| BH / TP | Depth (m) | Type | Ref. | Description | Remarks |
|---|---|---|---|---|---|
| - | | C | P3 | Stiff dark grey calcareous CLAY with rare fine to medium chert gravel. | |

| Sample Details | |
|---|---|
| Type of Sample | Undisturbed |

| Saturation Stage | | |
|---|---|---|
| B Value (Initial/Final) | 0.88 | 0.99 |

| Flow Conditions | |
|---|---|
| Direction | Vertical Downwards |

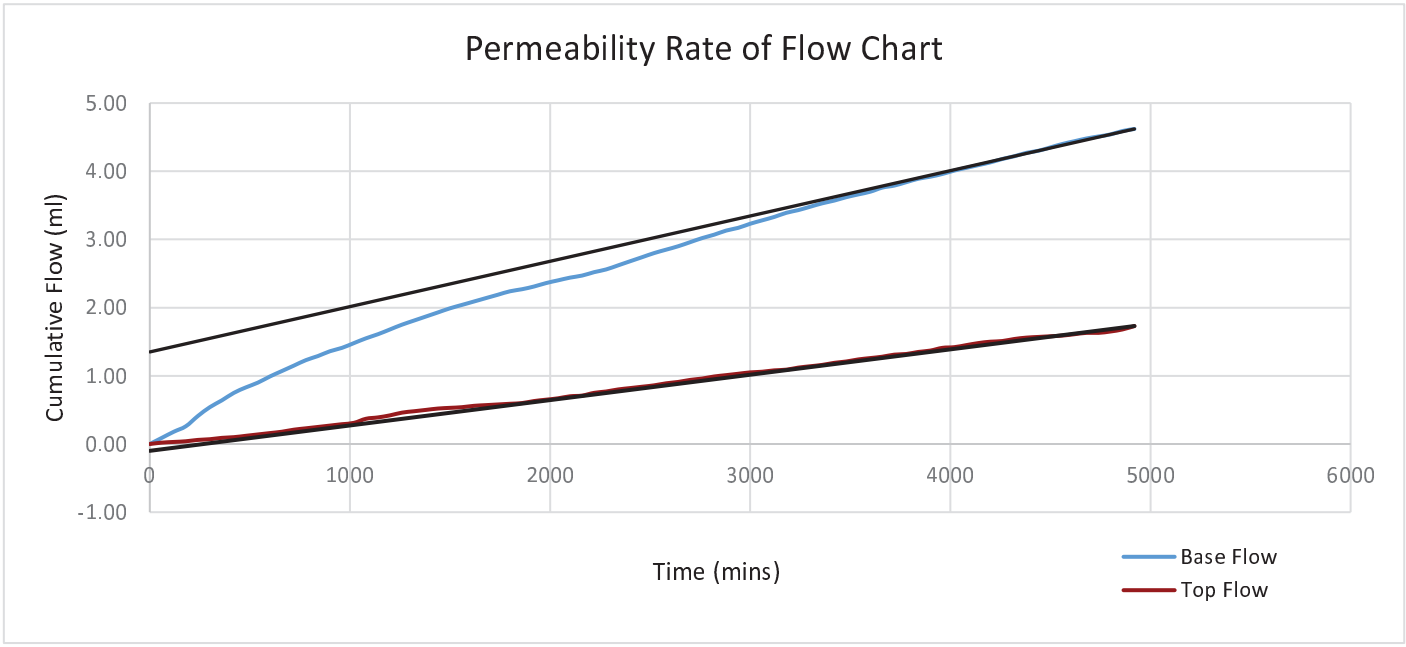
| Consolidation Stage | | |
|---|---|---|
| Consolidation Pressure | kPa | 100 |

| Test Specimen Details | | Initial | Final |
|---|---|---|---|
| Mass of Sample | g | 1195.0 | 1207.4 |
| Diameter | mm | 101.08 | 101.52 |
| Area | $mm^2$ | 8025.8 | 8095.9 |
| Length | mm | 75.97 | 76.46 |
| Bulk Density | $Mg/m^3$ | 1.96 | 1.95 |
| Water Content | % | 30.9 | 31.8 |
| Dry Density | $Mg/m^3$ | 1.50 | 1.48 |

| Permeability Stage | | |
|---|---|---|
| Test Temperature | °C | 20 |
| Mean Effective Stress | kPa | 85 |
| Cell Pressure | kPa | 419 |
| Top Drain Pressure | kPa | 349 |
| Base Drain Pressure | kPa | 319 |
| Differential Pressure | kPa | 30 |
| Rate of Flow (q) | mL/min | 0.0007 |

| Test Duration | |
|---|---|
| Cell Pressure Test | 1 |
| Saturation | 4 |
| Consolidation | 9 |
| Flow | 4 |

| Test Result | | |
|---|---|---|
| **Permeability (kv)** | **m/s** | **$3.6x10^{-11}$** |




| | |
|---|---|
| Method of Preparation: | BS1377: PART 1: 2016: 9.3 |
| Method of Test: | BS1377: PART 6: 1990: 6 - SATURATION |
| | BS1377: PART 6: 1990: 6 - CONSOLIDATION - With deviation to allow flow from both ends of specimen |
| | BS1377: PART 6: 1990: 6 - FLOW |
| Type of sample key: | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W= Water, SPT = Split Spoon Sample, C = Core Cutter |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-3** |

**Client:**

WYG Environmental

Geneva Building
Lakeview Drive
Sherwood Business Park
Annesley
Nottinghamshire
NG15 0ED


***Soil Property Testing Ltd***

**15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG**

**Tel: 01480 455579**
**Email:** enquiries@soilpropertytesting.com
**Website:** www.soilpropertytesting.com


**Samples Submitted By:**

WYG Environmental

**Samples Labelled:**

Mepal Landfill Site - Phase 9

**Approved Signatories:**

- ☑ **J.C. Garner B.Eng (Hons) FGS** Technical Director
- ☐ **S.P. Townend FGS** Quality Manager
- ☐ **W. Johnstone** Materials Lab Manager
- ☐ **D. Sabnis** Operations Manager

**Date Received:** 16/05/2018

**Samples Tested Between:** 16/05/2018 **and** 04/06/2018

**Remarks:**

For the attention of Mr M Holzer
Your Reference No: A103049

**Notes:**

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2. (a) UKAS - United Kingdom Accreditation Service
   (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

0998

| | | | |
|---|---|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** | | |
| **Serial No.** | **S33037-3** | **Target Date** | 30/05/2018 |
| **Scheduled By** | WYG Environmental | | |

## SCHEDULE OF LABORATORY TESTS

**Schedule Remarks**

| Bore Hole No. | Type | Sample Ref. | Top Depth | Water Content BSEN | Density Determination BSEN | PSD by Hydro + Pre-sieve | | | | | | | | | | | | | | | | Sample Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | C | 5 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | C | 6 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | C | 7 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | C | 8 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | B | 5 | | | | 1 | | | | | | | | | | | | | | | | |
| - | B | 6 | | | | 1 | | | | | | | | | | | | | | | | |
| - | B | 7 | | | | 1 | | | | | | | | | | | | | | | | |
| - | B | 8 | | | | 1 | | | | | | | | | | | | | | | | |
| **Totals** | | | | **4** | **4** | **4** | | | | | | | | | | | | | | | | **End of Schedule** |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

UKAS TESTING

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-3** |

## DETERMINATION OF DENSITY AND WATER CONTENT

| Borehole /Pit No. | Depth (m) | Sample | | Water Content (%) | Bulk Density (Mg/m3) | Dry Density (Mg/m3) | Description | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Type | Reference | | | | | |
| - | | C | 5 | 26.0 | 2.03 | 1.61 | Stiff dark grey slightly gravelly calcareous CLAY with occasional grey mottling and rare shell debris. Gravel is fine to medium. | |
| - | | C | 6 | 25.5 | 2.02 | 1.61 | Stiff dark grey calcareous CLAY with occasional grey mottling, and rare shell debris. | |
| - | | C | 7 | 26.5 | 2.01 | 1.59 | Stiff dark grey calcareous CLAY with occasional grey mottling, and rare shell debris. | |
| - | | C | 8 | 26.2 | 2.02 | 1.60 | Stiff dark grey calcareous CLAY with occasional grey mottling, and rare shell debris. | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Method of Preparation:

