LICHFIELD DRIVE / BLABY GOLF COURSE, BLABY

PHASE II SITE APPRAISAL FOR DAVIDSONS DEVELOPMENTS C/O ANDREW GRANGER & CO LTD

Project Ref:
P7791

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Prepared for:
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This report has been prepared in accordance with GRM's Accredited Quality Procedures

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Issue	Description of Revision	Signature

Site Appraisal for
Lichfield Drive, Blaby Golf Course, Blaby

SUMMARY OF RECOMMENDATIONS

Where further assessment is required it is indicated with a "Y" in the right hand column.		
Proposed Development	Residential properties with associated gardens, soft landscaping and infrastructure	
CONTAMINATION ASSESSMENT - REMEDIATION / WASTE DISPOSAL		
End Users	Asbestos identified in allotment area; further investigation required to assess risk posed to end users.	
Site Workers	Site specific risk assessment with PPE and RPE when dealing with asbestos impacted soils within the allotment area.	
Construction Materials	Appropriate concrete specification. PE water supply pipes (to be confirmed by water provider).	Y
Groundwater	No remediation required.	
Surface Water	No remediation required.	
Waste Disposal	Preliminary Waste Classification: Non-Hazardous for reworked topsoil. Inert for natural strata. Will need to be confirmed by receiving landfill.	Y
GEOTECHNICAL ASSESSMENT – FOUNDATIONS		
Ground Treatment Required	Temporary Drainage for standing water, temporary haul roads and piling platform.	
Main Bearing Strata	Glacial Till and Mercia Mudstone (i.e. clay).	
Nett Allowable Bearing Pressure	110kN/m^2 (Clay); To be confirmed by a specialist contractor for piles.	Y
Rockhead	Not encountered.	
Tree Influence	Significant. Extent to be confirmed by a tree survey.	Y
Volume Change Potential	Medium.	
Likely Foundation Types	90% Trench Fill 10% Pile; to be confirmed following production of a proposed development engineering plan and tree survey.	
Likely Foundation Depth Range	0.9m begl minimum, >2.5m begl maximum depths; estimated average depth of 1.5m begl. To be confirmed by piling contractor for piles.	Y
Excavation Hazards	Shallow groundwater.	
Floor Slab Types	100% beam and block.	
Gas Protection Requirements Radon and/or Landfill	Following two visits; no gas protection measures required. To be confirmed when gas monitoring is complete. No radon protection required.	Y
GEOTECHNICAL ASSESSMENT - GENERAL		
Slope Stability Risk	Negligible based on current site profile.	
Soakaways Potential	Not suitable due to primarily cohesive soil and shallow perched water.	
New Access Roads	Observational CBRs <1% in Glacial Till soils.	
Buried Concrete Class	DS - 1; AC- 1s. GEN-1, RC35.	
Retaining Walls and Boundary Features	No retaining features currently onsite; not anticipated to be required for proposed development.	
Further Assessment Targets	Asbestos survey and removal. Further identification, delineation, removal and validation of asbestos impacted soils. Arboricultural survey. Cable percussion boreholes. Flood risk assessment required due to size of site >1ha.	Y
Other Comments		

This summary is based on the full report that provides the detailed assessment of the ground risks affecting the development and how to manage them. It should not be used in isolation.

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APPENDICES

1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by Andrew Granger Co Ltd (Client's Agent) on behalf of Davidson Developments (Client) to undertake a Phase II Site Appraisal. A previous desk study by GRM (Lichfield Drive, Blaby Golf Course, Blaby, Phase I Site Appraisal (Desk Study), Ref: GRM/P7791/DS.1, dated February 2017) formed Phase I of the assessment and allowed the geotechnical and geo-environmental setting of the site to be determined and the identification of areas of particular concern that required targeted investigation. The Phase II works reported within this document comprise the intrusive ground investigation, geotechnical testing and chemical analysis. The information gained from the Phase II works will be used to refine the conceptual model for the site and determine cost-effective development solutions.

This document is intended to provide information that will assist decision making by identifying and recommending solutions to ground engineering and contamination issues.

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

The Client proposes to develop the site with residential properties with associated gardens, soft landscaping and infrastructure. No detailed development proposals were available at the time of issue of this report.

1.2 OBJECTIVES OF THE SITE APPRAISAL

The principal aims of the Phase II Site Appraisal are as follows:

a) Obtain information, from easily accessible sources, about the soil and groundwater conditions within the area of the site.

b) Determine the possible ground-related geotechnical and contamination hazards within the site boundaries that may affect the proposed development.

c) Provide preliminary development recommendations.

d) Provide advice on further works required for the cost-effective reduction of risks to the development and procedures likely to satisfy regulators.

Whilst every effort has been made to pre-empt the likely requirements of the Local Authority and the Environment Agency, they are likely to have specific requirements that will need to be discussed and addressed at a later date.

2 PHASE I DESK STUDY SUMMARY

Project Name.	Lichfield Drive, Blaby Golf Course, Blaby.
Project Reference.	P7791.
Client.	Davidsons Developments Ltd.
Site Location (address).	Lichfield Drive, Lutterworth Road, Blaby Golf Course, Blaby LE8 4DP. A Site Location Plan is presented in Appendix B.
National Grid Reference.	SP 566 966.
Site Area (Ha).	2.0.
Summary of Proposed Development.	Residential properties with associated gardens, soft landscaping, infrastructure and public open space.
Client Supplied Information.	Location of the site.
Site Setting.	The site is presently used as an active golf course on the southern half and comprises abandoned allotment gardens on the northern half. A derelict shed constructed out of cement sheeting (potential asbestos) was observed in the allotment area.
Site History.	The earliest map of 1884 – 1902 records the site to be fields with no nearby development. The map of 1904 records the northern half of the site to be allotments gardens, with associated structures being recorded on the map of 1930, 1969 and 1974, and southern half was recorded as a nursery from 1974. There are then no further significant changes onsite. The map of 1992 shows a driving range located to the south and a golf course to the south east.
Geology.	The geological mapping record: · Superficial deposits of Glacial Till in the eastern area of the site with no superficial recorded in the western area. Glacial Till is also present off-site to the west and north of the site. · The solid geology of the site is recorded to be Branscombe Mudstone Formation.
Hydrogeology.	The Environment Agency has classified the underlying Superficial Strata (Glacial Till) as a Secondary Undifferentiated Aquifer, and the underlying Solid Geology (Branscombe Mudstone Formation) as a Secondary B Aquifer. The Glacial Till is considered likely to be predominantly cohesive in nature and unlikely to contain significant amounts of groundwater. The Branscombe Mudstone Formation strata are also considered likely to be predominantly cohesive in nature with thin water bearing horizons. The cohesive nature of these strata should restrict the migration of any contamination. There are no recorded groundwater abstraction

	licenses within 500m of the site, and the site is not recorded to be within a Groundwater Source Protection Zone.
Hydrology.	The only local surface water feature is a drain classified as a secondary river is shown 490m south west of the site, leading directly into Whetstone Brook (Primary River) 550m to the south west. Given the distance from the site and presence of cohesive strata this is not considered to be a potential surface water receptor.
Flooding.	The BGS suggests the site is within an area of potential groundwater flooding related to Superficial Deposits Flooding (shallow unconsolidated sedimentary aquifers overlying unproductive aquifers) and that the confidence level is high. The site is not recorded to be within 250m of an indicative fluvial floodplain, and the Environment Agency's Internet based flood risk maps suggest there is no risk from river flooding. A flood risk assessment is required as the site area is in excess of 1ha.
Mining and Quarrying.	The site is not within an area recorded to require a Coal Authority mining report and no shallow coal seams are recorded, therefore, the risk from coal mining is considered to be negligible. There is no evidence of any non-coal mineral extraction having taken place within, or close to, the site area.
Environmental Information.	No significant environmental hazards, that are considered likely to pose a potential risk to the site, have been identified from the available information.
Potential Soil Contamination Sources.	Asbestos associated with demolished allotment structures. PAHs associated with the allotments and pesticides associated with the allotments and golf course.
Potential Ground Gas Sources (including Radon).	Very low gas risk from limited made ground and natural strata. Radon protection measures are not required.

2.1 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Level of Risk**
Potentially contaminated made ground associated with previous allotment development.	Indoor and outdoor inhalation of soil dust, the ingestion of, and dermal contact with, contaminated soil and soil dust, ingestion of vegetables that have taken up contamination and contaminated soil attached to vegetables.	End users.	Low.
Pesticides associated with historical site use.		Construction and Maintenance Workers.	
Made ground.	Inhalation of ground gas.	End users.	Very low.
Asbestos containing materials associated with allotment buildings.	Inhalation of asbestos fibres.	Construction and Maintenance Workers.	Moderate.
Made ground / allotment chemicals.	Water pipes.	End users.	Very Low.

CONTROLLED WATERS			
Made ground.	Leaching of contaminants and vertical migration to the groundwater. (Restricted due to suspected presence of cohesive strata).	Secondary Aquifers.	Low.

3 PHASE II GROUND INVESTIGATION

3.1 FIELDWORK

The ground investigation has been designed in accordance with the general comments outlined in Appendix A (iv).

The ground investigation fieldwork was conducted on 19th and 23rd November with groundwater/gas monitoring visits continuing after that period. A total of seventeen exploratory holes (fifteen windowless sample boreholes and two hand excavated trial holes) were progressed, to depths ranging between 0.5m to 5.45m below existing ground level (begl). In addition to this a soil sample was also collected from a stockpile recorded near the south west corner of the site (SS01). The exploratory hole location plan and exploratory hole logs are presented in Appendix C and Appendix D respectively.

The locations of the exploratory holes were spread out on a general grid; with WS01 to WS07 and SS01 being located on the southern golf course area, and WS08 to WS15, HP01 and HP02 being located within the historic allotment area. The hand excavated pits were undertaken to collect bulk samples for CBR testing, hand excavated pits were not undertaken on the golf course to minimise disturbance to an active golf course.

Five gas and water monitoring standpipes were installed during the site works (WS01, WS05, WS07, WS08 and WS12), the rationale for these works are discussed fully in Section 6. A Gas Monitoring Plan, illustrating the locations of the standpipes, is presented in Appendix E. The standpipes will need to remain in place until the end of the monitoring period; estimated to be the end of February 2021.

3.2 PROVEN GROUND

The following ground conditions were encountered during the investigation fieldwork:

- Topsoil (re-worked)
- Glacial Till
- Branscombe Mudstone Formation

3.2.1 Re-worked Topsoil (including subsoil)

Topsoil was encountered in all locations as brown sandy or silty clay with rootlets and gravels of quartzite and/or chert, and was generally recorded to a depth of 0.3m. As the historical land use is recorded to be a golf course and allotment gardens; all topsoils are likely to have been reworked.

3.2.2 Glacial Till

These strata were recorded in all exploratory holes, with the exception of WS03, WS04 and WS13 to depths of between 0.6m (WS08) and 4.0m (WS07).

These deposits generally comprised either:

- Soft to stiff orangish or reddish brown and grey or mottled grey sandy clay with gravel of quartzite.

  Or

- Loose to medium dense orangish brown fine to coarse sand (or silty sandy gravel in WS14).

It was observed that greater thicknesses of Glacial Till were typically observed on the western half of the site, with more variable deposits; such as multiple granular horizons also being recorded within the boreholes in this area (WS01, WS07 and WS14).

Utilising the empirical relationship formulated by Stroud (1974) where undrained shear strength is related to SPT N-values and a factor based on plasticity; the Standard Penetration Test N-values were undertaken and the respective strength and relative density recorded within the Glacial Till are presented in the table below:

Depth	Cohesive Soils		Granular Soils	
	N Value	Strength	N Value	Relative Density
1m	6 to 16	Low to high	8 to 24	Loose to medium dense
2m	13 to 36	Medium to very high	6 to 14	Loose to medium dense
3m	19 to 50	High to very high	23	Medium dense

It was noted that lower SPT results were recorded on the western side of the site with WS01, WS06, WS14 and WS15 all recording single figure SPTs (N = 6 to 9). No SPT could be undertaken in WS07 as the SPT rod broke during the first test.

3.2.3 Branscombe Mudstone Formation

These strata were recorded beneath the Topsoil or Glacial Till in all locations with the exception of WS02 and WS07 (both recorded within the western area), they were not fully penetrated in any of the exploratory holes undertaken.

This stratum was typically recorded as stiff to very stiff reddish brown mottled grey, silty clay with gravels of mudstone and siltstone.

Utilising the empirical relationship formulated by Stroud (1974) where undrained shear strength is related to SPT N-values and a factor based on plasticity; the strengths recorded are presented in the table below:

Depth	Cohesive Soils	
	N value	Strength
1m	10 to 29	Medium to high
2m	21 to 50	High to very high
3m	26 to 44	High to very high
4m	26 to 50	High to very high
5m	22 to 40	High to very high

3.3 CONTAMINATION OBSERVATIONS

Evidence of potential contamination was limited to potential asbestos containing materials (ACMs) within the fabric of derelict structures within the allotment area.

Additionally it should be noted that general rubbish, fly tipping and empty containers (including fuel and gas cylinders) were also observed at ground level within this area; however, no evidence of contamination (such as hydrocarbon spills) was observed at or below ground level.

3.4 GROUNDWATER OBSERVATIONS

Groundwater was struck in the exploratory holes WS01, WS02, WS06, WS10 and WS14 at depths of between 0.3m to 2.0m begl. Groundwater was only recorded within granular lenses.

Two groundwater monitoring visits have been conducted and the results of the monitoring are reported in Appendix F. In summary, ground water was recorded from 0.1m begl to not being recorded at depths of 5.53m begl. Areas of standing water were also observed pooled at surface in multiple locations onsite.

Based on the above it is considered that the water recorded is representative of perched volumes of water present within the granular glacial soils and not part of a larger water body or local water table.

Long term monitoring of groundwater levels has not been conducted as part of this investigation and interpreted levels are approximate and may be dependent on seasonal variations.

Due to the lack of groundwater data for the site it has not been possible to accurately determine the groundwater flow direction beneath the site. However, the shallow groundwater flow is considered to be to the west following the local topography towards Whetstone Brook. The geological mapping does not reference a dip in the deeper geology, so the deeper groundwater flow direction is unknown.

3.5 GROUND GAS AND VAPOURS

Ground gases are discussed in full in Section 6. In summary, the concentrations of ground gases recorded to date are presented in Appendix F and summarised below:

- No methane has been recorded above the gas monitors level of detection.
- Carbon dioxide between 0.9%v/v and 4.5%v/v.
- Oxygen between 10.2%v/v and 20.5%v/v.
- A peak positive flow rate of 0.6 l/hr, and a peak negative flow of 0.8l/hr.

3.6 SUMMARY OF FIELDWORK OBSERVATIONS

The fieldwork has revealed/confirmed the following:

Significant Features identified during fieldwork
Variable soils – deepened or reinforced foundations. **Cohesive soils and Trees** – deepened foundations. **Shallow perched groundwater** – dewatering likely to be required. **Potential ACMs present within structures on site** – potential source of contamination, asbestos removal required. **Rubbish and fly tipping and empty fuel containers –** potential source of contamination. **Low level oxygen** – potential asphyxiation conditions within confined spaces.

