



BIGDALE DRIVE, KIRKBY, LIVERPOOL

SITE APPRAISAL REPORT
FOR
ALAN JOHNSTON PARTNERSHIP on behalf of LIVV
HOUSING GROUP

Project Ref:
P10680

Date:
October 2024

Prepared for:
Alan Johnston Partnership Ltd.
1 Dale Street
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This report has been prepared in accordance with GRM's Accredited Quality Procedures

If you have any queries regarding this report please contact the project manager in the first instance.

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Site Appraisal for Bigdale Drive, Kirkby, Liverpool

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	600mm capping in gardens and soft landscaped areas.	
Site Workers	No remediation required. Enforcement of PPE / RPE due to asbestos within made ground. Adoption of appropriate working protocols.	
Construction Materials	Appropriate concrete specification. Barrier Type water supply pipes required (to be confirmed by water supply company).	Y
Groundwater	No remediation required.	
Surface Water	No viable receptor identified.	
Waste Disposal	Preliminary Waste Classification: Generally non-hazardous for made ground; however, an allowance for some to be disposed as hazardous waste due to asbestos. Inert for natural strata. Will need to be confirmed by receiving landfill.	Y
GEOTECHNICAL ASSESSMENT – FOUNDATIONS		
Ground Treatment Required	None required.	
Main Bearing Strata	Clay.	
Nett Allowable Bearing Pressure	110kN/m ² (Clay) for trench fill foundations.	Y
Rockhead	Not encountered within 4.0m of existing ground level.	
Tree Influence	None.	Y
Volume Change Potential	Low to Medium – medium to be adopted for design purposes.	
Likely Foundation Types	100% Strip/Trench Fill with some reinforcement.	
Likely Foundation Depth Range	0.9m begl minimum, 2.0m begl maximum depths; average depth 1.6m begl.	Y
Excavation Hazards	Buried services. Potential for buried foundations and substructures not encountered by the ground investigation.	
Floor Slab Types	100% cast in-situ suspended.	
Gas Protection Requirements Radon and/or Landfill	No gas protection measures currently anticipated to be required. To be confirmed when gas monitoring is complete. No radon protection required.	Y
GEOTECHNICAL ASSESSMENT - GENERAL		
Slope Stability Risk	Low.	
Soakaways Potential	Not suitable.	
New Access Roads	Observational CBRs 2% to 4% in natural cohesive soils, c. 5% in natural granular soils, and <2% in untreated made ground.	
Buried Concrete Class	DS - 1; AC- 1. GEN-1 (unreinforced), RC35 (reinforced).	
Retaining Walls and Boundary Features	None existing. Unlikely as part of proposed development.	
Further Assessment Targets	Gas monitoring on-going.	Y
Other Comments	Buried services may need disconnection or diversion as part of development.	Y

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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1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by Aland Johnston Partnership (Client's Agent) on behalf of Livv Housing Group (Client) to undertake a Phase II Site Appraisal. A previous desk study by GRM (Phase I Desk Study Report for Bigdale Drive, Kirkby, Liverpool, ref GRM/P10680/DS.1, September 2024) 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 one block of apartments and associated infrastructure. The proposed end use includes a car park, gardens and minimal soft landscaping. The development layout provided by the Client, on which this report is based is presented in Appendix B.

The Client has not informed GRM of any significant development hazards.

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.	Bigdale Drive, Kirkby, Liverpool.
Project Reference.	P10680.
Client.	Livv Housing Group.
Site Location (address).	Bigdale Drive, Kirkby, Liverpool L33 6US.
National Grid Reference.	SJ 420 994.
Site Area (Ha).	0.14.
Summary of Proposed Development.	Apartment block with associated infrastructure and minimal soft landscaping.
Client Supplied Information.	Site location and Proposed Development plans.
Site Setting.	The site is located approximately 14km north east of Liverpool city centre and comprises an approximately square parcel of land at the junction of Brook Hey Drive and Bigdale Drive.
Site History.	The site was a part of farmland until c.1962 when it became a vacant plot within the residential housing development of Northwood. In c.1984 the site was developed with a public house, which was subsequently demolished around 2010. No evidence of subsequent development has been found.
Geology.	Superficial strata is recorded as Shirdley Hill Sand Formation (sand) with underlying Glacial Till (clay, silt and sand). Solid geology is recorded as the Chester Formation (sandstone, likely to have weathered to a silty, pebbly sand at shallow depth).
Hydrogeology.	Shirdley Hill sand – Secondary A aquifer. Glacial Till – Undifferentiated aquifer. Chester Formation - Principal aquifer. The site is within a Zone 3 Groundwater Source Protection Zone.
Hydrology.	No significant features identified.
Flooding.	Rivers and the sea – negligible risk. Surface waters – very low risk. Groundwater – moderate. Flood Risk Assessment recommended.
Mining and Quarrying.	No significant risks identified.
Environmental Information.	No significant risks identified.
UXO Risk.	Low risk. No further assessment anticipated.
Potential Soil Contamination Sources.	Made ground from on-site development. Asbestos mixed with site soils from demolition of previous structure (public house).
Potential Ground Gas Sources (including Radon).	Made ground. Not in an area of elevated radon.



2.1 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	Pathway	Receptor	Level of Risk
Potentially contaminated made ground / fill associated with previous 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.	Very low.
		Construction and Maintenance Workers.	
Potentially contaminated made ground / fill associated with previous development.	Inhalation of ground gas.	End users.	Low.
Asbestos containing materials associated with demolished building.	Inhalation of asbestos fibres.	Construction and Maintenance Workers.	Moderate.
Potentially contaminated made ground / fill associated with previous development.	Water pipes.	End users.	Very low.
CONTROLLED WATERS			
Potentially contaminated made ground / fill associated with previous development.	Leaching of contaminants and vertical migration to the groundwater (risk reduced due to anticipated cohesive strata).	Principal Aquifer, Secondary A aquifer and Abstraction Point.	Very low.

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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 11th September 2024 with groundwater/gas monitoring visits continuing after that period. A total of five windowless sample boreholes were progressed, to depths ranging between 2.86m and 4.00m below existing ground level (begl). The exploratory hole location plan and exploratory hole logs are presented in Appendix C and Appendix D respectively.

The exploratory holes were positioned to give a general appreciation of the ground conditions across the site. No evidence of the former public house having a cellar has been identified.

Five gas and groundwater monitoring standpipes were installed during the site works, and 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 November 2024. Once the regulators have approved the conclusion of the final ground gas risk assessment, the Client should inform GRM so that advice can be provided with regard to the decommissioning of them. Should the Client choose not to proceed with the site, then GRM should be contacted to determine whether decommissioning works are required to protect sensitive receptors.

3.2 PROVEN GROUND

The following ground conditions were encountered during the investigation fieldwork:

- Re-laid Topsoil
- Made Ground
- Glacial Till

3.2.1 Re-laid Topsoil

Re-laid topsoil was encountered in one hole (WS01) situated in the north east of the site, from ground level to 0.10m below existing ground level (begl). The re-laid topsoil comprised brown sand.

3.2.2 Made Ground

Made ground was encountered in all boreholes, to depths ranging between 0.85m and 1.4m begl, with a general thickness of 1.0m.

Various types of made ground were observed but these generally comprised:

- Tarmacadam / Asphalt from ground level to 0.1m begl in WS02.
- Brown, sandy GRAVEL including brick, asphalt, sandstone and granite in most boreholes either beneath the re-laid topsoil / tarmacadam, or from ground level to depths of between 0.30m and 0.40m begl. The material is potentially the remnants of a drainage layer placed beneath the hardstanding of the former public house's parking areas.
- Black slightly gravelly SAND in all boreholes encountered beneath the gravel horizon to depths of between 0.85m and 1.4m begl.
- Multi-coloured very gravelly, slightly sandy CLAY only recorded in WS02 between 0.6m and 0.75m begl.

The made ground was marginally thicker in the north, which is broadly consistent with the historical location of the former public house.

No evidence of a former cellar was observed; however, one could remain present outside of the exploratory hole locations.

3.2.3 Glacial Till

These strata were encountered in all boreholes, beneath the made ground and to the base of the boreholes at depths of between 2.86m and 4.00 begl, but were not fully penetrated.

These deposits were variable but generally comprised either:

- Yellowish brown slightly gravelly SAND with gravel of sandstone.

Or

- Brown or reddish brown, slightly gravelly, slightly sandy CLAY with gravel of sandstone.

Standard Penetration Test N-values in the granular strata generally ranged between 9 and 10, but were locally as low as 3 and as high as 50. This suggests that the material is generally medium dense, but locally loose and also locally very dense.

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 cohesive strata are medium to very high strength. There were some horizons of soft to firm clay present, typically below the granular materials and considered to have been subject to water softening.

The strength / density of the strata increases with depth.

Strata considered representative of the Shirdley Hill Sand and the Chester Formation were not encountered during the investigation.

3.3 CONTAMINATION OBSERVATIONS

No visual or olfactory evidence of potential contamination was encountered during the fieldwork and monitoring. In addition, a significant source of ground gas was not observed.

3.4 GROUNDWATER OBSERVATIONS

The presence of groundwater was observed in WS01 and WS02 by virtue of the granular strata being observed to be wet at 1.00m and 2.40m begl respectively. However, the exploratory techniques used were rapid and may have masked other small water seepages.

One groundwater monitoring visit has been conducted and the results of the monitoring are reported in Appendix F. In summary, groundwater has been recorded at depths of between 0.90m begl and 2.60m begl during the monitoring conducted to date. Shallow groundwater occurrences in WS01-WS03 are located within the made ground, or close to the made ground / granular natural interface, whilst deeper occurrences in WS04 and WS05 are within the primarily cohesive Glacial Till.

The boreholes were bailed and recharge rates were noted to be fast in WS01 and WS02, moderate in WS03 and slow in WS04 and WS05.

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 groundwater flow is considered to be to the west following the local topography.

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 elevated methane has been detected.
- Carbon dioxide between 0.2%v/v and 2.2%v/v.
- Oxygen between 16.5%v/v and 20.4%v/v.

A maximum flow of 0.1l/hr has been noted during the monitoring completed to date.

3.6 SUMMARY OF FIELDWORK OBSERVATIONS

The fieldwork has revealed/confirmed the following:

Significant Features identified during fieldwork
Made ground – deepened foundations, potential source of contamination, potential source of ground gas (considered very low risk given limited thickness and lack of deleterious material noted).
Variable natural strata – deepened and / or reinforced foundations.
Groundwater – allowance for simple dewatering, increased risk of collapse of excavations especially in granular strata.
Ground gas – no significant concentrations or flow noted to date.
Shirdley Hill Sand Formation - not encountered.
Chester Formation – not encountered.
Low strength clay and sand – deepened foundations.

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 soils and/or waters, 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:

- Five samples of the made ground were analysed for a general suite of contaminants (metals, inorganics, speciated PAH, TPHCWG and an asbestos screen).
- Three samples of the made ground underwent leachate analysis and were analysed for a general suite of contaminants.

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

- Five samples of Glacial Till, underwent Atterberg Limits (PI) classification.
- Ten samples (five samples of made ground, and four cohesive and one granular samples Glacial Till) underwent pH and water soluble sulphate 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 a residential apartment block with minimal soft landscaping and associated infrastructure and soft landscaping.

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 made ground.

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

The rationale for the end use specific Tier 1 Acceptance Criteria (TAC) used by GRM is outlined in Appendix A (vi). To provide a conservative assessment 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 made ground, as this reflects the lowest SOM recorded in the material.

To provide an initial assessment, the results have been assessed to determine whether benzo(a)pyrene could be used as a surrogate marker in the assessment of carcinogenic risks posed by genotoxic PAHs in soils. It is recommended that such assessments should be based upon toxicological benchmarks derived from the data for two coal tar mixtures presented by Culp et al. (1998) and as described in the Public Health England document “Contaminated land information sheet: risk assessment approaches for polycyclic aromatic hydrocarbons (PAHs)”, dated 2017. The graphs completed show that benzo(a)pyrene can be used as a surrogate marker for genotoxic PAHs, with the exception of naphthalene, for the made ground. GRM’s TACs use published C4SL values which are based on minimal risk levels and have been confirmed to be suitable for use in a planning context by the UK Government. Other commercially available values have been published and have been used where C4SLs are not available.

A copy of the PAH profile graphs and GRM thresholds used in this assessment are presented in Appendix I.

A copy of the thresholds used in this assessment is presented in Appendix J.

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 made ground it is not considered appropriate to carry out statistical analysis on this data set.

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Therefore the results have been compared directly against the TAC. The results of the hydrocarbons and asbestos have also been assessed separately.

5.2.1 Analysis of Soil Contamination Data

GRM General Suite – Made Ground

The concentrations of most of the contaminants are below the relevant TAC for residential end use with plant uptake. However, the concentrations of the following are above the TAC:

- Arsenic of 410mg/kg in WS01 (0.4m begl) is above the threshold of 37mg/kg.
- Lead of 220mg/kg in WS01 (0.4m begl) and 600mg/kg in WS04 (0.3m begl) are above the threshold of 200mg/kg.

Remedial measures are considered to be necessary to protect end users of the development from the concentration of contaminants identified.