Method of Test: BS EN ISO 17892-1: 2014 & BS EN ISO 17892-2: 2014

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J - Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

Remarks to Include: Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110°C.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

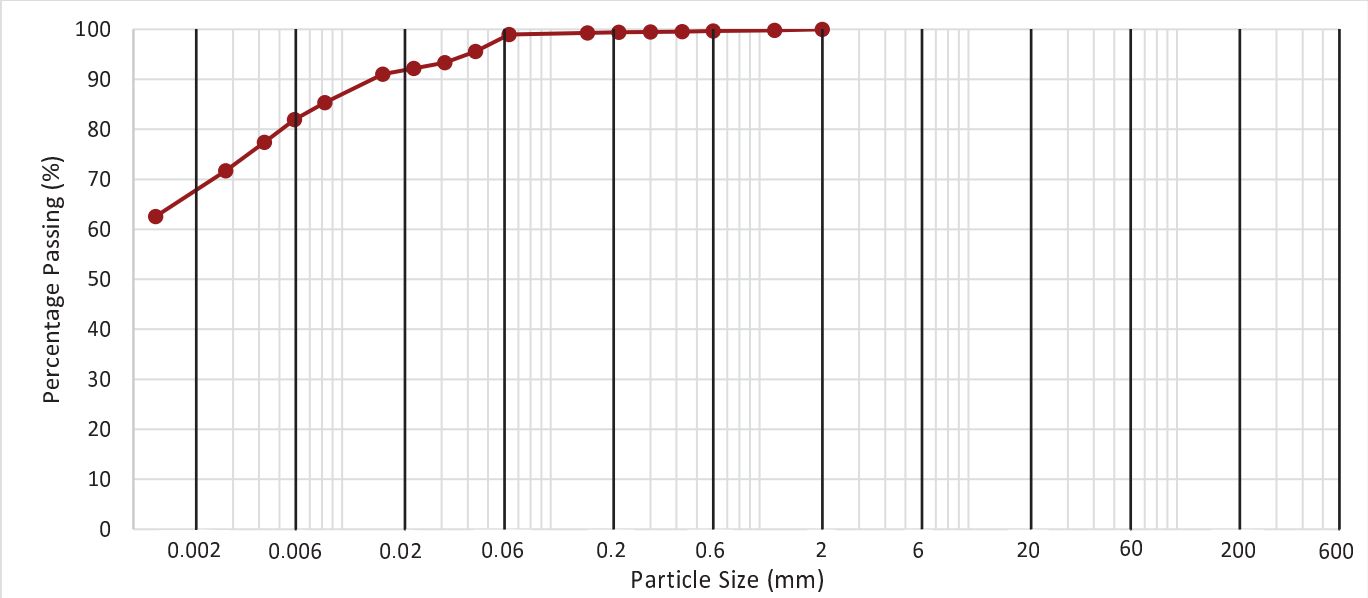
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-3 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 5 | Stiff dark grey calcareous CLAY with rare fossil debris. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

| Hydrometer | Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|---|
| | 0.0435 | 96 | 32 |
| | 0.0310 | 93 | |
| | 0.0220 | 92 | |
| | 0.0157 | 91 | Clay by Dry Mass (%) |
| | 0.0083 | 85 | |
| | 0.0059 | 82 | |
| | 0.0042 | 77 | 67 |
| | 0.0028 | 72 | |
| | 0.0013 | 63 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 1 |
| 1.18 | 100 | |
| 0.600 | 100 | |
| 0.425 | 100 | |
| 0.300 | 99 | |
| 0.212 | 99 | |
| 0.150 | 99 | |
| 0.063 | 99 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 99 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

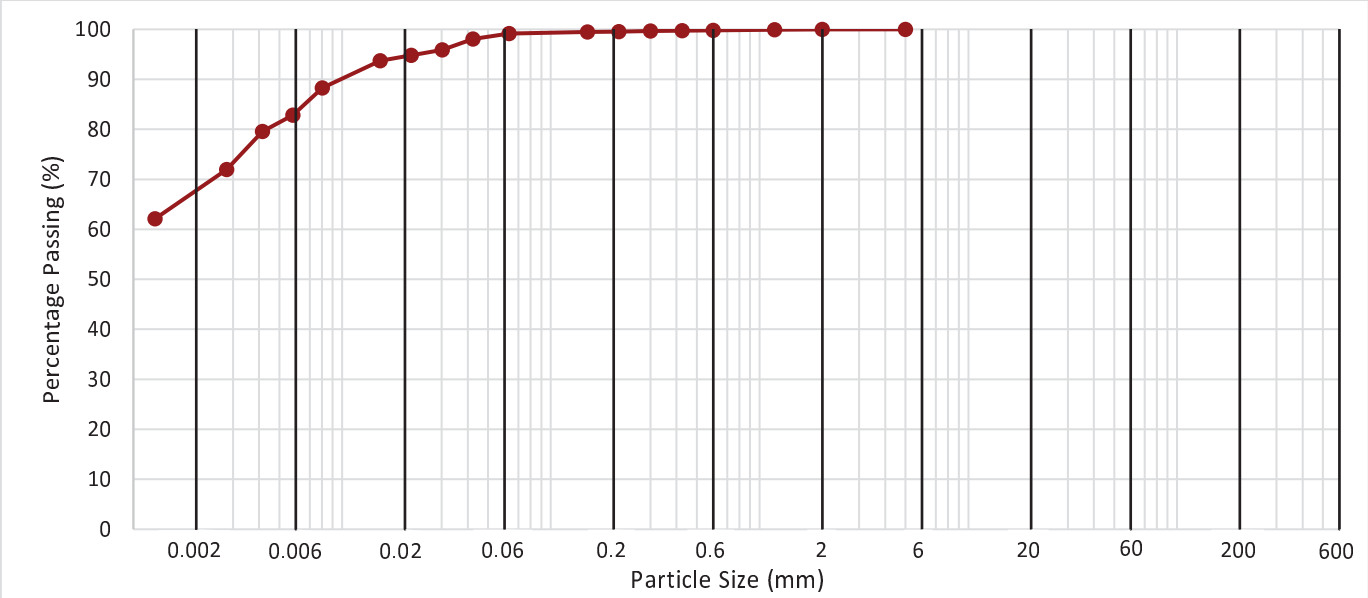
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-3 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 6 | Stiff dark grey calcareous CLAY with rare fossil debris. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

| Hydrometer | Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|---|
| | 0.0423 | 98 | 32 |
| | 0.0302 | 96 | |
| | 0.0215 | 95 | |
| | 0.0152 | 94 | Clay by Dry Mass (%) |
| | 0.0080 | 88 | |
| | 0.0058 | 83 | |
| | 0.0042 | 80 | 67 |
| | 0.0028 | 72 | |
| | 0.0013 | 62 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 1 |
| 1.18 | 100 | |
| 0.600 | 100 | |
| 0.425 | 100 | |
| 0.300 | 100 | |
| 0.212 | 100 | |
| 0.150 | 99 | |
| 0.063 | 99 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 99 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | 100 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