4 LABORATORY ANALYSES RATIONALE

4.1 CHEMICAL LABORATORY ANALYSIS

Chemical laboratory analyses were selected to provide the parameters necessary to make an initial assessment of potentially contaminated soil for the budgetary design of the development. The choice of contamination testing was based on the Phase I assessment, identified past uses of the site, site observations and comprised:

- Eight samples of reworked topsoil (four from the golf course and four from the allotment area) were analysed for a general suite of contaminants (metals, inorganics and speciated PAH).
- Four samples of reworked topsoil from the allotment area were analysed for banded aliphatic and aromatic hydrocarbons (TPHCWG).
- Eight samples of reworked topsoil (four from the golf course and four from the allotment area) have been screened for the presence of asbestos.
- Eight samples of reworked topsoil (four from the golf course and four from the allotment area) have been screened for the presence of pesticides.

The chemical analysis results are presented in Appendix G.

Samples not used for testing will be stored for a month after issue of this report and then disposed of, unless the client requests in writing that they be kept.

4.2 GEOTECHNICAL LABORATORY TESTING

Geotechnical soil testing has been undertaken as part of the ground investigation including the following:

- Eight samples (three of Glacial Till and five of Branscombe Mudstone Formation) were tested for Natural Moisture Content.
- Eight samples (three of Glacial Till and five of Branscombe Mudstone Formation) underwent Atterberg Limits (PI) classification.
- Eight samples (six of Glacial Till, two of Branscombe Mudstone Formation) underwent pH and water soluble sulphate testing.
- Two samples of Glacial Till underwent remoulded CBR testing.

Geotechnical tests were selected to provide the parameters necessary for the budgetary design of the development including foundations and infrastructure. The geotechnical test results are presented in Appendix H, and summarised in Section 10.2.

5 QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH (SOIL)

5.1 INTRODUCTION

The Client proposes to develop the site with residential properties with associated gardens, soft landscaping and infrastructure.

Various sources of contamination have been put forward in earlier text and summarised in the Phase I conceptual model. The material on site identified as being the most likely to be contaminated is the reworked topsoil in the allotments and on the golf course.

Representative samples of all strata and those considered to be potentially contaminated by virtue of the desk study and based on site observations were collected for further examination and potential testing.

The rationale for the end use specific Tier 1 Acceptance Criteria (TAC) used by GRM is outlined in Appendix A (vi) and for this site the chemical analysis results are being compared against the TAC for residential end use with plant uptake. In order to adopt a conservative approach a Soil Organic Matter (SOM) content of 2.5% has been used to assess the reworked topsoil as this reflects the lowest SOM recorded in it.

To provide an initial assessment, benzo(a)pyrene has been used as a surrogate marker compound for genotoxic PAHs with the exception of naphthalene. A copy of the thresholds used in this assessment is presented in Appendix I.

5.2 RISK TO END USERS

The chemical analysis results are presented in Appendix G.

Whilst the number of samples tested is considered sufficient to characterise the reworked topsoil, it is not considered appropriate to carry out statistical analysis on this data set. Therefore the results have been compared directly against the TAC. The results of the hydrocarbons, asbestos and pesticides have also been assessed separately.

5.2.1 Analysis of Soil Contamination Data

<u>GRM General Suite: Re-worked Topsoil on Golf Course and Allotments</u>
When compared against GRMs TAC for residential land use with gardens; all contaminants were found to be below their respective critical concentration.

<u>Petroleum Hydrocarbons</u>
Four samples of made ground were tested for TPHCWG, all results were below their respective thresholds.

<u>Pesticides</u>
Eight samples were screened for the presence of pesticides; one sample from the allotment area (WS12) detected DDE (common breakdown product derived from DDT) at concentrations below the limit of detection. As concentrations were below the

laboratory level of detection, it is considered that the pesticides do not pose a risk to end users.

Asbestos

Eight samples of made ground were screened for the presence of asbestos. One sample from the allotment area (WS12) recorded a positive result in the form of chrysotile and was therefore sent for quantitative analysis.

The quantification result recorded loose fibres of chrysotile are present at a concentration of 0.002%. It is conjectured that the source of the asbestos is from sheds or small structures which were historically present onsite; similar to the current derelict shed in the south western corner of the allotment area. It is also considered that the presence of asbestos in the soil is unlikely to be an isolated hotspot and its presence could be indicative of more asbestos being present where historic sheds were situated.

5.2.2 Water Supply Pipes

It is considered that, based on the UKWIR guidance, and in the absence of any contamination and made ground, at likely water pipe depth; that PE type water supply pipes placed in a clean backfill should be suitable for the site.

It should however be noted that low level hydrocarbon contamination was recorded at WS14 (total C_5 to C_{40} 470mg/kg) at 0.2m begl; which is shallower than where water pipes would be placed. Careful handling of the soils at WS14 is recommended; misplacement of this soil may lead to the requirement of upgraded water pipes across the whole development. It would be prudent to allow for the disposal of this localised area, and reporting the removal to the water company.

It is recommended that the local water supply company for the site be contacted to confirm their requirements with regard to pipe materials.

5.2.3 Summary of Risk to End Users

Following the identification of asbestos within the shallow soils at WS12, and within the fabric of the shed building, it is considered that localised remedial works will be required on site to protect end users.

5.3 RISK TO SITE WORKERS

The investigation has not revealed any specific risk to site workers, apart from the presence of asbestos containing materials and asbestos impacted made ground; however, the general comments outlined in Appendix A (vii) should be considered when site specific risk assessments are completed.

The localised presence of asbestos within the made ground is a risk to ground workers and the surrounding environment and should be accounted for when devising method statements, particularly for the ground works, infrastructure and foundation construction stages.

6 QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH (GROUND GAS)

The gas risk assessment methodology used by GRM is outlined in Appendix A (v).

As the proposed land use is classed as high (residential with gardens); five 35mm diameter gas/water monitoring standpipes have been installed across the site (WS01, WS05, WS07, WS08 and WS12). The response zones have been targeted at the natural strata to determine natural ground gas regime.

Based on BS8576:2013 *Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds*, the gas hazard is considered very low (made ground/natural soil with low organic content (up to 5%), and so the monitoring programme will comprise six visits over three months. To date two visits have been conducted; therefore, only an initial assessment of the local gas regime has been undertaken at this stage and further visits will be required to complete the monitoring program. A separate gas addendum letter report will be issued following the completion of the full monitoring program.

The gas monitoring results to date, are presented in Appendix F, and summarised in Section 3.5.

The gas monitoring has been undertaken using a Gas Data GFM430.

The primary guidance document to determine if protection measures are required is BS8485:2015+A1:2019 *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 Screening Value (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

As methane concentrations have been consistently below the monitor's lower limit of detection a default methane concentration of 0.1%v/v has been used in the following assessment. As the monitoring program is yet to be completed, and in order to take a conservative approach, a maximum flow rate of 0.8l/hr, (taken from the maximum negative value of -0.8l/hr) will be used in the following assessment.

Using the maximum flow rate of 0.8l/hr and the default methane concentration of 0.1%v/v a Q_{hg} of 0.0008l/hr has been calculated for methane. Using the maximum flow rate of 0.8l/hr and the maximum carbon dioxide concentration of 4.5%v/v, a Q_{hg} of 0.036l/hr has been calculated for carbon dioxide. On this basis the GSV for the site is determined as 0.036l/hr.

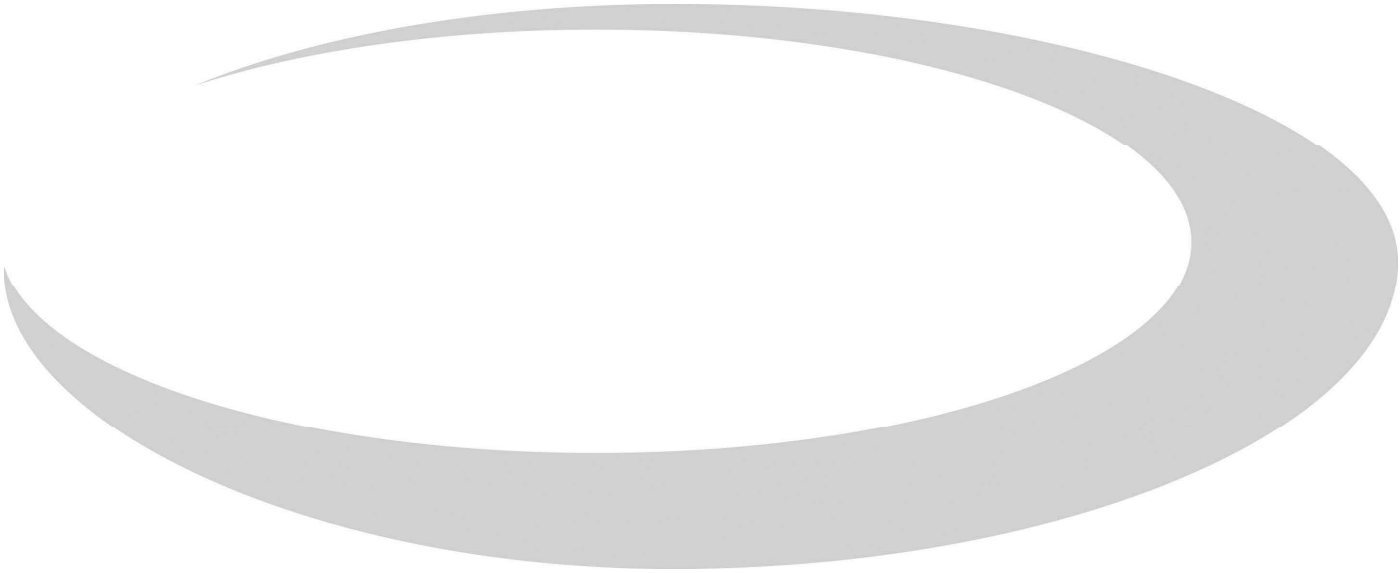
Therefore, as the maximum concentration of methane is <1%v/v, the maximum concentration of carbon dioxide is <5%, and the GSV is <0.07l/hr, the site has been assessed as 'Characteristic Situation 1' as outlined in BS8485:2015+A1:2019, for which gas protection measures are not required.

Further monitoring will be required to confirm the above assessment.

The desk study risk assessment determined that no radon protection measures are required.

6.1 SUMMARY OF RISK FROM GAS

The investigation has not revealed any specific risk to end users from ground gas and gas protection measures are not anticipated to be required. This assessment will require reviewing once the gas monitoring programme has been completed.



7 QUANTITATIVE RISK ASSESSMENT - CONTROLLED WATERS

The methodology, rationale and guidance GRM have used to assess the risk to controlled waters is set out in Appendix A (viii).

The primary receptors for this site have been identified as underlying Secondary B Aquifers; although, it should be noted that neither recorded significant volumes of water. As the underlying soils are primarily cohesive in nature, no significant pathway has been identified.

A potential significant source of contamination or significant pathway has not been identified at the site and, in the absence of a source, there is considered to be no risk to controlled waters and so soil leachate/water analysis has not been undertaken.

8 PHASE II CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Remedial Solution**
Asbestos present within the shallow soils within the allotment area.	Indoor and outdoor inhalation of soil/soil dust and asbestos fibres, ingestion of, and dermal contact with contaminated soil and soil dust, ingestion of vegetables that have taken up contamination and contaminated soil attached to vegetables.	End users.	Localised soil capping or removal of contaminated soils.
		Construction workers.	
Natural strata.	Inhalation of carbon dioxide.	End users.	No remediation required (to be confirmed following completion of the gas monitoring).
Potential asbestos containing materials associated with buildings.	Inhalation.	Construction workers.	Survey and removal by specialist contractor. Use of suitable PPE and adoption of appropriate working protocols.
A source of contamination has not been identified at water pipe depth.	Migration of contamination through leaks and joints, degradation of water pipe materials.	End Users.	PE water supply pipes and clean backfill (to be confirmed by water supply company).

CONTROLLED WATERS			
A source of contamination has not been identified.	Leaching of contaminants and vertical migration to the groundwater (lower risk due to limited groundwater and cohesive geology).	Secondary B Aquifers.	No remediation required.
		No surface water receptor identified.	

9 REMEDIATION

9.1 RECOMMENDED REMEDIAL MEASURES AND VALIDATION REQUIREMENTS

9.1.1 Protection of End Users

Soil Contamination

Based on the recorded levels of localised asbestos contamination recorded within the allotment area (WS12), remediation will be required to protect end users of the proposed residential development.

Whilst the only identified risk at present has been identified at and around WS12, it is also considered that the presence of asbestos is unlikely to be an isolated hotspot, and its presence could be indicative of more asbestos being present onsite. Therefore it is proposed that further shallow sampling of the soils within the allotment area is undertaken on a grid to better determine the risk posed to end users from asbestos.

It is recommended that the further sampling is undertaken after the removal of the potential asbestos shed present in the western corner of the allotment area, so that the underlying soils can also be assessed.

It should be noted that the asbestos contamination is likely to be localised to the source; such as below historic sheds, or where historic fly tipping has been undertaken. In this case a suitable form of remediation would be either localised source removal; estimated to be 200m^3 or localised capping; estimated to be >400m^2 with a minimum thickness of 600mm, and possibly up to 1m thick depending on concentration and EHO requirements.

Until further testing of the shallow soils within the allotments is undertaken, it is recommended that an allowance be made for the remediation of all plots within this area.

Ground Gas

Gas protection measures are currently not required for the proposed development. Further monitoring will be required to confirm the above assessment.

9.1.2 Protection of Site Workers

In general the risk to site workers from soil contamination is negligible, however, the presence of asbestos within the made ground increases the risk particularly to ground workers involved in enabling works as well as infrastructure and foundation construction.

The use of suitable PPE should be enforced during the ground works stage of construction and suitable precautions should be taken during the removal of any asbestos containing materials identified**,** which should be carried out by suitably qualified personnel.

It will be necessary for the ground workers responsible for the enabling works, and if necessary infrastructure and foundation construction personnel, to prepare methods

of work for dealing with asbestos contaminated soils on the site which will minimise the risk to site users and the surrounding environment from asbestos to acceptable levels.

The investigation has revealed the potential for depleted oxygen levels, which may pose a potential hazard to site workers working in confined spaces. It is recommended that there is no entry into excavations. If man entry is required, it is recommended that gas monitoring is conducted during operations to ensure adequate concentrations of oxygen are present and ventilation of excavations is undertaken. A banksman should also be present to monitor for any problems.

In addition to this the general comments outlined in Appendix A (vii) should be considered when site specific risk assessments are completed.

9.1.3 Protection of Controlled Waters

The risk to controlled waters is negligible and no remedial measures are required.

9.1.4 Protection of Water Pipes

It is considered that, based on the UKWIR guidance, and in the absence of any contamination and made ground at likely water pipe depth; that PE Type water supply pipes placed in a clean backfill should be suitable for the site.

It should however be noted that low level hydrocarbon contamination was recorded at WS14 (total C_5 to C_{40} 470mg/kg) at 0.2m begl; which is shallower than where water pipes would be placed. Careful handling of the soils at WS14 is recommended; misplacement of this soil may lead to the requirement of upgraded water pipes across the whole development. It would be prudent to allow for the disposal of this localised area, and reporting the removal to the water company.

It is recommended that the local water supply company for the site be contacted to confirm their requirements with regard to pipe materials.

9.2 REMEDIATION METHOD STATEMENT

A Remediation Strategy and Verification Report are likely to be required.