Petroleum Hydrocarbons

Evidence of potential petroleum hydrocarbon contamination was not observed in exploratory holes; however, five samples of the made ground were analysed for speciated TPH as part of the general contaminant suite.

None of the samples tested reported elevated concentrations of contaminants in excess of the thresholds.

No remedial measures are considered necessary to protect end users from the concentrations of hydrocarbons identified.

Asbestos

Five samples of the made ground were submitted for an asbestos screen. The sample from WS05 (0.3m begl) reported the presence of amosite. Asbestos was not identified in the remaining four samples.

Remedial measures are considered to be necessary to protect end users of the development from the presence of asbestos.

5.2.2 Water Supply Pipes

It is considered that, based on the UKWIR guidance, the concentrations of contaminants recorded to date (specifically the hydrocarbons) are such that Barrier Type water supply pipes will be required for the site. However, 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

The risk to end users from soil contamination is considered to be moderate and remedial works are required to protect them.

5.3 RISK TO SITE WORKERS

The investigation has revealed the presence of asbestos fibres within the made ground. The general comments outlined in Appendix A (vii) should be considered when site specific risk assessments are completed and the removal of any made ground should be undertaken in accordance with best practice.

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 sensitivity (residential with gardens); five 35mm diameter gas/water monitoring standpipes have been installed across the site (WS01-WS05). The installations in WS01 and WS02 targeted the made ground and natural strata, whilst those on WS03-WS05 targeted the natural strata due to the limited thickness of made ground present.

Based on BS8576:2013 *Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds*, the gas hazard is considered to be 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 one visit has 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 GFM436.

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 no elevated concentration of methane has been detected a default methane concentration of 0.1%v/v have been used in the following assessment.

Using the maximum flow rate of 0.1l/hr and the default methane concentration of 0.1%v/v a Q_{hg} of 0.0001l/hr has been calculated for methane. Using the maximum flow rate of 0.1l/hr and the maximum carbon dioxide concentration of 2.2%v/v, a Q_{hg} of 0.0022l/hr has been calculated for carbon dioxide. On this basis the GSV for the site is determined as 0.0022l/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.

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 at this stage and gas protection measures are not anticipated to be required. Although monitoring is on-going to confirm the requirements, the initial assessment is consistent with the sites conceptual model.

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 was initially considered to be the Shirdley Hill Sand and Chester Formations; however, these strata were not encountered during the investigation. The encountered Glacial Till, has been proven to be primarily cohesive in nature and the granular horizons are unlikely to have any significant connectivity. No viable surface water receptors have been identified.

The made ground has been identified as a potential source of contamination for controlled waters and, accordingly, soil leachate testing has been conducted to determine whether it poses a risk.

7.1 INTERPRETATION OF GROUNDWATER OBSERVATIONS AND MONITORING

Groundwater has been recorded at depths of between 0.90m begl and 2.60m begl during the monitoring conducted to date. Shallow groundwater occurrences in WS01-WS03 are located within the made ground, or close to the made ground / granular natural interface, whilst deeper occurrences in WS04 and WS05 are within the cohesive Glacial Till.

7.2 ASSESSMENT OF THE CHEMICAL ANALYSIS RESULTS

The results of the soil leachate and groundwater testing are presented in Appendix G; these have been compared against the UKDWS values presented in Appendix J.

The recorded concentrations of almost all contaminants are below the relevant threshold; however, the following were recorded at levels in excess of the relevant UKDWS values:

- Arsenic - concentration of 310µg/l in WS01 (0.40m begl), 17µg/l in WS03 (0.20m begl) and 35µg/l in WS05 (0.30m begl) exceed the UKDWS threshold of 10µg/l.
- Total phenols – concentrations of 6.48µg/l in WS01 (0.40m begl) and 3.29µg/l (0.20m begl) exceed the UKDWS threshold of 0.5µg/l.

Based on the results the contamination identified is considered to be pervasive.

The underlying geology (Glacial Till) has been proven to be predominately cohesive in nature. Although granular horizons are present they are unlikely to be interconnected and accordingly a clear and consistent pathway to the underlying Principal aquifer (Chester Formation) is considered not to exist.

7.3 SUMMARY OF RISK TO CONTROLLED WATERS

The risk to the aquifer below the site is considered to be very low.

No viable surface water receptors have been identified.

Remedial measures to protect controlled waters are considered not to be required.



8 PHASE II CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	Pathway	Receptor	Remedial Solution
Elevated concentrations of arsenic, lead and asbestos in the made ground.	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.	Soil capping or removal of contaminated soils.
		Construction workers.	
No significant source of ground gas identified.	Inhalation of carbon dioxide and / or methane.	End users.	No gas protection measures required (to be confirmed following completion of the gas monitoring).
Asbestos containing materials in made ground.	Inhalation.	Construction workers.	Use of suitable PPE / RPE and adoption of appropriate working protocols.
Elevated concentrations of hydrocarbons in the made ground.	Migration of contamination through leaks and joints, degradation of water pipe materials.	End Users.	Barrier Type water supply pipes and clean backfill required (to be confirmed by water supply company).
CONTROLLED WATERS			
Elevated concentrations of arsenic, lead and asbestos in the made ground.	Leaching of contaminants and vertical migration to the groundwater (risk reduced due to cohesive strata).	Principal Aquifer and Abstraction point.	No remediation required.

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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 contamination across the site remediation will be required to protect end users of the proposed residential development.

For this site, it is considered that the use of a soil 600mm thick clean soil capping layer in private gardens and soft landscaped areas to break the source-pathway-receptor linkage would currently represent a suitable form of remediation.

The capping layer should include a geotextile marker beneath the topsoil/subsoil.

The site is devoid of topsoil and some will need to be imported to complete the development. It is recommended that a maximum thickness of 300mm of topsoil is used to ensure the longevity of the quality of it. No capping would be required below areas of hard standing, such as roads, drives and houses as the hard cover will remove the possibility of a plausible linkage being present by removing the pathway.

If current ground levels are to be maintained then sufficient material should be removed to facilitate the capping layer. Any material removed to facilitate the capping layer can be placed under areas of hardstanding.

Alternatively, all the made ground could be removed, which would negate the requirement for capping; however, there would be a requirement to confirm total removal of the made ground. In addition, any imported material (even if not required for capping) would require testing to demonstrate suitability.

Any materials imported for use to construct the soil capping layer will require chemical validation to confirm that they are suitable for use. Samples of these materials will need to be analysed for a suite of contaminants including metals, inorganics, speciated PAHs and other contaminants such as, speciated hydrocarbons and asbestos depending on the source. The number of samples that require analysis will depend on the source of the materials. Typically an analysis rate of one sample per two gardens and one sample per four gardens (minimum of three samples per source and material type) applies for generated and virgin soils respectively. It is also recommended that the topsoil be subjected to analysis to BS3882 to confirm that it conforms to this standard. A typical analysis rate of one sample per 5,000m³ is considered appropriate for this site.

The thickness of the soil capping layer will also need verifying by way of hand dug pits in each plot.

Should any material suspected of being significantly contaminated be encountered during the redevelopment of the site, GRM can be contacted to undertake additional

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investigation if necessary. The local Environmental Health Officer should be contacted and informed of any additional remedial work required.

Ground Gas

Gas protection measures are not currently considered to be required for the proposed development.

9.1.2 Protection of Site Workers

The risk to site workers from the identified soil contamination is low. No remedial measures are required. However the use of suitable PPE / RPE and adoption of appropriate working protocols should be enforced during the ground works stage of construction and suitable precautions should be taken during the removal of any made ground in which asbestos fibres have been identified.

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, the concentrations of contaminants recorded to date (specifically the hydrocarbons) are such that Barrier Type water supply pipes are likely to be required. However, 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 REMEDIAL STRATEGY

A Remedial Strategy is 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

The re-laid topsoil will be classified as Non-Hazardous Waste and, due to its organic content, may not be suitable for disposal at an Inert landfill.

Based on the Waste Classification Report (Appendix K) it is considered that the made ground will generally be classed as Non-Hazardous Waste; however, an allowance for a volume of soil to be disposed of as hazardous waste would be prudent due to the presence of asbestos noted in WS05. 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 should be suitable for disposal at an Inert landfill site, although further testing (including WAC analysis) may be required to confirm this. Natural soils may be suitable for re-use on-site as part of any capping layer 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.

Although not identified during the site works, 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. made ground or 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 one block of apartments and associated infrastructure. The proposed end use includes a car park, gardens and minimal soft landscaping.

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

Test Parameter	Range of Results	
	Granular	Cohesive
SPT 'N' values	3 to 50, typically 9 to 10	11 to 50, typically 23 to 37

Laboratory Testing: Glacial Till

Test Parameter	Range of Results
Plasticity Index	16 to 20% (low to medium VCP – adopt medium for design). One sample reported as non-plastic

10.3 ENGINEERING GROUND TREATMENT AND EARTHWORKS

ENGINEERING GROUND TREATMENT

Engineering ground treatment is not considered to be necessary.

The near surface soils were generally firm under foot during the intrusive investigation. It is therefore considered unlikely that pre-treatment of the surface soils will be required for any small plant/personnel movements.

EARTHWORKS

Should site levels require raising then, in line with NHBC Standards Chapter 4.6, the following are likely to be required:

- An earthworks specification.
- Geotechnical Design Report or Geotechnical Design Statement.
- Geotechnical testing to confirm the earthworks parameters for any fill material.
- At least some third party supervision of the earthworks.
- Geotechnical verification testing during the earthworks.
- A verification report at the end of the earthworks.

10.4 EXCAVATION CONDITIONS

Excavation of the materials encountered during the ground investigation should be easily achieved using conventional hydraulic excavation techniques. A breaker or similar plant may be required where hard standing or existing foundations are encountered. Rock is not anticipated within 3m of the existing ground level.

From the ground investigation undertaken, it is likely that excavations will be generally stable in the short term. Some materials such as granular soils 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.

It is considered unlikely that dewatering will be required for shallow short-term excavations. The observed groundwater conditions suggest that only simple dewatering techniques (e.g. sump pumping) will be needed to control water ingress to deeper excavations. Care should be taken to ensure that dewatering does not lead to settlement of soils below existing structures or services on or off-site.

10.5 EXISTING STRUCTURES / SUBSTRUCTURES

There are no above ground structures on site; however inspection covers denoting buried services were observed. There may also be old foundations or other buried structures from the previous site use (e.g. associated with demolished buildings), that have not been identified from this investigation, such as a cellar from the former public house.

10.6 FOUNDATIONS

The untreated made ground, low and the medium strength natural clay with an undrained shear strength of less than 60kPa and shallow sand horizons are considered unsuitable as a bearing stratum and all new foundations should be carried down through them to found on the more competent natural strata. This will result in foundation depths of up to 2.0m 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. Foundations should

No trees are present within influencing distance; accordingly, the deepening of foundations due to trees is not anticipated to be required.

At this stage, and based on the above, it is considered likely that trench fill foundations, founded on the natural strata will be suitable for the proposed development. Foundation depths of between 0.9m begl and 2.0m begl may be expected, with an average foundation depth of 1.6m begl.

The natural soils encountered at anticipated foundation depths, were generally at least or medium strength (cohesive). It is anticipated that a nett allowable bearing pressure of at least 110kN/m² should be available for conventional strip or trench fill footings. This will allow line loads up to 49kN/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.

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 are variable. Deepening through any water softened clay and thin sand horizons to found on competent clay strata is recommended.

Reinforced concrete containing two layers of B785 mesh is recommended over large steps if required due to deepening to consistent strata.

10.7 FLOOR SLABS

Due to the presence of in excess of 0.6m of unsuitable strata and/or the potential for the disturbance of the near surface soils during construction, it is recommended that an allowance be made for suspended floor slabs throughout the development.

Old substructures should be removed to at least 0.5m below any new floor slabs to prevent the formation of 'hard spots'.

10.8 BURIED CONCRETE

Based on the recorded water soluble sulphate and pH levels in the soils below the site and assuming mobile groundwater condition as a worse case, 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-1.

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 is flat-lying as is the area surrounding the site. Therefore, there is no significant risk of slope instability occurring on the site at present gradients.

The present gradients on site are likely to be adjusted by minor earthworks. Future ground profiles are considered unlikely to require earth retaining structures; however, further advice can be provided if necessary.

10.10 SEDIMENT MANAGEMENT

To prevent the run off of sediment and potential pollution into any surface water, during the construction and earthworks process. Reference should be made to CIRIA C532 'Control of Water Pollution from Construction Sites'.

An Environmental Management Plan and Construction Management Plan will be required to prevent pollution of Controlled waters.

10.11 SOAKAWAY DRAINAGE

The natural strata encountered during the investigation are unlikely to be suitable for soakaway drainage by virtue of being clay or sand, which already contain groundwater, and an alternative drainage system should be considered for the disposal of surface water.

It is recommended that the Local Authority and Environment Agency be consulted with regards to the use of soakaways.

10.12 NEW ACCESS ROADS

Site observations suggest that the untreated made ground will have CBR values of <2%, whilst the natural cohesive materials will have CBR values of between 2% and 4%. The natural granular strata is likely to have CBR values >5%, when suitably drained. 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.