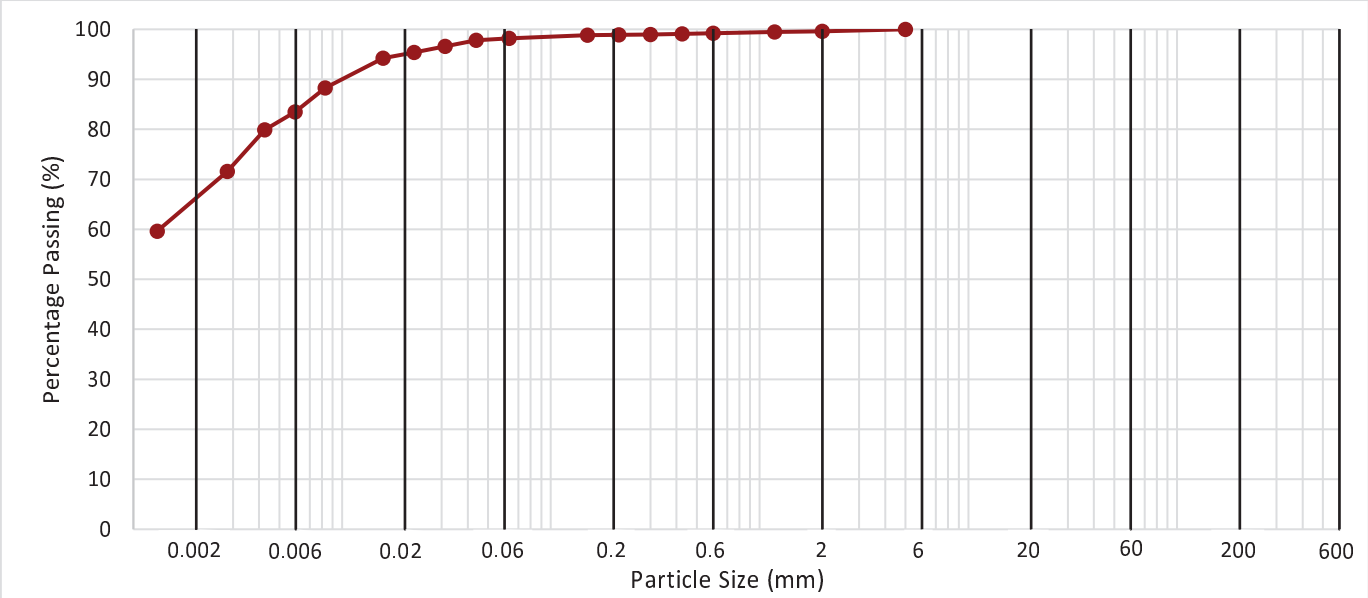
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-3 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 7 | Stiff dark grey calcareous CLAY with rare fossil debris. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

| Hydrometer | Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|---|
| | 0.0439 | 98 | 33 |
| | 0.0312 | 97 | |
| | 0.0221 | 95 | |
| | 0.0157 | 94 | Clay by Dry Mass (%) |
| | 0.0083 | 88 | |
| | 0.0060 | 83 | |
| | 0.0043 | 80 | 65 |
| | 0.0028 | 72 | |
| | 0.0013 | 60 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 2 |
| 1.18 | 99 | |
| 0.600 | 99 | |
| 0.425 | 99 | |
| 0.300 | 99 | |
| 0.212 | 99 | |
| 0.150 | 99 | |
| 0.063 | 98 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 98 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | 100 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 04/06/2018**

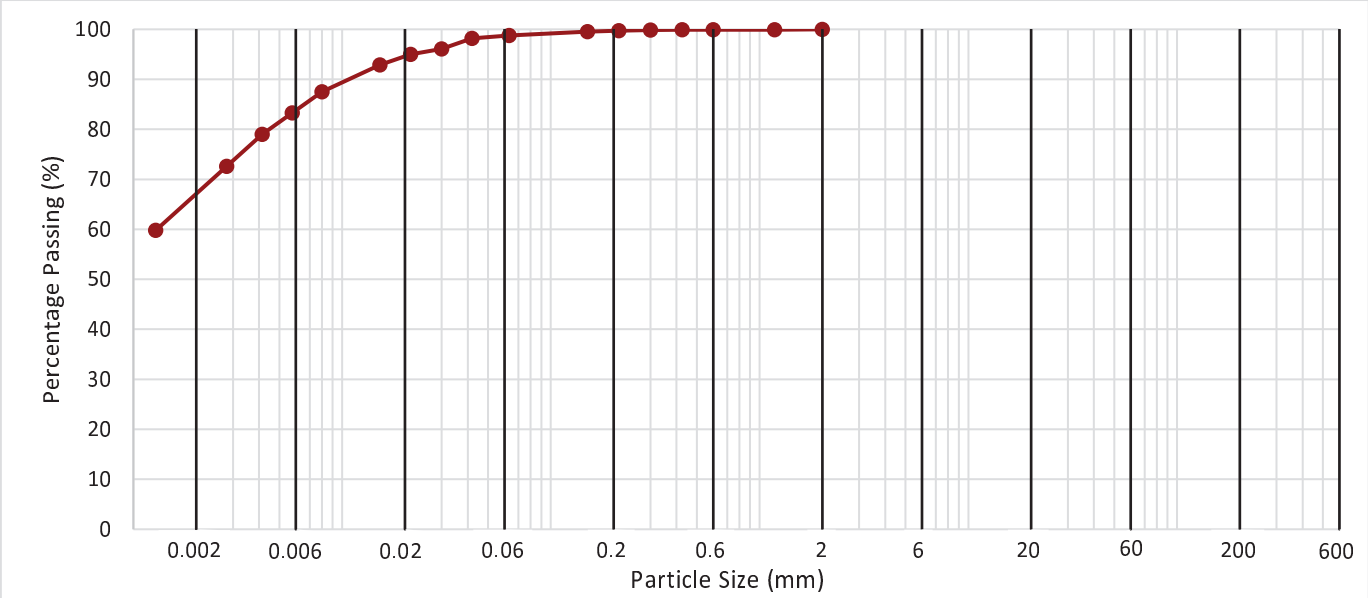
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-3 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 8 | Very stiff dark grey calcareous CLAY with rare fossil debris. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

| Hydrometer | Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|---|
| | 0.0419 | 98 | 33 |
| | 0.0299 | 96 | |
| | 0.0213 | 95 | |
| | 0.0152 | 93 | Clay by Dry Mass (%) |
| | 0.0080 | 88 | |
| | 0.0058 | 83 | |
| | 0.0041 | 79 | 66 |
| | 0.0028 | 73 | |
| | 0.0013 | 60 | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 1 |
| 1.18 | 100 | |
| 0.600 | 100 | |
| 0.425 | 100 | |
| 0.300 | 100 | |
| 0.212 | 100 | |
| 0.150 | 100 | |
| 0.063 | 99 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 99 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-4** |

**Client:**

WYG Environmental

Geneva Building
Lakeview Drive
Sherwood Business Park
Annesley
Nottinghamshire
NG15 0ED


***Soil Property Testing Ltd***

**15, 16, 18 Halcyon Court, St Margaret's Way,**
**Stukeley Meadows, Huntingdon,**
**Cambridgeshire, PE29 6DG**

**Tel: 01480 455579**
**Email:** enquiries@soilpropertytesting.com
**Website:** www.soilpropertytesting.com


**Samples Submitted By:**

WYG Environmental

**Samples Labelled:**

Mepal Landfill Site - Phase 9

**Approved Signatories:**

- ☑ **J.C. Garner B.Eng (Hons) FGS** — Technical Director
- ☐ **S.P. Townend FGS** — Quality Manager
- ☐ **W. Johnstone** — Materials Lab Manager
- ☐ **D. Sabnis** — Operations Manager

**Date Received:** 24/05/2018

**Samples Tested Between:** 24/05/2018 **and** 06/06/2018

**Remarks:**

For the attention of Mr M Holzer
Your Reference No: A103049

**Notes:**

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2. (a) UKAS - United Kingdom Accreditation Service
   (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

0998

| | | | |
|---|---|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** | | |
| **Serial No.** | **S33037-4** | **Target Date** | 07/06/2018 |
| **Scheduled By** | WYG Environmental | | |

## SCHEDULE OF LABORATORY TESTS

**Schedule Remarks**

| Bore Hole No. | Type | Sample Ref. | Top Depth | Water Content BSEN | Density Determination BSEN | PSD by Hydrometer | | | | | | | | | | | | | | | | Sample Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | C | 9 | | 1 | 1 | | | | | | | | | | | | | | | | | |
| - | B | 9 | | | | 1 | | | | | | | | | | | | | | | | |
| **Totals** | | | | **1** | **1** | **1** | | | | | | | | | | | | | | | | **End of Schedule** |

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

UKAS TESTING

0998

| | |
|---|---|
| **Contract** | **Mepal Landfill Site - Phase 9** |
| **Serial No.** | **S33037-4** |

## DETERMINATION OF DENSITY AND WATER CONTENT

| Borehole /Pit No. | Depth (m) | Sample | | Water Content (%) | Bulk Density (Mg/m3) | Dry Density (Mg/m3) | Description | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | Type | Reference | | | | | |
| - | | C | 9 | 24.7 | 2.02 | 1.62 | Stiff dark grey slightly gravelly calcareous CLAY with occasional grey mottling, and rare shell fragments. Gravel is fine to medium. | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Method of Preparation:

Method of Test: BS EN ISO 17892-1: 2014 & BS EN ISO 17892-2: 2014

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J - Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

Remarks to Include: Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110°C.