Following your review of this document, we would recommend that a copy of it be forwarded to the Local Authority for comment and approval, prior to commencing development of the site. The Local Authority may choose to include other consultees as part of the planning process (such as the Environment Agency).

Consultation should be undertaken at the earliest possible opportunity to avoid abortive or delayed works.

9.3 DISPOSAL AND CLASSIFICATION

Based on the Waste Classification Report (Appendix K) it is considered that the re-worked topsoil will not be classed as Hazardous Waste. At this stage, we would recommend allowing for the reworked topsoil to be disposed of as Non-Hazardous Waste; however, early consultation with the relevant landfill sites over their particular acceptance criteria may produce cost savings. Reference should be made to the relevant notes presented in Appendix A (x).

The natural strata underlying the site is likely to be classified as Inert for disposal purposes, however, further testing will be required to confirm this. Natural soils may be suitable for re-use on-site as part of soft landscaping and consideration should be given to retaining this material on-site. Alternatively, it may be sold as a commodity to off-set construction costs.

Care should be taken to keep natural arisings separate from the made ground and free from construction materials, as natural soils mixed with made ground and construction materials may attract additional disposal costs.

Any visible asbestos containing materials (ACMs) within soils will result in the soils being classified as Hazardous Waste. Visible ACMs should be removed, employing appropriate health and safety protocols and where possible should be undertaken prior to disposal.

It is recommended that any materials to be exported are stockpiled and tested to confirm disposal rates, as this may be more cost effective than using the results contained within this report.

Where site-won materials (i.e. contaminated natural soils) are to be re-used on site, or materials are to be imported, it is recommended that this should be carried out under a Materials Management Plan produced in accordance with the CL:AIRE Definition of Waste Code of Practice. This document should be approved by a CL:AIRE-registered Qualified Person prior to excavation of materials, and be maintained throughout the duration of the project. A Verification Report should be produced on completion of the project in order to confirm the control and recording of material movements around or between sites in accordance with current waste management legislation and guidance.

10 GEOTECHNICAL ASSESSMENT

10.1 INTRODUCTION

The Client proposes to develop the site with residential properties with associated gardens, soft landscaping and infrastructure. A development plan, finished floor levels and the levels of any underground engineering works have not been provided.

Detailed development plans were not available at the time of report preparation so it has been assumed in the following assessment that the development will be in line with current planning guidance and comprise two to three storey residential housing.

In addition to the site specific comments below reference should be made to the general comments relating to the Geotechnical Assessment listed in Appendix A (xi to xvi).

10.2 GEOTECHNICAL TESTING

Geotechnical testing has been carried out both on site and in the laboratory; the results of this testing are provided on the logs in Appendix D, and in Appendix H. These results are summarised in the tables below:

Insitu Testing*:*

Glacial Till

Depth	Cohesive Soils		Granular Soils	
	N Value	Strength	N Value	Relative Density
1m	6 to 16	Low to high	8 to 24	Loose to medium dense
2m	13 to 36	Medium to very high	6 to 14	Loose to medium dense
3m	19 to 50	High to very high	23	Medium dense

Branscombe Mudstone Formation

Depth	Cohesive Soils	
	N value	Strength
1m	10 to 29	Medium to high
2m	21 to 50	High to very high
3m	26 to 44	High to very high
4m	26 to 50	High to very high
5m	22 to 40	High to very high

Laboratory Testing:

Test Parameter	Range of Results
CBR	0.5 to 0.8%
Plasticity Index	17 to 25%

10.3 ENGINEERING GROUND TREATMENT

Whilst the near surface soils were generally firm under foot during the intrusive investigation, standing water was observed during the gas monitoring visits; suggesting poor drainage onsite. To prevent the surface soils from becoming heavily disturbed, it is recommended that temporary haul roads are implemented until the main roads are constructed.

A working platform will be required for any piling plant. It is recommended that the design of the working platform is carried out as soon as possible. The working platform certificate requires signing by the Principal Contractor for the site. An allowance for this, and responsibility for the design of the platform (estimated at 600mm thick if constructed without reinforcement), should be made in tender packages and site programmes.

10.4 EXCAVATION CONDITIONS

Excavation of the materials encountered during the ground investigation should be easily achieved using conventional hydraulic excavation techniques.

No trial pit stability observations are available. However, based on the results of the window sampling boreholes and observation of similar soils seen on other sites, it is likely that excavations will be generally stable in the short term where cohesive soils are recorded. Some materials such as granular soils (identified in greater thicknesses on the western half of the site), re-worked soils (allotments) and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. Therefore, instability may be experienced in the medium to long term. Additionally, it is expected that once excavations are undertaken, if they are left open for significant lengths of time, water will accumulate and stability may become compromised.

The observed geology and groundwater conditions suggest that limited groundwater is present within granular pockets, suggesting that simple dewatering techniques (e.g. sump pumping) would be suitable to control water ingress.

Standing water has been observed onsite; therefore an allowance should be made for temporary drainage solutions.

Care should be taken to ensure that dewatering does not lead to settlement of soils below existing structures, infrastructure or services on or off-site.

10.5 EXISTING STRUCTURES / SUBSTRUCTURES

There are existing structures on the site including derelict sheds and containers in the allotments area. The derelict shed located in the south western corner of this area was observed to be made out of potential ACMs.

10.6 FOUNDATIONS

The untreated made ground, low to medium strength natural clay with an undrained shear strength of less than 60kPa, are considered unsuitable as a bearing stratum and all new foundations should be carried down through them to found on the more competent natural cohesive or granular strata. This will result in foundation depths of up to 2.1m begl.

Minimum foundation depths of between 0.6m (granular strata) and 0.9m (medium volume change potential cohesive strata) would normally be applicable for this site. However, as the occurrence of granular strata is unpredictable, it would be prudent to allow for a minimum founding depth of 0.9m throughout.

There are trees along and within the site boundaries and any new foundations within the zone of influence of these trees will need to be deepened in line with guidance in NHBC Standards, Chapter 4.2. Based on the trees tentatively identified on site (birch, sycamore, fir, hawthorn, amongst other unidentified trees) it is estimated that approximately 60% of plots will be affected by trees.

The resultant foundation depths can only be determined by a tree survey and tree influence drawing, but at this stage it is estimated that foundation depths of between 0.9m to 2.5m begl might be expected for 90% of plots and 10% of plots may require foundations situated >2.5m begl (if and where houses are situated close or over a high water demand tree).

TRENCH FILL

At this stage, and based on the above, it is considered likely that trench fill foundations, founded on the natural cohesive and granular strata will be suitable for the majority of the proposed development. Foundation depths of between 0.9m begl to 2.5m begl may be expected, with an average foundation depth of 1.5m begl.

The natural cohesive and granular soils encountered at anticipated foundation depths, were generally at least medium strength and medium dense. Whilst localised areas recorded low strength soils, deepening due to tree influence means that foundations are likely to be progressed through the low strength soils in these areas (with the exception of WS01).

It is anticipated that a nett allowable bearing pressure of at least 110kN/m^2 should be available for conventional strip or trench fill footings. This will allow line loads up to 44kN/m to be taken on footings 450mm wide and 66kN/m on footings 600mm wide. This should result in total settlements of not more than 20mm, keeping differential settlements within acceptable limits.

Whilst greater bearing pressures could be allowed for in granular strata with the densities recorded, as the occurrence of cohesive and granular soils cannot be guaranteed, it would be prudent to be conservative with nett allowable bearing pressures unless plot specific ground investigation is undertaken.

Heave precautions will be required where the foundations lie within the heave zone of trees as defined in NHBC Standards Chapter 4.2. Foundations should be remote from the direct action of tree roots, and should not be constructed so close to trees as to significantly damage their root systems.

Wider footings may be required for higher point/line loads such as at party walls etc. Should wider footings be required for higher point/line loads, GRM should be contacted for further advice.

The strata at the site have been recorded to be variable; specifically on the western side of the site, and so an allowance should be made for the localised use of reinforcement. As the presence of a single type of strata is unpredictable, deepening of foundations is not recommended unless plot specific investigation has been undertaken. Where reinforcement is used, the use of S2 concrete to mass fill the majority of the foundation and topped by a wet strip of RC-35 reinforced concrete containing two layers of B785 mesh is recommended.

PILES

Due to the influence of trees, it is estimated that 10% of the site areas could require foundations bearing at depths in excess of 2.50m begl (i.e. within the engineer design zone); the exact number of plots will depend on where the plots are situated with regards to the trees on site and proposed development levels.

To determine depth of tree influence; desiccation testing could be undertaken, to determine a safe bearing depth for traditional foundations. However, this must be undertaken in the summer months if trees are to remain or at any time once removed. Until this is undertaken it would be prudent to allow for piling all plots within the engineer design zone.

A piling specialist will need to be approached to provide pile dimensions and safe pile capacities. They are likely to require cable percussion (or possibly rotary) boreholes to provide information for detailed pile design. Consideration should be given to nearby structures and infrastructure, and achieving sufficient penetration to resist heave, when choosing the appropriate pile type. Until information on the deeper geology is obtained, it is estimated that 10m driven piles should be suitable for the site, it should also be noted that a minimum pile length of 7.5m is advised as shorter lengths are unlikely to be acceptable to warranting bodies.

Whilst driven piles are recommended at this stage, depending on the proximity of structures, services and infrastructure; a CFA pile solution which produces less vibration could be required.

Whilst piled foundations would end bear beneath the influence of trees, the piles and ring beams should be designed to resist potential heave, down-drag and negative skin friction.

A testing regime and objectives of the works will need agreeing with regulatory and warranting bodies prior to piling works. The pile design will need to be justified to the warranting bodies and the justification should be included within the piling contract.

It should be noted that a working platform will be required by the piling contractor and pile layouts and ground beams will need to be engineer designed.

10.7 FLOOR SLABS

We understand that our Client's preference is to use beam and block floor slabs across the whole development; this floor slab type will be suitable.

10.8 BURIED CONCRETE

Based on the recorded water soluble sulphate and pH levels in the soils below the site and assuming static groundwater conditions, in accordance with requirements of BRE Special Digest 1 (2005), 'Concrete in Aggressive Ground', the Design Sulphate Class for buried concrete at the site should be assumed as DS-1 and the ACEC Class as AC-1s.

For unreinforced trench-fill foundations with a width of greater than 450mm, the classifications above equate to a concrete designated as GEN1 in BS8500 and RC35 for reinforced foundations.

The results of the water soluble sulphate and pH testing of are presented in Appendix G.

10.9 SLOPE STABILITY AND RETAINING STRUCTURES

The site has a gentle slope down to the south east, and the area surrounding the site is similar. Therefore, at current gradients there is negligible risk of slope instability occurring.

The present gradients on site are likely to be adjusted by minor earthworks. Future ground profiles may require earth retaining structures, for which further advice may be required when more information is available.

10.10 SOAKAWAY DRAINAGE

Infiltration testing to determine the feasibility of soakaway drainage was undertaken in the window sample installations on site. A plan showing the locations of each position is presented in Appendix E.

Falling Head Testing

The falling head tests were carried out, in line with the methodology in BS5930, in the Glacial Till and Branscombe Mudstone Formation strata present across the site at WS05 and WS08 (only two locations that did not already record groundwater).

In summary; WS08 did not record sufficient infiltration to allow an infiltration rate to be calculated; this is due to the geology at this location being solely cohesive which typically has a very low permeability. An infiltration rate of 8.21×10^{-6} m/s was calculated for WS05, however this is likely to be representative of the water infiltrating into the local granular pockets recorded at this location; and therefore, based on the recorded geology it is unlikely that the calculated infiltration rate is representative. Given the geology and groundwater levels recorded across the site, it is recommended that an alternative drainage solution should be adopted on site.

Rising Head Testing

Within WS01, WS07 and WS12 groundwater was recorded to be relatively shallow (0.1m to 0.74m begl), so falling head testing could not be undertaken. Therefore, rising head tests were undertaken to assess the rate of groundwater ingress likely to be encountered when excavations are undertaken onsite. The recharge is shown in the table presented below:

WS01		**WS07**		**WS12**	
Start Depth 0.73 Bailed to 1.65		Start Depth 0.10 Bailed to 1.08		Start Depth 0.74 Bailed to 2.04	
Minutes	**Depth**	**Minutes**	**Depth**	**Minutes**	**Depth**
0	1.65	0	1.08	0	2.04
1	1.56	1	0.89	1	1.97
3	1.41	2	0.75	2	1.9
5	1.32	3	0.62	3	1.86
10	1.14	4	0.54	11	1.53
23	0.92	5	0.53	31	1.23
42	0.82	10	0.39	63	1.09
75	0.78	20	0.27	121	0.96
110	0.77	47	0.1	175	0.91
165	0.75			219	0.88

It should be noted that rate of ingress will vary depending on the specific geology found in each area of site.

It should also be noted that while WS01, WS07 and WS12 are recorded to be 3.4m, 3.3m and 5.3m deep respectively (from monitoring data), they could not be bailed below 1.65m, 1.08 and 2.04m respectively.

The groundwater is likely from limited pockets of granular strata from within the Glacial Till; suggesting sump pumping and side wall support should be sufficient for dewatering excavations. However, due to the speed of recharge and as the wells could not be bailed, it is recommended that an allowance be made for well pointing at this stage.

10.11 NEW ACCESS ROADS

Laboratory CBR testing was undertaken on Glacial Till soils taken at approximately 0.5m begl. The soils comprised two samples of sandy gravelly clay.

The remoulded CBR results of the sandy clay recorded CBRs of <1%. Given these conditions, it is recommended that an allowance is made for increased capping thickness and/or the incorporation of a geotextile membrane.

Proof rolling and the improvement of soft spots may result in increased CBR values and the incorporation of a geotextile grid into sub-base layers may allow for reduced capping thickness.

Further insitu CBR testing immediately prior to road construction, under the adopting authority procedures, may allow a greater CBR value to be used for design purposes.

11 FURTHER INVESTIGATION

Further investigation, to determine more accurately the effect of some of the identified hazards on the development, is recommended. This includes the following:

- Completion of the ground gas monitoring program.
- Asbestos survey of shed and removal by specialist contractor.
- Additional ground investigation to determine extent of asbestos contamination within allotment area.
- Delineation, removal and validation of asbestos hotspot(s) (if asbestos is not pervasive).
- Arboricultural survey to assist with specific foundation design.
- Desiccation testing (in summer moths if trees retained).
- Delineation of locally soft and loose strata at WS01.
- Cable percussive boreholes for pile design.
- Budget foundation schedule (if required).
- Liaison with the Local Water Supply Company to determine the appropriate water supply pipes at the site.
- Removal of soils which exceed water pipe thresholds (if required).

A copy of this report should be submitted to the Planning Department of the Local Authority/Local Authority EHO for review, if planning conditions exist for this site. A copy should also be sent to the NHBC for their records.

12 CONCLUSIONS

Assuming compliance with all the recommendations contained within this report (for abridged version see ‘Summary of Recommendations’ table at the beginning of the report) the site is suitable for the proposed development.