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Site observations should be confirmed by in situ or laboratory testing in accordance with the adopting Local Authority's preference.

11 ONGOING WORKS

Gas monitoring is anticipated to be on-going to November 2024.

12 FURTHER INVESTIGATION

- Trial pits to provide an assessment of ground stability and impact on foundation design.
- WAC and additional asbestos analysis to better inform disposal classification.
- MMP for capping importation (should it be required).
- A Remedial Strategy.

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.

13 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.

Based on the evidence currently available the site is assessed as being of low risk for geotechnical hazards and moderate risk for contamination hazards. These are summarised in the Post Ground Investigation Hazard Plan (Ground Model) in Appendix L.



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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: <https://mapapps2.bgs.ac.uk/geoindex/home.html>
- BGS online viewer: <https://geologyviewer.bgs.ac.uk>
- Magic Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: <http://www.environment-agency.gov.uk/>
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2023), 'Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects)'
- UK HSA Radon Maps: <https://www.ukradon.org/information/ukmaps>
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015 +A1: 2019, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

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

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

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 (including supplementary advice for extensions, conversions and refurbishment projects) (BR211: 2023)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

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

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

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

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

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables. For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

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

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

vii RISK TO SITE WORKERS – GENERAL COMMENTS

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

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

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

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

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

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

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

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

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Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

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

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

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

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

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

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

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

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

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

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

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

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

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

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

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

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

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

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

xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS

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

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

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

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

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

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

xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

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

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

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

xv **GEOTECHNICAL ASSESSMENT – SOAKAWAYS**

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

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

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

xvi **GEOTECHNICAL ASSESSMENT – FOUNDATIONS**

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

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

NOTES ON LIMITATIONS

General

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

GRM Development Solutions Limited accepts no responsibility or liability for:

- a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and
- b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

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

Phase II Environmental Audits (Contamination Investigations)

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

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

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

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

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

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

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

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

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects. The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.



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



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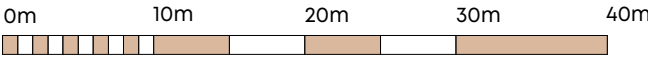
Notes: This drawing is the copyright Paddock Johnson Partnership Limited and may not be used without their prior written consent. Written dimensions to be taken in preference to scaled dimensions. Due to the inaccuracies of scanning, scanned images should not be scaled.

REV:	DATE:	DESCRIPTION:	BY:
A	30.3.22	Areas Increased	PO
B	21.07.22	Entrance to apartment relocated.	RD
C	22.09.22	Layout Re-Design of two end units (Brook Hey Dr)	RD
D	18.10.22	Updated layout to suit redesigned footprint.	RD
E	27.10.22	Planning Issue	EG
F	01.12.22	Site layout amendments to suit the proposed indicative FFL.	RD
G	01.12.22	Additional levels added as per planning officer's request.	RD
H	10.03.23	Amendments made to planner's requests	EG
J	19.07.23	drying area added, parking removed at planner's request	EG

- Ground Floor Apartment 50sqm
Apartment Type 1
8no. units
- Ground Floor Apartment 52sqm
Apartment Type 2
2no. units
- First Floor Apartment 55sqm (5+50)
Apartment Type 3
10no. units

External works to be a combination of hard and soft landscaping in the form of shrubbery/ low-no maintenance planting and paving.

- EV charging point
- Secure covered bike storage
- 1100mm h. timber fencing to boundary
- for all other boundary treatments, refer to elevations and streetscenes, generally low level brick walls and timber fencing



VISUAL SCALE 1:500 @ A3

CLIENT:
Advent Construction Ltd/ Livv
Housing Group

PROJECT:
Residential Development
Bigdale Drive, Kirkby

DRAWING TITLE:
Proposed Site Plan

DRAWING NUMBER:
22017-PJA-00-ZZ-DR-A-1000-J

STATUS:
PLANNING

SCALE: As indicated@A3
DATE: 23.3.22
BY: PO
CHECKED: SH

PADDOCK
JOHNSON

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Legend

- Site Boundary
- Exploratory Holes
- Window Sample Borehole



NOTES:

CLIENT:	ALAN JOHNSTON PARTNERSHIP on behalf of LIVV HOUSING GROUP
PROJECT:	Bigdale Drive, Kirkby
TITLE:	Exploratory Hole Location Plan

PROJECT No:	P10680	DATE:	September 2024	DESIGN/DRAWN:	RJH
DRAWING NUMBER:	002	ISSUE:	A	© GRM Development Solutions Ltd © Crown Copyright. AL 100014100	



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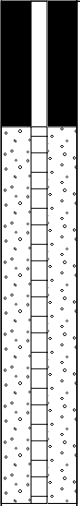


A P P E N D I X D

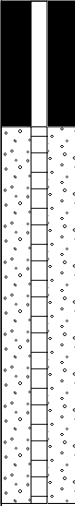
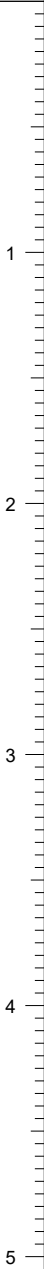
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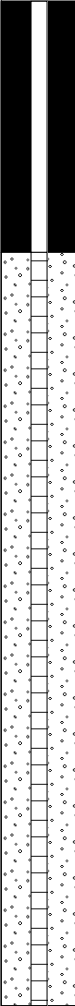
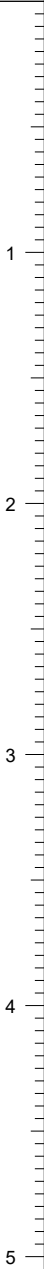
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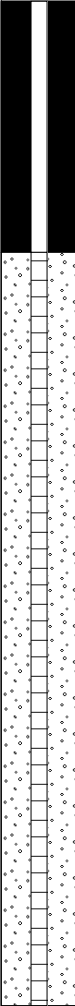
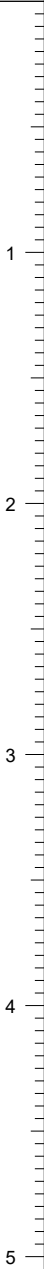
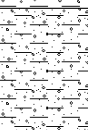
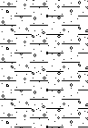
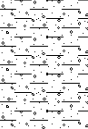
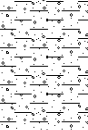
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS01 Sheet 1 of 1	
Site Name: Bigdale Drive, Kirkby							Ground Level (mAOD)	
Client: Livv Housing Group					GRM Project Ref: P10680		Coordinates E N	

Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
					0.10			Loose brown, fine to medium SAND. (TOPSOIL) Re-laid Topsoil	
		0.40 - 0.45	ES		0.40			Loose brown sandy GRAVEL. Sand is medium to coarse. Gravel is fine to coarse, sub-rounded to angular of brick, granite, asphalt and PFA. Made Ground	
					0.50				
		1.00	C	N=9 (2,2/2,3,2,2)	1.00			Black, slightly gravelly, fine to medium SAND. Gravel is fine to coarse, sub-rounded to angular of brick, chalk, granite and sandstone. Made Ground	1
		1.10 - 1.15	D					Medium dense brown mottled black, slightly gravelly, fine to medium SAND. Gravel is fine to coarse of asphalt. Made Ground	
					1.55				
		1.70 - 1.75	D		1.60			Medium dense yellowish, light brown, slightly gravelly, fine to medium SAND. Gravel is fine to coarse sub angular to angular of sandstone. Glacial Till <i>Material was wet between 1.00 - 1.55m</i>	
		2.00	C	N=39 (4,5/8,9,10,12)	2.00			Yellowish, light brown, clayey, slightly gravelly, fine to medium SAND. Gravel is fine to coarse sub angular to angular of sandstone. Glacial Till	2
					2.50			Soft to firm light brown mottled light grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, sub-rounded to sub-angular of mudstone. Glacial Till	
		2.42	C	N=50 (3,9/10,11,14,15)	2.87			Stiff reddish brown mottled light grey, sandy CLAY. Sand is fine to coarse. Glacial Till Dense light brown, slightly gravelly, fine to medium SAND. Gravel is fine to coarse, sub-rounded to angular of sandstone and mudstone. Glacial Till End of Borehole at 2.870m	3
								4	
								5	

Crew: Peak Drilling Site Investigation and Geo Services Ltd.		Logger: SW		Weather: Overcast with rain/hail intervals.	
Equipment: YANMAR Italy Lightweight Archway Dart Rig					
Reason for termination of borehole: Refusal					
Groundwater Remarks: Groundwater not encountered					
General Remarks: No significant remarks					
Hole Started: 11/09/2024		Hole Complete:		Version: FINAL	
				Scale: 1:31	

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS02 Sheet 1 of 1		
Site Name: Bigdale Drive, Kirkby							Ground Level (mAOD)		
Client: Livv Housing Group					GRM Project Ref: P10680		Coordinates E N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.30 - 0.35	ES		0.10			Tarmac	
		1.00	C	N=9 (2,3/2,2,3,2)	0.30			Made Ground	
					0.45			Loose black and dark brown slightly clayey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse sub-angular to angular of brick, granite and tarmac.	
					0.60			Made Ground	
					0.75			Dark brown and black gravelly fine to medium SAND. Gravel is fine to coarse, sub-rounded to angular of brick and sandstone.	
					1.00			Made Ground	
		1.50 - 1.55	D		1.40			Black sandy GRAVEL. Gravel is medium to coarse, sub-rounded to angular of tarmac and PFA	
					1.00			Made Ground	
		2.00	C	N=33 (3,4/5,6,10,12)	1.40			Multicoloured (red, yellow, brown, grey, black, beige) very gravelly, slightly sandy CLAY. Gravel is fine to coarse, sub-rounded to angular of brick and sandstone.	
					2.00			Made Ground	
2.40	Dense black fine to coarse SAND.								
2.86	C	N=50 (9,11/50 for 295mm)	2.00			Made Ground			
			2.40			Dark brown gravelly, fine to coarse SAND. Gravel is fine to coarse sub-angular to angular of brick and granite.			
			2.86			Made Ground			
								Firm light brown mottled light grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, sub-rounded to angular of sandstone and granite.	
								Glacial Till	
								Firm brown, very sandy CLAY. Sand is Fine to medium.	
								Glacial Till	
								Medium dense black and dark brown fine to coarse SAND.	
								Glacial Till	
								Material was wet from 2.40m	
								End of Borehole at 2.860m	
Crew: Peak Drilling Site Investigation and Geo Services Ltd.		Logger: SW		Weather: Overcast with rain/hail intervals.					
Equipment: YANMAR Italy Lightweight Archway Dart Rig									
Reason for termination of borehole: Refusal									
Groundwater Remarks: Groundwater not encountered									
General Remarks: No significant remarks									
Hole Started: 11/09/2024		Hole Complete:		Version: FINAL		Scale: 1:31			

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS03 Sheet 1 of 1		
Site Name: Bigdale Drive, Kirkby							Ground Level (mAOD)		
Client: Livv Housing Group					GRM Project Ref: P10680			Coordinates E N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.20 - 0.25	ES		0.40			Loose brown, very gravelly, fine to coarse SAND. Gravel is fine to coarse, sub-rounded to angular of brick, granite and asphalt. Made Ground	
					0.60			Medium dense black, slightly gravelly, fine to medium SAND. Gravel is fine to coarse, sub-rounded to angular of brick, chalk, granite and sandstone. Made Ground	
					0.70			Light brown, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, sub-rounded to angular of brick, granite and sandstone. Made Ground	
		1.00	C	N=10 (2,4/4,2,2,2)	1.00			Medium dense brown mottled black, slightly gravelly, fine to medium SAND. Gravel is fine to coarse of asphalt. Made Ground	
					1.10			Yellow fine to medium SAND. Glacial Till	
					1.45			Dense yellowish, light brown, slightly gravelly SAND. Gravel is fine to coarse sub-angular to angular of sandstone. Glacial Till	
		2.00	C	N=12 (2,1/2,2,3,5)				Firm brown, slightly gravelly, slightly sandy CLAY. Gravel is fine to coarse sub-rounded to angular of sandstone. Glacial Till	
								Light brown sand lens between 2.00 - 2.20m	
								Stiff reddish brown slightly gravelly, sandy CLAY. Gravel is fine to coarse, sub-rounded to angular of sandstone. Glacial Till	
									