# TEST REPORT

**ISSUED BY SOIL PROPERTY TESTING LTD**

**DATE ISSUED: 06/06/2018**

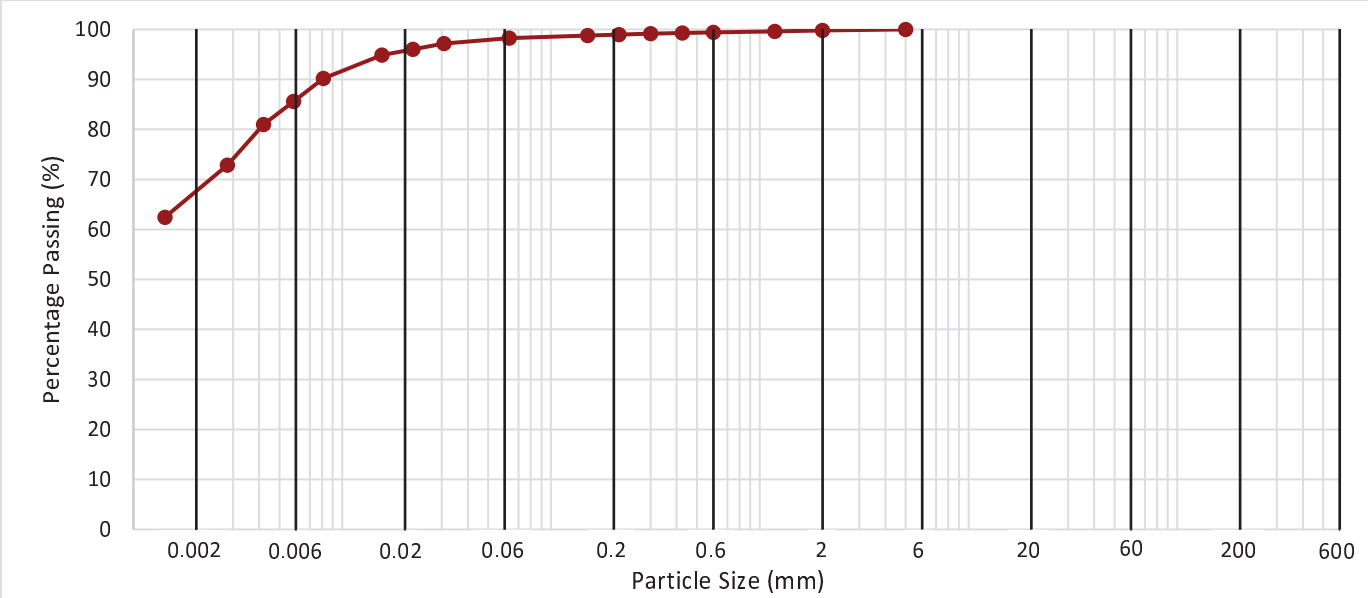
0998

| | |
|---|---|
| **Contract** | Mepal Landfill Site - Phase 9 |
| **Serial No.** | S33037-4 |

## DETERMINATION OF PARTICLE SIZE DISTRIBUTION

| Borehole / Pit No. | Depth (m) | Sample Type | Sample Reference | Description | Remarks |
|---|---|---|---|---|---|
| - | | B | 9 | Stiff dark grey calcareous CLAY with rare shell/fossil fragments. | |

| Method of Test: | Hydrometer + Pre-sieve | Method of Pretreatment: | Not required |
|---|---|---|---|




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

Hydrometer

| Particle Size (mm) | Passing (%) | Silt by Dry Mass (%) |
|---|---|---|
| 0.0307 | 97 | 31 |
| 0.0218 | 96 | |
| 0.0155 | 95 | |
| 0.0081 | 90 | Clay by Dry Mass (%) |
| 0.0058 | 86 | |
| 0.0042 | 81 | |
| 0.0028 | 73 | 67 |
| 0.0014 | 62 | |
| | | |

| Sieve Size (mm) | Passing (%) | Sand By Dry Mass (%) |
|---|---|---|
| 2.00 | 100 | 2 |
| 1.18 | 100 | |
| 0.600 | 99 | |
| 0.425 | 99 | |
| 0.300 | 99 | |
| 0.212 | 99 | |
| 0.150 | 99 | |
| 0.063 | 98 | |

| Fines By Dry Mass (%) | |
|---|---|
| <0.063mm | 98 |

| Sieve Size (mm) | Passing (%) | Gravel By Dry Mass (%) |
|---|---|---|
| 150 | | 0 |
| 125 | | |
| 90 | | |
| 63 | | |
| 50 | | |
| 37.5 | | |
| 28 | | |
| 20 | | |
| 14 | | |
| 10 | | |
| 6.3 | | |
| 5 | 100 | |

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

APPENDIX H

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com

APPENDIX I

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

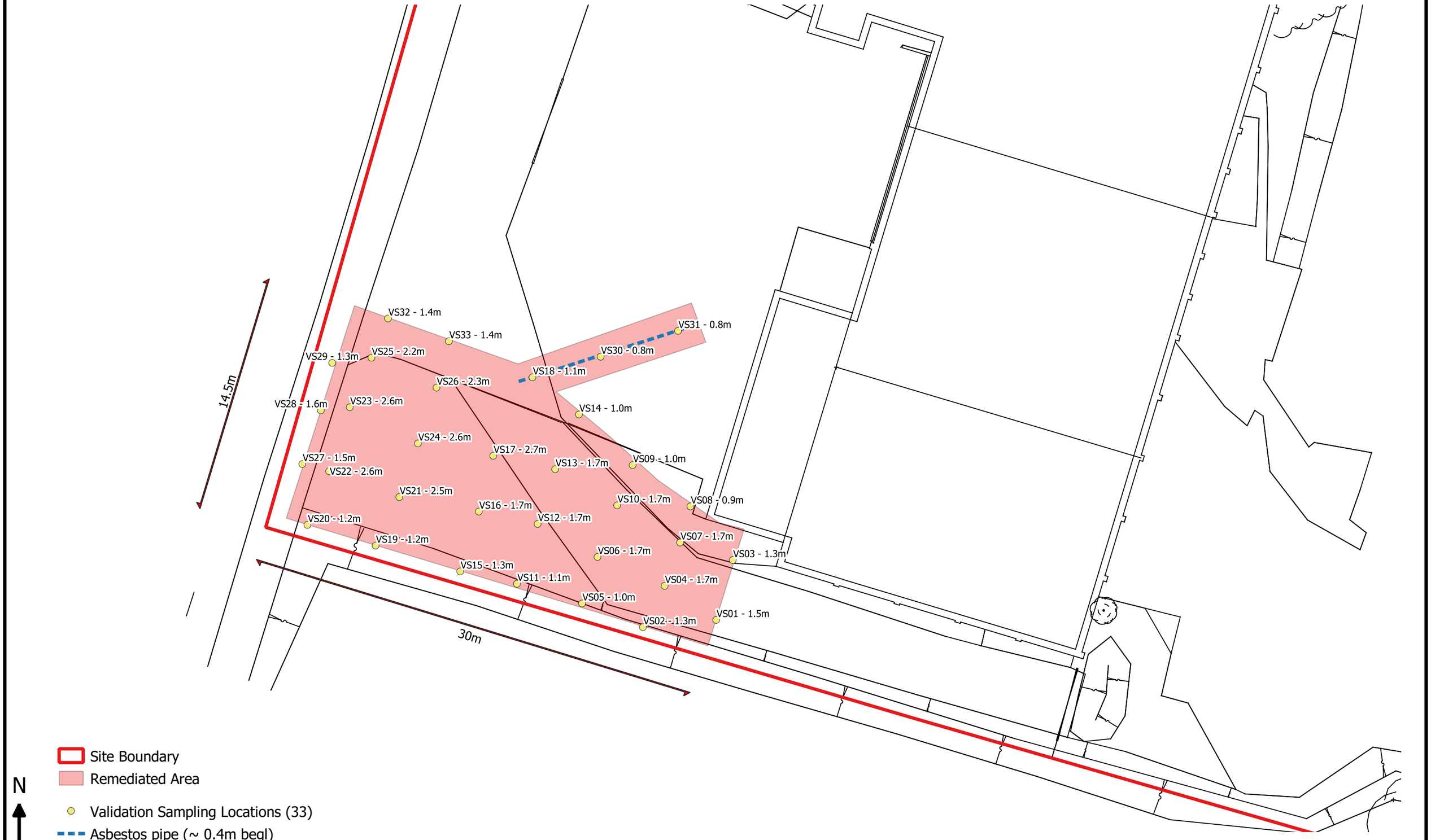
- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com




| | | | | |
|---|---|---|---|---|
| NOTES: NOTES | CLIENT: Partner Construction Ltd & Waterloo Housing Group Ltd | PROJECT No: P8723 | DATE: 12/2019 | DESIGN/DRAWN: AL |
| | PROJECT: Crease Drove, Crowland | DRAWING NUMBER: 08 | ISSUE: FINAL | |
| | TITLE: Vaidation Plan | © GRM Development Solutions Ltd © Crown Copyright. AL 100014100 | | |