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

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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
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- MAGIC Website: http://magic.defra.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
- HPA-RPD-033 Indicative Atlas of Radon in England and Wales (HPA & BGS, 2007)
- BR211 Radon: Guidance on protective measures for new buildings (BRE, 2015)
- PHE-CRCE-032 Radon in Homes in England: 2016 Data Report (PHE, 2017)
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings (CIRIA, 2007)
- BS8485:2015+A1:2019 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BSI, 2019)
- CIRIA C733 Asbestos in soil and made ground: a guide to understanding and managing risks (CIRIA, 2014).
- CIRIA C765 Asbestos in soil and made ground good practice site guide (CIRIA, 2017)
- 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+A1:2019 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. Reference is made to the following guidance in respect of asbestos:

- Control of Asbestos Regulations (CAR) 2012 and Approved Code of Practice and guidance (L143 2nd Ed.) (HSE, 2013)
- CAR-SOIL™ Control of Asbestos Regulations 2012. Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry Guidance (CLAIRE, 2016)

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. 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 DoWCoP 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 should be assessed by a competent person to determine whether support is required.

All excavations on site should be in accordance with the Construction (Design and Management) Regulations 2015 (Regulation 22) and stability should be practically maintained at all times to prevent danger to any person.

Man entry into excavations should be prevented. Entry should only take place by persons with the necessary competencies to do so and where the excavation has been inspected by a competent person.

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.

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

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DO NOT SCALE

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CLIENT:

Andrew Granger and Co

PROJECT:

Lichfield Drive, Blaby Golf Course

TITLE:

Site Location and Boundary Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
GS	11/2020
PROJECT No:	DRAWING No:
P7791	1

APPENDIX C

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

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- Civil and Infrastructure Services
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NOTES:

CLIENT: Andrew Granger & Co

PROJECT: Lichfield Drive/ Blaby Golf Centre

TITLE: Exploratory Hole Location Plan

PROJECT No: P7791

DATE: Nov 2020

DESIGN/DRAWN: PC

DRAWING NUMBER: 2

ISSUE: ISSUE

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APPENDIX D

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Windowless Sample Borehole

Borehole No WS01
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456469 E, 296607 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. TOPSOIL
		0.20	ES			0.30	73.70		
		0.50	D						Firm, medium strength, orangish brown sandy CLAY. Sand is fine to coarse. Rare gravel of subrounded to subangular quartzite, mudstone and carbonaceous matter. GLACIAL TILL
		1.00	S	N=11 (2,2/2,3,3,3)					
		1.30	D						
						1.50	72.50		Medium dense orangish brown fine to medium SAND. (Damp). GLACIAL TILL
						1.80	72.20		Soft to firm, low to medium strength orangish brown mottled grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular mudstone, chalk and black carbonaceous matter. GLACIAL TILL
		1.90	D						
		2.00	S	N=6 (1,1/1,1,2,2)					
						2.10	71.90		
						2.40	71.60		Loose orangish brown fine to medium clayey SAND. (Damp). GLACIAL TILL
		2.50	D			2.55	71.45		Firm, medium strength orangish brown mottled grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular mudstone, chalk and black carbonaceous matter. GLACIAL TILL
						2.75	71.25		
		3.00	S	N=23 (3,4/5,6,6,6)					
						3.10	70.90		Loose to medium dense orangish brown fine to coarse SAND. (Wet). GLACIAL TILL
		3.40	D						Firm, medium strength orangish brown mottled grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular mudstone, chalk and black carbonaceous matter. GLACIAL TILL
						3.50	70.50		Medium dense orangish brown fine to coarse SAND. (Wet). GLACIAL TILL
		4.00	D	N=50 (6,6/50 for 260mm)					Stiff to very stiff, high to very high strength reddish brown mottled grey
		4.00	S						

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Rain.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
Groundwater encountered in granular horizons between 1.5m and 1.8m, 2.1 and 2.4m, 2.55m to 2.75m and 3.1 to 3.5m begl.

General Remarks:
Approximate data used for ground level. Small collapses recorded; gas and groundwater monitoring pipe installed to 3.5m begl.

Hole Started:	19/11/2020	**Hole Complete:**	19/11/2020	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS01
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456469 E, 296607 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						4.41	69.59		Stiff to very stiff, high to very high strength reddish brown mottled grey gravelly CLAY. Gravel is fine to coarse of subangular mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
									End of Borehole at 4.410m

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8

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Rain.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
Groundwater encountered in granular horizons between 1.5m and 1.8m, 2.1 and 2.4m, 2.55m to 2.75m and 3.1 to 3.5m begl.

General Remarks:
Approximate data used for ground level. Small collapses recorded; gas and groundwater monitoring pipe installed to 3.5m begl.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS02
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 75.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456529 E, 296615 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. Rare gravel of angular chert. TOPSOIL
		0.20	ES			0.30	74.70		
		0.60	D						Firm orangish brown sandy CLAY. Sand is fine to coarse. Rare fine to coarse subrounded to subangular gravel of chert and mudstone. (Approximately medium strength). GLACIAL TILL
						0.80	74.20		
		1.00	S	N=16 (2,4/4,4,4,4)					Soft, low strength orangish brown very sandy CLAY. Sand is fine to coarse. (Damp). GLACIAL TILL
						1.10	73.90		
		1.20	D						Stiff becoming very stiff, high to very high strength orangish brown and reddish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chalk, mudstone and siltstone. GLACIAL TILL
		1.70	D						
		2.00	S	N=36 (4,4/8,8,8,12)					
						2.30	72.70		
		2.50	D						Very stiff, very high strength reddish brown mottled grey gravelly CLAY. Gravel is fine to coarse of subangular mudstone and siltstone. GLACIAL TILL
		3.00	S	N=50 (8,8/10,11,14,15)					
						3.45	71.55		End of Borehole at 3.450m

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Rain.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
Damp between 0.8m and 1.1m.

General Remarks:
Approximate data used for ground level.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS03
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456529 E, 296597 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. Rare gravel of subrounded quartzite. TOPSOIL
		0.20	ES			0.30	75.70		
		0.80	D						Stiff becoming very stiff, high becoming very high strength reddish brown mottled grey gravelly CLAY. Gravel is fine to coarse of subangular mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		1.00	S	N=19 (1,2/3,4,6,6)					
		1.20	D						
		1.80	D						
		2.00	S	N=50 (10,11/50 for 275mm)					
						2.43	73.57		End of Borehole at 2.430m

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Rain.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS04
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456590 E, 296586 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. Rare gravel of angular chert. TOPSOIL
		0.20	ES			0.30	75.70		Stiff becoming very stiff, high becoming very high strength reddish brown mottled grey gravelly CLAY. Gravel is fine to coarse of subangular mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		0.80	D						
		1.00	S	N=22 (4,4/4,6,6,6)					
		1.20	D						
		1.70	D						
		2.00	S	N=50 (6,7/50 for 250mm)					
						2.40	73.60		End of Borehole at 2.400m

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Rain.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS05
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 77.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456629 E, 296567 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20 0.20	D ES			0.30	76.70		Dark brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. TOPSOIL
		0.60	D						Stiff, high strength reddish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, mudstone and siltstone. GLACIAL TILL
		1.00	S	N=24 (6,6/6,6,6,6)		1.10	75.90		
		1.20	D						Medium dense reddish brown fine to medium SAND. (Dry). GLACIAL TILL
						1.50	75.50		
		1.80	D						Stiff becoming very stiff, high to very high strength reddish brown mottled grey gravelly CLAY. Gravel is fine to coarse of subangular mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		2.00	S	N=50 (9,10/50 for 249mm)					
						2.39	74.61		End of Borehole at 2.390m

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Sunny.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS06
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456670 E, 296597 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Dark brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. TOPSOIL
		0.20	ES			0.30	73.70		
		0.70	D						Firm, medium strength orangish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chalk, mudstone and chert. GLACIAL TILL
		1.00	S	N=9 (2,2/2,2,2,3)					
		1.20	D						
		2.00	S	N=13 (3,3/3,3,3,4)					
		2.30	D			2.30	71.70		
						2.35	71.65		Medium dense orangish brown fine to coarse SAND. (Wet). GLACIAL TILL
									Stiff, high strength dark orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chert and chalk. GLACIAL TILL
		2.90	D						
		3.00	S	N=19 (4,4/4,5,5,5)					
						3.40	70.60		
		3.50	D						Stiff becoming very stiff, high to very high strength reddish brown very gravelly CLAY. Gravel is fine to coarse of subangular mudstone. BRANSCOMBE MUDSTONE FORMATION
		3.80	S	N=50 (6,14/50 for 245mm)					

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Sunny.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
Wet strata encountered within granular lens between 2.3 and 2.35m begl

General Remarks:
Approximate data used for ground level.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS06
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456670 E, 296597 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						4.20	69.80		Stiff becoming very stiff, high to very high strength reddish brown very gravelly CLAY. Gravel is fine to coarse of subangular mudstone. BRANSCOMBE MUDSTONE FORMATION
									End of Borehole at 4.200m

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Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Sunny.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
Wet strata encountered within granular lens between 2.3 and 2.35m begl

General Remarks:
Approximate data used for ground level.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS07
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456485 E, 296651 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	ES			0.30	73.70		Dark brown sandy CLAY. Sand is fine to coarse. Frequent rootlets. TOPSOIL
		0.70	D						Firm orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chalk, mudstone chert and carbonaceous matter. (Approximately medium strength). GLACIAL TILL
		1.20	D						
		1.90	D			1.70	72.30		Medium dense orangish brown clayey fine to medium SAND. (Wet). GLACIAL TILL
		2.50	D			2.20	71.80		Stiff orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chalk, mudstone and chert. (Approximately high strength). GLACIAL TILL
		3.10	D			2.80	71.20		Medium dense orangish brown clayey fine to medium SAND. (Wet). GLACIAL TILL
		3.80	D			3.20	70.80		Stiff dark grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chert and chalk. (Approximately high strength). GLACIAL TILL
						4.00	70.00		End of Borehole at 4.000m

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** PC **Weather:** Sunny.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Target depth achieved.

Groundwater Remarks:
Wet strata between 1.7m and 2.2m begl and 2.8m and 3.2m begl.

General Remarks:
Approximate data used for ground level. SPT broke off during 1.0m test, location re-drilled without SPT tests.

Hole Started: 19/11/2020 **Hole Complete:** 19/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS08
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 77.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456689 E, 296596 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Soft, dark brown, slightly gravelly clayey SILT with abundant rootlets. Gravel is fine to medium, sub-angular of carbonaceous fragments. TOPSOIL
		0.20	ES			0.30	76.70		
		0.35	D			0.40	76.60		Soft, light orangish brown, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to rounded of quartzite and chert. GLACIAL TILL
		0.65	D			0.60	76.40		Firm to stiff, reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to rounded of sandstone, siltstone, quartzite and carbonaceous fragments. GLACIAL TILL
		1.00	SPTLS	N=29					
		1.00	S	(5,5/6,7,8,8)					
		1.40	D						Stiff (very stiff beyond 0.70m begl), reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to rounded siltstone. BRANSCOMBE MUDSTONE FORMATION
		1.80	D						
		2.00	SPTLS	N=21					
		2.00	S	(4,3/4,5,6,6)					
		2.40	D						
		2.80	D						
		3.00	SPTLS	N=26					
		3.00	S	(5,5/5,6,7,8)					
		3.30	D						
		3.90	D						
		4.00	SPTLS	N=34					
		4.00	S	(5,5/6,7,9,12)					

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series

Reason for termination of borehole: Target depth reached.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS08
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 77.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456689 E, 296596 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		4.50	D						Stiff (very stiff beyond 0.70m begl), reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to rounded siltstone. BRANSCOMBE MUDSTONE FORMATION
		4.80	D						
		5.00 5.00	SPTLS S	N=40 (6,7/8,9,10,13)					
						5.45	71.55		End of Borehole at 5.450m

5
6
7
8

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series

Reason for termination of borehole: Target depth reached.

Groundwater Remarks:
No groundwater encountered.

General Remarks:

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS09
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 77.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456702 E, 296628 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Soft, dark brown, slightly gravelly silty CLAY. Gravel is fine to medium, sub-angular of carbonaceous fragements. TOPSOIL
		0.20	ES			0.30	76.70		
		0.50	D						Firm, dark brown, slightly sandy slightly gravelly silty CLAY. Sand is fine to medium. Gravel is fine to medium, sub-angular to rounded of chert and quartzite. GLACIAL TILL
						0.75	76.25		
		0.90	D						Medium dense, orangish brown silty SAND. Sand is fine to medium. GLACIAL TILL
		1.00	SPTLS	N=16					
		1.00	S	(2,2/2,3,5,6)		1.10	75.90		
		1.20	D						Very stiff, reddish brown mottled grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular to rounded, mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		1.80	D						
		2.00	SPTLS	N=50 (5,7/50 for 295mm)					
		2.00	S						
						2.45	74.56		End of Borehole at 2.445m

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No
WS10
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD)
76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates
456659 E
296644 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						
		0.20	ES			0.30	75.70		Soft, dark brown, sandy slightly gravelly clayey SILT. Sand is fine to medium. Gravel is fine to coarse, rounded of quartzite and chert. TOPSOIL
		0.50	D						Medium dense, orangish brown, very clayey silty SAND. Sand is fine to medium. GLACIAL TILL
		1.00	SPTLS	N=10		1.00	75.00		
		1.00	S	(2,2/2,2,2,4)					
		1.20	D						Firm, reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, rounded, siltstone. BRANSCOMBE MUDSTONE FORMATION
						1.50	74.50		
		1.80	D						Stiff (very stiff by 1.90m) reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, rounded of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		2.00	S	N=31 (4,6/6,7,8,10)					
		2.30	D						
		2.90	D						
		3.00	SPTLS	N=42					
		3.00	S	(5,7/8,10,12,12)					
		3.30	D						
		3.80	D						
		4.00	SPTLS	N=49					
		4.00	S	(7,9/9,12,13,15)					

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to near SPT refusal.

Groundwater Remarks:
Recovered damp from 0.30m to 0.60m begl.

General Remarks:

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS10
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456659 E, 296644 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						4.45	71.55		Stiff (very stiff by 1.90m) reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, rounded of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
									End of Borehole at 4.450m

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6
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8

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to near SPT refusal.

Groundwater Remarks:
Recovered damp from 0.30m to 0.60m begl.