		3.00	C	N=36 (7,6/7,9,9,11)	3.00			3	
		4.00	C	N=37 (7,8/8,9,10,10)	4.00			4	
								5	
End of Borehole at 4.450m									
Crew: Peak Drilling Site Investigation and Geo Services Ltd.				Logger: SW			Weather: Overcast with rain/hail intervals.		
Equipment: YANMAR Italy Lightweight Archway Dart Rig									
Reason for termination of borehole: Target Depth Achieved									
Groundwater Remarks: Groundwater not encountered									
General Remarks: No significant remarks									
Hole Started: 11/09/2024		Hole Complete:			Version: FINAL		Scale: 1:31		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS04 Sheet 1 of 1		
Site Name: Bigdale Drive, Kirkby							Ground Level (mAOD)		
Client: Livv Housing Group					GRM Project Ref: P10680			Coordinates E N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.30 - 0.35	ES		0.40			Loose slightly sandy GRAVEL. Sand is fine to coarse. Gravel is medium to coarse of brick, concrete, tarmac and granite. Made Ground	
		0.90 - 0.95 1.00	D	N=11 (1,1/1,4,3,3)	0.70			Medium dense black, slightly gravelly, fine to medium SAND. Gravel is fine to coarse, sub-rounded to angular of brick, chalk, granite and sandstone. Made Ground	
			C		0.85			Medium dense brown mottled black, slightly gravelly, fine to medium SAND. Gravel is fine to coarse of asphalt. Made Ground	
							Firm grey, slightly gravelly CLAY. Gravel is fine to coarse, sub-rounded to sub-angular of mudstone. Glacial Till		
		2.00	C	N=13 (2,2/2,3,3,5)				Firm to stiff brown slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse sub-rounded to sub-angular of mudstone. Glacial Till	
3.00	C	N=23 (2,3/4,5,6,8)						3	
4.00	C	N=50 (5,6/50 for 235mm)	4.00					4	
End of Borehole at 4.390m									5
Crew: Peak Drilling Site Investigation and Geo Services Ltd.				Logger: SW			Weather: Overcast with rain/hail intervals.		
Equipment: YANMAR Italy Lightweight Archway Dart Rig									
Reason for termination of borehole: Refusal									
Groundwater Remarks: Groundwater not encountered									
General Remarks: No significant remarks									
Hole Started: 11/09/2024		Hole Complete:			Version: FINAL		Scale: 1:31		



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Legend

- Site Boundary
- Exploratory Holes
- Window Sample Borehole



NOTES:

CLIENT:	ALAN JOHNSTON PARTNERSHIP on behalf of LIVV HOUSING GROUP
PROJECT:	Bigdale Drive, Kirkby
TITLE:	Gas Monitoring Plan

PROJECT No:	P10680	DATE:	September 2024	DESIGN/DRAWN:	RJH
DRAWING NUMBER:	003	ISSUE:	A	© GRM Development Solutions Ltd © Crown Copyright. AL 100014100	



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In-Situ Gas Monitoring Results

Project Name	Bigdale Drive, Kirkby
Project Number	10680
Client	Alan Johnston Partnership Ltd
Date	19/09/2024
Weather	Sunny
Atmospheric Pressure (mb)	1021
Pressure Trend	Falling
Equipment	Gas Data GFM436
Operator	Liam Press

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS01	0.5	2.0	MG	0.0	0.0	1.2	1.2	19.4	19.4	0.0	0.0	Not Recorded	
WS02	0.5	2.0	MG	0.0	0.0	0.2	0.2	20.4	20.4	0.0	0.0	Not Recorded	
WS03	1.0	4.0	NS	0.0	0.0	0.6	0.6	20.0	20.0	0.1	0.1	Not Recorded	
WS04	1.0	4.0	NS	0.0	0.0	2.2	2.2	16.5	16.5	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	1.9	1.9	18.3	18.3	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
1.1	2.2
0.9	2.1
1.2	3.8
2.5	3.9
2.6	3.9

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

Comments

WS01 fast recharge 5 secs= 1cm
 WS02 fast recharge 1 sec=1cm
 WS03 recharge 35 secs=1cm
 WS04,05 slow recharge



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7 - 11 Harding Street
Leicester
LE1 4DH

GRM Development Solutions

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

Analytical Test Report: L24/08473/GRM - 24-49728

Your Project Reference:	P10680 Bigdale Drive, Kirkby		
Your Order Number:	P10680	Samples Received / Instructed:	12/09/2024 / 12/09/2024
Report Issue Number:	1	Sample Tested:	12/09 to 27/09/2024
Samples Analysed:	5 sample(s)	Report issued:	27/09/2024

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page 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 CTS 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 CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

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 further analysis is required samples identified as containing asbestos are screened and tested on an as received basis. No correction is made for moisture content and these results are not covered by our accreditation

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

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 03.09.2024

Issued by: J. Gane

Issue No: 4

Rev No: 14

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

Analytical Test Results - Solid

Lab Reference			398382	398383	398384	398385	398386
Client Sample ID			-	-	-	-	-
Client Sample Location			WS01	WS02	WS03	WS04	WS05
Client Sample Type			ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-
Depth - Top (m)			0.40	0.30	0.20	0.30	0.30
Depth - Bottom (m)			0.40	0.30	0.20	0.30	0.30
Date of Sampling			11/09/2024	11/09/2024	11/09/2024	11/09/2024	11/09/2024
Time of Sampling			-	-	-	-	-
Sample Matrix			Sand	Sand	Sand	Sand	Sand
Determinant	Units	Accreditation					
Arsenic	(mg/kg)	MCERTS	410	15	20	21	17
Cadmium	(mg/kg)	MCERTS	1.0	0.7	0.6	1.0	0.3
Chromium (Total)	(mg/kg)	UKAS	32	23	26	19	24
Copper	(mg/kg)	MCERTS	100	59	40	44	27
Lead	(mg/kg)	MCERTS	220	59	74	600	48
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	24	28	18	16	16
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	150	98	76	410	79
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	8.5	9.9	8.8	9.0	9.1
Sulphate (Water soluble as SO ₄)	(mg/l)	u	62	63	240	140	82
Acenaphthene	(mg/kg)	MCERTS	< 0.20	0.05	0.81	< 0.02	< 0.20
Acenaphthylene	(mg/kg)	UKAS	< 0.20	0.31	< 0.20	0.06	< 0.20
Anthracene	(mg/kg)	UKAS	< 0.20	0.36	1.1	0.29	< 0.20
Benzo (a) anthracene	(mg/kg)	MCERTS	0.52	1.7	1.8	0.64	0.27
Benzo (a) pyrene	(mg/kg)	MCERTS	0.55	2.1	1.5	0.35	0.31
Benzo (b) fluoranthene	(mg/kg)	MCERTS	0.66	2.3	1.8	0.70	0.36
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	0.39	1.3	0.82	0.29	0.25
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.24	0.87	0.70	0.20	< 0.20
Chrysene	(mg/kg)	MCERTS	0.59	1.6	1.9	0.79	0.28
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.20	0.26	< 0.20	0.07	< 0.20
Fluoranthene	(mg/kg)	MCERTS	1.0	2.8	4.7	1.8	0.41
Fluorene	(mg/kg)	MCERTS	< 0.20	0.04	0.55	0.11	< 0.20
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.33	1.3	0.78	0.24	< 0.20
Naphthalene	(mg/kg)	MCERTS	< 0.20	0.04	< 0.20	0.04	< 0.20
Phenanthrene	(mg/kg)	MCERTS	0.62	0.48	4.9	0.65	0.20
Pyrene	(mg/kg)	MCERTS	0.95	2.5	4.0	1.5	0.40
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	7.3	18	26	7.7	4.1
SOM (via TOC)	(%)	UKAS	8.7	3.7	5.2	4.4	5.5
Asbestos	-	UKAS	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	Amosite

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

Analytical Test Results - VPH / EPH

Lab Reference			398382	398383	398384	398385	398386
Client Sample ID			-	-	-	-	-
Client Sample Location			WS01	WS02	WS03	WS04	WS05
Client Sample Type			ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-
Depth - Top (m)			0.40	0.30	0.20	0.30	0.30
Depth - Bottom (m)			0.40	0.30	0.20	0.30	0.30
Date of Sampling			11/09/2024	11/09/2024	11/09/2024	11/09/2024	11/09/2024
Time of Sampling			-	-	-	-	-
Sample Matrix			Sand	Sand	Sand	Sand	Sand
Determinant	Units	Accreditation					
Benzene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m&p Xylene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o-Xylene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C ₅ to C ₆ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >C ₆ to C ₈ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >C ₈ to C ₁₀ [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >C ₁₀ to C ₁₂ [EH_2D_AL]	(mg/kg)	u	< 1.0	< 1.0	< 1.0	1.4	1.7
Aliphatic >C ₁₂ to C ₁₆ [EH_2D_AL]	(mg/kg)	u	1.8	< 1.0	1.7	4.3	2.8
Aliphatic >C ₁₆ to C ₂₁ [EH_2D_AL]	(mg/kg)	u	3.1	< 1.0	8.5	33	5.6
Aliphatic >C ₂₁ to C ₃₅ [EH_2D_AL]	(mg/kg)	u	18	3.1	42	62	120
Aliphatic >C ₃₅ to C ₄₀ [EH_2D_AL]	(mg/kg)	u	3.9	< 1.0	13	2.2	52
Aromatic >C ₅ to C ₇ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C ₇ to C ₈ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C ₈ to C ₁₀ [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aromatic >C ₁₀ to C ₁₂ [EH_2D_AR]	(mg/kg)	u	< 1.0	< 1.0	< 1.0	< 1.0	1.6
Aromatic >C ₁₂ to C ₁₆ [EH_2D_AR]	(mg/kg)	u	4.3	< 1.0	1.4	7.4	2.0
Aromatic >C ₁₆ to C ₂₁ [EH_2D_AR]	(mg/kg)	u	17	3.4	4.6	61	6.6
Aromatic >C ₂₁ to C ₃₅ [EH_2D_AR]	(mg/kg)	u	40	8.8	29	130	230
Aromatic >C ₃₅ to C ₄₀ [EH_2D_AR]	(mg/kg)	u	12	< 2.0	16	4.3	95
Total >C ₅ to C ₄₀ [EH_2D+HS_1D_Total]	(mg/kg)	u	100	15	120	300	520

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

Analytical Test Results - Leachate

Lab Reference			398382	398384	398386
Client Sample ID			-	-	-
Client Sample Location			WS01	WS03	WS05
Client Sample Type			ES	ES	ES
Client Sample Number			-	-	-
Depth - Top (m)			0.40	0.20	0.30
Depth - Bottom (m)			0.40	0.20	0.30
Date of Sampling			11/09/2024	11/09/2024	11/09/2024
Time of Sampling			-	-	-
Sample Matrix			Leachate	Leachate	Leachate
Determinant	Units	Accreditation			
Arsenic	(µg/l)	u	310	17	35
Cadmium	(µg/l)	u	< 3	< 3	< 3
Chromium (Total)	(µg/l)	u	< 3	< 3	< 3
Copper	(µg/l)	u	< 1	1	13
Lead	(µg/l)	u	< 5	< 5	< 5
Mercury	(µg/l)	u	< 1	< 1	< 1
Nickel	(µg/l)	u	< 3	< 3	< 3
Selenium	(µg/l)	u	2	< 1	< 1
Zinc	(µg/l)	u	< 5	< 5	< 5
Ammonical Nitrogen (as N)	(mgN/l)	u	0.35	0.34	0.66
Cyanide (Total)	(µg/l)	u	< 5.0	< 5.0	< 5.0
pH	pH Units	u	8.0	7.8	9.3
Sulphate (As SO ₄)	(mg/l)	u	< 10	< 10	13
Anthracene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (b) fluoranthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (g, h, i) perylene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Benzo (k) fluoranthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Fluoranthene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Indeno (1, 2, 3, -cd) pyrene	(µg/l)	u	< 0.01	< 0.01	< 0.01
Naphthalene	(µg/l)	u	0.03	0.02	0.03
Phenols (Total)	(µg/l)	u	6.48	3.29	< 1.10



7 - 11 Harding Street
Leicester
LE1 4DH

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
398382	-	WS01	ES	-	Dark brown slightly clayey silty sand	15	9.4	81
398383	-	WS02	ES	-	Dark brown gravelly clayey silty sand	20	15	90
398384	-	WS03	ES	-	Made Ground- dark brown slightly clayey silty sand with occasional brick fragments	12	20	90
398385	-	WS04	ES	-	Made Ground- dark brown clayey gravelly silty sand with occasional brick fragments slag bituminous material	20	11	42
398386	-	WS05	ES	-	Made Ground- dark brown clayey gravelly silty sand with occasional brick fragments	U/S	U/S	U/S



7 - 11 Harding Street
Leicester
LE1 4DH

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
398382	-	WS01	ES	-	PAHAR 1:10 Dilution
398383	-	WS02	ES	-	
398384	-	WS03	ES	-	PAHAR 1:10 Dilution
398385	-	WS04	ES	-	
398386	-	WS05	ES	-	PAHAR 1:10 Dilution VPH/BTEX - Sample taken from container with headspace.