GRM Development Solutions Ltd
Tel: 01283 551 249
mail@grm-uk.com www.grm-uk.com

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**GRM Development Solutions**
Laurus House
First Avenue
Centrum 100
Burton Upon Trent
DE14 2WH

## Analytical Test Report: L19/02765/GRM/001

| | | | |
|---|---|---|---|
| Your Project Reference: | **P8723 - Crease Drove, Crowland** | Samples Received on: | 28/11/2019 |
| Your Order Number: | P8723 | Testing Instruction Received: | 28/11/2019 |
| Report Issue Number: | 1 | Sample Tested: | 28/11 to 11/12/2019 |
| Samples Analysed: | 10 soil samples | Report issued: | 12/12/2019 |

Signed



**Peter Swanston**
Environmental Laboratories Manager
Nicholls Colton Group

Notes:

**General**

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with NC method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with NC method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Samples were supplied by customer, results are representative of the material provided

**Deviating Samples**

| | |
|---|---|
| Samples were received in suitable containers | **Yes** |
| A date and time of sampling was provided | **Yes** |
| Sample holding times were exceeded prior to analysis of determinants | **No** |

Where samples do not meet one or more of the above criteria they will be classed as deviating, this means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

**Accreditation Key**

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/02765/GRM/001**

**Project Reference - P8723 - Crease Drove, Crowland**

**Analytical Test Results - TPH CWG**

| NC Reference | | | 64748 | 64749 | 64750 | 64751 | 64752 | 64753 | 64754 |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID | | | VS01 | VS02 | VS03 | VS04 | VS05 | VS06 | VS07 |
| Depth (m) | | | 1.5 | 1.3 | 1.3 | 1.7 | 1.0 | 1.7 | 1.7 |
| Date of Sampling | | | 27/11/2019 | 27/11/2019 | 27/11/2019 | 27/11/2019 | 27/11/2019 | 27/11/2019 | 27/11/2019 |
| Time of Sampling | | | 11.00 | 11.15 | 11.30 | 12.00 | 12.15 | 12.30 | 13.00 |
| Sample Matrix | | | Clay | Clay | Clay | Clay | Clay | Sand | Clay |
| **Determinant** | **Units** | **Accreditation** | | | | | | | |
| **Aliphatics** | | | | | | | | | |
| $>C_5$ to $C_6$ | (mg/kg) | u | 0.05 | 0.10 | 0.07 | < 0.03 | 0.16 | < 0.03 | < 0.03 |
| $>C_6$ to $C_8$ | (mg/kg) | u | < 0.03 | 0.04 | < 0.03 | < 0.03 | 0.11 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | 20 | 16 | < 10 | < 10 | < 10 | 14 | < 10 |
| **Aromatics** | | | | | | | | | |
| $>C_5$ to $C_7$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_7$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | 15 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| **Total** | | | | | | | | | |
| $>C_5$ to $C_{35}$ | (mg/kg) | u | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/02765/GRM/001**

**Project Reference - P8723 - Crease Drove, Cro**

**Analytical Test Results - TPH CWG**

| NC Reference | | | 64755 | 64756 | 64757 |
|---|---|---|---|---|---|
| Client Sample ID | | | VS08 | VS09 | VS10 |
| Depth (m) | | | 0.9 | 1.0 | 1.7 |
| Date of Sampling | | | 27/11/2019 | 27/11/2019 | 27/11/2019 |
| Time of Sampling | | | 13.15 | 14.00 | 14.30 |
| Sample Matrix | | | Clay | Clay | Clay |
| **Determinant** | **Units** | **Accreditation** | | | |
| **Aliphatics** | | | | | |
| $>C_5$ to $C_6$ | (mg/kg) | u | 0.06 | 0.10 | < 0.03 |
| $>C_6$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| **Aromatics** | | | | | |
| $>C_5$ to $C_7$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 |
| $>C_7$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | 24 | 17 | < 10 |
| **Total** | | | | | |
| $>C_5$ to $C_{35}$ | (mg/kg) | u | < 50 | < 50 | < 50 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/02765/GRM/001**

**Project Reference - P8723 - Crease Drove, Crowland**

**Sample Descriptions**

| NC Reference | Client Sample ID | Description | Moisture Content (%) | Stone Content (%) |
|---|---|---|---|---|
| 64748 | VS01 | Grey slightly sandy slightly gravelly silty clay | 27 | 25 |
| 64749 | VS02 | Grey slightly sandy slightly gravelly silty clay | 26 | 25 |
| 64750 | VS03 | Grey slightly sandy slightly gravelly silty clay | 38 | 3.4 |
| 64751 | VS04 | Light brown slightly sandy silt | 30 | 1.2 |
| 64752 | VS05 | Grey slightly sandy silty clay | 23 | 1.8 |
| 64753 | VS06 | Mottled greyish brown slightly sandy silty clay | 24 | 6.8 |
| 64754 | VS07 | Mottled brownish grey slightly sandy slightly gravelly silty clay | 19 | 11 |
| 64755 | VS08 | Mottled reddish grey slightly sandy silty clay | 110 | 2.6 |
| 64756 | VS09 | Grey slightly sandy silty clay | 44 | 0.9 |
| 64757 | VS10 | Orangish brown slightly sandy slightly gravelly silty clay | 14 | 20 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/02765/GRM/001**

**Project Reference - P8723 - Crease Drove, Crowland**

**Analysis Methodologies**

| Matrix | Determinant | Sample condition for analysis | Test Method used |
|---|---|---|---|
| Soil | CWG | As Received | In house method statements - MS - CL - EPH in soil and MS - CL - VPH |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**GRM Development Solutions**
Laurus House
First Avenue
Centrum 100
Burton Upon Trent
DE14 2WH

## Analytical Test Report: L19/2772/GRM/001

| | | | |
|---|---|---|---|
| Your Project Reference: | **Crease Drove,Crowland** | Samples Received on: | 29/11/2019 |
| Your Order Number: | P8723 | Testing Instruction Received: | 29/11/2019 |
| Report Issue Number: | 1 | Sample Tested: | 29/11 to 12/12/2019 |
| Samples Analysed: | 11 soil samples | Report issued: | 12/12/2019 |

Signed



**Peter Swanston**
Environmental Laboratories Manager
Nicholls Colton Group

Notes:

**General**

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with NC method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with NC method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Concentrations are reported as a percentage mass of the dry soil passing the 10mm BS test sieve. As received samples have been corrected for moisture content but not stone content.