General Remarks:

Hole Started:	Hole Complete:	Version:	Scale:
23/11/2020	23/11/2020	FINAL	1:25

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Windowless Sample Borehole

Borehole No WS11
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456638 E, 296613 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.15	D						Soft, dark brown sandy silty CLAY with frequent rootlets. TOPSOIL
		0.15	ES			0.25	75.75		Firm, light orangish brown, sandy silty CLAY. Sand is fine to medium. GLACIAL TILL
		0.60	D						
		0.95	D			0.90	75.10		Loose, orangish brown, clayey silty fine to medium grained SAND. GLACIAL TILL
		1.00	SPTLS	N=8 (2,2/1,2,2,3)					
		1.00	S						
		1.60	D			1.40	74.60		Stiff (very stiff at 1.80m), reddish brown mottled light grey, slightly gravely silty CLAY. Gravel is fine to coarse, sub-angular to rounded of sandstone, siltstone and mudstone. BRANSCOMBE MUDSTONE FORMATION
		2.00	SPTLS	N=38					
		2.00	S	(3,5/7,9,10,12)					
		2.20	D						
		2.70	D						
		3.00	SPTLS	N=44					
		3.00	S	(6,8/8,10,13,13)					
		3.60	D						
		4.00	SPTLS	N=50					
		4.00	S	(7,9/11,13,13,13)					

1 2 3 4

Crew: Dynamic Sampling Uk Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS11
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456638 E, 296613 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						4.45	71.55		Stiff (very stiff at 1.80m), reddish brown mottled light grey, slightly gravely silty CLAY. Gravel is fine to coarse, sub-angular to rounded of sandstone, siltstone and mudstone. BRANSCOMBE MUDSTONE FORMATION
									End of Borehole at 4.450m

5
6
7
8

Crew: Dynamic Sampling Uk Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started:	23/11/2020	Hole Complete:	23/11/2020	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS12
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 75.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456607 E, 296662 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						
		0.20	ES			0.30	74.70		Soft, dark brown, sandy slightly gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to medium, sub-angular of siltstone and carbonaceous material. TOPSOIL
		0.60	D						Firm, orangish brown, slightly gravelly silty CLAY. Gravel is fine to coarse, rounded of quartzite. GLACIAL TILL
		1.00	SPTLS	N=14		1.00	74.00		
		1.00	S	(3,3/4,4,3,3)					Medium dense, orangish brown, slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse, rounded of quartzite. GLACIAL TILL
		1.30	D						
						1.50	73.50		Very stiff, reddish brown, mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		1.80	D						
		2.00	SPTLS	N=29					
		2.00	S	(4,5/6,7,8,8)					
		2.50	D						
		3.00	SPTLS	N=30					
		3.00	S	(5,7/6,7,8,9)					
		3.50	D						
		4.00	S	N=33 (5,8/7,7,9,10)					

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Target depth reached.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started:	23/11/2020	**Hole Complete:**	23/11/2020	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS12

Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 75.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456607 E, 296662 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		4.50	D						Very stiff, reddish brown, mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		5.00 5.00	SPTLS S	N=22 (4,4/5,5,6,6)					
						5.45	69.55		End of Borehole at 5.450m

5
6
7
8

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Target depth reached.

Groundwater Remarks:

No groundwater encountered.

General Remarks:

Approximate data used for ground level.

Hole Started:	23/11/2020	**Hole Complete:**	23/11/2020	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS13
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 75.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456586 E, 296632 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Soft, dark brown, slightly sandy slightly gravelly silty CLAY. Sand is fine. Gravel is fine to medium, angular of chert. TOPSOIL
		0.20	ES			0.35	74.65		
		0.60	D						Firm, reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
									Becoming slightly sandy.
		1.00	SPTLS	N=14					1
		1.00	S	(2,1/2,4,4,4)		1.10	73.90		
		1.20	D						Stiff (very stiff at 1.60m), reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		1.80	D						
		2.00	SPTLS	N=35					2
		2.00	S	(4,6/7,8,9,11)					
		2.40	D						
		2.90	D						
		3.00	SPTLS	N=34					3
		3.00	S	(5,6/7,8,9,10)					
		3.50	D						
		4.00	SPTLS	50 (25 for 110mm/50 for 15mm)					4
		4.00	S			4.13	70.88		End of Borehole at 4.125m

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS14

Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456537 E, 296644 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						
		0.20	ES						
						0.35	73.65		Soft, dark brown, slightly sandy, slightly gravelly silty CLAY. Gravel is fine to medium, sub-angular of quartzite, chert and carbonaceous material. TOPSOIL
		0.60	D						Firm, orangish brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded quartzite and chert. GLACIAL TILL
		1.00	SPTLS	N=6 (3,2/2,2,1,1)					
		1.00	S						
						1.40	72.60		
		1.50	D						Medium dense, orangish brown, slightly silty gravelly SAND. Sand is medium to coarse. Gravel is fine to coarse, angular of chert and quartzite. GLACIAL TILL
						1.60	72.40		
		1.70	D						
						1.80	72.20		
		1.90	D						Soft, brown, very sandy clayey SILT. Sand is fine to medium. GLACIAL TILL
		2.00	SPTLS	N=14		2.00	72.00		
		2.00	S	(2,3/3,4,4,3)		2.10	71.90		Loose, orangish brown, clayey silty sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular of quartzite and chert. GLACIAL TILL
	▼	2.30	D						
						2.50	71.50		Loose, orangish brown, very clayey silty fine to medium grade SAND. (wet) GLACIAL TILL
						2.60	71.40		
		2.65	D			2.70	71.30		Medium dense, light yellowish brow, clayey silty sandy GRAVEL. Sand is fine to coarse. Gravel is fine to course, sub-angular of quartzite and chert. (Very wet). GLACIAL TILL
		2.90	D						
		3.00	SPTLS	N=28					
		3.00	S	(4,4/6,7,7,8)					
									Very stiff, brown, silty CLAY. GLACIAL TILL
									Loose, brown, silty fine grained SAND. GLACIAL TILL
									Very stiff, reddish brown mottled light grey gravelly silt CLAY. Gravel is fine to coarse, angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
									No recovery from 3.0m to 4.0m begl due to hole collapse.
		4.00	SPTLS	N=26					
		4.00	S	(4,4/5,6,7,8)					

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to hole collapse.

Groundwater Remarks:

Wet strata recovered beyond 2.0m begl and very wet 2.30m to 2.70m begl.

General Remarks:

Approximate data used for ground level.

Hole Started:	23/11/2020	**Hole Complete:**	23/11/2020	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS14
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456537 E, 296644 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						4.45	69.55		Very stiff, reddish brown mottled light grey gravelly silt CLAY. Gravel is fine to coarse, angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
									End of Borehole at 4.450m

5
6
7
8

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Terminated due to hole collapse.

Groundwater Remarks:
Wet strata recovered beyond 2.0m begl and very wet 2.30m to 2.70m begl.

General Remarks:
Approximate data used for ground level.

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS15
Sheet 1 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456554 E 296682 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.20	D						Soft, dark brown, slightly sandy slightly gravelly silty CLAY with frequent rootlets. Gravel is fine to medium, sandstone, siltstone and carbonaceous material. TOPSOIL
		0.20	D						
		0.20	ES			0.30	73.70		
		0.90	D						Firm, light orangish brown, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-rounded of quartzite, chert, chalk and sandstone. GLACIAL TILL
		1.00	SPTLS	N=8 (1,1/2,1,2,3)					
		1.00	S						
		1.50	D						
		2.00	SPTLS	N=19					
		2.00	S	(3,3/4,4,5,6)					
		2.50	D			2.35	71.65		Stiff, reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
		3.00	SPTLS	N=28					
		3.00	S	(4,5/5,7,8,8)					
		3.30	D						
		3.80	D						
		4.00	SPTLS	N=50 (5,6/50 for					
		4.00	S	295mm)					

1 2 3 4

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Termination due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started: 23/11/2020 **Hole Complete:** 23/11/2020 **Version:** FINAL **Scale:** 1:25

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Windowless Sample Borehole

Borehole No WS15
Sheet 2 of 2

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456554 E 296682 N

Installation/ Backfill	Water Strike	Samples/Tests: Depth	Samples/Tests: Type	Samples/Tests: Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						4.45	69.56		Stiff, reddish brown mottled light grey, slightly gravelly silty CLAY. Gravel is fine to coarse, sub-angular of mudstone and siltstone. BRANSCOMBE MUDSTONE FORMATION
									End of Borehole at 4.445m

5
6
7
8

Crew: Dynamic Sampling UK Ltd. **Logger:** CMM **Weather:** Clear.

Equipment: Premier Compact 110 Series.

Reason for termination of borehole: Termination due to SPT refusal.

Groundwater Remarks:
No groundwater encountered.

General Remarks:
Approximate data used for ground level.

Hole Started:	23/11/2020	Hole Complete:	23/11/2020	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

Trial Pit Log

Trial Pit No
HP01
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

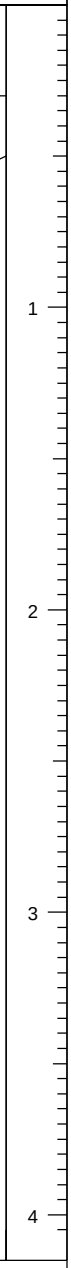
Ground Level (mAOD)
75.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates
456569 E
296653 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	74.70		Dark brown sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded quartzite and chert. TOPSOIL
	0.40 - 0.50	B		0.50	74.50		Dark brown sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded quartzite and chert. GLACIAL TILL
							End of Pit at 0.50m



Date Excavated: 19/11/2020
Date Backfilled: 19/11/2020
Shoring: None.
Stability: Pit stable.
Plant Used: Hand dug pit.
Logged by: PC

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.50
0.50

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Approximate data used for ground level.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No HP02
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

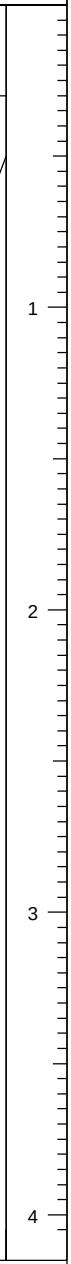
Ground Level (mAOD) 76.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456658 E, 296620 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	75.70		Firm orangish brown sandy CLAY. Sand is fine to coarse. Rare gravel of subrounded to subangular quartzite, chert and mudstone. (Approximately medium strength). TOPSOIL
	0.40 - 0.50	B		0.50	75.50		Firm orangish brown sandy CLAY. Sand is fine to coarse. Rare gravel of subrounded to subangular quartzite, chert and mudstone. (Approximately medium strength). GLACIAL TILL
							End of Pit at 0.50m



Date Excavated: 19/11/2020
Date Backfilled: 19/11/2020
Shoring: None.
Stability: Pit stable.
Plant Used: Hand dug pit.
Logged by: PC

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.50 × 0.50

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Approximate data used for ground level.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No SS01
Sheet 1 of 1

Site Name: Blaby - Lichfield Drive and Golf Centre

Ground Level (mAOD) 74.00

Client: Andrew Granger & Co

GRM Project Ref: P7791

Coordinates 456458 E 296620 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES		0.10	73.90		Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse of subrounded to subangular quartzite, chert, chalk and mudstone. Rare rootlets. TOPSOIL
							End of Pit at 0.10m

Date Excavated: 19/11/2020
Date Backfilled: 19/11/2020
Shoring: None.
Stability: Pit stable.
Plant Used: Hand dug pit.
Logged by: PC

Groundwater Observations:
No groundwater encountered.

Trial Pit Dimensions (m):
0.50 × 0.50

Reason for termination of Trial Pit:
Target depth achieved.

General Remarks: Sample of top soil bund forming raised tee area. Approximate data used for ground level.

Relative density is approximate and determined by observation only.

Version: FINAL

Scale: 1:25

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

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NOTES:

CLIENT: Andrew Granger & Co

PROJECT: Lichfield Drive/ Blaby Golf Centre

TITLE: Gas Monitoring Plan

PROJECT No: P7791

DATE: December 2020

DESIGN/DRAWN: CMM

DRAWING NUMBER: 3

ISSUE: FINAL

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APPENDIX F

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

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- Construction Management
- Site Services

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www.grm-uk.com

In-Situ Gas Monitoring Results

Project Name	Lichfield Road / Golf Course Blaby
Project Number	7791
Client	Andrew Granger & Co
Date	09/12/2020
Weather	Cloudy
Atmospheric Pressure (mb)	1001
Presure Trend	Rising
Equipment	Gas Data LMSXi
Operator	Bryan Burgh

Ground Gas														Groundwater	
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading		Depth to Groundwater	Total Well Depth
	mbegl			%v/v		%v/v		%v/v		l/h		ppm		mbegl	mbegl
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady		
WS01	1.00	3.50	NS	0.00	0.00	3.70	3.70	18.30	18.30	0.00	0.00	Not Recorded		0.73	3.39
WS05	0.50	2.00	NS	0.00	0.00	2.20	2.20	17.10	17.10	-0.80	-0.50	Not Recorded		Not Detected	2.58
WS07	1.00	4.00	NS	0.00	0.00	1.90	1.90	20.20	20.20	0.00	0.00	Not Recorded		0.10	3.30
WS08	0.50	5.45	NS	0.00	0.00	4.20	4.20	12.90	12.90	0.00	0.00	Not Recorded		Not Detected	5.53
WS12	0.50	5.45	NS	0.00	0.00	1.70	1.70	20.20	20.20	0.00	0.00	Not Recorded		0.74	5.33

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

NS	Natural Strata

Key

	Threshold gas concentration exceeded
	Response Zone Flooded

Printed 07/01/2021

In-Situ Gas Monitoring Results

Project Name	Lichfield Road / Golf Course Blaby
Project Number	7791
Client	Andrew Granger & Co
Date	22/12/2020
Weather	Partly Sunny
Atmospheric Pressure (mb)	1006
Presure Trend	Steady
Equipment	Gas Data LMSXi
Operator	Bryan Burgh

Ground Gas														Groundwater	
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading		Depth to Groundwater	Total Well Depth
	mbegl			%v/v		%v/v		%v/v		l/h		ppm		mbegl	mbegl
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady		
WS01	1.00	3.50	NS												
WS05	0.50	2.00	NS	0.00	0.00	2.20	2.20	18.70	18.70	0.00	0.00	Not Recorded		1.92	2.58
WS07	1.00	4.00	NS	0.00	0.00	2.30	2.30	17.00	17.00	0.00	0.00	Not Recorded		0.00	3.29
WS08	0.50	5.45	NS	0.00	0.00	4.50	4.50	10.20	10.20	0.00	0.00	Not Recorded		1.32	5.52
WS12	0.50	5.45	NS	0.00	0.00	0.90	0.90	20.50	20.50	0.60	0.00	Not Recorded		0.47	5.31

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

NS	Natural Strata

Key

	Threshold gas concentration exceeded
	Response Zone Flooded

Printed 07/01/2021

APPENDIX G

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- Civil and Infrastructure Services
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GRM Development Solutions
Laurus House
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Burton Upon Trent
DE14 2WH

Analytical Test Report: L20/3201/GRM/001

Your Project Reference:	**Blaby - Lichfield Drive Golf Course**	Samples Received on:	20/11/2020
Your Order Number:	P7791	Testing Instruction Received:	20/11/2020
Report Issue Number:	1	Sample Tested:	20/11 to 01/12/2020
Samples Analysed:	4 soil samples	Report issued:	03/12/2020

Asbestos & Sample Registration 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.