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ANIONSL	MS - CL - Anions by Aquakem	As received	-	Determination of Anions (inc Sulphate, chloride etc.) in leachate samples by Aquakem
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
SKALARCNL	MS - CL - Cyanide by Skalar - Leachate	As received	BSEN:12457 Leaching	Determination of cyanide (total / free / complex) in leachates using a Skalar segmented flow analyser
SKALARCNS	MS - CL - Cyanide by Skalar	As received	Passing 10mm test sieve	Determination of cyanide (total / free / complex) in soil using a Skalar segmented flow analyser
SKALARHCS	MS - CL - Hexavalent Chromium by Skalar	As received	Passing 10mm test sieve	Determination of hexavalent chromium in soil using Skalar segmented flow analyser
ICPMETL	MS - CL - ICP Metals in Waters	As received	BSEN:12457 Leaching	Determination of metals in leachates via ICP
ICPMETS	MS - CL - ICP Metals	Air dried	Passing 10mm test sieve	Determination of metals in soils via ICP
PHL	MS - CL - pH in Waters	As received	BSEN:12457 Leaching	Determination of pH in leachates using a pH probe
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
PAHSPMEL	MS - CL - PAH SPME	As received	BSEN:12457 Leaching	Determination of Polyaromatic hydrocarbons in leachates via GC-MS
PAHASRDS	MS - CL - PAH (As Received)	As received	Passing 10mm test sieve	Determination of Polyaromatic hydrocarbons in soil via GC-MS
PHOHHPLCL	MS - CL - Phenol Waters by HPLC	As received	BSEN:12457 Leaching	Determination of speciated phenols in leachates using HPLC
SKALARPHS	MS - CL - Phenols by Skalar	As received	Passing 10mm test sieve	Determination of total phenols in soil using Skalar segmented flow analyser
TOCS	MS - CL - TOC Eltra	Air Dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soils
GXCXGCS	MS - CL - TPH & EPH by GCXGC	As received	Passing 10mm test sieve	Determination of TPH and EPH in soils via GCXGC-FID
CWGS	Calculation from VPH-S and EPH-S	As received	Passing 10mm test sieve	Determination of TPH CWG (Volatile Petroleum Hydrocarbons and Extractable Petroleum Hydrocarbons) in soils via Headspace-GC-MS and GC-GC-FID respectively
VPHS	MS - CL - VPH	As received	Passing 10mm test sieve	Determination of VPH in soils via Headspace-GC-MS
ASB	MS - AS - 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"
ENLEACHP	BS EN 12457-2	As Received	-	Leaching in accordance with BSEN 12457-2 (10:1 Ratio)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis



7 - 11 Harding Street
Leicester
LE1 4DH

L24/08473/GRM - 24-49728

Project Reference - P10680 Bigdale Drive, Kirkby

HWOL TPH Acronym Index

Acronym	Description
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics and Aromatics
AL	Aliphatics Only
AR	Aromatics Only
2D	GC-GC - Double Coil Gas Chromatography
#1	EH_Total but with humics mathmatically subtracted
#2	EH_Total but with fatty acids mathmatically subtracted
_	Operator - underscore to separate acronyms (except for +)
+	Operator to indicate cumlative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



A P P E N D I X H

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

TEST REPORT

Client GRM Development Solutions Ltd

Address Laurus House
1st Avenue
Centrum 100
Burton-on-Trent
Staffordshire
DE14 2WH

Contract P10680

Job Number MRN 24007/85

Date of Issue 26 September 2024

Page 1 of 7

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

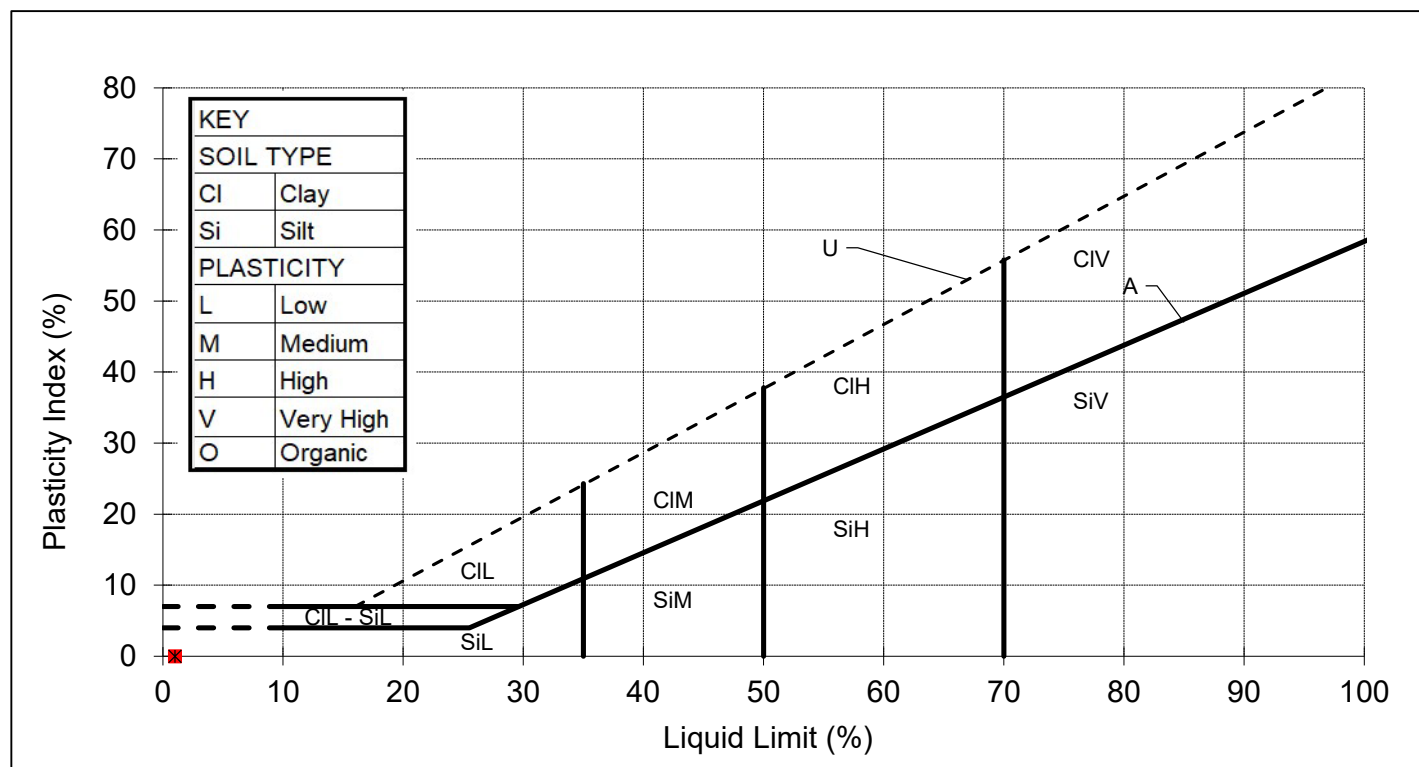
CLIENT	GRM Development Solutions Ltd
SITE	P10680
JOB NUMBER	MRN 24007/85

SAMPLE LABEL	WS01 - 1.1m	DATE SAMPLED	11-Sep-24
SAMPLE No.	554801	DATE RECEIVED	12-Sep-24
DATE TESTED	13-Sep-24	SAMPLED BY	Client

MATERIAL	Brown silty gravelly SAND		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	N/A	N/A	N/A	
Determination 2 (avg)	N/A	N/A		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.5	N/A	Non Plastic	N/A	76



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

26-Sep-24

MURRAY RIX

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

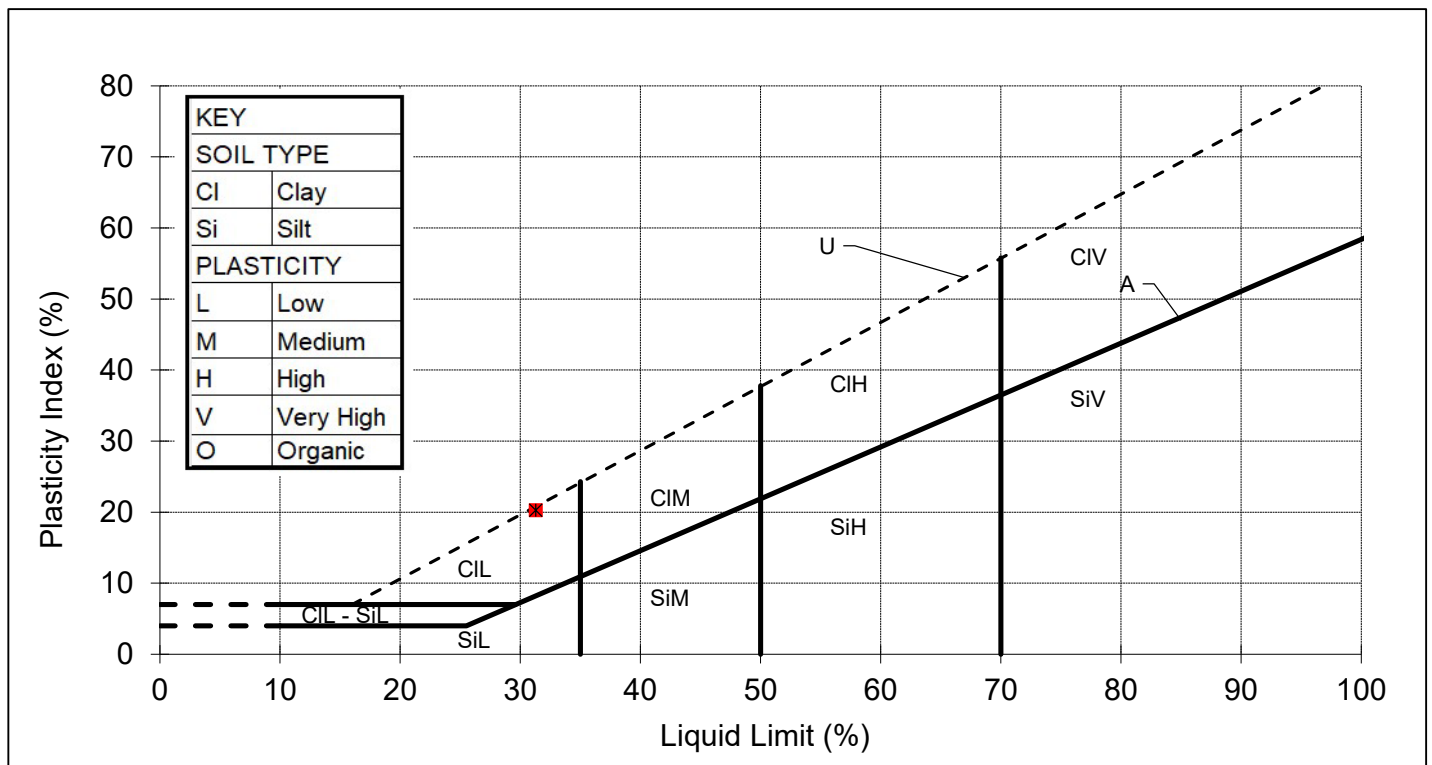
CLIENT	GRM Development Solutions Ltd		
SITE	P10680		
JOB NUMBER	MRN 24007/85		

SAMPLE LABEL	WS01 - 1.7m	DATE SAMPLED	11-Sep-24
SAMPLE No.	554802	DATE RECEIVED	12-Sep-24
DATE TESTED	13-Sep-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	22.1	32.3	0.969	
Determination 2 (avg)	22.4	32.3		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17.5	31	11	20	100



REMARKS

SIGNED

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O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

26-Sep-24

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

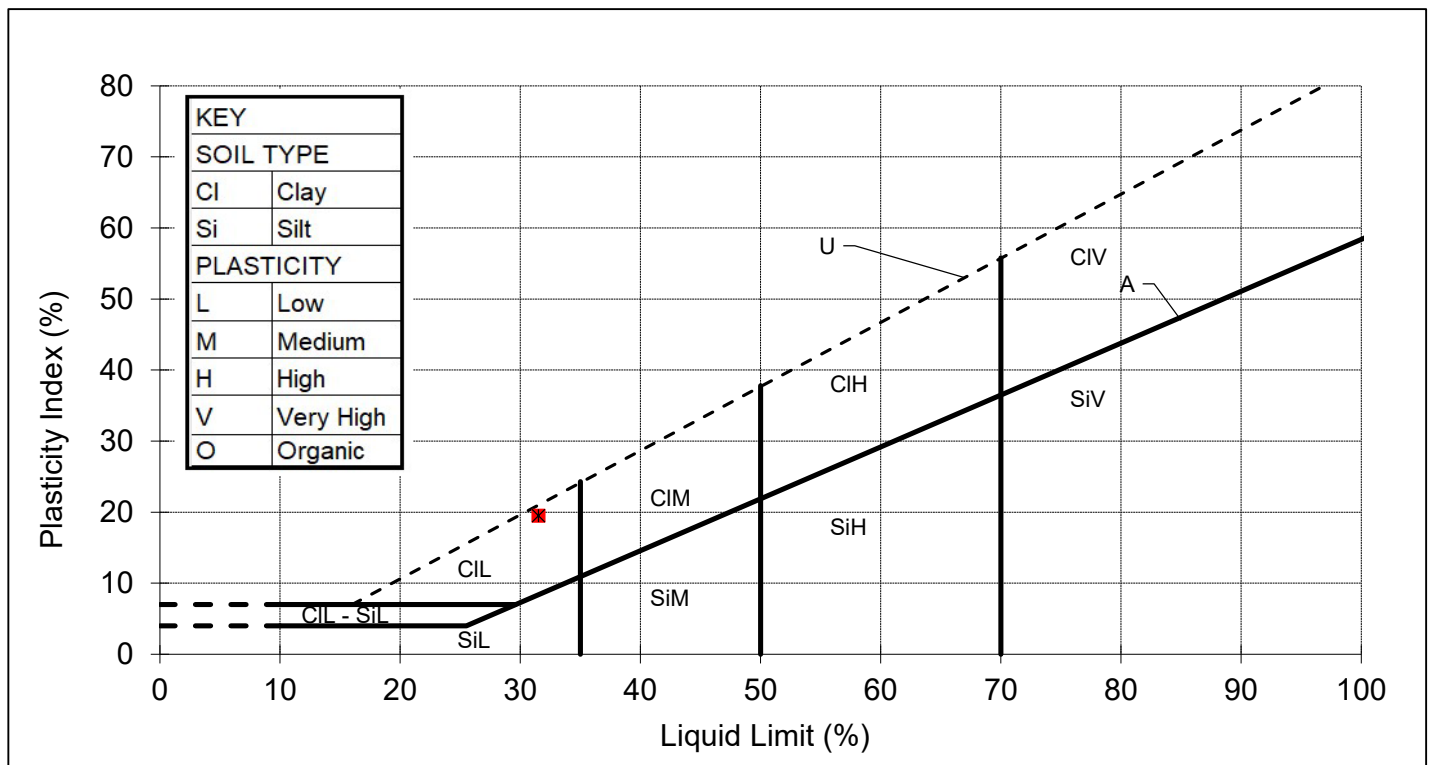
CLIENT	GRM Development Solutions Ltd		
SITE	P10680		
JOB NUMBER	MRN 24007/85		