Samples were supplied by customer, results are representative of the material provided

**Deviating Samples**

| | |
|---|---|
| Samples were received in suitable containers | **Yes** |
| A date and time of sampling was provided | **Yes** |
| Sample holding times were exceeded prior to analysis of determinants | **No** |

Where samples do not meet one or more of the above criteria they will be classed as deviating, this means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

**Accreditation Key**

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue 24.01.2017
Owned by Emily Blissett - Customer Services Supervisor
Authorised by James Gane - Commercial Manager
J:\Public\Projects\2019\L19\GRM - GRM Development solutions\L19-2772-GRM P8723\[L19-2772-GRM-001.xlsx]Cover Sheet

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2772/GRM/001**

**Project Reference - Crease Drove,Crowland**

**Analytical Test Results - TPH CWG**

| NC Reference | | | 64972 | 64973 | 64974 | 64975 | 64976 | 64977 | 64978 |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID | | | VS11 | VS12 | VS13 | VS14 | VS15 | VS16 | VS17 |
| Depth - Top (m) | | | 1.1 | 1.7 | 1.7 | 1.0 | 1.3 | 1.7 | 2.7 |
| Depth - Bottom (m) | | | 1.1 | 1.7 | 1.7 | 1.0 | 1.3 | 1.7 | 2.7 |
| Date of Sampling | | | 28/11/2019 | 28/11/2019 | 28/11/2019 | 28/11/2019 | 28/11/2019 | 28/11/2019 | 28/11/2019 |
| Time of Sampling | | | Not provided | Not provided | Not provided | Not provided | Not provided | Not provided | Not provided |
| Sample Matrix | | | Clay | Sand | Sand | Clay | Clay | Clay | Clay |
| **Determinant** | **Units** | **Accreditation** | | | | | | | |
| **Aliphatics** | | | | | | | | | |
| $>C_5$ to $C_6$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | 0.08 | < 0.03 | < 0.03 | < 0.03 |
| $>C_6$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 13 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| **Aromatics** | | | | | | | | | |
| $>C_5$ to $C_7$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_7$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 14 | < 10 | < 10 |
| **Total** | | | | | | | | | |
| $>C_5$ to $C_{35}$ | (mg/kg) | u | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 | < 50 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2772/GRM/001**

**Project Reference - Crease Drove,Crowland**

**Analytical Test Results - TPH CWG**

| NC Reference | | | 64979 | 64980 | 64981 | 64982 |
|---|---|---|---|---|---|---|
| Client Sample ID | | | VS19 | VS20 | VS21 | VS22 |
| Depth - Top (m) | | | 1.2 | 1.2 | 2.5 | 2.6 |
| Depth - Bottom (m) | | | 1.2 | 1.2 | 2.5 | 2.6 |
| Date of Sampling | | | 28/11/2019 | 28/11/2019 | 28/11/2019 | 28/11/2019 |
| Time of Sampling | | | Not provided | Not provided | Not provided | Not provided |
| Sample Matrix | | | Sand | Sand | Clay | Clay |
| **Determinant** | **Units** | **Accreditation** | | | | |
| **Aliphatics** | | | | | | |
| $>C_5$ to $C_6$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_6$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| **Aromatics** | | | | | | |
| $>C_5$ to $C_7$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_7$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 |
| **Total** | | | | | | |
| $>C_5$ to $C_{35}$ | (mg/kg) | u | < 50 | < 50 | < 50 | < 50 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2772/GRM/001**

**Project Reference - Crease Drove,Crowland**

**Sample Descriptions**

| NC Reference | Client Sample ID | Description | Moisture Content (%) | Stone Content (%) |
|---|---|---|---|---|
| 64972 | VS11 | Grey slightly sandy silty clay | 21 | 6.5 |
| 64973 | VS12 | Brown gravelly silty sand | 22 | 7.6 |
| 64974 | VS13 | Brown gravelly silty sand | 19 | 7.1 |
| 64975 | VS14 | Grey slightly sandy silty clay with rare organic matter | 54 | 0.7 |
| 64976 | VS15 | Grey slightly sandy slightly gravelly silty clay | 15 | 22 |
| 64977 | VS16 | Mottled brownish grey slightly sandy slightly gravelly silty clay | 18 | 1.4 |
| 64978 | VS17 | Mottled brownish grey slightly sandy slightly gravelly silty clay | 19 | 5.1 |
| 64979 | VS19 | Orangish brown slightly gravelly silty sand | 16 | 12 |
| 64980 | VS20 | Orangish brown silty sand | 17 | 3.3 |
| 64981 | VS21 | Mottled greyish brown slightly sandy slightly gravelly silty clay | 15 | 17 |
| 64982 | VS22 | Mottled brown grey slightly sandy slightly gravelly silty clay | 16 | 1.3 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2772/GRM/001**

**Project Reference - Crease Drove,Crowland**

**Sample Comments**

| NC Reference | Client Sample ID | Comments |
|---|---|---|
| 64973 | VS12 | VPH - Sample taken from container with headspace. |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2772/GRM/001**

**Project Reference - Crease Drove,Crowland**

**Analysis Methodologies**

| Matrix | Determinant | Sample condition for analysis | Test Method used |
|---|---|---|---|
| Soil | CWG | As Received | In house method statements - MS - CL - EPH in soil and MS - CL - VPH |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**GRM Development Solutions**
Laurus House
First Avenue
Centrum 100
Burton Upon Trent
DE14 2WH

## Analytical Test Report: L19/2783/GRM/001

| | | | |
|---|---|---|---|
| Your Project Reference: | **P8723 - Crease Drove, Crowland** | Samples Received on: | 02/12/2019 |
| Your Order Number: | P8723 | Testing Instruction Received: | 02/12/2019 |
| Report Issue Number: | 1 | Sample Tested: | 02/12 to 10/12/2019 |
| Samples Analysed: | 12 soil samples | Report issued: | 10/12/2019 |

Signed



**Peter Swanston**
Environmental Laboratories Manager
Nicholls Colton Group

Notes:

**General**

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report with the exception of the asbestos test portion which is held for 6 months unless otherwise requested.

Moisture Content was determined in accordance with NC method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with NC method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Concentrations are reported as a percentage mass of the dry soil passing the 10mm BS test sieve. As received samples have been corrected for moisture content but not stone content.

Samples were supplied by customer, results are representative of the material provided

**Asbestos**

Please note: Where futher analaysis is required samples identified as containing asbestos are screened and tested on an as recevied basis. No correction is made for moisture content and these results are not covered by our accrediation

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

**Deviating Samples**

| | |
|---|---|
| Samples were received in suitable containers | **Yes** |
| A date and time of sampling was provided | **Yes** |
| Sample holding times were exceeded prior to analysis of determinants | **No** |

Where samples do not meet one or more of the above criteria they will be classed as deviating, this means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

**Accreditation Key**

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue 24.01.2017
Owned by Emily Blissett - Customer Services Supervisor
Authorised by James Gane - Commercial Manager
J:\Public\Projects\2019\L19\GRM - GRM Development solutions\L19-2783-GRM P8723\[L19-2783-GRM-001.xlsx]Methodology

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2783/GRM/001**
**Project Reference - P8723 - Crease Drove, Crowland**
**Analytical Test Results - Soil**

| NC Reference | | | 65154 | 65162 | 65163 |
|---|---|---|---|---|---|
| Client Sample ID | | | VS18 | VS30 | VS31 |
| Client Sample Location | | | - | - | - |
| Depth - Bottom (m) | | | 1.1 | 0.8 | 0.8 |
| Date of Sampling | | | 29/11/2019 | 29/11/2019 | 29/11/2019 |
| Time of Sampling | | | Not provided | Not provided | Not provided |
| Sample Matrix | | | Clay | Clay | Clay |
| **Determinant** | **Units** | **Accreditation** | | | |
| Asbestos | - | UKAS | No asbestos detected | No asbestos detected | No asbestos detected |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2783/GRM/001**