With the exception of Sulphate which is crushed over the 2mm 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.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

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

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\2020\L20\GRM - GRM Development Solutions\L20-03201-GRM P7791\[L20-3201-GRM-001.XLSX]Cover Sheet

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7 - 11 Harding Street
Leicester
LE1 4DH

L20/3201/GRM/001

Project Reference - Blaby - Lichfield Drive Golf Course

Analytical Test Results - GRM Soil Suite

NC Reference			126521	126522	126523	126524
Client Sample ID			WS01	WS03	WS05	WS06
Client Sample Location			WS01	WS03	WS05	WS06
Depth - Top (m)			0.20	0.20	0.20	0.20
Depth - Bottom (m)			0.20	0.20	0.20	0.20
Date of Sampling			19/11/2020	19/11/2020	19/11/2020	19/11/2020
Time of Sampling			Not provided	Not provided	Not provided	Not provided
Sample Matrix			Clay	Clay	Clay	Clay
Determinant	Units	Accreditation				
Arsenic	(mg/kg)	MCERTS	12	< 10	< 10	< 10
Cadmium	(mg/kg)	MCERTS	0.7	0.7	0.6	0.6
Chromium (Total)	(mg/kg)	UKAS	28	29	25	26
Copper	(mg/kg)	MCERTS	24	23	20	22
Lead	(mg/kg)	MCERTS	46	38	37	41
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	21	22	19	19
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	89	63	64	80
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	7.4	7.4	7.0	6.4
SOM	(%)	UKAS	3.2	2.8	2.8	3.6
Sulphate	(mg/l)	u	< 10	< 10	< 10	< 10
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	0.03	< 0.02	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	0.22	< 0.02	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	0.61	0.06	0.10	0.07
Benzo (a) pyrene	(mg/kg)	MCERTS	0.59	0.06	0.11	0.08
Benzo (b) fluoranthene	(mg/kg)	MCERTS	0.83	0.09	0.15	0.11
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	0.36	0.04	0.08	0.06
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.31	0.03	0.05	0.04
Chrysene	(mg/kg)	MCERTS	0.62	0.06	0.10	0.08
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	0.07	< 0.02	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	1.2	0.09	0.16	0.12
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.39	0.04	0.08	0.06
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	0.18	< 0.02	0.02	0.03
Pyrene	(mg/kg)	MCERTS	0.97	0.08	0.14	0.11
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	6.4	0.72	1.1	0.89
Asbestos	-	UKAS	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Pesticide Screen	(mg/kg)	u	Undetected <1mg/kg	Undetected <1mg/kg	Undetected <1mg/kg	Undetected <1mg/kg

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7 - 11 Harding Street
Leicester
LE1 4DH

L20/3201/GRM/001

Project Reference - Blaby - Lichfield Drive Golf Course

Sample Descriptions

NC Reference	Client Sample ID	Client Sample Location	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
126521	WS01	WS01	Brown slightly silty slightly gravelly sandy clay with rare rootlets	17	4.7	98
126522	WS03	WS03	Brown slightly silty slightly gravelly sandy clay with rare rootlets	18	0.0	100
126523	WS05	WS05	Brown slightly silty slightly gravelly sandy clay with rare rootlets	16	0.0	100
126524	WS06	WS06	Brown slightly silty slightly gravelly sandy clay with rare rootlets	21	0.0	99

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L20/3201/GRM/001

Project Reference - Blaby - Lichfield Drive Golf Course

Analysis Methodologies

Matrix	Determinant	Sample condition for analysis	Test Method used
Soil	Metals	Air Dried	In house method statement - MS - CL - ICP metals
Soil	PAH	As Received	In house method statement - MS - CL - PAH (As received)
Soil	Phenols	As Received	In house method statement - MS - CL - Phenols by Skalar
Soil	Chromium (hexavalent)	As Received	In house method statement - MS - CL - Hexavalent Chromium by Skalar
Soil	Cyanide	As Received	In house method statement - MS - CL - Cyanide by Skalar
Soil	pH	As Received	In house method statement - MS - CL - pH in soils (using a 1:3 soil to water extraction)
Soil	SOM	Air Dried	In house method statement - MS - CL - TOC Eltra
Soil	Sulphate (w/s)	Oven Dried	In house method statement - MS - CL - Anions by Aquakem
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"
Soil	Pesticide Screen	As Received	In house method statement - MS - CL - Pesticides

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

Analytical Test Report: L20/03240/GRM/002

Your Project Reference:	**Blaby - Lichfield Drive / Golf Course**	Samples Received on:	25/11/2020
Your Order Number:	P7791	Testing Instruction Received:	24/11/2020
Report Issue Number:	1	Sample Tested:	25/11 to 08/12/2020
Samples Analysed:	12 soil samples	Report issued:	08/12/2020

[redacted]

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.

With the exception of Sulphate which is crushed over the 2mm 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.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

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

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
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Leicester
LE1 4DH

L20/03240/GRM/002

Project Reference - Blaby - Lichfield Drive / Golf Course

Analytical Test Results - GRM Soil Suite

NC Reference			127309	127310	127311	127312
Client Sample ID			WS09	WS11	WS12	WS14
Client Sample Location			WS09	WS11	WS12	WS14
Depth - Top (m)			0.20	0.15	0.20	0.20
Depth - Bottom (m)			0.20	0.15	0.20	0.20
Date of Sampling			23/11/2020	23/11/2020	23/11/2020	23/11/2020
Time of Sampling			Not provided	Not provided	Not provided	Not provided
Sample Matrix			Clay	Clay	Clay	Clay
Determinant	Units	Accreditation				
Arsenic	(mg/kg)	MCERTS	11	< 10	13	15
Cadmium	(mg/kg)	MCERTS	0.7	0.8	1.0	1.3
Chromium (Total)	(mg/kg)	UKAS	29	23	45	28
Copper	(mg/kg)	MCERTS	71	59	160	88
Lead	(mg/kg)	MCERTS	97	110	120	190
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	24	25	26	27
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	160	210	410	410
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	7.1	7.1	7.3	7.1
SOM	(%)	UKAS	5.3	4.8	7.3	8.3
Sulphate	(mg/l)	u	91	< 10	74	< 10
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.20	0.04	< 0.20
Acenaphthylene	(mg/kg)	UKAS	0.04	< 0.20	0.05	< 0.20
Anthracene	(mg/kg)	UKAS	0.12	0.60	0.18	0.45
Benzo (a) anthracene	(mg/kg)	MCERTS	0.29	0.86	0.54	0.96
Benzo (a) pyrene	(mg/kg)	MCERTS	0.34	0.72	0.59	0.97
Benzo (b) fluoranthene	(mg/kg)	MCERTS	0.49	0.96	0.82	1.4
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	0.30	0.65	0.53	0.88
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.15	0.31	0.26	0.45
Chrysene	(mg/kg)	MCERTS	0.33	0.86	0.64	1.0
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	0.05	< 0.20	0.10	< 0.20
Fluoranthene	(mg/kg)	MCERTS	0.45	1.8	1.2	1.6
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.20	0.03	< 0.20
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.27	0.50	0.48	0.71
Naphthalene	(mg/kg)	MCERTS	0.03	< 0.20	< 0.02	< 0.20
Phenanthrene	(mg/kg)	MCERTS	0.19	1.2	0.38	0.65
Pyrene	(mg/kg)	MCERTS	0.42	1.6	1.1	1.5
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	3.5	11	7.0	12
Asbestos	-	UKAS	No asbestos detected	No asbestos detected	Chrysotile	No asbestos detected
ACM Type Detected	-	UKAS	-	-	Loose Fibres	-
Total Asbestos Content	(%)	UKAS	-	-	0.002	-
Asbestos Stage used	-	UKAS	-	-	3	-
Mass of sample tested	(g)	UKAS	-	-	207	-
Pesticide Screen	(mg/kg)	u	Undetected <1mg/kg	Undetected <1mg/kg	Detected <1mg/kg DDE	Undetected <1mg/kg

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L20/03240/GRM/002

Project Reference - Blaby - Lichfield Drive / Golf Course

Analytical Test Results - TPH CWG

NC Reference			127309	127310	127311	127312
Client Sample ID			WS09	WS11	WS12	WS14
Client Sample Location			WS09	WS11	WS12	WS14
Depth - Top (m)			0.20	0.15	0.20	0.20
Depth - Bottom (m)			0.20	0.15	0.20	0.20
Date of Sampling			23/11/2020	23/11/2020	23/11/2020	23/11/2020
Time of Sampling			Not provided	Not provided	Not provided	Not provided
Sample Matrix			Clay	Clay	Clay	Clay
Determinant	Units	Accreditation				
Aliphatics						
>C_5 to C_6	(mg/kg)	u	< 0.04	< 0.04	< 0.04	< 0.04
>C_6 to C_8	(mg/kg)	u	< 0.04	0.06	0.08	0.18
>C_8 to C_{10}	(mg/kg)	u	< 0.04	< 0.04	< 0.04	< 0.04
>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	17
>C_{21} to C_{35}	(mg/kg)	u	< 10	16	28	62
Aromatics						
>C_5 to C_7	(mg/kg)	u	< 0.04	< 0.04	< 0.04	< 0.04
>C_7 to C_8	(mg/kg)	u	< 0.04	< 0.04	< 0.04	< 0.04
>C_8 to C_{10}	(mg/kg)	u	< 0.04	< 0.04	< 0.04	< 0.04
>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	13	12	83
>C_{21} to C_{35}	(mg/kg)	u	38	56	55	280
Total						
>C_5 to C_{40}	(mg/kg)	u	< 50	84	95	470

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L20/03240/GRM/002

Project Reference - Blaby - Lichfield Drive / Golf Course

Analytical Test Results - BRE Suite

NC Reference			127313	127314	127315	127316	127317	127318	127319
Client Sample ID			WS01	WS03	WS05	WS05	WS07	WS09	WS10
Client Sample Location			WS01	WS03	WS05	WS05	WS07	WS09	WS10
Depth - Top (m)			1.90	0.80	0.60	1.20	1.90	0.90	0.50
Depth - Bottom (m)			1.90	0.80	0.60	1.20	1.90	0.90	0.50
Date of Sampling			23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020	23/11/2020
Time of Sampling			Not provided	Not provided	Not provided	Not provided	Not provided	Not provided	Not provided
Sample Matrix			Clay	Clay	Clay	Clay	Sand	Sand	Clay
Determinant	Units	Accreditation							
Water soluble sulphate	(mg/l)	u	< 10	< 10	< 10	< 10	13	< 10	< 10
pH Value	pH Units	MCERTS	7.9	8.6	8.2	8.8	8.3	7.9	7.5

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Project Reference - Blaby - Lichfield Drive / Golf (

Analytical Test Results - BRE Suite

NC Reference			127320
Client Sample ID			WS10
Client Sample Location			WS10
Depth - Top (m)			2.30
Depth - Bottom (m)			2.30
Date of Sampling			23/11/2020
Time of Sampling			Not provided
Sample Matrix			Clay
Determinant	Units	Accreditation	
Water soluble sulphate	(mg/l)	u	40
pH Value	pH Units	MCERTS	9.0

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L20/03240/GRM/002

Project Reference - Blaby - Lichfield Drive / Golf Course

Analytical Test Results - GRM Leachate Suite

NC Reference			127309	127312
Client Sample ID			WS09	WS14
Client Sample Location			WS09	WS14
Depth - Top (m)			0.20	0.20
Depth - Bottom (m)			0.20	0.20
Date of Sampling			23/11/2020	23/11/2020
Time of Sampling			Not provided	Not provided
Sample Matrix			Leachate	Leachate
Determinant	Units	Accreditation		
Arsenic	(µg/l)	u	< 3	5
Cadmium	(µg/l)	u	< 3	< 3
Chromium (Total)	(µg/l)	u	< 3	< 3
Copper	(µg/l)	u	13	9
Lead	(µg/l)	u	< 5	< 5
Mercury	(µg/l)	u	< 1	< 1
Nickel	(µg/l)	u	< 3	< 3
Selenium	(µg/l)	u	< 1	< 1
Zinc	(µg/l)	u	< 5	9
Phenol (Total)	(µg/l)	u	< 1.60	< 1.60
Cyanide (Total)	(mg/l)	u	< 0.5	< 0.5
pH	pH Units	u	8.5	7.9
Sulphate (as SO_4)	(mg/l)	u	< 5.0	< 5.0
Ammonical Nitrogen (as N)	(mg/l)	u	0.11	0.13
Anthracene	(µg/l)	u	< 0.02	< 0.02
Benzo (a) pyrene	(µg/l)	u	0.08	< 0.02
Benzo (b) fluoranthene	(µg/l)	u	0.08	< 0.02
Benzo (g, h, i) perylene	(µg/l)	u	0.08	< 0.02
Benzo (k) fluoranthene	(µg/l)	u	0.07	< 0.02
Fluroanthene	(µg/l)	u	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(µg/l)	u	0.10	< 0.02
Naphthalene	(µg/l)	u	< 0.02	< 0.02

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L20/03240/GRM/002

Project Reference - Blaby - Lichfield Drive / Golf Course

Sample Descriptions

NC Reference	Client Sample ID	Client Sample Location	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
127309	WS09	WS09	Black slightly gravelly very silty sandy clay with rare rootlets	18	0.1	100
127310	WS11	WS11	Black slightly gravelly very silty sandy clay with rare rootlets	20	1.3	100
127311	WS12	WS12	Black slightly gravelly very silty sandy clay with rare rootlets	19	5.3	91
127312	WS14	WS14	Black slightly gravelly very silty sandy clay with rare rootlets	23	0.5	95
127313	WS01	WS01	Brown slightly sandy silty clay			100
127314	WS03	WS03	Reddish brown slightly sandy slightly gravelly silty clay			88
127315	WS05	WS05	Reddish brown slightly sandy slightly gravelly silty clay			70
127316	WS05	WS05	Reddish brown slightly silty slightly gravelly silty clay			94
127317	WS07	WS07	Brown clayey slightly gravelly sand			100
127318	WS09	WS09	Reddish brown clayey slightly gravelly sand			100
127319	WS10	WS10	Brown slightly silty slightly gravelly sandy clay			96
127320	WS10	WS10	Reddish brown slightly sandy slightly gravelly silty clay			100

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L20/03240/GRM/002

Project Reference - Blaby - Lichfield Drive / Golf Course

Sample Comments

NC Reference	Client Sample ID	Client Sample Location	Comments
127309	WS09	WS09	VPH - Sample taken from container with headspace.
127310	WS11	WS11	VPH - Sample taken from container with headspace.
127311	WS12	WS12	VPH - Sample taken from container with headspace.
127312	WS14	WS14	VPH - Sample taken from container with headspace.

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Project Reference - Blaby - Lichfield Drive / Golf Course

Analysis Methodologies

Matrix	Determinant	Sample condition for analysis	Test Method used
Soil	Metals	Air Dried	In house method statement - MS - CL - ICP metals
Soil	PAH	As Received	In house method statement - MS - CL - PAH (As received)
Soil	Phenols	As Received	In house method statement - MS - CL - Phenols by Skalar
Soil	Chromium (hexavalent)	As Received	In house method statement - MS - CL - Hexavalent Chromium by Skalar
Soil	Cyanide	As Received	In house method statement - MS - CL - Cyanide by Skalar
Soil	pH	As Received	In house method statement - MS - CL - pH in soils (using a 1:3 soil to water extraction)
Soil	SOM	Air Dried	In house method statement - MS - CL - TOC Eltra
Soil	Sulphate (w/s)	Oven Dried	In house method statement - MS - CL - Anions by Aquakem
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"
Soil	Asbestos Content (%)	-	Documented in-house method MS-AS-Asbestos Quantification using polarising light microscopy, gravimetric analysis, fibre counting and sizing through phase contrast optical microscopy (Stages 2 + 3 Gravimetric, Stage 4 fibre count + sizing)
Soil	Pesticide Screen	As Received	In house method statement - MS - CL - Pesticides
Soil	Leaching	As Received	NRA R&D note 301 using a 10 : 1 by wet mass of sample extraction ratio
Leachate	Metals	As Received	In house method statement - MS - CL - ICP Waters
Leachate	PAH	As Received	In house method statement - MS - CL - PAH in Waters
Leachate	Phenol	As Received	In house method statement - MS - CL - Phenol waters by HPLC
Leachate	pH	As Received	BS 1377, Part 3, 1990
Leachate	Cyanide	As Received	In house method statement - MS - CL - Cyanide by Skalar
Leachate	Sulphate	As Received	In house method statement - MS - CL - Anions by Aquakem
Leachate	Ammonia	As Received	In house method statement - MS - CL - Anions by Aquakem

APPENDIX H

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

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

Analytical Test Report: L20/3240/GRM/001

Your Project Reference:	**P7791 Blaby - Lichfield Drive Golf Course**	Samples Received on:	25/11/2020
Your Order Number:	P7791	Testing Instruction Received:	24/11/2020
Report Issue Number:	1	Sample Tested:	25/11 to 03/12/2020
Samples Analysed:	8 soil samples	Report issued:	03/12/2020

Lee Harbottle
GCM Operations Manager
Nicholls Colton Group

Notes:

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

The results included within the report are representative of the samples submitted for analysis.