SAMPLE LABEL	WS02 - 1.5m	DATE SAMPLED	11-Sep-24
SAMPLE No.	554803	DATE RECEIVED	12-Sep-24
DATE TESTED	13-Sep-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.0	31.5	1.002	
Determination 2 (avg)	19.7	31.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
16.4	32	12	20	99



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

26-Sep-24

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

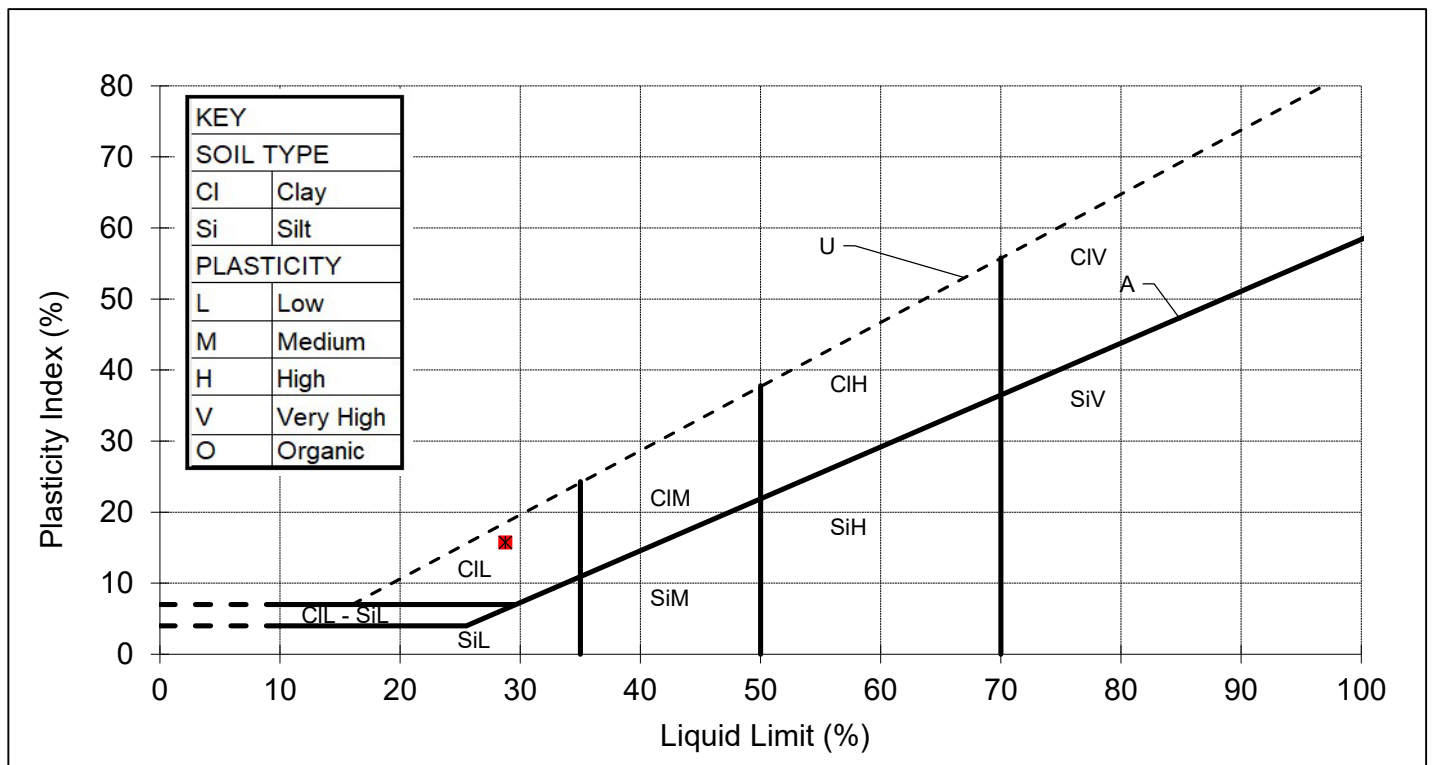
CLIENT	GRM Development Solutions Ltd		
SITE	P10680		
JOB NUMBER	MRN 24007/85		

SAMPLE LABEL	WS04 - 0.9m	DATE SAMPLED	11-Sep-24
SAMPLE No.	554804	DATE RECEIVED	12-Sep-24
DATE TESTED	13-Sep-24	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.6	28.6	1.008	
Determination 2 (avg)	19.4	28.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20.5	29	13	16	97



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

26-Sep-24

MURRAY RIX

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

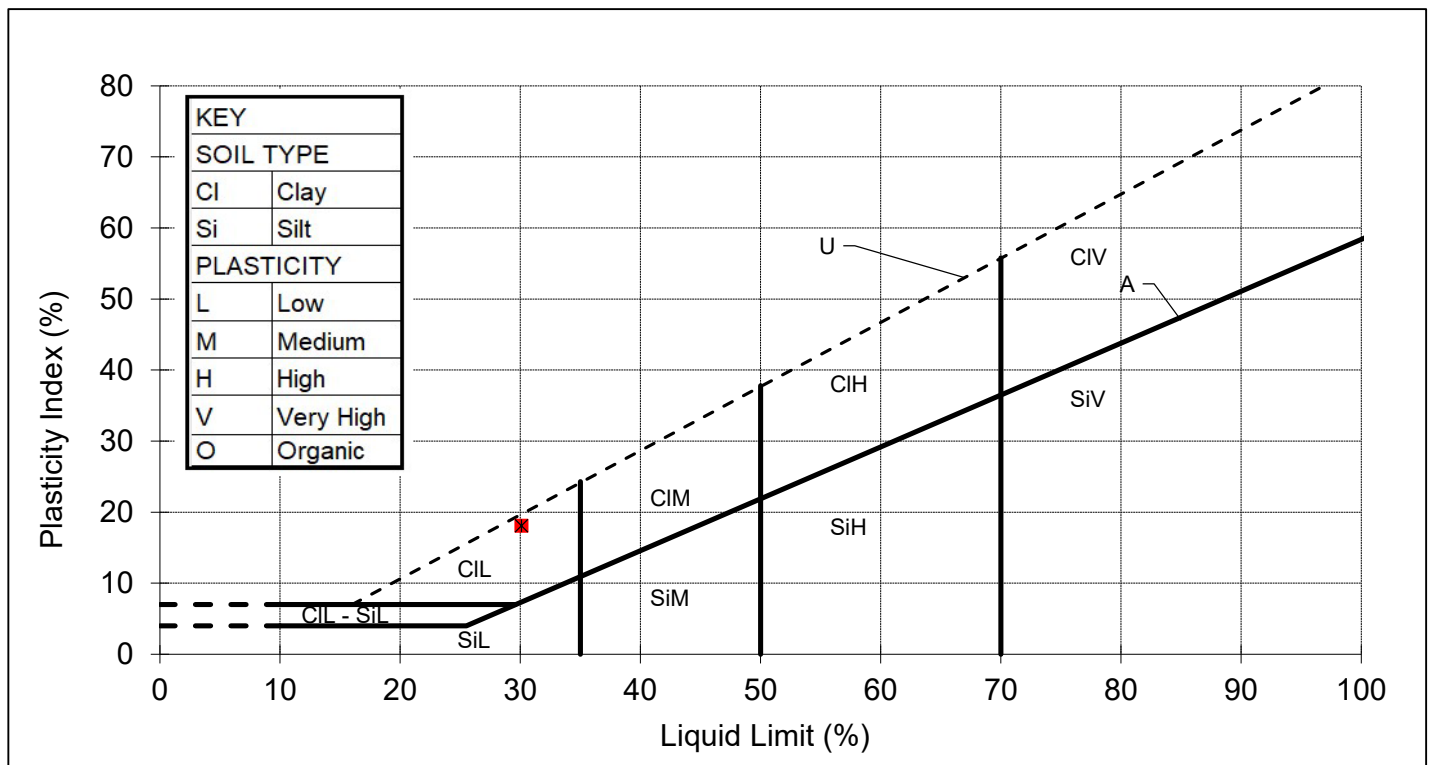
CLIENT	GRM Development Solutions Ltd
SITE	P10680
JOB NUMBER	MRN 24007/85

SAMPLE LABEL	WS05 - 2.0m	DATE SAMPLED	11-Sep-24
SAMPLE No.	554805	DATE RECEIVED	12-Sep-24
DATE TESTED	13-Sep-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.5	29.2	1.022	
Determination 2 (avg)	18.6	29.7		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15.5	30	12	18	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

26-Sep-24

MURRAY RIX

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TEST CERTIFICATE

DETERMINATION OF WATER-SOLUBLE SULPHATE IN SOIL
& DETERMINATION OF THE pH VALUE
BS 1377-3:2018+A1:2021, Cl. 7.3 & Cl. 12

CLIENT	GRM Development Solutions Ltd
SITE	P10680
JOB NUMBER	MRN 24007/85

DATE TESTED	13-Sep-24	DATE SAMPLED	11-Sep-24
SAMPLED BY	Client	DATE RECEIVED	12-Sep-24
PRE-TREATMENT	Air Dried	ADVISED SOURCE	Site Investigation Samples

Sample Number	Sample Label	Material	% Ret. 2mm	pH Value	Water Soluble Sulphate as SO ₄ (mg/l)
554801	WS01 - 1.1m	Brown silty gravelly SAND	17	7.2	130
554802	WS01 - 1.7m	Grey brown silty slightly sandy CLAY	0	7.0	80
554803	WS02 - 1.5m	Grey brown silty slightly sandy CLAY	0	7.0	100
554804	WS04 - 0.9m	Grey brown silty slightly sandy CLAY	0	7.1	90
554805	silty slightly sandy	Brown silty slightly sandy CLAY	0	7.2	50

REMARKS

SIGNED



NAME

O.P. Davies BA (Hons)
(Director / Head of Laboratory)

DATE

26-Sep-24



A P P E N D I X I

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

PAH Mixture Analysis



P No: P10680
Site: Bigdale Drive, Kirkby
Client: Livv Houing Group
Engineer: PW



A P P E N D I X J

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

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	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Residential with Plant Uptake		
CONTAMINANT	Metals and Inorganic Compounds		
^a Arsenic	37		
^a Cadmium	22		
^b Chromium III	910		
^a Chromium VI	21		
^a Lead	200		
^{b/c} Mercury	11		
^b Selenium	250		
^b Nickel	130		
^b Phenols	200		
^b Copper	2400		
^b Zinc	3700		
^d Cyanide	34		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
^a Benzene	0.20	0.41	0.87
^b Toluene	130	290	660
^b Ethylbenzene	47	110	260
^b <i>o</i> - xylene	60	140	330
^b <i>m</i> - xylene	59	140	320
^b <i>p</i> - 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

- C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071. Cadmium using lifetime exposure.
- LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- S4UL for Methyl Hg used.
- Atkins ATRISKsoil Value
- 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, Ideno(1,2,3-cd)pyrene)
All values in mg/kg unless otherwise stated

GRM TAC 02-2024

Contaminant Thresholds for Subsurface Water Pipes

Contaminant	Thresholds (mg/kg)
Corrosion	
Wrapped Steel	pH<7 Cond >400µS/cm
Wrapped Ductile Iron	pH<5 Cond >400µS/cm, he not neutral
Copper	pH<5 >8 and Eh +ve
Toxic Substances	
Chromium (total) (Cr)	Applies to above pipe materials
Organic Contaminants	
VOC's	0.5 PE/0.125 PVC
BTEX & MTBE	0.1 PE/0.03 PVC
SVOC	2 PE/1.4 PVC
Phenols	2 PE/0.4 PVC
Cresols & Chlorinated Phenols	2 PE/0.04 PVC
Mineral Oil C11-C20	10 PE
Mineral Oil C21 - C40	500
Ether/Ketone/Amines, Nitrobenzene/Aldehydes	0.5 PE/0.02-1 PVC

Notes.