**Project Reference - P8723 - Crease Drove, Crowland**

**Analytical Test Results - TPH CWG**

| NC Reference | | | 65154 | 65155 | 65156 | 65157 | 65158 | 65159 | 65160 |
|---|---|---|---|---|---|---|---|---|---|
| Client Sample ID | | | VS18 | VS23 | VS24 | VS25 | VS26 | VS27 | VS28 |
| Client Sample Location | | | - | - | - | - | - | - | - |
| Depth (m) | | | 1.1 | 2.6 | 2.6 | 2.2 | 2.3 | 1.5 | 1.6 |
| Date of Sampling | | | 29/11/2019 | 29/11/2019 | 29/11/2019 | 29/11/2019 | 29/11/2019 | 29/11/2019 | 29/11/2019 |
| Time of Sampling | | | Not provided | Not provided | Not provided | Not provided | Not provided | Not provided | Not provided |
| Sample Matrix | | | Clay | Clay | Clay | Clay | Clay | Clay | Sand |
| **Determinant** | **Units** | **Accreditation** | | | | | | | |
| **Aliphatics** | | | | | | | | | |
| $>C_5$ to $C_6$ | (mg/kg) | u | 0.06 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_6$ to $C_8$ | (mg/kg) | u | 0.06 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 14 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 45 | 31 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 52 | 35 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | < 10 | 15 | 13 | < 10 | 34 | 22 | < 10 |
| **Aromatics** | | | | | | | | | |
| $>C_5$ to $C_7$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_7$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| $>C_{10}$ to $C_{12}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 | < 10 |
| $>C_{12}$ to $C_{16}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 20 | 14 | < 10 |
| $>C_{16}$ to $C_{21}$ | (mg/kg) | u | < 10 | < 10 | < 10 | < 10 | 27 | 21 | < 10 |
| $>C_{21}$ to $C_{35}$ | (mg/kg) | u | 28 | < 10 | < 10 | 12 | 17 | 15 | 11 |
| **Total** | | | | | | | | | |
| $>C_5$ to $C_{35}$ | (mg/kg) | u | < 50 | < 50 | < 50 | < 50 | 210 | 140 | < 50 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2783/GRM/001**

**Project Reference - P8723 - Crease Drove, Cro**

**Analytical Test Results - TPH CWG**

| NC Reference | | | 65161 | 65162 | 65163 | 65164 | 65165 |
|---|---|---|---|---|---|---|---|
| Client Sample ID | | | VS29 | VS30 | VS31 | VS32 | VS33 |
| Client Sample Location | | | - | - | - | - | - |
| Depth (m) | | | 1.3 | 0.8 | 0.8 | 1.4 | 1.4 |
| Date of Sampling | | | 29/11/2019 | 29/11/2019 | 29/11/2019 | 29/11/2019 | 29/11/2019 |
| Time of Sampling | | | Not provided | Not provided | Not provided | Not provided | Not provided |
| Sample Matrix | | | Clay | Clay | Clay | Clay | Clay |
| **Determinant** | **Units** | **Accreditation** | | | | | |
| **Aliphatics** | | | | | | | |
| >$C_5$ to $C_6$ | (mg/kg) | u | < 0.03 | 0.08 | 0.09 | < 0.03 | < 0.03 |
| >$C_6$ to $C_8$ | (mg/kg) | u | 0.04 | 0.08 | 0.20 | < 0.03 | < 0.03 |
| >$C_8$ to $C_{10}$ | (mg/kg) | u | 1.4 | < 0.03 | < 0.03 | < 0.03 | 0.48 |
| >$C_{10}$ to $C_{12}$ | (mg/kg) | u | 43 | < 10 | < 10 | < 10 | 23 |
| >$C_{12}$ to $C_{16}$ | (mg/kg) | u | 300 | < 10 | < 10 | 29 | 120 |
| >$C_{16}$ to $C_{21}$ | (mg/kg) | u | 300 | < 10 | < 10 | 28 | 130 |
| >$C_{21}$ to $C_{35}$ | (mg/kg) | u | 76 | 23 | 24 | < 10 | 36 |
| **Aromatics** | | | | | | | |
| >$C_5$ to $C_7$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| >$C_7$ to $C_8$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| >$C_8$ to $C_{10}$ | (mg/kg) | u | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| >$C_{10}$ to $C_{12}$ | (mg/kg) | u | 13 | < 10 | < 10 | < 10 | < 10 |
| >$C_{12}$ to $C_{16}$ | (mg/kg) | u | 150 | < 10 | < 10 | 14 | 71 |
| >$C_{16}$ to $C_{21}$ | (mg/kg) | u | 170 | < 10 | < 10 | 16 | 86 |
| >$C_{21}$ to $C_{35}$ | (mg/kg) | u | 47 | 31 | 21 | < 10 | 26 |
| **Total** | | | | | | | |
| >$C_5$ to $C_{35}$ | (mg/kg) | u | 1100 | 54 | < 50 | 87 | 490 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2783/GRM/001**

**Project Reference - P8723 - Crease Drove, Crowland**

**Sample Descriptions**

| NC Reference | Client Sample ID | Client Sample Location | Description | Moisture Content (%) | Stone Content (%) |
|---|---|---|---|---|---|
| 65154 | VS18 | - | Dark greyish brown slightly sandy silty clay | 60 | 23 |
| 65155 | VS23 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay | 19 | 1.0 |
| 65156 | VS24 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay | 26 | 5.3 |
| 65157 | VS25 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay | 16 | 7.8 |
| 65158 | VS26 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay | 17 | 5.6 |
| 65159 | VS27 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay | 19 | 4.6 |
| 65160 | VS28 | - | Mottled greyish brown gravelly silty sand | 13 | 37 |
| 65161 | VS29 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay with frequent hydrocarbons | 21 | 10 |
| 65162 | VS30 | - | Dark brown slightly sandy silty clay | 54 | 1.7 |
| 65163 | VS31 | - | Dark brown slightly sandy silty clay | 55 | 9.6 |
| 65164 | VS32 | - | Grey slightly sandy slightly gravelly silty clay with occasional hydrocarbons | 22 | 23 |
| 65165 | VS33 | - | Mottled greyish brown slightly sandy slightly gravelly silty clay with frequent hydrocarbons | 29 | 5.1 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L19/2783/GRM/001**

**Project Reference - P8723 - Crease Drove, Crowland**

**Analysis Methodologies**

| Matrix | Determinant | Sample condition for analysis | Test Method used |
|---|---|---|---|
| Soil | CWG | As Received | In house method statements - MS - CL - EPH in soil and MS - CL - VPH |
| Soil | Asbestos | - | Fibre identification is in accordance with in house documented methods which are based on the procedure documented in the HSE Document HSG 248 "Asbestos: The analysts guide for sampling, analysis and clearance procedures" |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**GRM Development Solutions**
Laurus House
First Avenue
Centrum 100
Burton Upon Trent
DE14 2WH

| **Analytical Test Report:** | **L20/0093/GRM/001** | | |
|---|---|---|---|
| Your Project Reference: | **Crease Drove, Crowland** | Samples Received on: | 16/01/2020 |
| Your Order Number: | P8723 | Testing Instruction Received: | 16/01/2020 |
| Report Issue Number: | 1 | Sample Tested: | 16/01 to 24/01/2020 |
| Samples Analysed: | 2 water samples | Report issued: | 27/01/2020 |

Signed



**Peter Swanston**
Environmental Laboratories Manager
Nicholls Colton Group

Notes:

**General**

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Samples were supplied by customer, results apply to the samples as received.

**Accreditation Key**

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue 24.01.2017
Owned by Emily Blissett - Customer Services Supervisor
Authorised by James Gane - Commercial Manager
J:\Public\Projects\2020\L20\GRM - GRM Development Solutions\L20-0093-GRM P8723\[L20-0093-GRM-001.xlsx]Cover Sheet

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L20/0093/GRM/001**

**Project Reference - Crease Drove, Crowland**

**Analytical Test Results - TPH CWG Water Samples**

| NC Reference | | | 70510 | 70511 |
|---|---|---|---|---|
| Client Sample ID | | | WS106A | WS109A |
| Client Sample Location | | | WS106A | WS109A |
| Date of Sampling | | | 13/01/2020 | 13/01/2020 |
| Time of Sampling | | | Not provided | Not provided |
| Sample Matrix | | | Water | Water |
| **Determinant** | **Units** | **Accreditation** | | |
| **Aliphatics** | | | | |
| >$C_5$ to $C_6$ | (µg/l) | u | 1.77 | < 0.10 |
| >$C_6$ to $C_8$ | (µg/l) | u | < 0.10 | < 0.10 |
| >$C_8$ to $C_{10}$ | (µg/l) | u | 4.03 | < 0.10 |
| >$C_{10}$ to $C_{12}$ | (µg/l) | u | < 5.00 | < 5.00 |
| >$C_{12}$ to $C_{16}$ | (µg/l) | u | < 10.00 | < 10.00 |
| >$C_{16}$ to $C_{21}$ | (µg/l) | u | < 10.00 | < 10.00 |
| >$C_{21}$ to $C_{35}$ | (µg/l) | u | < 15.00 | < 15.00 |
| **Aromatics** | | | | |
| >$C_5$ to $C_7$ | (µg/l) | u | < 0.10 | < 0.10 |
| >$C_7$ to $C_8$ | (µg/l) | u | < 0.10 | < 0.10 |
| >$C_8$ to $C_{10}$ | (µg/l) | u | 0.57 | < 0.10 |
| >$C_{10}$ to $C_{12}$ | (µg/l) | u | < 5.00 | < 5.00 |
| >$C_{12}$ to $C_{16}$ | (µg/l) | u | < 10.00 | < 10.00 |
| >$C_{16}$ to $C_{21}$ | (µg/l) | u | < 10.00 | < 10.00 |
| >$C_{21}$ to $C_{35}$ | (µg/l) | u | < 15.00 | < 15.00 |
| **Total** | | | | |
| >$C_5$ to $C_{35}$ | (µg/l) | u | < 30 | < 30 |