A certificate of sampling was not supplied.

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

1377 Plasticity Index

Sample preparation was in accordance with BS1377:Part 1:2016.

Testing was in accordance with BS1377:Part 2:1990

1377 Moisture Content

Sample preparation was in accordance with BS1377:Part 1:2016.

Moisture content testing was in accordance with BS1377 : Part 2 :1990

Accreditation Key

UKAS = UKAS Accreditation, u = Unaccredited

Date of Issue 27/11/2019

Owned by Emily Blissett - Commercial Reporting Supervisor
Authorised by Lee Harbottle - GCM Operations Manager
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L20/3240/GRM/001

Project Reference - P7791 Blaby - Lichfield Drive Golf Course

Analytical Test Results - Soil

NC Reference			127321	127322	127323	127324	127325	127326
Client Sample ID			WS01	WS02	WS03	WS05	WS08	WS10
Client Sample Location			WS01	WS02	WS03	WS05	WS08	WS10
Depth - (m)			1.90	1.20	0.80	0.60	1.40	2.30
Date of Sampling			20/11/2020	20/11/2020	20/11/2020	20/11/2020	23/11/2020	23/11/2020
Sample type			Disturbed	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed
Sample Description			Brown slightly gravelly silty clay	Brown slightly gravelly silty clay	Brown slightly gravelly silty clay	Brown slightky gravelly silty clay	Brown silty clay with ocassional siltstone	Brown slightly silty clay with ocassional siltstone
Determinant	Specification	Units						
Moisture Content		(%)	23	19	15	12	13	17
Moisture Content Prep		-	3.2.3.1 (fine)	3.2.3.1 (fine)	3.2.3.1 (fine)	3.2.3.1 (fine)	3.2.3.1 (fine)	3.2.3.1 (fine)
Fines passing 425µm test sieve		(%)	99	97	99	99	100	100
Liquid Limit		(%)	41	40	37	43	35	42
Plastic Limit		(%)	19	17	18	18	18	19
Plasticity Index		(%)	22	23	19	25	17	23
PI preparation		-	from its natural state	from its natural state	from its natural state	from its natural state	from its natural state	from its natural state
PI Test Method			clause 4.4 (one point)	clause 4.4 (one point)	clause 4.4 (one point)	clause 4.4 (one point)	clause 4.4 (one point)	clause 4.4 (one point)

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L20/3240/GRM/001

Project Reference - P7791 Blaby - Lichfield Driv

Analytical Test Results - Soil

NC Reference			127327	127328
Client Sample ID			WS11	WS15
Client Sample Location			WS11	WS15
Depth - (m)			1.60	2.50
Date of Sampling			23/11/2020	23/11/2020
Sample type			Disturbed	Disturbed
Sample Description			Brown slightly silty,slightly sandy clay	Brown slightly silty clay with ocassional siltstone
Determinant	Specification	Units		
Moisture Content		(%)	16	15
Moisture Content Prep		-	3.2.3.1 (fine)	3.2.3.1 (fine)
Fines passing 425µm test sieve		(%)	100	100
Liquid Limit		(%)	34	34
Plastic Limit		(%)	17	17
Plasticity Index		(%)	17	17
PI preparation		-	from its natural state	from its natural state
PI Test Method			clause 4.4 (one point)	clause 4.4 (one point)

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GRM Development Solutions
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DE14 2WH

Analytical Test Report: L20/3201/GRM/002

Your Project Reference:	**Blaby - Lichfield Drive Golf Course**	Samples Received on:	21/11/2020
Your Order Number:	P7791	Testing Instruction Received:	20/11/2020
Report Issue Number:	1	Sample Tested:	20/11 to 01/12/2020
Samples Analysed:	2 soil samples	Report issued:	03/12/2020

[redacted]

Lee Harbottle
GCM Operations Manager
Nicholls Colton Group

Notes:

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

The results included within the report are representative of the samples submitted for analysis.

A certificate of sampling was not supplied.

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

Accreditation Key

UKAS = UKAS Accreditation, u = Unaccredited

Date of Issue 27/11/2019

Owned by Emily Blissett - Commercial Reporting Supervisor
Authorised by Lee Harbottle - GCM Operations Manager
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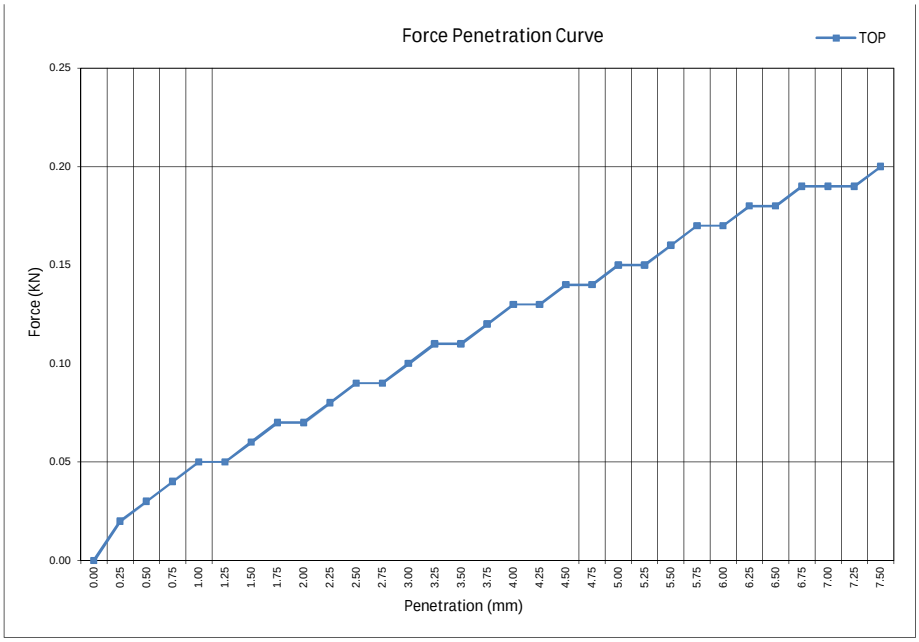
L20/3201/GRM/002
Project Reference - Blaby - Lichfield Drive Golf Course
Test Result - BS 1377 Laboratory CBR value

NC Reference	126531

Client Sample ID	HP01	Depth (Top) (m)	0.40
Client Sample Location	HP01	Depth - Bottom (m)	0.50
Visual description :	Brown silty sandy gravelly clay with occasional shale		
Sample type:	Disturbed		
Initial Bulk Density (Mg/m3) :	2.03	Initial Dry Density (Mg/m3) :	1.69
Material retained on 20mm test sieve (%) :	7	Moisture content after test (%):	20
California Bearing Ratio (%) :	0.8		



NOTES :

1. Testing was in accordance with BS 1377 : Part 4 : 1990 : Clause 7.
2. Sample preparation was in accordance with cl.7.2.4.4 method 5 - 2.5Kg rammer
3. The test specimen was not soaked prior to testing

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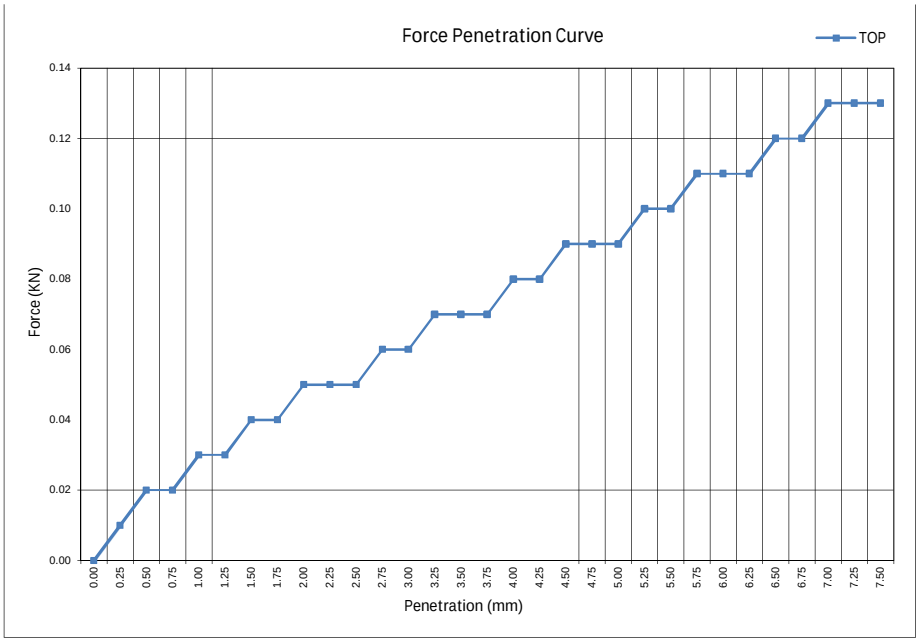
L20/3201/GRM/002
Project Reference - Blaby - Lichfield Drive Golf Course
Test Result - BS 1377 Laboratory CBR value

NC Reference	126532		
Client Sample ID	HP02	Depth (Top) (m)	0.40
Client Sample Location	HP02	Depth - Bottom (m)	0.50
Visual description :	Brown silty sandy clay with occasional gravel and crushed brick		
Sample type:	Disturbed		
Initial Bulk Density (Mg/m3) :	2.00	Initial Dry Density (Mg/m3) :	1.65
Material retained on 20mm test sieve (%) :	10	Moisture content after test (%):	21
California Bearing Ratio (%) :	0.5		



NOTES :

1. Testing was in accordance with BS 1377 : Part 4 : 1990 : Clause 7.
2. Sample preparation was in accordance with cl.7.2.4.4 method 5 - 2.5Kg rammer
3. The test specimen was not soaked prior to testing

APPENDIX I

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	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Residential with Plant Uptake		
CONTAMINANT	**1%**	**2.50%**	**6%**
[a] Arsenic	37	37	37
[a] Cadmium	22	22	22
[b] Chromium III	910	910	910
[a] Chromium VI	21	21	21
[a] Lead	200	200	200
[b/c] Mercury	40	40	40
[b] Selenium	250	250	250
[b] Nickel	180	180	180
[b] Phenols	280	550	1100
[b] Copper	2400	2400	2400
[b] Zinc	3700	3700	3700
[d] Cyanide	34	34	34
[a] Benzene	0.20	0.33	0.87
[b] Toluene	130	290	660
[b] Ethylbenzene	47	110	260
[b] *o* - xylene	60	140	330
[b] *m* - xylene	59	140	320
[b] *p* - xylene	56	130	310
Non Genotoxic PAHs			
[b] Acenaphthene	210	510	1100
[b] Acenaphthylene	170	420	920
[b] Anthracene	2400	5400	11000
[b] Fluoranthene	280	560	890
[b] Fluorene	170	400	860
[b] Naphthalene	2.3	5.6	13
[b] Phenanthrene	95	220	440
[b] Pyrene	620	1200	2000
Genotoxic PAHs			
[a/e] Benzo(a)pyrene	5	5	5
ALIPHATIC HYDROCARBONS			
[b] C5-C6	42	78	160
[b] C6-C8	100	230	530
[b] C8-C10	27	65	150
[b] C10-C12	130	330	760
[b] C12-C16	1100	2400	4300
[b] C16-35	65000	92000	110000
AROMATIC HYDROCARBONS			
[b] C5-7 (benzene)	70	140	300
[b] C7-8 (toluene)	130	290	660
[b] C8-C10	34	83	190
[b] C10-C12	74	180	380
[b] C12-C16	140	330	660
[b] C16-C21	260	540	930
[b] C21-C35	1100	1500	1700

Notes

a C4SL - SP1010 (2014) - Benzene and Benzo(a)pyrene values for 1% and 2.5% SOM have been calculated using default C4SL parameters in CLEA v1.07

b LQM/CIEH S4UL values (2015).

c S4UL for inorganic Hg used.

d Atkins ATRISKsoil Value

e Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Indeno(1,2,3-cd)pyrene)

GRM TAC 06-2020

APPENDIX J

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Current potential asbestos shed

Historic potential asbestos sheds

DO NOT SCALE

NOTES:

Approx. Site Boundary

Approx location of current sheds; potential source of asbestos.

Structures observed on historic aerial photography (potential for asbestos in underlying soil).

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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:

Davidsons C/O Andrew Granger and

PROJECT:

Lichfield Drive / Blaby Golf Course

TITLE:

Potential Asbestos Contamination Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
GS	01/2021
PROJECT No:	DRAWING No:
P7791	4

APPENDIX K

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Waste Classification Report

WCZ7J-7TURD-6KF6B

Job name

P7791 - Lichfield Drive, Blaby Golf Course

Description/Comments

Data obtained from human health risk assessment.