It is not recommended that water pipes should be laid in sites where these substances are identified or suspected
Local Utility Companies should be consulted prior to pipe specifications being finalised.

Ref: Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. UKWIR Ref. No. 10/WM/03/21. 2010.

GRM Controlled Waters Tier 1 Assessment Criteria

Table 1a

UKDWS (µg/l)		EQS freshwater (µg/l)*	EQS other surface water (µg/l)* (Including saline waters)
Parameter	Concentration		
Acrylamide	0.1	-	-
Aluminium	200	-	-
Total Ammonia (as N)	-	200 (See Table 3)	-
Ammonia (Unionised as N)	-	-	21
Ammonium (NH4)	500	-	-
Antimony	5	-	-
Arsenic	10	50 (dissolved)	25 (dissolved)
Benzene	1	10	8
Boron	1,000	750#	7,000
Bromate	10	-	-
Cadmium	5	See Table 2	0.2
Chromium	50	-	-
Chromium (III)	-	4.7	-
Chromium (VI)	-	3.4	0.6
Chloride	250,000	188,000#	-
Conductivity (µS/cm at 20°C)	2,500	-	-
Copper	2,000	1 (dissolved & bioavailable)	3.76 (where DOC <1mg/l)
Cyanide	50	1	1
1, 2 dichloroethane	3	10	10
Dichloromethane	-	20	20
Epichlorohydrin	0.4***	-	-
Fluoride	1,500	See Table 4	5,000
Hydrogen ion (pH)	<6.5 or >9.5	-	<6.0 or >9.0
Iron	200	1000 (dissolved)	1000 (dissolved)
Lead (II)	10	1.2 (dissolved & bioavailable)	1.3
Manganese	50	123 (bioavailable)	-
Mercury	1	0.07 (dissolved)	0.07 (dissolved)
Mineral Oil (TPH##)	10	5000 (total) ****	5000 (total) ****
Nickel	20	4 (dissolved & bioavailable)	8.6
Nitrate	50,000	-	-
Nitrite	500	-	-
Phenol	0.5	7.7	7.7
Polycyclic Aromatic Hydrocarbons *#	0.1	0.00017	0.00017
Fluoranthene	-	0.0063	0.0063
Naphthalene	-	2	2
Benzo(a)pyrene	0.01	0.00017	0.00017
Benzo(b)fluoranthene	-	use BaP as marker	use BaP as marker
Benzo(k)fluoranthene	-	use BaP as marker	use BaP as marker
Benzo(g,h,i)perylene	-	use BaP as marker	use BaP as marker
Indeno(1,2,3-cd)pyrene	-	use BaP as marker	use BaP as marker
Anthracene	-	0.1	0.1
Selenium	10	7.5#	-
Sodium	200,000	150,000#	-
Sulphate	250,000	188,000#	-
Tetrachloroethene and Trichloroethene	10	10	10
Tetrachloroethane	-	140	1848
Tetrachloromethane (Carbon Tetrachloride)	3	12	12
Toluene	700***	74	74
Xylene	500***	30*	30*
Ethylbenzene	300***	20**	20**
1,1,1-Trichloroethane	-	100*	100*
Trichlorobenzenes	-	0.4	0.4
Trichloromethane (chloroform)	-	2.5	2.5
Trihalomethanes Total ###	100	-	-
Tributyltin	-	0.0002	0.0002
Vinyl chloride	0.5	-	-
Zinc	5000	10.9 (dissolved & bioavailable) + background concentration - See table 5	6.8 (dissolved) + 1.1

Table 1b

Pesticides	UKDWS (µg/l)	EQS freshwater (µg/l)*	EQS other surface water (µg/l)* (Including saline waters)
Aldrin	0.03	-	-
Dieldrin	0.03	-	-
Heptachlor	0.03	-	-
Heptachlor epoxide	0.03	-	-
other pesticides	0.1	-	-
Cyclodiene pesticides: Sum of Aldrin, Dieldrin, Endrin & Isodrin	-	0.01 (sum)	0.005
DDT total	-	0.025	0.025
Pesticides: Total	0.5	-	-

Table 2

EQS for Hardness Related Substances*						
Substance	EQS Type	EQS (µg/l) for hardness classes (mg/l CaCO ₃)				
		Class 1: <40	Class 2: 40-50	Class 3: 50-100	Class 4: 100-200	Class 5: >200
Cadmium (dissolved)	Annual average	<0.08	0.08	0.09	0.15	0.25

Reference

*# Drinking water standards based on PAH - benzo(b)fluoranthene + benzo(k)fluoranthene + benzo(ghi)perylene + indeno(1,2,3-cd)pyrene
 * The Water Framework Directive (Standards and Classification) Directions (England and Wales) Directions 2015

** Provisional EQS Value

*** WHO Drinking Water Standard

**** EA PPG3

* The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010 - Now Withdrawn

Groundwater Drinking Water Protected Zones Only

Speciated TPH thresholds - available from WHO, 2005

the specified compounds are chloroform, bromoform, dibromochloromethane and bromodichloromethane

Table 3 Ammonia - inland waters (high status)*		
Akailinity (as mg/l CaCO ₃)	Altitude	EQS (ug/l)
<10	Any	200
10 to 50	Any	200
50 to 100	<80m	300
50 to 100	>80m	200
100 to 200	<80m	300
100 to 200	>80m	200
>200	Any	300

The Appropriate Agency has categorised a river, or part of a river, by type, in accordance with paragraphs 1(1) and 1(2) of Schedule 2 - standards for high, good, moderate or poor

Alkalinity is the concentration of CaCO₃ in mg/l.

Altitude means the site's altitude above mean sea level in metres.

Total ammonia in the environment comprises two principal forms: the ionised ammonium ion (NH₄⁺) and un-ionised ammonia (NH₃). The proportion of ionised and un-ionised ammonia can be calculated from total ammonia, taking into account salinity, temperature and pH. The proportion of unionised ammonia increases with increasing temperature and pH, but decreases with increasing salinity. Of the three main factors affecting ammonia speciation, salinity appears to be relatively unimportant. Temperature and pH, however, have a much more significant effect. At pH 8.5, the proportion of un-ionised ammonia is approximately 10 times that at pH 7.5 and, for every 9°C increase in temperature, the proportion of un-ionised ammonia approximately doubles. At the pH of most biological systems, ammonia exists predominantly in the ionised form (NH₄⁺).

Table 4 Substance	EQS Type	Freshwater EQS (mg/l) based on hardness (mg/l CaCO ₃)*	
		<50	>50
Fluoride (dissolved)	AA	1	5
	MAC	3	15

Table 5 Ambient Background Concentrations (i) for dissolved zinc in freshwaters in England and Wales*	
Catchment/Group of catchments (ii)	ABC (µg/l)
Tyne	4.8
Tees	4.1
Ouse, Humber	2.9
Nene	4.0
Great Ouse	3.1
River Stour	3.0
Blackwater/Chelmer	3.6
Lee	3.3
Thames	2.0
Test	2.0
Avon/Hants	3.1
Exe	1.4
Dart	1.7
Clywd/Conwy	2.0
Dee	2.9
Eden	1.2
Anglesey	3.0
Tamar	2.9
Fal	5.8
Camel	7.1
Tone/Parrett	3.3
Frome, Bristol Avon	2.3
Wye	2.0
Usk	2.2
Taff	2.8
Neath	2.8
Loughar	3.9
Tywi	2.0
Teifi	2.5
Rheidol/Ystwyth	4.1
Dovey	3.2
Glaslyn	2.6
All other freshwaters not listed above	1.4

(i) Ambient Background Concentration is an estimate of background concentration based on a low percentile of monitoring data. Ambient Background Concentration ABC is the environmental concentration expected where no (or only minor) anthropogenic inputs are present. (ii) Freshwater Ambient Background Concentrations in England and Wales are delineated by Hydrometric Area, details of which can be found on the website of the Centre for Ecology & Hydrology.



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Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



PDVH7-IXAAO-RPEOS

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in **pale yellow**.

Job name

P10680 - Bigdale Drive, Kirkby

Description/Comments

Project

P10680

Site

Bigdale Drive, Kirkby

Classified by

Name: **George Salloway**
 Date: **01 Oct 2024 07:45 GMT**
 Telephone: **01283 551 249**
 Company: **GRM Development Solutions Ltd**
Laurus House
First Avenue
Burton on Trent
DE14 2WH

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

CERTIFIED

Course

Hazardous Waste Classification
 Most recent 3 year Refresher

Date

06 Dec 2018
 03 Dec 2024 *

Next 3 year Refresher due by Dec 2024
 * training course booked

Purpose of classification

2 - Material Characterisation

Address of the waste

Bigdale Drive, Kirkby Liverpool

Post Code N/A

SIC for the process giving rise to the waste

41202 Construction of domestic buildings

Description of industry/producer giving rise to the waste

construction.

Description of the specific process, sub-process and/or activity that created the waste

Foundation arisings generated during construction.

Description of the waste

Made ground



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.40	Non Hazardous		3
2	WS02	0.30	Non Hazardous		5
3	WS03	0.20	Non Hazardous		7
4	WS04	0.30	Non Hazardous		9
5	WS05	0.30	Non Hazardous		11

Related documents

#	Name	Description
1	GRM Validation Suite - WM3 V1.2.GB	waste stream template used to create this Job

Report

Created by: George Salloway

Created date: 01 Oct 2024 07:45 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	13
Appendix B: Rationale for selection of metal species	14
Appendix C: Version	15

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:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.40 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
15%	
(dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
1		arsenic { arsenic trioxide }			1	410 mg/kg	1.32	470.725 mg/kg	0.0471 %	✓	
		033-003-00-0	215-481-4	1327-53-3							
2		cadmium { cadmium sulfide }			1	1 mg/kg	1.285	1.118 mg/kg	0.000087 %	✓	
		048-010-00-4	215-147-8	1306-23-6							
3		chromium { chromium(III) oxide (worst case) }				32 mg/kg	1.462	40.669 mg/kg	0.00407 %	✓	
			215-160-9	1308-38-9							
4		copper { dicopper oxide; copper (I) oxide }				100 mg/kg	1.126	97.903 mg/kg	0.00979 %	✓	
		029-002-00-X	215-270-7	1317-39-1							
5		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	220 mg/kg		191.304 mg/kg	0.0191 %	✓	
		082-001-00-6									
6		mercury { mercury dichloride }				<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<LOD
		080-010-00-X	231-299-8	7487-94-7							
7		nickel { nickel dihydroxide }				24 mg/kg	1.579	32.963 mg/kg	0.0033 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<LOD
		034-002-00-8									
9		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				150 mg/kg	4.398	573.643 mg/kg	0.0574 %	✓	
		030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
10		phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
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 }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
		006-007-00-5									
12		pH				8.5 pH		8.5 pH	8.5 pH		
				PH							
13		acenaphthene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
			201-469-6	83-32-9							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
15	anthracene	204-371-1	120-12-7		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
16	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.52 mg/kg		0.452 mg/kg	0.0000452 %	✓	
17	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.55 mg/kg		0.478 mg/kg	0.0000478 %	✓	
18	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.66 mg/kg		0.574 mg/kg	0.0000574 %	✓	
19	benzo[ghi]perylene	205-883-8	191-24-2		0.39 mg/kg		0.339 mg/kg	0.0000339 %	✓	
20	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.24 mg/kg		0.209 mg/kg	0.0000209 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	0.59 mg/kg		0.513 mg/kg	0.0000513 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
23	fluoranthene	205-912-4	206-44-0		1 mg/kg		0.87 mg/kg	0.000087 %	✓	
24	fluorene	201-695-5	86-73-7		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.33 mg/kg		0.287 mg/kg	0.0000287 %	✓	
26	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
27	phenanthrene	201-581-5	85-01-8		0.62 mg/kg		0.539 mg/kg	0.0000539 %	✓	
28	pyrene	204-927-3	129-00-0		0.95 mg/kg		0.826 mg/kg	0.0000826 %	✓	
29	TPH (C6 to C40) petroleum group		TPH		100 mg/kg		86.957 mg/kg	0.0087 %	✓	
Total:								0.152 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: No free phase product present.