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

**L20/0093/GRM/001**

**Project Reference - Crease Drove, Crowland**

**Analysis Methodologies**

| Matrix | Determinant | Sample condition for analysis | Test Method used |
|---|---|---|---|
| Water | CWG | As Received | In house method statement - MS - CL - VPH and EPH Waters |

# APPENDIX J

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel: 01283 551249**

**Fax: 01283 211968**

info@grm-uk.com

www.grm-uk.com




NOTES:
NOTES

CLIENT: Partner Construction Ltd & Waterloo Housing Group Ltd

PROJECT: Crease Drove, Crowland

TITLE: Post-Remediation Monitoring Wells

PROJECT No: P8723

DATE: 12/2019

DESIGN/DRAWN: CM

DRAWING NUMBER: 09

ISSUE: FINAL

© GRM Development Solutions Ltd © Crown Copyright. AL 100014100

GRM Development Solutions Ltd
Tel: 01283 551 249
mail@grm-uk.com www.grm-uk.com

# APPENDIX K

**GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

**Tel:** 01283 551249

**Fax:** 01283 211968

info@grm-uk.com

www.grm-uk.com

GRM Development Solutions Ltd
Laurus House,
First Avenue, Centrum 100,
Burton-on-Trent, DE14 2WH
Tel (HQ): 01283 551249
Email: info@grm-uk.com

# Windowless Sample Borehole

**Borehole No** WS06A
Sheet 1 of 1

**Site Name:** Crease Drove, Crowland

**Ground Level (mAOD)**

**Client:** Partner Construction Ltd

**GRM Project Ref:** P8723

**Coordinates** 523691 E 309652 N

| Installation/ Backfill | Water Strike | Samples/Tests: Depth | Type | Result | Dynamic Probing (Blows per 100mm) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | | Loose, buff and grey, slightly sandy, clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular, brick, concrete and limestone. MADE GROUND |
| | | | | | | 0.35 | | | Loose to medium dense, buff, slightly silty, sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, limestone. MADE GROUND |
| | | 0.60 - 0.70 | D | | | 0.80 | | | Soft, low strength, dark grey, slightly sandy, silty, organic CLAY/PEAT with frequent decomposed fibrous material. Sand is fine to coarse. PEAT |
| | | 0.90 - 1.00 | D | | | | | | |
| | | 1.00 | SPTLS | | | | | | |
| | | 1.20 | S | N=3 (2,1/0,1,1,1) | | 1.30 | | | Soft to firm, low strength to medium strength, dark grey, sandy, silty, organic CLAY with rare gravel. Sand is fine to coarse. Gravel is fine to medium, sub-angular, mudstone. PEAT |
| | | 1.60 - 1.70 | D | | | 1.80 | | | Medium dense to dense, slightly gravelly, clayey fine to coarse SAND. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded, quartzite. ABBEY SAND AND GRAVEL |
| | | 2.00 | SPTLS | N=14 | | | | | Medium dense to dense, yellow brown, slightly clayey, gravelly fine to coarse SAND. Gravel is fine to coarse, sub-rounded to rounded, quartzite. ABBEY SAND AND GRAVEL |
| | | 2.00 | S | (3,3/3,3,4,4) | | 2.70 | | | Stiff to very stiff, high to very high strength, grey, slightly sandy, gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded to rounded, chalk. OXFORD CLAY |
| | | 2.80 - 2.90 | D | | | 3.00 | | | End of Borehole at 3.000m |

1 2 3 4

**Crew:** Borehole Solutions. **Logger:** AL. **Weather:** Overcast.

**Equipment:** Premier Compact.

**Reason for termination of borehole:** Borehole collapsed from 3.0m to 2.5m begl.

**Groundwater Remarks:**
Groundwater encountered at 1.5m begl within natural strata.

**General Remarks:**

**Hole Started:** 11/12/2019 **Hole Complete:** 11/12/2019 **Version:** FINAL **Scale:** 1:25

GRM Development Solutions Ltd
Laurus House,
First Avenue, Centrum 100,
Burton-on-Trent, DE14 2WH
Tel (HQ): 01283 551249
Email: info@grm-uk.com

# Windowless Sample Borehole

**Borehole No** WS109A
Sheet 1 of 1

**Site Name:** Crease Drove, Crowland

**Ground Level (mAOD)**

**Client:** Partner Construction Ltd

**GRM Project Ref:** P8723

**Coordinates**
523675 E
309665 N

| Installation/ Backfill | Water Strike | Samples/Tests Depth | Type | Result | Dynamic Probing (Blows per 100mm) | Depth (m) | Level (m) | Legend | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | | Loose, buff and grey, slightly silty, sandy GRAVEL. Sand is fine is coarse. Gravel is fine to coarse, sub-angular to angular, brick, concrete and limestone. MADE GROUND |
| | | 0.60 - 0.70 | D | | | 0.45 | | | Dense, buff, slightly sandy, gravelly COBBLES. Sand is fine to coarse. Gravel is fine to coarse. Gravel and cobbles are angular, limestone. MADE GROUND |
| | | 1.00 | SPTLS | | | 0.80 | | | Soft, low strength, dark grey, slightly sandy, silty, organic CLAY/PEAT with frequent decomposed organic fibrous material. Sand is fine to coarse. PEAT |
| | | 1.00 - 1.10 | D | | | | | | |
| | | 1.20 | S | N=18 (3,4/5,5,4,4) | | | | | Soft, low strength, dark grey, sandy, silty, organic CLAY with rare gravel. Sand is fine to coarse. Gravel is fine to medium, sub-angular, mudstone. PEAT |
| | | | | | | 1.50 | | | Medium dense to dense, yellow brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is fine to coarse, sub-angular, quartzite. ABBEY SAND AND GRAVEL |
| | ▼ | 1.80 - 1.90 | D | | | 1.80 | | | Medium dense to dense, yellow brown, slightly clayey, fine to coarse SAND with rare gravel of fine to coarse, sub-angular to sub-rounded, quartzite. ABBEY SAND AND GRAVEL |
| | | 2.00 | SPTLS | N=30 (6,9/10,8,8,4) | | | | | *Band of fine to coarse sand between 2.0m and 2.1m begl.* |
| | | 2.00 | S | | | | | | |
| | | 2.10 - 2.20 | D | | | | | | |
| | | | | | | 2.80 | | | Stiff to very stiff, high to very high strength, slightly sandy, gravelly CLAY. Sand is fine to coarse, Gravel is fine to coarse, sub-rounded to rounded, chalk. OXFORD CLAY |
| | | 2.90 - 3.00 | D | | | 3.00 | | | End of Borehole at 3.000m |
| | | 3.00 | SPTLS | N=50 (10,13/14,12,16, 8) | | | | | |
| | | 3.00 | S | | | | | | |

1
2
3
4

**Crew:** Borehole Solutions. **Logger:** AL. **Weather:** Overcast.

**Equipment:** Premier Compact.

**Reason for termination of borehole:** Refused on very stiff clay on 3.0m SPT.

**Groundwater Remarks:**
Groundwater encountered at 1.8m begl within natural strata.

**General Remarks:**

**Hole Started:** 11/12/2019 **Hole Complete:** 11/12/2019 **Version:** FINAL **Scale:** 1:25