Project

P7791

Site

Lichfield Drive, Blaby Golf Course

Related Documents

#	Name	Description
None		

Waste Stream Template

GRM Standard Suite - incl TPH

Classified by

Name:
George Salloway
Date:
06 Jan 2021 11:23 GMT
Telephone:
01283 551 249

Company:
GRM Development Solutions Ltd

HazWasteOnline™ Training Record:

Course	Date
Hazardous Waste Classification	18 Sep 2017
Advanced Hazardous Waste Classification	06 Dec 2018

Report

Created by: George Salloway
Created date: 06 Jan 2021 11:23 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.20	Non Hazardous		3
2	WS03	0.20	Non Hazardous		5
3	WS05	0.20	Non Hazardous		7
4	WS06	0.20	Non Hazardous		9
5	WS09	0.20	Non Hazardous		11
6	WS11	0.15	Non Hazardous		13
7	WS12	0.20	Non Hazardous		15
8	WS14	0.20	Non Hazardous		18

Classification of sample: WS01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS01	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0.20 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12 mg/kg	1.32	15.844 mg/kg	0.00158 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.7 mg/kg	1.285	0.9 mg/kg	0.00007 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28 mg/kg	1.462	40.924 mg/kg	0.00409 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		24 mg/kg	1.126	27.021 mg/kg	0.0027 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	46 mg/kg		46 mg/kg	0.0046 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<**LOD**
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		21 mg/kg	1.579	33.169 mg/kg	0.00332 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<**LOD**
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		89 mg/kg	4.398	391.415 mg/kg	0.0391 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<**LOD**
12	pH			PH		7.4 pH		7.4 pH	7.4 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
			201-469-6	83-32-9									
14		acenaphthylene				0.03	mg/kg		0.03	mg/kg	0.000003 %	✓	
			205-917-1	208-96-8									
15		anthracene				0.22	mg/kg		0.22	mg/kg	0.000022 %	✓	
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.61	mg/kg		0.61	mg/kg	0.000061 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.59	mg/kg		0.59	mg/kg	0.000059 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.83	mg/kg		0.83	mg/kg	0.000083 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.36	mg/kg		0.36	mg/kg	0.000036 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.31	mg/kg		0.31	mg/kg	0.000031 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.62	mg/kg		0.62	mg/kg	0.000062 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				0.07	mg/kg		0.07	mg/kg	0.000007 %	✓	
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				1.2	mg/kg		1.2	mg/kg	0.00012 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.39	mg/kg		0.39	mg/kg	0.000039 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				0.18	mg/kg		0.18	mg/kg	0.000018 %	✓	
			201-581-5	85-01-8									
28		pyrene				0.97	mg/kg		0.97	mg/kg	0.000097 %	✓	
			204-927-3	129-00-0									
										Total:	0.0579 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS03	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0.20 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %		<**LOD**
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.7 mg/kg	1.285	0.9 mg/kg	0.00007 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		29 mg/kg	1.462	42.385 mg/kg	0.00424 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		23 mg/kg	1.126	25.895 mg/kg	0.00259 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	38 mg/kg		38 mg/kg	0.0038 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<**LOD**
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		22 mg/kg	1.579	34.749 mg/kg	0.00347 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<**LOD**
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		63 mg/kg	4.398	277.069 mg/kg	0.0277 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<**LOD**
12	pH			PH		7.4 pH		7.4 pH	7.4 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-469-6	83-32-9									
14		acenaphthylene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			205-917-1	208-96-8									
15		anthracene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.06	mg/kg		0.06	mg/kg	0.000006 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.06	mg/kg		0.06	mg/kg	0.000006 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.09	mg/kg		0.09	mg/kg	0.000009 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.04	mg/kg		0.04	mg/kg	0.000004 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.03	mg/kg		0.03	mg/kg	0.000003 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.06	mg/kg		0.06	mg/kg	0.000006 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				0.09	mg/kg		0.09	mg/kg	0.000009 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.04	mg/kg		0.04	mg/kg	0.000004 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-581-5	85-01-8									
28		pyrene				0.08	mg/kg		0.08	mg/kg	0.000008 %	✓	
			204-927-3	129-00-0									
										Total:	0.045 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS05

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS05	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0.20 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %		<LOD
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.6 mg/kg	1.285	0.771 mg/kg	0.00006 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		25 mg/kg	1.462	36.539 mg/kg	0.00365 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		20 mg/kg	1.126	22.518 mg/kg	0.00225 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	37 mg/kg		37 mg/kg	0.0037 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		19 mg/kg	1.579	30.01 mg/kg	0.003 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<LOD
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		64 mg/kg	4.398	281.467 mg/kg	0.0281 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
12	pH			PH		7 pH		7 pH	7pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-469-6	83-32-9									
14		acenaphthylene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			205-917-1	208-96-8									
15		anthracene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.11	mg/kg		0.11	mg/kg	0.000011 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.15	mg/kg		0.15	mg/kg	0.000015 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.08	mg/kg		0.08	mg/kg	0.000008 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.05	mg/kg		0.05	mg/kg	0.000005 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				0.16	mg/kg		0.16	mg/kg	0.000016 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.08	mg/kg		0.08	mg/kg	0.000008 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				0.02	mg/kg		0.02	mg/kg	0.000002 %	✓	
			201-581-5	85-01-8									
28		pyrene				0.14	mg/kg		0.14	mg/kg	0.000014 %	✓	
			204-927-3	129-00-0									
										Total:	0.044 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS06

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS06	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0.20 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %		<LOD
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.6 mg/kg	1.285	0.771 mg/kg	0.00006 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26 mg/kg	1.462	38 mg/kg	0.0038 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		22 mg/kg	1.126	24.77 mg/kg	0.00248 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	41 mg/kg		41 mg/kg	0.0041 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		19 mg/kg	1.579	30.01 mg/kg	0.003 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<LOD
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		80 mg/kg	4.398	351.834 mg/kg	0.0352 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
12	pH			PH		6.4 pH		6.4 pH	6.4 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-469-6	83-32-9									
14		acenaphthylene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			205-917-1	208-96-8									
15		anthracene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.07	mg/kg		0.07	mg/kg	0.000007 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.08	mg/kg		0.08	mg/kg	0.000008 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.11	mg/kg		0.11	mg/kg	0.000011 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.06	mg/kg		0.06	mg/kg	0.000006 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.04	mg/kg		0.04	mg/kg	0.000004 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.08	mg/kg		0.08	mg/kg	0.000008 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				0.12	mg/kg		0.12	mg/kg	0.000012 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.06	mg/kg		0.06	mg/kg	0.000006 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				0.03	mg/kg		0.03	mg/kg	0.000003 %	✓	
			201-581-5	85-01-8									
28		pyrene				0.11	mg/kg		0.11	mg/kg	0.000011 %	✓	
			204-927-3	129-00-0									
										Total:	0.0518 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS09

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS09	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0.20 m	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11 mg/kg	1.32	14.524 mg/kg	0.00145 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.7 mg/kg	1.285	0.9 mg/kg	0.00007 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		29 mg/kg	1.462	42.385 mg/kg	0.00424 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		71 mg/kg	1.126	79.938 mg/kg	0.00799 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	97 mg/kg		97 mg/kg	0.0097 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<**LOD**
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		24 mg/kg	1.579	37.908 mg/kg	0.00379 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<**LOD**
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		160 mg/kg	4.398	703.668 mg/kg	0.0704 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<**LOD**
12	pH			PH		7.1 pH		7.1 pH	7.1 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
			201-469-6	83-32-9									
14		acenaphthylene				0.04	mg/kg		0.04	mg/kg	0.000004 %	✓	
			205-917-1	208-96-8									
15		anthracene				0.12	mg/kg		0.12	mg/kg	0.000012 %	✓	
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.29	mg/kg		0.29	mg/kg	0.000029 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.34	mg/kg		0.34	mg/kg	0.000034 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.49	mg/kg		0.49	mg/kg	0.000049 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.3	mg/kg		0.3	mg/kg	0.00003 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.15	mg/kg		0.15	mg/kg	0.000015 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.33	mg/kg		0.33	mg/kg	0.000033 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				0.05	mg/kg		0.05	mg/kg	0.000005 %	✓	
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				0.45	mg/kg		0.45	mg/kg	0.000045 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.27	mg/kg		0.27	mg/kg	0.000027 %	✓	
			205-893-2	193-39-5									
26		naphthalene				0.03	mg/kg		0.03	mg/kg	0.000003 %	✓	
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				0.19	mg/kg		0.19	mg/kg	0.000019 %	✓	
			201-581-5	85-01-8									
28		pyrene				0.42	mg/kg		0.42	mg/kg	0.000042 %	✓	
			204-927-3	129-00-0									
29		TPH (C6 to C40) petroleum group				<50	mg/kg		<50	mg/kg	<0.005 %		**<LOD**
				TPH									
										Total:	0.105 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS11

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
WS11	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.15 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %		<**LOD**
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	0.8 mg/kg	1.285	1.028 mg/kg	0.00008 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		23 mg/kg	1.462	33.616 mg/kg	0.00336 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		59 mg/kg	1.126	66.427 mg/kg	0.00664 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	110 mg/kg		110 mg/kg	0.011 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<**LOD**
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		25 mg/kg	1.579	39.487 mg/kg	0.00395 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<**LOD**
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		210 mg/kg	4.398	923.564 mg/kg	0.0924 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<**LOD**
12	pH			PH		7.1 pH		7.1 pH	7.1 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			201-469-6	83-32-9									
14		acenaphthylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-917-1	208-96-8									
15		anthracene				0.6	mg/kg		0.6	mg/kg	0.00006 %	✓	
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.86	mg/kg		0.86	mg/kg	0.000086 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.72	mg/kg		0.72	mg/kg	0.000072 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.96	mg/kg		0.96	mg/kg	0.000096 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.65	mg/kg		0.65	mg/kg	0.000065 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.31	mg/kg		0.31	mg/kg	0.000031 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.86	mg/kg		0.86	mg/kg	0.000086 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				1.8	mg/kg		1.8	mg/kg	0.00018 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.5	mg/kg		0.5	mg/kg	0.00005 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				1.2	mg/kg		1.2	mg/kg	0.00012 %	✓	
			201-581-5	85-01-8									
28		pyrene				1.6	mg/kg		1.6	mg/kg	0.00016 %	✓	
			204-927-3	129-00-0									
29		TPH (C6 to C40) petroleum group				84	mg/kg		84	mg/kg	0.0084 %	✓	
				TPH									
										Total:	0.13 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present, soil not considered to be flammable below 1000 mg/kg

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0084%)

Classification of sample: WS12

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
WS12	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:		
0.20 m	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		13 mg/kg	1.32	17.164 mg/kg	0.00172 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	1 mg/kg	1.285	1.285 mg/kg	0.0001 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		45 mg/kg	1.462	65.77 mg/kg	0.00658 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		160 mg/kg	1.126	180.142 mg/kg	0.018 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	120 mg/kg		120 mg/kg	0.012 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<**LOD**
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		26 mg/kg	1.579	41.067 mg/kg	0.00411 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<**LOD**
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		410 mg/kg	4.398	1803.15 mg/kg	0.18 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<**LOD**
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<**LOD**
12	pH			PH		7.3 pH		7.3 pH	7.3 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				0.04	mg/kg		0.04	mg/kg	0.000004 %	✓	
			201-469-6	83-32-9									
14		acenaphthylene				0.05	mg/kg		0.05	mg/kg	0.000005 %	✓	
			205-917-1	208-96-8									
15		anthracene				0.18	mg/kg		0.18	mg/kg	0.000018 %	✓	
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.54	mg/kg		0.54	mg/kg	0.000054 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.59	mg/kg		0.59	mg/kg	0.000059 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				0.82	mg/kg		0.82	mg/kg	0.000082 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.53	mg/kg		0.53	mg/kg	0.000053 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.26	mg/kg		0.26	mg/kg	0.000026 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				0.64	mg/kg		0.64	mg/kg	0.000064 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				1.2	mg/kg		1.2	mg/kg	0.00012 %	✓	
			205-912-4	206-44-0									
24		fluorene				0.03	mg/kg		0.03	mg/kg	0.000003 %	✓	
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.48	mg/kg		0.48	mg/kg	0.000048 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				0.38	mg/kg		0.38	mg/kg	0.000038 %	✓	
			201-581-5	85-01-8									
28		pyrene				1.1	mg/kg		1.1	mg/kg	0.00011 %	✓	
			204-927-3	129-00-0									
29		asbestos				20	mg/kg		20	mg/kg	0.002 %	✓	
		650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5									
30		TPH (C6 to C40) petroleum group				95	mg/kg		95	mg/kg	0.0095 %	✓	
				TPH									
										Total:	0.237 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present, soil not considered to be flammable below 1000 mg/kg

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0095%)

Classification of sample: WS14

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
WS14
Sample Depth:
0.20 m

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		15 mg/kg	1.32	19.805 mg/kg	0.00198 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1	1.3 mg/kg	1.285	1.671 mg/kg	0.00013 %	✓	
3	chromium { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28 mg/kg	1.462	40.924 mg/kg	0.00409 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		88 mg/kg	1.126	99.078 mg/kg	0.00991 %	✓	
5	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	190 mg/kg		190 mg/kg	0.019 %	✓	
6	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		27 mg/kg	1.579	42.646 mg/kg	0.00426 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<LOD
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		410 mg/kg	4.398	1803.15 mg/kg	0.18 %	✓	
10	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
12	pH			PH		7.1 pH		7.1 pH	7.1 pH		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
13		acenaphthene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<**LOD**
			201-469-6	83-32-9									
14		acenaphthylene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<**LOD**
			205-917-1	208-96-8									
15		anthracene				0.45	mg/kg		0.45	mg/kg	0.000045 %	✓	
			204-371-1	120-12-7									
16		benzo[a]anthracene				0.96	mg/kg		0.96	mg/kg	0.000096 %	✓	
		601-033-00-9	200-280-6	56-55-3									
17		benzo[a]pyrene; benzo[def]chrysene				0.97	mg/kg		0.97	mg/kg	0.000097 %	✓	
		601-032-00-3	200-028-5	50-32-8									
18		benzo[b]fluoranthene				1.4	mg/kg		1.4	mg/kg	0.00014 %	✓	
		601-034-00-4	205-911-9	205-99-2									
19		benzo[ghi]perylene				0.88	mg/kg		0.88	mg/kg	0.000088 %	✓	
			205-883-8	191-24-2									
20		benzo[k]fluoranthene				0.45	mg/kg		0.45	mg/kg	0.000045 %	✓	
		601-036-00-5	205-916-6	207-08-9									
21		chrysene				1	mg/kg		1	mg/kg	0.0001 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		dibenz[a,h]anthracene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
23		fluoranthene				1.6	mg/kg		1.6	mg/kg	0.00016 %	✓	
			205-912-4	206-44-0									
24		fluorene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<**LOD**
			201-695-5	86-73-7									
25		indeno[123-cd]pyrene				0.71	mg/kg		0.71	mg/kg	0.000071 %	✓	
			205-893-2	193-39-5									
26		naphthalene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
27		phenanthrene				0.65	mg/kg		0.65	mg/kg	0.000065 %	✓	
			201-581-5	85-01-8									
28		pyrene				1.5	mg/kg		1.5	mg/kg	0.00015 %	✓	
			204-927-3	129-00-0									
29		TPH (C6 to C40) petroleum group				470	mg/kg		470	mg/kg	0.047 %	✓	
				TPH									
										Total:	0.27 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because No liquid phase present, soil not considered to be flammable below 1000 mg/kg

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.047%)

Appendix A: Classifier defined and non CLP determinands

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

CLP index number: 082-001-00-6
Description/Comments: Worst Case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers lead compounds from smelting industries, flue dust and similar to be Carcinogenic category 1A
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on risk phrases

cadmium {cadmium sulfide}

Worst case species based on risk phrases

chromium {chromium(III) oxide (worst case)}

No hexavalent chromium recorded in any sample tested.

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

No hexavalent chromium recorded in any sample tested.

mercury {mercury dichloride}

Worst case species based on risk phrases

nickel {nickel dihydroxide}

Worst case species based on risk phrases

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on risk phrases

zinc {zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2]}

No hexavalent chromium recorded in any sample tested.

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Worst case species

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2020.346.4563.8832 (11 Dec 2020)
HazWasteOnline Database: 2020.346.4563.8832 (11 Dec 2020)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1stEditionv1.1-May2018
CLP Regulation - Regulation1272/2008/ECof16December2008
1st ATP - Regulation790/2009/ECof10August2009
2nd ATP - Regulation286/2011/ECof10March2011
3rd ATP - Regulation618/2012/EUof10July2012
4th ATP - Regulation487/2013/EUof8May2013
Correction to 1st ATP - Regulation758/2013/EUof7August2013
5th ATP - Regulation944/2013/EUof2October2013
6th ATP - Regulation605/2014/EUof5June2014
WFD Annex III replacement - Regulation1357/2014/EUof18December2014
Revised List of Waste 2014 - Decision2014/955/EUof18December2014
7th ATP - Regulation2015/1221/EUof24July2015
8th ATP - Regulation(EU)2016/918of19May2016
9th ATP - Regulation(EU)2016/1179of19July2016
10th ATP - Regulation(EU)2017/776of4May2017
HP14 amendment - Regulation(EU)2017/997of8June2017
13th ATP - Regulation(EU)2018/1480of4October2018
14th ATP - Regulation(EU)2020/217of4October2019
15th ATP - Regulation(EU)2020/1182of19May2020
POPs Regulation 2019 - Regulation(EU)2019/1021of20June2019