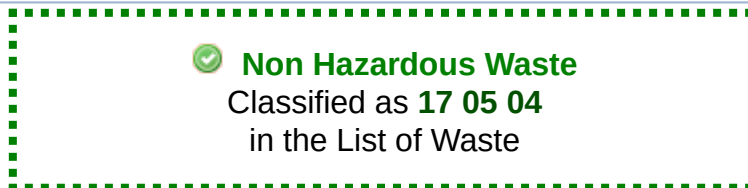
Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0087%)

Classification of sample: WS02



Sample details

Sample name:	LoW Code:
WS02	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.30 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
20%	
(dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 20% Dry Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number							
1		arsenic { arsenic trioxide }				15 mg/kg	1.32	16.504 mg/kg	0.00165 %	✓	
		033-003-00-0	215-481-4	1327-53-3							
2		cadmium { cadmium sulfide }			1	0.7 mg/kg	1.285	0.75 mg/kg	0.0000583 %	✓	
		048-010-00-4	215-147-8	1306-23-6							
3		chromium { chromium(III) oxide (worst case) }				23 mg/kg	1.462	28.013 mg/kg	0.0028 %	✓	
			215-160-9	1308-38-9							
4		copper { dicopper oxide; copper (I) oxide }				59 mg/kg	1.126	55.356 mg/kg	0.00554 %	✓	
		029-002-00-X	215-270-7	1317-39-1							
5		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	59 mg/kg		49.167 mg/kg	0.00492 %	✓	
		082-001-00-6									
6		mercury { mercury dichloride }				<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<LOD
		080-010-00-X	231-299-8	7487-94-7							
7		nickel { nickel dihydroxide }				28 mg/kg	1.579	36.855 mg/kg	0.00369 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %		<LOD
		034-002-00-8									
9		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				98 mg/kg	4.398	359.164 mg/kg	0.0359 %	✓	
		030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
10		phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2							
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 }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
		006-007-00-5									
12		pH				9.9 pH		9.9 pH	9.9 pH		
				PH							
13		acenaphthene				0.05 mg/kg		0.0417 mg/kg	0.00000417 %	✓	
			201-469-6	83-32-9							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		0.31 mg/kg		0.258 mg/kg	0.0000258 %	✓	
15	anthracene	204-371-1	120-12-7		0.36 mg/kg		0.3 mg/kg	0.00003 %	✓	
16	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	1.7 mg/kg		1.417 mg/kg	0.000142 %	✓	
17	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	2.1 mg/kg		1.75 mg/kg	0.000175 %	✓	
18	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	2.3 mg/kg		1.917 mg/kg	0.000192 %	✓	
19	benzo[ghi]perylene	205-883-8	191-24-2		1.3 mg/kg		1.083 mg/kg	0.000108 %	✓	
20	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.87 mg/kg		0.725 mg/kg	0.0000725 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	1.6 mg/kg		1.333 mg/kg	0.000133 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.26 mg/kg		0.217 mg/kg	0.0000217 %	✓	
23	fluoranthene	205-912-4	206-44-0		2.8 mg/kg		2.333 mg/kg	0.000233 %	✓	
24	fluorene	201-695-5	86-73-7		0.04 mg/kg		0.0333 mg/kg	0.00000333 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		1.3 mg/kg		1.083 mg/kg	0.000108 %	✓	
26	naphthalene	601-052-00-2	202-049-5	91-20-3	0.04 mg/kg		0.0333 mg/kg	0.00000333 %	✓	
27	phenanthrene	201-581-5	85-01-8		0.48 mg/kg		0.4 mg/kg	0.00004 %	✓	
28	pyrene	204-927-3	129-00-0		2.5 mg/kg		2.083 mg/kg	0.000208 %	✓	
29	TPH (C6 to C40) petroleum group		TPH		15 mg/kg		12.5 mg/kg	0.00125 %	✓	
Total:								0.0591 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: No free phase product present.

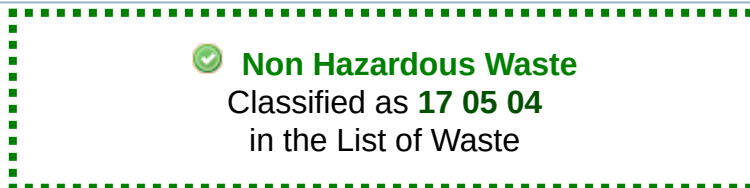
Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00125%)

Classification of sample: WS03



Sample details

Sample name:	LoW Code:
WS03	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.20 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
12%	
(dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used		
		EU CLP index number	EC Number	CAS Number									
1		arsenic { arsenic trioxide }			1	20	mg/kg	1.32	23.577	mg/kg	0.00236 %	✓	
		033-003-00-0	215-481-4	1327-53-3									
2		cadmium { cadmium sulfide }			1	0.6	mg/kg	1.285	0.689	mg/kg	0.0000536 %	✓	
		048-010-00-4	215-147-8	1306-23-6									
3		chromium { chromium(III) oxide (worst case) }				26	mg/kg	1.462	33.929	mg/kg	0.00339 %	✓	
			215-160-9	1308-38-9									
4		copper { dicopper oxide; copper (I) oxide }				40	mg/kg	1.126	40.21	mg/kg	0.00402 %	✓	
		029-002-00-X	215-270-7	1317-39-1									
5		lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	74	mg/kg		66.071	mg/kg	0.00661 %	✓	
		082-001-00-6											
6		mercury { mercury dichloride }				<2.5	mg/kg	1.353	<3.384	mg/kg	<0.000338 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
7		nickel { nickel dihydroxide }				18	mg/kg	1.579	25.385	mg/kg	0.00254 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<8	mg/kg	1.405	<11.24	mg/kg	<0.00112 %		<LOD
		034-002-00-8											
9		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				76	mg/kg	4.398	298.431	mg/kg	0.0298 %	✓	
		030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
10		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
12		pH				8.8	pH		8.8	pH	8.8 pH		
				PH									
13		acenaphthene				0.81	mg/kg		0.723	mg/kg	0.0000723 %	✓	
			201-469-6	83-32-9									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
15	anthracene	204-371-1	120-12-7		1.1 mg/kg		0.982 mg/kg	0.0000982 %	✓	
16	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	1.8 mg/kg		1.607 mg/kg	0.000161 %	✓	
17	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	1.5 mg/kg		1.339 mg/kg	0.000134 %	✓	
18	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	1.8 mg/kg		1.607 mg/kg	0.000161 %	✓	
19	benzo[ghi]perylene	205-883-8	191-24-2		0.82 mg/kg		0.732 mg/kg	0.0000732 %	✓	
20	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.7 mg/kg		0.625 mg/kg	0.0000625 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	1.9 mg/kg		1.696 mg/kg	0.00017 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
23	fluoranthene	205-912-4	206-44-0		4.7 mg/kg		4.196 mg/kg	0.00042 %	✓	
24	fluorene	201-695-5	86-73-7		0.55 mg/kg		0.491 mg/kg	0.0000491 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.78 mg/kg		0.696 mg/kg	0.0000696 %	✓	
26	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
27	phenanthrene	201-581-5	85-01-8		4.9 mg/kg		4.375 mg/kg	0.000438 %	✓	
28	pyrene	204-927-3	129-00-0		4 mg/kg		3.571 mg/kg	0.000357 %	✓	
29	TPH (C6 to C40) petroleum group		TPH		120 mg/kg		107.143 mg/kg	0.0107 %	✓	
Total:								0.0636 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: No free phase product present.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0107%)

Classification of sample: WS04

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

Sample details

Sample name:	LoW Code:
WS04	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.30 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
20%	
(dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 20% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				21	mg/kg	1.32	23.106	mg/kg	0.00231 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium sulfide }			1	1	mg/kg	1.285	1.071	mg/kg	0.0000833 %	✓	
	048-010-00-4	215-147-8	1306-23-6									
3	chromium { chromium(III) oxide (worst case) }				19	mg/kg	1.462	23.141	mg/kg	0.00231 %	✓	
		215-160-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				44	mg/kg	1.126	41.283	mg/kg	0.00413 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
5	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	600	mg/kg		500	mg/kg	0.05 %	✓	
	082-001-00-6											
6	mercury { mercury dichloride }				<2.5	mg/kg	1.353	<3.384	mg/kg	<0.000338 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel dihydroxide }				16	mg/kg	1.579	21.06	mg/kg	0.00211 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<8	mg/kg	1.405	<11.24	mg/kg	<0.00112 %		<LOD
	034-002-00-8											
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				410	mg/kg	4.398	1502.625	mg/kg	0.15 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
10	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
11	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric cyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
12	pH				9	pH		9	pH	9pH		
			PH									
13	acenaphthene				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
		201-469-6	83-32-9									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		0.06 mg/kg		0.05 mg/kg	0.000005 %	✓	
15	anthracene	204-371-1	120-12-7		0.29 mg/kg		0.242 mg/kg	0.0000242 %	✓	
16	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.64 mg/kg		0.533 mg/kg	0.0000533 %	✓	
17	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.35 mg/kg		0.292 mg/kg	0.0000292 %	✓	
18	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.7 mg/kg		0.583 mg/kg	0.0000583 %	✓	
19	benzo[ghi]perylene	205-883-8	191-24-2		0.29 mg/kg		0.242 mg/kg	0.0000242 %	✓	
20	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.2 mg/kg		0.167 mg/kg	0.0000167 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	0.79 mg/kg		0.658 mg/kg	0.0000658 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.07 mg/kg		0.0583 mg/kg	0.00000583 %	✓	
23	fluoranthene	205-912-4	206-44-0		1.8 mg/kg		1.5 mg/kg	0.00015 %	✓	
24	fluorene	201-695-5	86-73-7		0.11 mg/kg		0.0917 mg/kg	0.00000917 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.24 mg/kg		0.2 mg/kg	0.00002 %	✓	
26	naphthalene	601-052-00-2	202-049-5	91-20-3	0.04 mg/kg		0.0333 mg/kg	0.00000333 %	✓	
27	phenanthrene	201-581-5	85-01-8		0.65 mg/kg		0.542 mg/kg	0.0000542 %	✓	
28	pyrene	204-927-3	129-00-0		1.5 mg/kg		1.25 mg/kg	0.000125 %	✓	
29	TPH (C6 to C40) petroleum group		TPH		300 mg/kg		250 mg/kg	0.025 %	✓	
Total:								0.239 %		

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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: No free phase product present.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.025%)

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:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.30 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 Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				17	mg/kg	1.32	22.446	mg/kg	0.00224 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium sulfide }			1	0.3	mg/kg	1.285	0.386	mg/kg	0.00003 %	✓	
	048-010-00-4	215-147-8	1306-23-6									
3	chromium { chromium(III) oxide (worst case) }				24	mg/kg	1.462	35.077	mg/kg	0.00351 %	✓	
		215-160-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				27	mg/kg	1.126	30.399	mg/kg	0.00304 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
5	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	48	mg/kg		48	mg/kg	0.0048 %	✓	
	082-001-00-6											
6	mercury { mercury dichloride }				<2.5	mg/kg	1.353	<3.384	mg/kg	<0.000338 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
7	nickel { nickel dihydroxide }				16	mg/kg	1.579	25.272	mg/kg	0.00253 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<8	mg/kg	1.405	<11.24	mg/kg	<0.00112 %		<LOD
	034-002-00-8											
9	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				79	mg/kg	4.398	347.436	mg/kg	0.0347 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
10	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
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 }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
	006-007-00-5											
12	pH				9.1	pH		9.1	pH	9.1 pH		
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									

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	anthracene	204-371-1	120-12-7		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
16	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.27 mg/kg		0.27 mg/kg	0.000027 %	✓	
17	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.31 mg/kg		0.31 mg/kg	0.000031 %	✓	
18	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.36 mg/kg		0.36 mg/kg	0.000036 %	✓	
19	benzo[ghi]perylene	205-883-8	191-24-2		0.25 mg/kg		0.25 mg/kg	0.000025 %	✓	
20	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
21	chrysene	601-048-00-0	205-923-4	218-01-9	0.28 mg/kg		0.28 mg/kg	0.000028 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
23	fluoranthene	205-912-4	206-44-0		0.41 mg/kg		0.41 mg/kg	0.000041 %	✓	
24	fluorene	201-695-5	86-73-7		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
26	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
27	phenanthrene	201-581-5	85-01-8		0.2 mg/kg		0.2 mg/kg	0.00002 %	✓	
28	pyrene	204-927-3	129-00-0		0.4 mg/kg		0.4 mg/kg	0.00004 %	✓	
29	TPH (C6 to C40) petroleum group		TPH		520 mg/kg		520 mg/kg	0.052 %	✓	
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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: No free phase product present.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.052%)

Appendix A: Classifier defined and non GB MCL 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**

GB MCL index number: 082-001-00-6

Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2

Additional Hazard Statement(s): Carc. 2; H351

Reason for additional Hazards Statement(s):

20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. 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**

GB MCL index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - 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 above the laboratory limit of detection.

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

No hexavalent chromium recorded above the laboratory limit of detection.

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 sulposelenide 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 above the laboratory limit of detection.

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 v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2024.271.6257.11459 (29 Sep 2024)

HazWasteOnline Database: 2024.271.6257.11459 (29 Sep 2024)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021

GB MCL List v2.0 - version 2.0 of 20th October 2023

GB MCL List v3.0 - version 3.0 of 11th January 2024

GB MCL List v4.0 - version 4.0 of 2nd March 2024

GB MCL List v5.0 - version 5.0 of 26th June 2024



A P P E N D I X L

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

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Legend

Site Boundary

Exploratory Holes

Window Sample Borehole

Exceedance of arsenic

Exceedance of lead

Occurrence of amosite

Extent of made ground



NOTES:

CLIENT: ALAN JOHNSTON PARTNERSHIP on behalf of LIVV HOUSING GROUP

PROJECT: Bigdale Drive, Kirkby

TITLE: Post GI Hazard Plan

PROJECT No:
P10680

DATE:
September 2024

DESIGN/DRAWN:
RJH

DRAWING NUMBER:
004

ISSUE:
A

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